

KeepWarm

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

Showroom of DHS pilot projects



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 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 DHS 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**

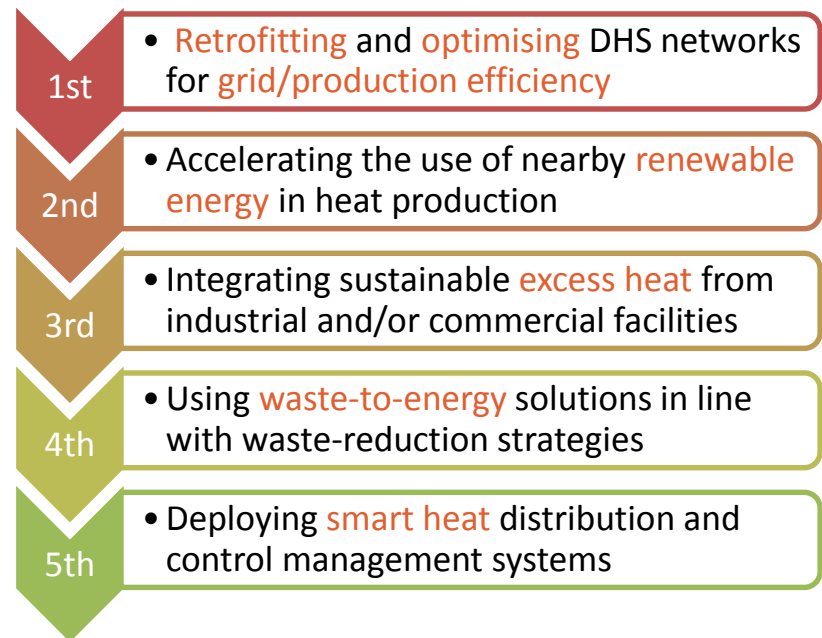


Facilitating the multi-level integration of DHS retrofits into key **strategies and plans**

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



Summary of DHS demo cases

DHS	Page	Boiler retrofits	Grid retrofits	Efficiency/ optimisation	Temperature downgrade	Expansion/ connections	Significant phase-outn of fossil fuels	Biomass integration	Solar thermal integration	Integration of other sources	Smarter controls
Austria	7	✓	✓	✓		✓					✓
Eibiswald	9	✓	✓	✓		✓					✓
Ligist	11	✓				✓					✓
Croatia	13	✓	✓			✓			✓		✓
Samobor	15					✓			✓		✓
Velika Gorica	17	✓				✓			✓		✓
Zagreb	19		✓								
Zaprešić	21	✓				✓			✓		✓
Czech Republic	23		✓	✓	✓		✓	✓		✓	
Brno	25			✓	✓			✓		✓	
České Budějovice	27		✓		✓		✓			✓	
Písek	29				✓		✓	✓			
Latvia	31	✓	✓	✓				✓			✓
Bene	33	✓		✓				✓			✓
Jekabpils	35	✓		✓							✓
Lielaucē	37	✓	✓	✓							

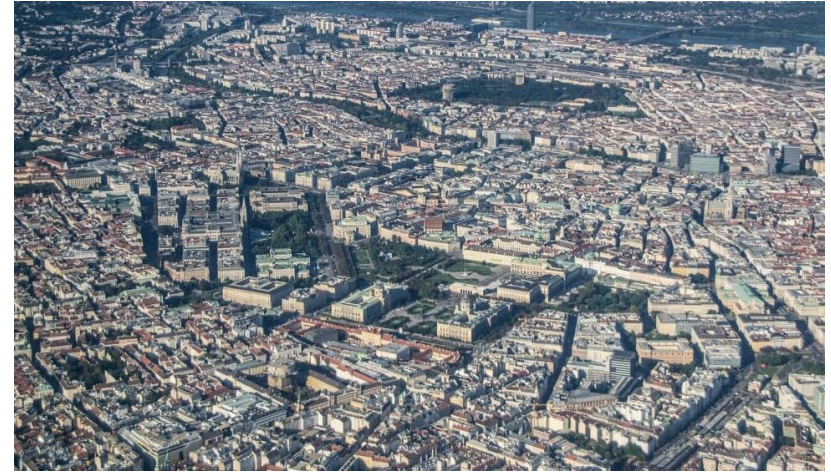
Summary of DHS demo cases

DHS	Page	Boiler retrofits	Grid retrofits	sEfficiency / optimisation	Temperature downgrade	Expansion / connections	Significant phase-out of fossil fuels	Biomass integration	Solar thermal integration	Integration of other sources	Smarter controls
Serbia	39	✓	✓	✓		✓	✓	✓			
Bajina Bašta	41	✓	✓			✓	✓	✓			
Nova Varoš	43	✓	✓	✓				✓			
Priboj	45	✓	✓	✓		✓	✓	✓			
Šabac	47	✓		✓			✓	✓			
Slovenia	49	✓	✓	✓				✓			✓
Ptuj	51	✓	✓	✓				✓			
Slovenj Gradec	53	✓						✓			
Velenje	55		✓								✓
Ukraine	57	✓	✓	✓				✓			
Bila Tserkva	59	✓	✓	✓				✓			
Khmelnyskyi	61	✓	✓	✓				✓			
Ternopil	63	✓	✓					✓			
Zhytomyr	65	✓	✓	✓				✓			

You can also find further **inspirations for your next steps** forward and how **KeepWarm can help you achieve your DH goals**, on page **67**.

Austrian DH context

DH in Austria covers **15%** of total heat demand, being the **3rd-most dense DH network** in Europe. DH is especially predominant in larger **cities**, but also in rural villages with more than **2400 DH networks** all over the country. Networks are mainly operated by **private** utilities.

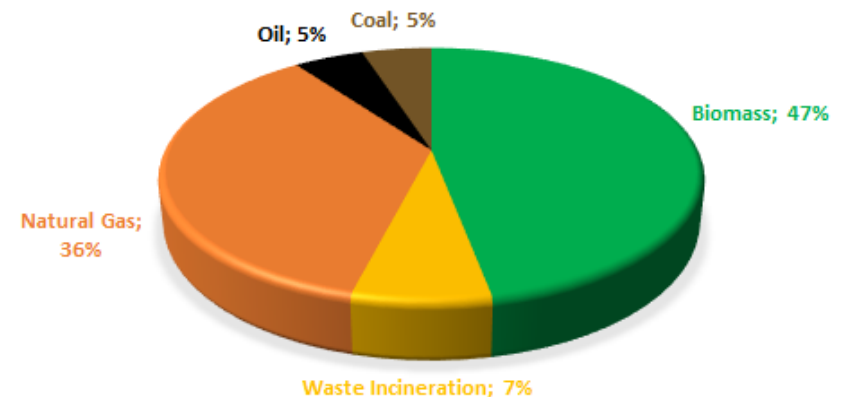


Source: [PEAKPX](#)

