

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.



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**



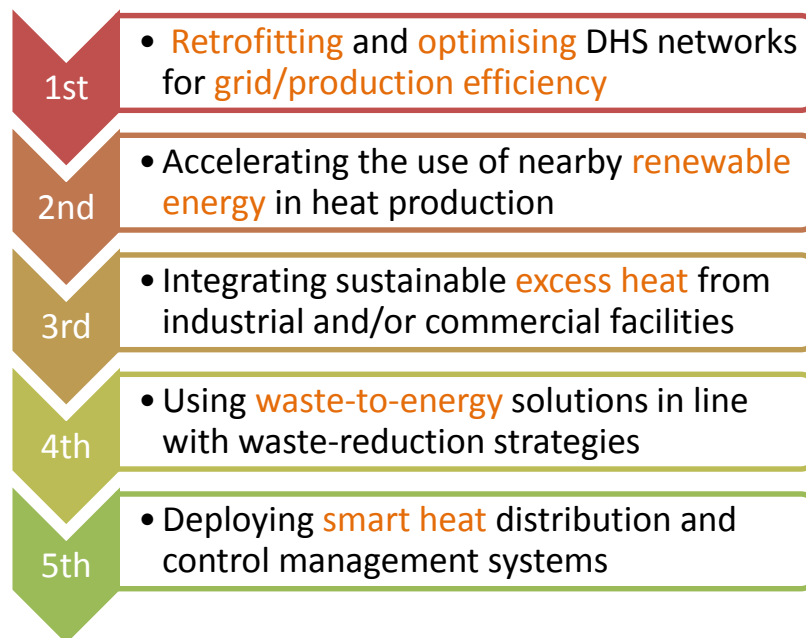
Facilitating the multi-level integration of DHS retrofits into key **strategies and plans**

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**



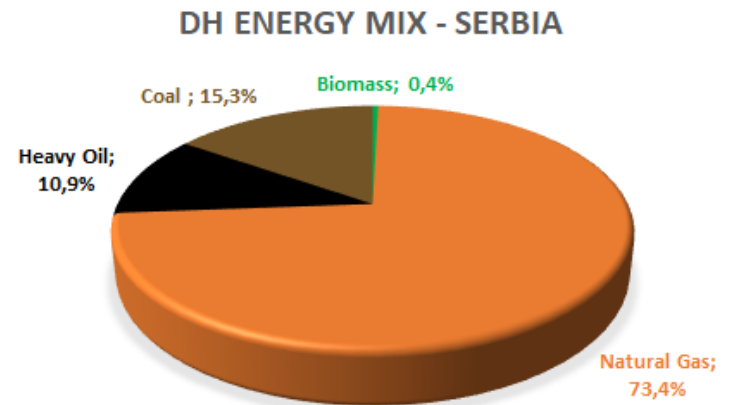
DH covers **25.1%** of households in Serbia, with 31% of the total length of networks in/near the capital **Belgrade**. DH heat is supplied to 48.3 % of **urban** households. DHSs are typically **owned by municipalities** and operate as public enterprises.

Challenges

- High potential for **solar and geothermal aren't exploited** enough
- Old and **outdated DHSs**, with average **heat losses** of 12-14%.
- Most DHSs operate with **no profit**, due to **inefficiencies** and **energy-pricing policy**



Source: [Wikimedia Commons](#)



Framework & action

Trends

- Total national network has expanded by nearly **300 km annually** in recent years
- Number of plants using **wood chips** is increasing each year

Policy stance

- Plans for RES use in the heating/cooling sector include an increase with **biomass** in DHS
- Production of heat has the highest potential for the energy **efficiency** increase (> 50%) compared with any other energy activity

Investment subsidies covering:

New DHS /expansions of DHS	✗
DHS retrofits for EE / RES	✓✓
Consumers / connections	✗
Soft loans and other financing	✓✓
Tax incentives	✗

Recommended actions

- Greater integration of **RES** into the DHS wherever feasible, especially **biomass**, but also **solar, geothermal & excess heat**
- Increasing DHS **energy efficiency**
- Find **synergies between electricity and DHS grids**
- Establishing **parity** of heating and electricity prices

DHS Bajina Bašta

(JP “BB TERM”)

- Location: **Bajina Bašta, Serbia**
- Operating since: **1973**
- Ownership: **Municipality of B. Bašta**
- Grid: **2900 m** (owned by municipality)
- Customers: **1200**
- Connected load: **10800 kW**
- Boiler output: **12300 kW** (6 boilers)
- Type of DHS: **warm-water, hot-water**
- Current fuel: **Oil, coal**
- Potential renewables nearby:
wood chips



Source: http://www.bioenergy-serbia.rs/images/documents/studies/BSCstudy_final.pdf

Investment plans:

Build - up a new biomass plant (wood chips) of 2 x 3 MW, replacing the substations and replacing the part of the main hot water pipes net., planned in the next 2 years.

