KeepWarm
Renewing district heating

Improving the performance of District Heating Systems in Central and Eastern Europe

Work package N°2: Capacity Building of DHS operators

Deliverable D2.3: Training Package

Horizon 2020 (H2020-EE-2017-PPI)
Project N°784966

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DEUTSCHE ZUSAMMENARBEIT

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List of Abbreviations

AT	Austria
CEE	Central and Eastern Europe
CoM	Covenant of Mayors for Climate and Energy
CZ	Czech Republic
DisComEx	Dissemination, Communication and Exploitation
DG	Directorate-General of the European Commission
DHS	District Heating System
EU	European Union
GHG	Greenhouse Gas
HR	Croatia
KPI	Key Performance Indicator
LV	Latvia
NGO	Non-Governmental Organisation
RES	Renewable Energy Source(s)
SI	Slovenia
SRB	Serbia
UKR	Ukraine
WP	Work Package

Summary of the project

The project “KeepWarm - Improving the performance of district heating systems in Eastern Europe” is funded under the EU Horizon 2020 programme. Its objective is to accelerate cost-effective investments in the modernisation of District Heating Systems (DHS) in Central and Eastern Europe (CEE). KeepWarm is most active in seven countries: Austria (AT), Croatia (HR), Czech Republic (CZ), Latvia (LV), Serbia (SRB), Slovenia (SI) and Ukraine (UKR). The project focuses on this region, and these particular countries, because in most cases DHSs are frequently still inefficient and for the most part overly reliant on fossil fuels (especially gas, coal or oil).

The aim of this initiative, launched in April 2018, is to modernise DHSs around the whole region in a more sustainable manner. By improving system operations and promoting a switch to less-polluting sources, like renewable energy sources (RES), KeepWarm will contribute to reducing greenhouse gas (GHG) emissions. The eleven project partners strive to ensure that best practices for environmentally-friendlier heating and cooling will be taken up across Europe, replicating KeepWarm’s approach in other countries and regions, even beyond the end of the project in September 2020.

Project objectives

KeepWarm’s specific objectives are:

- At least 450 relevant stakeholders with increased capacities on technical, organisational, financial and managerial aspects – includes 150 DHS operators;
- At least 95 DHS operators are able to develop business plans and to identify the most suitable financial model for modernisation of their own DHS;
- At least 23 business plans for the modernisation of DHSs have been developed and sources for investment have been identified;
- DHS network retrofitting is addressed in at least 10 local energy plans and 7 regional or national strategies or plans;
- At least 23,300 relevant stakeholders (directly) and 125,000 (indirectly) reached across Europe in order to replicate the project outputs in primary and secondary target regions and ensure the project’s impact;
- Support EU policies and initiatives, such as the Covenant of Mayors for Climate and Energy (CoM) and DecarbHeat, by exploiting key lessons from KeepWarm activities and pilots to disseminate best practices across Europe.

KeepWarm consortium partners

LOGO	PARTNER NAME	SHORT	COUNTRY
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	GIZ	Germany
FSB	University of Zagreb Faculty of Mechanical Engineering and Naval Architecture	UNIZAG FSB	Croatia
lk Landwirtschaftskammer Steiermark	Landeskammer für Land- und Fortwirtschaft in Steiermark	LWK	Austria
REGEA	Regionalna Energetska Agencija Sjeverozapadne Hrvatske	REGEA	Croatia
Jožef Stefan Institute, Ljubljana, Slovenia Energy Efficiency Centre	Jožef Stefan Institute Energy Efficiency Centre	JSI	Slovenia
ICLEI Local Governments for Sustainability	ICLEI European Secretariat GmbH	ICLEI Europe	Germany
ASSOCIATION FOR DISTRICT HEATING of the Czech Republic	Teplarenske Sdruzeni Ceske Republiky	TSCR	Czech Republic
ZREA ZEMGALES REGIONĀLĀ ENERGĒTIKAS AĢENTŪRA	Biedriba Zemgales Regionala Energetikas Agentura	ZREA	Latvia
KSSENA	Zavod Energetska Agencija za Savinjsko Salesko in Korosko	KSSENA	Slovenia
KT-ENERGY	LLC KT-Energy Consulting	KT-Energy	Ukraine
VINČA INSTITUTE OF NUCLEAR SCIENCES University of Belgrade NATIONAL INSTITUTE OF THE REPUBLIC OF SERBIA	Institut za Nuklearne Nauke Vinca	VINCA	Serbia

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Executive summary

The Project “Improving the performance of district heating systems in Central and East Europe” – or KeepWarm for short – targets the largest energy user in the EU: Energy demand for heating and cooling (49%). KeepWarm is working intensively with DHS in seven countries: Austria, Croatia, Czech Republic, Latvia, Serbia, Slovenia and Ukraine; to increase the energy efficiency of these systems; and to reduce greenhouse gas emissions by promoting a switch from fossil to renewable fuels.

