

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

Pilot projects

Report on local working groups

Ukraine

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



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PROJECT INFORMATION

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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
EBRD	European Bank for Reconstruction and Development
EU	European Union
GHG	Greenhouse Gas
HR	Croatia
KPI	Key Performance Indicator
LV	Latvia
LWG	Local Working Groups
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
	Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ) GmbH	GIZ	Germany
	University of Zagreb Faculty of Mechanical Engineering and Naval Architecture	UNIZAG FSB	Croatia
	Landeskammer für Land- und Fortwirtschaft in Steiermark	LWK	Austria
	Regionalna Energetska Agencija Sjeverozapadne Hrvatske	REGEA	Croatia
	Jožef Stefan Institute Energy Efficiency Centre	JSI	Slovenia
	ICLEI European Secretariat GmbH	ICLEI Europe	Germany
	Teplarenske Sdruzeni České Republiky	TSCR	Czech Republic
	Biedriba Zemgales Regionala Energetikas Agentura	ZREA	Latvia
	Zavod Energetska Agencija za Savinjsko Salesko in Korosko	KSENA	Slovenia
	LLC KT-Energy Consulting	KT-Energy	Ukraine
	Institut za Nuklearne Nauke Vinca	VINCA	Serbia

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Executive summary

The switch from a fossil fuel and inefficient DH system to clean and renewable alternatives with low level of losses is a challenging task. Moreover, other competitive heating solutions in heating sector make it difficult for other heating alternatives, such as DH to compete. Besides DH systems often were not able to provide appropriate value of their services from technical, environmental, societal as well as economic perspective. In other words, DH systems are often in a difficult position due to many reasons. As a results, they often lack of ambitious plans and performing relevant activities such as development of feasibility studies, complicated public procurement procedures, evaluation of RES potential, successfully negotiation with both existing and future end-consumers, identification and application to both local/regional/national and EU funds (lack of investment strategy). On the other hand, they often lack work force and capacity to achieve ambitious plans due to lack of financial funds or know-how. To foster modernization of above-mentioned DHSs, the KeepWarm project focuses on modernization of pilot DH systems in 7 partner countries (Austria, Croatia, Czech Republic, Latvia, Slovenia, Serbia and Ukraine).

Project partners committed to provide support to DHSs representatives throughout an interdisciplinary approach with the aim of achieving investments developed in previous activities of projects such as feasibility studies, business plans and selection of pilot DHSs. After identification of current state and barriers which hinder successful investments, the KeepWarm consortium organized local working groups in each country with the aim of providing tailor-made assistance to remove barriers. The goal of the local working groups was to include all relevant stakeholders, which can be identified through the stakeholder analysis, to provide input for business plan development and feedback on future retrofitting plans as well as on barrier removal for DHS. This report is created as country-by-country overview of organized local working group meetings with the aim of presenting systematic and continuous activities of KeepWarm partners toward DHSs representatives and other stakeholders with the aim of achieving investments. In addition to this, each project partner used a tailor-made KeepWarm approach which is a result of previously taken activities such as feasibility studies, business plans and selection of DHSs to be retrofitted.

In case of Ukraine, project partner KT-Energy organized eight meetings on different topics with respective DHSs representatives which were attended by 45 participants. In each initial meeting with DHSs, feasibility studies created through the project have been presented, as well as discussed in terms of modifications and further steps. Meetings taken afterwards have been a result of a continuous collaboration between Ukrainian partner and DHSs representatives towards achieving investments.

DHS Bila Tserkva: Deep rehabilitation of the boiler house located at 263 Skvyrske avenue in Bila Tserkva city, with the installation of 1 MW wood pellet boiler and two gas fired boilers with the capacity of 1.5 MW each, installation of 17 individual heating units to regulate heat supply and ensure hot water availability for consumers, replacement of heat energy pipelines with the reduction of heat pipes diameters.

DHS Zhytomyr: Installation of a biomass CHP unit applying ORC technology, B+boilers replacement at 7 First Vilskyi lane boiler house, boilers replacement at 4 Karenyi lane

boiler house, modernization of the district heating sub-network connected to RK-6 boiler house

DHS Khmelnytskyi: Optimization of district heating system in Grechany district, installation of a biomass boiler

DHS Ternopil: Installation of 10 MW biomass boiler, Installation of 4 MW biomass boiler, installation of biomass CHP

It should be mentioned that, due to the pandemic situation (COVID-19), most of planned and already organized meeting have been cancelled and adjusted to virtual platforms which definitively hindered implementation of scenarios and reduced a number of total meetings taken. Following table presents basic information:

LOCAL WORKING GROUP MEETING 1
Pilot: DHS Zhytomyr Number of stakeholders: 5 Main topics: Pilot investments, DH sector legislation/regulation, twinning activities, inspire event
LOCAL WORKING GROUP MEETING 2
Pilot: DHS Bila Tserkva Number of stakeholders: 6 Main topics: Pilot investments, DH sector legislation/regulation, twinning activities, inspire event
LOCAL WORKING GROUP MEETING 3
Pilot: DHS Khmelnytskyi Number of stakeholders: 10 Main topics: Pilot investments, DH sector legislation/regulation, twinning activities, inspire event
LOCAL WORKING GROUP MEETING 4
Pilot: DHS Ternopil Number of stakeholders: 4 Main topics: Pilot investments, DH sector legislation/regulation, twinning activities, inspire event
LOCAL WORKING GROUP MEETING 5
Pilot: DHS Bila Tserkva Number of stakeholders: 4 Main topics: Pilot investments, DH sector legislation/regulation, twinning activities, inspire event
LOCAL WORKING GROUP MEETING 6
Pilot: DHS Khmelnytskyi Number of stakeholders: 6 Main topics: Pilot investments, DH sector legislation/regulation, twinning activities, inspire event
LOCAL WORKING GROUP MEETING 7
Pilot: DHS Zhytomyr Number of stakeholders: 6 Main topics: Pilot investments, DH sector legislation/regulation, twinning activities, inspire event
LOCAL WORKING GROUP MEETING 8
Pilot: DHS Ternopil Number of stakeholders: 4 Main topics: Pilot investments, DH sector legislation/regulation, twinning activities, inspire event