For more information:

- www.keepwarmeurope.eu/country-pages/serbia
- <http://www.bbterm.rs/#>

Total replacement of fossil fuels (mazut&coal) by 2x3.0 MW boilers on wood chips , integration of presently segmented grid into one unified system, enabling increase in heat consumption



Results:

- RES-share increase: **0% ⇒ 100%**
- RES/fossil heat production ratio: **1/0**
- Reduction of losses: **overall efficiency remains the same**
- Primary energy factors: **remains the same**
- Emission reductions: **↓4835 tCO₂**
- Return on investment (ROI): **81%** (for period of 25 years)
- Annualized ROI: **2,40%**

Want to adapt our work to your DHS?

Want to invest in our progressive DHS?

Contact us using the information below!

- Velimir Radovanović, executive director of the heating plant
- jp.bbterm@gmail.com

Primary work-steps and investment drivers:

- planning and selection of location finished 03/2020
- contract with investors 2020
- public procurement and selection of bidder in progress
- tech.documentation elaboration & permits obtaining 09/2020
- boiler&boiler house construction, grid segments connection
- operation of plant 05/2022

Strategic background documents:

- Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with projections by 2030
- The National Sustainable Development Strategy



Stakeholder involvement:

- Leading: **Municipality of Bajina Bašta, PIMO**
- Other: **Planning and construction companies**



Required resources:

Financial investment: **2130000 €**

Additional staff: **operators, maintenance wood chips manipulation personnel,...**

Other: **fuel, maintenance, electricity...**



447.200€

- Location: **Nova Varoš, Serbia**
- Operating since: **1981**
- Ownership: **Municipality of N.Varoš**
- Grid: **4638 m** (owned by municipality)
- Customers: **765**
- Connected load: **9538 kW**
- Boiler output: **15520 kW** (12 boilers)
- Type of DHS: **hot-water**
- Current fuel: **oil, pellets**
- Potential renewables nearby:
wood chips



Source: http://www.bioenergy-serbia.rs/images/documents/studies/Biomass_in_DH_2014.pdf

Investment plans:

Reconstruction and modernization of all boiler rooms and distribution network, **transition** from fossil fuels/oil **to biomass** in existing boiler houses, planned in the next 2 years.

For more information:

- www.keepwarmeurope.eu/country-pages/serbia
- energijazlatarnv@gmail.com

Construction of a new 3.0 MW boiler on wood chips with, extended operation including night shift, integration of grid



Primary work-steps and investment drivers:

- First planning, coordination of project
- Contract with PIMO or KfW, producing documentation, selection of bidder,
- Construction phase, obtaining new customers,
- Test phase, training of staff

Strategic background documents:

- Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with projections by 2030
- The National Sustainable Development Strategy



Stakeholder involvement:

- Leading: Nova Varoš municipality & DHS operators, KfW, PIMO, Regulatory and energy agencies
- Other: Wood chips producers (Holz Tim, Jela Star, Zlatar Šped)

Required resources:

Financial investment: **1640000€**

Additional staff: -

Other: **fuel, maintenance, electricity...** / **458.682€**



Results:

- RES-share increase: **before 10% ⇒ after 93%**
- RES/fossil heat production ratio: **0,95**
- Reduction of losses: **via primary energy savings: 5%**
- Primary energy factors: **0,629 ⇒ 0,663**
- Emission reductions: **↓2542 tCO₂**
- Return on investment (ROI): **93% (for period of 25 years)**
- Annualized ROI: **2,66**

Want to adapt our work to your DHS?

Want to invest in our progressive DHS?

Contact us using the information below!

