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.
KeepWarm Showroom
of
replicable and bankable DHS pilot projects
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**
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**

1. **1st**: Retrofitting and optimising DHS networks for grid/production efficiency
2. **2nd**: Accelerating the use of nearby **renewable energy** in heat production
3. **3rd**: Integrating sustainable **excess heat** from industrial and/or commercial facilities
4. **4th**: Using **waste-to-energy** solutions in line with waste-reduction strategies
5. **5th**: Deploying **smart heat** distribution and control management systems
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](https://keepwarmeurope.eu/countries-in-focus/croatia/english/)
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**

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**Investment subsidies covering:**

<table>
<thead>
<tr>
<th>Investment subsidy</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>New DHS /expansions of DHS</td>
<td>✔️</td>
</tr>
<tr>
<td>DHS retrofits for EE / RES</td>
<td>✔️</td>
</tr>
<tr>
<td>Consumers / connections</td>
<td>✔️</td>
</tr>
<tr>
<td>Soft loans and other financing</td>
<td>✔️</td>
</tr>
<tr>
<td>Tax incentives</td>
<td>❌</td>
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</tbody>
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**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

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https://keepwarmeurope.eu/countries-in-focus/croatia/hrvatska/
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**

**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
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://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
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

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

Required resources:
Financial investment: 7 500 000 kn (1 000 000 EUR)
Additional staff: -
Other: External experts

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

Marko Čavar (REGEA)
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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

For more information:
https://keepwarmeurope.eu/countries-in-focus/croatia/english/
http://www.hep.hr/toplinarstvo/

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

Source: Andrej Majcen, Razvoj izvora CTS grada Zagreba
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

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%

Want to find out more about this project? Contact us using the information below!

Marko Čavar (REGEA)
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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

For more information:
https://keepwarmeurope.eu/countries-in-focus/croatia/english/
http://www.hep.hr/toplinarstvo/

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
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 Competitivness 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

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

Required resources:
Financial investment: 26 250 000 kn (3 500 000 EUR)
Additional staff: -
Other: External experts

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

Marko Čavar (REGEA)
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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](https://www.KeepWarm.eu), including its [Learning Centre](https://www.KeepWarm.eu/lc) 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!
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

- Czech Republic
- Austria
- Slovenia
- Croatia
- Latvia
- Ukraine
- Serbia
- (Germany)
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This project receives co-funding from the German Federal Ministry of Economic Cooperation and Development.

For more information:
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