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SUPPORT DHC

D5.1

Report on capacity building courses for DHC operators and related stakeholders

December 2025

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Executive Summary

The SUPPORT DHC project aims to promote the fast implementation of low-grade renewable energy (RE) and waste heat (WH) for district heating and cooling (DHC) by supporting DHC operators in 10 frontrunner cases and 27 follower cases. D5.1 reports on the capacity building programme developed and implemented within WP5. It presents the design, organisation and outcomes of training courses, events and engagement activities tailored to DHC operators and related stakeholders across the target countries. The deliverable describes how needs were identified, how contents and methods were co-designed with associations and operators, and how many participants, well above the expected targets of 400, were involved through interactive sessions, courses and networking tools. Moreover, it describes the materials produced (templates, guidelines, training modules), the feedback mechanisms adopted, and the initial results achieved in terms of skills development, awareness and cooperation.

According to the achieved outcomes, the activities under tasks 5.1 and 5.2 effectively contributed to achieving the project objectives by strengthening the capacity of DHC operators, authorities and relevant stakeholders to plan and implement decarbonisation measures for DHC.

The courses delivered (task 5.1) provided operators with competences in transformation planning, investment planning, integration of low-grade RES and waste heat, low-temperature solutions. Training also addressed regulatory and permitting challenges, helping participants identify obstacles and potential solutions. Representatives from frontrunner and follower cases were engaged effectively.

Events (task 5.2) complemented this by training local and regional authorities, waste heat providers and other stakeholders on heat-planning responsibilities, regulatory frameworks, business models and coordination mechanisms required for DHC transformation.

POLIMI developed the methodological framework and the pilot program, which was subsequently adapted and implemented in each target country in the national language. Globally, at consortium level, 17 courses and 12 events were realized, reaching 1384 presences (i.e. sum of all the participants in all the courses and events, including speakers and moderators), with an average of about 48 people involved in each event/course.

1 Introduction

WP5 "Capacity building and framework improvement" of the SUPPORT DHC project is designed to strengthen the technical and strategic skills of district heating and cooling (DHC) operators and related stakeholders in the six target countries (Austria, Germany, Italy, Lithuania, Poland and Ukraine). Its overall purpose is to enable a faster uptake of low-grade renewable energy sources (RES) and waste heat (WH) sources towards the decarbonization of the existing DHC systems and the global expansion of the DHC sector. Within WP5, Task 5.1 focuses on capacity building (CB) for DHC operators, while Task 5.2 addresses local and regional authorities and other relevant stakeholders. According to the aim of the project, the CB activities for DHC operators are provided as **courses**, while those for stakeholders as **events**. Both tasks are closely interconnected (in fact, courses for operators were opened also to stakeholders and vice versa, in the most part of target countries) and provide the backbone for Deliverable D5.1, which reports on the development and implementation of the CB programme across the target countries (Figure 1).

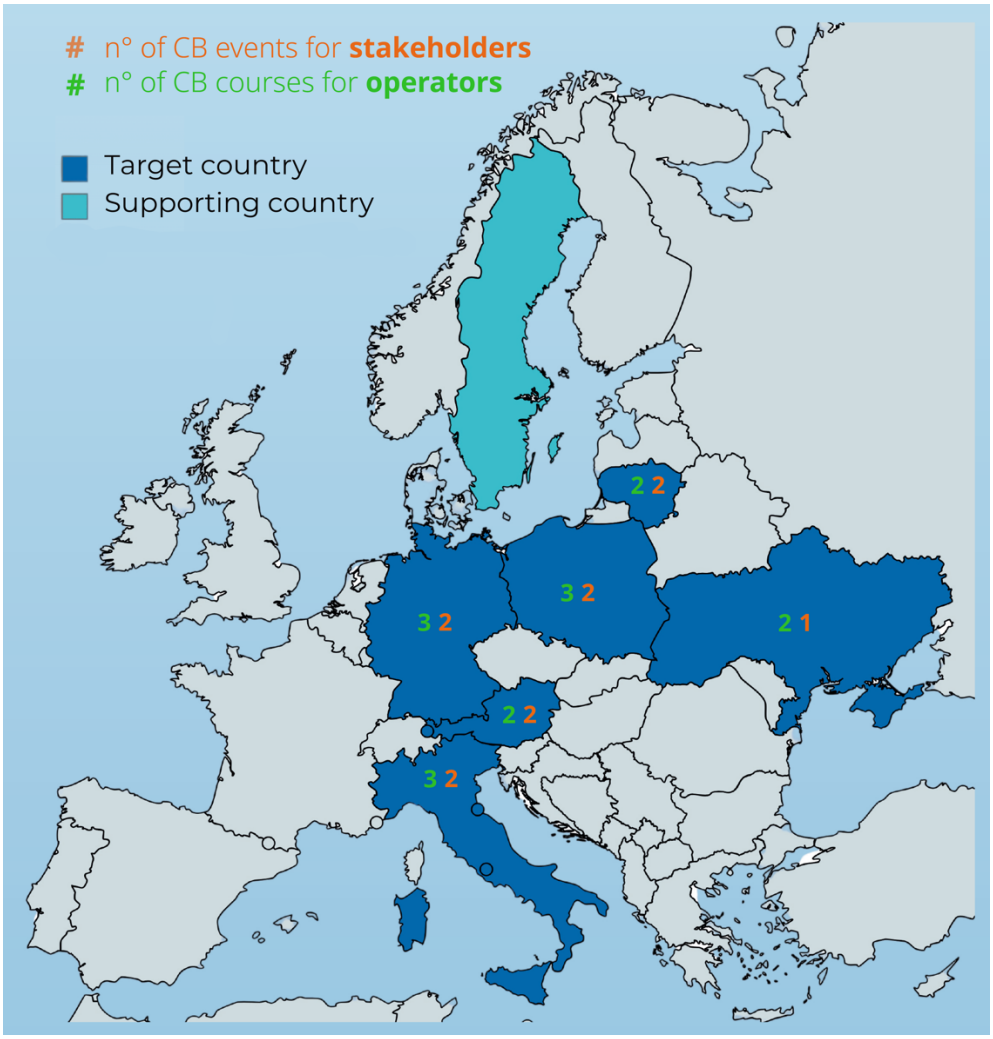

Figure 1. Map of the countries involved in CB task and indication of the expected number of courses (mainly for operators) and events (mainly for stakeholders) to be carried out

Politecnico di Milano (POLIMI), WP 5 leader, oversaw elaborating method, approach, contents and implementation guidelines, piloting the training courses in Italy and coordinating the

implementation in the other partner countries. Based on the Italian pilot experience, and according to the approach defined, the responsible target-country partners (AEE INTEC for Austria, AGFW for Germany, LSTA for Lithuania, PNEC for Poland and LVIV City Institute for Ukraine) adapted and organised courses and events at national level, in the local language and in cooperation with national DHC associations and other key entities. The agreed goals and programme are summarized in Table 1, underlining the expected number of courses/events and participants.

Table 1. Capacity building implementation programme in target countries

Country	Austria	Germany	Italy	Lithuania	Poland	Ukraine
Responsible partner	AEE INTEC	AGFW	POLIMI	LSTA	PNEC	LVIV
Number of courses (T5.1)	**2**	**3**	**3**	**2**	**2**	**2**
Min. audience at each course	9	24	20	9	20	12
Number of events (T5.2)	**2**	**2**	**2**	**2**	**2**	**1**
Min. audience at each event	9	24	20	9	20	12

As shown in Table 1, the total number of people to be involved in the CB activities is 408. As will be described in the following sections, this objective was fully achieved and even exceeded overall (Section 4), both at the consortium level and at the national level. In some cases, the number of participants in individual courses/events was slightly below the indicated threshold, but this was more than compensated for by higher participation in other courses/events.
The main objectives of tasks 5.1 and 5.2 are:

- to investigate existing barriers and needs regarding DHC decarbonization
- to build the capacity of DHC operators, owners and authorities to plan and operate DHC systems able to integrate and exploit available low-grade RES and WH;
- to create a basis to transfer knowledge and lessons learnt from frontrunner cases to follower cases;
- to involve stakeholders in creating conditions towards DHC decarbonization, also providing training contents that reflect national contexts, barriers and needs;
- to create networks able to find out drivers and to provide possible solutions to the investigated barriers;
- to develop replicable templates, materials and methods for future CB initiatives beyond the project.

The training programmes for DHC operators involved in transformation or investment planning were designed to cover the full spectrum of relevant aspects, including planning, permitting procedures, technical solutions, economic assessment and financing. Providing structured opportunities for exchange and knowledge transfer between frontrunners and

followers was also a key enabling factor in supporting the sector's transition, together with fostering adequate awareness among the relevant stakeholders.
To achieve these objectives a four-phase workflow (Figure 2) was defined and implemented: i) preliminary phase (surveying needs and existing training offers), ii) preparation phase (definition of the engagement methods, development of guidelines, reporting templates and course/event outlines), iii) implementation phase (delivery of pilot courses and events in Italy followed by national courses and stakeholder events in the other countries), and iv) reporting phase (collection of data via standardised templates and consolidation into Deliverable D5.1).

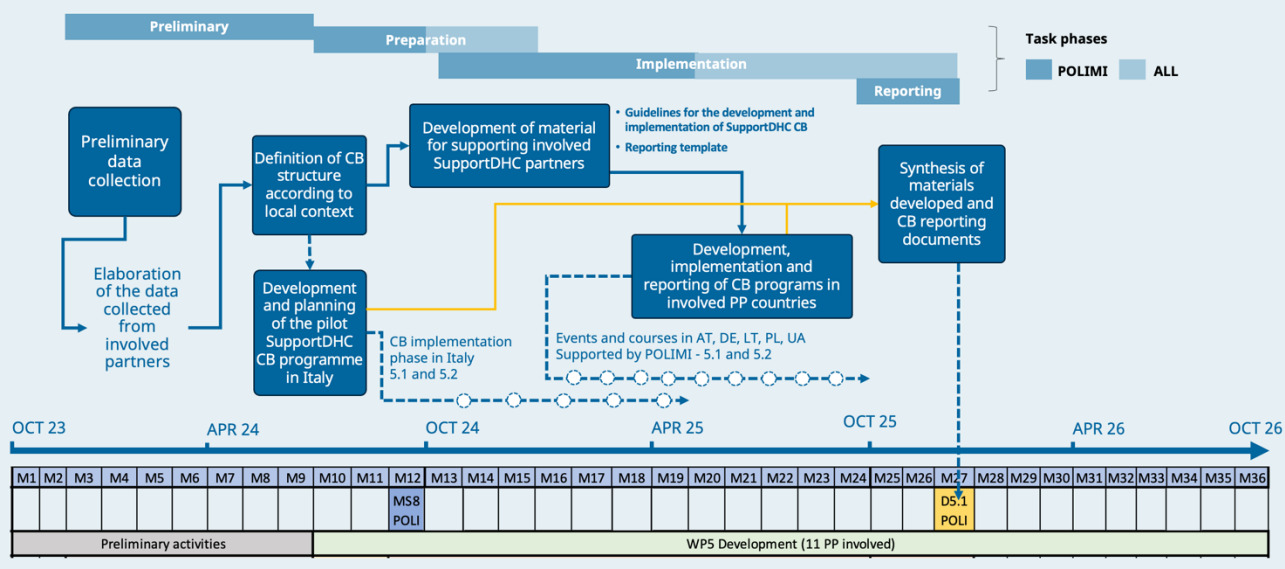

Figure 2. Workplan of WP5

According to the project workflow, and leveraging lessons learnt from the Italian pilot, the implementation phase was completed in December 2025, together with followed by collecting materials and finalising the deliverable.
Key milestones linked to this deliverable included Milestone 8 (organisation of the pilot CB course for operators in Italy and presentation of the CB concept in the target countries, October 2024) and the completion of national CB programmes.

2 Approach and methods

This section presents the systematic methodology adopted to design, implement, and report the CB programs for national DHC operators and related stakeholders to support DHC decarbonization. The approach was conceived to maximise effectiveness at course/event level while, at programme level, establishing a structured, repeatable and adaptable model that partners could apply across diverse national contexts. It explicitly couples early evidence-gathering with direct engagement of frontrunner and follower operators, and the co-creation of training contents with national partners and associations. Structured in four phases (Preliminary, Preparation, Implementation, and Reporting), the approach combines:

- early mapping and surveying of operators and stakeholders to elicit needs and preferences and to build targeted engagement lists;
- modular training design, co-created with national partners and associations, that can be assembled into country-specific pathways;
- a flexible mix of delivery formats (workshops, seminars, roundtables, technical tours, virtual sessions) to match objectives and audiences, according to the local conditions;
- systematic monitoring and evaluation using shared reporting templates to capture participation, to uniform materials used, and to get qualitative feedback.

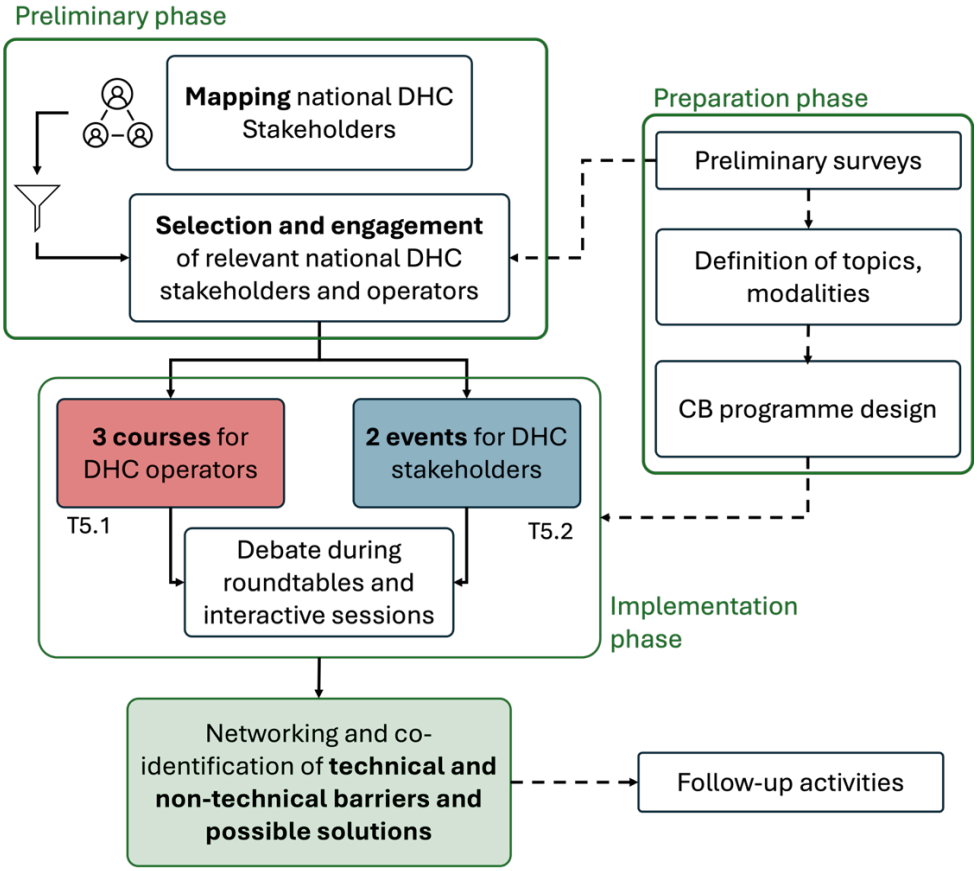

Figure 3. Overall approach workflow. Example applied to the Italian pilot

The scheme developed was firstly tested in Italy (Figure 3).

POLIMI worked in parallel on two tasks: (i) development and implementation of the Italian pilot of the SupportDHC CB programme for DHC operators (T5.1) and stakeholders (T5.2); and (ii) coordination of the CB activities and preparation of common support material for partners, namely the CB programme development, the implementation guidelines and the reporting templates. The Italian pilot served as a test to refine the methodology and consolidate a replicable model for subsequent application in the other target countries.
Main suggestions to set the implementation stage are detailed in Section 2.3. The development and implementation of the CB programmes in each country is provided Section 3 in full detail. Final considerations on the global outcomes, lesson learnt, follow up and further developments are provided in Section 4.

2.1 Preliminary phase

A partner data-collection survey captured the local context of each target country to optimize the CB activities (e.g. existing training materials and providers, priority topics and formats, available case studies). Data collected for each country in the field of DHC based on WH and low-grade RES included:

- map of key stakeholders and operators;
- existing training associations;
- existing capacity-building courses;
- preliminary view of topics to be covered and preferred course/event formats;
- availability of case studies to be used.

The partner surveys provided a concise picture of country needs and priorities used to refine the Italian pilot and shape country-specific CB plans and timelines. Main first indications were:

- **Austria:** biomass-based DH appeared as the main driver (LOS, expertise, past events); regions, energy agencies were key stakeholders; network extension and DHC decarbonisation in large systems were priority topics.

- **Germany:** this case is particular because, as will be clarified in the dedicated section, a systematic and well-established CB programme was already in place, with courses and events scheduled even before the Italian pilot. This situation enabled synergies with the project and facilitated valuable exchanges of contributions. Adaptation to the structure of the national funding scheme BEW emerged as a need; RES and waste heat were a central driver for stakeholders and topics.

- **Italy:** strong, recent interest in DHC decarbonisation with multiple courses/events; a wide set of stakeholders and topics, in particular regarding European directives and national implementation.

- **Poland:** IGCP Academy acted as a driver; municipalities and regional energy agencies were key stakeholders; links with ENTRAIN Life project and AGFW.

- **Lithuania:** CB activities for DH operators already in place: short weekly online trainings as well as events/seminars organized 2–4 times per year. Interest in: diversification of heat sources, RES and WH, and storage; heat planning and investments; heat price

regulation; sustainable bioCHP and local biomass use; transition to low-temperature DH supply; digitalization and smart metering; improving energy efficiency in buildings; integration into the electricity system, including flexibility and balancing services.

- **Ukraine:** difficult in implementing preliminary stages due to the critical situation at country level; need of a methodology structure and guidelines for the future establishment of CB activities toward the expansion and decarbonization of DHC.

Additional considerations for the target countries were discussed during project meetings and were used to finalise topic selection, delivery formats, and scheduling at national level. These results informed the common materials and the reference timeline shared with partners.

2.2 Preparation phase

This phase translates the preliminary mapping into a concrete, country-ready plan. It comprises three steps detailed below: (i) identification and engagement of target DHC operators and stakeholders (2.1); (ii) a focused survey and data collection to tailor content, formats, and logistics (2.2); and (iii) development of the CB programme (2.3), with separate tracks for operators and for stakeholders. The following subsections resume the **suggested indications for implementing the CB activities at country level**, according to the Italian pilot.

2.2.1 Identification and engagement of target DHC operators and stakeholders

The first step is to identify the CB programme targets. In this early phase, national DHC associations can serve as contact points for engaging relevant DHC operators and stakeholders.

DHC operators to be engaged should be identified primarily among staff of the frontrunners (FRs) involved in SupportDHC, LOS, and potential follower cases. According to each national context, the invitation can be extended to additional interested DHC operators.

Similarly, the identification of relevant stakeholders should start from the LOS initially collected and the output of task 2.4 on stakeholders-mapping (T2.4). As in T2.4, identified stakeholders can be organised in a contact list (e.g., an Excel file) and classified according to defined categories/fields, to make sure to have involved a representative sample of DHC stakeholders.

2.2.2 Survey and data collection

To maximise the relevance and effectiveness of the CB programme, preliminary online surveys were conducted among both stakeholders and operators.

A sample survey should be developed, which can be tailored to specific targets and distributed among the involved national operators and stakeholders. The aim is to assess their views on:

- main gaps in the national DHC sector;
- key challenges and barriers (technical and non-technical) to DHC decarbonization;
- preferred CB delivery formats (workshops, lectures, technical visits, etc.);
- interest in specific topics;
- availability to attend the CB as audience or invited speakers;
- organisational aspects (location, etc.).

When developing or modifying the survey, the management of responses should be considered, especially for DHC operators, as it may be time-consuming. It is also recommended to keep the survey anonymous for privacy reasons.

2.2.3 Development of the CB programme

The CB format, didactical modalities and tools and related activities should be defined to maximise effectiveness, in line with the objectives stated in the Introduction and the results of the survey and data collection stage. Examples include workshops, technical tours, round tables, virtual tours, and seminars.
The different didactical formats should be surveyed explaining details to guide the selection by the interviewed.
Also, the title, structure, and content of courses for DHC operators and of events for stakeholders should be defined based on survey results (i.e., the needs, gaps, and barriers identified). The level of detail should be adjusted to the actual local progress toward DHC decarbonization and the objectives set for project support activities, exploiting and leveraging the expertise of the international SupportDHC consortium.

2.3 Implementation phase

Once the structure, contents, and formats of the CB activities were defined, the implementation phase began, involving a set of preparatory actions aimed at ensuring an effective stakeholder engagement.
These activities included the identification and invitation of speakers, moderators, and participants, with the objective of ensuring balanced representation across institutional, technical, and territorial dimensions. Particular attention was paid to aligning the initiative with the strategic objectives of national and European decarbonisation policies, and to fostering peer-to-peer exchange and cross-sectoral dialogue among the actors involved.
The implementation phase should take into consideration the following list of activities:

- **Materials**

It is suggested to prepare an archive of reference to materials that can be useful for speakers and to be left to audience. In addition to materials tailored on the local context, Reports from SupportDHC project deliverables, SupportDHC toolkit, etc. could be provided. Other materials to be prepared include organization, dissemination and communication support (e.g. leaflets, digital and social media, badges, hard copies list of presence, certifications of attendance etc.). These materials have to clearly mention the SupportDHC project including the logo and graphics (as coordinated by EHP). In each activity, a short presentation of the main features and aims of the project is provided.

- **Invited speakers**

The definition of the speakers list is to be invited in function of the topics and the audience. Expertise from the SupportDHC consortium can be included, according to the CB topics and language.

- **Logistics**

Concerning CB programme for operators, it may be interesting to organise the courses in or near the frontrunners' sites to facilitate participation and possible technical tour. Preference about location and logistic should be assessed by means of the preliminary survey (Section 2.2.2).
One or more people should be foreseen for facilitating accreditation to the events, distribution of materials, etc. Specific instruments could be needed according to the kind of activities foreseen (whiteboards, large tables, on-line tools to support interactive sessions etc.).

- **Audience engagement**

As official engagement it is suggested to foresee e.g. a *MS Forms*, to be sent with at least 1 month in advance, to collect adhesion, facilitating the development of tailored material for the events and the reporting phase. An effective description of the initiative should be included in the invitation form.
To enhance the success of the initiatives, the engagement should be supported also by direct communications via phone calls, e-mails, social media etc.
Examples of the materials adopted for the CB in Italy are reported in section 3.1, referring to the events for stakeholders.

2.4 Reporting phase

Once the programme design was completed, partners were requested to fill the reporting templates, enabling POLIMI to aggregate results. The reporting template was developed and provided to collect data and results uniformly and to consolidate them into the present deliverable. The template includes a factsheet to be adopted to document all the courses and events in the different countries (section 3). The factsheet is organised to collect:

- General information
- Moderators and speakers
- Agenda
- Further details and results of the satisfaction surveys, where applicable
- Mai outcomes of the CB activities.

3 Results and impact at county level

This section summarises how the SupportDHC CB programmes were developed and implemented across target countries. Results are reported adopting country factsheets, as detailed in the following subsections. Because Italy served as the pilot while the methodology was being designed, its factsheet is intentionally more detailed: it documents the design–test–refine cycle, provides exemplar agendas and materials, and offers a reference timeline subsequently used by partners. For all other countries, the same template captures the essentials—context, engagement approach, programme design, delivery, and results, according to the methodology described above.

The synoptical view of the CB activities performed across the target countries is presented in Figure 4.

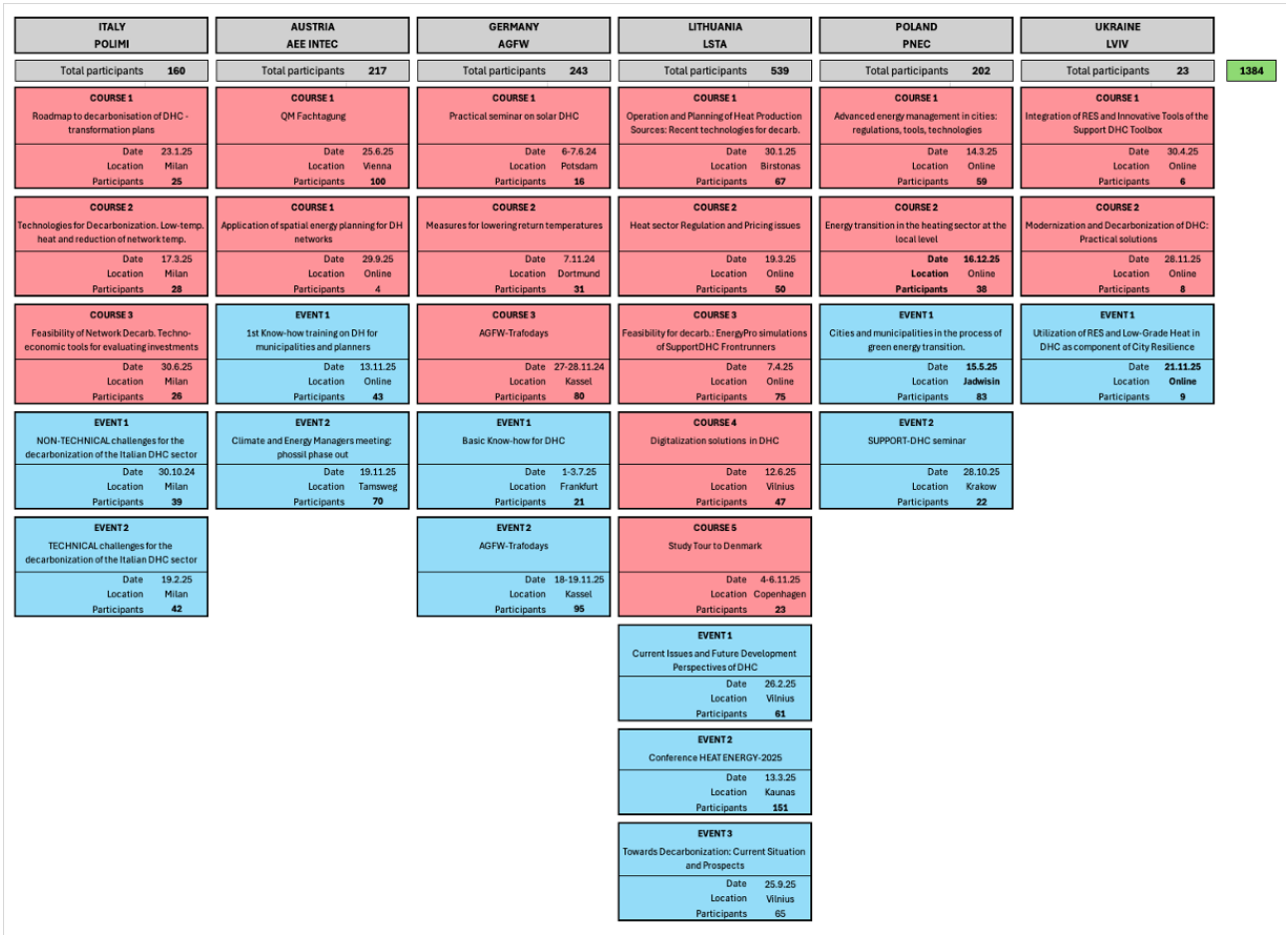

Figure 4. SupportDHC CB activities performed in all the target countries (course designed mainly for operators in light red; events designed mainly for stakeholders in light blue; presences in the grey boxes at country level and in the green box at consortium level)

3.1 Italy

The CB program for the Italian DHC sector was promoted by a successful launch event held at Politecnico di Milano in October 2024 and organized in two one-day in presence events mainly targeted on stakeholders (winter 2024-25) and three one-day in presence courses mainly targeted on operators (spring-summer 2025).
According to the results of the accomplished survey, the **two events** were focused on non-technical and technical barriers and solutions for the decarbonization of the Italian DHC sector, respectively.
Analogously, the **three courses** were focused on providing awareness, competences, tools and other techno-economic support for a set of Italian DHC operators, enhancing also pear to pear exchanges and networking at national and international level.