The first step in reaching these goals is capacity building of DHS operators. The report *D2.3 Training Package* summarizes KeepWarm’s approach of capacity building – from training needs assessment and training plan to conduction of training with evaluation and finally to sustainable storage and availability of training materials. It serves as a guide for stakeholders interested in starting a training for DHS operators as well as DHS employees/ management interested in training materials on their own/ DHS operators. Thus, this report focuses on the training materials – which materials are available, where to find them, how to use them and whom are they intended for.

The training materials are publicly available at the KeepWarm website http://www.keepwarmeurope.eu/, organized under the sections *Learning Centre* and *Countries in focus*.

Introduction

The KeepWarm project promotes sustainable pathways to retrofit existing district heating systems (DHS) by upgrading their operation efficiency and switching to local renewable energy sources. As a first step of this process, KeepWarm trained DHS operators to streamline their operations and to provide more efficient, attractive and reliable services.

A tailor-made KeepWarm training approach aimed to address the specific objectives and capacities of target group and to set foundations for business plan development and further implementation of cost-effective investments in the modernization of DHSs.

This document provides an overview of the KeepWarm training approach and serves as a guide of the pooled training materials and tools available at the KeepWarm website. The material and tools are meant for all stakeholders involved and related to the planning, provision or use of district heating. The main goal of this document is to present the KeepWarm training approach and the elaborated training materials used within the project, which correspond with our vison of further exploitation and replication of the results.

For this purpose, the most important pre-training activities, such as training needs assessment and selection of appropriate training methods are explained in the following chapter. Furthermore, the chapter contains a description of training evaluation procedure and links to respective documents, e.g. reports, questionnaires.

The second chapter, oriented toward potential users, is focused on the elaboration and storage of the training material, which is publicly available on the KeepWarm website. The

material is divided into baseline material, which is available in English and country specific materials in the national languages used within capacity building measures in the KeepWarm countries.

Website screenshots will guide and explain where as well as under which thematic area the material is available for download. Further, the training focus for each country is pointed out at a respective country chapter including links to the country specific materials to ensure direct and fast access.

KeepWarm Training Approach

The first step towards the capacity building of the district heating system (DHS) operators in Austria, Croatia, Czech Republic, Latvia, Serbia, Slovenia, and Ukraine was a **detailed training needs assessment** involving DHS operators in these countries. The objective was to filter the most important training topics of DHS operators and propose suitable training measures. This led to the definition of a unique training plan for each of the seven countries. More can be read in **D2.1 Training needs assessment** and plan at the KeepWarm website – Project materials.

The main instruments for the training needs assessment were two questionnaires. The first questionnaire focuses on the identification of training topics, which are of highest interest to DHS operators. The second questionnaire asks for the DHS operators' preferences regarding the type, timing, organisation, etc. of specific training measures. Both questionnaires are online and included in the annex of this deliverable – in the English version, free of copyrights.

The **training topics were clustered** in the following major groups to successfully address all aspects of district heating:

- Technical concerns
- The utilisation of renewable energy sources, waste and excess heat
- Organisational capacity development
- Financial concerns
- Managerial concerns

Interviewed DHS operators were asked to rate the **priority for each proposed topic** from their points of view (1 being lowest and 5 the highest priority). The importance of topics to DHS operators were considered as followed:

- >4 very important (> 81%)
- 3,7 – 4 important (74% -80%)
- 3,3 – 3,7 rather lightly important (66% - 73%)

The main training focus lied on the identified topics, which gained more than 74% by the DHS operators. If none of the subthemes in the topic groups was highly relevant to the DHS operators, the lightly important topics have been identified and partially included in the training.

Based on the identified needs, the addressed topics varied between countries and DHSs. In the following table, the green highlighted fields mark top-priority topics to be covered in capacity building in a particular country, and elaborated topics are marked with ✓.

Table 1 Summary of training topics

TOPIC N° AND A SHORT DESCRIPTION	AUSTRIA	CROATIA	CZECH REPUBLI	LATVIA	SERBIA	SLOVENIA	UKRAINE
1. Technical topics							
1.1 Reduction of energy losses	✓	✓	✓	✓	✓	✓	✓
1.2 Control of heat generation and storage	✓		✓	✓	✓		
1.3 System temperatures	✓	✓	✓	✓	✓	✓	
1.4 Energy audits and surveillance	✓	✓			✓		✓
1.5 Adaptation to reduced heat demand		✓		✓	✓		✓
1.6. DH vs decentralised solutions			✓				
1.7 Cost-effective optimisation	✓	✓	✓	✓	✓	✓	✓
1.8 GIS applications		✓		✓	X	✓	
2. RES and EE topics							
2.1 Integration of RES	✓	✓	✓	✓	✓	✓	✓
2.2 Industrial waste heat			✓	✓		✓	✓
2.3 Feasibility of fuel switch		✓	✓	✓	✓	✓	
2.4 Biomass supply	✓		✓	✓	✓	✓	✓
2.5 Biomass quality	✓		✓	✓	✓		✓
3. Organisation topics							
3.1 Organization of DH networks	✓	X	✓	✓	✓		✓
3.2 Operation of boiler houses	✓	X		✓	✓		
3.3 Corporate organisation	✓		✓	✓	✓	✓	
4. Financing topics							
4.1 Viability of RES and waste heat		✓	✓	✓	✓	✓	✓
4.2 Innovative financing	✓	✓	✓	✓	✓		✓
4.3 Economic feasibility analysis	✓	✓	✓	✓	✓	✓	✓
4.4 Financial support and funding sources	✓	✓	✓	✓	✓	✓	✓
4.5 Business planning	✓		✓	✓	✓	✓	✓

