



LIFE
CLIMATE
PATH
2050

Local Energy Scoreboard & Heat Mapping

Gašper Stegnar

CA EED study visit, Ljubljana, 8.11.2018

Projekt LIFE ClimatePath2050 (LIFE16 GIC/SI/000043)
je financiran iz finančnega mehanizma LIFE, ki ga
upravlja Evropska komisija, in iz Sklada za podnebne
spremembe Ministrstva za okolje in prostor RS.



Local Energy Scoreboard FACTS

- What?** A website interactive platform.
- Why?** To monitor the implementation of climate related measures by municipalities!
- How?** With 57 indicators.
- Where?** Across all sectors that have influence on climate mitigation.



Prikaz kazalnikov občin na zemljevidu

Primerjava kazalnikov med občinami

OSNOVNI KAZALNIKI | STAVBE | PROMET | KMETIJSTVO | GOZDARSTVO |

INDUSTRILJA | ODPADKI | ELEKTRIČNA ENERGIJA IZ OVE | DALJINSKO OGREVANJE |

> Domov

LOKALNI SEMAFOR PODNEBNIH AKTIVNOSTI

Lokalni semafor podnebnih aktivnosti je spletna aplikacija, ki prikazuje izvajanje ukrepov energetske prenove stavb, širitve kolesarskih mrež ter druge ukrepe za zmanjševanje emisij toplogrednih plinov v posameznih občinah.

Portal prikazuje aktivnosti občin na področju blaženja podnebnih sprememb s 56-imi kazalniki, 47 od teh je prikazanih za vse občine v Sloveniji. Do oktobra 2018 se je aktivno na semafor priključilo 10 občin, za katere so na voljo tudi vsi osnovni podatki, osnovni kazalci za javne stavbe, energetska prenova brez spodbud ter kazalnik o številu polnilnic za električna vozila.

Občine, ki bi se rade pridružile semaforju, pošljite e-mail na info@podnebnapot2050.si

*kazalnik je prikazan le za občine, ki so se aktivno pridružile lokalnemu semaforju podnebnih aktivnosti

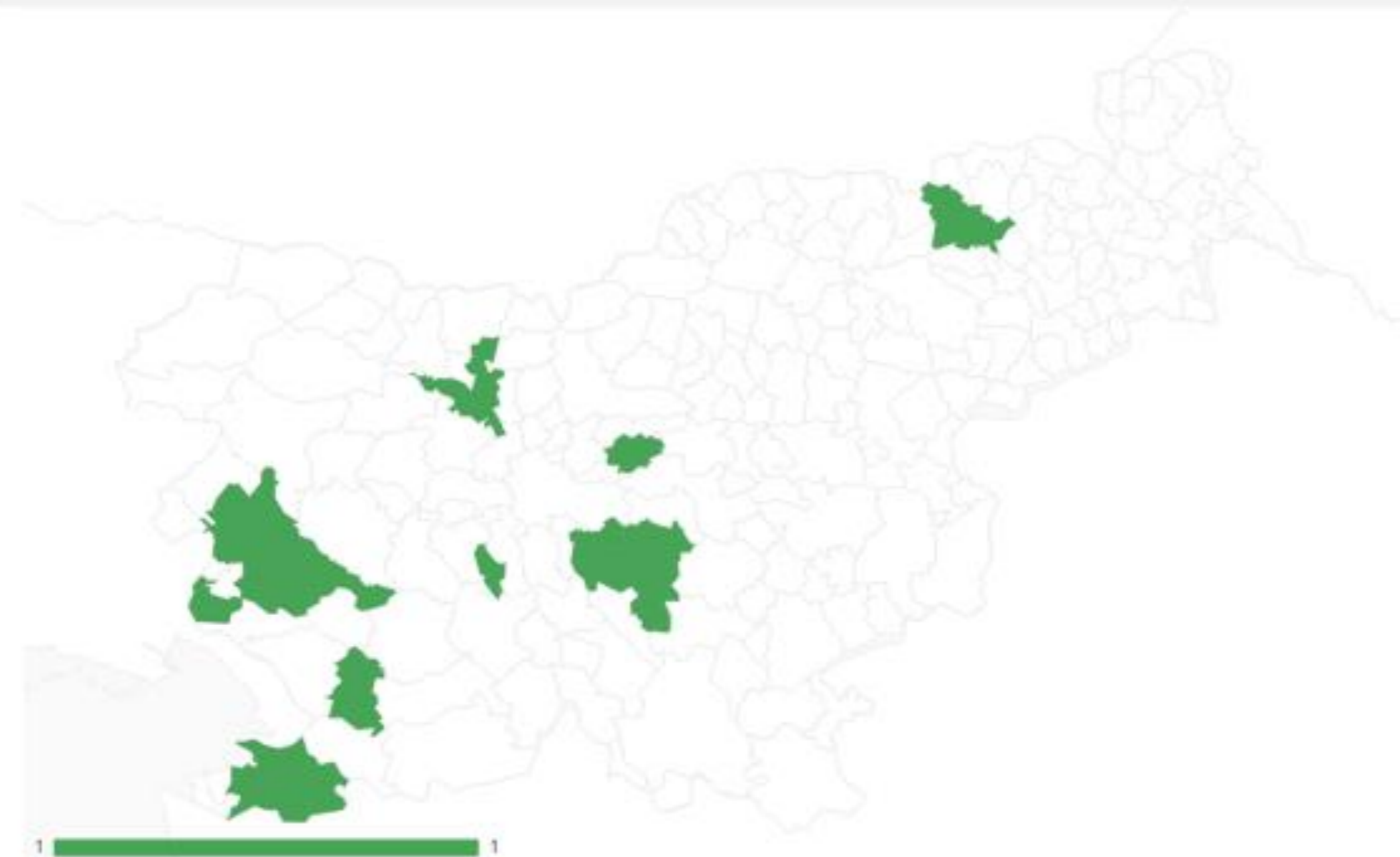
Izberite kazalnik, za katerega želite prikaz na zemljevidu občin ali pa v glavnem meniju izberite prikaz skupine kazalnikov za vse občine.