The elaboration of the topics to be faced and of the agenda of the two events and the three courses was accomplished after the preparatory stages, in which the most relevant stakeholders and operators were selected and engaged, included the following steps:

- identification and engagement of target DHC stakeholders and operators;
- administration of a survey to collect preferences about timing, topics, logistical aspects and format of the events;
- selection of the participants, invitation and definition of the final list of presenters and attendees;
- preparation of materials (welcome kit, nameplates, name badges; etc.);
- collection and sharing of presentations;
- preparation and administration of the satisfaction questionnaire.

3.1.1 National DHC operators' courses (T5.1)

This report is related to the three DH operators' courses aiming to strengthen technical and operational competences related to the decarbonisation of DHC. The elaboration of the topics and agendas was carried out after a dedicated preparatory stage, which involved the identification and engagement of representative national DHC companies. The selected participants reflected the diversity of the Italian DHC landscape, from large operators to medium-small local utilities, ensuring a balanced exchange of experiences, challenges, and perspectives. Representatives from all the involved **Italian frontrunners and followers** attended the three courses, benefitting from peer-to-peer exchanges and indications for decarbonization plans (elements and tools for techno-economic feasibility).

Table 2. Scheduled courses for operators

Task	Course num.	Title	Where	When
T5.1	*1*	*Roadmap to decarbonisation of DHC - transformation plans*	*Politecnico di Milano*	*23.01.2025*
T5.1	*2*	*Technologies for Decarbonization - Low-temperature heat and reduction of network temperatures*	*Politecnico di Milano*	*17.03.2025*
T5.1	*3*	*Feasibility of Network Decarbonization - Technical and economic tools for evaluating investments*	*Politecnico di Milano*	*30.06.2025*

3.1.1.1 Preparatory actions, supporting material, implementation remarks

The elaboration of the topics to be faced and of the agenda of the courses was accomplished after the preparatory stages in which the DHC operators involved in the project, starting form frontrunners and followers, have been engaged. The survey conducted prior to drafting the courses' plan and distributed with the support of the Italian DH association, clearly revealed a strong interest in the topic of district heating decarbonization. Beyond the need to explore the subject itself and its technological aspects, the DH operators expressed a keen interest in addressing the challenges and critical issues they phase while planning the implementation-especially non-technical ones, such as legislative frameworks and economic/financial sustainability. The preferred format emerged as the **workshop with interaction**.

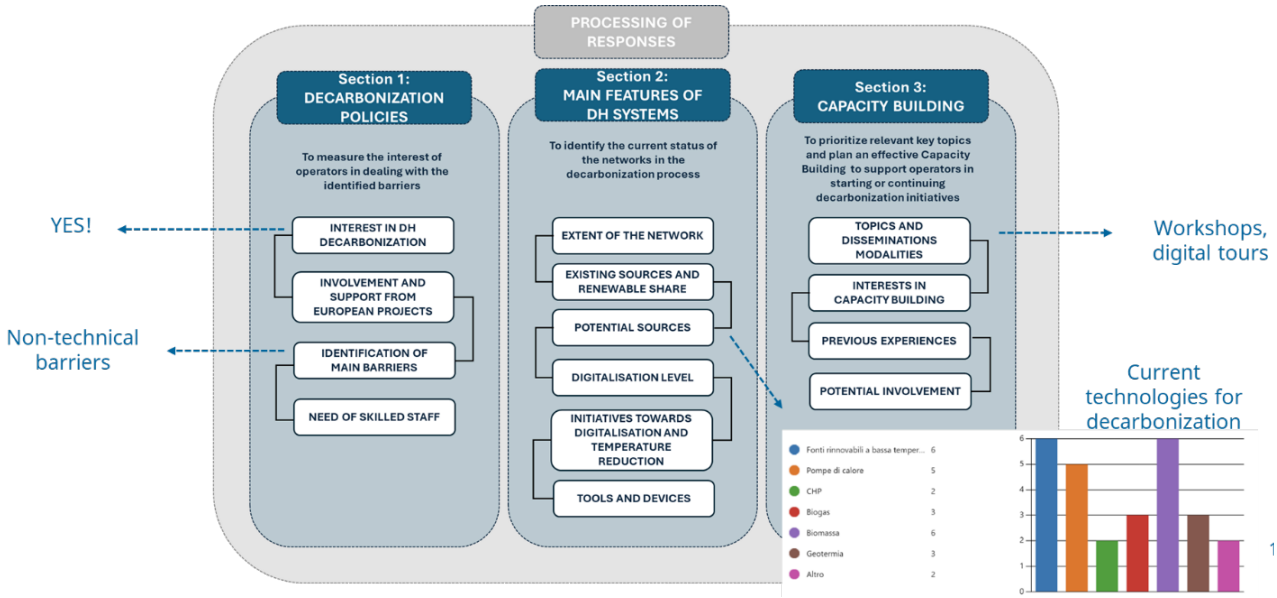

Figure 5. Result of the preliminary survey on CB interest in Italy

Technologies to be treated in CB (HT-HP; storage, waste heat etc.)

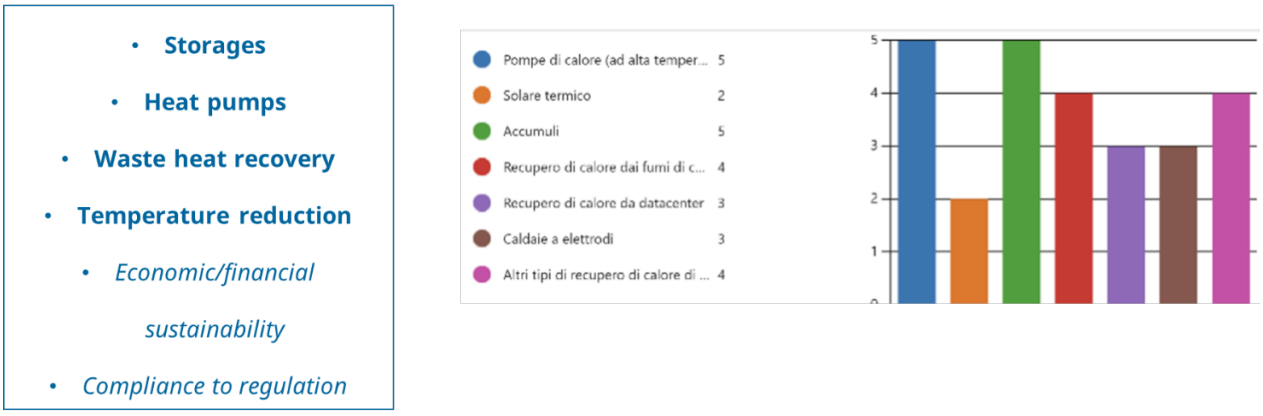

Figure 6. Result of the preliminary survey on CB in Italy – focus on technologies

To best respond to these interests, Polimi has planned the three courses as a series that progressively deepens the topic: starting with a general introduction on decarbonization and transformation plan, followed by a session focused on technologies, and concluding with the economic feasibility and implementation challenges.

To encourage as much exchange and discussion as possible, POLIMI has tried to include in the program presentations coming real project experiences carried out by other operators or consortium partners. **The consortium internal support team was strongly involved (POLIMI, AGFW, Halmstad University, eThink, and PlanEnergi).** Concerning the agenda of the CB courses, the frontal presentations were limited to the mornings, leaving end of the mornings for a Q&A section and the afternoons for fully interactive and participatory activities that fostered peer-to-peer exchange between frontrunners and followers on the topics addressed.

The creation of this working group and discussion table in the afternoons is undoubtedly one of the successes of this project: the operators are often competitors, and therefore rarely have the opportunity to sit around the same table, share their experiences, and compare approaches to decarbonization planning. This activity has been very much appreciated.

Since, in the framework of the Italian CB activities, the first experience was the event 1 for stakeholders, more details about the preparatory stages are reported in section 3.1.2.1.

The factsheets of the three courses, according to the description of section 2.4, are reported as follows.

3.1.1.2 Course 1

- **GENERAL INFORMATION**

Title	Level 1 - Roadmap to decarbonisation of DHC - transformation plans
Date	23rd January 2025
Physical/Virtual	Physical some presenters online
Platform/e-tools used (if virtual)	Teams
Location	Politecnico di Milano - Energy Department - via Lambruschini 4, Milano
Language	Italian and English
Responsible project partner	POLIMI (DENG)
Audience number	25: - 24 in person, including the Polimi teams and presenters - 1 online
Audience typology	☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☒ Universities / Research centres ☒ Operators
Duration	7:45 hours

- **MODERATORS AND SPEAKERS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	A. Dénarié	Host, presenter and moderator
2	P. Caputo	Host, presenter and moderator
3	A. Cecchi	Presenter and discussant
4	U. Persson	Presenter and discussant
5	T. Pauschinger	Presenter and discussant
6	S. Richter	Presenter and discussant

- **AGENDA**

Start	*End*		
9:00	*9:30*	**Welcome and registration**	
9:30	*9:45*	**Description of the SupportDHC project and aim of the event**	A. Dénarié + P. Caputo - POLIMI
9:45	*10:00*	**Round of presentations**	All participants
10:00	*10:30*	**Framework:** **EU directives and implications** EED, RED - Oiert, EPBD, ET2	A. Cecchi - President of AIRU Italian DHA
10:30	*11:00*	**RES and Waste Heat integration in existing DH** Principles, methodologies, and tools	U. Persson - Halmstad University
11:00	*11:30*	**Coffe break**	
11:30	*11:50*	**DH Transformation plans** Framework and methodologies from Germany	T. Paushinger - AGFW
11:50	*12:30*	**Examples of decarbonization plans** Practical lessons learnt German experiences	S. Richter - GEF Ingenieur AG
12:30	*13:00*	**Wrap up and questions**	
13:00	*14:00*	***Lunch break***	
		Workshop - exchange of experiences	
14:00	*14:15*	**Introduction of the workshop**	A. Dénarié + P. Caputo - POLIMI
14:15	*16:15*	**Italian experiences - round of all participants + discussion**	Open discussion on participants' case studies
16:15	*16:45*	**Presentation of following activities + conclusions**	A. Dénarié + P. Caputo - POLIMI

- **DETAILED REPORT**

Level 1 - Roadmap to decarbonisation of DHC - transformation plans	
Description, topics and aims	The main objectives of the course were to: • introduce the concept and framework of transformation roadmaps as instruments to plan and manage the progressive transition of existing DHC systems towards low-carbon configurations; • provide an overview of the European policy context (EED, RED, EPBD, and ET2) and its implications for national DHC strategies; • illustrate methodologies, tools, and best practices for integrating renewable energy and waste heat into existing networks so to be compliant with EED directive; • promote the construction of a working group of Italian DHC operators, aimed at sharing experiences and jointly developing pathways for decarbonisation.

	The morning session introduced the SupportDHC project, the aims of the event, and the European regulatory framework relevant to DHC transformation. Presentations focused on the principles and tools for developing transformation plans and on the integration of RES and waste heat sources into district heating networks. Contributions from the German partner highlighted methodological frameworks and practical lessons learned from ongoing decarbonisation plans in Germany, providing replicable insights for the Italian context. In particular, the involvement of a German engineering and design firm with long-standing experience in transformation planning was especially appreciated by the operators. Their contribution, grounded in real-life case studies and a hands-on approach, offered practical insights that resonated strongly with the participants. In the afternoon, the focus shifted to engaging frontrunners and followers. The early selection of followers was a choice to involve them from the beginning through capacity-building activities. This approach has promoted a meaningful exchange of experiences with frontrunners and allowed followers to immediately observe and benefit from the support given in the project. As a result, a truly collective working group was formed, where the operators had the opportunity to share ideas. The afternoon session was therefore designed as an interactive workshop: participants were invited to present their own company experiences, discuss challenges and opportunities for transformation, and collectively identify priorities and next steps.
Speakers	A.Dénarié (POLIMI), P. Caputo (POLIMI), A. Cecchi (AIRU), U. Persson (Halmstad University), T. Pauschinger (AGFW)
Moderator	A.Dénarié , P. Caputo
Format	Workshop
Main remarks from the session	The course strengthened the operators' ability to translate policy targets and technical opportunities into actionable decarbonisation strategies, paving the way for the preparation of site-specific roadmaps and investment plans. Emerged critical issues: • National implementation of EED pending – no clear rules; • Absence of support schemes and the challenges of decarbonisation. A key concern is that significant investments are required, yet there is no increase in heat sales to generate returns and cover those costs; • Emphasizing the importance of a "backcasting" approach to decarbonisation planning, rather than traditional forecasting. This method starts from the long-term objective—such as full decarbonisation by 2050—and works backward to identify the necessary steps and milestones. In contrast, forecasting typically begins with short-term possibilities and attempts to extrapolate forward, which may overlook the structural changes required to meet long-term goals.

3.1.1.3 Course 2

- **GENERAL INFORMATION**

Title	Level 2 – Technologies for Decarbonization Low-temperature heat and reduction of network temperatures
Date	17th March 2025
Physical/Virtual	Hybrid: Mainly physical and some guests on-line
Platform/e-tools used (if virtual)	Teams
Location	Politecnico di Milano - Energy Department - via Lambruschini 4, Milano
Language	Italian and English
Responsible project partner	POLIMI (DENG)
Audience number	28: - 23 in person, including the Polimi Teams - 5 connected online
Audience typology	☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☒ Universities / Research centres ☒ Operators
Duration	7:45 hours

- **MODERATORS AND SPEAKERS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	A. Dénarié	Host, presenter and moderator
2	P. Caputo	Host, presenter and moderator
3	A. Del Corno (RSE)	Presenter and discussant
4	L. Reinholdt	Presenter and discussant
5	S. Bazzoli	Presenter and discussant
6	H. Gadd	Presenter and discussant
7	A. Schild	Presenter and discussant

- **AGENDA**

Start	*End*		
9:00	*9:30*	**Welcome and registration**	
9:30	*9:40*	**Introduction of the workshop**	A. Dénarié + P. Caputo - POLIMI
9:40	*10:00*	**Mapping Atlas**	A. Dénarié - POLIMI and A. Del Corno - RSE
10:00	*10:40*	**Heat pump tecnologies for High temp DH network**	L. Reinholdt - Planenergi
10:40	*11:20*	**Italian examples of Heat pumps and waste heat recovery**	S. Bazzoli - Energard
11:20	*11:50*	**Coffe break**	
11:50	*12:10*	**Reducing DH network temperatures**	H. Gadd - Halmstad University
12:10	*12:30*	**Examples of Temperature reduction** Practical lessons from a Swedish Utility	A. Schild - Halmstad Energi & Miljö
12:30	*13:00*	**Wrap up and questions**	
13:00	*14:00*	***Lunch break***	
		Workshop - exchange of experiences	
14:00	*14:15*	**Introduction of the workshop**	A. Dénarié + P. Caputo - POLIMI
14:15	*16:15*	**Italian experiences - round of all participants + discussion**	Open discussion on participants' case studies
16:15	*16:45*	**Presentation of following activities + conclusions**	A. Dénarié + P. Caputo - POLIMI

- **DETAILED REPORT**

Level 2 – Technologies for Decarbonization. Low-temperature heat and reduction of network temperatures	
Description, topics and aims	The main objectives of the course were to: • present the principles and technological solutions enabling the integration of low-grade renewable and waste heat sources into existing networks; • provide an overview of heat pump technologies suitable for high- and medium-temperature existing district heating applications; • discuss temperature reduction strategies and their impact on efficiency, flexibility, and integration potential through analysis of real experiences in Sweden; • share Italian best practices and case studies of waste heat recovery and heat pump deployment. The morning session presented the workshop objectives and included a presentation of the new waste heat and DH National Atlas, which illustrates the geographical distribution of heating demand mapping,

	waste heat and renewable energy potential in Italy. This was followed by a series of technical presentations on heat pump technologies for high-temperature district heating networks, supplemented by Italian case studies demonstrating practical applications of heat recovery and integration into existing systems. A specific session has been dedicated to temperature reduction strategies in DH with a presentation from a Swedish DH operator of successful experiences of interaction with users. The afternoon session took the form of the Workshop with an interactive discussion, where participants presented their own experiences and projects related to low-temperature operation and decarbonisation technologies. The session concluded with a synthesis of key lessons learned and an outline of the subsequent activities planned within the SupportDHC capacity-building programme.
Speakers	A.Dénarié (POLIMI), P. Caputo (POLIMI), L. Reinholdt (Planenergi), S. Bazzoli (Energard), H. Gadd (Halmstad University), A.Schild (Halmstad Energi & Miljö)
Moderator	A.Dénarié and P. Caputo (POLIMI)
Format	Workshop
Main remarks from the session	Critical aspect: Difficult to engage building managers to make them understand the importance of low temperature in building Common interest on waste-water treatment plants (WWTPs)for HP installation.

3.1.1.4 Course 3

- **GENERAL INFORMATION**

Title	Level 3 – Feasibility of Network Decarbonization
Date	30th June 2025
Physical/Virtual	Hybrid: Mainly physical and some guests on-line
Platform/e-tools used (if virtual)	Teams
Location	Politecnico di Milano - Eneergy department - via Lambruschini Milano
Language	Italian and English
Responsible project partner	POLIMI (DENG)
Audience number	26: - 24 in person, including the Polimi Teams - 2 connected online
Audience typology	☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☒ Universities / Research centres ☒ Operators
Duration	7:00 hours

- **MODERATORS AND SPEAKERS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	A. Dénarié	Host, presenter and moderator
2	P. Caputo	Host, presenter and moderator
3	M. Hummel	Presenter and discussant
4	S. Mannarino	Presenter and discussant
5	A. Del Corno	Presenter and discussant
6	R. Tomaseting	Presenter and discussant

- **AGENDA**

Start	*End*		
9:00	*9:30*	**welcome and registration**	
9:30	*9:40*	**Introduction of the workshop**	A. Dénarié + P. Caputo - POLIMI
9:40	*10:10*	**Excel-based tool to assess the economics of the integration of (data centre) waste heat into an existing DH system**	M. Hummel - e-think
10:10	*10:50*	**Challenges and Support Tools for District Heating – National Context**	Ing. Mannarino – AIRU
10:50	*11:10*	**Sercast – A simple tool for assessing the economic and financial feasibility of heat recovery in networks**	Ing. Del Corno – RSE
11:10	*11:40*	**Coffe break**	
11:40	*12:20*	**Thermal demand and waste heat mapping – A national atlas for the technical and economic feasibility of waste heat recovery**	POLIMI e RSE
12:20	*13:00*	**Synergies between district heating and wastewater treatment – A case study in the Province of Milan**	CAP water company
13:00	*14:00*	***Lunch***	
14:00	*16:00*	**Discussion on preliminary results of frontrunners analysis**	Dedicated session for frontrunners

- **DETAILED REPORT**

Level 3 – Feasibility of Network Decarbonization	
Description, topics and aims	The main objectives of the course were to: • introduce quantitative methods and practical tools for assessing the economic performance of decarbonisation measures; • demonstrate how to evaluate the integration of waste and renewable heat sources into existing DHC systems from both technical and financial perspectives; • present national and European economic support instruments relevant to DHC investment planning; • discuss key challenges in feasibility analysis, data availability, and uncertainty management. The morning session included technical presentations and tool demonstrations, beginning with an Excel-based tool for assessing the economic viability of integrating waste heat (e.g., from data centres) into existing networks developed by e-think in this project. This was followed by an overview of the national policy framework and support

	mechanisms for DHC transformation, and by a presentation of Sercast, a simplified tool from RSE for evaluating the financial feasibility of heat recovery projects. Further contributions explored thermal demand and waste heat mapping using a national atlas. Since in the project there's a specific and common interest shared among frontrunners and followers to HP application in waste-water treatment plant, a waste-water company with a successful experience on potential synergies between district heating and wastewater treatment systems through a real case study from the Province of Milan. The afternoon session was devoted to a discussion on the preliminary results of the frontrunners analysis.
Speakers	A.Dénarié (POLIMI), P. Caputo (POLIMI), M.Hummel (e-think), S.Mannarino (AIRU), A.Del Corno (RSE), R.Tomseting (gruppo CAP)
Moderator	A.Dénarié and P. Caputo (POLIMI)
Format	Workshop
Main remarks from the session	The persistence of incentives for the CHP plants based on natural gas and the ongoing tax reductions on gas consumption continue to distort the economic competitiveness of renewable-based solutions. In parallel, the current taxation scheme on negatively affects the economic feasibility of large-scale heat pumps. This creates an uneven playing field between fossil-based and electrified heat production technologies, discouraging investments in innovative solutions such as hybrid systems or fully renewable configurations. Operators also highlighted that, in the absence of targeted incentives or support mechanisms dedicated to district heating based on renewable energy or waste heat, even technically feasible projects often fail to achieve financial sustainability. Consequently, there is a clear need to review the tax and incentive framework to align it with the EU's decarbonisation targets and enable more balanced competition between different technologies.

- **SATISFACTION SURVEY RESULTS**

At the end of each capacity-building course, participants were invited to complete an **online satisfaction questionnaire** aimed at collecting feedback on the quality, organisation, and relevance of the initiative. The survey was structured to evaluate both the overall perception of the events and specific aspects such as content interest, delivery format, and organisational arrangements.

The feedback received was highly positive and confirmed the strong engagement of participants. Respondents particularly appreciated the clarity and technical depth of the presentations, the balance between theoretical and practical contributions, and the opportunities for direct exchange among operators and experts. Organisation and logistics also received favourable comments, with participants highlighting the quality of the venues and the overall management of the events.

Quantitative results further confirm this positive feedback, with average scores (on a 1–5 scale, where 5 corresponds to the highest satisfaction) as follows:

- Overall satisfaction with the event: 4.75;
- Interest in the topics addressed: 4.75;
- Format and delivery method: 4.63;
- Organisation and logistics – venue: 4.63;
- Organisation and logistics – catering: 4.63.

3.1.1.5 Output and materials

The CB courses for DH operators have represented a good opportunity for peer-to- peer exchange and for building a working group on decarbonisation challenges. Overall satisfaction has been good, and the participation has been kept constant in terms of number of participants.

The main outputs of the courses were:

- leaflets;
- results of the interactive sessions;
- results of the surveys of satisfaction;
- presentations;
- pictures;
- list of participants.

Leaflets, presentations and results of the interactive sessions were shared with the participants.



Figure 7. Picture of one course in POLIMI

3.1.2 National DHC stakeholders' events (T5.2)

The elaboration of the topics to be faced and of the agenda of the events was accomplished after the preparatory stages in which the most relevant stakeholders were selected and engaged. According to the survey, the contributions were organised to provide a complete panorama of the main technical and non-technical barriers and to stimulate a constructive discussion to find-out possible solutions. The entities involved include, in addition to the project partners, associations of DH, regional and local PAs, the national Authority, national institutions of research, engineering companies and, to create a connection also with the "world" of operators, representatives of the DH companies of the two Italian frontrunners.

Table 3. Scheduled courses for operators

Task	Event num.	Title	Where	When
T5.2	*1*	*NON-TECHNICAL challenges for the decarbonization of the Italian DHC sector*	*Politecnico di Milano*	*30.10.24*
T5.2	*2*	*TECHNICAL challenges for the decarbonization of the Italian DHC sector*	*Politecnico di Milano*	*19.02.25*

3.1.2.1 Preparatory actions, supporting material, implementation remarks

The key-stakeholder of the DHC were selected based on the expertise on the scholars involved and according to the opinions of the Italian DHC associations. A wide and relevant representative sample of key stakeholders was identified and categorized in five groups: energy agencies; industry associations; local entities; regional entities; technical companies.

The feedback revealed strong interest in both non-technical topics, such as the regulatory framework, RES targets, and support mechanisms, and technical aspects, including network temperature management, peak demand strategies, and broader technological innovation. Regarding preferred learning formats, respondents favoured a combination of seminars and technical roundtables. As for scheduling, the majority expressed a clear preference for two one-day, in-person events.

The contributions (invited speakers, debate topics, etc.) were organised to provide a complete panorama of the main technical and non-technical barriers and to stimulate a constructive discussion to find-out possible solutions, not only at the end of the event but also between the two scheduled events by a follow-up on-line section devoted to finalise the *manifesto* of each event.

Preparation also included the development of practical materials, to be shared with partners to enable consistent replication: checklists for stakeholder/operator identification, contact-list structures, survey templates, agenda formats, slide decks and speaker briefs, and monitoring/evaluation forms aligned with the reporting templates. It also includes short implementation notes (e.g., sequencing, logistics, and follow-up) distilled from the Italian pilot and reused, where relevant, in the other national programmes.

In the following list it is reported the list of activities that has been carried out for the preparation and implementation:

- Stakeholder mapping and engagement of frontrunner/follower DHC operators and related actors;
- Survey design, deployment, and analysis to elicit needs on timing, topics, logistics, and formats;
- Participant & speaker management: contact lists, invitations, coordination, and confirmation of availability;
- Programme design: modular, country-specific agendas; consolidation of session objectives and delivery formats;
- Registration & communications: online registration (Microsoft Forms), event info pages, and promotional assets;
- Content management: collection and archiving of speakers' presentations for post-event dissemination;
- Interactive facilitation: design and testing of live polling/feedback (e.g. *Mentimeter*) to tailor discussions;
- On-site delivery logistics: audience/speaker packs (welcome kits, badges/nameplates) and venue signage;
- Monitoring & reporting: standardized event report template, participation tracking, and satisfaction survey;
- Follow-up outputs: attendance certificates and drafting of a shared stakeholder *manifesto*.

According to the list reported above, the following supporting materials were used during the event implementation (some examples are provided in the figures below):

- Survey summary informing CB program design;
- Registration & attendance tools: online form and attendance sheet;
- Event programme materials: agenda, participant/presenter lists, welcome kit;
- Speaker contents repository: presentation archive for internal use and dissemination;
- Communications assets: event poster and related promotional materials;
- Venue information: event signage;
- Evaluation instruments: post-event satisfaction questionnaire;
- Follow-up deliverables: *manifesto* for conclusions/next steps; attendance certificates.