Challenges

- High **investment costs** for RES, emission regulations and competition
- **Low consumption** in new homes
- Lack of a national heating **strategy**

DH ENERGY MIX - AUSTRIA



Framework & action

Trends

- Annual **5% growth** of DHSs
- Trend towards **switching DHSs to RES**, especially biomass

Policy stance

- Goal of **1% annual increase of RES** share in DHC
- Austria must **reduce GHG emissions at least 36%** until 2030
- Concerted effort to increase DH's share of **biomass** and other RES

Investment subsidies covering:

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

Recommended actions

- Build new RES-DHS in urban as well as rural areas
- Find synergies between electricity and DHS grids
- Investigate the potential of large-scale biomass, excess heat and ambient heat

- Location: **Eibiswald, Austria**
- Operating since: **1993**
- Ownership: **farmers cooperative**
- Grid: **10,6 km** (owned by the DHS)
- Customers: **150**
- Connected load: **5800 kW**
- Boiler output: **4870 kW** (5 boilers)
- Type of DHS: **hot water**
- Current fuel: **wood chips, thermal solar, oil (peak load & back-up)**
- Potential renewables nearby: waste **wood, excess heat, solar**



Source: Nahwärme Eibiswald



Investment plans:

Optimisation to achieve more efficient operation of the boiler house and grid as well as grid extension, in 2019.

For more information:

- www.keepwarmeurope.eu/country-pages/austria
- <http://nahwaerme-eibiswald.at/>

New boiler house, grid extension & grid connection



Primary work-steps and investment drivers:

- Takeover of nearby DHS
- Connecting both Grids
- Building new boiler-house / heating central
- Grid extension in Eibiswald

Strategic background documents:

- Environmental subsidies for optimising DHS
- Climate & Energy Strategy of Styria



Stakeholder involvement:

- Leading: **Owner consortium, planner**
- Other: **municipality, financing partners**



Required resources:

Financial investment:

Approx. 7 Million EUR



Results:

- RES use increase: **before 10.9 ⇒ after 19.5 GWh**
- RES heat production ratio: **99.1% RES**
- Primary energy savings: **320 MWh/a**
- Emission reductions: **↓1764 tCO₂/a**
- Increased heat sales: **80%**
- **Increased profitability**

Want to adapt our work to your DHS?
Want to invest in our progressive DHS?

Contact us using the information below!

- Franz Moser, Bioenergie Service
- Franz.moser@lk-stmk.at, +43 316/8050-1366

- Location: **Ligist, Austria**
- Operating since: **1986**
- Ownership: **private/community**
- Grid: **6000 m** (owned by the DHS)
- Customers: **138**
- Connected load: **2880 kW**
- Boiler output: **2500 kW** (2 boilers)
- Type of DHS: **hot water**
- Current fuel: **wood chips**
- Potential renewables nearby:
waste **wood** from forestry and saw mills



Source: Biomasse
Heizgemeinschaft Ligist



Investment plans:

Renewal of biomass boilers to achieve more efficient operation in 2019. Connecting new customers in 2020.

For more information:

- www.keepwarmeurope.eu/country-pages/austria
- www.ligist.at/startseite/wirtschaft/heizgemeinschaft

Boiler Replacement & new customers

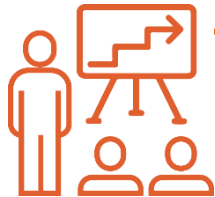


Primary work-steps and investment drivers:

- **Boiler Replacement during 2019**
- **Connecting new customers during 2020**

Strategic background documents:

- **Environmental subsidies for optimising DHS**
- **Climate & Energy Strategy of Styria**



Stakeholder involvement:

- Leading: **Owner consortium, planner**
- Other: **municipality, financing partners**

Required resources:

Financial investment:

Approx. 1.5 Million EUR



Results:

- RES use increase: **before 4.7 GWh ⇒ after 5.5 GWh**
- RES heat production ratio: **100% RES**
- Total efficiency gain: **6%**
- Emission reductions: **↓323 tCO₂/a**
- Resources: **100% local biomass from a 30 km radius**
- **Increased profitability**

Want to adapt our work to your DHS?
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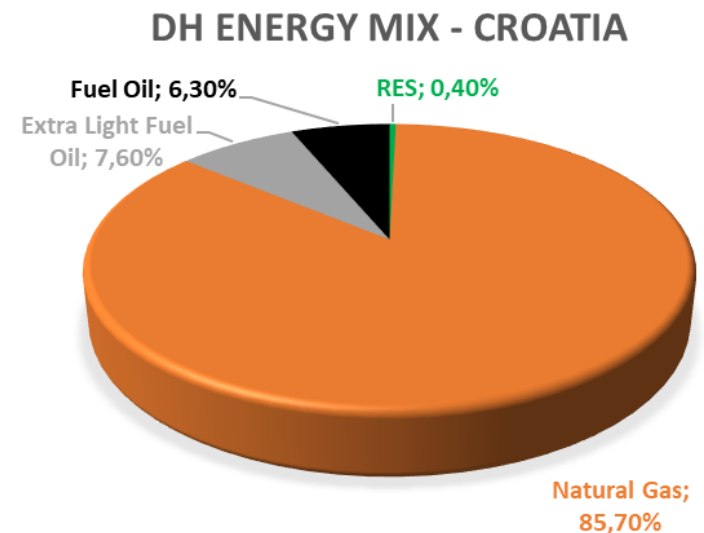
DH covers **15%** of total heat demand in Croatia, with DHS of many **different** sizes and type. Around 110 DHS are **regulated** by the national energy regulator HERA. Most of the DHS are owned by public companies.

Challenges

- Distribution networks tend to be old and **inefficient**
- DHSs require significant **investments to renovate** and modernise
- Lack of **proper energy planning** which would enable cooperation
- Lack of **legal framework** for systematic decarbonisation



Source: [WIKIPEDIA](https://en.wikipedia.org/wiki/Cathedral_of_Saint_Martin_in_Zagreb)



Framework & action

Trends

- **CHP** remains the core of Croatia's DH sector
- Heat consumption is **decreasing** due to increases of energy efficiency among newer/renovated buildings
- Slow integration of RES
- Increase of energy efficiency in production and distribution

Policy stance

- Goal of **1% annual increase of RES** in DHSs for 2021-2025
- Measures to stimulate increased **efficiency of DHSs**
- Support of highly efficient **cogeneration and RES**

Investment subsidies covering:

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

Recommended actions

- Introduction of solar energy in DHS
- Investigating the potential of excess heat, large scale solar and geothermal energy
- Connection of individual boiler rooms (smaller DHS) into a single distribution network
- Revitalisation of heat distribution network

- Location: **Samobor, Croatia**
- Operating since: **1986**
- Ownership: **national company**
- Grid: **3 081 m** (owned by the DHS)
- Customers: **1 263**
- Connected load: **9 525 kW**
- Boiler output: **16 600 kW**
(6 boilers)
- Type of DHS: **hot-water**
- Current fuel: **Natural gas**
- Potential renewables nearby:
solar thermal energy