5. Management topics							
5.1 Demand-oriented service schemes	✓	✓	✓	✓	✓	✓	
5.2 Public relations		✓	✓	✓	✓	✓	✓
5.3 Assessment of user behaviour		✓	✓	✓			
5.4 Individual billing		✓		✓			✓
5.5 Rewarding energy savings			✓		✓		
5.6 Retrofitting DH networks	✓	✓	✓	✓	✓	✓	✓
5.7 Ensuring biomass supply	✓		✓	✓	✓		✓

The training sessions were conducted between September 2018 and beginning of June 2019. Due to a low availability of DHS operators during the heating season, it is recommended to conduct trainings between spring and autumn. KeepWarm project partners organised trainings in each country with help from national technical planners, energy agencies, consulting companies, public authorities, advanced DHSs, academic institutions, and other relevant stakeholders included in DH sector with an adequate level of knowledge and relevant expertise in specific topics. The training sessions combined lectures, workshops, case studies and study visits since the knowledge gained in this way remains more sustainable. For the lectures, presenters mostly used presentations and printed materials.

Baseline material for each topic group has been provided by KeepWarm partners and was further adapted by the local partner/ training organisers concerning the country specific context. Additionally, the KeepWarm partners systematically collected materials from various, open source and high-quality sources, e.g. related (H2020) projects of district heating and cooling - the focus lied on new projects and up-to-date materials as baseline for the topics:

- Data input
- Business models and funding assessment
- Financing implementation
- Technical solutions and cases
- Sustainable energy sources
- Policy recommendations
- Thermal planning tools
- Materials in other languages

Based on the feedback participants have given after the training sessions most material has been adapted. The used evaluation form is available in the annex and online. More can be read in **D2.2 Report of trainings conducted** at the KeepWarm website – Project materials.

To ensure sustainability of the lectures, a long-term evaluation of the KeepWarm capacity building is planned – it will be finished in June 2020.

KeepWarm Training Material

Since there is an abundance of training materials available, KeepWarm rather collected and used materials at hand. Thus, the KeepWarm training materials consist of:

collected materials from various, open source and high quality sources, e.g. related projects of district heating and cooling like Eurostat, I-TheRM, STRATEGO, Heat Roadmap Europe, RELaTED, FROnT, BioRes, THERMOS, GeoDH, CoolHeating, Flexiheat, Joint Research Centre, European Investment Bank, International Finance Corporation, UNEP District Heating Initiative, UNEP, ICLEI, UN-Habitat, IRENA, Upgrade DH, Ruggedised, GrowSmarter, Storm-DHC, Solar District Heating, Agora Energiewende, Peta4, as baseline

- materials of national technical planners, energy agencies, consulting companies, public authorities, advanced DHSs, academic institutions, and other relevant stakeholders of the DH sector helping to conduct the trainings
- baseline material for each topic group which has been provided by the KeepWarm task leader for a specific topic and further adapted by the local partner/ training organisers concerning the country specific context
- some new country-specific and topic-specific material

The baseline material of the related (H2020) projects is available in English, and the training **materials used in each country's trainings are in the national languages**. The available training materials mainly consist of presentations, which were used in the training lectures.

All the training material is accessible on the KeepWarm website at the section *Learning Centre* under the chapter *Resources*. Additionally, training materials in the languages of project partners are available in the section *Countries in focus* under the respective country pages.

Figure 1 Training Material is available under Learning Centre and Countries in focus

1. Learning Centre

The KeepWarm Learning Centre is pooling hot resources and cool solutions on district heating in Europe and beyond. This includes a large selection of training materials collected or developed by project partners in seven languages, but also reports, materials with **datasheets, analyses, policy recommendations, as well as business models and funding sources,** which are characteristic for project development and implementation steps for such technological solutions. The Learning Centre is primarily designed to support district heating operators, when deciding to improve their existing district heating system. However, it is useful for policy-makers, engineers, urban planners, real-estate developers, consumers, and organisations or just concerned citizens and all other stakeholders interested in training materials.

The Learning Centre was launched on the occasion of the H2020 CELSIUS Summit in October 2019 and consist of four chapters: *Resources, Policy Spotlights, Project materials* (e.g. flyers) and *Related projects*. All the training materials are available under *Resources*: http://www.keepwarmeurope.eu/learning-centre/

Figure 2 Learning Centre and Resources

The systematically collected English training materials from various, open source and high-quality sources, e.g. related projects, which were or are still active in the area of district heating and cooling, served as basis. They are sorted in the thematically areas data inputs, business models and funding, financing implementation, technical solutions and cases, sustainable energy sources, policy recommendations and thermal planning tools under Resources:

Figure 3 Training material organized in eight thematically areas

The training materials used in the training sessions within the KeepWarm project include already available and newly developed materials in the national languages. These materials are available under the thematic area Materials in other languages and accessable via the listed languages:

Figure 4 Training materials per language

The languages are directly linked to the *Capacity Building* chapter of the respective country page. This page can also directly accessed via *Country in focus* - Austria, Croatia, Czech Republic, Latvia, Serbia, Slovenia and Ukraine. The provided training material is organized based on the five main topics:

- Technical concerns
- The utilisation of renewable energy sources, waste and excess heat
- Organisational capacity development
- Financial concerns
- Managerial concerns

Under each topic, the training material are available for download including the following additional information:

- Topic/ Language/ Author
- Training Duration
- Description
- Target Group

Thus, all stakeholders involved in the planning, provision or use of district heating and interested in starting a training for DHS operators can find hands-on material according to the topic and language. The description helps to figure out the content of the material, the information about the training duration is useful to organize the timeframe and the addition about whom the training is suitable for announces the target group.

Terms and conditions regarding the collected training materials are pointed out:

Terms and Conditions presentations from external speakers

The KeepWarm website has not reviewed, is not responsible for, and accepts no liability in respect of any information, graphics or images contained in the presentations provided by the respective speakers at events or trainings. Moreover, the KeepWarm website does not warrant that the information contained in the presentations is complete and correct and shall not be liable whatsoever for any damages incurred as a result of its use. The authors alone are responsible for the content of the published presentations in the current website.

2. Countries in focus

As previously mentioned, the training material in national language can also be accessed via the country page of **Austria, Croatia, Czech Republic, Latvia, Serbia, Slovenia** and **Ukraine**.

These pages contain the following information:

- a country specific introduction
- replicable DHS demo cases
- capacity building
- the country project partners
- KeepWarm resources
- news

Under Capacity Building, information about the training topics identified by the country's DHS operators and staff during the needs assessment phase and the training priorities are given as it can also be seen in table 1: KeepWarm training approach.

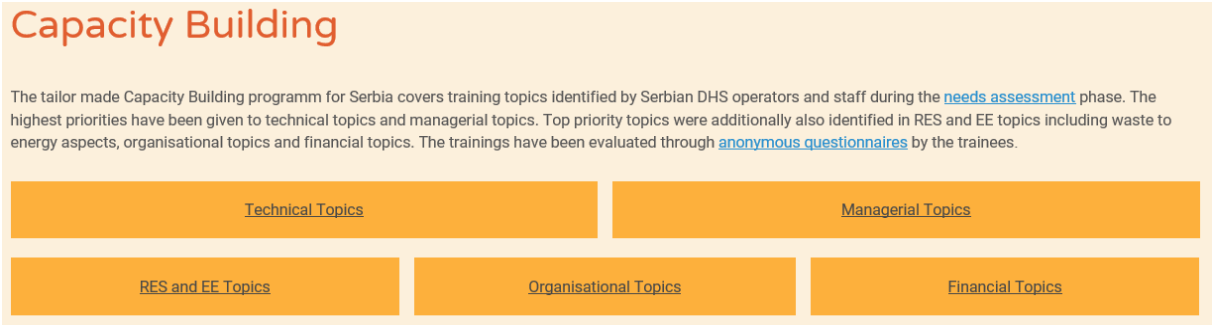

Figure 5 Training materials in the national languages organized under the five relevant topics (Example Serbia)

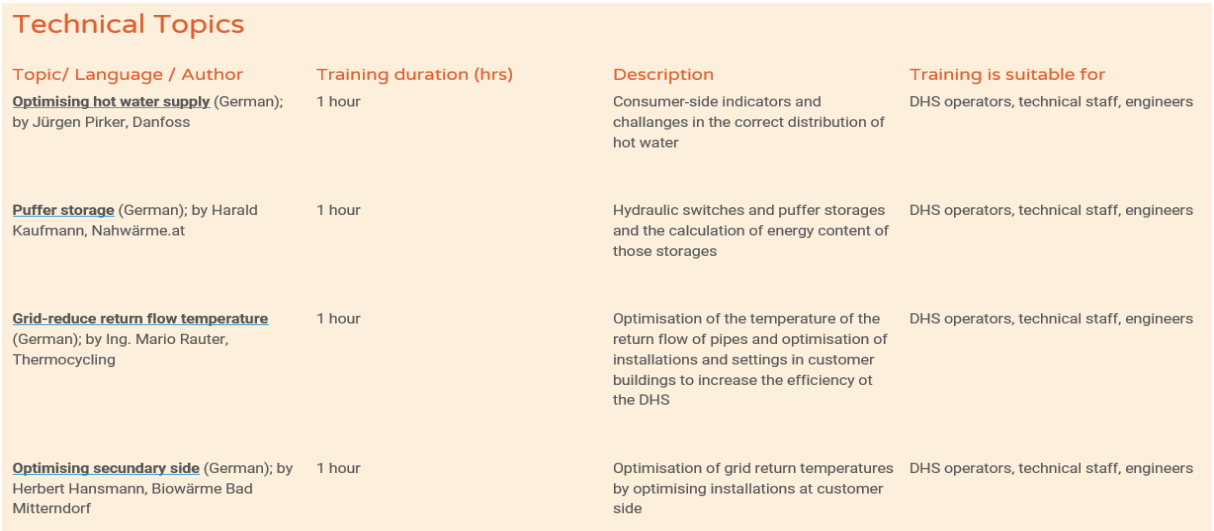

Figure 6 Information about training materials incl. Topic/ Language/ Author, Training duration, Description and Training is suitable for (Example Austria)

The following sub-chapters give an overview of the training priorities and available material per country and language. Main training topics are directly linked to the respective country page´s capacity material.