Figure 8. Example of leaflet (first event in Italy)

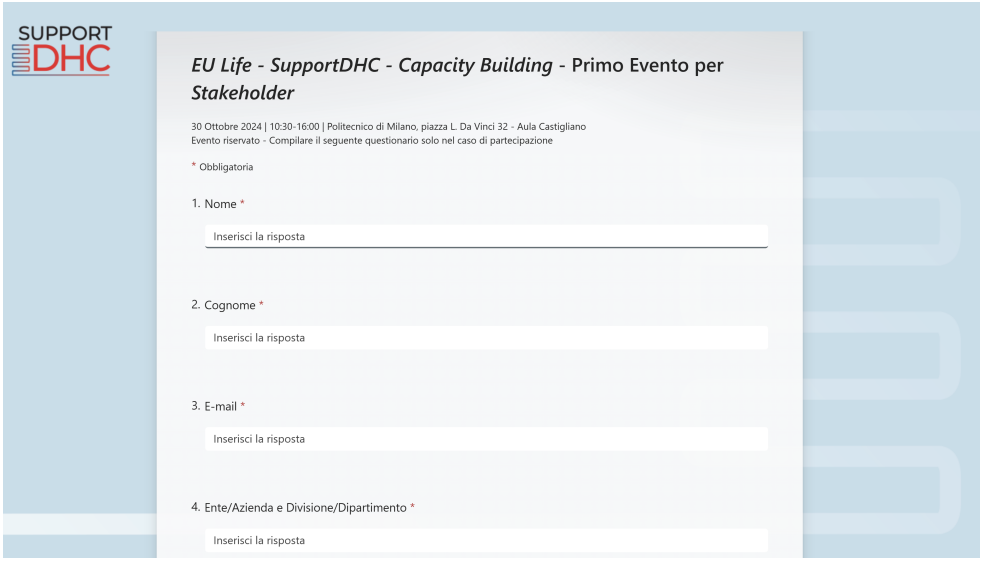

Figure 9. Example of the MS forms for collecting registrations to CB activities (first event in Italy)



Figure 10. Template of the certificate of participation

According to the results of the preparation stage, for both the events the morning session was conducted with the approach of a **seminar**, while the afternoon session with **interactive activities including round tables and debates** to detect and discuss barriers and possible solutions for the decarbonization of DHC. The events reach a relevant and various attendance by associations of DHC, regional and local Public Administrations (PAs), national Authority, national institutions of research, engineering companies and representatives of some key DHC operators, revealing the success of the initiatives and ended with the co-construction of a ***manifesto*** and the proposal of **follow-up activities** with a structured dialogue and technical table. Post-event stages included: i) the satisfaction survey to collect feedback about the event from participants; ii) the reporting of the details and outcomes; iii) the consolidation of the *manifesto* (revised and signed by the involved stakeholders).

3.1.2.2 Event 1

- **GENERAL INFORMATION**

Title	Decarbonization of the Italian DHC sector: focus on the non-technical challenges
Date	30th October 2024
Physical/Virtual	Hybrid: Mainly physical, 3 guests on-line
Platform/e-tools used (if virtual)	Teams
Location	Politecnico di Milano, Aula Castigliano, Milan (IT)
Language	Italian (1 on-line presentation and related Q&A in English)
Responsible project partner	POLIMI (DABC)
Audience number	39: - 35 in person, including the Polimi Team - 1 in person as the Head of the DABC to welcome the audience - 1 on-line as a project partner (AGFW) 2 online as representative of the frontrunner company IREN
Audience typology	☒ Policy maker – Local administration ☒ Policy maker – Regional administration ☐ Policy maker – National administration ☒ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☒ Universities / Research centres ☒ Operators
Duration	6:00 hours

- **MODERATORS AND SPEAKERS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	P. Caputo	Host, presenter and moderator
2	A. Cecchi	Presenter and discussant
3	F. Tadiello	Presenter and discussant
4	A. Fraccaroli	Presenter
5	D. De Simone	Presenter and discussant
6	T. Pauschinger	Presenter
7	M. Ricci	Roundtable moderator
8	L. Mazzocchi	Roundtable moderator
9	A. Denarie	Discussant
10	G. Ferla	Activity facilitator
11	B. Mura	Note taker

- **AGENDA**

10:30	Welcome and registration	
10:45	**Introduction**: *opportunities offered by the LIFE EU Project SupportDHC; presentation of the Capacity Building programs, agenda and goals of the day*	P. Caputo (POLIMI)
11:15	**State of the art of District Heating and Cooling in Italy**: *overview on the DHC sector and on the energy efficiency goals, on the expansion and decarbonization of DHC*	A. Cecchi (AIRU)
11:30	**Decarbonization of the district heating and cooling sector: which is the role of regulations?** *Effect of regulative procedures on the DHC sector*	F. Tadiello (ARERA)
11:45	**Support mechanisms:** *measures and incentive calls for the promotion on DHC in Lombardy Region*	A. Fraccaroli (Regione Lombardia), D. De Simone (ARIA SpA)
12:00	**State of the art in the EU***: evolution of the DHC in Germany and suggestions according to the first results of the SupportDHC project*	T. Pauschinger (AGFW)
12:30	**Debate and closure of the first session**	P. Caputo (POLIMI)
13:15	Lunch break and networking	
14:15	**Round Table 1***: how to promote the data availability, methods and tool for the creation of new skills and competences in the evolution framework of DHC*	M. Ricci (ENEA)
15:00	**Round Table 2***: tariffs, contracts, authorization processes, international experiences as starting point for promoting investments and creating accessible and sustainable business models*	L. Mazzocchi (RSE)
15:45	**Interactive Session***: Main obstacles and possible solution for DHC decarbonization; synergies for the decarbonization of the sector thanks to the contribution of SupportDHC project*	Moderated by G. Ferla (POLIMI)
16:30	**Closure and follow-up***: towards the creation of a shared Manifesto of DHC stakeholders for the expansion and the decarbonization on the sector in Italy*	P. Caputo (POLIMI)

- **DETAILED REPORT**

Morning session: Seminar with different contributions on the Italian context and related challenges for DHC	
Description, topics and aims	This session provided a comprehensive overview of the current status and potential evolution of the DHC sector in Italy. Topics covered included the state of the art of DHC systems, RES and energy efficiency goals, and strategies for sectoral expansion and decarbonization. It has been explored how regulatory frameworks may affect the growth and decarbonization of the DHC sector. The new scheme of incentives for Lombardy Region was also presented together with interesting suggestions derived from the recent German experience. The aim was to deepen the most relevant and characterizing conditions, challenges and drivers for the sector and how the activities of the Life SupportDHC project can support the penetration and decarbonization of DHC in Italy.
Duration	2:45 hours
Speakers	P. Caputo (POLIMI), A. Cecchi (AIRU), F. Tadiello (ARERA), A. Fraccaroli (Regione Lombardia), D. De Simone (ARIA), T. Pauschinger (AGFW)
Moderator	P. Caputo
Format	Seminar
Main remarks from the session	The most interesting takeaways can be summarized as it follows: - The importance of the challenges at legislative, authorization and regulatory level was underlined; - Despite of some important regional measures, the support mechanisms currently in place do not appear to be sufficiently supportive for the sector; - The German experience can bring effective suggestions, underlining the importance of having stable conditions, adequate financing, at least medium-term planning, involving municipalities and building consumers trust in DHC.

Afternoon session: Round tables on data, competence development, investment and business model for DHC and interactive session using Mentimeter platform	
Description, topics and aims	This session focused on discussion trough two round tables and by an interactive session exploiting the online platform Mentimeter. Topics of round tables included enhancing data availability and reliability and the promotion of new skills and competencies for sectoral growth. Participants discussed tariffs, contracts, authorization processes, discrepancy in regulations, economic instability, drawing on international experiences to identify strategies for encouraging investment and creating sustainable business models. The interactive activity focused on non-technical barriers to the Italian DHC decarbonization. This session fostered collaboration among participants

	and some proposals to overcome obstacles to de decarbonization came up.
Duration	2:15 hours
Moderators	M. Ricci (ENEA), L. Mazzocchi (RSE), G. Ferla (POLIMI), P. Caputo (POLIMI)
Format	Round tables and interactive session using the tool Mentimeter
Main remarks from the session	The most interesting takeaways can be summarized as it follows: - There is room for improvement in the quality, availability and interoperability of data and for the development of new skills; - A certain disconnection is perceived between those who have responsibilities in providing and controlling the observance of norms and rules and those who invest and work in DHC; - The interpretation of the use of waste heat is still ambiguous, and it is necessary to standardize the role of different renewable sources and waste heat in terms of standards and support mechanisms; - The establishment of a coordinated stakeholders working group is fundamental, also to negotiate with the central government.

- **SATISFACTION SURVEY RESULTS**

Feedback from 10 respondents underline the effectiveness of the event, providing average scores (on a 1–5 scale) as follows:

- Overall satisfaction with the event: 3.83;
- SupportDHC's ability to concretely support DHC decarbonization: 4.25;
- Event helped identify technical challenges & solutions for DH decarbonisation: 4.75;
- Event met expectations (content & delivery): 4.75.

3.1.2.3 Event 2

- **GENERAL INFORMATION**

Title	Decarbonization of the Italian DHC sector: focus on the technical challenges
Date	19th February 2025
Physical/Virtual	Physical (10 people by on-line connections)
Platform/e-tools used (if virtual)	Teams
Target country	Italy
Language	Italian (1 on-line presentation and related Q&A in English)
Responsible project partner	POLIMI (DABC)
Capacity Building typology	For stakeholders (5.2)
Audience number	42 as it follows: - 32 in person, including the Polimi Team - 2 on-line as a project partner (WIP and PLANENERGI) - 5 on-line as representative of the frontrunner company IREN - 3 on-line stakeholders (OPTIT, RSE)
Audience typology	☒ Policy maker – Local administration ☒ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☒ Engineering companies ☒ Industries representatives ☒ Universities / Research centres ☒ Operators
Duration	5:30 hours

- **MODERATORS AND SPEAKERS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	P. Caputo	Host, presenter and moderator
2	A. Denarie	Presenter
3	D. Rutz	Presenter
4	N. Beck-Larsen	Presenter
5	S. Bazzoli	Presenter
6	F. Gianaroli	Presenter
7	F. Cotana	Roundtable presenter
8	V. Gallo	Roundtable moderator
9	C. Bastita	Discussant
10	A. Bre	Discussant
11	M. Colli	Discussant
12	P. Giarda	Discussant
13	G. Ferla	Activity facilitator
14	B. Mura	Note taker

- **AGENDA**

10:30	Welcome and registration	
10:45	**Introduction**: *presentation of moderators and participants, objectives of the day*	P. Caputo (POLIMI)
11:00	**Follow-Up of the 1st SH event:** *presentation of the cowritten Manifesto, output of the 1st SH event*	P. Caputo (POLIMI)
11:10	**Development and decarbonization of the district heating and cooling sector:** *identification of main technical barriers at European level*	D. Rutz (WIP), N. Beck Larsen (Planenergi)
11:30	**The role of centralised and decentralised thermal storages in the DHC decarbonization pathway**	S. Bazzoli (Energard)
11:45	**Waste heat from industries and datacenter:** *a real opportunity?*	S. Bazzoli (Energard)
12:00	**Optimization of DHC system management by digitalization and AI:** *solutions and best practices*	M. Pozzi (OPTIT)
12:15	**Retrofit of traditional substations** *in bidirectional substations for the integration of thermal prosumers in the DHC network*	F. Gianaroli (ENEA)
12:30	**Debate and closure of the first session**	P. Caputo (POLIMI)
13:15	Lunch break and networking	
14:15	**Round Table:** *the role of biomass in the decarbonization of DHC, economical challenges and sustainable use of resources*	Contributions moderated by V. Gallo (FIPER)
15:30	**Interactive Session***: Main obstacles and possible solution for DHC decarbonization; synergies for the decarbonization of the sector thanks to the contribution of SupportDHC project*	Moderated by G. Ferla (POLIMI)
16:00	**Closure and follow-up***: towards the creation of a shared Manifesto of DHC stakeholders for the expansion and the decarbonization on the sector in Italy*	P. Caputo (POLIMI)

- **DETAILED REPORT**

Morning session: Seminar with different contributions on the Italian context and related technical challenges for DHC	
Description, topics and aims	This session focused on the technical challenges of DHC decarbonization in Italy. Initially, experts from the Support DHC consortium provided an international perspective, contributing in positioning Italy within the broader European context. Key topics included the role of thermal energy storage in improving system flexibility and an in-depth analysis of opportunities and challenges in waste heat recovery. The session also explored the optimization of DHC networks through digitalization, with case studies demonstrating how advanced control tools reduce emissions, resource consumption, and operational costs. Further discussions addressed smart substations enabling bidirectional energy exchange and the potential of prosumers to enhance network efficiency. The session concluded with a discussion on these emerging trends and innovations.
Speakers	P. Caputo (POLIMI), D. Rutz (WIP), N. Beck-Larsen (Planenergi), S. Bazzoli (Energard), M. Pozzi (Optit), F. Gianaroli (Enea)
Moderator	P. Caputo (POLIMI)
Format	Seminar
Main remarks from the session	The sector has strong innovation potential, with no major technical barriers from missing technologies. Instead, challenges lie in market conditions, knowledge, communication, authorization, and regulation, influenced by the competitiveness of gas-based solutions. The session highlighted the overlooked potential of waste heat recovery in Italy, hindered by regulatory gaps and lack of incentives. While high-efficiency cogeneration remains cost-effective in the short term, EU policies push towards renewables and waste heat, requiring clearer regulations and financial support. Digitalization and predictive tools were identified as key enablers for optimizing network efficiency, yet challenges remain in integrating large-scale heat pumps due to economic and technical constraints. Finally, the relevant role of applied research has been underlined for a wider innovation in DHC and the discussion focused on the discussion emphasized the need of collaboration between policymakers, industry, and technology providers to align national strategies with decarbonization goals.

Afternoon session	
Title	Round table about the role of biomass in the decarbonisation of DHC in Italy and interactive activity using Mentimeter platform
Description, topics and aims	The afternoon session focused on the role of biomass in the decarbonization of DH in Italy, addressing key economic, environmental, and regulatory challenges. Discussions covered investment barriers, sustainable resource management within a circular supply chain, and emission control strategies. The debate also highlighted the evolving

	market dynamics and the need for the biomass sector to adapt to changing regulatory and technological landscapes. The session concluded with an interactive workshop, where stakeholders synthesized key takeaways from the day, identifying priority actions and collaborative strategies to overcome technical barriers in DH decarbonization.
Speakers	C. Bastita (BWF – Environtec), A. Bre (Cogeinfra), M. Colli (Fiper), F. Cotana (RSE), P. Giarda (Carbotermo),
Moderator	P. Caputo (Polimi), G. Ferla (Polimi), V. Gallo (Fiper)
Format	Round table and interactive session with online platform
Main remarks from the session	During the roundtable, the crucial role of biomass DH in meeting national renewable energy targets was clarified. Biomass-based systems have been operational in Italy for over 20 years, a period that has seen advancements in storage, emission reduction, digitalization, integration with other renewable sources (other low-grade RES and WH locally available), and implementation of efficiency measures (e.g. flue gas condensation plus HPs, if possible). The sector has also developed specific regulatory frameworks, particularly concerning pollutants emission control. To further support its expansion, incentive mechanisms for highly efficient plants and stable market conditions are needed. From the interactive session, stakeholders identified two key challenges: the difficulty of integrating large-scale heat pumps and the urgent need to lower network temperatures while adapting substations accordingly. Addressing these barriers will require strengthened collaboration and synergy among all stakeholders.

- **SATISFACTION SURVEY RESULTS**

Feedback from 12 respondents underline the effectiveness of the event, providing average scores (on a 1–5 scale) as follows:

- Overall satisfaction with the event: 4.10;
- SupportDHC's ability to concretely support DHC decarbonization: 4.05;
- Event helped identify technical challenges & solutions for DH decarbonisation: 4.23;
- Event met expectations (content & delivery): 4.63.

3.1.2.4 Output and materials

The events represented an important opportunity for mutual understanding, exchange of points of view and growth for the sector. Despite the first event took place in a complex period for the DHC stakeholders, the success was demonstrated by the large participation, the compliments received from important affiliations and the request to share the material presented with the associate of the DHC sector at national level.

The main outputs of the events were:

- leaflets;
- presentations;

- results of the interactive afternoon sessions, including the graphs elaborated using *Mentimeter;*
- results of the satisfaction surveys;
- final version of the *manifesto* (for event 1 and 2);
- list of the questions proposed in the round tables;
- list of participants.

Leaflets, presentations, results of the Mentimeter session, and the final version of the *manifesto* were shared with the participants.

In addition, for the two events and the related results were disseminated by the Linkedin pages and official websites of the involved institutions.



Figure 11. Picture of one event in POLIMI



Manifesto for the Decarbonization of the District Heating and Cooling (DHC) Sector – Part 1

This Manifesto is the result of a day of work among stakeholders in the Italian district heating sector, organized as part of the first Capacity Building event of the EU Life SupportDHC project.
Participants recognize the importance of supporting, expanding, and decarbonizing the DHC sector and are willing to contribute actively to this goal by offering their expertise.
Regarding the main and urgent **non-technical challenges and barriers** to decarbonization, the following points are highlighted:

- There is a perceived **gap between the operational components of the sector and the institutional components**. Tools need to be created to make collaboration between operators and institutional actors, including local, regional, and national entities, research institutes, associations, and regulatory authorities, more effective.
- **Municipal administrations** can play a crucial role in optimizing and expanding existing networks and creating new ones. Skills, resources, and tools are needed for the planning of thermal networks and the identification of suitable areas for systems dedicated to the integration of renewable sources.
- District heating is often considered a less competitive technology compared to other solutions. Strategies are needed to promote the **acceptance** of these systems and increase user **trust and awareness**. The benefits derived from the local economic impact should also be considered, examining all involved sectors.
- **Necessary data and tools are not easily accessible**. Efforts must continue to optimize regional open data while supporting the development of national tools to make them more homogeneous and complete and to create the necessary interoperability of useful data for the planning of thermal networks, both on the heat demand side and potential energy supply sources.
- **Interoperability** must also be promoted in the implementation of European Directives (RED, EED, and EPBD), appropriately considering different renewable sources and waste heat in decarbonization and taking into account the characteristics of existing plants and buildings.
- The ongoing **uncertainty of the regulatory and programmatic framework** makes it difficult to plan new investments in the sector. Even the "NPRR", initially seen as a driving force, has not had the expected success due to the timing of calls and decrees and the limited resources allocated and utilized. The "OIERT" (law in progress for integrating shares of RES into DH systems) also does not appear to be a concretely supportive intervention at this time.
- Different renewable sources and waste heat do not have a technologically neutral approach. Currently, in Italy, **waste heat is not considered equivalent to renewable sources**, limiting investment opportunities and resource optimization.

Manifesto for the Decarbonization of the District Heating and Cooling (DHC) Sector – Part 2

This Manifesto is the result of a day of work among **stakeholders** in the Italian district heating sector, related to the **second Capacity Building event of the EU Life SupportDHC project**.
Participants recognize the importance of supporting, expanding, and decarbonizing the DHC sector and are willing to contribute actively to this goal by offering their expertise.
Regarding the main and urgent **technical challenges and barriers** to decarbonization, the following points are highlighted:

- The sector has potential for innovation and constant technological progress; however, technical barriers in terms of lack of components and systems on the market are not significant. **Collaboration** is needed to create adequate market conditions (influenced by the cost of competitive technologies based on the use of natural gas), knowledge, communication, authorization, and regulation.
- Concerning the need for managerial and technological changes, **lowering temperatures** on the networks remains a challenging (it is indicated as the most urgent and critical barrier by the present actors) proposal for the Italian context;
- The integration of **large-scale heat pumps** is still difficult and requires optimized plant management, achievable through the implementation of digital models.
- There is a need to intervene on the national transpositions of European Directives and their interoperability, appropriately considering different renewable sources and waste heat in decarbonization, and taking into account the characteristics of existing plants and buildings. Currently, in Italy, **waste heat** is not adequately incentivized, as it is not considered on par with renewable sources, thus limiting investment opportunities and resource optimization.
- A deep analysis, by **accurate evaluations**, is suggested on how the application of Directives can translate into an increase in the renewable share for thermal uses, reduction of CO_2 emissions, and reduction of climate change for the same sector.
- There is a need to make **tools and open data** more accessible, precise, updated, and interoperable, considering both heat demand and potentially available energy supply sources. This activity should be "calibrated" and supported through experimental campaigns, involving concrete knowledge of local conditions, network status, development plans, heat generation and demand with their respective temperatures.
- Generally, there is a perceived lack of a systematic framework to favor the sector's expansion, also useful for building greater **trust and awareness** among users.
- Overcoming these critical issues requires cooperation between companies, engineering firms, regulatory bodies, sector associations, and the research world. **Applied research** could foster greater innovation and acceptance.
- The focus on **biomass district heating systems** highlights the important role of this resource in the national landscape for achieving targets for thermal energy production from renewable sources. These systems have been operational and present nationally for 20

- The development/transformation of DHC systems works on long timelines, involves significant investments with long payback periods; these characteristics are in contrast with an **unstable economic-financial market** and unclear and unstable support schemes.
- DHC plants can have different characteristics depending on the context and available sources; the definition of overly rigid **tariff systems** and the presence of regulatory complications further hinder the sector.

In response to the identified needs, the participants propose some solutions as follows:

- Creation of a **"technical table"**:
  - for the definition and application of strategies and policies to incentivize connection to district heating networks;
  - for the development of decarbonization plans and economic-financial tools to support the necessary investments for the sector's energy transition;
  - for the creation of necessary connections between the main actors in the sector, reaching the Ministries and relevant Authorities;
  - for the verification of mechanisms that can be activated to simplify administrative and authorization procedures (also introducing new forms of procedural responsibility for simplification and reduction of timelines);
  - for the definition of less rigid tariff calculation tools that can take into account the peculiar characteristics of different systems.
- Design and implementation of regional/supra-regional **open data** as interoperable as possible (equipped with "ready-to-use" KPIs) dedicated to useful information for the verification, simulation, and planning of district heating networks (both on the demand side and potential renewable sources and waste heat), re-verifying the share of thermal demand actually attributable to the DHC sector.
- Activation of tables dedicated to municipalities and mountain communities on the planning of new networks (municipal and community heat plan), with potential connection to the development of **thermal RECs**.
- In line with existing references such as the EU Recommendation 2024/2395 of 2-9-24, adoption of a **technologically neutral and balanced approach** to the integration of different renewable sources, waste heat, and necessary thermal storage systems. For waste heat, regulatory and legislative clarifications on usage conditions are urgently needed, also working on reduced VAT (10%), "OIERT", guarantees of origin, ETS, and tax credits.
- Creation of a structured **plan of courses and training events** useful to strengthen the necessary skills in district heating.

As part of the Capacity Building activities of the Life SupportDHC project, involving a large international consortium, the participants at the event, hoping that this document inspires continuous dialogue and effective cooperation among all involved actors, commit to continuing the discussions initiated during this day of work and to providing their contribution to the implementation of the proposed actions aimed at decarbonizing and expanding the DHC sector in Italy.

Milan, Octber 30th 2024

years, a period characterized by disruptive changes in the energy sector and significant technological evolution (storage, emission reduction, digitalization, integration of other renewable sources). In light of this, rewarding tools for particularly virtuous plants and measures to create stable market conditions for this resource could be developed.

In response to the emerging needs, the present stakeholders propose some solutions as follows:

- Creation of a **"technical table"** for:
  - Sharing best practices of district heating systems and regional policies with potential replicability.
  - Application of technologies for reducing heat and pressure losses, optimizing storage (daily), and, more generally, managing various components.
  - Understanding how to lower supply temperatures:
    - Working on plant ignition and shutdown schemes to limit the morning peak
    - Acting on substations (to be studied case by case)
    - Managing domestic hot water (for networks that also provide this service)
    - Introducing dedicated tariff schemes.
- Regarding non-technical barriers (already discussed in the previous event, as per Manifesto, part 1), proposing measures to translate new regulatory constraints into **concrete stimuli and opportunities** for the sector (also affecting the overcoming of technical barriers), considering the different time horizons of work of operators and involved actors.
- Regarding energy systems at community-scale, proposing incentive measures (e.g., tax deductions, reduced VAT) for end users who decide to connect to decarbonized district heating systems, which may also include specific schemes for **"thermal RECs"** based on waste heat or thermal renewables sharing.
- Regarding **existing plants mainly powered by virgin wood biomass**, considering that nationally revamping and innovation/efficiency interventions have not been contemplated in the socalled Industry 4.0 Program, identifying dedicated funding lines within new regional calls.
- Creation of a structured **plan of courses and training events** to strengthen the necessary skills in district heating.

As part of the Capacity Building activities of the Life SupportDHC project, involving a large international reference consortium, the participants at the event, hoping that this document inspires continuous dialogue and effective cooperation among all involved actors, commit to continuing the discussions initiated during this day of work and to providing their contribution to the realization of the proposed actions aimed at decarbonizing and expanding the DHC sector in Italy.

Milan, February 19th 2025

Figure 12. Extract of the first part of the *manifesto of the two events of CB in Italy (English version)*

3.1.3 Conclusions and lesson learnt from the capacity building activities

The activities under tasks 5.1 and 5.2 effectively contributed to achieving the project objectives by strengthening the capacity of DHC operators, authorities and relevant stakeholders to plan and implement decarbonisation measures for DHC.

The methodological framework and the pilot program were tested, constituting a basis for the other involved target countries. The impressions gathered and the feedback collected—both on the content and on the engagement and knowledge-transfer approaches—were discussed with the other project partners during project meetings, providing additional insights for further optimising the activities across the different local contexts.

Results showed that, in Italy, the decarbonisation of the DHC sector is hindered mainly by non-technical barriers, in particular regulatory uncertainty and the absence of stable support mechanisms. The structured dialogue among stakeholders and operators highlighted that inter-institutional coordination, the recognition and valorisation of waste heat, and the availability of adequate technical skills are crucial enabling conditions. The participatory initiatives helped in identifying priorities and laying the groundwork for accelerating the expansion and low-carbon transition of the DHC sector in Italy.

3.2 Austria

The need for CB activities in Austria was determined in individual interviews with different stakeholders active in the DHC sector in Austria, such as:

- Planners of DHC systems (EVN, MOSER Energie & Umwelt, KELAG Energie und Wärme);
- Operators of DHC systems (EVN, KELAG Energie und Wärme);
- Funding agency for the DH sector (KPC – Kommunalkredit public consulting);
- Energy Agency in Styria (Energie Agentur Steiermark);
- DH representation agencies (FGW - Association of Gas- and District Heating Supply, Bioenergie Service).

Based on the interviews, the CB activities were divided into two groups, as also planned in the proposal:

1. DHC operators including DHC planners;
2. DHC stakeholders, such as energy agencies, municipalities or climate and energy region managers.

For DHC operators and planners, the main need lies in strengthening interdisciplinary, system-level and technology-specific competences. Planners increasingly must integrate new technologies such as low-temperature DH, large heat pumps, hybrid systems and innovative control strategies. Hence, the CB focused on advanced heat planning, hydraulic optimisation, integration of renewable heat sources, and quality management throughout all planning stages.