Source: HEP Toplinarstvo Ltd

Investment plans:

Connection into a single DHS and integration of solar thermal energy (optimisation included)

Timeline:

End of 2020 - detailed feasibility study

Mid 2021 - engineering study

End of 2021 - investment

Integration of solar thermal



Primary work-steps and investment drivers:

- First planning phase - Feasibility study
- Detailed planning (+external expertise)
- Negotiations with existing and prospective customers
- Obtaining permits & Tendering
- Construction – integration of solar energy

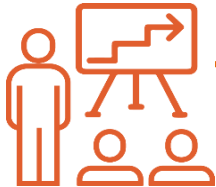
Strategic background documents:

- OP (Operative Programme Competitiveness and Cohesion)
- SECAP Samobor



Stakeholder involvement:

- Leading: HEP Toplinarstvo, REGEA, TVP Solar
- Other: City of Samobor, existing and prospective customers, financial institutions



Required resources:

Financial investment: **3 750 000 kn (500 000 EUR)**
Additional staff: -
Other: **External experts**



Results:

- Collector area: **3 000 m²**
- RES-share increase: **0% ⇒ 4%**
- RES/fossil heat production ratio: **1:25**
- Reduction of losses: **0%**
Primary energy factors: **1.69 ⇒ 1.45**
- Emission reductions: **↓151 tCO₂ (-4.90%)**
- Payback period: **12.25 years**

Want to adapt our work to your DHS?

Contact us using the information below!

Marko Čavar (REGEA)

mcavar@regea.org

DHS Velika Gorica

(HEP Toplinarstvo Ltd)

- Location: **Velika Gorica, Croatia**
- Operating since: **1984**
- Ownership: **national company**
- Grid: **9 836 m** (owned by the DHS)
- Customers: **5 902**
- Connected load: **46 275 kW**
- Boiler output: **69 612 kW**
(33 boilers)
- Type of DHS: **hot-water**
- Current fuel: **Natural gas and extra light fuel oil**
- Potential renewables nearby: **solar thermal energy**



Source:
<https://turopolje.info/files.wordpress.com/2018/03/toplanajakus.jpg?w=816>

Investment plans:

Connection of boiler rooms into a single DHS network, optimisation of new system and integration of solar thermal energy.

Timeline:

End of 2020 – detailed feasibility study

Mid 2021 – engineering study

End of 2021 - investment

For more information:

<https://keepwarmeurope.eu/countries-in-focus/croatia/english/>

<http://www.hep.hr/toplinarstvo/>

Interconnection of boiler rooms & integration of solar thermal



Primary work-steps and investment drivers:

- Feasibility study & scenario evaluation
- Detailed planning (+external expertise)
- Negotiations with regional authorities and customers
- Obtaining permits & tendering
- Construction phase – solar plant & interconnection

Strategic background documents:

- OP (Operative Programme Competitiveness and Cohesion)
- SECAP Velika Gorica



Stakeholder involvement:

- Leading: HEP Toplinarstvo, REGEA, TVP Solar
- Other: City of Velika Gorica, existing and prospective customers, financial institutions, planning and construction companies, equipment producers



Required resources:

Financial investment: 7 500 000 kn (1 000 000 EUR)

Additional staff: -

Other: External experts



Results:

- Collector area: **500 m²**
- RES-share increase:
0% ⇒ 3%
- RES/fossil heat production ratio: **1:32.3**
- Reduction of losses: **0%**
- Primary energy factors:
1.29 ⇒ 1.14
- Emission reductions:
↓816 tCO₂ (-5%)
- Payback period: **10,1 years**

Want to adapt our work to your DHS?

Contact us using the information below!

Marko Čavar (REGEA)

mcavar@regea.org

- Location: **Zagreb, Croatia**
- Operating since: **1954**
- Ownership: **national company**
- Grid: **271 395 m** (owned by the DHS)
- Customers: **99 004**
- Connected load: **1 186 815 kW**
- Boiler output: **1 378 000 kW**
- Type of DHS: **hot-water and steam**
- Current fuel: **Natural gas**
(cogeneration)
- Potential renewables nearby:
geothermal, solar thermal energy



Source: Andrej Majcen, Razvoj izvora CTS grada Zagreba

Investment plans:

Optimisation of current cogeneration plans, increase in energy efficiency in distribution network, reconstruction of direct heating stations

Timeline:

End 2019 - detailed feasibility study
April 2020 - securing external funds
2021-2023 - Investments

Distribution network revitalisation



Primary work-steps and investment drivers:

- Feasibility studies and scenario evaluation
- Obtaining necessary permits
- Securing funds
- Tendering; equipment, construction work, supervision, revision, project management and promotion
- Construction, supervision and revision



Results:

- Length revitalised:
68 500 m
- Reduction of heat losses
28%
- Primary energy savings
5.31 GWh/year
- Emission reductions:
↓816 tCO₂
- Internal return rate:
ca 15%

Strategic background documents:

- **SECAP Zagreb, OPKK (Operational Programme Competitiveness and Cohesion)**



Stakeholder involvement:

- Leading: **HEP Group**
- Other: **Government bodies, Ministry of Finance, Ministry of Regional Development, Ministry of Environment, Croatian Energy Regulatory Agency, City of Zagreb, consulting, planning and construction companies...**



Required resources:

Financial investment:

around 573 000 000 kn (76 500 000 EUR)

Additional staff: -

Other: **External experts for revision, construction and promotion**



Want to find out more about this project?

Contact us using the information below!

Marko Čavar (REGEA)

mcavar@regea.org

DHS Zaprešić

(HEP Toplinarstvo Ltd)

- Location: **Zaprešić, Croatia**
- Operating since: **1984**
- Ownership: **national company**
- Grid: **2 368 m** (owned by the DHS)
- Customers: **2 372**
- Connected load: **15 172 kW**
- Boiler output: **20 360 kW** (19 boilers)
- Type of DHS: **hot-water**
- Current fuel: **Natural gas and extra light fuel oil**
- Potential renewables nearby:
solar thermal energy



Source: HEP Toplinarstvo Ltd

Investment plans:

Connection into a single DHS system, optimisation of new system, connection of potential customers and integration of solar thermal energy

Timeline:

End of 2020 – detailed feasibility study

Mid 2021 – engineering study

End of 2021 – Investments

For more information:

<https://keepwarmeurope.eu/countries-in-focus/croatia/english/>

<http://www.hep.hr/toplinarstvo/>

Interconnection of boiler rooms & integration of solar thermal



Primary work-steps and investment drivers:

- Feasibility study & scenario evaluation
- Detailed planning (+ external expertise)
- Negotiations with regional authorities and customers
- Obtaining permits & Tendering
- Construction phase – solar plant & interconnection

Strategic background documents:

- OP (Operative Programme Competitiveness and Cohesion)
- ECAP Zaprešić



Stakeholder involvement:

- Leading: HEP Toplinarstvo, REGEA, TVP Solar
- Other: City of Zaprešić, existing and prospective customers, financial institutions, planning and construction companies, equipment producers



Required resources:

Financial investment:

26 250 000 kn (3 500 000 EUR)

Additional staff: -

Other: **External experts**



Results:

- Collector area: **50 000 m²**
- RES-share increase: **0% ⇒ 17%**
- RES/fossil heat production ratio: **1:4.8**
- Reduction of losses: **0%**
Primary energy factors: **before 1.20 ⇒ after 0.86**
- Emission reductions: **↓1046 tCO₂ (-22.07%)**
- Payback period: **21,4 years**

Want to adapt our work to your DHS?

