

# **KeepWarm**

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



This project is funded by the EU's Horizon 2020 research and innovation programme under grant agreement N°784966, and lasts from April 2018 – September 2020.

This project receives co-funding from the German Federal Ministry of Economic Cooperation and Development.





Renewing district heating

### KeepWarm Showroom of replicable and bankable DHS pilot projects





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# About the KeepWarm project

KeepWarm supports **forward-looking district heating systems** (DHS) in seven countries of Central and Eastern Europe (CEE) to develop and implement pilot projects which **retrofit** their systems in a more **sustainable** manner.

To **overcome barriers** to DH deployment across the region, KeepWarm facilitates DHSs via a multi-stage approach:





Increased capacities of specialists working in DHS companies by offering training workshops

DHSs supported in the development of viable business plans





DHSs advised on how to mobilise funding for bankable pilot projects

Exhibit of replicable DHS demo cases







## **KeepWarm Showroom**

Following KeepWarm's suggested action-hierarchy below, DHSs will have more **efficient operations** from such **cost-effective investments**, and which provide even more **reliable services** to their customers while still contributing greatly to **climate-related goals**.

The following pages exhibit KeepWarm's portfolio of leading DHS demo cases as a means to:

- Inspire other DHSs to replicate their successes
- **Stimulate investment** in worthwhile opportunities
- Attract customers to the viability of DHS services
- Showcase DHSs' justifiable role within energy policies





## **Ukrainian DH context**

40% of Ukrainian citizens are served by DH, particularly in densely populated urban areas. DHSs are typically owned by municipalities and operated by municipal enterprises.

#### Challenges

- Smart modernisation of DHS is needed to increase efficiency
- Heat energy demand decreasing
- Significant debt levels and lack of financial resources
- Third-party access to DH networks
- Human resources deficit



Source: <u>Pixabay</u>



### **Framework & action**

#### Trends

- The use of **biomass** for heating is growing
- Energy efficiency investment is increasing but needs to be accelerated

#### **Policy stance**

- Goal of 40% share of RES share in DH by 2030
- Measures to minimise natural gas usage and increase efficiency in DH and buildings
- Reducing GHGs emissions according to NDC

#### **Investment subsidies covering:**

New DHS /expansions of DHS	X
DHS retrofits for EE / RES	$\checkmark\checkmark$
Consumers / connections	$\checkmark\checkmark$
Soft loans and other financing	
Tax incentives	X

#### **Recommended actions**

- Approve a sector strategy on efficient DH and decarbonisation goals
- Develop a **debt management** plan
- Increase public investment in DH modernisation
- Support new **business models**



## **DHS Bila Tserkva**

### (Municipal enterprise Bilotserkivteplomerezha)

- Location: Bila Tserkva, Ukraine
- Ownership: municipal
- Grid: **163** km (owned by the municipality)
- Customers: 1,370 buildings
- Connected load: 327 MW
- Boiler output: 419 MW (407 boilers)
- Type of DHS: hot water
- Current fuel: natural gas
- Potential renewables nearby: biomass



Source: DHS Bila Tserkva web-site, bctm.com.ua

Investment plans (2020-2025): Installation of new efficient natural gas boilers and 1 MW biomass boiler, replacement of pipelines, including 800 mm pipeline connecting DHS with the nearby CHP plant

# Increased efficiency and security of heat supply



- Primary investment drivers:
- network and equipment conditions
- energy security risks
- available financing sources

Strategic background documents:

- Sustainable Energy and Climate Actio
   Plan of Bila Tserkva city up to 2030
- National energy efficiency, renewable energy and climate policy



Stakeholder involvement:

- Leading: Bila Tserkva city council
- Other: Bilotserkivska CHP, international financial organizations

Required resources:

Financial investment: **10.8 million EUR** Other: equipment and materials, energy resources, incl. biomass



### **Results:**



- RES heat increase:
   20,624 GJ per year
- Primary energy savings: 92,152 GJ per year
- Emissions:
   \$\Pi\$6,895 tonnes CO<sub>2e</sub>
   per year or 6%
- Internal rate of return:
   5-18% depending on the intervention and assumed natural gas prices

### Want to <u>support our</u> modernization projects?

**Contact us using the information below!** 

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# **DHS Khmelnytskyi**

#### (Municipal enterprise Pivdenno-zahidni teplomerezhi)

- Location: Khmelnytskyi, Ukraine
- Ownership: municipal
- Grid: 138 km (owned by the municipality)
- Customers: about 20,000
- Connected load: 96.75 MW
- Boiler output: 293.8 MW (43 boilers)
- Type of DHS: hot water
- Current fuel: natural gas
- Potential renewables nearby: biomass



Source: DHS Khmelnytskyi web-site, pivzahteplo.com

Investment plans (2020-2025): Construction of 5 MW biomass boiler, modernization of boiler houses with new burners installation,

replacement of pipelines and installation of individual heating units.