For broader DHC stakeholders, particularly municipalities, energy agencies, or climate and energy region managers, the key challenge is limited technical knowledge and insufficient capacity to initiate, plan and implement DHC projects. Many municipalities lack access to relevant data, have difficulty identifying suitable operators and require foundational training in DHC basics, heat planning, and the use of heat maps. Stakeholders would benefit from crash courses, mentoring formats, peer-to-peer exchanges, excursions and best-practice examples to build confidence and decision-making competence. Planning organisations and urban planners need deeper skills in spatial heat planning and integrating DHC expansion into local development strategies. Hence the courses aimed to address these topics.

Accordingly, **2 courses and 2 events** were implemented as described in the following subsections. As detailed in sections 3.2.1 and 3.2.2, the CB activities effectively contributed to achieving the project objectives by strengthening the capacity of DHC operators, authorities and relevant stakeholders to plan and implement decarbonisation measures for DHC.

3.2.1 National DHC operators' courses (T5.1)

Details about the implementation of the two courses for operators in Austria are reported in the following subsections.

3.2.1.1 Course 1

- **GENERAL INFORMATION**

Title	QM Fachtagung
Date	26.06.2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	-
Location	Vienna, Austria
Language	German
Responsible project partner	AEE INTEC
Audience number	~ 100
Audience typology	☒ Operators ☐ Policy maker – Local administration ☒ Policy maker – Regional administration ☒ Policy maker – National administration ☒ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☒ Universities / Research centres ☐ Others (specify)
Duration (hours)	Full day

- **SPEAKERS AND MODERATORS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	C. Ramerstorfer	Host, presenter and moderator
2	S. Retschitzegger	Host and moderator
3	S. Metz	Host and moderator
4	I. Leusbrock	Presenter and discussant
5	S. Hay	Presenter and discussant
6	T. Deselaers	Presenter and discussant
7	S. Azzouzi	Presenter and discussant
8	J. Good	Presenter and discussant
9	G. Dunst	Presenter and discussant
10	K.A. Griessmair Farkas	Presenter and discussant
11	C. Aste	Presenter and discussant
12	K. Flor	Presenter and discussant
13	A. Hammerschmid	Presenter and discussant

- **AGENDA**

Wärmenetze – sicher und effizient

QM Fachtagung

09:30 Uhr	*Empfang und Anmeldung*
10:00 Uhr	**Begrüßung** klimaaktiv Heizwerke und Wärmenetze
10:15 Uhr	**Transformationspläne für Wärmenetze** Ingo Leusbrock, AEE INTEC
10:45 Uhr	**Asset Management für Wärmenetze** - Zustandserfassung und (Rest-)Nutzungsdauerprognose am Beispiel erdverlegter Kunststoffmantelrohre Stefan Hay und Tillmann Deselaers, AGFW
11:30 Uhr	**Schadensvorbeugung und Leckortung in Fernwärmenetzen** Samir Azzouzi, EKR Netzmanagement e.U.
12:00 Uhr	**Mittagessen**
13:00 Uhr	**Qualitätsmanagement für Holzvergaser-BHKW und Pflanzenkohleanlagen** Jürgen Good, Verenum AG
13:30 Uhr	**Betriebserfahrungen mit der ersten Verkohlungsanlage Europas** Gerald Dunst, Sonnenerde GmbH
14:00 Uhr	**Leitlinien der Fernwärmebranche und neuer Green Job: Lehrberuf Fernwärmetechnik** Katalin-Andrea Griessmair-Farkas, FGW
14:30 Uhr	**Kaffeepause**
15:00 Uhr	**Blackout-Prävention in Theorie und Praxis** Karl Flor, EVN Wärme GmbH Alfred Hammerschmid, BIOS BIOENERGIESYSTEME GmbH Christoph Aste, aste Energy
16:30 Uhr	Ende der Fachtagung

- **MAIN OUTCOMES**

Presentations, pictures documenting the activities and lists of participants were collected and the presentations were shared with the participants.
The QM Fachtagung is a yearly event for stakeholders interested in DH Austrian. This year, the Fachtagung was organized together as a cooperation of the klimaaktiv programme Heizwerke und Wärmenetze and the project Support DHC. Within the QM Fachtagung a comprehensive overview about relevant topics for the DH sector in Austria was presented.
Main aspects considered the transformation of DHC networks towards renewable sources as well as economic aspects for long-term evaluation of networks. In addition, the new field of producing biochar from biomass was introduced. The event was finished with an introduction of the new job-training possibility for a DH technician in Austria and practical aspects on blackout prevention, based on renewable energy.



Figure 13. Picture of the QM Fachtagung in Austria

3.2.1.2 Course 2

- **GENERAL INFORMATION**

Title	Fokusgruppe räumliche Energieplanung
Date	29.09.2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	MS Teams
Location	-
Language	German
Responsible project partner	AEE INTEC
Audience number	4 (incl. presenter and moderators)
Audience typology	☒ Operators ☐ Policy maker – Local administration ☒ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☐ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☐ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☒ Others: climate and energy region managers
Duration (hours)	Full day

- **SPEAKERS AND MODERATORS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	I. Leusbrock	Presenter, moderation and discussant
2	J. Kelz	Presenter and discussant

- **AGENDA**

13:00	Begrüßung	Ingo Leusbrock, AEE INTEC
13:05	Ansatz und Aufbau Energie- / Wärmeatlas	Ingo Leusbrock, AEE INTEC
13:30	Anwendungsfelder der räumlichen Energieplanung Live - Demo	Joachim Kelz, AEE INTEC
14:00	Diskussionsteil	Alle Teilnehmer Moderation: Ingo Leusbrock, AEE INTEC
15:00	Ende des Kurses	

- **MAIN OUTCOMES**

Presentations and screenshot of the online course were collected, and the presentations were shared with the participants.
The training for operators and stakeholders in Murau targeted the application of municipal energy planning strategies. Within Murau, municipal spatial energy planning is only partially applied at the moment. For DH operators, this method was presented and it seen as a suitable method for targeted expansion of DH systems.
For the climate and energy managers in the regions, the method was received as a suitable method to identify the most promising solutions to replace old oil and gas fired heating units, that are typically installed in single buildings. Based on the spatial energy planning method a first evaluation of areas suitable for DH is possible.

3.2.2 National DHC stakeholders' events (T5.2)

Details about the implementation of the two events for stakeholders in Austria are reported in the following subsections.

3.2.2.1 Event 1

- **GENERAL INFORMATION**

Title	Energieraumplanung, kommunale Wärmeplanung und Transformation von Wärmenetzen
Date	13.11.2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	MS Teams
Location	-
Language	German
Responsible project partner	AEE INTEC, e-think
Audience number	43
Audience typology	☒ Operators ☒ Policy maker – Local administration ☒ Policy maker – Regional administration ☐ Policy maker – National administration ☒ Authorities and regulative entities ☐ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☒ Universities / Research centres ☒ Climate and energy model region managers
Duration (hours)	1.5 hours

- **SPEAKERS AND MODERATORS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	S. Metz	Host, moderator
2	S. Retschitzegger	Host, moderator
3	A. König	Host, moderator
4	I. Leusbrock	Presenter and discussant
5	C. Ramerstorfer	Presenter and discussant
6	M. Hummel	Presenter and discussant
7	H. Rothwangel-Heber	Presenter and discussant
8	S. Standl	Presenter and discussant

- **AGENDA**



- **MAIN OUTCOMES**

Programme, screenshot of the event, and presentations were collected and the presentations were shared with the participants.

The online training "Energieraumplanung, kommunale Wärmeplanung und Transformation von Wärmenetzen" (Spatial energy planning, municipal heat planning, and transformation of heating networks), had a dedicated focus of DH planning and municipal heat planning with the aim to inform and train cities, municipalities, and spatial planners.

The training contained fundamentals of municipal heat planning and energy space planning, fundamentals of heating networks and QM heating plants, tools in municipal heat planning and a guide to dialogue between DH operator and municipalities on heating networks.

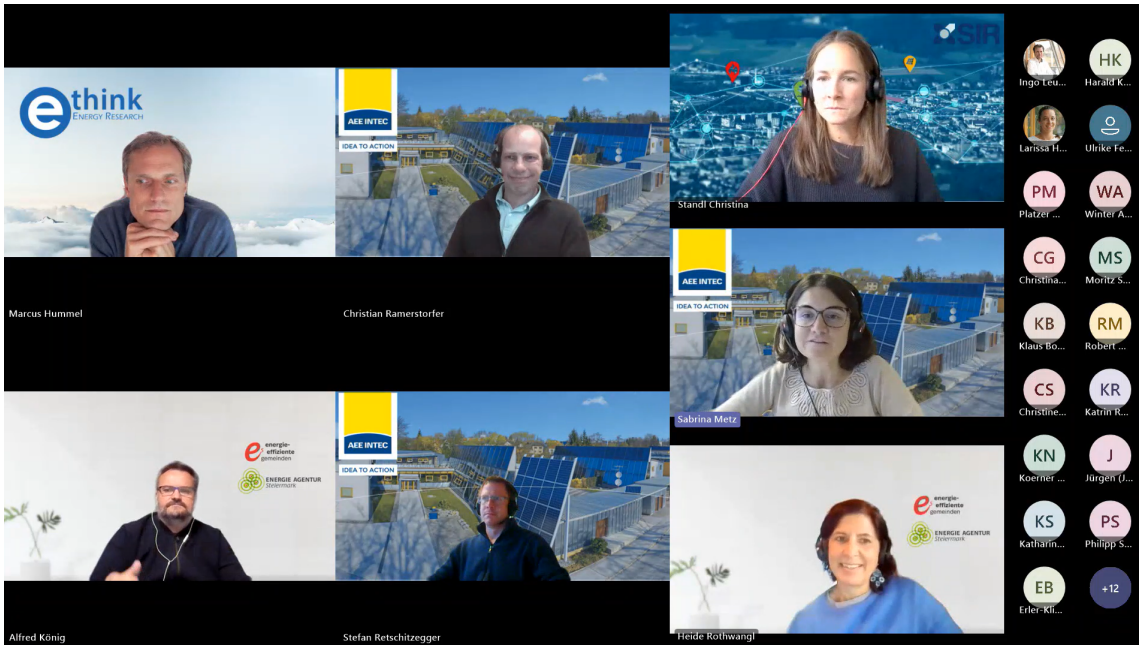

Figure 14. Screenshot of presenters and moderators of the webinar "Energieraumplanung, kommunale Wärmeplanung und Transformation von Wärmenetzen" in Austria

3.2.2.2 Event 2

- **GENERAL INFORMATION**

Title	KEM Fachtagung (KEM manager meeting)
Date	19.11.2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	-
Location	Tamsweg
Language	German
Responsible project partner	AEE INTEC
Audience number	~ 70
Audience typology	☐ Operators ☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☐ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☐ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☒ Climate and energy model region managers
Duration (hours)	3h

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	Franz Mauthner	AEE INTEC, Scientific researcher with a focus on spatial energy planning
2	Claudia Leichtfried	Energy-Climate GmbH, Organisation and moderation of whole event

- **AGENDA**

DAY 1	Internal KEM manager meeting	Organized by Claudia Leichtfried
DAY 2 – morning session	Internal KEM manager meeting	Organized by Claudia Leichtfried
DAY 2 – afternoon session	"Dies und Das Marktstände" Guide to municipal heat planning: contribution of KEM managers to heat transition	Franz Mauthner, AEE INTEC

MAIN OUTCOMES

Three times a year, Austria's KEM managers (KEM: Klima und Energie Modellregionen = climate and energy model regions) meet for a working meeting and collegial exchange. Part of the mostly two-day events are the so-called "Dies und Das Marktstände" where there is space for presentations on current developments, possible points of contact, or successfully completed projects.

At the KEM symposium on November 19, 2025, at Kuenburg Castle in Tamsweg, AEE INTEC participated with training materials for energy planning. In detail, AEE INTEC was able present the recently published, hot-off-the-press guide to municipal heat planning. In addition, an introduction on how KEM regional managers and, above all, municipalities and cities can proactively contribute to the heat transition was presented.

3.2.3 Conclusions and lesson learnt from the capacity building activities

The CB activities carried out in Austria were successful, involving more than 200 people and demonstrated the strong need for tailored knowledge transfer across the diverse DHC stakeholder landscape. Interviews with planners, operators, funding agencies and regional energy actors confirmed that both technical and strategic skills—ranging from network transformation and spatial energy planning to new technologies such as biochar production—are essential for supporting the heat transition.

The trainings and stakeholder events showed that practical, case-based approaches and the integration of municipal heat planning tools significantly enhance participants' understanding and readiness to implement renewable and resilient heating solutions. Moreover, the high level of engagement across events highlights the growing demand for structured cooperation between DH operators, municipalities and regional managers. Overall, the activities demonstrated that continuous capacity building, targeted at specific stakeholder needs, is crucial for enabling informed decision-making and accelerating the transformation of heating networks in Austria.

3.3 Germany

As already introduced, the case of Germany is particular because of the systematic and long-life training programme already in place, provided by AGFW. Independently from the SUPPORT DHC project, AGFW already performs training courses related to "the use of low-grade renewable energy and waste heat for DHC" on a regular base. This holds for both target groups: DH operators (e.g. the annual "DHC transformation days") and for related stakeholders (e.g. "base courses and courses including permission processes" for municipalities and authorities). Due to the present high relevance of DHC decarbonization in Germany, AGFW is in cooperation with concerned associations (e.g. of data centres) and regulators on this. The impact of the CB activities is underlined in the following table, with the involvement of almost 250 participants.

Table 4. AGFW courses and events related to "the use of low-grade renewable energy and waste heat for DHC" for operators and market stakeholders

CB in GERMANY, AGFW
Course 1: Practical seminar on solar district heating 2-day-course for operators and stakeholders 6-7.6.2024, Potsdam 16 participants
Course 2: Measures for lowering return temperatures 1-day-course for operators and stakeholders 7.11.2024, Dortmund 31 participants
Course 3: AGFW-Trafodays 2-day branch event on DHC transformation for operators and stakeholders 27-28.11.2024, Kassel 80 participants
Event 1: Basic Know-how for District Heating 3-day-basic course for municipalities new to DH and operators 1-3.7.2025, Frankfurt a.M. 21 participants
Event 2: AGFW-Trafodays 2-day branch event on DHC transformation for municipalities, authorities and operators 18-19.11.2025, Kassel 95 participants

3.3.1 National DHC operators' courses (T5.1)

Details about the courses for operators in Germany are described in the following subsections. The titles of the courses are: Practical seminar on solar DH, Measures for lowering return temperatures and AGFW Trafo-Days 2024, respectively.

3.3.1.1 Course 1

- **GENERAL INFORMATION**

Title	Praxisseminar Solare Fernwärme
Date	6-7 June 2024
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Potsdam
Language	German
Responsible project partner	AGFW
Audience number	16
Audience typology	Policy maker – Local administration Policy maker – Regional administration Policy maker – National administration Authorities and regulative entities Associations of DHC operators Associations of DHC manufacturing companies **X Manufacturing companies** **X Engineering companies** Industries representatives Universities / Research centres **X Operators**
Duration (hours)	15 h

- **AGENDA, SPEAKERS AND MODERATORS**

Programm | Donnerstag, 06. Juni 2024

Leitung:	**Dipl.-Ing. Thomas Pauschinger, AGFW e.V., Frankfurt am Main**
ab 09:00 Uhr	**Begrüßungskaffee**
09:10 Uhr	**Begrüßung und Einführung in die Thematik** Dipl.-Ing. Thomas Pauschinger, AGFW e. V., Frankfurt am Main Eckard Veil, Energie und Wasser Potsdam GmbH
10:10 Uhr	**Grundlagenwissen Technik** - Technologieüberblick Kollektoren, Bezugsgrößen und Kennwerte - Wärmespeicher und Systemtechnik Dipl.-Kfm. Dipl.-Ing. (FH) Guido Schwabe, AGFW e. V., Frankfurt am Main
11:10 Uhr	**Kaffeepause**
11:30 Uhr	**Grundlagenwissen Technik (Fortsetzung)** - Einbindung von Solarthermieanlagen in Wärmenetze - Kennzahlen in der Fernwärme Dipl.-Kfm. Dipl.-Ing. (FH) Guido Schwabe, AGFW e. V., Frankfurt am Main
12:30 Uhr	**Mittagspause**
13:30 Uhr	**Entwicklung von Freiflächen** - Vorgehensweise und Kriterien bei der Flächenfindung - Rechtliche Aspekte und Genehmigungspraxis - Praxisbeispiele M. Sc. Felix Landsberg, Hamburg Institut Research gGmbH
15:00 Uhr	**Kaffeepause**
15:20 Uhr	**Wirtschaftlichkeit** - Investitions- und Betriebskosten - Berechnungsbeispiel - Förderprogramme, iKWK-Ausschreibung Dipl.-Kfm. Dipl.-Ing. (FH) Guido Schwabe, AGFW e. V., Frankfurt am Main
16:10 Uhr	**Arbeitshilfe zur Ausschreibung von Solarthermieanlagen** Dipl.-Ing. (FH) Daniel Heiler, AGFW e. V., Frankfurt am Main
16:40 Uhr	**Zusammenfassung des ersten Seminartages**
17:00 Uhr	**Ende des ersten Seminartages**
19:00 Uhr	**Gemeinsames Abendessen und Erfahrungsaustausch**

Programm | Freitag, 07. Juni 2024

08:30 Uhr	**Einführung in den 2. Seminartag** Dipl.-Ing. Thomas Pauschinger, AGFW e. V., Frankfurt am Main
08:40 Uhr	**Auslegung und Dimensionierung** - Grundlagen der Anlagendimensionierung, Auslegungskennwerte - Gruppenübung zur Auslegung - Wetterdaten und Softwaretools M. Sc. Michael Klöck, Steinbeis Forschungsinstitut Solites, Stuttgart
10:40 Uhr	**Kaffeepause**
11:00 Uhr	**Erfahrungen aus Bau und Betrieb der Solarthermieanlage der Energie und Wasser Potsdam GmbH** René Elgert, Energie und Wasser Potsdam GmbH
12:00 Uhr	**Mittagspause**
13:00 Uhr	**Vor-Ort-Besichtigung der Solarthermieanlage der Energie und Wasser Potsdam GmbH** René Elgert, Energie und Wasser Potsdam GmbH
15:00 Uhr	**Abschließende Frage- und Antwortrunde**
15:30 Uhr	**Ende des Seminars**

- **FINAL CONSIDERATIONS AND OUTCOMES**

The 2024 seminar on solar DH was a practical on site course hosted by the utility of Potsdam, who is operator of a solar DH plant and who broadly shared its experience. The importance and the feasibility of integrating low-temperature renewable energy in the existing net was shown, basic knowledge on the technology and further aspects were shared and a site visit helped to understand the potentials of solar thermal heat for DH. The course enabled the participants to dimension a plant and to perform economic calculations for considering solar thermal in their investment plan.

Current studies attribute an important role to solar thermal energy in the decarbonization of DH. Even today, attractive subsidy conditions enable its economically competitive and largely risk-free operation. Where the integration of solar thermal energy is operationally feasible, it offers an ideal and proven opportunity to increase the renewable share of DH. Against this background, the practical seminar provided participants with basic knowledge about the technology and economics of large-scale solar thermal systems. The focus lay on specific issues relating to integration into DH systems. Important aspects of project development were addressed, such as finding open spaces, permit requirements, and information on tendering. Concrete practical knowledge was transmitted by visiting the solar thermal plant (3.1 MW) of Energie und Wasser Potsdam GmbH, which has been in operation since 2019 and by having the opportunity to talk directly with the project managers on site.

3.3.1.2 Course 2

- **GENERAL INFORMATION**

Title	Maßnahmen zur Erreichung niedriger Rücklauftemperaturen
Date	07.11.2024
Physical/Virtual	physical
Platform/e-tools used (if virtual)	
Location	Dortmund, Germany
Language	German
Responsible project partner	AGFW
Audience number	31
Audience typology	Policy maker – Local administration Policy maker – Regional administration Policy maker – National administration Authorities and regulative entities Associations of DHC operators Associations of DHC manufacturing companies **X Manufacturing companies** **X Engineering companies** Industries representatives Universities / Research centres **X Operators**
Duration (hours)	15

- **AGENDA, SPEAKERS AND MODERATORS**

AGFW Der Energieeffizienzverband für Wärme, Kälte und KWK e.V.

Seminar

Maßnahmen zur Erreichung niedriger Rücklauftemperaturen

07. November 2024
Dortmund

Programm | Donnerstag, 07. November 2024

Seminarleitung:	**Ehsan Khorsandnejad M. Sc., AGFW e. V., Frankfurt am Main**
08:30 Uhr	**Begrüßungskaffee**
08:50 Uhr	**Begrüßung und Einleitung in die Thematik** Ehsan Khorsandnejad M. Sc., AGFW e. V., Frankfurt am Main
09:00 Uhr	**Niedrige Rücklauftemperaturen - Grundlagen** - Technisch - Rechtlich - Organisatorisch Ehsan Khorsandnejad M. Sc., AGFW e. V., Frankfurt am Main
09:30 Uhr	**Hydraulische Schaltungen für statische Heizungen und RLT-Anlagen** Dipl.-Ing. Othniel Zaitschek, swa Netze GmbH, Augsburg
10:30 Uhr	**Kaffeepause**
10:45 Uhr	**Hydraulische Schaltungen für TWE und Wohnungsstationen** - Speichersysteme - Durchflusssysteme - Erfahrungen aus der Praxis Dipl.-Ing. Stephan Teubner, SWM Infrastruktur GmbH, München
11:30 Uhr	**Auslegungshilfen für Neuanlagen** - Wahl der geeigneten Auslegungstemperaturen - Besonderheiten bei indirekten Fernwärmeanschlüssen - Regelungstechnische Verknüpfungen Dipl.-Ing. Othniel Zaitschek, swa Netze GmbH, Augsburg
12:30 Uhr	**Gemeinsames Mittagessen**

Programm (Fortsetzung)

13:30 Uhr	**Fehleranalyse - Woraus resultieren hohe Rücklauftemperaturen?** - Ursachen - Abhilfe - Ad-hoc-Maßnahmen Dipl.-Ing. Thomas Kreisel, enercity Netz GmbH, Hannover
14:30 Uhr	**Einflussmöglichkeiten von Nutzern und EVU** - Sensibilisierung zur effektiven Energienutzung - Anreizschaffung - Beispiele Dipl.-Ing. Andreas Overhage, Energieversorgung Oberhausen AG
15:15 Uhr	**Kaffeepause**
15:30 Uhr	**Maßnahmen zur Rücklauftemperatursenkung** - Technische Vorgaben und Umsetzung - Maßnahmen in Neuanlagen - Modernisierungsprodukt der SWM Dipl.-Ing. Stephan Teubner, SWM Infrastruktur GmbH, München
16:15 Uhr	**Zusammenfassung und Abschlussdiskussion** Ehsan Khorsandnejad M. Sc., AGFW e. V., Frankfurt am Main
16:30 Uhr	**Ende der Veranstaltung**

- **FINAL CONSIDERATIONS AND OUTCOMES**

An optimized DH supply based on low-grade renewables and waste heat requires low return temperatures. No technical requirement is neglected or ignored more by building planners and plant operators than that of low return temperature. The focus of the seminar is on providing concrete assistance so that the technical specifications of DH supply companies can be met. This is in the interests of all parties involved: building designers and DH customers (comfortable and economical heating systems) as well as supply companies (economical and energy-efficient heat supply).

The course presents concrete measures for lowering the network temperatures as they need to be considered in transformation plans, in order to make networks fit for low-grade heat.

3.3.1.3 Course 3

- **GENERAL INFORMATION**

Title	AGFW Trafotage – genug Zeit, Geld und Ideen?
Date	27 – 28 November 2024
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Kassel, Germany
Language	German
Responsible project partner	AGFW
Audience number	80
Audience typology	Policy maker – Local administration Policy maker – Regional administration Policy maker – National administration Authorities and regulative entities Associations of DHC operators Associations of DHC manufacturing companies **X Manufacturing companies** **X Engineering companies** Industries representatives Universities / Research centres **X Operators**
Duration (hours)	15 h

- **AGENDA, SPEAKERS AND MODERATORS**

AGFW Der Energieeffizienzverband für Wärme, Kälte und KWK e.V.

„AGFW-TRAFOTAGE - genug Zeit, Geld und Ideen?“

27.- 28. November 2024
Kassel

Programm | Mittwoch, 27. November 2024

09:30 Uhr	**Begrüßungskaffee**
10:00 Uhr	**Begrüßung** AGFW e. V., Frankfurt am Main
10:30 Uhr	**Fernwärme - Wo geht die Reise hin?** Nina Lepsius, Referat IIA3, Bundesministerium für Wirtschaft und Klimaschutz, Berlin
11:00 Uhr	**Status Quo der Fernwärmeförderung** Sophia-Susanne Nau, Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA), Eschborn
11:45 Uhr	**Kaffeepause**
12:00 Uhr	**Three Body Problem der Wärmewende: Wirtschaftlichkeit, Infrastrukturinvestment und Transformation** Dr. Jörg Böttcher, IB.SH Investitionsbank Schleswig-Holstein, Kiel
12:30 Uhr	**Finanzierung der Wärmewende** Dr. Michael Arnold, Stadtwerke Duisburg AG
13:00 Uhr	**Mittagspause**
14:00 Uhr	**Fernwärme in Hamburg: Netzentwicklung für Wachstum und Klimaneutralität** Erik Sewe, Hamburger Energiewerke, Hamburg
14:45 Uhr	**Betriebserfahrungen mit Solarthermie: Würde ich es nochmal machen?** Christian Stadler, Viessmann Deutschland GmbH, Allendorf; Lars M. Damkaer, Gram Fjernvarme, Gram (Dänemark)
15:15 Uhr	**Kaffeepause**
15:45 Uhr	**Erfahrungen bei Großwärmepumpenprojekten: Planung, Umsetzung und Betrieb** Oliver Schülting, Stadtwerke Münster GmbH
16:30 Uhr	**Großwärmepumpen: Herausforderungen und Lösungen** Tobias Hirsch, MAN Energy Solutions SE Oberhausen
17:15 Uhr	**Ende erster Veranstaltungstag**
ab 18:30 Uhr	**Gemeinsames Abendessen in der „Königsalm“ auf dem Weihnachtsmarkt in Kassel mit Erfahrungsaustausch**

Programm | Donnerstag, 28. November 2024

09:00 Uhr	**Begrüßung** AGFW e. V., Frankfurt am Main
09:10 Uhr	**Erfahrungen und Erkenntnisse aus zwei Jahren Transformationsplanung für Wärmenetze** Dr. Armin Kraft, EEB ENERKO Energiewirtschaftliche Beratung GmbH, Aldenhoven
09:55 Uhr	**Langzeitprojekt Tiefengeothermie in der BEW** Tobias Roth, AGFW e. V., Frankfurt am Main
10:30 Uhr	**Projektbeispiel für interkommunale Tiefengeothermie in der BEW** Benjamin Richter, Rödl & Partner GmbH, Nürnberg
11:15 Uhr	**Kaffeepause**
11:30 Uhr	**Projekt RE=FILL: EEW- & BEW-geförderte, industrielle Abwärmenutzung der Leipziger Stadtwerke vom Chemiepark Leuna** Marcus Krüger, Stadtwerke Leipzig GmbH
12:15 Uhr	**Strategie zur Absenkung der Temperatur im Fernwärmenetz - Erfahrungsbericht aus Leipzig** Kay Doßmann, Netz Leipzig GmbH
12:45 Uhr	**Mittagspause**
13:45 Uhr	**Ungar, aber wahr** • **Windwärme - P2H mit eigener Windanlage** Uwe Weber, Stadtwerke Lemgo GmbH • **Chancen und Herausforderungen bei dem Einsatz biogener Reststoffe – Beispiel Laubpellets** Johannes Hinrichsen, BTB Blockheizkraftwerksträger- und -betreibergesellschaft mbH • **Grubenwassernutzung zur Transformation eines Wärmenetzes** Tobias Stolz, Stadtwerke Herne AG • **Konzentrierende, nachgeführte Solarkollektoren für Wärmenetze** Dirk Krüger, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR) • **Eisen als Energieträger einer klimaneutralen Kreislaufwirtschaft** Dr. Marius Schmidt, Clean Circles, Technische Universität Darmstadt
16:00 Uhr	**Schlusswort und Ende der Veranstaltung**

- **FINAL CONSIDERATIONS AND OUTCOMES**

The AGFW Trafotage 2024 in Kassel offered a two-day programme that combined strategic debate on the DHC system transformation with very concrete project experience from utilities, industry and research institutions. Participants benefited from contributions by government bodies on the regulatory framework and funding landscape, alongside sessions on the economics and financing of new heat infrastructure and on the practical operation of solar thermal systems and large-scale heat pumps in DH networks. A dedicated second-day focus on deep geothermal energy, industrial waste heat projects and novel energy carriers such as wind power-to-heat (P2H) was complemented by case studies on temperature reduction in existing grids and inter-municipal cooperation. Hosted in Kassel, the event was rounded off by extensive opportunities for professional networking, including a joint evening function, and thus established itself as a key meeting point for stakeholders shaping climate-neutral DH in Germany.

