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Renewing district heating

The role and contribution of DH to the development of sustainable heating in Slovenia

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Nejc Jurko / KSSENA, Jure Cizman / JSI

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CONTENTS

- brief presentation of the Slovene (district) heating context,
- future challenges of SLO DH
- SLO KW pilot (biomass - presentation, what are their vision/goals, which main steps towards retrofitting have been done; plans)
- large heat pump integration in DH (heat source: shallow geothermal and sufrace waters)

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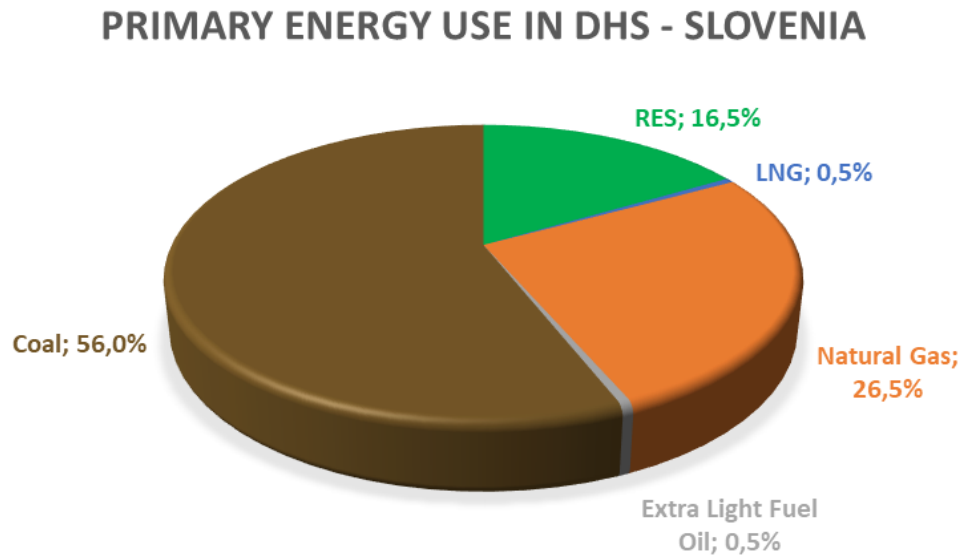
SLOVENIAN DH CONTEXT

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



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FRAMEWORK & ACTIONS

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 **reductionof temperature** levels
- Integration of **large HPs and heat storages**
- Intensified electricity and heat **sector coupling**
- **DH network planning** supported by “heat mapping “tools

