



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

Integration of solar energy in DHS, cases from Croatia

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October 8, 2020



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.

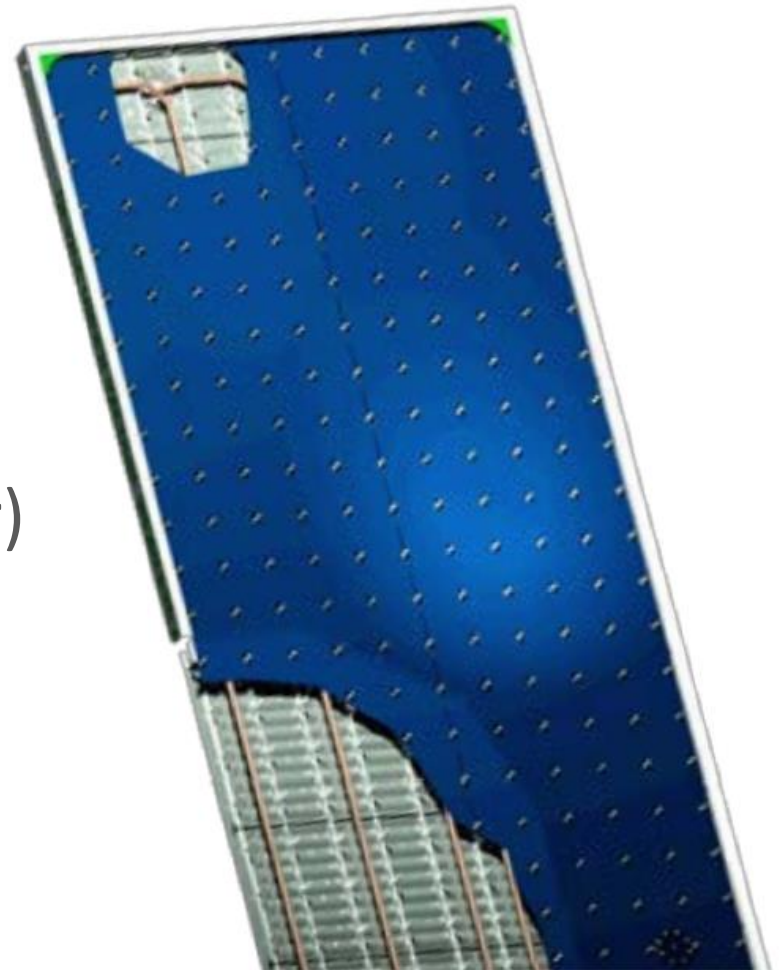
This project receives co-funding from the German Federal Ministry of Economic Cooperation and Development.



Content

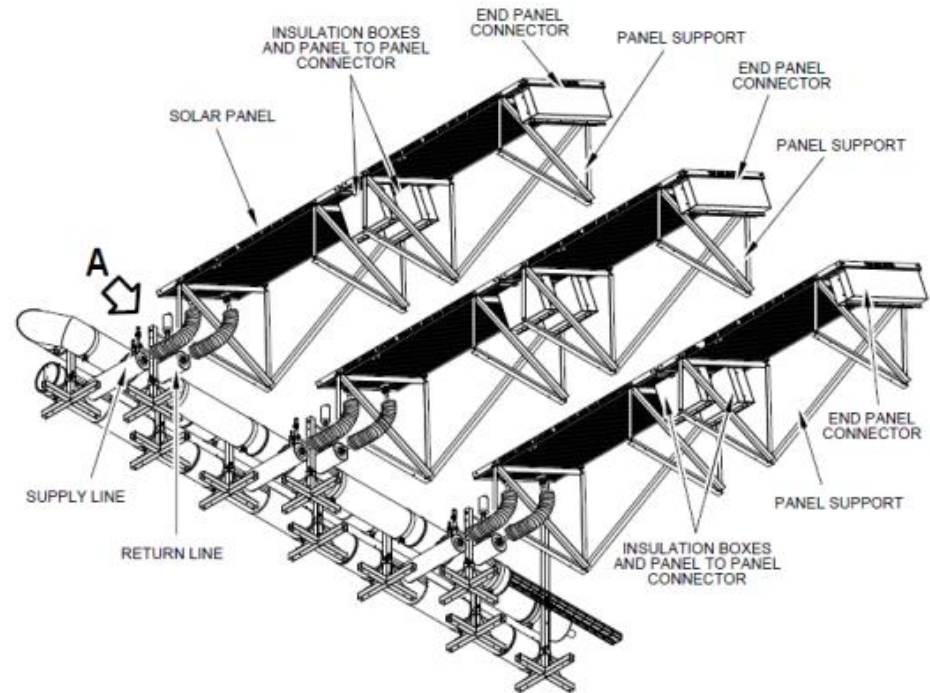
- Solar thermal collectors
- Integration in DHS
- Case study from Croatia – DHS Zaprešić
 - Feasibility studies
 - Technical limitations
 - Financing
- Lessons learned in KeepWarm
- Replication potential in Croatia