The available training material is free for download and can be used by all stakeholders involved in the planning, provision or use of district heating and interested in starting a training for DHS operators or interested in training materials on their own/ DHS operators.

Austria

In the training needs assessment for Austria, the highest priority has been given to technical topics such as system temperatures, reduction of energy losses, control of heat generation and storage, cost-effective optimisation and energy audits and surveillance. Moreover, inclusion of photovoltaic and use of waste ash (RES and EE); corporate organisation and operation of boiler houses (organizational); retrofitting DH networks (managerial) are also considered as important for improvements, while financing topics are in general not of highest priority. Nevertheless, some financing issues have been addressed within technical, RES and EE and organisational training sessions.

Thus, the available Austrian training materials, mostly presentations in German language, cover the above mentioned training priorities within the thematic topics:

Table 2 Training material hours and suitability – Austria

TOPIC	AVAILABLE MATERIAL USABLE FOR TRAINING DURATION HRS	TRAINING IS SUITABLE FOR
Technical Topics	9 hrs	DHS operators, technical staff, engineers
RES and EE Topics	11 hrs	DHS operators, technical staff, engineers
Organisational Topics	1 hr	DHS operators, technical staff, engineers

Get further information on the Austrian country page or by contacting Landwirtschaftskammer Steiermark - Department for Energy, Climate and Bioressources (LWK).

Croatia

In the training needs assessment for Croatia, the highest priority has been given to technical topics, in particular to reduction of energy losses, system temperatures, adaptation to reduced heat demand, cost-effective optimisation and GIS applications. Furthermore, topics such as integration of RES and feasibility of fuel switch (RES and EE); financial support and funding sources, viability of RES and waste heat, and economic feasibility analysis (financial); demand-oriented system schemes, public relations and individual billing (managerial) were additionally identified as important.

Thus, the available Croatian training materials in form of presentations cover the above-mentioned training priorities and some others within the thematic topics:

Table 3 Training material hours and suitability - Croatia

TOPIC	AVAILABLE MATERIAL USABLE FOR TRAINING DURATION HRS	TRAINING IS SUITABLE FOR
Technical Topics	26 hrs	DHS operators, technical staff, engineers
RES and EE Topics	14 hrs	DHS operators, technical staff, engineers
Financial Topics	8 hrs	Business support staff
Managerial Topics	16 hrs	Managerial staff

Get further information on the Croatian country page or by contacing Goran Krajačić from the research group at the Power Engineering and Energy Management Chair at the University of Zagreb/ Istraživačka skupina na Katedri za energetska postrojenja i energetiku na Fakultetu strojarstva i brodogradnje, Sveučilište u Zagrebu (UNIZAG FSB) or Marko Čavar from the North-West Croatia Regional Energy Agency/ Regionalna energetska agencija Sjeverozapadne Hrvatske (REGEA).

Czech Republic

The training needs assessment for Czech Republic uncovered that four out of the five topic groups are of top-priority - technical topics, RES and EE topics, financial topics and managerial topics. Following sub-topics were especially mentioned control of heat generation and storage, system temperatures and reduction of energy losses (technical); feasibility of fuel switch, biomass supply and biomass quality (RES and EE); financial support and funding sources, innovative financing and economic feasibility analysis (financial); demand-oriented service schemes, public relations, assessment of user behaviour and ensuring biomass supply (managerial).

Thus, the available Czech training materials in form of presentations cover the above-mentioned training priorities and additionally some organisational topics within the thematic topics:

Table 4 Training material hours and suitability - Czech Republic

TOPIC	AVAILABLE MATERIAL USABLE FOR TRAINING DURATION HRS	TRAINING IS SUITABLE FOR
Technical Topics	27 hrs	DHS operators, managerial staff, technical staff
RES and EE Topics	19 hrs	DHS operators, managerial staff, business support staff
Financial Topics	18,5 hrs	DHS operators, managerial staff, business support staff

Managerial Topics	13 hrs	DHS operators, managerial staff, business support staff
Organisational Topics	17,5 hrs	DHS operators, managerial staff, technical staff

Get further information on the Czech country page or by contacting Jolana Bugáňová from the Association for district heating of the Czech Republic/ Teplárenské sdružení České republiky (TSCR).

Latvia

In the training needs assessment for Latvia, the highest priority has been given to technical topics, RES and EE and organisation topics with the following focus: Integration of RES (RES and EE); reduction of energy losses and control of heat generation and storage (technical); organization of DH networks (organizational); viability of RES and waste heat (financial).