Introduction

As defined in the Grant Agreement, this deliverable N°4.2 Report on local working groups is closely tight with the work package 4's objective – achieve at least 15 DHS investments in at least 5 countries, using suitable technical and financial approaches (developed in Work Package 3), which will lead to increased efficiency and RES use. Throughout the task 4.2 Support to DH operators/owners to remove barriers and achieve investments, it is stated in the Grant Agreement that the main objectives are to provide a tailor-made support, remove barriers and achieve above mentioned investments.

The specific topics and focus of the conducted meetings were defined based on the needs of each DHS operator/owner and related stakeholder which is defined throughout the Task 4.1 Selection of DHS for retrofiting, investments and working groups. Working groups are established for each DHS to be retrofited and include at least representatives of DHS operators/owners, local government and end consumers (and possible other key stakeholders if needed). The local working groups are responsible for the implementation and monitoring of the DHS retrofits. KeepWarm partner were mainly facilitator, discussion leader and triggering reflections and provide support in planned actions

In addition, the working groups will consider results of the Work Package 3 in order to provide an adequate support to secure investments:

- Supporting choices in the optimal financial approach and business model (combination of public and private capital, financing schemes like on-bill financing and similar)
- Support and guidance in preparation and application for potential grants (for example, EU structural funds through the Integrated Territorial Investment mechanism, and others)
- Supporting negotiations with customers (joint meetings with project partners as facilitators)
- Support on specific technical issues (in addition to the ones analyzed in WP3)
- Support with legal issues (e.g. unclear ownership/responsibilities of heating substations)
- Exchange with twins – and including lessons learnt
- Conclusions for future scenarios – long-term orientation

The outcome of Task 4.2 is the realization of 15 actual investments in DHS retrofits. Therefore, this document presents steps taken towards the above-mentioned goal through the activity of local working groups in terms of identification of problems, discussions, exchange of knowledge, remove of barriers and proposing relevant solutions.

Local working group – meeting 1

General Info

SHORT INFORMATION ABOUT THE LOCAL WORKING GROUP MEETING	
Country	Ukraine
Pilot city name	Zhytomyr DHS
Date	January 16, 2020
Location	10001, Zhytomyr city, 48 Kyivska st,
Number of participants/ Stakeholder groups	5 participants / 3 stakeholder groups: 2 participants from Zhytomyr DHS 2 participants from Zhytomyr city council 1 participant from KT-Energy LLC
Topic(s)	Pilot investments DH sector legislation/regulation Twinning activities Inspire event
Minutes by	Kyryl Tomliak

Agenda

There is no official document which can serve as an agenda. Topics of this meeting are given below:

1. Pilot Investments
2. DHS Regulation's Improvements
3. Twinning Visit
4. Low Temp District Heating
5. National Inspire Event

Minutes and main Conclusions

On Pilot Investments

KT-Energy presented in detail the latest shape of the projects stemming from the major scenarios of the Feasibility Study and Business Model, in terms of items included, financing figures, NPV and IRR values etc. Participants discussed in detail the ongoing activities from all the scenarios. Additional information is presented in Monitor of retrofit implementation steps.

On DHS Regulation's Improvements

KT-Energy has presented the draft amendments to the Draft National Plan on Energy Efficiency by 2030 (The draft National Plan is being developed by the State Agency for Energy Efficiency and Saving of Ukraine). The amendments aim to streamline investment into efficient district heating practices. The parties agreed to further discuss and process the proposed amendments and shape them in more legal and detailed format.

On Twinning Visit

KT-Energy indicated the national Inspire Events of KeepWarm partners in the Czech Republic and in Croatia, coming in April 2020. Visit to either of those events could facilitate experience exchange between DH companies within the project. It was proposed to further discuss the participation of Zhytomyr DHS in the mentioned conferences. Present participants from Zhytomyr DHS confirmed the interest toward the participation; agenda of both events would be welcomed.

On Low Temp District Heating

Given the fact that Zhytomyr DHS has applied efforts to reduce the temperature regime of the heat carrier and its facilities, KT-Energy has asked to provide more detail on these developments. Low temp has been discussed and piloted in a number of places in Europe and it would be interesting to contribute to the process with concrete cases and projects.

The parties agreed to continue the dialog in this regard.

On National Inspire Event

The participants were informed about the KeepWarm's Ukrainian National Inspire Event, scheduled for 14-15th of May, 2020. Zhytomyr DHS representatives are more than welcome to join the event. Moreover, there is an option to execute the visit of the conference participants to Zhytomyr to see the developments of the DHS and discuss the details on the spot. In this case the visit could take place on the 14th of May.

The parties agreed to further discuss possible involvement of the DHS to the event and the visit.

Twinning activities

This meeting did not include any activities focused on twinning.

Monitor of retrofit implementation steps

On scenario 1 (Installation of a biomass CHP unit applying ORC technology), the project design documentation has undergone state technical expertise and its positive conclusion is expected in the coming month, opening the way to further tendering procedures and construction. It is expected that the ORC unit can be installed by Autumn, 2021.

On Scenario 2 (Boilers replacement at 7 First Vilskyi lane boiler house), DHS indicated that may be financed through the company investment program, which should cover the costs of the two boilers.