Contact us using the information below!

Marko Čavar (REGEA)

mcavar@regea.org

DH has a high **40,3 %** share of residential heating. Though the DH sector is **highly developed**, nearly 15% of heat networks are still **steam technology**. DHS are mostly owned by municipalities or in combination with the private sector.

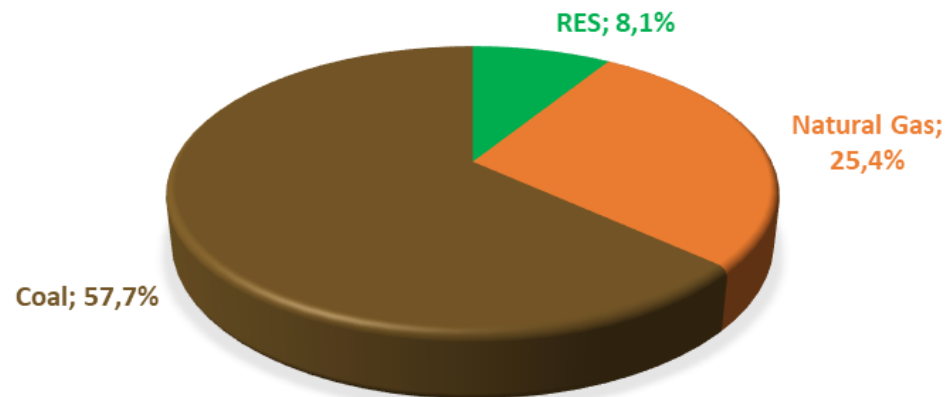
Challenges

- Heat **prices are regulated**
- Economic **discrimination** of DH industry
- **Vulnerability** of DHSs
- **Retrofits of (steam)** DHSs needed
- Transition from **coal to RES**



Source: [Wallpaper Flare](https://www.wallpaperflare.com/prague-aerial-view-wallpaper)

DH ENERGY MIX - CZECH REPUBLIC



Framework & action

Trends

- Between 2017 and 2019 **3.5% decrease** in DH supplied
- Even so, the share of heat from **biomass** and **biogas** is growing
- Trend in **replacement of inefficient steam** systems with modern ones

Policy stance

- There are goals for the **increase of RES** in heating & cooling
- A **DH Modernisation Fund** is operational

Investment subsidies covering:

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

Recommended actions

- Upgrade biogas plants and increase the efficiency of bio-methane (CHP, gas systems)
- Promotion of electricity from high-efficiency cogeneration
- Support of heat from RES
- Introduce a carbon tax, thus eliminating discrimination in the DH sector

- Location: **Brno, Czech Republic**
- Operating since: **1930**
- Ownership: **community**
- Grid: **291 011 m** (owned by the DHS)
- Customers: **4 000**
- Connected load: **1 078 000 kW**
- Boiler output: **762 840 kW**
(13 boilers)
- Type of DHS: **steam, hot-water**
- Current fuel: **natural gas**
- Potential renewables nearby:
wood chips, Forests of Brno city



Source: <http://www.teplarny.cz/provozy>

Investment plans:

Reconstruction of obsolete steam pipelines for **modern economical hot water system** in the period 2020-2023, **expansion of WtE** capacity by 2024.

For more information:

- www.keepwarmeurope.eu/country-pages/czech-republic
- www.teplarny.cz/projekt/1005/keep-warm-renewing-district-heating/

Upgrade to hot-water system



Primary work-steps and investment drivers:

- Analysis of heat network condition, heat distribution losses and demand for technological steam
- OP Enterprise and Innovations for Competitiveness

Strategic background documents:

- Territorial Energy Concept of the City of Brno
- State Energy Policy supporting DH modernisation



Stakeholder involvement:

- Leading: DHS operator, municipality as an owner of DHS
- Other: Financial institutions, suppliers



Required resources:

Financial investment: **650 mil Kč (25 mil €)**
for a conversion of the steam network



Results:

- Reduction of losses:
18 % before ⇒ 6 % after
- Primary energy savings over the lifetime of the solution: **5 533 GWh**
- Emission reductions:
↓1 106 670 tCO₂ (- 14 %)
- Fuel (natural gas) savings per year: **19 529 000 m³**

Want to adapt our work to your DHS?
Want to invest in our progressive DHS?

Contact us using the information below!

- Martin Sroubek, Head of Tech.Development
- sroubek@teplarny.cz

- Location: **České Budějovice, Czech Republic**
- Operating since: **1965**
- Ownership: **community**
- Grid: **165 000 m** (owned by the DHS)
- Customers: **1181**
- Connected load: **456 400 kW**
- Boiler output: **453 700 kW** (5 boilers)
- Type of DHS: **steam, hot-water**
- Current fuel: **lignite, natural gas**
- Other energy potential:
excess heat from NPP Temelín



Source: <http://www.teplarna-cb.cz/o-spolecnosti/zakladni-udaje/>



Investment plans:

Conversion of a reasonable part of the **steam network to hot water** by 2021. Construction of a hot-water feeder and start of **excess heat supply from NPP Temelín** in 2020/21.

For more information:

- www.keepwarmeurope.eu/country-pages/czech-republic
- <http://www.teplarna-cb.cz/media/projekt-keepwarm/>

Switch to heat from NPP



Primary work-steps and investment drivers:

- Technical and economic analysis of heat utilisation from nuclear power plant
- Plan of the feeder route and negotiations with the participating municipalities
- OP Enterprise and IC, OP Environment, loans

Strategic background documents:

- Long-term business concept of DHS České Budějovice in 2018–2045
- State Energy Policy supporting DH modernisation



Stakeholder involvement:

- Leading: DHS operator, municipality as an owner of DHS, NPP owner as heat supplier
- Other: Financial institutions



Required resources:

Financial investment: **1,5 mld Kč (58,3 mil €)**
for a construction of the hot-water pipeline



Results:

- RES-share increase:
0 before ⇒ 208 GWh after
- RES/fossil heat production ratio: **1/2**
- Reduction of coal production: **30 %**,
- Primary energy savings over the lifetime of the solution: **4 583 GWh**
- Emission reductions:
↓1 650 000 tCO₂ (- 30%)

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

- Jan Vaclík, Head of Production Economics
- Jan.vaclik@teplarna-cb.cz

- Location: **Písek, Czech Republic**
- Operating since: **1987**
- Ownership: **community + private**
- Grid: **56 001 m** (owned by the DHS)
- Customers: **446**
- Connected load: **64 800 kW**
- Boiler output: **66 350 kW**
(3 boilers)
- Type of DHS: **steam/hot-water**
- Current fuel: **lignite, oil, gas, BM**
- Potential renewables nearby:
wood chips



Source: <http://www.tpi.cz/informace-pro-odberatele.php>

Investment plans:

Conversion of steam network to hot water by the end of 2020, **fuel optimisation** - switch from coal to biomass in 2020.