Thus, the available Latvian training materials, mostly presentations, cover the above-mentioned training top priorities as well as some other sub-topics:

Table 5 Training material hours and suitability - Latvia

TOPIC	AVAILABLE MATERIAL USABLE FOR TRAINING DURATION HRS	TRAINING IS SUITABLE FOR
Technical Topics	12 hrs	DHS owners and staff, technical students
RES and EE Topics	14,5 hrs	DHS owners and staff, technical students
Financial Topics	12,5 hrs	DHS owners and staff, technical students
Managerial Topics	6 hrs	DHS owners and staff, technical students
Organisational Topics	10 hrs	DHS owners and staff, technical students

Get further information on the Latvian country page or by contacting Zemgale regional energy agency/ Zemgales reģionālā enerģētikas aģentūra (ZREA).

Serbia

In the training needs assessment for Serbia, the highest priority has been given to technical and managerial topics such as reduction of energy losses, control of heat generation and storage, system temperatures, adaptation to reduced heat demand and GIS applications (technical); integration of RES, feasibility of fuel switch and biomass supply (RES and EE); organization of DH networks and operation of boiler houses (organizational); economic feasibility analysis (financial); demand-oriented service schemes, public relations, rewarding energy savings and ensuring biomass supply (managerial).

Thus, the available Serbian training materials, mostly presentations, cover the above-mentioned training top priorities within the five thematic topics:

Table 6 Training material hours and suitability - Serbia

TOPIC	AVAILABLE MATERIAL USABLE FOR TRAINING DURATION HRS	TRAINING IS SUITABLE FOR
Technical Topics	9 hrs	Engineers
RES and EE Topics	15 hrs	Engineers, DHS operators, business support staff
Financial Topics	15 hrs	Business support staff
Managerial Topics	15 hrs	Engineers, managerial staff, business support staff
Organisational Topics	9,5 hrs	DHS operators, business support staff, managerial staff

Get further information on the Serbian country page or by contacting Milica Mladenović from VINCA Institute of Nuclear Sciences – University of Belgrade (VINCA).

Slovenia

In the training needs assessment for Slovenia, the highest priority has been given to the integration of RES and EE in DHSs such as: Integration of RES, industrial waste heat and feasibility of fuel switch (RES and EE); system temperatures, reduction of energy losses and cost-effective optimization (technical); viability of RES and waste heat and financial support and funding sources (financial); demand-oriented service schemes and public relations (managerial).

Thus, the available Slovenian training materials, mostly presentations, cover the above-mentioned training top priorities and others within the five thematic topics:

Table 7 Training material hours and suitability - Slovenia

TOPIC	AVAILABLE MATERIAL USABLE FOR TRAINING DURATION HRS	TRAINING IS SUITABLE FOR
Technical Topics	18 hrs	DHS operators; business support staff, managerial staff, technical staff
RES and EE Topics	9 hrs	DHS operators; business support staff, managerial staff, technical staff
Financial Topics	8 hrs	Business support staff, managerial staff, technical staff
Managerial Topics	9 hrs	Business support staff, managerial staff, technical staff

Organisational Topics	4 hrs	DHS operators

Get further information are available on the Slovenian country page or by contacting Energy Efficiency Centre/ Center za energetsko učinkovitost (IJS) or the Energy Agency of Savinjska, Šaleška and Koroška Regions/ Zavod Energetska Agencija za Savinjsko, Šaleško in Koroško (KSSENA).

Ukraine

In the training needs assessment for Ukraine, the interviewed operators overall recognized technical, financial and managerial topics as very important such as:Reduction of energy losses, energy audits and surveillance (technical); Economic feasibility, viability of RES and waste heat and business planning (financial); Integration of RES (RES and EE).

Thus, the available Ukrainian training materials, mostly presentations, cover the above-mentioned training top priorities and additional important topics within the five thematic topics:

Table 8 Training material hours and suitability - Ukraine

TOPIC	AVAILABLE MATERIAL USABLE FOR TRAINING DURATION HRS	TRAINING IS SUITABLE FOR
Technical Topics	28,5 hrs	Technical staff, maintenance staff, engineers
RES and EE Topics	16 hrs	Technical staff, maintenance staff, engineers; managerial staff, administrative staff, business support staff
Financial Topics	13,5 hrs	Managerial staff, administrative staff, business support staff
Managerial Topics	9 hrs	Managerial staff, administrative staff, business staff
Organisational Topics	11 hrs	Managerial staff, administrative staff, business support staff

Get further information on the Ukrainian country page or by contacting Kyryl Tomliak from KT-Energy.

Summary

The participants expressed their satisfaction with the lecturers in their evaluations and proposed to conduct similar trainings in the future. They appreciated especially that the lecturers had work and life experience in specific areas, high-quality content, and concrete problem identification as well as the inclusion of study visits, practical sessions, good practice examples and appreciated time for discussions. To further evaluate outcomes and results of, the KeepWarm training approach and outcomes will be assets viay a long-term evaluation which is planned for June 2020.