On Scenario 3 (Boilers replacement at 4 Karetnyi lane boiler house), the finance ought to be sought.

On Scenario 4 (Modernization of the district heating sub-network connected to RK-6 boiler house), Zhytomyr DHS pointed on the likelihood of further extension of this activity, inter alia, to comprise additional pipeline replacement around boiler house # 6, on the course of its further centralization.

DHS representatives have pointed on the important role of the city to help the DHS to finance some preparatory and core activities within scenario 1, 2 and 4. The representatives of Zhytomyr city council confirmed the understanding of the importance of the district heating for the city and the need to finance some DHS activities.

DHS representatives pointed on the interest of the company toward some of the items which have not become part of the Feasibility study and the Business Model. In particular, they have mentioned (1) the billing system, to improve the relationships with customers, and (2) SCADA (supervisory control and data acquisition) system.

All the present participants agreed to further cooperate on the search the needed finance. USAID, IFC, Swedish Fund on District Heating development (under NEFCO management) and State Fund on Regional Development have been identified as possible partners in this regard. The parties agreed to discuss a possible cooperation with these organizations.

Local working group – meeting 2

General Info

SHORT INFORMATION ABOUT THE LOCAL WORKING GROUP MEETING	
Country	Ukraine
Pilot city name	Bila Tserkva DHS
Date	January 21, 2020
Location	09100, Bila Tserkva city, Iaroslava Mudrogo 15 st
Number of participants/ Stakeholder groups	6 participants / 3 stakeholder groups: 2 participants from Bila Tserkva DHS 3 participants from Bila Tserkva city council 1 participant from KT-Energy LLC
Topic(s)	Pilot investments DH sector legislation/regulation Twinning activities Inspire event
Minutes by	Kyryl Tomliak

Agenda

There is no official document which can serve as an agenda. Topics of this meeting are given below:

1. Pilot Investments
2. DHS Regulation's Improvements
3. Twinning Visit
4. National Inspire Event

Minutes and main Conclusions

On Pilot Investments

KT-Energy presented in detail the latest shape of the projects stemming from the major scenarios of the Feasibility Study and Business Model, in terms of items included, financing figures, NPV and IRR values etc. to Bila Tserkva DHS. Participants discussed in detail the on-going activities from all the scenarios. Additional information is presented in Monitor of retrofit implementation steps.

On DHS Regulation's Improvements

KT-Energy has presented the draft amendments to the Draft National Plan on Energy Efficiency by 2030 (The draft National Plan is being developed by the State Agency for Energy Efficiency and Saving of Ukraine). The amendments aim to streamline investment into efficient district heating practices. The parties agreed to further discuss and process the proposed amendments and shape them in more legal and detailed format.

On Twinning Visit

The national Inspire Events of the Czech and Croatian KeepWarm partners have been indicated, coming in April 2020. Visit to either of those events could facilitate experience exchange between DH companies within the project. It was proposed to further discuss the participation of Bila Tserkva DHS in the mentioned conferences. Present participants confirmed the interest toward the participation; agenda of both events would be welcomed.

On National Inspire Event

KT-Energy has informed the participants about the Ukrainian KeepWarm National Inspire Event, scheduled for 14-15th of May, 2020. Bila Tserkva DHS representatives are more than welcome to join the event.

The parties agreed to further discuss possible involvement of the DHS to the event and the visit.

Twinning activities

This meeting did not include any activities focused on twinning.

Monitor of retrofit implementation steps

On scenario 3 (pipeline CHP-City), the parties discussed the following: The project is of high priority to the DHS and the city – thus, maximum efforts shall be applied to find resources to finance the project. Among the major potential donors/investors, KT-Energy has mentioned the State Fund for Regional Development (DFRD) and the IFC funds.

DFRD provides money to projects which correspond to DFRD selection criteria, including the mandatory share of co-financing (around 10% or even more). The selection is done at regional level (Kyiv oblast) and approved at national level.

The amount of investment needed is between Euro 8.7 million to Euro 12.4 million. The DHS has informed, that the project design documentation for the scenario estimated the necessary costs at the level of Euro 12.4 million. The documentation was prepared in 2017 and may require an update, which may result in the bigger cost of the activity.

KT-Energy informed the audience about the recent meeting with IFC representatives. IFC seeks clients from Ukrainian cities to finance energy efficiency measures. However, the minimum volumes of the fund sought is Euro 20 million. It may be possible to apply for the funds for the consortium of cities, subject to the confirmation and approval from IFC legal

specialists. Effective interest rate may constitute 4%, including the grant part.

DFRD application shall be done by the city or organisation authorised by the city council (likely, a municipal enterprise or even the DHS, which does have the experience in the past of communicating with the Fund). City authorities, i.e. the Energy Efficiency Department, shall provide all the necessary support to the application drafting and submission. KT-Energy will take active part in the process as well. The City Execution Committee or even the City Council may be requested to support the application with the respectful official decision.

The city shall initiate a dialog with the Fund and respectful regional authorities on the matter of possible financing of the scenario. KT-Energy looks forward to participating in the process. Given its considerable cost, the application shall be divided into 3 or 4 stages.

KT-Energy shall as well follow up with NEFCO, as well, to attract possible investment. Overall, it has been agreed to go different ways in terms of financing search, meaning addressing, within reasonable level, all the major donors/investors to have flexibility.

On Scenario 2 and 4 (NIISTU boilers replacement and pipeline replacement), the DHS indicated that at present the company does not have the necessary resources to execute the project. The financing shall be sought outside of the company, subject to the readiness of the city to support the fund attraction with co-financing and guarantees.