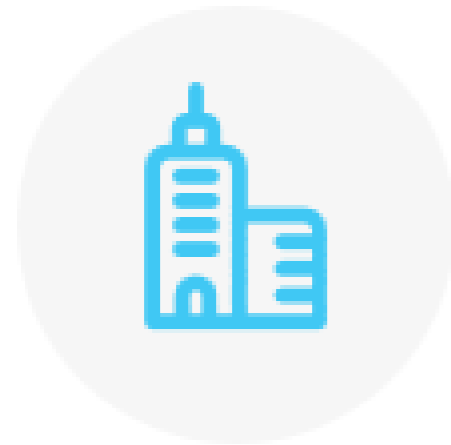
Kazalnik:

Pridružene občine na lokalni semafor podnebnih aktivnosti ▼

Leto:

2018 ▼





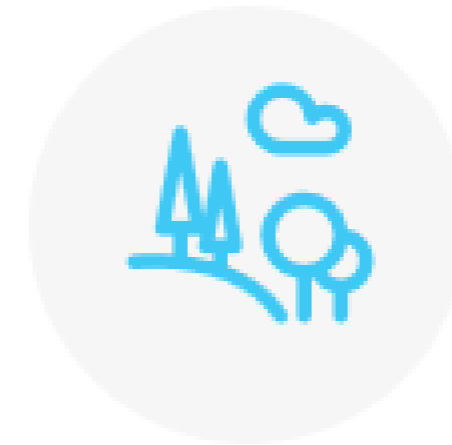
BUILDINGS



TRANSPORTATION



AGRICULTURE



FORESTRY



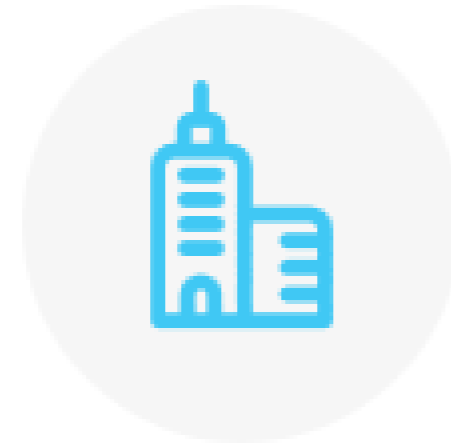
INDUSTRY



WASTE



**ELECTRIC
ENERGY
FROM RES**



**DISTRICT
HEATING**