For more information:

- www.keepwarmeurope.eu/country-pages/czech-republic
- <http://www.tpi.cz/keepwarm.php>

Switch to biomass



Primary work-steps and investment drivers:

- Definition of DHS strategic objectives: reduction of CO₂ emissions, replacement of fossil fuels, efficient heat production and distribution
- Integrated Regional OP, OP Enterprise and IC, OP Environment, investment loans

Strategic background documents:

- DHS Písek long-term strategy
- The thermal concept of town of Písek
- State Energy Policy supporting DH modernisation

Stakeholder involvement:

- Leading: DHS operator, municipality as an owner of DHS
- Other: Fuel suppliers, financial institutions

Required resources:

Financial investment: **170 mil Kč (6,5 mil €)** for desulphurisation and biomass boiler

Results:

- RES-share increase: **before 0 ⇒ after 63 GWh**
- RES/fossil heat production ratio: **2/3**
- Reduction of coal production: **40 %**,
- Primary energy savings over the lifetime of the solution: **1 260 GWh**
- Emission reductions: **↓453 320 tCO₂ (- 40%)**

Want to adapt our work to your DHS?

Want to invest in our progressive DHS?

Contact us using the information below!

- Andrea Zakova, DHS director
- zakova@tpi.cz

Latvian DH context

DH covers **80%** of Latvian buildings, mainly households. It is mainly **owned by municipalities or private** companies. A third of the total length of national heat networks is located in the capital **Riga**.

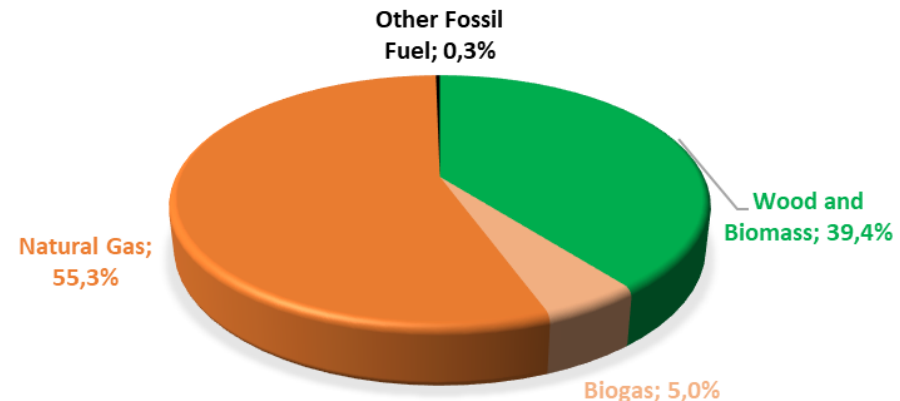
Challenges

- Some parts of the total network have **high losses**, up to 16%
- **Consumer engagement** and attraction issues
- Development of **old DHS, heat network** retrofitting
- **Inefficient use of RES** in DH
- **Non-existing district cooling** systems



Source: [Wikimedia Commons](#)

THERMAL ENERGY MIX - LATVIA



Framework & action

Trends

- Share of natural gas is gradually being replaced with higher share of **fuel wood**
- The number of **biomass** heat sources has increased 2.5 times in recent years

Policy stance

- Goal of **0,55% annual increase of RES** share in DH
- Latvia obliged to **reduce GHG emissions outside ETS by 13%** until 2030

Investment subsidies covering (2021-2027):

New DHS /expansions of DHS (capacity till 1MW)	✓
DHS retrofits for EE / RES (capacity till 1MW)	✓
Consumers / connections (capacity till 1MW)	✓
Soft loans and other financing	✓
Tax incentives	✗

Recommended actions

- Increase efficiency of DHS by using more RES technologies, especially non-emission technologies (solar collectors, heat pumps, etc.)
- Increase attractiveness of DH
- Reduce fuel consumption

(Heat supply grid in Bene parish, «Auces komunalie pakalpojumi», Ltd.)

- Location: **Bene parish, Auce county, Latvia**
- Operating since: **1994**
- Ownership: **municipality**
- Grid: **900 m (owned by the DHS)**
- Customers: **299**
- Connected load: **2310 kW (12 connections)**
- Type of DHS: **Heat energy is purchased according to meter from biological gas station and delivered to customers**
- Current fuel: **biogas**
- Potential renewables nearby: **woodchips / solar thermal energy**



Source: «Auces komunalie pakalpojumi», Ltd.



Investment plans:

To build own **new boiler house** (wood-chips), possible by the end of 2021.

For more information:

- <http://www.keepwarmeurope.eu/country-pages/latvia/english/>
- www.auceskp.lv/komunalie-pakalpojumi/siltumapgades-saimnieciba

Construction of new and automated boiler



Primary work-steps and investment drivers:

- Installation of new pellet boiler with an automated pellets delivery system (0,8-1MW)
- Availability of EU Funds and low cost loans

Strategic background documents:

- National energy and climate plan of Latvia for period 2021-2030;
- Energy Law
- Energy Action plan of Auce county, 2018-2025
- Medium-term operational strategy plan of «Auces komunalie pakalpojumi», Ltd. 2019-2021



Stakeholder involvement:

- Leading: DHS owner (municipality), state financial authorities, banks, technologies` suppliers
- Other: customers, government, fuel suppliers, state regulatory office



Required resources:

Financial investment: **165 000 EUR**

New equipment: **new pellet boiler with an automated pellets delivery system**

Additional staff: **external professionals for installation of new equipment**



Results:

- RES-share : **before 100% ⇒ after 100%**
- RES/fossil heat production ratio: **100% RES**
- Reduction of losses: **remain the same 9%**
- Planned energy input: **1760 MWh per year**
- CO2 emissions: **0 t/year**
- Internal Rate of Return(IRR): **44%**
- Discounted repayment period: **2,5 years**

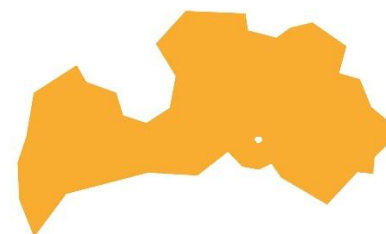
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Want to invest in our progressive DHS?
Contact us using the information below!