Bila Tserkva's Deputy Mayor pointed out that the applications to the DFRD on these two scenarios shall not be done to prioritize the scenario 1 application. The parties agreed to continue the dialog with potential donors/investors to find the money for the scenarios 2 and 4 execution.

Local working group – meeting 3

General Info

SHORT INFORMATION ABOUT THE LOCAL WORKING GROUP MEETING	
Country	Ukraine
Pilot city name	Khmelnytskyi DHS
Date	February13, 2020
Location	Khmelnytskyi DHS office
Number of participants/ Stakeholder groups	10 participants / 3 stakeholder groups: 5 participants from Khmelnytskyi DHS 4 participants from Khmelnytskyi city council 1 participant from KT-Energy LLC
Topic(s)	Pilot investments DH sector legislation/regulation Twinning activities Inspire event
Minutes by	Kyryl Tomliak

Agenda

There is no official document which can serve as an agenda. Topics of this meeting are given below:

1. Pilot Investments
2. DHS Regulation's Improvements
3. Twinning Visit
4. National Inspire Event

Minutes and main Conclusions

On Pilot Investments

KT-Energy presented in detail the latest shape of the projects stemming from the major scenarios of the Feasibility Study and Business Model, in terms of items included, financing figures, NPV and IRR values etc. Participants discussed in detail the on-going activities from all the scenarios. Additional information is presented in Monitor of retrofit implementation steps.

On DHS Regulation's Improvements

KT-Energy has presented the draft amendments to the Draft National Plan on Energy Efficiency by 2030 (The draft National Plan is being developed by the State Agency for Energy Efficiency and Saving of Ukraine). The amendments aim to streamline investment into efficient district heating practices. The parties agreed to further discuss and process the proposed amendments and shape them in more legal and detailed format.

KT-Energy has also informed that KT-Energy has sent proposals on improvements of the regulatory base to increase investment into district heating modernization to the State Agency on Energy Efficiency and Energy Savings of Ukraine.

On Twinning Visit

The national Inspire Events of the Czech and Croatian KeepWarm partners have been indicated, coming in April 2020. Visit to either of those events could facilitate experience exchange between DH companies within the project. It was proposed to further discuss the participation of Khmelnytskyi DHS in the mentioned conferences. Present participants confirmed the interest toward the participation; agenda of both events would be welcomed.

On National Inspire Event

KT-Energy has informed the participants about the Ukrainian KeepWarm National Inspire Event, scheduled for of May 14-15 2020. Khmelnytskyi DHS representatives are more than welcome to join the event. Within the event it is planned to visit Zhytomyr DHS together with the international partners of KeepWarm project as well as to have round table discussions and presentations from experts and policy makers.

The parties agreed to further discuss possible involvement of the DHS to the event and the visit.

Twinning activities

This meeting did not include any activities focused on twinning.

Monitor of retrofit implementation steps

On Scenario 1 (Installation of a biomass boiler) the DHS representatives indicated that the preferred option is implementation of Scenario 5 and reconnection of heating load from Pivnichna 2 boiler house to 8/1g Kurchatova str. boiler house. Therefore, installation of a biomass boiler would be considered in Scenario 5.

Scenario 2 (Pipelines replacement), which foresees replacement of pipelines connected to three boiler houses (Molodizhna 2, Ternopil'ska 14/3, and Pivnichna 2), requires a significant amount of finance and has a long payback period. The potential financing options for this project will be investigated. Moreover, this option should be reviewed after the final decisions of heating capacities centralization.

On Scenario 3 (Installation of a RDF boiler), KT-Energy has informed that although this

project demonstrates good financial results, there are significant uncertainties about the availability of RDF, its price and quality, as well as legal feasibility of using RDF for energy projects in Ukraine. Khmelnytskyi DHS and city council representatives informed that the city of Khmelnytskyi has already invested significant efforts in developing waste management system and attracting investment for the construction of a new waste processing facility. The work on this project started back in 2016.

On Scenario 4 (Replacement of burners), DHS representatives indicated that there is previous successful experience on burners modernization, which demonstrated the feasibility of such projects. The final decision on the list of boilers to be modernized will be made after decisions of heating capacities centralization.

On Scenario 5 (Optimization of district heating system in Grechany district), the participants discussed the possibility to combine this scenario with Scenario 1 (Installation of a biomass boiler). The scenarios foresee connection of heat load (heating and hot water supply) from the boiler house at 2 Pivnichna str. to a grid section served by the boiler house at 8/1g Kurchatova str. The project will result in centralization of heat supply and will increase the quality and reliability of the services provided by the DHS operator. This scenario is mutually exclusive with scenario 1. However, Scenario 5 could be extended and could also include installation of a biomass or RDF-fired boiler at the boiler house 8/1g Kurchatova str. for both heat energy and hot water production.

All the present participants agreed to further cooperate on the search of the needed finance. USAID, IFC, Swedish Fund on District Heating development (under NEFCO management) and State Fund on Regional Development have been identified as possible partners in this regard. The parties agreed to discuss a possible cooperation with these organizations.

Local working group – meeting 4

General Info

SHORT INFORMATION ABOUT THE LOCAL WORKING GROUP MEETING	
Country	Ukraine
Pilot city name	Ternopil DHS
Date	February14, 2020
Location	Ternopil
Number of participants/ Stakeholder groups	4 participants / 3 stakeholder groups: 2 participants from Ternopil DHS 1 participant from Ternopil city council 1 participant from KT-Energy LLC
Topic(s)	Pilot investments DH sector legislation/regulation Twinning activities Inspire event
Minutes by	Kyryl Tomliak

Agenda

There is no official document which can serve as an agenda. Topics of this meeting are given below:

1. Pilot Investments
2. DHS Regulation's Improvements
3. Twinning Visit
4. National Inspire Event

Minutes and main Conclusions

On Pilot Investments

KT-Energy presented in detail the latest shape of the projects stemming from the major scenarios of the Feasibility Study and Business Model, in terms of items included, financing figures, NPV and IRR values etc. Participants discussed in detail the on-going activities from all the scenarios. Additional information is presented in Monitor of retrofit implementation steps.