- Vacuum plate collectors
- Heating up to 200 °C
- Temperature of medium
 - 305 °C (max pressure 16 bar)
- Designed for all DHS applications
 - Most often: 65-180 °C



Solar thermal collectors

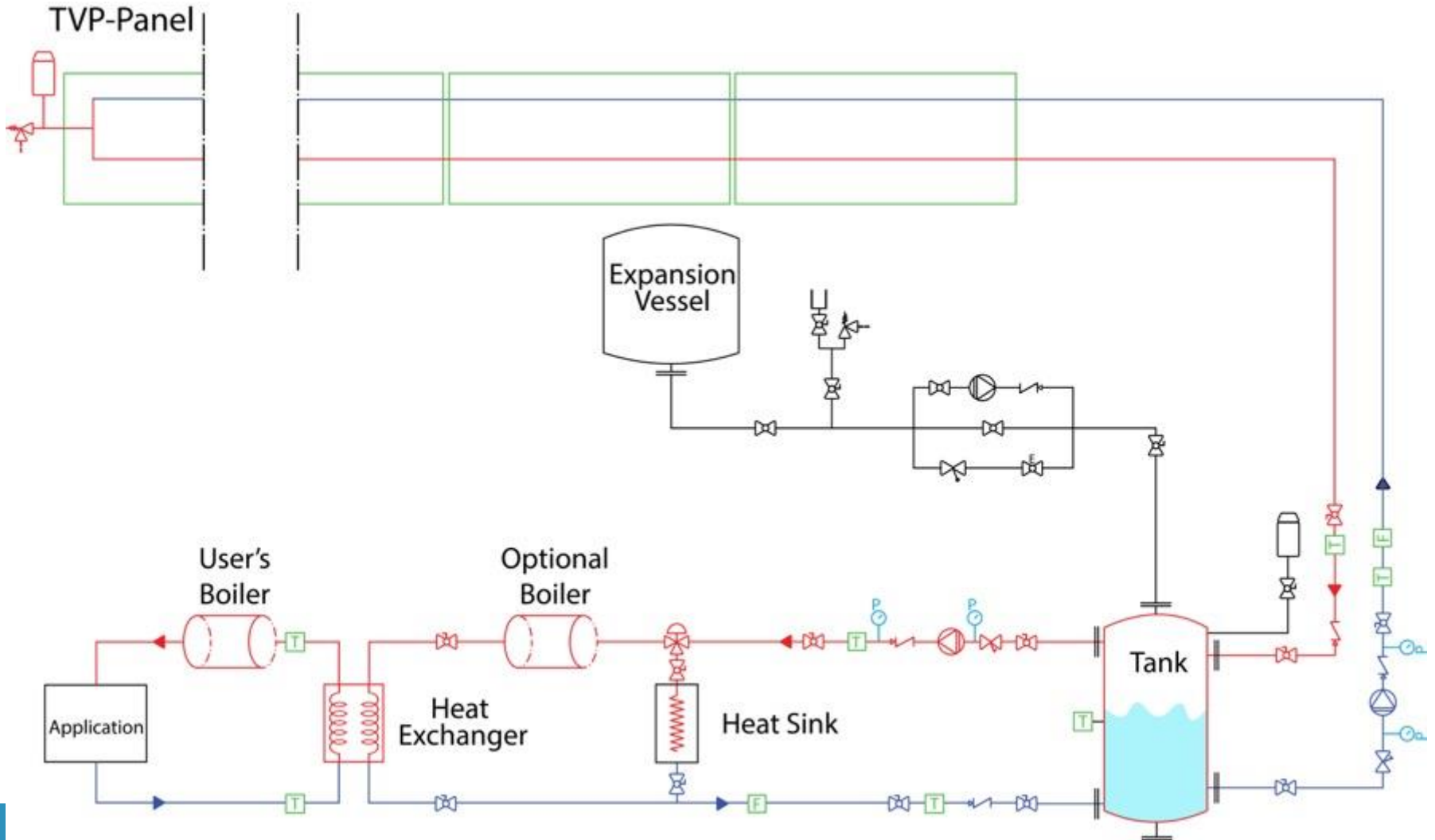
- Specific load: 70 kg/m²
 - Solar thermal collectors
 - Connectors
 - Pipes
 - Support construction
 - Control and monitoring
 - Regulation system
 - heat exchanger