**Transparent data at one place
based on public records and
municipalities's data.**

semafor.podnebnapot2050.si

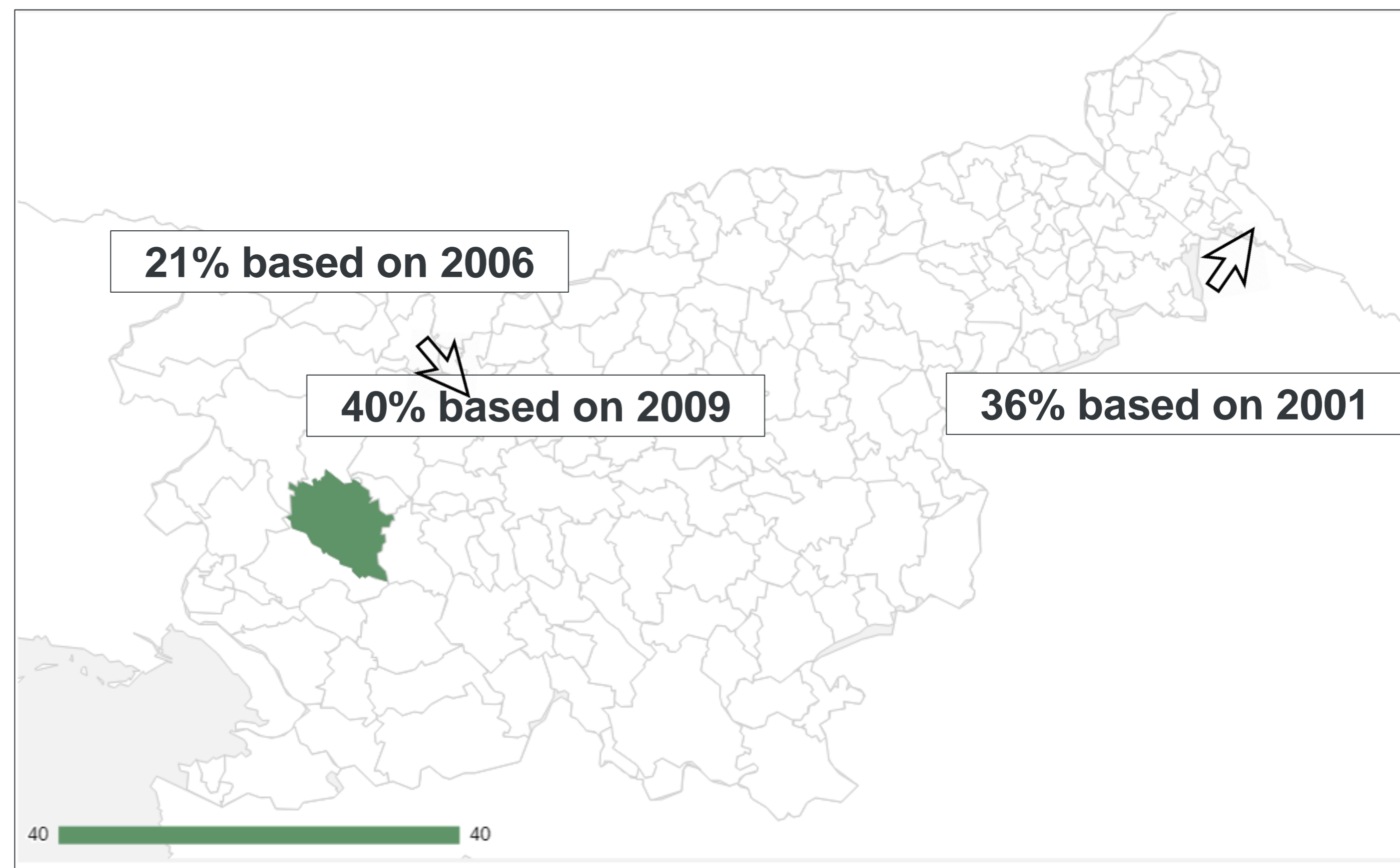
MUNICIPALITIES IN THE COVENANT OF MAYORS AND WITH CO2 EMISSIONS REDUCTION GOALS

7,755
Signatories



29 municipalities have already signed up to the Covenant of Mayors and actively committed to reducing emissions by 2020:

Beltinci, Brda, Cankova, Celje, Divača, Idrija, Kranj, Krško, Kuzma, Lendava, Ljubljana, Ljutomer, Maribor, Miren – Kostanjevica, Moravske Toplice, Ljubno, Nazarje, Odranci, Pivka, Puconci, Razkrižje, Rogašovci, Slovenj Gradec, Tržič, Tolmin, Turnišče, Velenje, Šempeter – Vrtojba, Žalec



Idrija has committed itself to even more long-term goals by 2030

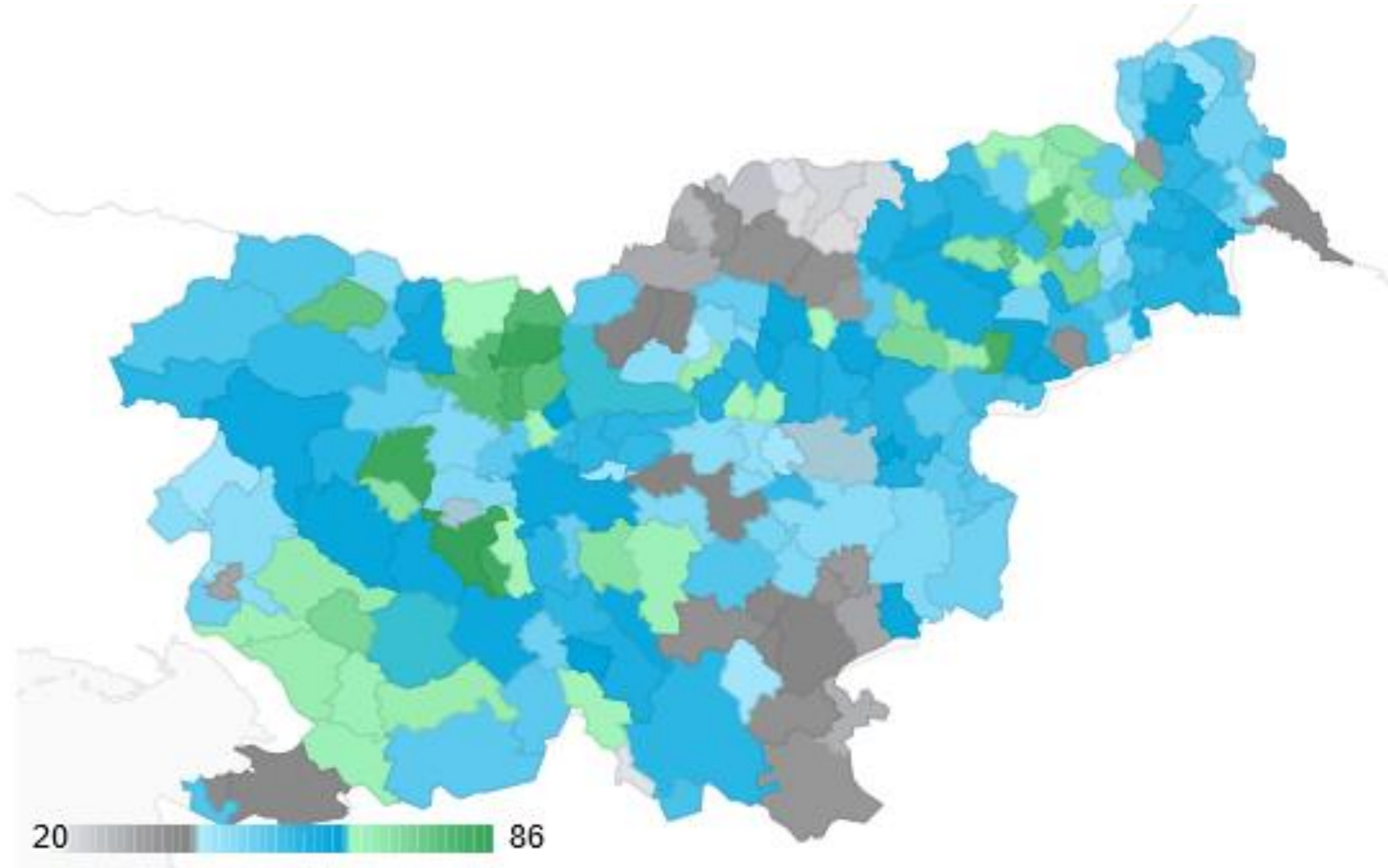
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How active are the municipalities in Slovenia?