3.3.2 National DHC stakeholders' events (T5.2)

Details about the two events for stakeholders in Germany are described in the following subsections. The titles are "Basic Know-how for District Heating" and "AGFW Trafo-Days 2025", respectively.

3.3.2.1 Event 1

- **GENERAL INFORMATION**

Title	Basiswissen Fernwärme
Date	1-3 July 2025
Physical/Virtual	physical
Platform/e-tools used (if virtual)	
Location	AGFW offices, Frankfurt a.M.
Language	German
Responsible project partner	AGFW
Audience number	21
Audience typology	**X Policy maker – Local administration** Policy maker – Regional administration Policy maker – National administration **X Authorities and regulative entities** Associations of DHC operators Associations of DHC manufacturing companies Manufacturing companies Engineering companies Industries representatives Universities / Research centres Operators
Duration (hours)	19 h

- **AGENDA, SPEAKERS AND MODERATORS**

Basiswissen Fernwärme

01.-03.07.2025
Frankfurt am Main

Programm | Dienstag, 01. Juli 2025

Leitung:	**Dipl.-Ing. Boris Lubinski, AGFW e.V., Frankfurt am Main** **Errol Unger M.A., AGFW e.V., Frankfurt am Main**
10:00 Uhr	**Einführung** a. Begrüßung & Info zum Ablauf b. Was ist Fernwärme? c. Vorstellung Planungsaufgabe Errol Unger, AGFW e.V., Frankfurt am Main
10:30 Uhr	**Physikalische Grundlagen Teil 1** Boris Lubinski, AGFW e.V., Frankfurt am Main
11:10 Uhr	**Pause**
11:25 Uhr	**Physikalische Grundlagen Teil 2** Boris Lubinski, AGFW e.V., Frankfurt am Main
11:55 Uhr	**Anschluss- und Kundenanlagen Teil 1** a. Hausstation b. Trinkwassererwärmung Dr.-Ing. Ehsan Khorsandnejad, AGFW e. V., Frankfurt am Main
12:25 Uhr	**Mittagspause**
13:20 Uhr	**Anschluss- und Kundenanlagen Teil 2** a. Hausstation b. Trinkwassererwärmung Dr.-Ing. Ehsan Khorsandnejad, AGFW e. V., Frankfurt am Main
14:25 Uhr	**Messung thermischer Energie** Boris Lubinski, AGFW e.V., Frankfurt am Main
14:55 Uhr	**Pause**
15:15 Uhr	**Strömungsmechanik und Druckhaltung** Boris Lubinski, AGFW e.V., Frankfurt am Main
16:45 Uhr	**Ende des ersten Tages**

Programm | Mittwoch, 02. Juli 2025

09:00 Uhr	**Verlegesysteme** a. mit starren Mediumrohren b. Grundlagen der Rohrstatik c. mit flexiblen Mediumrohren d. Armaturen e. Überwachungs- und Fehlerortungssysteme für KMR Boris Lubinski, AGFW e.V., Frankfurt am Main
10:15 Uhr	**Rohrleitungsbau** Boris Lubinski, AGFW e.V., Frankfurt am Main
10:40 Uhr	**Pause**
11:00 Uhr	**Wasseraufbereitung und Überwachung** Errol Unger, AGFW e.V., Frankfurt am Main
11:30 Uhr	**Netzbetrieb** Boris Lubinski, AGFW e.V., Frankfurt am Main
12:30 Uhr	**Mittagspause**
13:35 Uhr	**Grundzüge der Erzeugung und Speicherung von Fernwärme** a. Erzeugung b. Speicher Dr.-Ing. Jens Kühne, AGFW e.V., Frankfurt am Main
15:15 Uhr	**Ende des zweiten Tages**

Programm | Donnerstag, 03. Juli 2025

09:00 Uhr	**Einführung** Boris Lubinski, AGFW e.V., Frankfurt am Main
09:10 Uhr	**Technische Regeln** Boris Lubinski, AGFW e.V., Frankfurt am Main
09:45 Uhr	**Arbeits- und Organisationssicherheit** Lars Nordmann, AGFW e. V., Frankfurt am Main
10:20 Uhr	**Pause**
10:40 Uhr	**Gesetze (GEG, AVBFernwärme, FFVAV, WärmeLV)** Raphael David Schenkel, AGFW e.V., Frankfurt
11:40 Uhr	**Gesetze (WPG 1+2)** Gunnar Maaß, AGFW e.V., Frankfurt am Main
12:00 Uhr	**Gesetze (WPG 3)** Guido Schwabe, AGFW e. V., Frankfurt am Main
12:15 Uhr	**Mittagspause**
13:10 Uhr	**Förderung (BEW, Trafoplan, EEG, KWKG, EFRE]** Guido Schwabe, AGFW e. V., Frankfurt am Main
14:10 Uhr	**Förderung (BEG)** Johannes Dornberger, AGFW e.V., Frankfurt am Main
14:25 Uhr	**Abschlussdiskussion** Boris Lubinski, AGFW e.V., Frankfurt am Main
14:45 Uhr	**Ende des dritten Tages**

- **FINAL CONSIDERATIONS AND OUTCOMES**

The course “Basic know-how for District Heating” (Basiswissen Fernwärme) was designed for municipalities that are newly starting with DHC systems and their newcomer operators. It offered participants the opportunity to learn the basic concepts and physical–technical relationships that are important for understanding modern climate-neutral DH systems, while also providing an overview of the laws and technical regulations relevant for planning, construction and operation, as well as for the relationship between suppliers and customers. Topics covered included DH technology on the first two days – physical and chemical fundamentals, heat generation technology, heat distribution, customer installations and heat measurement – and, on the third day, work organisation, occupational safety, legislation, subsidies and technical rules for DH. In addition, particular attention was paid to how modern DHC networks can make systematic use of low-grade renewable energy and waste heat, for example by designing suitable temperature levels, integrating thermal storage and configuring customer systems so that they can utilise low-temperature sources effectively within the wider decarbonisation framework. The AGFW basic knowledge seminar is aimed at people without or with little prior experience of DH technology or regulation.

3.3.2.2 Event 2

- **GENERAL INFORMATION**

Title	AGFW Trafotage – mittendrin statt nur dabei – 3 Jahre Transformation, 3 Jahre BEW
Date	18 – 19 November 2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Kassel, Germany
Language	German
Responsible project partner	AGFW
Audience number	95
Audience typology	**X Policy maker – Local administration** **X Policy maker – Regional administration** **X Policy maker – National administration** **X Authorities and regulative entities** Associations of DHC operators Associations of DHC manufacturing companies **X Manufacturing companies** **X Engineering companies** Industries representatives Universities / Research centres **X Operators**
Duration (hours)	15 h

- **AGENDA, SPEAKERS AND MODERATORS**

AGFW-TRAFOTAGE - mittendrin statt nur dabei - 3 Jahre Transformation, 3 Jahre BEW

18.-19.11.2025
Kassel

Programm | Dienstag, 18. November 2025

09:30 Uhr	**Begrüßungskaffee**
10:00 Uhr	**Mittendrin statt nur dabei - 3 Jahre Transformation, 3 Jahre BEW** Dr. Jens Kühne, Tobias Roth, Guido Schwabe Bereich Erzeugung, Sektorkopplung und Speicher, AGFW e. V., Frankfurt am Main
10:30 Uhr	**Transformation - viel mehr als eine technische Frage** Prof. Dr. rer. pol. Claus Hartmann, Claus Hartmann GmbH, Rendsburg
11:15 Uhr	**Die Bundesförderung für effiziente Wärmenetze – Zwischenbilanz und Ausblick** Kira Schauer, Bundesministerium für Wirtschaft und Energie, Berlin
12:00 Uhr	**Mittagspause**
	Finanzierungsideen
13:00 Uhr	**Vom Trafoplan - über Investitions- & Finanzierungsplan - zum Preissystem** Andree Simon Gerken und Mario Meyer, PWC PricewaterhouseCoopers GmbH Wirtschaftsprüfungsgesellschaft, Berlin
13:45 Uhr	**Finanzierungsmodelle für eine erfolgreiche Wärmewende** Benjamin Schooß und Moritz Ellersiek, HKCF Corporate Finance GmbH, Köln
	Genehmigungen
14:30 Uhr	**Planungs- und Genehmigungsverfahren in der Praxis: Treiber oder Verhinderer der Wärmewende?** Dr. Max Peters und Moritz Pfannkuch, GEF Ingenieur AG, Leimen
15:00 Uhr	**Kaffeepause**
15:30 Uhr	**Einblick in Genehmigungsverfahren aus Versorgersicht mittels Ausführung PowerLahn** Dominik Lösche, Stadtwerke Gießen AG, Gießen
16:15 Uhr	**Genehmigungsverfahren aus behördlicher Sicht mit Fokus auf Wasserrecht** Oliver Huber, Regierungspräsidium Karlsruhe, Karlsruhe

17:00 Uhr	**Ende des 1. Veranstaltungstages**
18:30 Uhr	**Abendveranstaltung im Sudhaus Kassel, Hafenstraße 54, 34125 Kassel**

Programm | Mittwoch, 19. November 2025

08:30 Uhr	**Begrüßungskaffee**
	Ab in die Praxis
09:00 Uhr	**Von der Strategie zur Umsetzung: No-Regret-Pfade zur klimaneutralen Fernwärme in Linz** Dr.-Ing. Ralf-Roman Schmidt, AIT Austrian Institute of Technology GmbH, Wien Dr. Christian Scheinecker, LINZ STROM GAS WÄRME GmbH, Linz
09:45 Uhr	**Solarthermie - Ist das was für mich?** Manfred Bauer, Bauer Holzenergie GmbH u. Co. KG, Bad Rappenau
10:30 Uhr	**Absenkung der Wärmenetztemperaturen - Fluch oder Segen?** Diskussion im Plenum
11:15 Uhr	**Kaffeepause**
11:30 Uhr	**Zukunftssichere Fernwärme mit Tiefen-Geothermie und Groß-Wärmepumpen – Praxisbericht aus Aarhus (DK)** Alexander Braun, Innargi Germany GmbH, Berlin
12:15 Uhr	**KWK-Evaluierungsbericht der Verbände 2025** Andreas Görtz, BET Consulting GmbH, Aachen
13:00 Uhr	**Mittagspause**
14:00 Uhr	**Ungar, aber wahr** **CCS bei Gaskraftwerken – schnelle Lösung oder kostspieliger Irrweg?** Lukas Schenke, RheinEnergie AG, Köln **Das klimapositive MHKW –eine Vision für 2045?** Prof. Dr. Matthias Finkenrath, Hochschule für angewandte Wissenschaften Kempten **Wasser als Kältemittel** Thomas Mösch, COMBITHERM GmbH, Fellbach **Warum Windthermie die günstigste erneuerbare Wärmequelle ist** Dr.-Ing. Felix Herrmann, Windfire GbR, Leipzig **Geschlossener Kreislauf für horizontale geothermische Bohrungen** Dr. Oliver Weinmann, green therma, Hamburg **Eavor: aktueller Stand** Jörg Dembek, EAVOR GmbH, Düsseldorf
16:00 Uhr	**Ende der Veranstaltung**

- **FINAL CONSIDERATIONS AND OUTCOMES**

Compared to Trafoday 2024, additional focus was set on permission procedures for new RES technologies, such as heat pumps using rivers or lakes as heat source, involving also authorities into the event.

3.3.3 Conclusions and lesson learnt from the capacity building activities

Planning investments for DHC transformation or building new RES based DHC systems basically relate to various fields of the DHC systems chain. Focus is often put on climate neutral heat generation technologies such as heat pumps, solar thermal or waste heat. Evenly important are measures related to an adapted operation of the network (e.g. with lower network temperatures or advanced digitalized monitoring and control platforms). Measures for lowering network temperatures even include the improvement of substations and house installations in the buildings.

Ideally, courses for DHC operators supporting DHC transformation or investment planning should cover all these fields along the process steps of technical planning, permission procedures, economics and financing. Such a format is implemented by AGFW with the yearly course “AGFW trafo days” achieving always a high participation. In addition, various courses are offered to deepen specific topics e.g. the course on solar thermal or the course on lowering network temperatures.

As key stakeholders for realizing climate neutral DHC systems, “DHC newcomer municipalities” as well as “local and regional authorities giving permissions” were identified. AGFW addresses DHC newcomer municipalities with a DHC base course. Permission procedures were a key topic at the AGFW trafo days 2025. More specific formats related to permission procedures are under development.

Providing platforms for exchange and know-how transfer from frontrunners to early follower operators is an essential element for supporting the sector enterprises.



Figure 15. Site visit to a solar thermal plant during an AGFW course

3.4 Lithuania

The capacity building (CB) program in Lithuania was designed to strengthen the competencies of district heating (DH) operators and key stakeholders in line with the country's energy transition goals and EU decarbonization targets. The initiative aimed to provide practical knowledge, share best practices, and introduce innovative solutions for modernizing DH systems. Training topics covered technical aspects such as digitalization, integration of renewable energy sources (RES), and optimization of heat supply, as well as regulatory, financial, municipal and investment planning (non-technical) issues.

CB was held in the period between February 2025 and November 2025. The training sessions varied in length and content distribution. In general, 1-day training sessions in person in Lithuania with additional 3-day study tour to Denmark – to cover all relevant topics. Shorter training sessions were hosted on- line via Teams platform addressing specific topic for target group of participants. Training materials (presentations) were available on LSTA website after each event together with info note summarising the main outcomes.

After training sessions, the participants were usually given an on-line training evaluation form to fill out. The form consisted of overall satisfaction of the event with grade 1 to 5 with open question to emphasise major training strengths, interesting, new and meaningful aspects, identify changes, provide remarks for improving upcoming training sessions further.

3.4.1 National DHC operators' courses (T5.1)

The main instruments for the training needs assessment were previously conducted surveys, questionnaire via Google Forms, interviews via online calls and in-person meetings. Interviewed DHS operators were asked to rate the priority for each proposed topic from their point of view.

The highest priority has been given in line with upcoming financial support schemes from EU structural funds 2021-2027, first calls started at the beginning of February 2025 and adoption of new provisions of Heat Law, National Energy Strategy and other national and EU legal acts with the following focus in technical and non-technical concerns.

Table 5. Preliminary survey on CB topics in Lithuania

Technical topics	Non-technical topics
• Technical optimization of existing DH (DH) systems • Use of low-quality biomass • Development of DH systems, reduced energy losses and cost-effective optimization, predictive maintenance • Digitalization solutions for efficient heat supply • Lowering heat temperatures in networks (transition to 4th-generation DH), • Utilization of waste or excess heat • Short- and long-term heat storage solutions • Heat pumps • Experience and best practices in different EU countries	• Heat planning: municipal heat plans • 10-year DH system development and investment plans • Heat market regulation and new pricing methodology • State aid, support schemes, and funding opportunities • EU policy, legislation, and methodological requirements • DH infrastructure resilience and security • Prevention and management of heat consumer debt

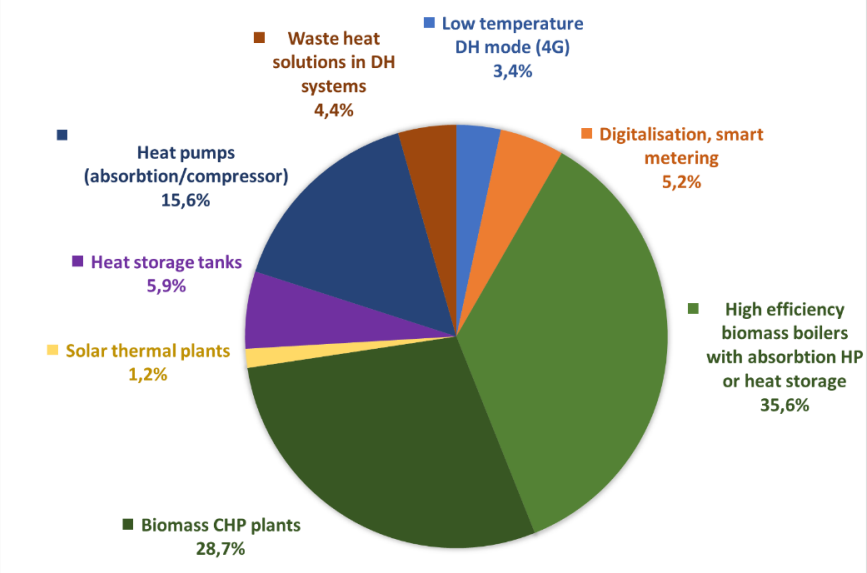

Figure 16. Result of the survey on capacity building for DH operators - Focus on technologies.

The results (collected from 24 respondents) illustrate the scope of RES technology projects planned to be implemented in the near future.
The preferences regarding the type, timing, organization of specific training measure for the DH operators was also collected. All this led to the definition of training plan (Table 6), including 5 courses (instead of the two expected).
It should be noted that some of the prioritized topics overlapped in both the training need assessments of DH operators and stakeholders. Therefore, it was decided not to hold separate sessions for different target group, but to combine the trainings. As a result, operators also participated in the capacity building events intended for the stakeholder group.

Table 6. Overview of the courses for operators in Lithuania

Course 1 (DH operators) *Operation and Planning of Heat Production Sources: Recent technologies for decarbonization*	30 Jan. 2025	On-site Seminar +technical site visit (Prienai)
Course 2 (DH operators+Municipalities+Regulator) *Preparation of investment plans, the investment coordination process, cost allocation, heat pricing*	19 Mar. 2025	Online (Teams) webinar
Course 3 (DH operators) *Feasibility for decarbonization: EnergyPro calculations, simulations of SupportDHC Frontrunner cases*	7 Apr. 2025	Online (Teams) webinar
Course 4 (DH operators) *Digitalization in DH*	12 June 2025	On site Seminar (Vilnius)
Course 5(DH operators+stakeholders) *Study tour to Denmark: knowledge transfer and showcasing of Danish district heating systems, know-how, and solutions*	3-6 Nov. 2025	B2B Workshop, networking +site visits to Danish utilities.

3.4.1.1 Course 1

- **GENERAL INFORMATION**

Title	*Operation and Planning of Heat Production Sources: Recent technologies for decarbonization*
Date	30 January 2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Prienai DH company & hotel Royal SPA (AERO hall), Pakalnes 3, Birstonas, Lithuania
Language	Lithuanian
Responsible project partner	LSTA
Audience number	67 (61 DH operators, 6 manufacturing, engineering companies)
Audience typology	☒ Operators ☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☐ Others (specify)
Duration (hours)	6 hours

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	V. Lukosevicius	Host, Moderator
2	R. Gurklienė	Host, presenter
3	A. Aladaitis	Presenter and discussant
4.	E. Verikas	Presenter and discussant
5.	A. Antulis	Presenter and discussant
6.	R. Kaselis	Presenter and discussant
7	V. Masalskas	Presenter and discussant
8	M. Kryzanauskas	Presenter and discussant

- **AGENDA**

9:30	Arrival at Prienai DH company **2 technical visits** in separate groups (4 groups of 15 participants each): Prienai boiler house (new heat storage tank installed), Balbieriškis automated biomass boiler house.	
11:00	**Welcome coffee & registration**	
11:30	Opening remarks	Valdas Lukosevicius, President of LSTA
11:35	**Description of the Support DHC project and aim of Course**	Ramune Gurkliene - LSTA
11:45	**Latest investment projects by Prienai DH** showcase projects such as an automated biomass boiler, a new condensing economizer, and a 100 m³ heat storage tank, improving operational efficiency and reducing start-stop cycles	Arturas Aladaitis – Production manager of Prienai DH
12:00	**Kaunas Energija:** Network consolidation project in Panemune district, ORC installation at Petrasiunai plant	Ernestas Verikas, Head of Production, AB Kauno Energija.
12:20	Overview of **Klaipėda heat storage** (3000 m^3) tank project	Arturas Antulis, Technical Maintenance Manager, AB Klaipėdos Energija
12:40	**Small-capacity heat pumps in Ukmerge**: project results and techno-economic aspects	Raimondas Kaselis, Deputy Director, UAB Ukmergės Šiluma
12:55	0.6 MW **heat pump for summer operation** in Rukla DH system	Vytautas Masalskas, Project Manager, Jonava DH company
13:10	**Automated biomass boiler house projects and future challenges**	Mindaugas Kryzanauskas, Sales Manager for Baltic States, UAB Kalvis
13:30	Q&A, discussion on participants case studies	
14:00	Lunch/Break	
15:00	Discussions, networking session	
15:40	Closing	




Figure 17. Images of course 1 in Lithuania

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

The course was divided into two parts: a morning session – technical visits and practical applications, and an afternoon session – methodological expert presentations with practical insights. At the end, a questions-and-answers (Q&A) session, accompanied by follow-up discussions, was held to help clarify key issues, strengthen understanding for participants.
Feedback in general was very good. The heat accumulation tank integration into biomass DHS was seen as very interesting, as such technologies are only begins used at the moment in Lithuania. The discussions were also assessed as very positive. Networking and exchange between the different operators were also very helpful. In conclusion, seeing new technologies and best practice examples are very encouraging for the DH operators to start improving their systems.
Training participants (in total, 8 persons) provided very positive feedback. A questionnaire was provided and the average satisfaction grade: 5.00. Feedback emphasized the following:
Strengths:

- Participants were satisfied with the content and organization: *"Everything was well presented and complete."*
- The trainings were considered interesting and useful, providing opportunities to meet and network with representatives from other cities.
- A good balance between theory and practice was noted.
- Presentations naturally transitioned into open discussions, which participants appreciated.
- Strong support for continuing similar training sessions to encourage collaboration among companies.

Suggestions for Future Topics:

- Systems for data collection and reporting, including tools that can generate specific reports.
- Maintain the mix of theory and practical insights.
- Continue fostering interactive discussions and networking opportunities.

3.4.1.2 Course 2

- **GENERAL INFORMATION**

Title	Heat sector Regulation and Pricing issues
Date	19 March 2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	MS Teams
Location	
Language	Lithuanian
Responsible project partner	LSTA
Audience number	50 (33 DH operators, 11 Municipalities, 6 stakeholders)
Audience typology	☒ Operators ☒ Policy maker – Local administration ☐ Policy maker – Regional administration ☐ Policy maker – National administration ☒ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☐ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☒ Others (Association of Local Municipalities)
Duration (hours)	2 hours

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	M. Taparauskas	Host, moderator
2	D. Rimkus	Presenter, discussant
3.	E. Goculenko	Presenter, discussant
4.	E. Paipolienė	Presenter
5	A.Kazlauskienė	Discussant, Association of Local Municipalities
6	V.Lukosevicius	Discussant (LSTA)

- **AGENDA**

14:00	Welcome and introduction to the training session	M. Taparauskas – member of NERC
14:10	***Coordination of Investments in the Heat Sector.*** *Differences between costs and investments and their impact on accounting and pricing, requirements for the 10-year investment plan, Regulator role in investment coordination.*	D. Rimkus – Head of NERC Investment Department
14:25	***Recognition of allocable costs*** *Provisions of the Description of Accounting Unbundling and Cost Allocation Requirements for Heat Sector Companies*	E. Paipolienė- Head of NERC Pricing Department
14:40	**Heat Pricing and regulation** Heat pricing principles, Heat revenue level cycle, Base revenue level, Cost assessment, Practical recommendations	E. Goculenko – advisor of NERC Pricing Department
14:55	Q&A, discussion	
15:30	Closure and follow up	

- **FINAL CONSIDERATIONS AND OUTCOMES**

The aim of this training was to clarify rules for investment planning, cost allocation, and tariff formation for DH companies on implementing updated provisions of the Heat Law (adopted in 2023) and National Energy Regulatory Council (NERC) resolutions regarding investment evaluation and coordination (Municipal Heat plans and 10-year DH investment plans). The online training session was conducted by representatives of the NERC in cooperation with LSTA and Lithuanian Municipalities Association. The target group of participants: DH companies and municipalities. During the training, the investment coordination process was presented, differences between investment plans prepared by municipalities and heat suppliers and those coordinated by NERC were discussed. Key principles of cost allocation and inclusion in regulated tariffs were reviewed. The heat price-setting process was explained, highlighting differences between prices regulated by NERC and those regulated by municipalities. At the end of the training, experts answered questions and shared useful recommendations, such as, how to align investment plans with municipal strategies and NERC requirements, how to ensure timely submission of projects for approval to avoid tariff exclusion; how to prepare detailed justifications for cost changes and efficiency.