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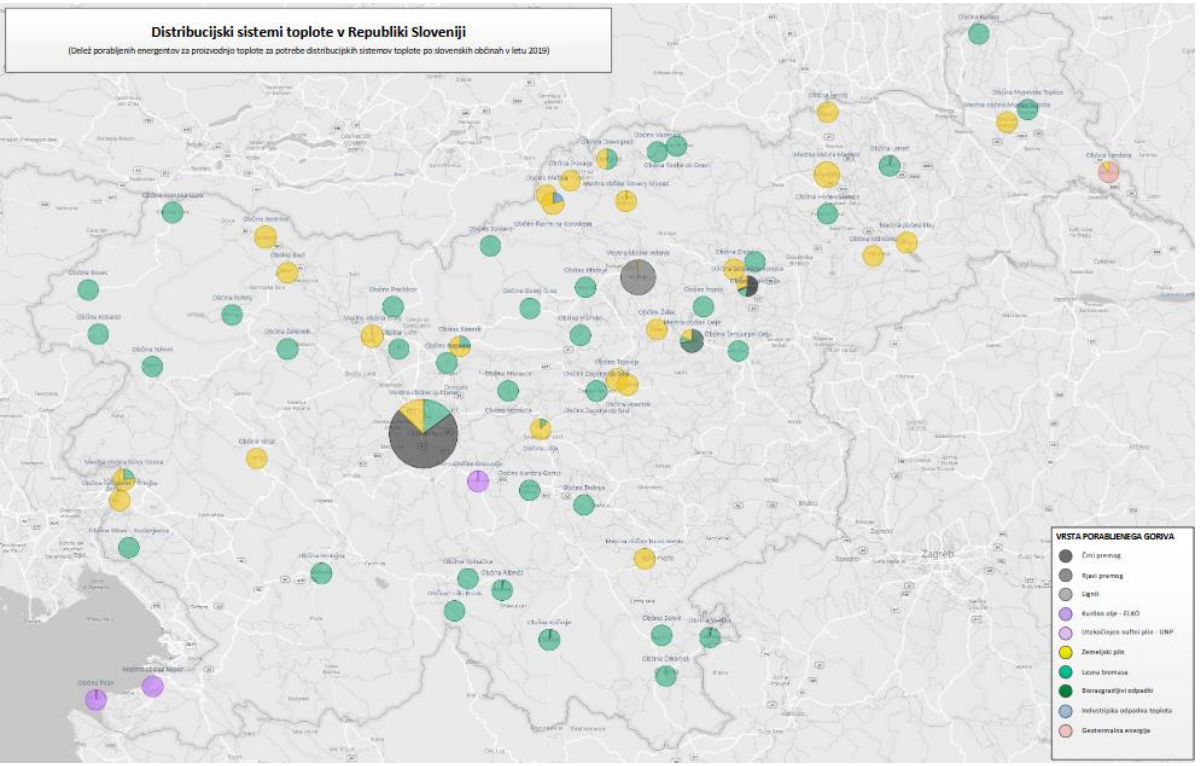
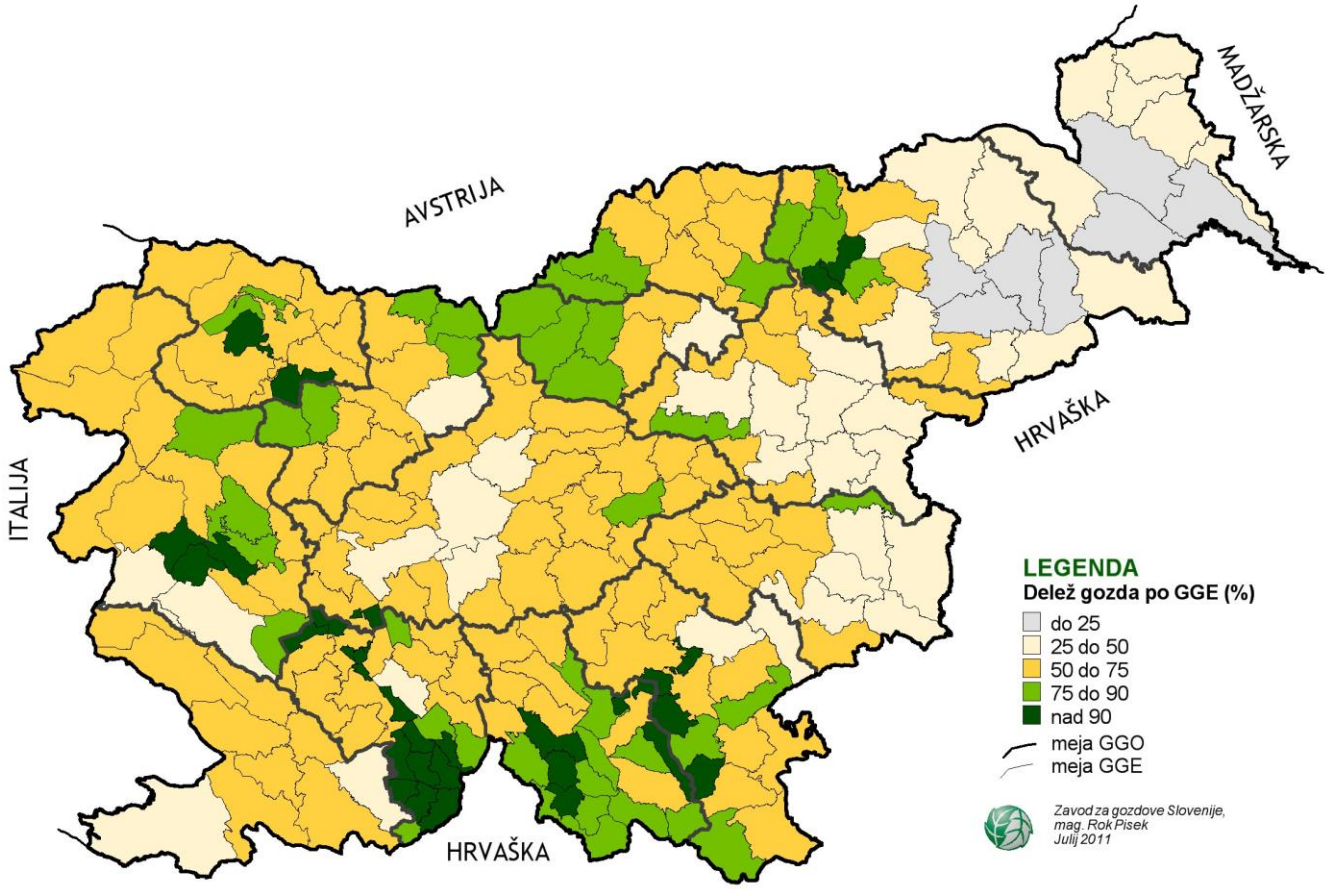
BIOMASS IN SLOVENIAN DHSS





