



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



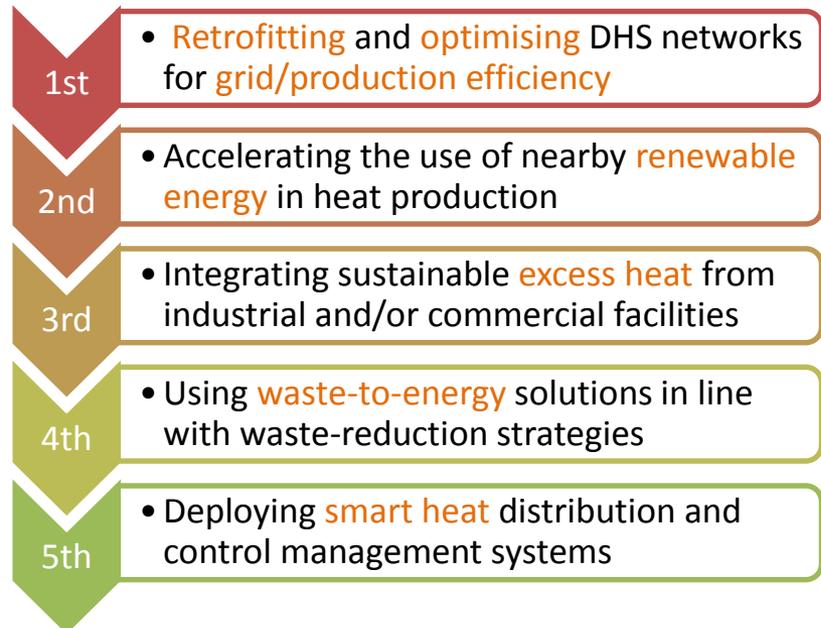
Facilitating the multi-level integration of DHS retrofits into key strategies and plans

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**



Croatian DH context



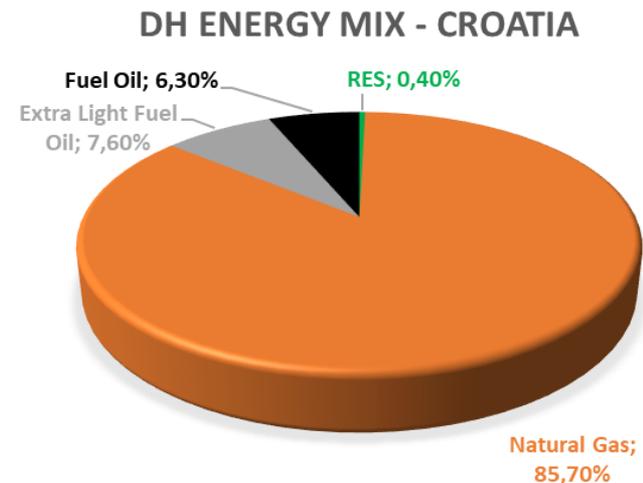
DH covers **15%** of total heat demand in Croatia, with DHSs of many **different** sizes and type. Around 110 DHSs are **regulated** by the national energy regulator HERA. Most of the DHSs are owned by public companies

Challenges

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



Source: [WIKIPEDIA](#)



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

DHS Samobor

(HEP Toplinarstvo Ltd)



- 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: own picture

Investment plans:

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

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/>

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

- 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://turopoljeinfo.files.wordpress.com/2018/03/toplanajakus.jpg?w=816>

Investment plans:

Connection of boiler rooms into a single DHS network, optimization 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

DHS Zagreb

(HEP Toplinarstvo Ltd)



- 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:

Optimization 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 financial funds

2021 – 2023 – Investments

Distribution network revitalization



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

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!

Results:

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

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: own picture

Investment plans:

Connection into a single DHS system, optimization 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)

mccavar@regea.org

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
Croatia

I.C.L.E.I
Local
Governments
for Sustainability
(Germany)

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



Latvia



Ukraine



Serbia

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

follow us on Twitter:

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



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