- Nenad Todorović, technical director of the heating plant
- nedtod@gmail.com

DHS Priboj

(JP "Toplana Priboj")

- Location: **Priboj, Serbia**
- Operating since: **2012**
- Ownership: **Municipality of Priboj**
- Grid: **4750 m** (not owned by DHS)
- Customers: **1390** households, **100** office buildings & school
- Connected load: **16338 kW**
- Boiler output: **51000 kW** (2 boilers)
- Type of DHS: **hot-water**
- Current fuel: **Oil**
- Potential renewables nearby:
wood chips



Source: http://www.bioenergy-serbia.rs/images/documents/studies/BSCstudy_final.pdf

Investment plans:

Construction of a brand new biomass heating plant of 8MW on wood chips, planned in the next 2 years/test work of the plant is scheduled for April 2022

For more information:

- www.keepwarmeurope.eu/country-pages/serbia
- toplana.priboj@gmail.com

Total replacement of fossil fuels (mazut) by introducing 8.0 MW boiler on wood chips , extended operation including night shift, integration of presently segmented grid into one unified system, enabling increase in heat consumption



Primary work-steps and investment drivers:

- planning and selection of location finished 02/2020
- contract with investors 03/2020
- public procurement and selection of bidder in progress
- tech.documentation elaboration & permits obtaining 09/2020
- boiler&boiler house construction, grid segments connection
- operation of plant 05/2022

Strategic background documents:

- Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with projections by 2030
- The National Sustainable Development Strategy
- Priboj has signed the "Covenant of Mayors"



Stakeholder involvement:

- Leading: Priboj municipality and DHS operators, KfW, PIMO, Regulatory and energy agencies
- Other: Wood chips producers (Srbijašume, Jela Star)

Required resources:

Financial investment:

3830000 EUR

Additional staff: **operators, maintenance & wood chips manipulation personnel,...**

Other: **fuel, maintenance, electricity...** **968.570€**



Results:

- RES-share increase: **0 % ⇒ 100%**
- RES/fossil heat production ratio: **1/0**
- Reduction of losses: **overall efficiency remains the same**
- Primary energy factors: **remains the same**
- Emission reductions: **↓7305 tCO₂ (-100%)**
- Return on investment (ROI): **50%** (for period of 25 years)
- Annualized ROI: **1,64%**

Want to adapt our work to your DHS?
Want to invest in our progressive DHS?
Contact us using the information below!

• Marko Janjušević, energy manager of Priboj municipality
• marko@priboj.rs, M: +381 64 20 66 826

- Location: **Šabac, Serbia**
- Operating since: **1986**
- Ownership: **Municipality of Šabac**
- Grid: **22400 m** (owned by municipality)
- Customers: **8135**
- Connected load: **75005 kW**
- Boiler output: **68300 kW** (9 boilers)
- Type of DHS: **warm- & hot-water**
- Current fuel: **natural gas, wood chips**
- Potential renewables nearby:
wood chips, straw bales, waste water & underground water, geothermal energy



Source: <https://toplanasabac.rs/o-nama/>

Investment plans:

Modernisation of DHS to 4G district heating with the participation of Heating plant and Civilian Initiatives, planned in the next 2 years.

For more information:

- www.keepwarmeurope.eu/country-pages/serbia
- <https://toplanasabac.rs/>

Significant (63 %) replacement of fossil fuel (gas) by new 10 MW boiler on wood chips, extended operation to include night shift



Primary work-steps and investment drivers:

- Company first planning phase **07/2020**
- Municipal Energy policy
- Contract with PIMO or/and KfW **08/2020**
- Public procurement and selection of bidder **12/2020**
- Construction phase, obtaining new customers, involvement of personnel, Test phase, training of staff **10/2023**

Strategic background documents:

- Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with projections by 2030
- The National Sustainable Development Strategy
- Energy policy of the city of Sabac



Stakeholder involvement:

- Leading: **Municipality of Šabac, PIMO, Planning and construction companies**
- Other: **Technical suppliers**



Required resources:

Financial investment: **3.250.000 €**

Additional staff: **operators, maintenance & wood chips manipulation personnel,...**

Other: **fuel, maintenance, electricity...** **1.460.774€**



Results:

- RES-share increase: **0,7% ⇒ 63%**
- RES/fossil heat production ratio: **63/37**
- Reduction of losses: **energy efficiency decreases slightly due to the replacement of gas boilers with biomass**
- Primary energy factors: **0,801 ⇒ 0,753**
- Emission reductions: **↓8885 tCO₂**
- Return on investment (ROI): **91% (for period of 25 years)**
- Annualized ROI: **2,62%**

Want to adapt our work to your DHS?

Want to invest in our progressive DHS?

Contact us using the information below!