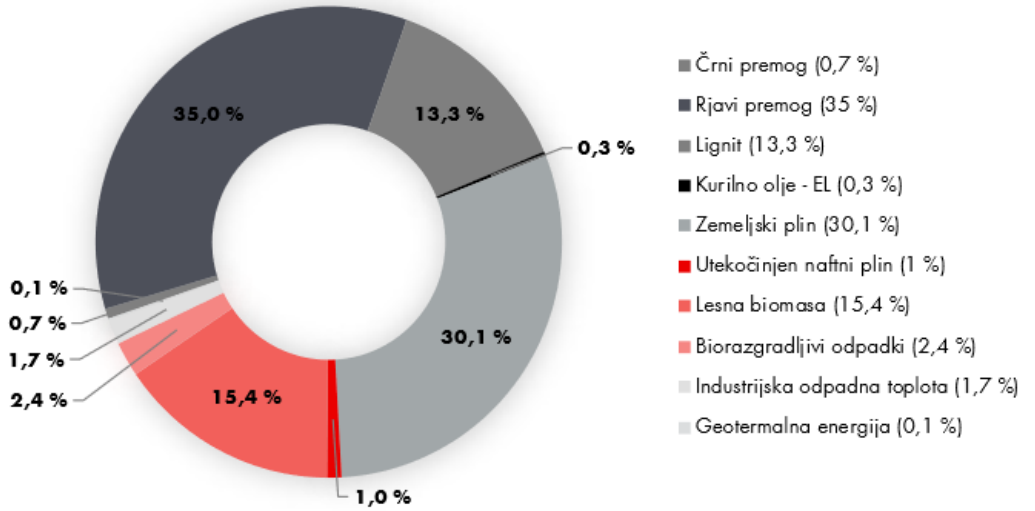
BIOMASS IN SLOVENIAN DHSS

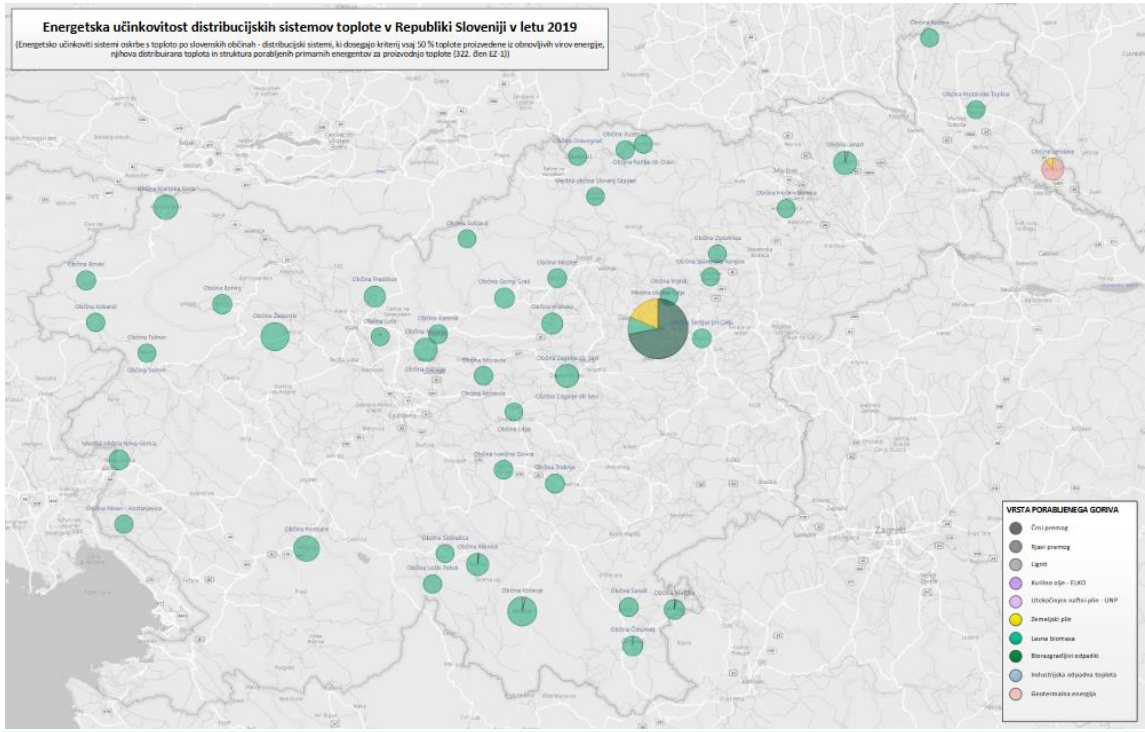
Trends

- 42 biomass DHSs + 2(wih help of KeepWarm).
- In the last few years, **the share of RES and excess heat** is around 17%.

Support

- Goal of **1% annual increase of RES** share in DHC (by 2030)
- Ministry of infrastructure (for investments)
- Slovenian Eco Fund
- Feed in (Slovenina energy agency)