3.4.1.3 Course 3

- **GENERAL INFORMATION**

Title	*Feasibility for decarbonization: EnergyPro calculations, simulations of SupportDHC Frontrunner cases*
Date	7 April 2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	MS Teams
Location	
Language	Lithuanian
Responsible project partner	LSTA
Audience number	75 (DH operators)
Audience typology	☒ Operators ☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☐ Others (specify)
Duration (hours)	1,5 hours

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	R. Gurkliene	Host, Moderator
2	V. Dziuvė	Host, Presenter and discussant
3	V. Lukosevicius	Host, discussant

- **AGENDA**

14:00	Welcome. **About the EU LIFE project SupportDHC and CB programme**	R. Gurkliene – LSTA
14:10	***Frontrunner Kaunas*: Neveronys DH system** – an integrated solution: air-to-water heat pump, thermal storage tank, electric boiler , solar plant	V. Dziuve – LSTA
14:40	***Frontrunner Alytus:* Increasing the efficiency of the biomass CHP plan**t – thermal storage tank	V. Dziuve – LSTA
14:50	Q&A, discussion	
15:00	Support DHC technical support: opportunities, available modelling, toolbox and data bases	V. Lukosevicius - LSTA
15:30	*Closing remarks*	

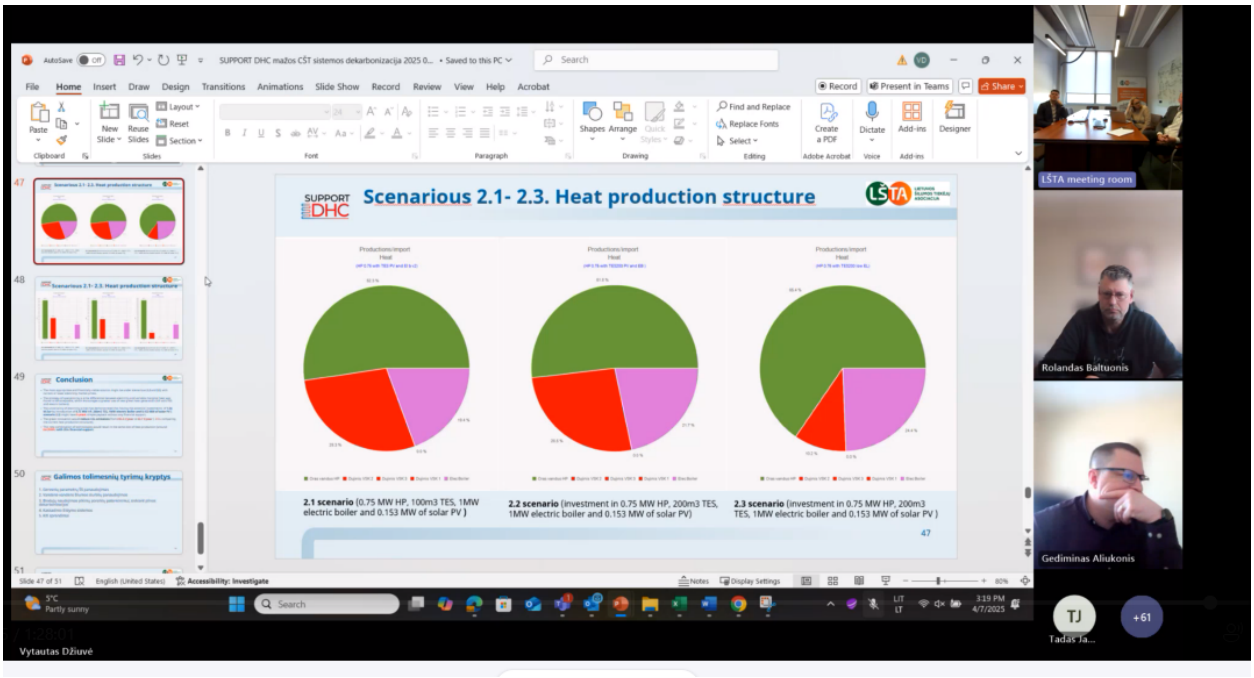

Figure 18. Screenshot of the on-line course 3 in Lithuania

- **FINAL CONSIDERATIONS AND OUTCOMES**

During this online training session, activities implemented under the Support DHC project were presented, along with assessments of technological RES alternatives in the *frontrunner cases*. Analyzes of various solutions in the Neveronys DH system to replace natural gas with renewable sources in a small-capacity boiler plant (a complex of air-to-water heat pump, thermal storage tank, electric boiler, and solar plant). In Alytus there were examined technological solutions for deep utilization of biomass energy (thermal storage tank) – improving the efficiency of the Alytus bioCHP plant.

3.4.1.4 Course 4

- **GENERAL INFORMATION**

Title	*District Heating Digitalization Solutions*
Date	12 June 2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Grand Resort Vilnius Hotel Ežeraičių g. 2, Vilnius
Language	Lithuanian
Responsible project partner	LSTA
Audience number	47 (42 DH operators and 5 engineering companies)
Audience typology	☒ Operators ☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☐ Others (specify)
Duration (hours)	4,5 hours

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	R. Gurkliene	Host, Moderator
2	V. Lukosevicius	Host, Presenter, discussant
3	V. Stanislauskas	Presenter
4	V. Mockevicius	Presenter, discussant
5	A.Kundrotas	Presenter, discussant
6	J. Kaminskas	Presenter, discussant
7	P. Dambrauskas	Presenter, discussant
8	G. Zaliauskas	Presenter, discussant
9	E. Balsevicius	Presenter, discussant
10	L. Alisauskas	Presenter, discussant

- **AGENDA**

9:30	Welcome and registration	
	1 session: Digitalization solutions in DH	
10:00	**Opening remarks**. About the SupportDHC project and CB program	R. Gurkliene, LSTA
10:10	**Brief overview of Lithuania's DH digitalization**	V. Lukosevicius, LSTA
10:30	**Vilnius DH network Digital Twin Project** (pilot and full integrated network). Implementation of smart metering system and solutions	V. Stanislauskas, Vilnius DH company
10:50	**Kaunas DH network digitalization:** creating a digital twin, hydraulic modeling tools, smart remote metering	V. Mockevicius, Kauno Energija
11:05	**Remote control system for heat substations** in Alytus municipal institutions. Installed remote meter data collection system	A.Kundrotas, Alytus DH company
11:20	**Digitalization solutions, results, and future plans in Jonava** DHS	J. Kaminskas, Jonava DH company
11:35	Danfoss Leanheat "**end-to-end" optimization solutions for production-supply-consumption**	P. Dambrauskas, Danfoss UAB
11:50	**Unified data collection and management system in DH**	G. Zaliauskas, IRTC UAB
12:00	Other participants' remarks, discussion	
12:30	Lunch/Break	
	2 session: Cybersecurity Law Requirements	
13:30	NIS2 – the fastest way to lose your business or why you should not ignore geopolitical and cybersecurity threats	L. Alisauskas, Cybersecurity expert
13:50	Cybersecurity implementation processes: Vilnius DH experience	E. Balsevicius, Vilnius DH company
14:10	*Discussion on* concrete action plan for implementing NIS2 requirements and the role of CISO in the DH organization	
14:40	*Closing remarks*	



Figure 19. Image of the course 4 in Lithuania

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

The aim of this seminar was to explore best practices in digitalization and the innovative solutions implemented by DH companies in Lithuania. The morning session focused primarily on benefits and experience sharing, including:

- remote heat and hot water metering systems;
- implementation of management and control systems in heat production, transmission, and consumption;
- optimization of operating modes and energy use;
- smart network monitoring and control systems;
- digitalization of customer service.

The discussion emphasized how full optimization of DH systems must seamlessly integrate customers and their HVAC systems. The afternoon session addressed the implementation of new cybersecurity requirements, as this topic has recently become one of the most relevant issues for ensuring the resilience of critical DH infrastructure in the event of war or extreme situations.

Feedback has been received from 4 participants. The overall rating of the course was 4,75.

3.4.1.5 Course 5

- **GENERAL INFORMATION**

Title	*Study tour to Denmark: knowledge transfer and showcasing of Danish DH systems, know-how, and solutions*
Date	3-6 November 2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Denmark (6 cities)
Language	English
Responsible project partner	LSTA
Audience number	23 (13 DH operators and 10 stakeholders)
Audience typology	☒ Operators ☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☒ Policy maker – National administration ☒ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☐ Others (specify)
Duration (hours)	25 hours

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	J. Vennerberg	Presenter, discussant
2	L. Gullev	Presenter, discussant
3	V. Jarasiuniene	Presenter, discussant
4	V. Lukosevicius	Presenter, discussant
5	E. Norgaard	Presenter, discussant
6	L. Justsen	Presenter, discussant
7	T. Visockas	Presenter, discussant
8	J. Enevoldsen	Presenter, discussant
9	M. R. Hintze	Presenter, discussant
10	T. E. Pedersen	Presenter, discussant

- **AGENDA**

8:00 – 8:30	Welcome session and introduction	
1-day session: Billund, Oksbøl		
8:30 - 12:30	**Seminar and Workshop**: District heating modern technologies; Renewable energy production & planning; Energy efficiency and low temperature in district heating	Jeannette Vennerberg - DBDH Lars Gullev - DBDH Vilma Jarasiuniene - Danish Embassy
	About Lithuanian DH developments	Valdas Lukosevicius- LSTA
	Manufacturer of heat pumps & chillers with natural refrigerants only	Ebbe Nørgaard - Fenagy
	Advanced boiler systems for all types of biomass	Lars Justsen - Justsen
	Kamstrup solutions to suit the need and digitalisation level of customers	Tadas Visockas - Kamstrup
12:45 – 14:15	**1 Site Visit to Billund District Heating :** newest developments, system integration	Jens Enevoldsen, CEO
15:30- 17:15	**2 Site Visit to Oksbøl District Heating :** cooperative utility, emphasizing community involvement and transparency. Recent upgrades include smart meters with leak detection and a new woodchip heating plant	
2-day session: Kassø, Fredericia, Assens		
9:30 – 11:00	**3 Site visit at Kassø PtX project** the world's first large-scale green methanol plant. Topic: how industrial processes can directly support the decarbonization and modernization of DH networks	
12:30 – 13:30	**Meeting with TVIS –(**Triangle Area Heat Transmission Company) - an independent general partnership company owned by 4 municipalities: excess heat from local industries, PtX	
14:30 – 16:00	**4 site visit to Assens District Heating :** Green transition and plans for further development	
3-day session: Sorø, Høje, Taastrup, HOFOR		
8:00 – 9:30	**5 Site Visit to AffaldPlusFjernvarme (Sorø District Heating) :** conversion from gas to district heating, the use of biomass	Marc Roar Hintze, CEO
10:30 – 12:30	**6 Site visit at Hoeje Taastrup District Heating:** CHP from sustainable biomass; waste incineration; Large heat pumps utilizing local energy resources	
13:30 – 15:00	**Meeting with HOFOR :** Green transition of the district heating system in Copenhagen, and strategy for electrification with 300MW heat pumps and 550 MW electrical boilers over the coming 10 years.	Thomas Engberg Pedersen
15:30 – 17:30	**7 Site visit to ARC:** Waste to energy CHP plant	




Figure 20. Image of the course 5 (3-day study visit)

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

The three-day study visit was organized in cooperation with the Danish Board of District Heating (DBDH) and the Danish Embassy in Lithuania. It was an exceptionally interesting study tour to several the most advanced DH facilities - 7 DH companies located across Denmark were visited, providing insights into their latest investments. These included various biomass boiler plants, large-capacity heat pumps, heat storage facilities, and a green methanol plant utilizing residual heat. Technical visits were combined with presentations and discussions on the development and decarbonization of DH systems, competition between different heat sources, pricing, and company management issues. It was an opportunity for Lithuanian DH operators and stakeholders to get acquainted with Denmark's heating sector in a short time, as Denmark is one of the leaders in the EU heat market. Lithuania has already implemented many lessons learned from Denmark's energy sector and policies. This CB served as a good illustration of what awaits the Lithuanian DH sector in the near future. In total, 23 participants from both target groups (13 DH operators, 10 stakeholders) participated in almost 25-hour CB.

3.4.2 National DHC stakeholders' events (T5.2)

In the training need assessment for stakeholder group the highest priority has been given to the provisions stipulated in new National Energy Independence Strategy approved in 2024 (Figure 21) reflecting the main trends to shape DH in the coming decades.

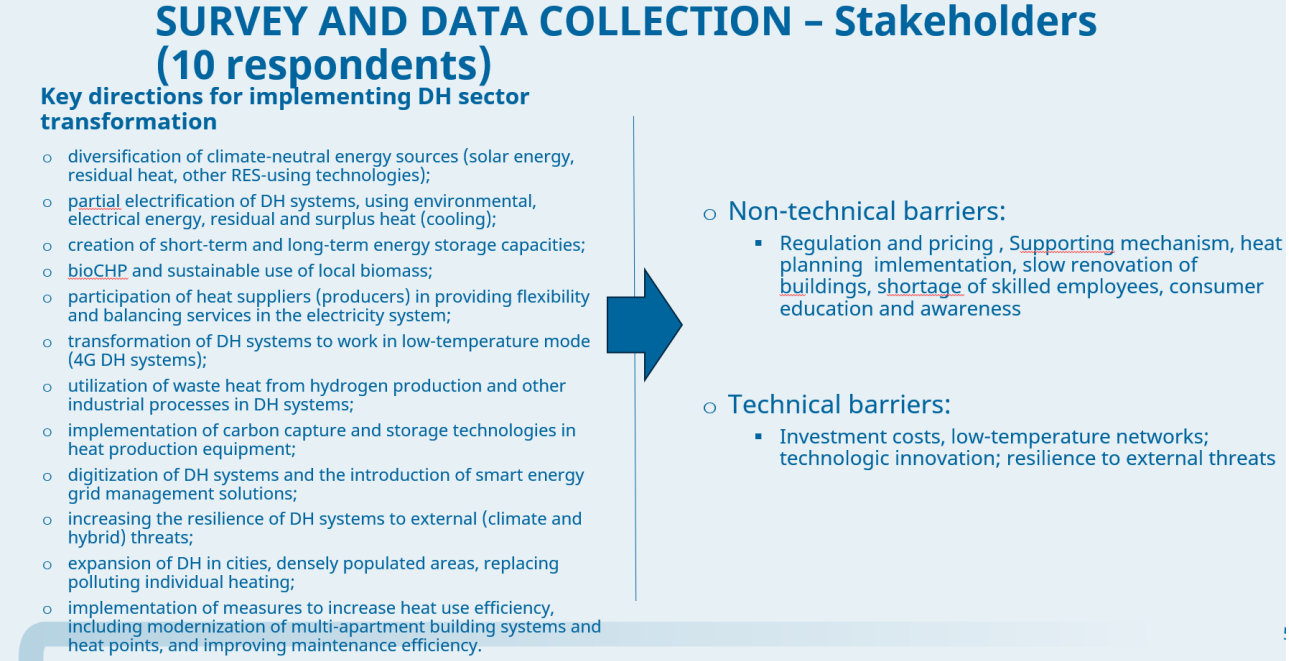

Figure 21. Survey on capacity buildings topics for stakeholders

To successfully cover all relevant aspects, the training topics (both technical and non-technical) were distributed for three events (instead of the two expected) and one additional Study tour to Denmark. The study tour was initially intended for the DH operator; however, during the planning phase, it was decided to also invite state and local authorities in order to address their existing knowledge gaps and enhance their competencies in regulating the DH market (course 5 in section 3.4.1.5). The events were shaped to engage stakeholders, however, many operators also attended as reported in the following sections, especially for event 1 and 3.

Table 7. Overview of the events for stakeholders in Lithuania

Title	Date	Format
Event 1 *Future Development Perspectives of District Heating*	26 Feb. 2025	In-person (Vilnius)
Event 2 Annual conference „HEAT ENERGY-2025“	13 Mar. 2025	In- person (Kaunas)
Event 3 *State aid, RES technologies for DH, Support DHC toolbox*	25 Sep. 2025	In-person (Vilnius)

3.4.2.1 Event 1

- **GENERAL INFORMATION**

Title	*District Heating: Current Issues and Future Development Perspectives"*
Date	26 February, 2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Art City Inn hotel in Vilnius
Language	Lithuanian
Responsible project partner	LSTA
Audience number	61 (24 Stakeholder and 37 DH operators)
Audience typology	☒ Operators ☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☒ Policy maker – National administration ☒ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☒ Industries representatives ☒ Universities / Research centres ☒ Others (Association of Local Municipalities)
Duration (hours)	3 hours

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	R. Gurkliene	Host, moderator
2	V. Lukosevicius	Host, presenter and moderator
3.	E. Gudauskiene	Presenter and discussant
4.	E. Goculenko	Presenter and discussant
5.	A. Rudinskiene	Presenter and discussant
6.	V. Jonutis	Presenter and discussant

- **AGENDA**

12:30	Welcome and registration	
12:50	Welcome. Information on the EU Support DHC Project	Ramune Gurklienė- LSTA
13:00	Keynote speech	Saulius Bucevicius, Chair of the Economic Committee of the Lithuanian Parliament
13:10	Public and State Expectations for the District Heating Sector	Edita Gudauskiene - Vice-Minister of Energy
13:30	Development of the Lithuanian DH Sector in an International Context.	Valdas Lukosevicius - LSTA
13:50	Heat pricing methodology updates: how are DH suppliers successful in applying heat revenues?	Egle Goculenko - NERC
14:10	Financial Instrument “Loans for Heat Suppliers and Producers”	Ausrinė Rudinskienė, Senior Project Manager at ILTE
14:30	Biomass market overview: long-term indexed contracts and quality control improvements	Vaidotas Jonutis, BALTPOOL Sales Manager
15:45	Q&A and Discussion	
16:15	Wrap – up and closing of the session	



Figure 22. CB for stakeholders In Lithuania (Event 1)

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

The event focused on state of the art of DH sector, consumer expectations, pricing disparities, and integration with renewable energy and electricity markets. Key presentations addressed Lithuania’s position in the EU context, regulatory updates, financing opportunities for RES technologies, and biomass market trends. The Event concluded with an open discussion on sector challenges, integration with electricity and hydrogen markets, and strategies for price alignment and decarbonization. Participants had the opportunity to exchange views and receive direct feedback from policymakers.

Feedback has been received from 3 participants. The overall rating of the course was 5,00.

3.4.2.2 Event 2

- **GENERAL INFORMATION**

Title	*Conference "HEAT ENERGY 2025*
Date	13 March 2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Kaunas, Lithuanian Energy Institute
Language	Lithuanian
Responsible project partner	LSTA
Audience number	151 (90 Stakeholders and 61 DH operators)
Audience typology	☒ Operators ☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☒ Policy maker – National administration ☒ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☐ Others (specify)
Duration (hours)	4 hours

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	R. Bakas	Host, Moderator
2	K. Svaikauskas	Speaker and discussant
3.	V. Lukosevicius	Speaker and discussant
4.	A. Agintas	Speaker and discussant
5.	D. Sabunas	Speaker and discussant
6.	D. Jasas	Speaker and discussant
7.	I. Ambrazevicius	Speaker
8.	E. Verikas	Speaker
9.	T. Janusas	Speaker
10.	R. Jonynas	Speaker
11.	R. Urbonas	Speaker

- **AGENDA**

09:15	Welcome coffee and registration	
10:00	Conference Opening and Welcome Address	Andrius Tamosiunas (Deputy Director, LEI), Edita Gudauskienė (Vice-Minister, Ministry of Energy)
10:10	District Heating in Energy Transition Plans	Karolis Svaikauskas - Head of Energy Competitiveness Group, Ministry of Energy
10:30	State of the art of DH Sector in Lithuania	Valdas Lukoševičius LSTA)
10:50	Low-Temperature Networks vs Waste Heat	Andrius Agintas - Head of Infrastructure Team, Vilnius DH company
11:10	Synthetic Fuels and CCS: Future Perspectives in the Heat Sector	Dovydas Sabunas - Head of P2X Project Group, Ignitis Renewables
11:30	Changes and Prospects in DH Regulation	Donatas Jasas - Deputy Chairman, NERC
11:50	Loans for Heat Suppliers and Producers	Ausrine Rudinskiene - Senior Project Manager, ILTE – National Development Bank
12:05	Hydrogen Transport and Production Prospects in Lithuania	Ignas Ambrazevicius- Renewable Energy Product Manager, Amber Grid
12:20	Kaunas DH Experience in Implementing Innovative Power Generation and Expanding Kaunas Integrated Network	Ernestas Verikas - Head of Production Department, Kauno Energija
12:40	Jonavos DH Innovative Digitalization Solutions: Benefits and Future Trends	Dr. Tomas Janušas - Deputy Director for Commerce and Investments, Jonavos DH company
12:55	Training Heat Energy Specialists: Attracting and retaining skilled employees	Dr. Rolandas Jonynas - Department of Energy, Faculty of Mechanical Engineering and Design, Kaunas University of Technology
13:10	Wrap-up and questions	
13:30	Lunch/Break	
14:00	Research and Innovation in the DH sector in the Context of EU Commission Programmes	Dr. Rolandas Urbonas, Lithuanian Energy Institute
14:20	Overview of ongoing EU Projects in the DH Sector (Horizon Europe, Life, Intereg, Erasmus+)	SupportDHC was presented by R. Gurkliene - LSTA
15:20	Discussion of conference outcomes	

- **FINAL CONSIDERATIONS AND OUTCOMES**

During the conference, current and future-relevant issues related to energy policy, regulation, and technological development were discussed, including synthetic fuels, hydrogen transportation, the integration and balancing of renewable energy sources, project financing, the optimisation of heat and electricity generation and supply systems, as well as the development and application of the latest research-based technologies.

The event highlighted solutions for improving the efficiency of the DH sector, including the reduction of heat supply temperatures and the broader utilisation of RES and waste heat. Current topics related to the education and training of energy professionals were also presented.

The afternoon session was focused on on the future prospects of urban heating, solutions to day-to-day operational challenges, and the potential contribution of Lithuanian researchers in introducing innovations to the DH sector. Current projects implemented by LEI, LSTA, Kaunas University of Technology (KTU), and VilniusTECH were presented as well. It was concluded that, for the rational development of the heating sector amid rapidly changing global circumstances, an effective energy policy is essential—one in which Lithuanian scientists could play a greater role.

3.4.2.3 Event 3

- **GENERAL INFORMATION**

Title	District Heating Sector Transformation Towards Decarbonization: Challenges and Directions
Date	25 September, 2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	
Location	Grand Resort Vilnius Hotel Ežeraičių g. 2, Vilnius
Language	Lithuanian
Responsible project partner	LSTA
Audience number	65 (22 Stakeholders and 43 DH operators)
Audience typology	☒ Operators ☐ Policy maker – Local administration ☐ Policy maker – Regional administration ☒ Policy maker – National administration ☒ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☒ Manufacturing companies ☒ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☐ Others (specify)
Duration (hours)	5 hours

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	
1	V.Lukosevicius	Host, Speaker, Moderator (1 session)
2	R. Gurkliene	Host, Moderator (2 session)
3.	K. Svaikauskas	Speaker and discussant
4	A.Dascioras	Speaker and discussant
5	T. Mincevicius	Speaker and discussant
6	R. Puodzius	Speaker and discussant
7	K. Orlingis	Speaker and discussant
8	D. Siauciulis	Speaker and discussant
9	R. Paskevicius	Speaker and discussant
10	V. Dziuve	Speaker and discussant

- **AGENDA**

9:30	Welcome coffee and registration	
	1 session: Policy and Regulatory Frameworks	
10:00	Opening and information on the EU SupportDHC Capacity building training	R. Gurkliene - LSTA
10:05	Lithuanian DH Sector in 2024 and Beyond	V. Lukosevicius - LSTA
10:25	Current Issues of State Aid in the DH Sector and New Biomass Sustainability requirements (REDIII implementation)	K. Svaikauskas – Ministry of energy
10:40	Control and supervision of DH infrastructure to ensure reliable, efficient, and safe production, supply, and consumption	A. Dascioras / Director of the Control and Supervision Department, NERC
10:55	State aid for DH sector: Application Statistics and Evaluation	T. Mincevicius / Senior Project Manager, ILTE Municipal and Housing Financing Division
11:10	Financing measures in other EU countries.	V. Lukosevicius - LSTA
11:25	Promoting RES and Energy Efficiency in DH: Overview of Economic and Technical Aspects of Projects - Biomass vs Heat Pumps	R. Puodzius – Director of TES
11:40	Other Participants' Remarks, Discussions	
12:00	Lunch/Break	
	2 session: Focus on small DH systems decarbonization	
13:00	Analysis of Economic Costs and EE Improvement Opportunities for Small DH Companies	V. Lukosevicius - LSTA
13:20	Best Practices and Challenges of Automated Biomass Boiler Houses: - Insights from Boiler Manufacturer - O&M Experience in practice	K. Orlingis - Commercial Director, UAB "Antara" D. Siauciulis - Director, UAB "Anykščių Šiluma"
13:50	New Technologies and Parameters of Heat Pumps	R. Paskevicius - Director, UAB "Frostera"
14:10	Overview of SupportDHC Project Toolbox and Fruntrunners Results	V. Dziuve - LSTA
14:30	Q&A, Discussions	
15:00	Closing of CB	



Figure 23. CB for stakeholders In Lithuania (Event 3)

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

The morning session aimed on recent updated overview of the DH market in Lithuania based on data for the year 2024. Discussions covered potential directions for **digitalization of DH systems,** including remote reading of heat meters, monitoring and control of heat substations, and advanced modelling and optimization solutions. Swedish technologies for early detection of pipeline defects and continuous monitoring were introduced. The Ministry of Energy outlined new requirements under RED III, which were transposed into national legislation and entered into force in July 2025. Considering that high heat prices in small municipalities have become a problem that needs to be addressed fundamentally, a targeted investment subsidy measure has been established to support heating decarbonisation and efficiency improvements in small DH systems. Subsidies will be available in 2026. The next topic widely discussed in this session was the reducing of temperature regimes in the DH network. A key obstacle is the incompatibility of existing end- consumer systems in buildings. Mandatory technical requirements for heating and hot water systems of apartment houses—adopted in 2022 and requiring modernization of all non-compliant systems by July 2026—have not resulted in tangible progress. NERC reported that around 16% of apartment building heating systems fail to meet mandatory requirements. The modernization process has progressed slowly. Building managers argue that these requirements cannot be enforced without flat owners approval, rendering the regulation largely ineffective. A new Building Data Bank information system is being developed to monitor modernization efforts. The session also reviewed financing practices in other EU countries, where state support for DH planning and expansion is widely available—unlike Lithuania, which currently do not support modernization and development of DH pipelines. Experts preparing investment projects reviewed various RES-based heat production technologies. It was discussed that installing heat pumps or solar thermal collectors without subsidy support could increase heat prices for end consumers, as these technologies are inefficient in winter and cannot replace biomass boilers. Moreover, in many cases, connecting such equipment to the electricity supply infrastructure requires substantial investment—especially for higher-capacity units—at a time when grid capacity in Lithuania is already insufficient.

The afternoon session focused on small DH systems, analysing cost structures and identifying opportunities to reduce heat prices. Discussions covered:

- Technological solutions such as automated biomass boilers, heat pumps, solar energy;
- Practical experiences from Lithuanian DH companies implementing modernization projects;
- Economic modelling tools offered by the SupportDHC project to optimize investment decisions.

The event concluded with an interactive discussion, reinforcing the shared commitment to improving efficiency, reducing costs, and aligning the sector with EU decarbonization goals. Participants gained practical insights into funding opportunities, technological innovations, and strategic planning for sustainable DH development.
Feedback from 14 respondents underline the effectiveness of the event with an overall satisfaction of 4.78 on a 1 to 5 scale where 5 is the maximum satisfaction.
Feedback highlighted the following:

Strengths:

- Highly relevant presentations and practical advice;
- Open discussions and exchange of experiences among colleagues;
- Clear and concise coverage of current issues;
- Valuable networking opportunities.

Areas for Improvement:

- More emphasis on the topic of utilizing residual energy in DH systems;
- Allocate additional time for in-depth analysis of specific issues;
- Consider reviving a technical committee or similar forum for DH engineers and specialists to share experiences;
- Some topics required more time for discussion.

Suggestions for Future Seminars:

- Organize dedicated sessions for deeper technical analysis;
- Continue fostering interactive discussions and knowledge sharing.

3.4.3 Conclusions and lesson learnt from the capacity building activities

For all the courses and events, materials such as pictures, leaflets, presentations, participants lists and media communications were prepared and collected. The presentations were shared with the participants.