• Slobodan Jerotić, director of DHS Sabac

• slobodan.jerotic@sabac.org, +381(65) 341 7000

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 [KeepWarm website](#), including its [Learning Centre](#) with numerous resources from KeepWarm and many other [related projects](#) and EU-led initiatives, not to mention our latest [news](#).

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
- [Inspire Events](#), many of which are now being done online...

... and much more!

Keep going with KeepWarm

Finally, it is worth highlighting that the [KeepWarm consortium](#) is especially well-suited to use its **competence to help you achieve your DH goals!** Our diverse group of experts can apply our great **experience all across Europe**, 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!

International project partners

ASSOCIATION FOR DISTRICT HEATING
of the Czech Republic

Czech Republic

ik Landwirtschaftskammer
Steiermark

Austria

Jožef Stefan Institute, Ljubljana, Slovenia
Energy Efficiency Centre



Slovenia

FSB University of Zagreb
Faculty of Mechanical Engineering
and Naval Architecture

ICLEI
Local
Governments
for Sustainability

(Germany)

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

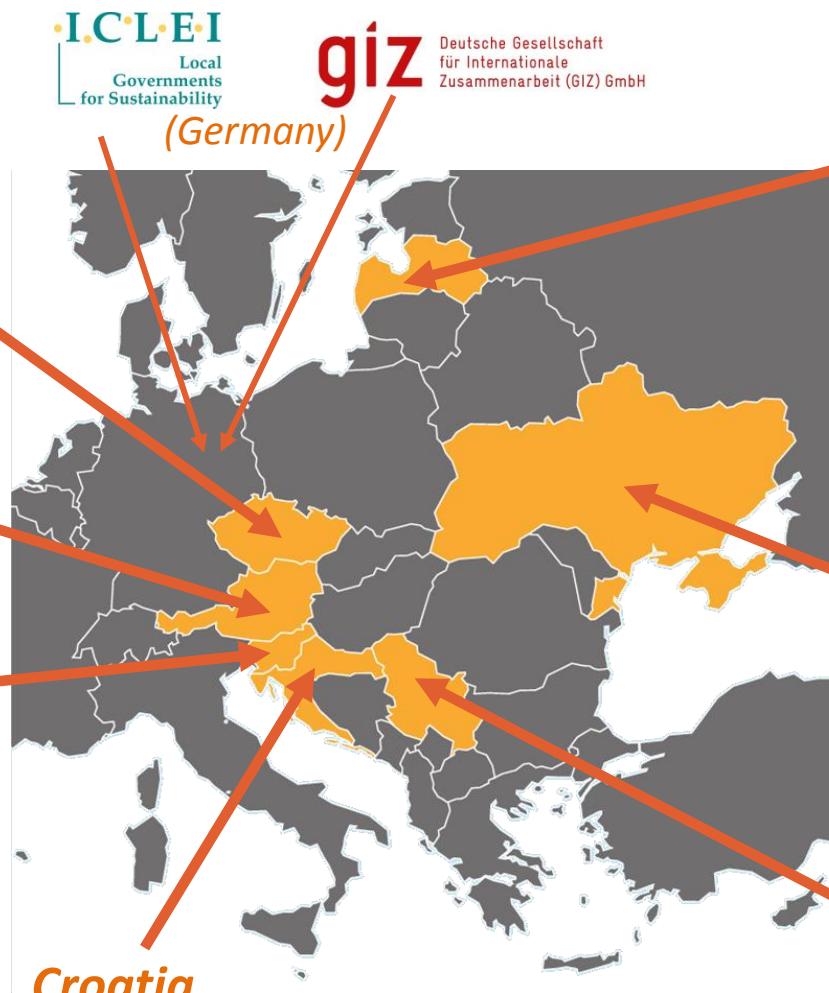
Latvia



Ukraine



Serbia



Croatia

REG REGIONALNA ENERGETSKA AGENCIJA
NORTH-WEST CROATIA
E SJEVEROZAPADNE HRVATSKE
A REGIONAL ENERGY AGENCY

For more information:

visit our website

www.KeepWarmEurope.eu

contact us at:

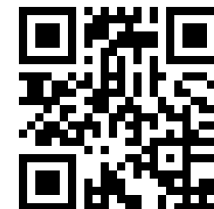
info@keepwarmeurope.eu

or at:

keepwarmeurope.eu/contact

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[@KeepWarm_EU](https://twitter.com/KeepWarm_EU)



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