On DHS Regulation's Improvements

KT-Energy has presented the draft amendments to the Draft National Plan on Energy Efficiency by 2030 (The draft National Plan is being developed by the State Agency for Energy Efficiency and Saving of Ukraine). The amendments aim to streamline investment into efficient district heating practices. The parties agreed to further discuss and process the proposed amendments and shape them in more legal and detailed format.

KT-Energy has also informed that KT-Energy has sent proposals on improvements of the regulatory base to increase investment into district heating modernization to the State Agency on Energy Efficiency and Energy Savings of Ukraine.

On Twinning Visit

KT-Energy indicated the national Inspire Events of the Czech and Croatian KeepWarm partners, coming in April 2020. Visit to either of those events could facilitate experience exchange between DH companies within the project. It was proposed to further discuss the participation of Ternopil DHS in the mentioned conferences. Present participants confirmed the interest toward the participation; agenda of both events would be welcomed.

On National Inspire Event

KT-Energy has informed the participants about the Ukrainian KeepWarm National Inspire Event, scheduled for 14-15th of May, 2020. Ternopil DHS representatives are more than welcome to join the event. Within the event it is planned to visit Zhytomyr DHS together with the international partners of KeepWarm project as well as have round table discussions and presentations from experts and policy makers.

The parties agreed to further discuss possible involvement of the DHS to the event and the visit.

Twinning activities

This meeting did not include any activities focused on twinning.

Monitor of retrofit implementation steps

The working group discusses all potential modernization scenarios: Scenario 1 (Installation of 4 biomass boiler), Scenario 2 (Installation of biomass CHP), and Scenario 3 (Installation of 10 MW biomass boiler).

KT-Energy has informed that all projects demonstrate good financial results and substitutions of natural gas with renewable biomass is economically feasible and environmentally a beneficial option for the modernization of district heating systems.

Participants discussed potential biomass sources and suggested that agricultural biomass residues should be also included as a potential fuel type.

Participants also discussed environmental and sustainability requirements for biomass projects. Financial institutions often require documental evidences about the source of

biomass and sustainability requirements (for instance, the evidences of reforestation areas from wood biomass suppliers).

All the present participants agreed to further cooperate on the search of needed finance. USAID, IFC, Swedish Fund on District Heating development (under NEFCO management) and State Fund on Regional Development have been identified as possible partners in this regard. The parties agree to discuss a possible cooperation with these organizations.

Local working group – meeting 5

General Info

SHORT INFORMATION ABOUT THE LOCAL WORKING GROUP MEETING	
Country	Ukraine
Pilot city name	Bila Tserkva DHS
Date	May 14, 2020
Location	Zoom meeting
Number of participants/ Stakeholder groups	4 participants / 3 stakeholder groups: 1 participant from Bila Tserkva DHS 1 participant from Bila Tserkva city council 2 participants from KT-Energy LLC
Topic(s)	Pilot investments DH sector legislation/regulation Twinning activities Inspire event
Minutes by	Mykola Shlapak

Agenda

There is no official document which can serve as an agenda. Topics of this meeting are given below:

1. Pilot Investments
2. DHS Regulation's Improvements
3. Twinning Visit
4. National Inspire Event

Minutes and main Conclusions

On Pilot Investments

The working group briefly discussed the potential of identified priority modernization scenarios. The impact of COVID19 pandemic has been also discussed. Additional information is presented in section Monitor of retrofit implementation steps.

On DHS Regulation's Improvements

KT-Energy has presented the general scope and objectives of the draft National Action Plan for retrofitting of District Heating Systems in Ukraine prepared within KeepWarm project. The action plan aims to set out the tangible steps that the government need to take in partnership with the wider public sector, business, industry, community representatives and other stakeholders to build confidence in the public sector to drive forward projects, the private sector to invest and in consumers to connect to DHS. The action plan is built upon the experience gained during the implementation of KeepWarm project, including training needs assessment, feasibility studies preparation and business model development, as well as reflections from DHS operators on possible supportive actions collected during discussions and interviews.

KT-Energy presented in detail the draft of the National Action Plan for retrofitting of District Heating Systems in Ukraine. The areas of recommendations are structured as following: (1) Heating (and Cooling) visions, strategies and plans; (2) Supporting actions and expert guidance; (3) Planning and regulation; (4) Funding.

Members of the local working group provided their comments and feedback on the presentation of the National Action Plan for retrofitting of District Heating Systems in Ukraine and made the following suggestions on the measures to be included in the document:

- highlight the importance of securing financial resources for district heating modernization and consider the establishment of a special state fund for these purposes similar to road development fund operating in Ukraine;
- measures to provide financial support of DH modernization projects from the local budgets since DH is an infrastructure of critical importance for the local communities;
- include provisions on environmental requirements and potential restrictions for the construction of biomass to energy facilities in densely populated areas in cities;
- adoption of a clear regulatory base for the provision of additional services of DH operators, including maintenance and servicing of distribution networks within buildings;
- support of automation technologies and smart operational control for both DHS and final consumers;

- capacity building activities and experience exchange between DHS operators (e.g. on operation of heat pumps, cogeneration units, management of environmental impact of biomass to energy projects, etc.);
- public awareness campaigns and educational materials on the benefits of district heating systems.