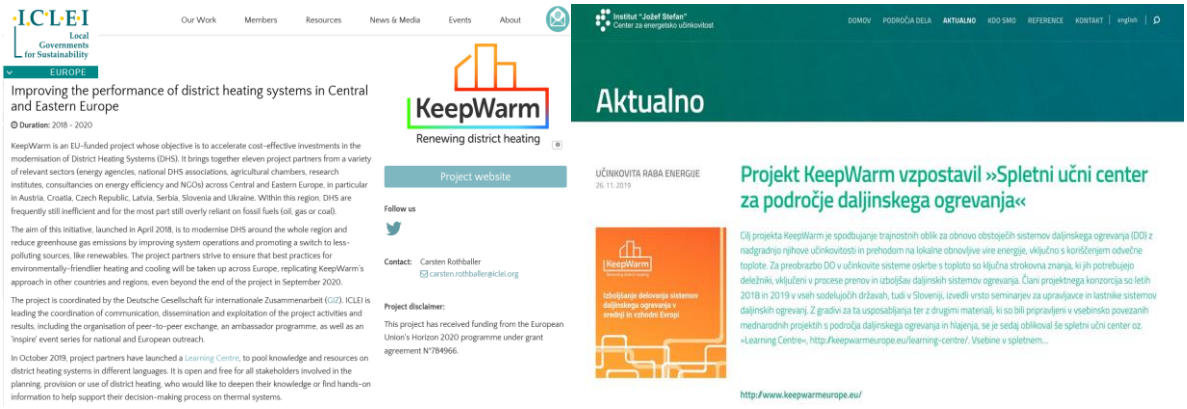

Figure 7 KeepWarm training material promoted at project parners' websites (Example ICLEI and JSI)

To ensure sustainability of KeepWarm's capacity building and enable further DHSs to train themselves, the training material is publicly available online for all interested and related stakeholders.

Figure 8 KeepWarm website - Home

On the KeepWarm website, the material is stored at least for four years after the project's end. For being more sustainable and a broader dissemination, the training materials are directly linked at some project partners' websites, e.g. ICLEI, ZREA, TSCR, JSI and transferred to other project related databases, like Business Association "SERBIAN HEATING PLANTS"/ Poslovno Udrženje "TOPLANE SRBIJE" and Covenant CapaCITY. Further, it will be linked at the Euroheat&Power knowledge centre. In addition, the material is planned to be stored at other repositories to ensure the sustainability of the project and its results ready for replication.

Feel encouraged to use the KeepWarm resources to improve district-heating systems all over Europe and beyond.

Annex

1. Training needs Assessment

The training needs assessment is also available at the KeepWarm website.

This project has received funding from the European Union's Horizon 2020 research and innovation programme.

KeepWarm: Improving the performance of district heating systems in Central and Eastern Europe

Training needs topic questionnaire

Name of the project partner:

Name of the DHS operator/City:

T1 Capacity development on technical concerns

Name of the topic	Give priority to the training topic (1 = lowest, 5 = highest priority)					Insert a few keywords on why you prioritised this topic so high/low
Assessment of energy losses in the district heating grid and determination of actions to improve grids and make them smart, remote metering systems, Metering standards	1	2	3	4	5	
Automatization of boiler house/substation and heat storage optimization	1	2	3	4	5	
Optimizing temperatures of supply/return pipes. Optimizing temperatures of supply/return pipes	1	2	3	4	5	
Optimization of heat networks energy audits and surveillance	1	2	3	4	5	
Modelling of DHS after energy retrofitting of connected buildings (consumers) – Building retrofit reduced heat demand, so DHS often needs to be adjusted to new heat demand	1	2	3	4	5	
Technical evaluation and comparison of the municipal heating system development options, including a comparison of DHS with decentralized solutions in municipalities with reduced heat load density	1	2	3	4	5	
Identification of cost-effective approaches to optimize DHS	1	2	3	4	5	
Use of GIS-based tools (Heat demand assessment, DH network development, mapping of excess heat sources)	1	2	3	4	5	
Suggest other possible topics for training in your country						

T2 Capacity development on the utilisation of RES, waste and excess heat

Name of the topic	Give priority to the training topic (1 = lowest, 5 = highest priority)					Insert a few keywords on why you prioritised this topic so high/low
The inclusion of RES in DHS (solar thermal, biomass, geothermal, heat pumps, …)	1	2	3	4	5	
Sustainability of biomass supply (increasing capacity of plant operators and their fuel/biomass suppliers, estimation of biomass potential)	1	2	3	4	5	
The utilisation of waste heat in an urban environment and from industrial sites	1	2	3	4	5	
Feasibility analysis of switching from fossil fuel to renewable energy or waste heat sources and feasibility analysis of using different RES/waste heat	1	2	3	4	5	
Assessment of the biomass quality	1	2	3	4	5	
Suggest other possible topics for training in your country	1	2	3	4	5	

T3 Organizational capacity needed

Name of the topic	Give priority to the training topic (1 = lowest, 5 = highest priority)					Insert a few keywords on why you prioritised this topic so high/low
Identification of measures and processes for improving the organization management of DH&C networks (comprising energy generation, distribution and consumption)	1	2	3	4	5	
The increase of the organisational qualifications of boiler house operators	1	2	3	4	5	
Different possibilities to organise DH companies according to national law	1	2	3	4	5	
Suggest other possible topics for training in your country	1	2	3	4	5	