The share of **separately collected waste fractions** has steadily increased in recent years and reached **57%** in 2016.

Municipalities Vrhnika, Preddvor, Gorenja vas-Poljane, Log-Dragomer, Borovnica, Makole and Šenčur already achieve more than **80 % delež**.

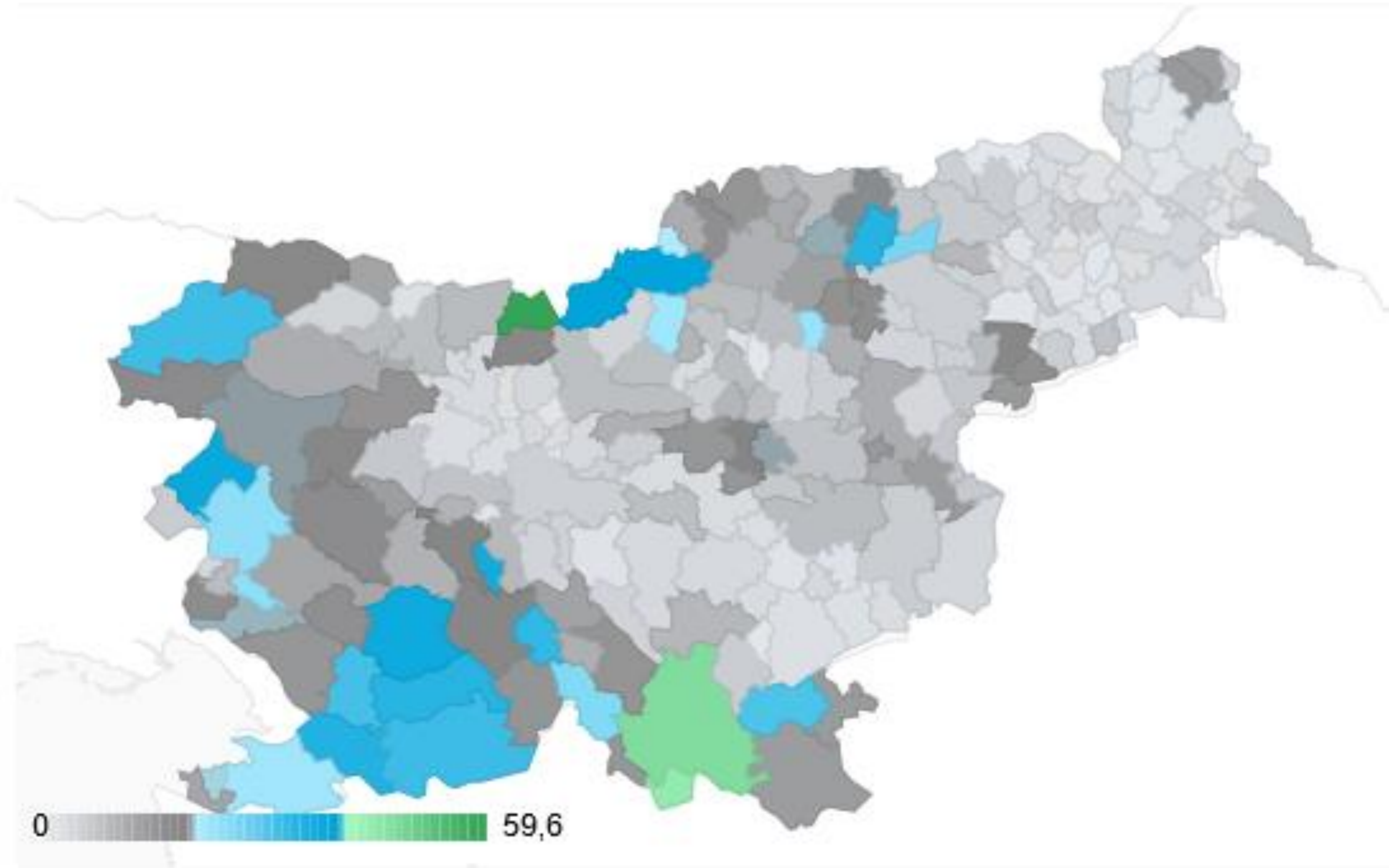


How active are the municipalities in Slovenia?

