KeepWarm
Renewing district heating

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

Integration of solar energy in DHS, cases from Croatia

Marko Čavar, REGEA

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- Integration in DHS
- Case study from Croatia – DHS Zaprešić
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  - Technical limitations
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Solar thermal collectors

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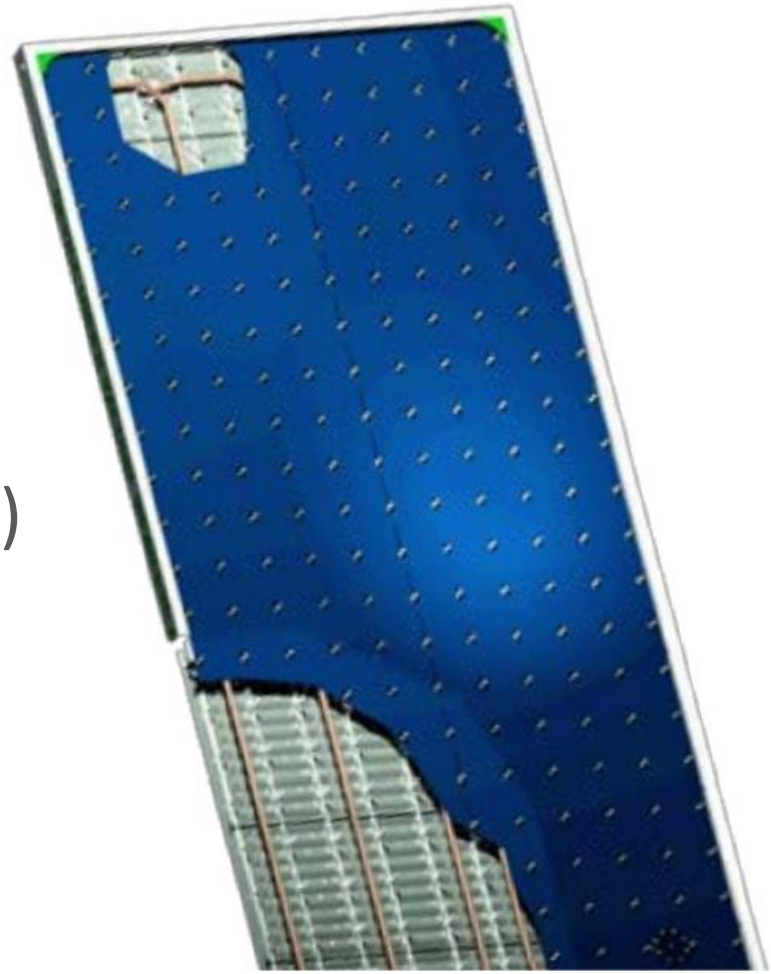
- Vacuum plate collectors
- Heating up to 200 °C
- Temperature of medium
  - 305 °C (max pressure 16 bar)
- Designed for all DHS applications
  - Most often: 65-180 °C



Solar thermal collectors

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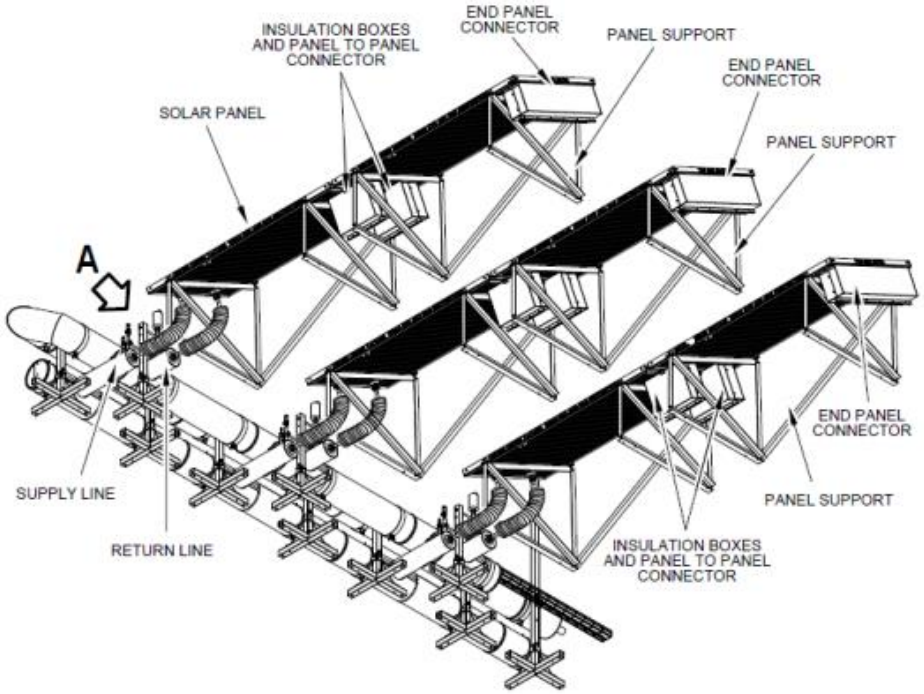
- Specific load: 70 kg/m2
  - Solar thermal collectors
  - Connectors
  - Pipes
  - Support construction
  - Control and monitoring
  - Regulation system
  - heat exchanger