CB in Lithuania successfully reached planned objectives. **The number of participants and addressed training sessions exceeded the planned objectives**:

- Instead of 2 Courses and 2 Events there were organized in total 8 CB activities, attracting a wide range of participants from DH companies, municipalities, regulatory bodies, and industry entities, associations;
- Feedback was very positive, highlighting the relevance of topics, the balance between theory and practice, and the value of networking opportunities. Participants emphasized the importance of continuing such initiatives to foster collaboration and accelerate the modernization of DH systems;
- The study tour to Denmark provided unique insights into advanced technologies and management practices, reinforcing Lithuania's commitment to adopting innovative solutions.

The CB activities effectively contributed to achieving the project objectives by strengthening the capacity of DHC operators, authorities and relevant stakeholders and to building the knowledge base required for the decarbonization and digital transformation of the Lithuanian DH sector. As emphasized during the one of the event discussion: "It's good to know something, even better to see it, and best of all to experience it!"

3.5 Poland

Capacity building (CB) activities in Poland were carried out from March to December 2025. The programme was coordinated by the Association of Municipalities Polish Network "Energie Cités" (PNEC), with several SupportDHC project partners contributing as experts and speakers, including representatives from **Halmstad University, AGFW, WIP, PlanEnergi and AEE**.

The primary stakeholders benefiting from the CB activities are local authorities. Strengthening their knowledge and skills is particularly important, as DH companies in Poland are frequently owned or managed by municipalities. Policy- and decision-makers play a crucial role in planning investments, securing funding, and overseeing and guiding related processes. They can also act as key enablers of transformation, ensuring that sustainable approaches to DH become embedded and institutionalised.

The CB also engaged other important groups, including DH operators, industry associations, and regional policymakers.

The CB sessions covered a wide range of topics, including the legal framework for DH and energy efficiency, municipal-level energy management, sustainable heating solutions, modern energy-efficiency technologies, and good practice examples. Participants also explored local conditions relevant to energy-transition planning, the development of renewable energy sources, and both practical and theoretical aspects of DH decarbonisation.

3.5.1 National DHC operators' courses (T5.1)

During the planning of the courses mainly dedicated to operators, PNEC identified potential **synergies with other projects**. The first course was organized in coordination with an initiative under the Polish National Recovery and Resilience Plan, which enabled live translation and allowed the participation of international speakers and attendees. The second course was co-hosted in synergy with the PlanHeat project (co-founded by European Union under Interreg Baltic Sea Region), which focuses on local heat planning and provided valuable insights for DH development and strategy.

To prepare the two courses for DH operators, PNEC developed draft agendas that reflected the most relevant knowledge needs and incorporated insights from the SupportDHC project. PNEC engaged its network to identify and invite field experts, collaborating with them to define the scope and content of the presentations. The organisation also leveraged its connections to promote the events and ensure strong participation. Following the courses, PNEC published summary articles on its website and shared the experts' presentations with the participants.

3.5.1.1 Course 1

- **GENERAL INFORMATION**

Title	Advanced Energy Management in Municipalities – regulations, tools, technologies
Date	14.03.2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	Zoom
Location	-
Language	Polish and English (with live interpretation)
Responsible project partner	PNEC
Audience number	59
Audience typology	1 Operator 30 Policy maker – Local administration 5 Policy maker – Regional administration 3 Associations of DHC operators 1 Associations of DHC manufacturing companies 2 Engineering companies 1 Industries representatives 3 Universities / Research centres Others: • 11 NGO • 2 Interpreters
Duration (hours)	2,5

- **SPEAKERS AND MODERATORS**

N.	Speaker's name	(*)
1	A. Jaskuła, Executive Director of PNEC	Strategic Approach to Energy Management in Cities
2	J. Janosz-Klus, PNEC	Effective Energy Management and Consumption Monitoring in Municipalities
3	B. Kupiec, Deputy Manager, Young Energy Consumers Task Force in European Youth Energy Network, member of the Association "Z energią o Prawie"	Legal and Regulatory Challenges in the Energy Transition
4	M. S. Atabaki, Halmstad University	Power-to-Heat Technologies Supporting the Energy Transition
5	T. Pauschinger, AGFW	Recent Developments of the German DHC sector
6	D. Heiler, AGFW	Local Conditions for an Energy Transition Planning: Case Studies of Chojnice, Skarżysko-Kamienna and Szczecin

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	I. Korohoda, PNEC	Moderator during the first Q&A session
2	I. Kuśnierz, PNEC	Moderator during the second Q&A session

(*) roles are clarified also in the Agenda

- **AGENDA**

Advanced Energy Management in Municipalities – regulations, tools, technologies Friday | 14 March 2025 | 10:00 – 12:30		
10:00-10:20	Strategic Approach to Energy Management in Cities	**Anna Jaskuła**, PNEC
	Title of the session: Systemic Approach	Moderator/Speaker
10:20-10:40	Effective Energy Management and Consumption Monitoring in Municipalities	**Justyna Janosz-Klus**, PNEC
10:40-11:20	Legal and Regulatory Challenges in the Energy Transition	**Bartłomiej Kupiec**, Deputy Manager, Young Energy Consumers Task Force in European Youth Energy Network, member of the Association "Z energią o Prawie"
11:20-11:30	Q&A session with experts	Moderator: **Iwona Korohoda**, PNEC
	Title of the session: Solutions and Local Examples	Moderator/Speaker
11:30-11:45	Power-to-Heat Technologies Supporting the Energy Transition	**Mohammad Saeid Atabaki**, Halmstad University
11:45-12:00	Recent Developments of the German DHC sector	**Thomas Pauschinger**, AGFW
12:00-12:15	Local Conditions for an Energy Transition Planning: Case Studies of Chojnice, Skarżysko-Kamienna and Szczecin	**Daniel Heiler**, AGFW
12:15-12:30	Q&A session with experts	Moderator: **Izabela Kuśnierz**, PNEC

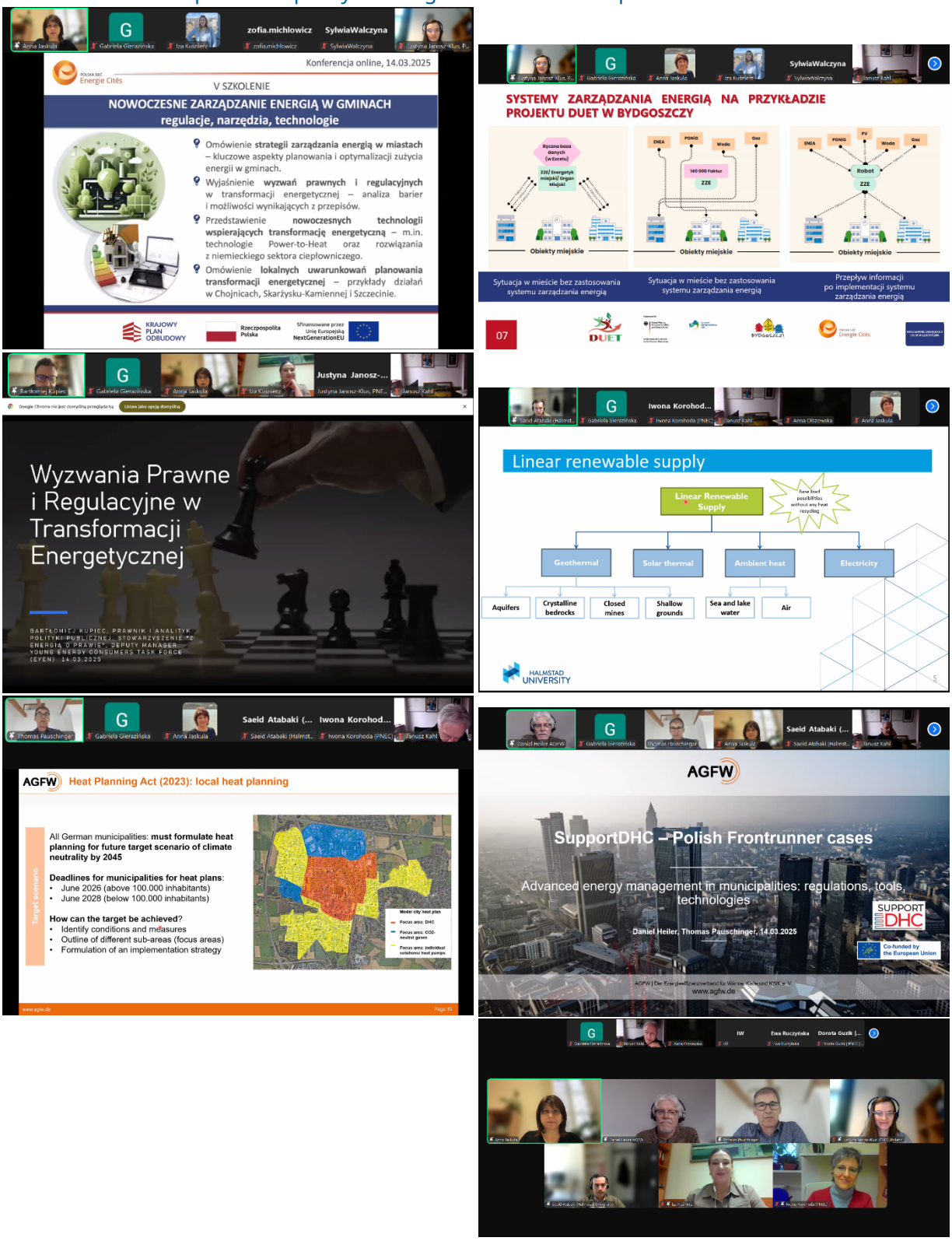

Figure 24. Set of pictures documenting CB in Poland (course 1)

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

All the materials produced such as presentations, pictures, attendance list were collected. Presentations were shared with participants.

Despite the wide range of participants, only one operator attended. However, the training brought together experts, local government officials and representatives of local communities.

It was an opportunity to exchange knowledge and experience, as well as an inspiration to take bold steps towards rational management of energy resources, including heat supply, in municipalities. The main outcomes include:

- **Strengthened energy governance**
  - Participants enhanced their knowledge of strategic energy management, monitoring systems, and long-term municipal planning.
- **Regulatory and legal insights**
  - Key EU and Polish regulations on DH, energy efficiency, and renewables were clarified, supporting local legal preparedness.
- **Technology and efficiency**
  - Advanced solutions, including heat pumps, waste heat utilization, and low-temperature networks, were highlighted for improving energy system efficiency.
- **Best practices and case studies**
  - International examples (Germany) and Polish municipal projects demonstrated practical approaches to decarbonisation and local energy management.
- **Capacity building and stakeholder engagement**
  - Interactive discussions strengthened municipal expertise, knowledge exchange, and the institutionalization of energy management practices.

Overall feedback from participants was **very positive**. The organisation of the webinar was rated highly (mostly **4–5**) and respondents generally agreed that the time allocated to individual topics was appropriate. The usefulness and relevance of the presented content were assessed as **high**, with most participants indicating that the topics matched their needs and interests well. Participants positively evaluated the **level of interactivity**, although some expressed a wish for **more opportunities for discussion e.g. in smaller groups**. The most valued formats for future events included **interactive workshops, group discussions, case studies, Q&A sessions, direct meetings, conferences and study visits**. A few respondents suggested expanding future webinars with **more information on innovative and emerging technologies**.

3.5.1.2 Course 2

- **GENERAL INFORMATION**

Title	Energy transition in the heating sector at the local level - WEBINAR
Date	16.12.2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	Zoom
Location	-
Language	Polish
Responsible project partner	PNEC
Audience number	38
Audience typology	11 Operators 10 Policy makers – Local administration 1 Associations of DHC operators 2 Associations of DHC manufacturing companies 1 Manufacturing company 5 Engineering companies 2 Industries representatives 2 Universities / Research centres Others: • 4 NGO
Duration (hours)	3 h

- **MODERATORS AND SPEAKERS**

N.	Speaker's name	
1	J. Ługowska, Mazovian Energy Agency	Challenges and directions for the transformation of the heating sector in Poland
2	Z. Michlowicz, PNEC	Planning local heat supply in municipalities of the Baltic Sea Region – the PlanHeat project
3	J. Bobrowski, National Energy Conservation Agency	Harmonization of energy data as the key to effective heating planning
4	Sławomir Lorek, City of Konin	Geothermal energy in Konin – directions for development and significance for the local heating system
5	A. Fijas, PNEC	Supporting the use of low-temperature waste heat and renewable energy sources in DHC systems – the SupportDHC project
6	J. Osiak, Płońsk Energy Cluster	Successful examples of the transformation of local heating systems using renewable energy sources
7	M. Komoszynska, PlanEnergi (Denmark)	Tool for preliminary assessment of the economic viability of heat pumps in district heating networks – EnergyPRO calculator

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	A. Jaskuła, PNEC	Moderator

- **AGENDA**

Energy transition in the heating sector at the local level - WEBINAR Tuesday| 16 December 2025 | 10:00 – 12:40		
10:00-10:10	Registration and welcoming of participants	**Anna Jaskuła**, PNEC
10:10-10:30	Challenges and directions for the transformation of the heating sector in Poland	**Julia Ługowska**, Mazovian Energy Agency
10:30-10:40	Planning local heat supply in municipalities of the Baltic Sea Region – the PlanHeat project	**Zofia Michlowicz**, PNEC
10:40-11:00	Harmonization of energy data as the key to effective heating planning	**Jakub Bobrowski**, National Energy Conservation Agency
11:00-11:20	Geothermal energy in Konin – directions for development and significance for the local heating system	**Sławomir Lorek,** DHC Operator in Konin
11:20-11:30	Q&A session	Moderator: **Anna Jaskuła**, PNEC
11:30-11:40	Supporting the use of low-temperature waste heat and renewable energy sources in DHC systems – the Support DHC project	**Anna Fijas**, PNEC
11:40-12:00	Successful examples of the transformation of local heating systems using renewable energy sources	**Jarosław Osiak**, Płońsk Energy Cluster
12:00-12:30	Tool for preliminary assessment of the economic viability of heat pumps in district heating networks – EnergyPRO calculator	**Magdalena Komoszynska**, PlanEnergi (Denmark)
12:30-12:40	Q&A session	Moderator:
12:40	Summary and closing of the meeting	**Anna Jaskuła**, PNEC

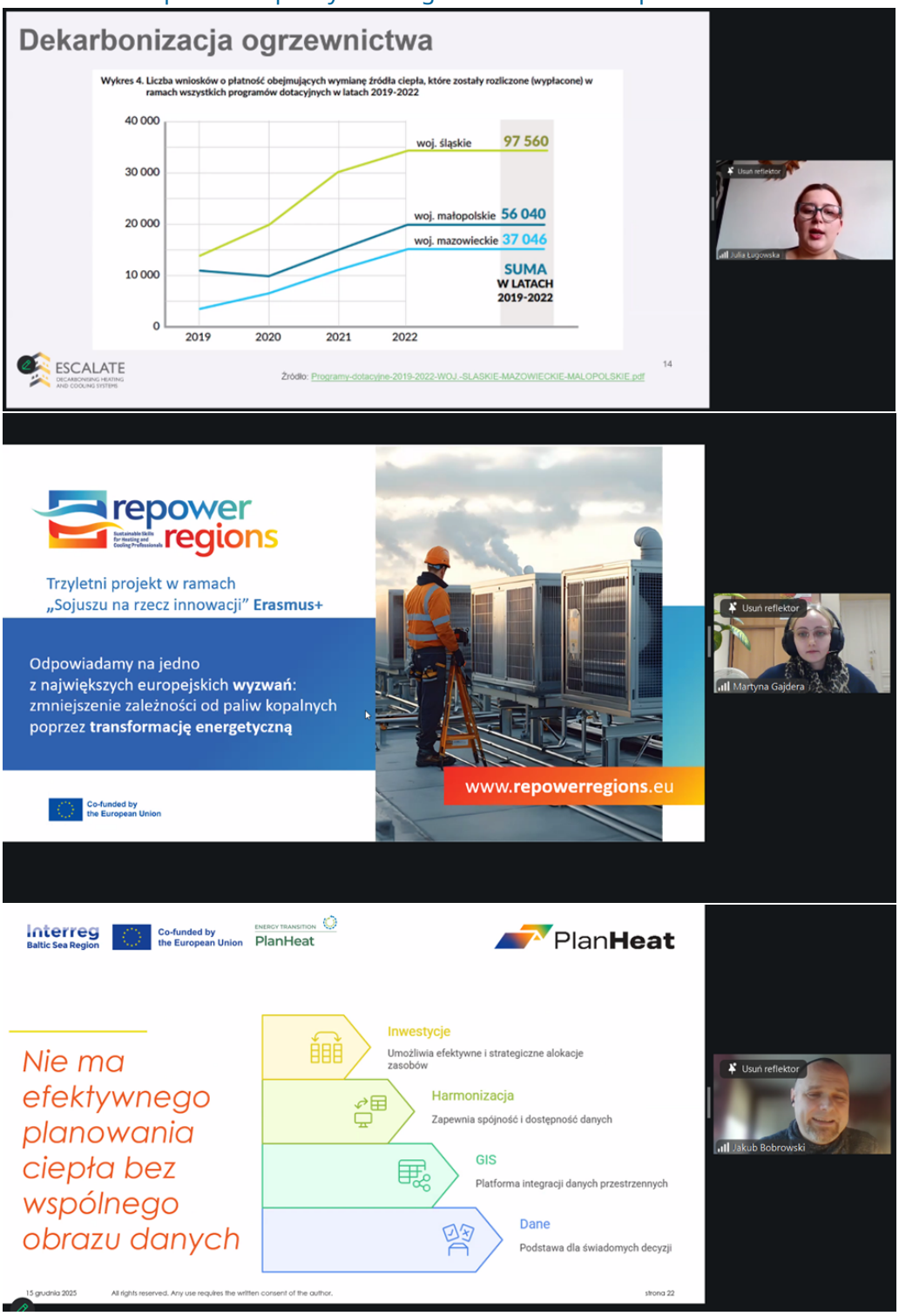

Figure 25. Set of pictures documenting CB in Poland (course 2)

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

The second course was the opportunity for a deeper involvement of Polish DHC operators. The webinar focused on the local-level energy transition of the heating sector and brought together representatives of DHC operators, authorities from municipalities, expert institutions, and practitioners from Poland and the Baltic Sea Region. The discussions addressed key challenges facing DH in Poland, including strong dependence on fossil fuels, rising operational costs, outdated pricing models, and limited availability and quality of data needed for effective

planning. At the same time, the event highlighted concrete pathways and practical tools supporting the shift towards low-emission and energy-efficient heating systems. The main outcomes include:

- **Local heating transition requires integrated planning**
  - Effective decarbonisation of the heating sector must be based on coordinated local heating and cooling planning.
  - Municipalities need clear frameworks that link energy policy, spatial planning, and investment decisions.
- **Data availability and harmonisation are critical barriers**
  - A major challenge identified was the lack of consistent, harmonised energy data at the local level.
  - Spatially accurate, and up-to-date data - supported by GIS tools - are essential for scenario analysis, planning, and cross-country learning.
- **Diversification of heat sources is key to resilience**
  - Moving away from coal requires diversified heating mixes. Renewable energy sources such as geothermal energy, biomass, waste heat, and heat pumps can increase system stability, reduce emissions, and limit exposure to fuel price volatility.
- **Geothermal energy offers strong potential but involves risk**
  - Geothermal heating can provide stable and predictable heat supply, especially for DH systems.
  - Its deployment depends on thorough geological studies, access to financing and risk management, particularly at the exploration stage.
- **Economic viability depends on system scale and optimisation**
  - Renewable heat solutions are not always the cheapest option initially, but they can become competitive or cost-effective when systems reach sufficient scale and are properly optimised, as shown in the Konin and Płońk case studies.
- **Municipal capacity building is essential**
  - Many municipalities lack technical expertise and practical experience in planning and implementing heating transition projects. Training programmes, online courses, and peer-to-peer exchanges were identified as crucial enablers.
- **Practical tools can significantly support decision-making**
  - Tools gathered within projects such as Support DHC or being under development as in PlanHeat, enable to assess heat demand, evaluate technology options, analyse economic scenarios and plan transition pathways in a structured way.
- **Replication and knowledge exchange accelerate progress**
  - Platforms like the Replication Hub and study visits (e.g. to Konin's geothermal plant in future (tbc)) support the transfer of proven solutions to other municipalities, reducing implementation risks and speeding up the learning process.
- **Strong stakeholder cooperation is a success factor**
  - Successful heating transition requires close collaboration between all actors: municipalities, DH operators, energy agencies, and national institutions to align technical, financial, and regulatory aspects.

The webinar resulted in concrete next steps, including bilateral support for geothermal potential assessment, preparation of potential study visits, participation in training programmes, and direct technical assistance for interested municipalities.
All the materials produced such as presentations, pictures, and attendance list were collected. The presentations and the link of the recording of the course were shared with participants.

3.5.2 National DHC stakeholders' events (T5.2)

To prepare the two CB events targeting various DH stakeholders, PNEC prepared draft agendas reflecting the most relevant knowledge areas in DH and reached out to its network to identify and involve field experts. The first event was held during PNEC's annual general assembly, which helped attract a broad audience, while the second was organized alongside a SupportDHC partner meeting, benefiting from the expertise of project partners and invited specialists. Following the events, PNEC published summary articles on its website and shared the experts' presentations with participants.

3.5.2.1 Event 1

- **GENERAL INFORMATION**

Title	Cities and Municipalities in the Green Energy Transformation Process – Polish nationwide seminar 2025
Date	15.05.2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	-
Location	Geovita Training and Conference Center 31 Ogrodowa Streat 05–140, Jadwisin, Poland
Language	Polish
Responsible project partner	PNEC
Audience number	83
Audience typology	2 Operators 57 Policy maker – Local administration 2 Policy maker – Regional administration 3 Authorities and regulative entities 1 Industries representatives 4 Universities / Research centres Others: • 12 NGO • 2 Local authorities association
Duration (hours)	6,5

- **MODERATORS AND SPEAKERS**

N.	Speaker's name	
1	A. Kassenberg, The Institute for Sustainable Development (ISD)	PRESENTATION: Challenges and pathways for European and local energy transition DEBATE: The potential for energy transition in Polish local governments
2	M. Anczewska, Reform Institute	PRESENTATION: Acceleration areas for renewables – objectives and legal conditions DEBATE: The potential for energy transition in Polish local governments
3	R. Zwolak, Mayor of Zamość	DEBATE: The potential for energy transition in Polish local governments
4	G. Grzybczyk, Kraków City Hall	DEBATE: The potential for energy transition in Polish local governments PRESENTATION: How is Krakow fulfilling its European mission to become a smart and climate-neutral city?
5	S. Górka, Włocławek City Hall	DEBATE: The potential for energy transition in Polish local governments
6	P. Adamów, Deputy Mayor of Konin	PRESENTATION: Green Energy City – Renewable Energy Sources in Konin
7	K. Kwiatkowski, Euros Energy	PRESENTATION: The use of renewable energy sources in the Heating Plant of the Future in Lidzbark Warmiński
N.	**Moderator's name**	**Moderator's role (e.g. facilitator, tech support, note taker etc.)**
1	A. Borkowski, Mayor of Serock City and Municipality	Welcoming participants and opening the seminar
2	L. Drogosz, President of the Board of PNEC, Director of the Infrastructure Office, City of Warsaw	Welcoming participants and opening the seminar Moderator in the debate: The potential for energy transition in Polish local governments
3	A. Jaskuła, Executive Director of PNEC	Welcoming participants and opening the seminar Moderation of the session: Challenges and pathways for European and local energy transition
4	I. Kuśnierz, PNEC	GOOD PRACTICE SESSION: Efficient district heating systems in practice
5	J. Osiak, Płońska Energia Foundation	GOOD PRACTICE SESSION: Efficient district heating systems in practice

- **AGENDA**

Cities and Municipalities in the Green Energy Transformation Process Thursday | 15 May 2025 | 10:00 – 16:30		
10:00-10:30	Registration of participants, welcome coffee	-
10:30-11:00	Welcoming participants and opening the seminar	• **Artur Borkowski**, Mayor of Serock City and Municipality • **Leszek Drogosz**, President of the Board of PNEC, Director of the Infrastructure Office, City of Warsaw • **Anna Jaskuła**, Executive Director of PNEC
	Title of the session: Challenges and pathways for European and local energy transition Moderator: Anna Jaskuła	Moderator/Speaker
11:00-11:20	Challenges and pathways for European and local energy transition	**Andrzej Kassenberg**, The Institute for Sustainable Development
11:20-11:40	Acceleration areas for renewables – objectives and legal conditions	**Marta Anczewska**, Reform Institute
11:40-13:00	DEBATE: The potential for energy transition in Polish local governments • Participants: ○ **Andrzej Kassenberg**, The Institute for Sustainable Development ○ **Rafał Zwolak**, Mayor of Zamość ○ **Grzegorz Grzybczyk**, Kraków City Hall ○ **Sebastian Górka**, Włocławek City Hall ○ **Marta Anczewska**, Reform Institute	Moderator: **Leszek Drogosz**, President of the Board of PNEC, Director of the Infrastructure Office, City of Warsaw
13:00-14:00	Lunch	-
	Title of the session: Renewable energy sources in local governments – experiences and inspiration	Moderator/Speaker
14:00-14:20	Green Energy City – Renewable Energy Sources in Konin	**Paweł Adamów**, Deputy Mayor of Konin
14:20-14:40	The use of renewable energy sources in the Heating Plant of the Future in Lidzbark Warmiński	**Kamil Kwiatkowski**, Euros Energy
14:40-15:00	How is Krakow fulfilling its European mission to become a smart and climate-neutral city?	**Grzegorz Grzybczyk**, Kraków City Hall
15:00-15:30	Coffee break	-
	Title of the session: Local actions supporting the green transition – good practices session	Moderator/Speaker
15:30-16:30	Efficient district heating systems in practice	**Izabela Kuśnierz**, PNEC **Jarosław Osiak**, Płońska Energia Foundation



Figure 26. Set of pictures documenting CB in Poland (even 1)

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

All the materials produced such as presentations, pictures, and attendance list were collected. Presentations were shared with participants.

The seminar *"Cities and Municipalities in the Green Energy Transformation Process"* provided a valuable opportunity to enhance knowledge on DH, exchange experiences, and engage in constructive discussions with peers and experts. The final outputs of the event include:

- **Enhanced knowledge on district heating and energy transition**
  - Participants gained insights into European and national climate and energy policies and their implications for municipal energy planning.
  - Key energy challenges up to 2050 were discussed, along with components of actionable local energy strategies.
- **Good practices and renewable energy deployment**
  - The seminar showcased successful municipal examples of renewable energy integration into heating systems and urban infrastructure, including:

- Konin – a “Green Energy City” with predominantly renewable-based heat supply.
- Lidzbark Warmiński – the “Future Heat Plant” utilizing renewable sources.
- Kraków – climate-neutral initiatives supported by energy-system simulation tools.

- **Capacity building for local authorities**
  - The event emphasized the importance of strengthening administrative capacity in municipalities to support sustainable DH and energy transition planning.
  - Training and exchange of experiences among local authorities, experts, and stakeholders were highlighted as key enablers of transformation.
- **Stakeholder engagement and networking**
  - The seminar facilitated knowledge exchange, experience sharing, and the establishment of new contacts and collaborative opportunities.