Organic farming

In 16 municipalities, organic farms accounts for **over 30%** of all agricultural land, which is 29% of all land with organic farming in Slovenia.

Municipality of **Jezersko** stands out with 60% share.



How active are the municipalities in Slovenia?

- Energy renovation of public buildings in municipalities has been carried out in the range of 18 - 47%.
- Energy accounting is now fully established in 78-100% of municipal buildings.
- In the period 2013 - 2017, energy renovation was encouraged in 150 municipalities with funds from the Cohesion Fund with a **total** heated floor area of almost 765,000 m².

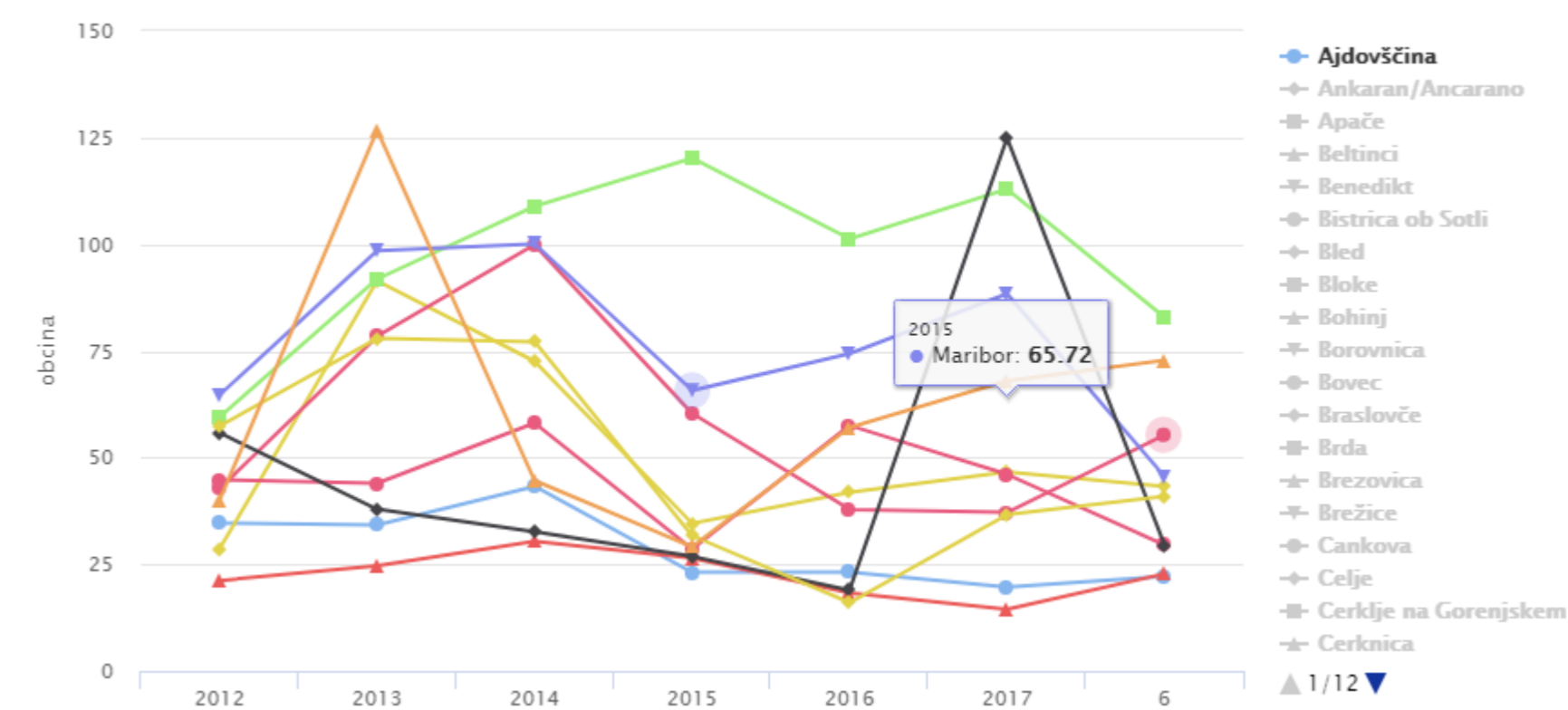
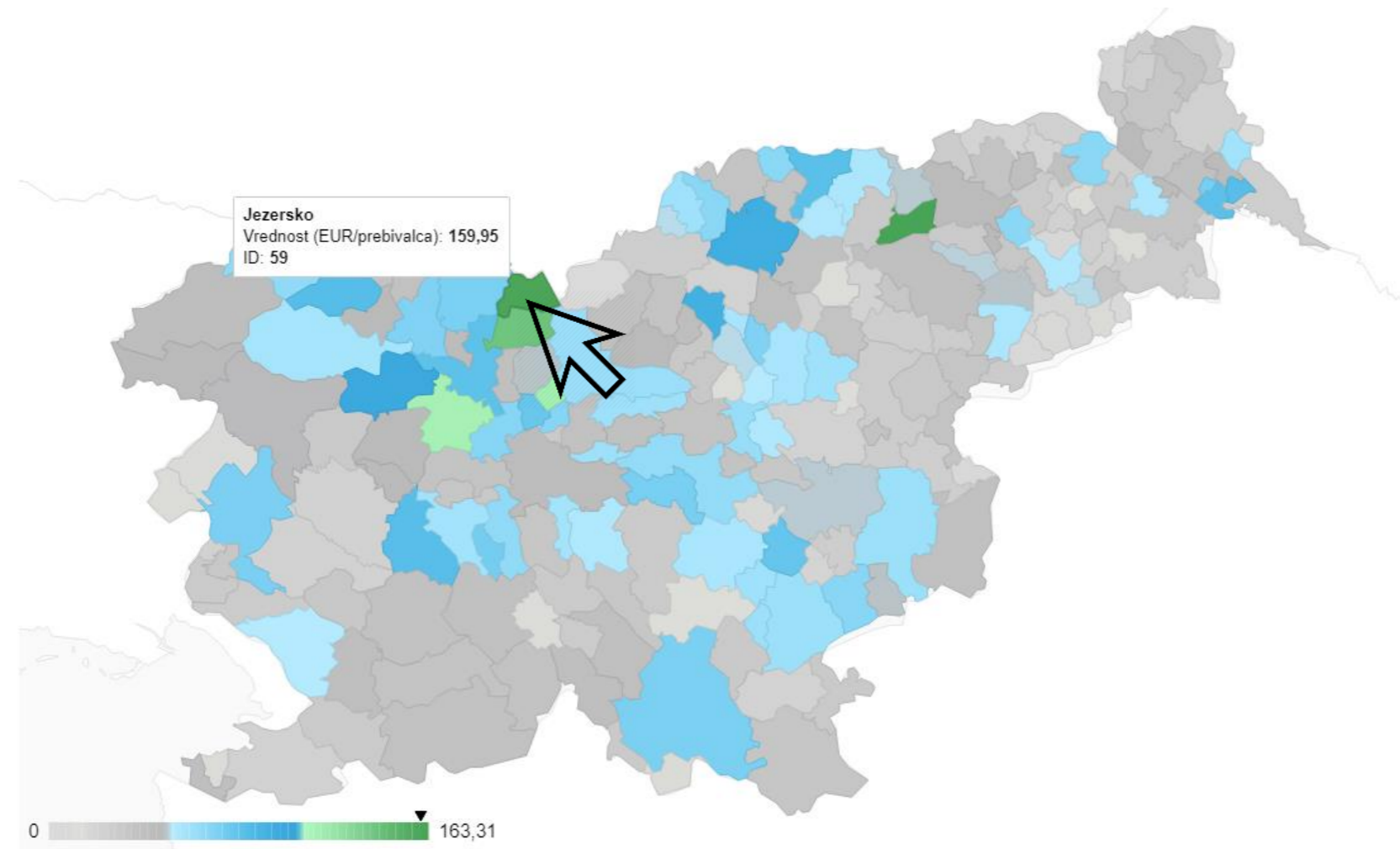


How active are Slovenian households?

The irreversible incentives of the Eco Fund have so far encouraged investment in EEU and RES measures in households in **all** Slovenian municipalities.

In the period 2012-2017, the most **investments** per capita, **between 600 and 700 €**, were encouraged in the municipalities of Škofja Loka, Radovljica, Komenda, Kranj, Jezersko and Preddvor.