Integration in DHS

- 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

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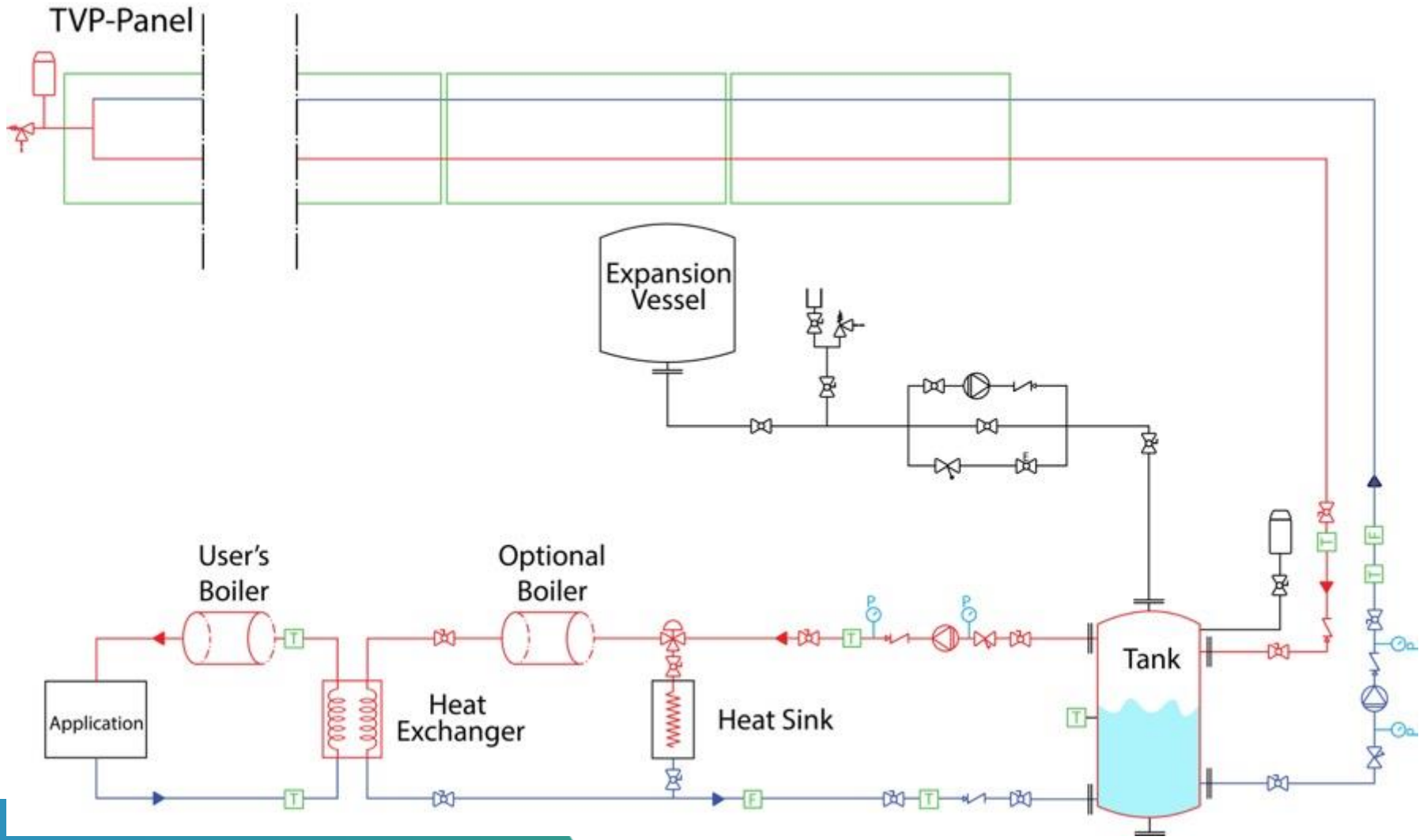

Necessary steps for DHS

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

Business plan – Croatian cities

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

DHS Zaprešić – pilot project

- Boiler room „Mokričkа”
- 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

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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