- **Promotion and incentives for biomass in small and medium DHSs**





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PTUJ DHS

- 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**

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 optimize it.

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PTUJ DHS

Boiler no.1 - new biomass boiler with output power of 3 MW.

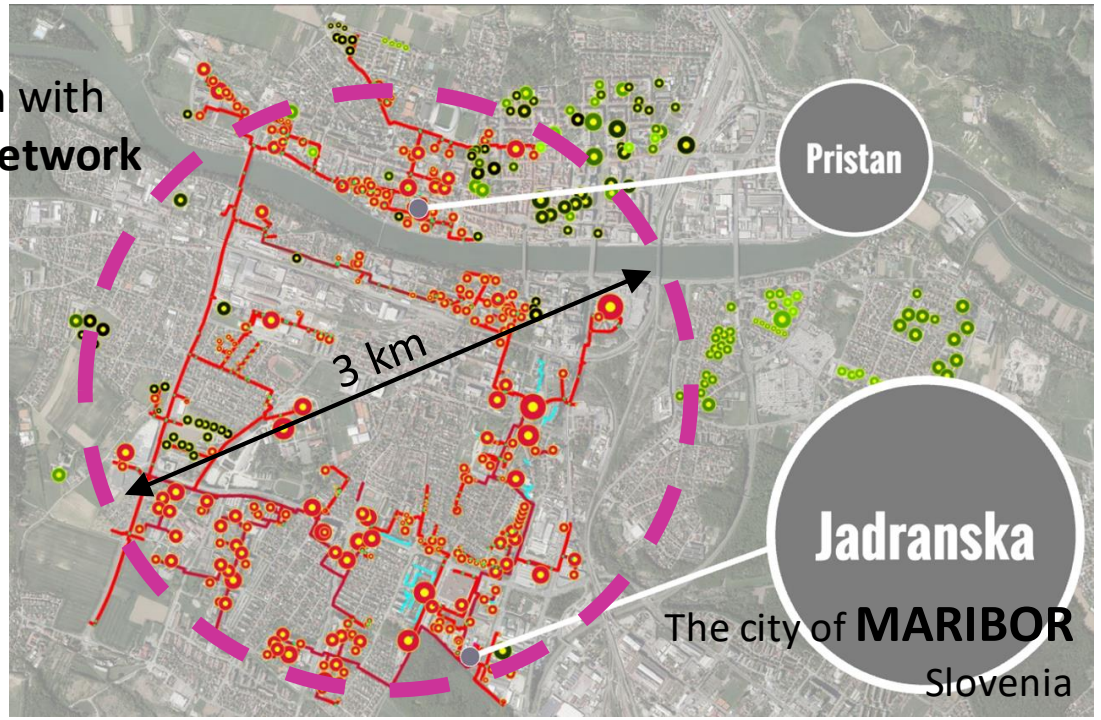
Boiler no. 2 new gas boiler with output power of -6.75 MW.