DHS representative suggested sharing the draft of the National Action Plan for retrofitting of District Heating Systems in Ukraine among wider circle of DHSs operators not participating in the KeepWarm project for their review and comments. She also pointed out that focus on renewable energy sources and waste heat utilization should take into account specific circumstances in each city. In particular, there are no large industrial enterprises that could supply waste heat to the DH network in Bila Tserkva and the potential for biomass use could also be limited.

KT-Energy informed that after the round of consultations with the representatives of DHSs taking part in the KeepWarm project, the draft National Action Plan for retrofitting of District Heating Systems in Ukraine will be updated and sent to the deputy minister of the Ministry of Communities and Territories Development responsible for DH sector and other interested stakeholders for wider discussion.

On Twinning Visit

KT-Energy informed that the national inspire events of KeepWarm partners in Czechia and Croatia planned to be held in April 2020 will likely be switched to a virtual mode. Additional information will be provided in a due course.

On National Inspire Event

KT-Energy informed that KeepWarm National Inspire Event initially scheduled for 14-15th of May, 2020 in Kyiv will likely be switched to a virtual mode. Additional information will be provided in a due course.

Twinning activities

This meeting did not include any activities focused on twinning.

Monitor of retrofit implementation steps

The working group briefly discussed the potential of identified priority modernization scenarios. Representative of Bila Tserkva city council informed that preparatory work for the implementation of Scenario 1 (DemoUkraine project) is ongoing and the positive decision of the Antimonopoly Committee of Ukraine has been received. The final approval of the project is expected in the coming months. DHS Bila Tserkva representative informed that the preparation of a new district heating system development scheme, taking into account the identified priority projects and new recommendations and requirements for DH mapping and development planning, would be required in the near future.

All the present participants agreed to further cooperate on the search the needed finance. USAID, IFC, Swedish Fund on District Heating development (under NEFCO management) and State Fund on Regional Development have been identified as possible partners in this regard.

Local working group – meeting 6

General Info

SHORT INFORMATION ABOUT THE LOCAL WORKING GROUP MEETING	
Country	Ukraine
Pilot city name	Khmelnyskyi DHS
Date	May 19, 2020
Location	Zoom meeting
Number of participants/ Stakeholder groups	6 participants / 3 stakeholder groups: 3 participants from Khmelnytskyi DHS 1 participant from Khmelnytskyi city council 2 participants from KT-Energy LLC
Topic(s)	Pilot investments DH sector legislation/regulation Twinning activities Inspire event
Minutes by	Mykola Shlapak

Agenda

There is no official document which can serve as an agenda. Topics of this meeting are given below:

1. Pilot Investments
2. DHS Regulation's Improvements
3. Twinning Visit
4. National Inspire Event

Minutes and main Conclusions

On Pilot Investments

The working group briefly discussed the potential of identified priority modernization scenarios. The impact of COVID19 pandemic has been also discussed. Additional information is presented in section Monitor of retrofit implementation steps.

On DHS Regulation's Improvements

KT-Energy has presented the general scope and objectives of the draft National Action Plan for retrofitting of District Heating Systems in Ukraine prepared within KeepWarm project. The action plan aims to set out the tangible steps that the government need to take in partnership with the wider public sector, business, industry, community representatives and other stakeholders to build confidence in the public sector to drive forward projects, the private sector to invest and in consumers to connect to DHS. The action plan is built upon the experience gained during the implementation of KeepWarm project, including training needs assessment, feasibility studies preparation and business model development, as well as reflections from DHS operators on possible supportive actions collected during discussions and interviews.

KT-Energy presented in detail the draft of the National Action Plan for retrofitting of District Heating Systems in Ukraine. The areas of recommendations are structured as following: (1) Heating (and Cooling) visions, strategies and plans; (2) Supporting actions and expert guidance; (3) Planning and regulation; (4) Funding.

Members of the local working group provided their comments and feedback on the presentation of the National Action Plan for retrofitting of District Heating Systems in Ukraine and made the following suggestions on the measures to be included in the document:

- strengthen coordination between different state authorities, in particular Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency, and local councils, on the aspects related to the modernization of district heating sector;
- highlight the importance of district heating development strategy at the national level;
- improve institutional capacity and limit the political impact and impact of the change of management in the state authorities on decision making process and organizational procedures;
- clarify the roles and responsibilities of different state authorities in the process of elaborating and approving district heating systems development schemes;
- updating state construction norms regulating DH modernization projects (e.g. pipelines placement, connection requirements, environmental requirements, etc.).

Overall, the members of the working group supported the key measures proposed in the draft National Action Plan for retrofitting of District Heating Systems in Ukraine and

underlined the importance of communicating the plan to the political leadership of the country and key stakeholders.

DHS representatives stressed the complicated financial conditions of many enterprises in the sector and the need of reforms.

KT-Energy informed that after the round of consultations with the representatives of DHSs taking part in the KeepWarm project, the draft National Action Plan for retrofitting of District Heating Systems in Ukraine will be updated and sent to the deputy minister of the Ministry of Communities and Territories Development responsible for DH sector and other interested stakeholders for wider discussion. Khmelnytskyi city council representative agreed to send the draft document to the Municipal Enterprise Khmelnytskteplokomunenegro (the second DH operator in Khmelnytskyi city) for their review and feedback.

On Twinning Visit

KT-Energy informed that the national inspire events of KeepWarm partners in Czechia and Croatia planned to be held in April 2020 will likely be switched to a virtual mode. Additional information will be provided in a due course.

On National Inspire Event

KT-Energy informed that KeepWarm National Inspire Event initially scheduled for 14-15th of May 2020 in Kyiv will likely be switched to a virtual mode. Additional information will be provided in a due course.

Twinning activities

This meeting did not include any activities focused on twinning.