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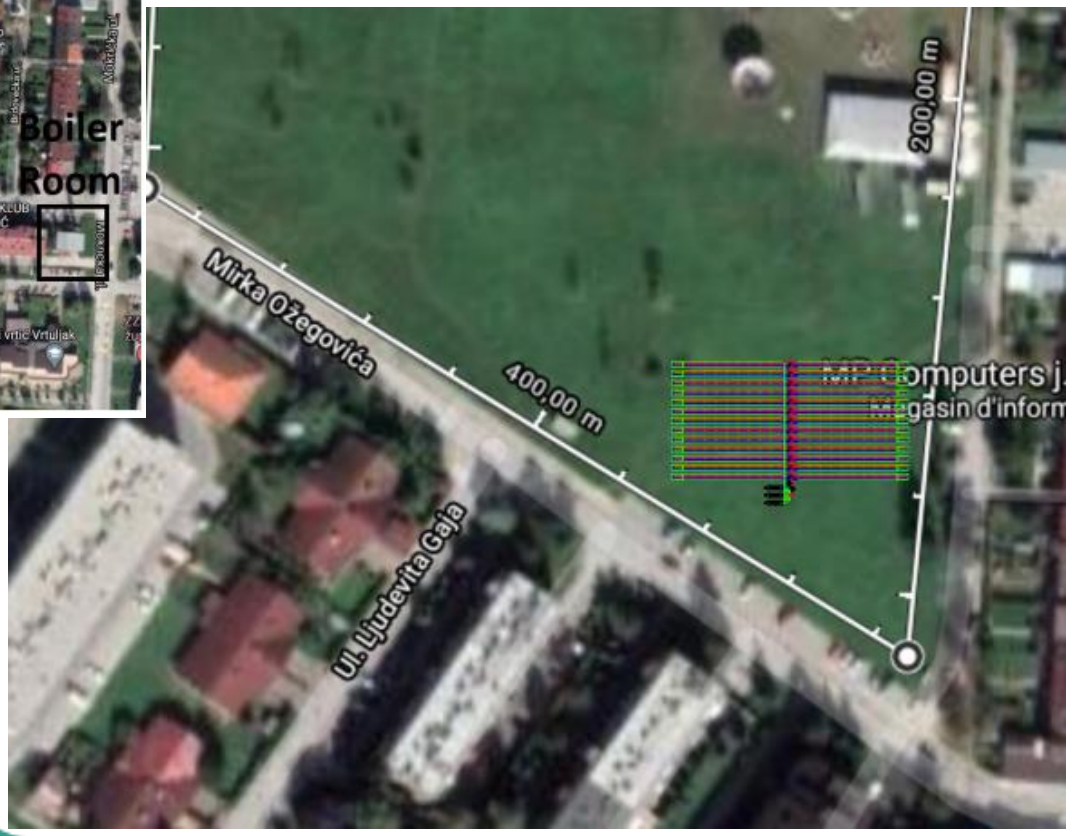

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Scenario 1 – large-scale projects

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

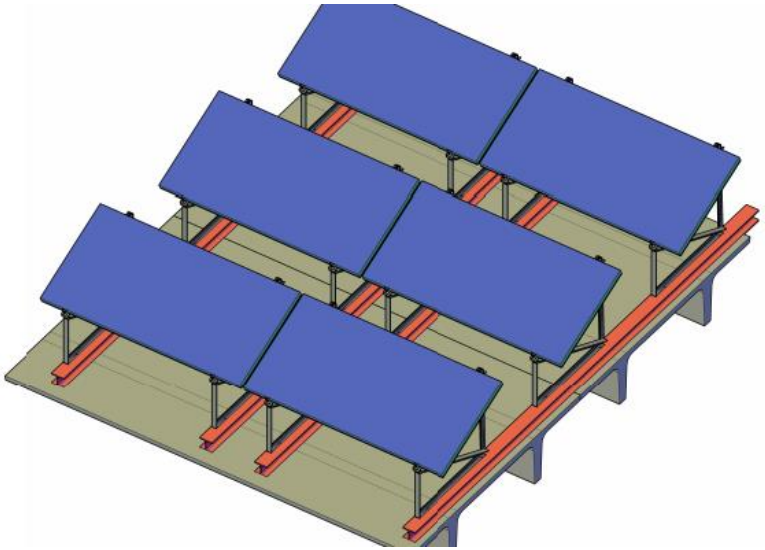
Lessons learned in KeepWarm

- Low operational and maintenance costs
- Hugh 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?

Replication potential - Croatia

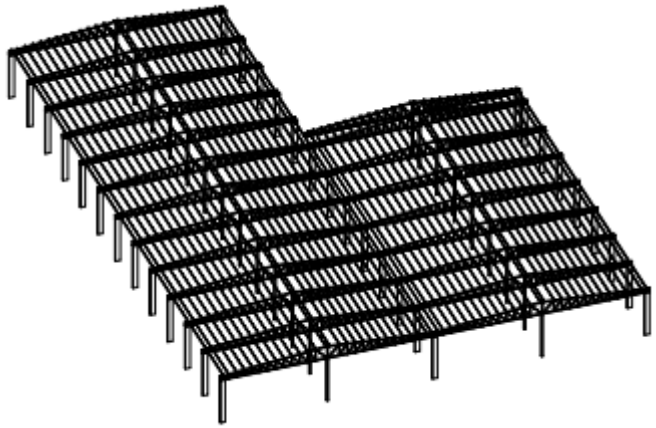
Pilot projects in KeepWarm

- 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 geografic reference as Zaprešoć
- Can be used to achieve 30% RES in DHS



Replication potential - Croatia

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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

Finacing

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

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Thank you for your attention!