The seminar received **very positive overall feedback** (ratings 4–5). Participants reported a **clear increase in knowledge** related to **energy transition pathways**, **deep renovation processes** and **technical, financial and administrative aspects** relevant to the heating and cooling sector. High scores also indicate that the seminar supported a better understanding of how these topics can be **applied in future planning and policy work**. Participants expressed strong interest in **further cooperation and knowledge exchange**, confirming the relevance of the seminar for ongoing and future activities related to sustainable heating and cooling.

3.5.2.2 Event 2

- **GENERAL INFORMATION**

Title	SUPPORT-DHC seminar
Date	28.10.2025
Physical/Virtual	Physical
Platform/e-tools used (if virtual)	-
Location	Provincial Public Library in Krakow 1 Rajska Streat, 31-124 Kraków, Poland
Language	English
Responsible project partner	PNEC
Audience number	22
Audience typology	3 Operators 4 Associations of DHC operators 2 Associations of DHC manufacturing companies 1 Industries representatives 6 Universities / Research centres Others: • 4 NGO • 2 Consulting agencies
Duration (hours)	3

- **MODERATORS AND SPEAKERS**

N.	Speaker's name	
1	D. Rutz, WIP	Introduction to the SUPPORT-DHC project and key activities Frontrunners experience: Decarbonisation strategy for Chojnice and Skarżysko-Kamienna
2	T. Pauschinger, AGFW	Introduction to the SUPPORT-DHC project and key activities
3	J. Szymczak, President, Polish District Heating Chamber of Commerce	District heating transformation in Poland – opportunities and risks
4	A. Palacz, Coal Exit Project Manager, E.ON	Strategic decarbonisation of district heating companies in Poland
5	S. Retschitzegger, AEE	Frontrunners experience: Decarbonisation strategy for Chojnice and Skarżysko-Kamienna
6	P. Jastrzębski, Director of Innovation, MPEC Kraków	Efficiency and sustainability of heat infrastructure in Krakow
N.	**Moderator's name**	**Moderator's role (e.g. facilitator, tech support, note taker etc.)**
1	A. Jaskuła, Executive Director of PNEC	Moderator of the seminar and the discussions

- **AGENDA**

SUPPORT-DHC seminar Tuesday | 28 October 2025 | 9:00 – 12:10		
9:00-9:10	Welcome	**Anna Jaskuła**, Executive Director of PNEC
9:10-9:30	Introduction to the SUPPORT-DHC project and key activities	**Dominik Rutz**, WIP, Project Coordinator **Thomas Pauschinger**, AGFW
9:30-9:50	District heating transformation in Poland – opportunities and risks	**Jacek Szymczak**, President, Polish District Heating Chamber of Commerce
9:50-10:20	Strategic decarbonisation of district heating companies in Poland	**Adam Palacz**, Coal Exit Project Manager, E.ON
10:20-10:50	Coffee break	-
10:50-11:20	Frontrunners experience: Decarbonisation strategy for Chojnice and Skarżysko-Kamienna	**Daniel Heiler**, AGFW **Stefan Retschitzegger**, AEE
11:20-11:40	Efficiency and sustainability of heat infrastructure in Krakow	**Paweł Jastrzębski**, Director of Innovation, MPEC Kraków
11:40-12:10	Panel disscusion	Moderator: **Anna Jaskuła**, Executive Director of PNEC



Figure 27. Pictures documenting CB in Poland (event 2)

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

All the materials produced such as presentations, pictures, attendance list, articles were collected. Presentations were shared with participants.

Although a wider group of stakeholders and operators was invited to the seminar, their participation was limited due to some circumstances. The event gathered 22 participants in total, including project partners (18 participants) and externals (4 participants) acting as

speakers and moderators. Nevertheless, the outcomes of the seminar were further disseminated to stakeholders and operators through project communication channels.
The event offered insights into the transformation of Poland's DH sector, featuring contributions from industry experts and practitioners. The main outcomes include:

- **Prospects and challenges**
  - High-level presentations addressed opportunities and risks in Poland's DH transformation.
  - Decarbonisation practices were shared: experiences of E.ON., and frontrunner cases from Chojnice and Skarżysko-Kamienna.
  - MPEC Kraków presented on improving efficiency and sustainability of its heat infrastructure.
- **Expansion and investment plans**
  - Presented examples showcased a low-carbon investment plans, demonstrating how such infrastructure can replace fossil-based heating.
- **Energy transition relevance**
  - The event highlighted how scaling up renewable energy sources and other low-emission technologies within DH networks can enhance energy security, reduce carbon emissions, and support decarbonisation strategies.

3.5.3 Conclusions and lesson learnt from the capacity building activities

The 2025 CB programme in Poland strengthened the knowledge base and strategic capabilities of key actors involved in the **transformation of the district heating (DH**) sector. Through courses and national stakeholder events, local authorities, DH operators, and industry organisations representatives enhanced their practical and regulatory insights essential for advancing sustainable heating systems.
The activities contributed to an improved understanding of the evolving legal and policy framework for DH, including European and national requirements related to energy efficiency, renewable energy integration, and long-term system planning. Participants developed stronger competencies in municipal energy management, investment planning, and the institutionalisation of sustainable approaches within local administrations.
Technological aspects were widely discussed, with experts presenting modern low-carbon solutions such as heat pumps, waste-heat utilisation, low-temperature networks, geothermal options, and best-practice examples from both Poland and other European countries. These insights demonstrated clear pathways for decarbonising DH networks and improving system efficiency.
The programme also facilitated broad stakeholder engagement by creating platforms for dialogue, exchange of experience, and cooperation across municipalities, operators, and national associations. This contributed to stronger networks supporting the energy transition at the local level.
Overall, the CB activities enhanced Poland's preparedness for the transformation of the DH sector by:

- improving knowledge and skills within municipal administrations and DH operators,
- increasing awareness of available low-carbon technologies and practical decarbonisation solutions,

- strengthening institutional capacity for planning and implementing sustainable heating strategies, and
- fostering collaboration among relevant actors in the DH ecosystem.

These outcomes provide a solid foundation for continued progress toward a more efficient, low-emission, and resilient DH sector in Poland.

3.6 Ukraine

The Capacity Building (CB) program in Ukraine (March–December 2025) focused on the modernization and decarbonization of district heating (DH) to enhance national energy security and resilience. Coordinated by the City Institute (Lviv), the program engaged municipal DH operators and local policy-makers, who are key to transforming municipally-owned heating systems.

Due to security challenges and the wide geography of participants, all sessions were held online via Zoom.

Key topics included:

- Legal frameworks for energy efficiency and renewable energy (RES);
- Technical solutions for low-temperature heating networks;
- Waste heat recovery (e.g., from wastewater) using industrial heat pumps;
- Practical use of the SupportDHC Toolbox for investment planning.

The program followed a structured four-step approach:

- Identification: Mapping operators and leaders committed to decarbonization;
- Assessment: Using surveys to tailor topics to the participants' needs;
- Training: Delivering courses on innovative tools and "know-how" methodologies;
- Networking: Building a technical group of operators for future policy collaboration.

Despite significant challenges, initial CB activities for DHC expansion and decarbonisation were launched and, according to the CB program of the project, two courses and one event were realized.

The **preparation of the program** of the CB activities and of their realization has included several stages such as:

- Identification and engagement of target DHC operators;
- Preparation of a survey for operators to collect preferences about timing, topics, logistical aspects and format of the events;
- Analysis of the survey results;
- Creation of the final contact list and interlocution.

According to the list reported above, the following supporting materials were used during the event implementation:

- Summary of the results of the survey used to shape the CB program;
- Event agenda to provide a schedule of sessions, including timing and topics;
- Conclusions and follow-up.

The invitations were sent by e-mail and WhatsApp.

3.6.1 National DHC operators' courses (T5.1)

The elaboration of the topics to be faced and of the agenda of the events was accomplished after the preparatory stages in which the most relevant operators were selected and engaged. Operators who expressed a desire to join the European project and the idea of DH network decarbonization were selected. Taking into account the wide geography and security issues, all interaction at this stage was decided to be conducted online.

The focus was on familiarizing participants with the know-how toolbox and the decarbonization tools. Details are reported in the following tables.

3.6.1.1 Course 1

- **GENERAL INFORMATION**

Workshop's details	Description
Title	Integration of Renewable Energy Sources (RES) and Innovative Tools of the Support DHC Toolbox
Date	30th October 2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	Zoom
Target country	Ukraine
Language	Ukrainian
Responsible project partner	City institute
Capacity Building typology	For operators (5.1)
Audience number	The in-person attendance was of 6 participants, including the City Institute and operators representatives.
Audience typology	☐ Policy maker – Local administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☐ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☐ Engineering companies ☐ Industries representatives ☐ Universities / Research centres ☒ Operators
Duration	1 hour

- **MODERATORS AND SPEAKERS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	Maksym Terletskyi	Presenter and moderator
2	Vitalii Voloshyn	discussant

- **AGENDA**

14:50	Welcome and registration	
15:00-15:15	Welcome and participant greetings. Overview of the project's main goals and objectives (Capacity Building, Technical Assistance, Strategic Planning). Setting the context: why RES is a key priority.	Maksym Terletskyi (CI)
15:15-15:30	The importance of integrating RES into Ukraine's energy system. Review of key requirements and recommendations from EU Directives on energy efficiency and District Heating (DH). Financial and reputational benefits for cities.	Vitalii Voloshyn (CI)
15:30-16:00	Presentation of the innovative toolkit (Toolbox). How it helps DH operators: algorithms and methodologies for analyzing the potential of RES (biomass, waste heat, solar). Practical examples of incorporating RES into the heating network.	Maksym Terletskyi (CI)

- **FURTHER DETAILS**

Title	Integration of Renewable Energy Sources (RES) and Innovative Tools of the Support DHC Toolbox
Description, topics and aims	This session focuses on the renovation of District Heating (DH) systems through the integration of Renewable Energy Sources (RES) and the efficient utilization of waste heat using heat pumps, aiming to equip DH operators with tools for planning the complete decarbonization of the heat supply at the city level, while also addressing the significant non-technical and educational barriers that impede the widespread transition to sustainable heating networks.
Speakers	Representatives from City Institute.
Moderator	M. Terletskiy
Format	webinar
Main remarks from the session	Main Remarks from the Session: The most interesting takeaways can be summarized as it follows: • Regulatory and Authorization Complexity: The significant impact of challenges at the legislative, authorization, and regulatory levels was heavily emphasized. These issues are particularly acute for complex multi-utility projects. • International and European experience: based on successfully completed projects and established know-how in energy transition, clearly demonstrates that effective action requires several fundamental elements: stable regulatory conditions, long-term financing, strategic planning, active involvement of the Municipal Administrations, and a concerted effort to build consumer trust.

3.6.1.2 Course 2

- **GENERAL INFORMATION**

Workshop's details	Description
Title	Modernization and Decarbonization of District Heating (DH): Practical solutions
Date	28th November 2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	Zoom
Target country	Ukraine
Language	Ukrainian
Responsible project partner	City institute
Capacity Building typology	For operators (5.1)
Audience number	The in-person attendance was of 8 participants, including the City Institute, Danfoss Ukraine and operators representatives.
Audience typology	☐ Policy maker – Local administration ☐ Policy maker – National administration ☐ Authorities and regulative entities ☒ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☐ Engineering companies ☒ Industries representatives ☐ Universities / Research centres ☒ Operators
Duration	1h and 30 minutes

- **MODERATORS AND SPEAKERS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	V. Voloshyn	Host, presenter and moderator
2	Kyrylo Baranchuk	Presenter

- **AGENDA**

10:50	Welcome and registration	
11:00 – 11:05	Introduction and Context Setting. Welcoming participants, overview of the training's goal within the Support DHC Capacity Building Programme.	Vitalii Voloshyn (CI)
11:05 – 11:15	Non-Technical Decarbonization Challenges: Strategy and Regulatory Context. Focus on priorities (based on surveys): the need for a rapid transition to RES, financial barriers, and the role of local authorities in decision-making.	Vitalii Voloshyn (City Institute)
11:15 – 12:05	Main Presentation: Technical Solutions for DH System Renewal.	Kyrylo Baranchuk (Danfoss Ukraine)
12:05 – 12:30	Summary and Next Steps. Recap of key training conclusions, thanks to the speaker, announcement of future Support DHC activities, and expectations for using the acquired knowledge.	Vitalii Voloshyn (Moderator)

- **FURTHER DETAILS**

Title	Modernization and Decarbonization of District Heating (DH): Practical solutions
Description, topics and aims	This session focused on the technical challenges and core principles of District Heating (DH) decarbonization. A key area explored was the advantages and preparation of existing DH networks for operation with lower temperatures, underlining the primary interest in the optimization and extension of current infrastructure assets. Furthermore, the session addressed the Integration of Renewable Energy Sources (RES) and Surplus Heat (Waste Heat), specifically examining the crucial role of industrial heat pumps in utilizing secondary heat sources for diversifying energy supply and introducing new, efficient technologies.
Speakers	Kyrylo Baranchuk (Danfoss), V. Voloshyn (CI)
Moderator	V. Voloshyn
Format	webinar
Main remarks from the session	Low-Temperature Network Transition: The critical challenge identified is how to effectively prepare existing, high-temperature infrastructure for operation with lower temperatures, strategic role of industrial heat pumps in utilizing secondary (waste) heat sources for thermal energy production, which is key to diversification of energy sources and adopting new technologies. Additional Challenge: Russian invasion and Resilience. The full-scale Russian invasion has transformed decarbonization from a long-term goal into an imperative for national security and system resilience.

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

Products such as participant lists, presentations etc. were collected. Presentations were shared with the participants.

The summary of the main results of the two courses is reported in the following sub-sections. The main outputs of the events are:

- A list of operators willing to cooperate and form a permanent technical group to create specific proposals for both local city authorities and the central government;
- The participants agreed on the necessity of conducting a deep and comprehensive analysis of existing investment plans to effectively ensure the strategic attraction and integration of Renewable Energy Sources (RES) into the heat supply sector;
- A list of the questions proposed in the open discussion.

Following the discussion, the operators reached an agreement on the following three concrete next steps:

- Feasibility Study for Local RES Integration: To initiate an exploration and discovery of the technical and economic potential of local, low-carbon Renewable Energy Sources (RES) within their respective DH networks;
- Toolbox Knowledge Transfer and Application: To engage in the transfer of know-how and expertise related to the innovative Toolkit (Toolbox), facilitating its practical application for comprehensive analysis of decarbonization potential and system optimization;
- Development of Strategic Investment Plans: To commence the study and drafting of detailed investment plans necessary to implement the identified RES and energy efficiency measures, ensuring a financially sound path towards the decarbonization goals.

3.6.2 National DHC stakeholders' events (T5.2)

3.6.2.1 Event 1

After selecting and engaging key stakeholders, the specific topics and agenda for the event were elaborated. The structure of the contributions was designed to present a full spectrum of technical and non-technical barriers and to inspire a collaborative discussion focused on generating possible solutions, both during the scheduled sessions and in the follow-up period.

- **GENERAL INFORMATION**

Workshop's details	Description
Title	Utilization of Renewable Energy Sources and Low-Grade Heat in the District Heating System as a Component of City Resilience
Date	21th November 2025
Physical/Virtual	Virtual
Platform/e-tools used (if virtual)	Zoom
Target country	Ukraine
Language	Ukrainian
Responsible project partner	City institute
Capacity Building typology	For stakeholders (5.2)
Audience number	The in-person attendance totalled 9 participants, including the City Institute and key local stakeholders from the Lviv administration and utilities. • The City institute Team • The Head of Lvivteploenerho • One Representative of Lvivvodokanal • One Representative of the Lviv Municipal Administration (LMR)
Audience typology	☒ Policy maker – Local administration ☐ Policy maker – National administration ☒ Authorities and regulative entities ☐ Associations of DHC operators ☐ Associations of DHC manufacturing companies ☐ Manufacturing companies ☐ Engineering companies Industries representatives ☐ Universities / Research centres ☒ Operators
Duration (hours)	1h and 30 minutes

- **MODERATORS AND SPEAKERS**

N.	Moderator's name	Moderator's role (e.g. facilitator, tech support, note taker etc.)
1	V. Voloshyn	Presenter and moderator
2	O. Odynets	discussant
3	V. Bilinskiy	discussant
4	O. Sladkova	discussant

- **AGENDA**

10:50	Welcome and registration	
11:00-11:45	Introduction to the Support DHC Project: Goals and Objectives. Presenting the project's strategy and expected outcomes for local DH modernization	Vitalii Voloshyn (CI)
11:45-12:00	Decarbonization Opportunities for Lvivteploenerho. The company's real needs and prospective project solutions for the coming years regarding energy source decarbonization	O.Odynets (Lviv District Heating Company)
12:00-12:30	Potential for Utilizing Wastewater Treatment Plant (WWTP) Heat for the Lviv Community. (Current projects of the utility focusing on heat recovery)	V.Bilinskiy (Lviv Water Utility)

- **FURTHER DETAILS**

Title	Utilization of Renewable Energy Sources and Low-Grade Heat in the District Heating System as a Component of City Resilience
Description, topics and aims	This session provided a comprehensive overview of the current status and potential evolution of the District Heating (DH) sector in Lviv, with a primary focus on improving city resilience through resource diversification. Topics covered included the current operational state and decarbonization needs of Lvivteploenerho, the technical potential and barriers associated with utilizing Lvivvodokanal's waste heat from wastewater treatment, and the role of the Lviv National University (LNU) Department of Energy in addressing the sector's new training demands. It has been explored how the local regulatory and administrative frameworks affect the growth and financing of RES and low-grade heat projects. The aim was to deepen the most relevant and characterizing conditions, challenges, and drivers for the Lviv DH sector and how the activities of the Life SupportDHC project can support the penetration and decarbonization of DH in Lviv.
Speakers	Representatives from Lvivteploenerho, Lvivvodokanal, and Lviv National University (LNU) – Department of Energy.

Moderator	V. Voloshyn
Format	Seminar
Main remarks from the session	Main Remarks from the Session: The most interesting takeaways can be summarized as it follows: • Non-Technical Barriers: The importance of the challenges at legislative, authorization, and regulatory level was underlined, particularly as they pertain to multi-utility projects like the Lvivvodokanal heat recovery. • Support Mechanisms: Despite the problem of decarbonization emphasized by Lvivteploenerho, mechanisms and administrative processes currently do not appear to be sufficiently supportive enough for the sector's needs. A challenge significantly exacerbated by the limitations and instability created by the ongoing martial law (war time conditions). • International Experience Context: International and European experience suggests effective actions, underlining the importance of having stable conditions, adequate financing, at least medium-term planning, involving the Lviv Municipal Administration (LMR), and building consumers' trust in the efficiency of decentralized and low-temperature DH systems.

- **FINAL CONSIDERATIONS, OUTCOMES, SURVEY OF SATISFACTION**

The project concluded its CB stage with a single online event held in Lviv. The core focus of the session was a detailed online discussion on the feasibility and barriers associated with utilizing Lvivvodokanal's waste heat for District Heating and Cooling (DHC) purposes. The event aimed to explore practical solutions and address the technical and non-technical challenges specific to the Lviv context.
The presentations and other materials were collected and shared with participants.
The main outputs of the event are:

- A list of stakeholders available to cooperate and to co-construct a lasting technical table aimed at formulating concrete proposals for both the Lviv Municipal Administration (LMR) and central government authorities.
- A list of the questions proposed in the open discussion (acting as a round table).

Following the successful discussion on the utilization of waste heat, the stakeholders agreed on the following three concrete next steps:

- To develop a comprehensive Technical and Economic Feasibility Study (TEFS) regarding the use of waste heat from the Wastewater Treatment Plant (WWTP/KOC) and other low-grade sources.
- To create a development concept for the Northern District of Lviv whose energy supply would include the integration of Renewable Energy Sources (RES).

To prepare the next follow-up meeting with a more detailed agenda and the engagement of additional, relevant stakeholders.

3.6.3 Conclusions and lesson learnt from the capacity building activities

Despite significant challenges, initial CB activities for DHC expansion and decarbonisation were successfully launched. Although participation was slightly lower than initially expected and the global duration rather short, the methodology and guidelines developed under SupportDHC provide a solid foundation for the future establishment of more structured and sustainable CB processes as conditions improve.

4 General conclusions and lessons learnt from the CB activities

The activities under tasks 5.1 and 5.2 effectively contributed to achieving the project objectives by strengthening the capacity of DHC operators, authorities and relevant stakeholders to plan and implement decarbonisation measures for DHC.

The courses delivered in **task 5.1** supported operators in key areas such as transformation planning, investment planning, integration of low-grade RES and WH, low-temperature solutions and digitalization. Training also addressed regulatory and permitting challenges, helping participants identify obstacles and potential solutions. Representatives from frontrunner and follower cases were engaged effectively and with a fruitful awareness transfer.

Task 5.2 complemented this by training local and regional authorities, WH providers and other stakeholders on heat-planning responsibilities and competences, regulatory frameworks, basic elements for business models and coordination mechanisms required for DHC transformation.

POLIMI developed the methodological framework and the pilot program, which was subsequently adapted and implemented in each target country in the national language.

Overall, the CB program provided practical, context-specific guidance that directly supported the project's objectives of enhancing technical and strategic capacities, addressing regulatory barriers, and improving the conditions for integrating low-grade RES and WH **in line with EU policy frameworks**.

The results of the Capacity Building (CB) activities presented in the previous sections demonstrate the effectiveness of the methodology and guidelines developed, **resources that remain applicable and valuable for future initiatives**, and confirm the successful implementation of CB actions across the target countries. The initial targets regarding the number of activities (courses and events) and participants were achieved and, in some cases, substantially exceeded**, realising 17 courses, 12 events and reaching 1384 presences** (including presenters and moderators), with an average of about 48 people for each event/course, at consortium level (Figure 4).

Satisfaction surveys consistently indicated high levels of approval from participants.

CB activities were delivered **predominantly through in-presence formats**, with some exceptions such as Ukraine, where, due to well-known constraints, in-presence engagement was more challenging. The CB activities had different durations, and the formats adopted included seminars, workshops, webinars, and technical site visits, highlighting the added value of direct interaction, particularly during roundtables and moderated discussions, sometimes supported by digital engagement tools such as Mentimeter. Local operators and stakeholders also contributed as presenters, discussants, or moderators, strengthening their proactive involvement.

It is important to recognise the **heterogeneous starting conditions across countries**.

In those countries where CB structures for DHC expansion and decarbonisation were already well established, i.e. characterised by recurring, institutionalised lifelong training programmes, the project served primarily as an opportunity for innovation, knowledge

exchange, and cross-fertilisation. Partners such as **AGFW** leveraged their consolidated expertise, training materials, and networks, also involving national experts, to support and inspire countries where CB on DHC had not yet reached the same level of maturity. Contributions on particular topics were made by other partners, including **Halmstad University, e-think, Planenergi, AEE Intec and WIP**, who introduced innovative content and practical tools to strengthen skills, even if they were not formally responsible for CB implementation in the target countries. In these contexts, feedback collected at national level contributed to a productive exchange process, generating insights for further refinement and optimisation of CB activities.
In countries where CB activities for DHC expansion and decarbonisation were less structured or lacked long-term planning, the project provided guidance and resources to support the establishment of more systematic and effective CB schemes. In Italy, for instance, the activities generated **significant follow-up effects**, including the creation of collaborative working networks, the production of joint documents, and the adoption of the CB guidelines as a reference for other initiatives, such as the ongoing Skills4DHC project.

The training courses for **operators** led to a meaningful enhancement of technical competencies and fostered an intensive exchange of experiences and lessons learned at both national and international levels, promoting a more collaborative and less competitive environment within the DHC sector.

Stakeholder engagement events also strengthened the understanding of the need for coordinated action among local authorities, regulatory bodies, and sector experts when managing complex processes that require a high degree of interoperability, particularly concerning data infrastructures, regulatory frameworks, and operational procedures.

The CB programmes implemented across the participating countries underline the importance of targeted training, structured stakeholder engagement, and context-specific guidance to support the transformation of the DHC sector. While several cross-cutting needs emerged, such as strengthened technical skills, improved institutional coordination, and better-informed decision-making, the activities also reflected distinct national contexts. A synthesis of the main outcomes at country level follows:

- **Austria**: CB activities highlighted a strong need for tailored knowledge transfer among a diverse stakeholder community. Key topics included network transformation, spatial energy planning, and emerging technologies. Practical, case-based training and the integration of municipal heat-planning tools proved particularly effective. High participation levels confirmed the importance of establishing more structured cooperation between operators, municipalities, and regional authorities.
- **Germany**: The project reinforced the value of AGFW's recurring training formats, notably the annual *trafo days*, complemented by specialised courses. Needs emerged particularly among newcomer municipalities and permitting authorities, with permission procedures identified as a priority area. New training modules addressing administrative and procedural challenges are being developed. Platforms for

knowledge exchange between frontrunners and early followers were recognised as essential for sector development.

- **Italy**: CB activities demonstrated that non-technical barriers—particularly regulatory uncertainty and the lack of long-term support mechanisms—remain major obstacles to DHC decarbonisation. Structured dialogue among operators and institutions emphasised the relevance of inter-institutional coordination, waste-heat valorisation, and enhanced technical skills. Participatory processes contributed to identifying national priorities and advancing network expansion and low-carbon transition.
- **Lithuania**: CB activities exceeded participation targets, and feedback confirmed the high relevance and balanced nature of the training formats. The programme substantially strengthened the knowledge base required for decarbonisation and digitalisation of the DH sector, while emphasising the importance of continued collaboration and capacity development.
- **Poland**: CB activities enhanced strategic and operational capabilities among local authorities, operators, and industry representatives. Training improved competencies in municipal energy management, investment planning, and sustainable governance practices. A broad range of low-carbon technologies was presented, supported by national and international examples. The programme significantly fostered stakeholder cooperation, increasing Poland's preparedness for DH sector modernisation.
- **Ukraine**: Despite significant challenges, initial CB activities for DHC expansion and decarbonisation were successfully launched. Although participation was slightly lower than initially expected, the methodology and guidelines developed under SupportDHC provide a solid foundation for the future establishment of more structured and sustainable CB processes as conditions improve.

In line with the SupportDHC project timeline, the CB activities under WP5 are now formally concluded. However, several ongoing initiatives indicate that such efforts **will continue during the final phase of the project**, supported by synergies with other WPs working on frontrunners, followers, replication, and dissemination. For example, both the **toolkit** and the **replication hub** served as references for CB activities, while materials developed under WP5 could feed the replication hub. Among the activities currently underway, a delegation event in Germany, coordinated by AGFW, and involving Italian regional authorities together with German ministerial bodies and sector associations should take place in spring 2026, again to facilitate experience exchange and support DHC decarbonisation in a concrete and effective manner. Another effect is related to the event held in May 2025, a study visit to Lithuania within the SupportDHC framework. It enabled a Ukrainian delegation to gain practical insights into successful DH sector modernisation and RES integration, through targeted trainings, site visits and exchanges with national and municipal actors. The experience highlighted the value of peer learning and international cooperation in supporting DHC transformation, particularly under challenging national conditions.

Finally, CB activities are likely to be sustained by future initiatives such as the Skills4DHC project, the DHC+ Academy, and the ENABLE DHC project.