- Autonomous system
- No need for human supervision
- Sensors
- Safety valves and cooler system

- Medium (inside solar thermal collectors loop)
 - demineralised water with/without glycol
 - Oil

Integration in DHS



Koraci

- KeepWarm feasibility study
- Scenario selection
- Pilot project locations
- Detailed feasibility study
- Pilot project size selection
- Engineering study
 - Water tank heat storage included
- Project documentation
- Communication with public authorities
- Permits
- Public procurement process

1st planning phase ✓

2nd planning phase

Implementation phase

1. Integration of pilot projects
2. Testing of pilot projects
3. Achieve 100% of summer heat demand
4. Integrate thermal storage
5. Achieve 30% of total heat demand

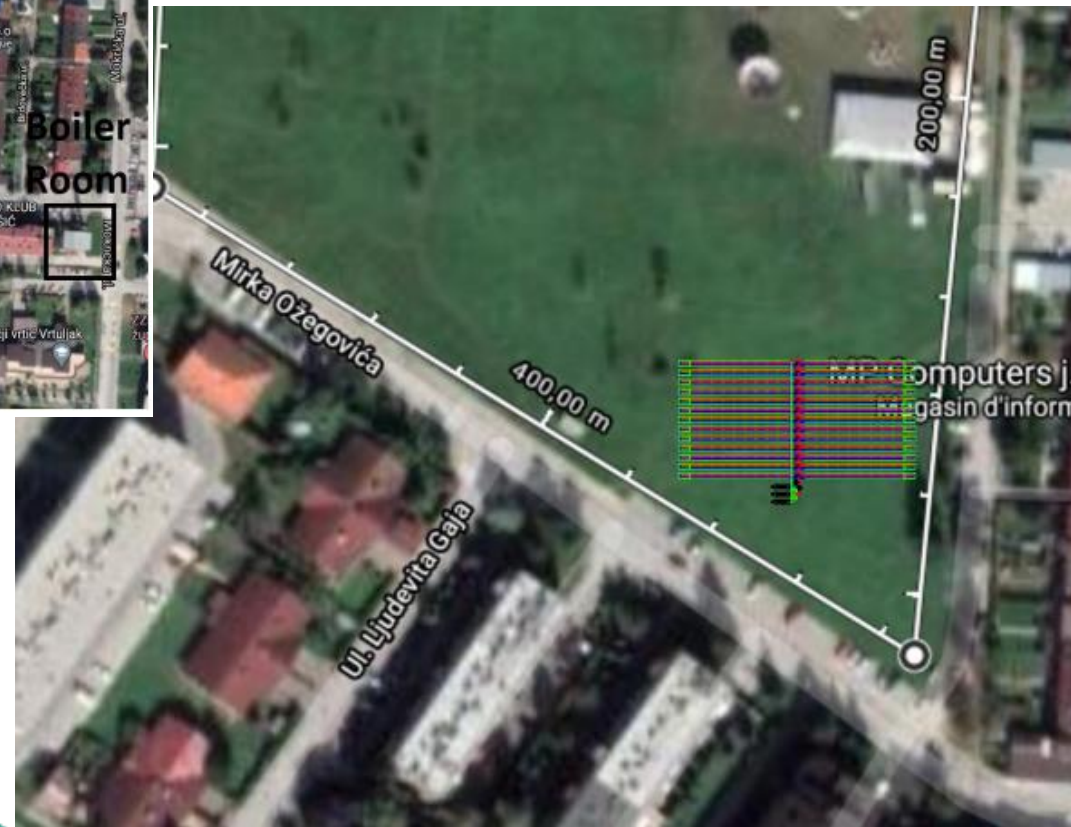


- Boiler room „Mokrička”
- Solar radiation: 1205 kWh/m²/god
- Temperature 90 °C / 70 °C
- Fuel: natural gas
- Maximum available area:
 - Green area 1 – 17 000 m²
 - Green area 2 – 32 000 m²
- Goals of FS
 - Scenario 1 – small scale pilot project
 - Scenario 2 – meeting 100% of summer heat demand