T4 Financial concerns

Name of the topic	Give priority to the training topic (1 = lowest, 5 = highest priority)					Insert a few keywords on why you prioritised this topic so high/low
Assessment of the economic and financial viability of using RES and waste heat in DHS plants	1	2	3	4	5	
Development of innovative financing mechanisms (on-bill, public-private, inclusion of consumers/citizens…)	1	2	3	4	5	
Tools for economic/financial viability analysis	1	2	3	4	5	
Financial support schemes and funding resources for DHS retrofits and decarbonisation	1	2	3	4	5	
Business plans development	1	2	3	4	5	

Suggest other possible topics for training in your country	1	2	3	4	5	

T5 Managerial concerns

Name of the topic	**Give priority to the training topic (1 = lowest, 5 = highest priority)**					**Insert a few keywords on why you prioritised this topic so high/low**
Identification of measures for increasing the attractiveness of DHS for end-consumers, in close interaction with end-consumers and public authorities	1	2	3	4	5	
Training on PR and user engagement towards new and existing consumers	1	2	3	4	5	
How to assess user behaviour	1	2	3	4	5	
Identification of options for individual billing in multi-apartment buildings equipped with building heat meters	1	2	3	4	5	
Increasing transparency of information about bill structure and available energy services to reduce heat consumption	1	2	3	4	5	
Contractual arrangements needed to ensure a smooth retrofit of the DH network	1	2	3	4	5	
Contractual arrangements needed to ensure a smooth biomass supply	1	2	3	4	5	
Suggest other possible topics for training in your country	1	2	3	4	5	

Questionnaire on the training preferences

Name of the project partner:

Name of the DHS operator/City:

PART A: Questions for DHS operators:

1. What is your preferred type of training?
    a. Lectures
    b. Workshops
    c. Webinars
    d. Software training
    e. Field trip
    f. Individual training (1 on 1 consultancy)
    g. Combination of above mentioned, which?
    h. Other
2. What type of training duration and slots would you prefer?

Example:

- 3 days full training with 8 hours slots
- 2 weeks training with 2 hours per day slots
- 1-day full training with 8 hours slot(s)
- Other…

3. Type of learning materials that you would prefer?

a. Online material (lectures, presentations, exercises)
b. Scripts
c. Books
d. Field trip
e. Combination of above mentioned, which?
f. Other

4. What type of personnel would you send to the training?
   a. Managers
   b. Financial officers
   c. Boiler operators
   d. Operation and maintenance workers
   e. Engineers
   f. IT officers
   g. Legal and personnel officers
   h. Combination of above mentioned, which?
   i. Others

5. Would you like to include any external stakeholders in the training?
   a. Local and/or regional public authorities
   b. Spatial development planners
   c. Development and/or energy agencies
   d. Potential investors/banks
   e. Real estate developers
   f. ESCO companies
   g. Others
6. Describe what would be for you the desired outcome of the training?

PART B: Questions for training organisers:

1. Who will be the lecturers providing training in your country? Describe the necessary qualifications.

2. How will you prefer to evaluate training efficiency?
   a. Signing sheet
   b. Anonymous questionnaire
   c. Combination of the above mentioned
   d. Other
3. What will be the necessary competences and knowledge necessary to participate in and understand planned training?

4. What will be expected learning outcomes of the planned training?

5. Provide a 10-row description of the planned training? After you receive responses on the topic and training preferences from the DHS operators.

2. Training evaluation form

The training evaluation form is also available at the KeepWarm website.

This project has received funding from the European Union's Horizon 2020 research and innovation programme.

KeepWarm: Improving the performance of district heating systems in Central and Eastern Europe

Training evaluation form

Please respond to each of the following questions, they are intended to allow us to evaluate held and improve upcoming trainings. Please be as honest as possible to provide us with an accurate assessment of your experience. Thank you for taking the time to complete this.

Date, Location and Topic of Training:

Circle 1-5 with your evaluation.

	Strongly Disagree		Neutral		Strongly Agree
1. My overall experience of the Training was positive.	1	2	3	4	5
2. Since the Training, my knowledge of the subject matter has improved.	1	2	3	4	5
3. I will be able to apply the topics discussed on my plant.	1	2	3	4	5
4. The amount of information was appropriate for the time allowed.	1	2	3	4	5
5. The introductory presentations/site visits provided me with useful information.	1	2	3	4	5
6. The pace and style of the Training was effective.	1	2	3	4	5
7. The given materials were useful.	1	2	3	4	5
8. Participation was encouraged.	1	2	3	4	5
9. Group work was effective.	1	2	3	4	5
10. The facilitator responded to questions effectively.	1	2	3	4	5
11. The facilitator(s) was knowledgeable about the core topic.	1	2	3	4	5
12. The Training met its objectives.	1	2	3	4	5

Training evaluation form 1 / 3

13. What were the major strengths of the Training? What did you find most useful?

14. What aspects of the Training could be improved and how?

15. Did anything strike you as interesting, new, provocative, or meaningful during the Training?

16. Can you identify one change that you will make in your practice, or one idea that you will put into practice, as a result of this Training?

17. What part of the Training format should be changed to improve discussion?

18. Any other comments?