- zrea@zrea.lv / www.zrea.lv
- www.auceskp.lv

- Location: **Jekabpils city, Latvia**
- Operating since: **2003**
- Ownership: **municipality**
- Grid: **1362 m** (owned by the DHS)
- Customers: **15 multi-residential buildings**
- Connected load: **3649 kW**
- Boiler output: **3360 kW (2 boilers)**
- Type of DHS: **production and distribution-hot water supply**
- Current fuel: **wood chips (93%) / gas (7%)**
- Potential renewables nearby: **woodchips, solar energy**



Source: «Jekabpils Siltums», Ltd.



Investment plans:

Reconstruction and automatisisation of boiler house, planned within the next 2-3 years.

For more information:

- www.keepwarmeurope.eu/country-pages/austria
- jekabpils-siltums.lv/lv/par-uznjeemumu-63321/inform%C4%81cija-par-kapit%C4%81lsabiedr%C4%ABbu

Boiler house reconstruction and automatisisation



Primary work-steps and investment drivers:

- Change of wood-chips boiler to new, automated wood-chips boiler (1MW);
- Automation of existing gas boiler;
- Installation of additional new automated 0,5 MW gas boiler (for summer load);
- Availability of EU Funds and low cost loans.

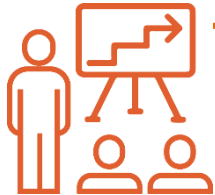
Strategic background documents:

- National energy and climate plan of Latvia for period 2021-2030;
- Energy Law;
- Sustainable Development Strategy of Jekabpils city by 2030,
- Medium-term operational strategy plan of «Jekabpils Siltums», Ltd. 2019-2022.



Stakeholder involvement:

- Leading: DHS owner (municipality), state financial authorities, banks, technologies` suppliers;
- Other: Customers, Government, fuel suppliers, state regulatory office.



Required resources:

Financial investment: **510 000 EUR**

New equipment: **wood-chips boiler (1MW), gas boiler (0,5MW), equipment for automation of an existing gas boiler**

Additional staff: **external professionals for installation of new equipment.**



Results:

- RES-share : **before 93% ⇒ after 78%**
- RES/fossil heat production ratio: **78%/22%**
- Reduction of losses: **remain same at 7% level**
- Primary energy input: **6736 MWh/year ⇒ 4907 MWh per year**
- CO2 emissions: **205,698 t/year**
- Internal Rate of Return(IRR): **14%**
- Discounted repayment period: **8 years**

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- zrea@zrea.lv / www.zrea.lv
- <https://www.jekabpils-siltums.lv/>

DHS Lielaucē



(Boiler house «Niedras», Lielaucē parish, «Auces komunalie pakalpojumi», Ltd.)

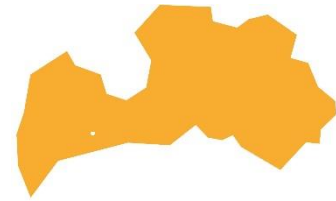
- Location: **Lielaucē parish, Auce county, Latvia**
- Operating since: **2004**
- Ownership: **municipality**
- Grid: **300 m** (owned by the DHS)
- Customers: **96**
- Connected load: **540 kW**
- Boiler output: **0,6 kW**
- Type of DHS: production and distribution of **hot water for heating**
- Current fuel: **wood chips**
- Potential renewables nearby: **wood-chips, solar thermal energy**



Source: «Auces komunalie pakalpojumi», Ltd.

Investment plans:

Modernisation of the heat source without replacing the existing boiler, planned by the end of 2020.



For more information:

- <http://www.keepwarmeurope.eu/country-pages/latvia/english/>
- www.auceskp.lv/komunalie-pakalpojumi/siltumapgades-saimnieciba

Boiler house and grid modernisation



Primary work-steps and investment drivers:

- Installation of frequency changer for network pumps;
- Change of grid: installation of industrially isolated single channel pipes with less diameter;
- Automation of fuel supply with a sliding floor and a fitted conveyor;
- Availability of EU Funds and low cost loans.

Strategic background documents:

- National energy and climate plan of Latvia for period 2021-2030;
- Energy Law;
- Energy Action plan of Auce county, 2018-2025;
- Medium-term operational strategy plan of «Auces komunalie pakalpojumi», Ltd. 2019-2021.



Stakeholder involvement:

- Leading: **DHS owner (municipality), state financial authorities, banks, technologies` suppliers;**
- Other: **customers, government, fuel suppliers, state regulatory office.**

Required resources:

Financial investment: **65 000 EUR;**

New equipment: **a sliding floor and a fitted conveyor, frequency changer for network pumps, industrially isolated single channel pipes with less diameter;**

Additional staff: **external professionals for installation of new equipment.**



Results:

- RES-share : **before 100% ⇒ after 100%**
- RES/fossil heat production ratio: **100% RES**
- Reduction of losses: **27% ⇒ 10%**
Primary energy input: **1423 MWh/year ⇒ 1178 MWh per year**
- CO2 emissions: **0 t/year**
- Internal Rate of Return(IRR): **29%**
- Discounted repayment period: **4 years**

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- zrea@zrea.lv / www.zrea.lv
- <http://www.auceskp.lv/>

Serbian DH context

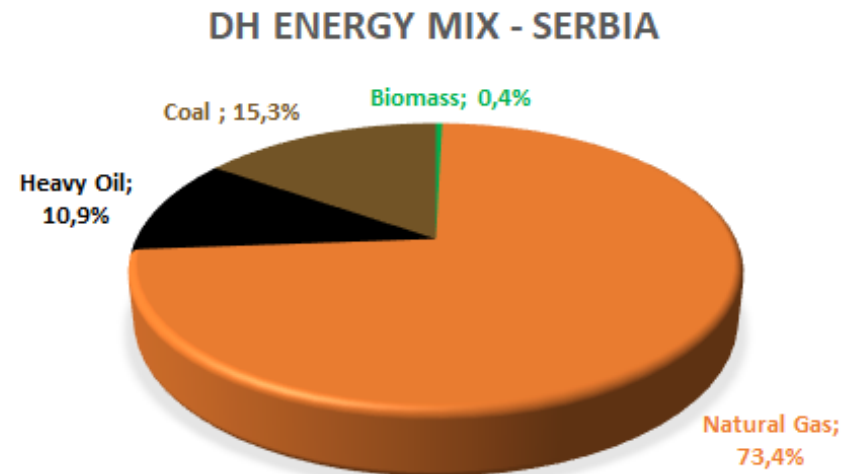
DH covers **25.1%** of households in Serbia, with 31% of the total length of networks in/near the capital **Belgrade**. DH heat is supplied to 48.3 % of **urban** households. DHSs are typically **owned by municipalities** and operate as public enterprises.