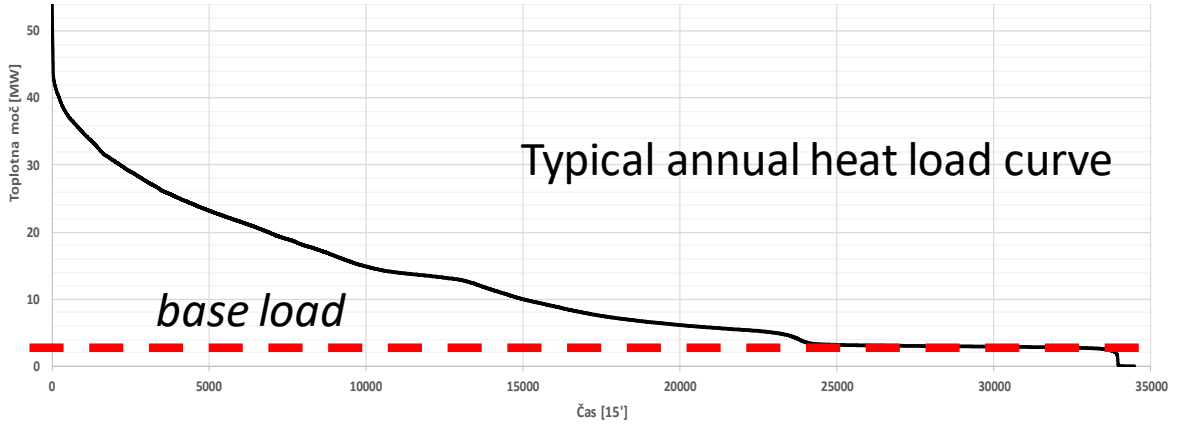
Boiler no. 3. old gas boiler for cold reserve – 7 MW.

DH UPGRADE PROJECT CRITERIA

- Integration of **large heat pump into DHS**
- 1.5 MW thermal output (base load, 365 days/yr)
- Output T: 75-80 °C
- HP COP = min 2.8

Objecitves: (1) cover the base load & (2) increase the share of RES (following the goals of Directive (EU) 2018/2001 on the promotion of the use of energy from RES)





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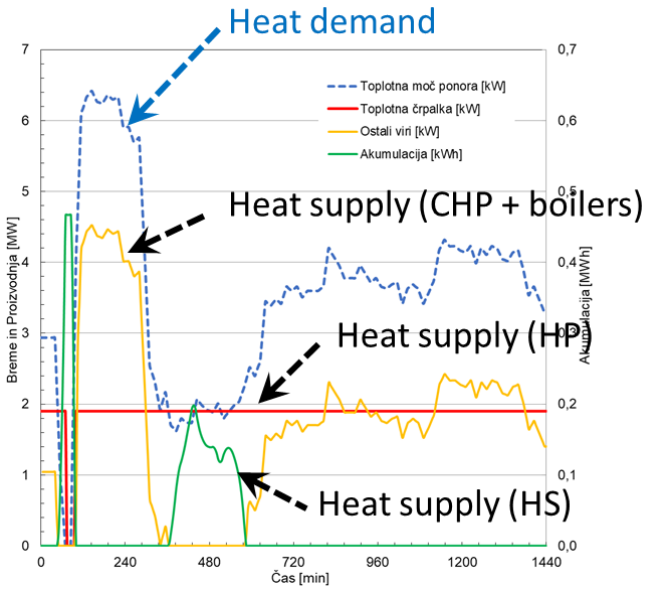
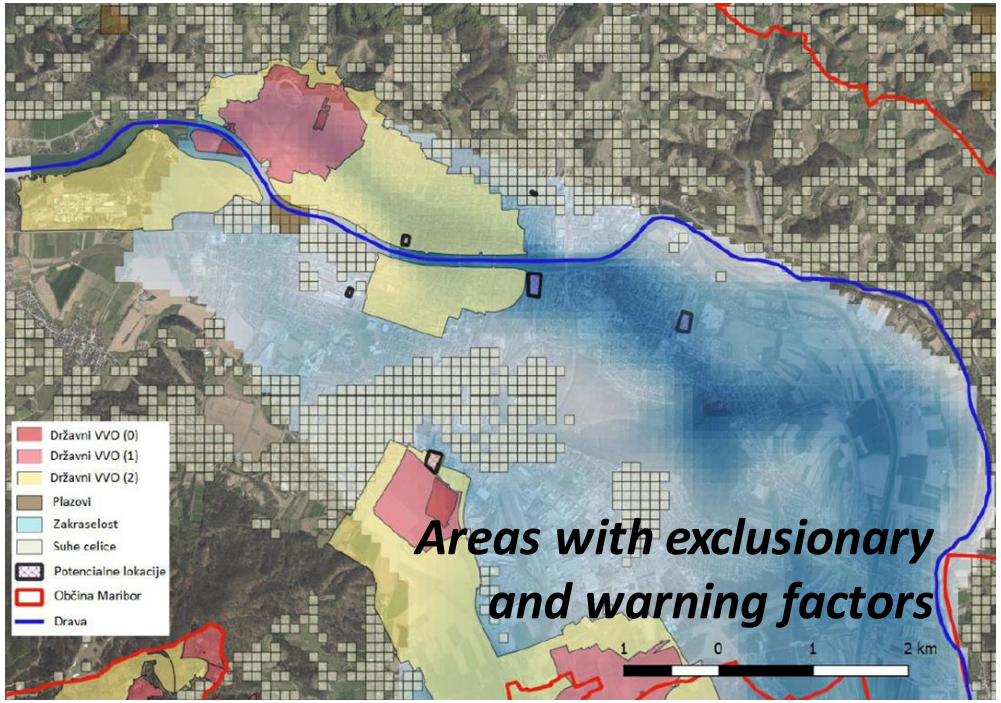
UTILISATION OF GEOTHERMAL ENERGY