Monitor of retrofit implementation steps

The working group briefly discussed the potential of identified priority modernization scenarios. There were no major updates on the implementation of the projects.

All the present participants agreed to further cooperate on the search the needed finance. USAID, IFC, Swedish Fund on District Heating development (under NEFCO management) and State Fund on Regional Development have been identified as possible partners in this regard.

Local working group – meeting 7

General Info

SHORT INFORMATION ABOUT THE LOCAL WORKING GROUP MEETING	
Country	Ukraine
Pilot city name	Zhytomyr DHS
Date	May 20, 2020
Location	Zoom meeting
Number of participants/ Stakeholder groups	6 participants / 3 stakeholder groups: 2 participants from Zhytomyr DHS 2 participants from Zhytomyr city council 2 participants from KT-Energy LLC
Topic(s)	Pilot investments DH sector legislation/regulation Twinning activities Inspire event
Minutes by	Mykola Shlapak

Agenda

There is no official document which can serve as an agenda. Topics of this meeting are given below:

1. Pilot Investments
2. DHS Regulation's Improvements
3. Twinning Visit
4. National Inspire Event

Minutes and main Conclusions

On Pilot Investments

Municipal Enterprise updated the members of the working group on the ongoing modernization projects and informed that projects previously implemented demonstrate good results in terms of reduced heat carrier leakages and improved energy efficiency of the system. Participants discussed in detail the on-going activities from all the scenarios. Municipal Enterprise informed about the procedures for securing financial resources for the modernization projects. Municipal Enterprise also informed that heat supply system scheme of the city is currently being updated by a specialized contractor and is expected to be ready in a few months. The document will include all priority modernization projects

included in the business model developed within Keep Warm project. KT-Energy suggested to consider the draft requirements for heat supply system schemes development published recently by the Ministry of Communities and Territories Development and also assess potential progress in building efficient district heating system according to the definition of EU Energy Efficiency Directive. The impact of COVID19 pandemic has been also discussed. Additional information is presented in section Monitor of retrofit implementation steps.

On DHS Regulation's Improvements

KT-Energy has presented the general scope and objectives of the draft National Action Plan for retrofitting of District Heating Systems in Ukraine. The action plan aims to set out the tangible steps that the government need to take in partnership with the wider public sector, business, industry, community representatives and other stakeholders to build confidence in the public sector to drive forward projects, the private sector to invest and in consumers to connect to DHS. The action plan is built upon the experience gained during the implementation of KeepWarm project, including training needs assessment, feasibility studies preparation and business model development, as well as reflections from DHS operators on possible supportive actions collected during discussions and interviews.

KT-Energy presented in detail the draft of the National Action Plan for retrofitting of District Heating Systems in Ukraine. The areas of recommendations are structured as following: (1) Heating (and Cooling) visions, strategies and plans; (2) Supporting actions and expert guidance; (3) Planning and regulation; (4) Funding.

Members of the local working group provided their comments and feedback on the presentation of the National Action Plan for retrofitting of District Heating Systems in Ukraine and made the following suggestions on the measures to be included in the document:

- on improvement of public procurement process to eliminate barriers for district heating modernization process and possibility to include non-financial criteria for the evaluation of the bids and proposals;
- on elimination of regulatory and capacity barriers during implementation of modernization projects financed with the support of international financial institutions and other donors, which currently lead to significant delays in execution of the projects;
- on the importance of state support for cogeneration projects to improve the overall efficiency of DH systems;
- on the role of city councils and municipal authorities in supporting district heating systems;
- to include additional responsible parties to some of the actions presented in the draft action plan (e.g. regional state administrations for biomass availability studies, Ministry of Finance for the aspects related to taxation and funding, city councils and Ministry of Environment and Energy for climate change related aspects, national

Regulator for tariff setting aspects, etc.).

KT-Energy informed that after the round of consultations with the representatives of DHSs taking part in the KeepWarm project, the draft National Action Plan for retrofitting of District Heating Systems in Ukraine will be updated and sent to the deputy minister of the Ministry of Communities and Territories Development responsible for DH sector and other interested stakeholders for wider discussion.

On Twinning Visit

KT-Energy informed that the national inspire events of KeepWarm partners in Czechia and Croatia planned to be held in April 2020 will likely be switched to a virtual mode. Additional information will be provided in a due course.

On National Inspire Event

KT-Energy informed that KeepWarm National Inspire Event initially scheduled for 14-15th of May 2020 in Kyiv will likely be switched to a virtual mode. Additional information will be provided in a due course.

Twinning activities

This meeting did not include any activities focused on twinning.

Monitor of retrofit implementation steps

On scenario 1 (Installation of a biomass CHP unit applying ORC technology), Zhytomyr DHS informed that implementation of the project is ongoing. There could be some delays in construction works due to the impact of COVID19 pandemic and shortage of financial resources in the municipal budget to co-finance some elements of the project.

On Scenario 2 (Boilers replacement at 7 First Vilskyi lane boiler house), DHS indicated that the project has been included in the draft heat supply system scheme currently being developed. The sources of financing are currently being explored. Initially, the company considered financing through the company investment program, which should cover the costs of the two boilers.

On Scenario 3 (Boilers replacement at 4 Karenyi lane boiler house), the finance ought to be sought. DHS indicated that the project has been included in the draft heat supply system scheme currently being developed.

On Scenario 4 (Modernization of the district heating sub-network connected to RK-6 boiler house), Zhytomyr DHS informed that implementation and planning of the project is ongoing. There could be some delays in construction works due to the impact of COVID19 pandemic and shortage of financial resources in the municipal budget to co-finance some elements of the project.