Challenges

- High potential for **solar and geothermal aren't exploited** enough
- Old and **outdated DHS**, with average **heat losses** of 12-14%.
- Most DHS 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 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 a period of 25 years)**
- Annualised ROI: **2,40%**

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: **2'130'000 €**

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

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



447.200€

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

- 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 modernisation 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)**
- Annualised 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

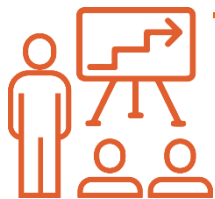


Primary work-steps and investment drivers:

- 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 Šabac



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)**
- Annualised 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

DH covers about **10%** of total heat supply in Slovenia and is the prevailing type of space heating particularly in densely populated **urban** areas. The DH is mainly carried out as an optional local service of general economic interest (supply to 89% of all DH consumers), as commercial distribution or as the supply from a private DHS.

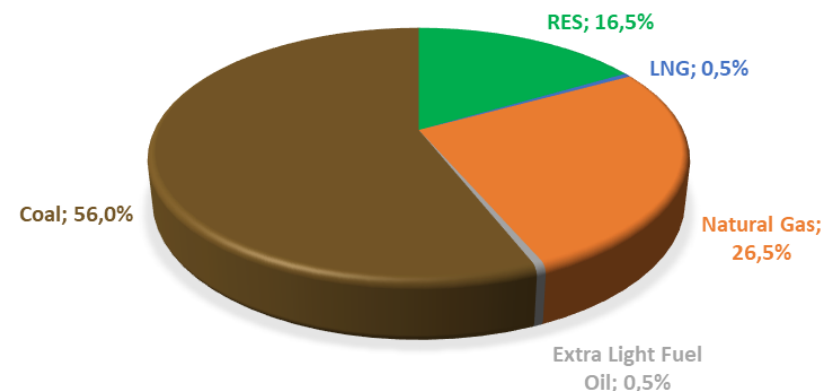
Challenges

- Average **annual losses** are estimated to be around 15%
- DHS **temperatures** often still too high to enable more RES to be integrated
- Need to ensure **cost competitiveness** despite **decreasing heat demand**
- Lack of **strategic framework and supportive activities/funds** for systematic decarbonisation of DHSs



Source: [Piqsels](#)

PRIMARY ENERGY USE IN DHS - SLOVENIA



Framework & action

Trends

- Compared to 2016, DH consumers **connections increased by 5 %** in 2017 and additional 1% in 2018.
- In the last few years, **the share of RES and excess heat** is around 17%.
- Carbon intensity is planned to noticeably decrease by 2021 due to **coal phase-out** in the largest DHS.

Policy stance

- Goal of **1% annual increase of RES** share in DHC (by 2030)
- All black and brown **coal should be replaced** by 2023 (via gas or other)
- **GHG emissions reductions** expected as a result of building renovations and DH retrofitting

Investment subsidies covering:

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

Recommended actions

- Investments in renewable heat generation facilities, the use of excess heat and reduction of temperature levels
- Integration of large HPs and heat storages
- Intensified electricity and heat sector coupling
- DH network planning supported by “heat mapping” tools

- Location: **Ptuj, Slovenia**
- Operating since: **1975**
- Ownership: **community**
- Grid: **5.990 m** (owned by the DHS)
- Customers: **42**
- Connected load: **24,8 MW**
- Boiler output: **27 MW**
- Type of DHS: **hot water**
- Current fuel: **natural gas**
- Potential renewables nearby: **biomass, solar**



Source: Javne službe Ptuj, d.o.o.

Investment plans:

Optimisation of the biomass boiler and boiler house installation within next two years. In second phase is also planned to increase the grid and optimise it.

For more information:

- www.keepwarmeurope.eu/country-pages/austria
- www.ligist.at/startseite/wirtschaft/heizgemeinschaft

Switch to biomass and optimisation of boiler and grid



Primary work-steps and investment drivers:

- **Company (internal) development plan** Municipal Local energy concept (LEK)
- **Available incentives – Ministry of Infrastructure** Co-financing of renewables for DHSs

Strategic background documents:

- **NATIONAL ENERGY EFFICIENCY ACTION PLAN 2014–2020**



Stakeholder involvement:

- **Leading:** Local decision makers, biomass suppliers
- **Other:** Costumers, Technology suppliers



Required resources:

Financial investment:

1.538.824,88 EUR + 525.500 EUR

Additional staff: **none – outsource**

Other: **outsourcing of services for documentation, design, etc**



Results:

- RES-share increase: **before 0 % ⇒ after 80 %**
- RES/fossil heat production ratio: **5/1**
- Grid efficiency: **increase of 3 %**
- New connections: **2.500 MWh/Year**
- Emissions: **1.515 tCO₂**
- Payback period: **8-10 years**

Want to adapt our work to your DHS?
Want to invest in our progressive DHS?

Contact us using the information below!

Franci Voglar/ Project manager

Franci.Voglar@jsp.si

- Location: **Slovenj Gradec, Slovenia**
- Operating since: **1980**
- Ownership: **community**
- Grid: **7.958 m** (owned by the DHS)
- Customers: **170**
- Connected load: **21,2 MW**
- Boiler output: **17,4 MW** (2 boilers + CHP)
- Type of DHS: **hot water**
- Current fuel: **natural gas**
- Potential renewables nearby: **biomass**



Source: Komunala Slovenj Gradec

Investment plans:

For the next year of operation, DHS SG plans to install a **new boiler system on biomass**, buffer tank system and logistic facilities;

For more information:

- www.keepwarmeurope.eu/country-pages/austria
- www.ligist.at/startseite/wirtschaft/heizgemeinschaft

Modernisation and switch to biomass



Primary work-steps and investment drivers:

- **Company (internal) development plan** Municipal Local energy concept (LEK)
- **Available incentives – Ministry of Infrastructure** Co-financing of renewables for DHSs

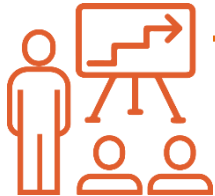
Strategic background documents:

- **NATIONAL ENERGY EFFICIENCY ACTION PLAN 2014–2020**



Stakeholder involvement:

- **Leading:** Local decision makers, biomass suppliers
- **Other:** Costumers, Technology suppliers



Required resources:

Financial investment: **2.500.000 EUR**
Additional staff: **one and outsourcing**
Other: **outsourcing of services for documentation, design, etc**



Results:

- RES-share increase: **before 0 % ⇒ after 75 %**
- RES/fossil heat production ratio: **4/1**
- Reduction of losses: **4-5 %**
- Primary energy savings: **5 %**
- Emissions: **3.000 tCO₂ p.a**
- Payback period: **10-12 years**

Want to adapt our work to your DHS?
Want to invest in our progressive DHS?

Contact us using the information below!