- **Hydrogeological verification** of the technical potential of shallow geothermal energy
- Analytical calculations and mathematical modelling of **hydraulic and temperature impact**





Obstacle: The construction of geothermal energy wells at the site is not (yet) allowed (regulation on water protection)

Chosen option: HP (utilization of river thermal energy) + heat storage (HS)

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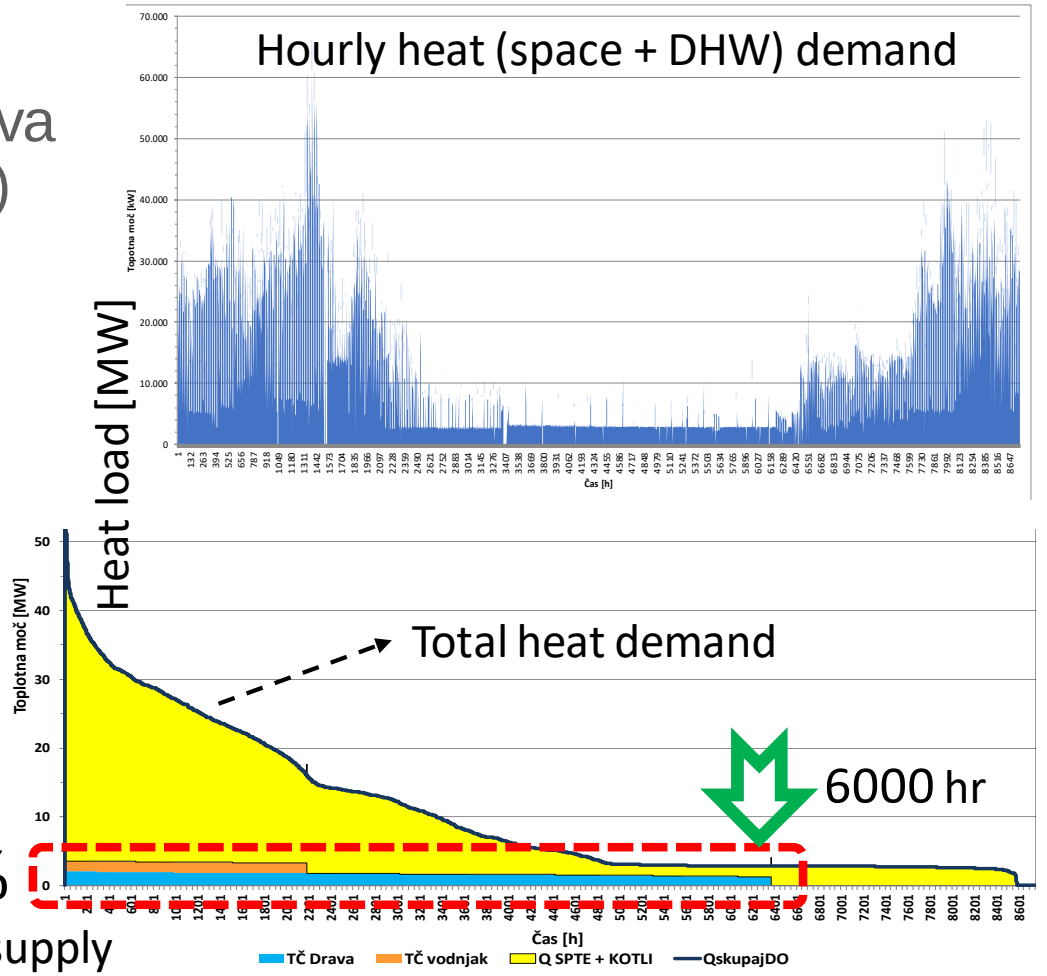
SUMMARY RESULTS OF THE FEASIBILITY STUDY