### **Increasing biomass share and efficiency**



- **Primary investment drivers:** 
  - network and equipment conditions
- available financing sources

Strategic background documents:

- Sustainable Energy Action Plan of Khmelnytskyi city for 2016-2025
- National energy efficiency, renewable energy and climate policy

Stakeholder involvement:

- Leading: Khmelnytskyi city council
- Other: international financial organizations, customers, contractors

Required resources: Financial investment: 4.6 million EUR Other: equipment and materials,

energy resources, incl. biomass

#### **Results:**

- RES heat increase:
   44,823 GJ per year
- Primary energy savings: 24,188 GJ per year
- Emissions:
  - \$\$4,557\$ tonnes CO<sub>2e</sub> per year or 10%
- Internal rate of return:
   3-43% depending on intervention and assumed natural gas prices

### Want to <u>support our</u> modernization projects?

**Contact us using the information below!** 

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# **DHS Ternopil**



(Municipal utility district heating company "Ternopilmiskteplokomunenergo" of Ternopil City Council)

- Location: Ternopil, Ukraine
- Ownership: municipal
- Grid: 152 km (owned by the municipality)
- Customers: over 42,000
- Production: **471,597 MWh** (2018)
- Boiler output: 709 MW (137 boilers)
- Type of DHS: hot water
- Current fuel: natural gas
- Potential renewables nearby: biomass



Source: DHS Ternopil web-site, teplo.te.ua

Investment plans (2020-2025): 10 MW and 4 MW biomass boilers, modernization of boiler houses, replacement of pipelines, and installation of individual heating units.

### Increasing biomass share in heat supply





- Modernization Program for the District Heating and Hot Water Supply System of Ternopil city for the period 2016-2020
- available financing sources

Strategic background documents:

- Sustainable Energy Action Plan of Ternopil city up to 2020
- National energy efficiency, renewable energy and climate policy

Stakeholder involvement:

- Leading: Ternopil city council
- Other: international financial
   organizations, customers, contractors

Required resources: Financial investment: 4.9-6.9 million EUR Other: equipment and materials, energy resources, incl. biomass



**Results:** 

- RES heat increase:
   271,256 GJ per year
- Emissions: 14,820
   tonnes CO<sub>2e</sub> per year
   or 12%
- Internal rate of return: 13-54% depending on the intervention and assumed natural gas prices

Want to <u>support our</u> modernisation projects?

Contact us using the information below!

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# **DHS Zhytomyr**

KeepWarm Renewing district heating

(Municipal enterprise «Zhytomyrteplokomunenergo» of Zhytomyr city council)

- Location: Zhytomyr, Ukraine
- Ownership: municipal
- Grid: 207 km (owned by the municipality)
- Customers: 1,952 buildings
- Production: 563,299 MWh (2017)
- Boiler output: **789 MW** (204 boilers)
- Type of DHS: hot water
- Current fuel: natural gas
- Potential renewables nearby:
   biomass



Source: DHS Zhytomyr web-site, tke.org.ua

Investment plans (2020-2025): Biomass CHP unit with ORC technology, complex modernisation of network subsection, installation of new natural gas boilers, replacement of pipelines, and installation of individual heating units.

# Complex modernization and switching to biomass



- Primary investment drivers:
  - Internal development plans
  - network and equipment conditions
- available financing sources

Strategic background documents:

- Sustainable Energy Action Plan of Zhytomyr city for 2015-2024
- National energy efficiency, renewable energy and climate policy



Stakeholder involvement:

- Leading: Zhytomyr city council
  - Other: international financial organizations, customers, contractors

Required resources:

Financial investment:

#### 9.8 million EUR

Other: equipment and materials, en وي رو resources, incl. biomass

### **Results:**

- RES heat increase:
   158,909 GJ per year
- Primary energy savings: 101,322 GJ per year
- Emissions:
  - ♣17,472 tonnes CO<sub>2e</sub> per year or 13%
- Internal rate of return: 7-32% depending on intervention and assumed natural gas prices

### Want to <u>support our</u> modernization projects?

Contact us using the information below!

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## KeepWarm inspires

Now that you have discovered our front-running DHSs all across the CEE region, we hope that they have inspired you to **replicate their successes for your own DHSs**, as well as set up **effective policy frameworks** to support them further and inject **investments into their bankable DH projects**.

To facilitate your next steps, please keep reading the remaining few pages to see how we can help you to KeepWarm.



### Keep learning with KeepWarm

In order to help you on your way, you are highly recommended to explore further the <u>KeepWarm website</u>, including its <u>Learning Centre</u> with numerous resources from KeepWarm and many other <u>related</u> <u>projects</u> and EU-led initiatives, not to mention our latest <u>news</u>.

In particular, you can discover numerous **guidebooks, tools and other useful materials** to help you on your way to modernising DHSs:

- case studies of DH retrofits and sustainable-energy upgrades
- spatial mapping about heat supply and demand across Europe
- free-to use thermal planning software
- policy recommendations
- insights into finance and technical assistance
- <u>Inspire Events</u>, many of which are now being done online...

... and much more!



# Keep going with KeepWarm

Finally, it is worth highlighting that the <u>KeepWarm</u> <u>consortium</u> is especially well-suited to use its <u>competence</u> to help you achieve your DH goals! Our diverse group of experts can apply our great <u>experience all across Europe</u>, especially in countries of the CEE region.

Contact us (centrally or via links on the next pages) so we can know how **our expertise can benefit your work** towards making your DH more efficient and sustainable:

- Technical consultancy
- Feasibility studies
- Financial guidance
- Strategic action-planning

- Policy/market integration
- Staff/stakeholder trainings
- General advice
  - ... and much more!





Renewing district heating

For more information: visit our website www.KeepWarmEurope.eu contact us at: info@keepwarmeurope.eu or at: keepwarmeurope.eu/contact follow us on Twitter: @KeepWarm\_EU





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