Scenario 1 – small scale pilot project

| | | |
|------------------------------------|-------------------|---------|
| Total number of collectors | | 260 |
| Area (collectors) | m ² | 520 |
| Total required field area | m ² | 936 |
| Efficiency | | 65%-69% |
| Peak production | kW | 349 |
| Annual heat production | kWh/a | 349.877 |
| Heat savings | kWh/a | 405.848 |
| Fuel (Ngas) savings | m ³ /a | 42.320 |
| CO ₂ emission reduction | t/a | 108 |

DHS Zaprešić - FS



Scenario 1 – large-scale projects

| | | |
|------------------------------------|-------------------|---------|
| Area (collectors) | m ² | 2.760 |
| Total required field area | m ² | 4.970 |
| Efficiency | | 65%-69% |
| Peak production | kW | 1.853 |
| Annual heat production | kWh/a | 185.000 |
| Fuel (Ngas) savings | m ³ /a | 224.088 |
| CO ₂ emission reduction | t/a | 570 |

Lessons learned in KeepWarm

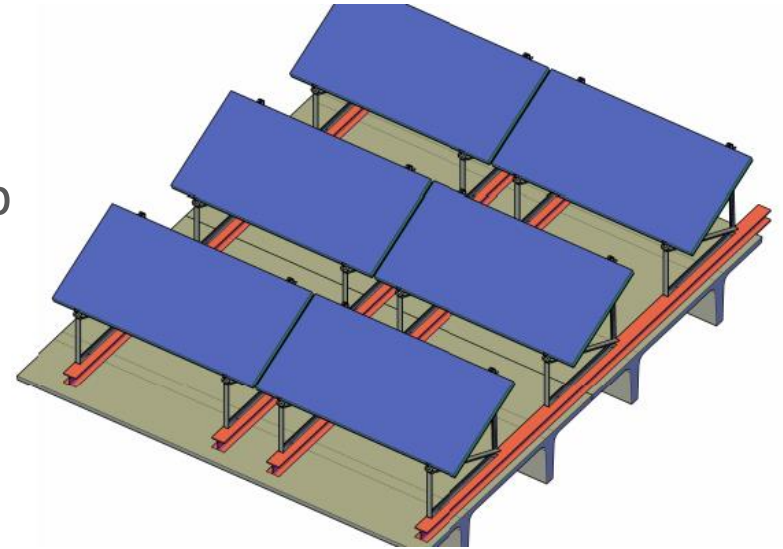


- Low operational and maintenance costs
- High influence of „seasonal” heating between summer and winter period
 - Main limitation factor
- System can be used to cover summer heat demand
 - Overheating?
- Heat storage is essential for further development
- Position of solar collectors
 - Roof vs ground version?



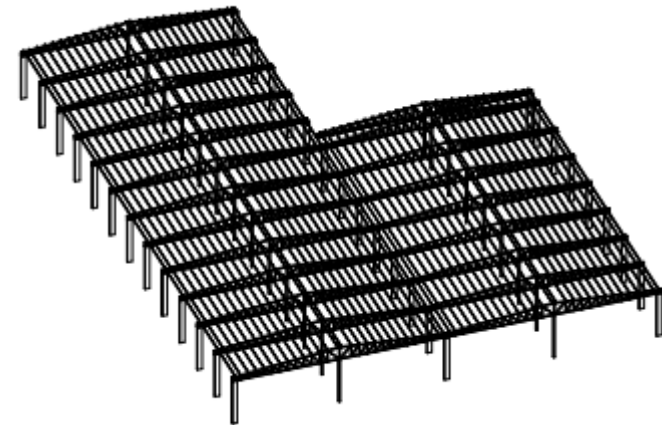
Pilot projects in KeepWarm

- Samobor
 - Questionable static stability of rooftop
 - Increase of costs in case of anchoring
- Velika Gorica
 - Integration of metallic construction
 - Increase of costs



Large scale

- Same geographic reference as Zaprešić
- Can be used to achieve 30% RES in DHS



Other HEP Toplinarstvo's DHSs:

- DHS Osijek
 - Huge problems with domestic hot water preparation
 - Can be solved with integration of solar thermal collectors
 - Already included in activities of our project
- DHS Sisak
 - Already implemented biomass
 - Great synergy between these two technologies
 - Solar energy can be used for summer heat demand

- HEP Toplinarstvo will invest their own financial funds in pilot projects
- National funds
 - Operation programme Competitiveness and Cohesion
- Application to external funds
 - Innovation Fund
 - Recovery Fund

Thank you for your attention!