- **Operational time of HP**: appr. 6000 hr/yr (T of Drava river > 5°C (evaluation based on the historic T data)
- Estimated heat production from HP: 10.9 GWh of heat annually (**11.6% of the total heat in the DHS system = the increase of RES**)
- **Heat storage** (20m^3 = 15 min HP on/off interval; 47m^3 = base load covered by HP)
- Installation of HP will reduce the use of NG >>> **reduction of CO_2 emissions**: + 4,000 t / year
- Estimated investments: 1,7 mio EUR



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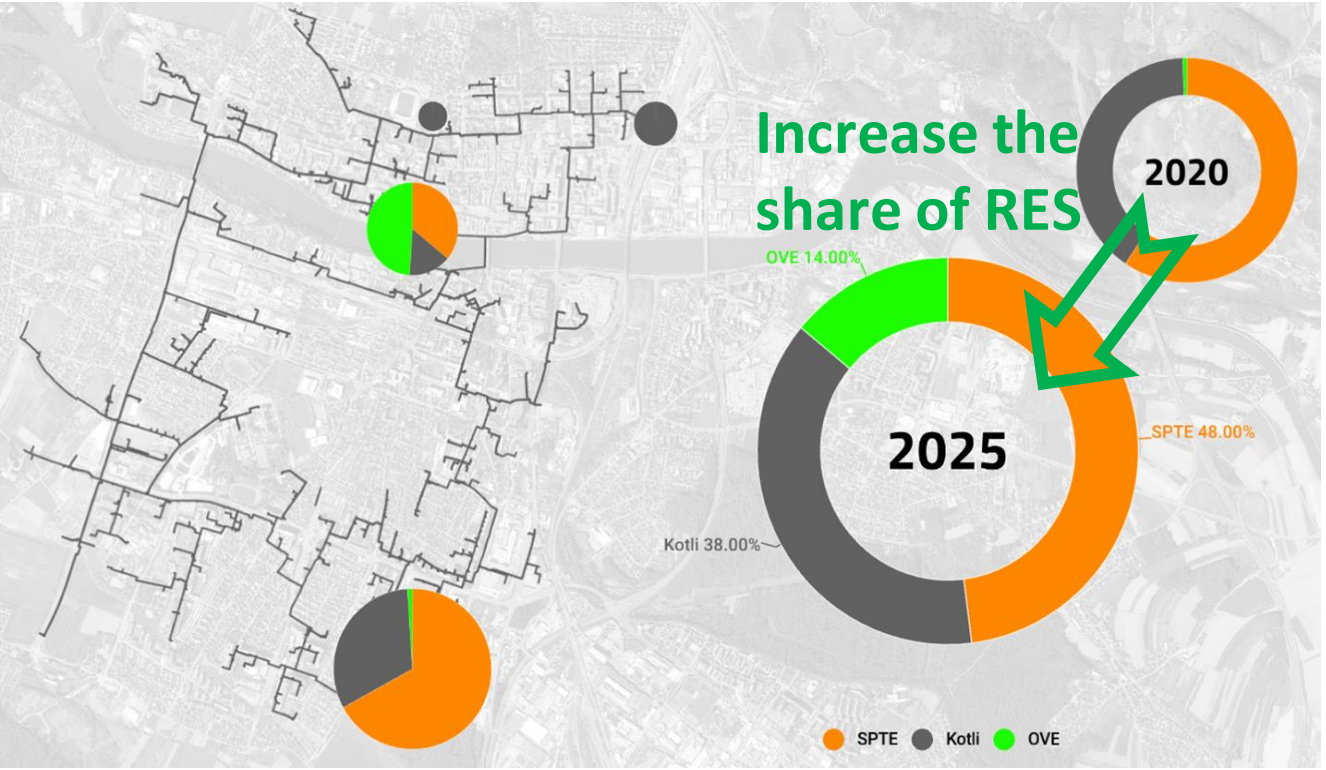
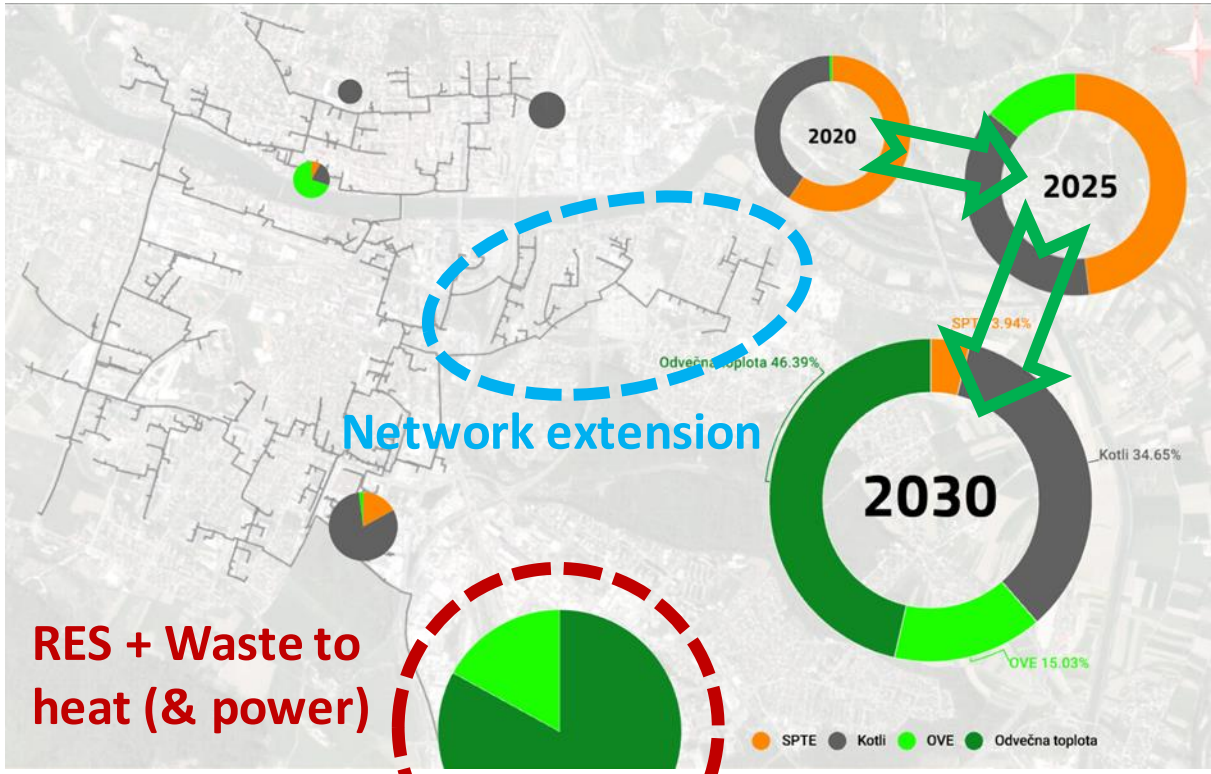
DHS VISION 2025 – 2030 - CITY OF MARIBOR





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CONCLUSIONS

- Prioritised technologies in the future SLO DH: geothermal, waste heat, biomass (wood), CHP, heat storages (+ waste to heat)
- Development of the national support programme for installation of large HPs to boost utilisation of geothermal in DHS
- Knowledge, long-term vision & supportive framework are key drivers for the development of DHS
- Heat mapping (supply & demand) demonstrated as very useful tool for planning
- Painful tasks: for the majority DHS - to increase the share of energy from RES or from waste heat by at least 1 percentage point; for some DHS – how to meet EED criteria on efficient DHC;