All the present participants agreed to further cooperate on the search the needed finance. USAID, IFC, Swedish Fund on District Heating development (under NEFCO management) and State Fund on Regional Development have been identified as possible partners in this

regard. The parties agree to discuss with these organizations' possible cooperation.

Local working group – meeting 8

General Info

SHORT INFORMATION ABOUT THE LOCAL WORKING GROUP MEETING	
Country	Ukraine
Pilot city name	Ternopil DHS
Date	June 1 st , 2020
Location	Zoom meeting
Number of participants/ Stakeholder groups	4 participants / 2 stakeholder groups: 2 participants from Ternopil DHS 2 participants from KT-Energy LLC
Topic(s)	Pilot investments DH sector legislation/regulation Twinning activities Inspire event
Minutes by	Mykola Shlapak

Agenda

There is no official document which can serve as an agenda. Topics of this meeting are given below:

1. Pilot Investments
2. DHS Regulation's Improvements
3. Twinning Visit
4. National Inspire Event

Minutes and main Conclusions

On Pilot Investments

The working group briefly discussed the potential of identified priority modernization scenarios: Scenario 1 (Installation of 4 MW biomass boiler), Scenario 2 (Installation of biomass CHP), and Scenario 3 (Installation of 10 MW biomass boiler). The impact of COVID19 pandemic has been also discussed (e.g. equipment manufacturing delays due to lockdown). Additional information is presented in section Monitor on retrofit implementation steps.

On DHS Regulation's Improvements

KT-Energy has presented the general scope and objectives of the draft National Action Plan for retrofitting of District Heating Systems in Ukraine prepared within KeepWarm project. The action plan aims to set out the tangible steps that the government need to take in partnership with the wider public sector, business, industry, community representatives and other stakeholders to build confidence in the public sector to drive forward projects, the private sector to invest and in consumers to connect to DHS. The action plan is built upon the experience gained during the implementation of KeepWarm project, including training needs assessment, feasibility studies preparation and business model development, as well as reflections from DHS operators on possible supportive actions collected during discussions and interviews.

KT-Energy presented in detail the draft of the National Action Plan for retrofitting of District Heating Systems in Ukraine. The areas of recommendations are structured as following: (1) Heating (and Cooling) visions, strategies and plans; (2) Supporting actions and expert guidance; (3) Planning and regulation; (4) Funding.

Members of the local working group provided their comments and feedback on the presentation of the National Action Plan for retrofitting of District Heating Systems in Ukraine and made the following suggestions on the measures to be included in the document:

- include in section (1) “Heating (and Cooling) visions, strategies and plans” a specific measure to define the roles of responsibilities of different state authorities at the national level and local levels in the process of district heating sector modernization; DHC representatives suggested that local authorities should be responsible for planning and approving capital investment in district heating systems, since they are accountable to local communities on ensuring energy security and reliable energy services;
- highlight the strategic role of building renovation planning and execution of building renovation activities for the future operation and modernization of the district heating sector; DHC representatives stressed that to plan modernization projects they need a reliable information on future energy demand to avoid investment in stranded assets; national authorities should assess the impact of buildings sector policies on DH and adopt relevant support policies for the DH sector;
- include measures on allowing access to district heating networks for independent third-party produces as this is considered as the optimal mechanism for investing in renewable energy generation capacities; DHS operators are reluctant to invest in biomass to energy projects due to additional cost, complicated logistic and lack of expertise;
- consider international experience in developing new business models for DH sector and regulating DH investments.

KT-Energy informed that after the round of consultations with the representatives of DHSs taking part in the KeepWarm project, the draft National Action Plan for retrofitting of District Heating Systems in Ukraine will be updated and shared among stakeholders for wider discussion. The draft of the plan has already been sent to the deputy minister of the Ministry of Communities and Territories Development responsible for DH sector.

On Twinning Visit

KT-Energy informed that the national inspire events of KeepWarm partners in Czechia and Croatia planned to be held in April 2020 will likely be switched to a virtual mode. Additional information will be provided in a due course.

On National Inspire Event

KT-Energy informed that KeepWarm National Inspire Event initially scheduled for 14-15th of May 2020 in Kyiv will likely be switched to a virtual mode. Additional information will be provided in a due course

Twinning activities

This meeting did not include any activities focused on twinning.

Monitor of retrofit implementation steps

The working group briefly discussed the potential of identified priority modernization scenarios: Scenario 1 (Installation of 4 MW biomass boiler), Scenario 2 (Installation of biomass CHP), and Scenario 3 (Installation of 10 MW biomass boiler).

Participants discussed the feasibility of biomass to energy projects in district heating sector under the conditions of reduced natural gas prices, taking into account additional technological and logistical barriers of biomass projects. The introduction of competitive access to district heating networks for private companies was mentioned as one of the potential options for streamlining biomass to energy projects in district heating sector.

All the present participants agreed to further cooperate on the search the needed finance. USAID, IFC, Swedish Fund on District Heating development (under NEFCO management) and State Fund on Regional Development have been identified as possible partners in this regard.

Future activities of local working groups

By the end of 2020 additional meetings of local working groups are planned to be organized in order to continue above-mentioned activities in terms of achieving investments. Most of those meetings will likely take place virtually due to new working environment influenced by the COVID-19. One meeting with each local working group is planned to discuss the following topics:

- Progress on development and implementation of priority investment projects included in feasibility studies and business models prepared within KeepWarm project, including key measures implemented and planned, financing, procurement, barriers, etc.;
- Potential financing sources for the implementation of district heating modernization projects;
- Comments on the final proposals for the National Action Plan for district heating modernization of Ukraine;
- Incorporation of district heating modernization priorities in the local sustainable energy and climate action plans and other local planning documents;
- Feedback on participation in KeepWarm project, including training activities and online webinars.