Sašo Mozgan/ consultant

Saso.mozgan@kssena.velenje.eu

DHS Velenje

- Location: **Velenje, Slovenia**
- Operating since: **1959**
- Ownership: **community**
- Grid: **173 km** (owned by the DHS)
- Customers: **11.776**
- Connected load: **224 MW**
- Boiler output: **600 MW**
(4 boilers)
- Type of DHS: **steam**
- Current fuel: **coal - lignite**
- Potential renewables nearby: **solar energy, biomass, lakes**



Investment plans:

grid renovation and optimisation,
digitalisation.

For more information:

- www.keepwarmeurope.eu/country-pages/austria
- www.ligist.at/startseite/wirtschaft/heizgemeinschaft

Grid renovation and digitalisation



Primary work-steps and investment drivers:

- Company (internal) development plan
- Municipal Local energy concept (LEK)
- SEAP Velenje



Strategic background documents:

- NATIONAL ENERGY EFFICIENCY ACTION PLAN 2014–2020



Stakeholder involvement:

- Leading: Local decision makers,
- Other: Costumers, Technology suppliers



Required resources:

Financial investment: **834.500 EUR**

Additional **staff: not needed**

Other: **outsourcing of services**



Results:

- Costumers: **lowering connected power**
- Savings for costumers: **33.900 EUR p.a.**
- Reduction of losses: **0,3 %**
- Primary energy savings: **1.600 MWh p.a.**
- Emissions: **784 tCO₂ p.a**
- Payback period: **25 years**

Want to adapt our work to your DHS?
Want to invest in our progressive DHS?

Contact us using the information below!

Ervin Miklavžina / Head of department
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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.

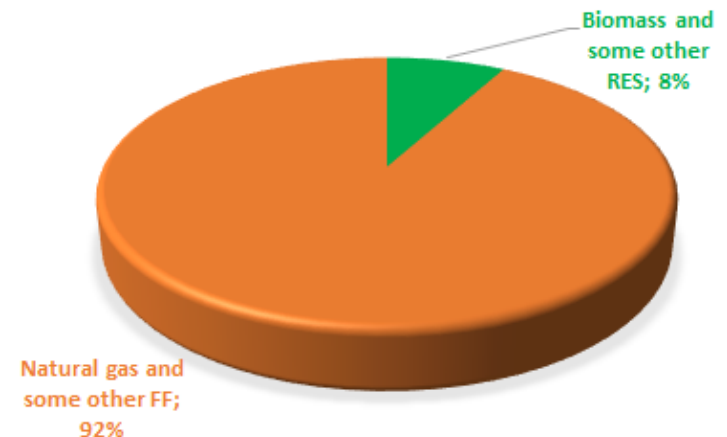
Challenges

- **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: [Pixabay](#)

DH ENERGY MIX - UKRAINE



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

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

For more information:

<http://www.keepwarmeurope.eu/country-pages/ukraine/>

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 Action 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 organisations.



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: **6,895 tonnes CO_{2e} per year or 6%**
- Internal rate of return: **5-18%** depending on the intervention and assumed natural gas prices

Want to support our modernisation projects?

Contact us using the information below!

- Mr. Vladyslav Bezukladnikov, Director
- bctm@magnus.kiev.ua

- 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, pivzateplo.com

Investment plans (2020-2025):
Construction of 5 MW biomass boiler,
modernisation 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_{2e} per year or 10%**
- Internal rate of return: **3-43%** depending on intervention and assumed natural gas prices

Want to support our modernisation projects?

Contact us using the information below!

- Mr. Pavlo Vozborskyi, Director
- p.z.teplomerega@gmail.com

(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,
modernisation of boiler houses,
replacement of pipelines, and
installation of individual heating
units.

For more information:

<http://www.keepwarmeurope.eu/country-pages/ukraine/>

Increasing biomass share in heat supply



Primary investment drivers:

- Modernisation 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 organisations, 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_{2e} per year or 12%**
- Internal rate of return: **13-54%** depending on the intervention and assumed natural gas prices

Want to support our modernisation projects?

Contact us using the information below!

- Mr. Andriy Chumak
- zvern.kptmtke@ukr.net

- 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 organisations, customers, contractors



Required resources:

Financial investment: **9.8 million EUR**
Other: **equipment and materials, energy 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_{2e} per year or 13%**
- Internal rate of return: **7-32%** depending on intervention and assumed natural gas prices

Want to support our modernisation projects?

Contact us using the information below!

- Mr. Dmytro Rogozhyn, Director
- teplo@teplo.net.zt.ua

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



KT-ENERGY

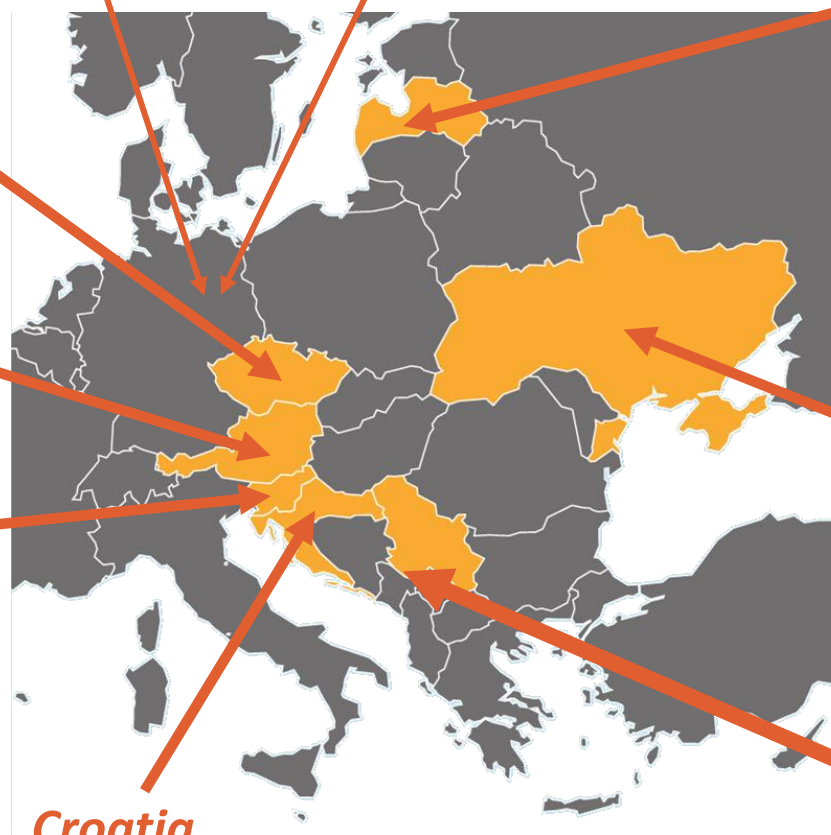
Ukraine

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REGIONAL ENERGY AGENCY



For more information:

visit our website

www.KeepWarmEurope.eu

contact us at:

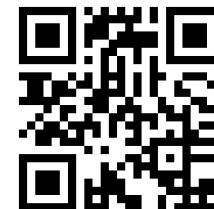
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