The highest per capita **subsidies** amount to **115 €**, with the highest per capita in the municipalities of Preddvor, Jesenice, Kranj and Ravne na Koroskem.





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Shallow geothermal energy potential through heat mapping

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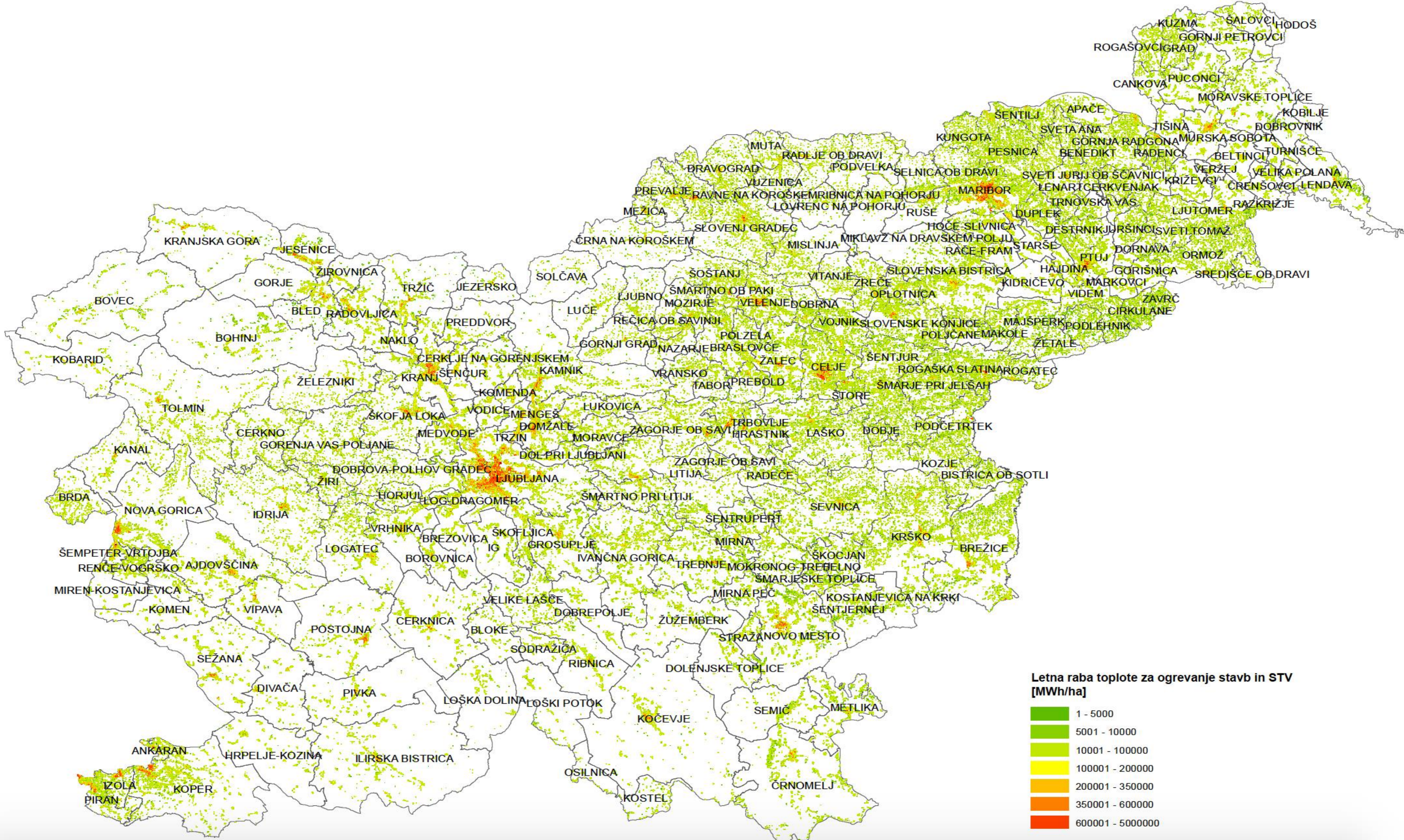
Research activities

Heat mapping

Development of the heat map began with a local initiative in 2015.

Currently ongoing 2 projects and soon 1 long-term project with focus on the end-result of:

**Regularly updated heat map for
demand-supply-potential side/aspect of Slovenia with
systematical data quality check for advanced local and
national energy planning.**



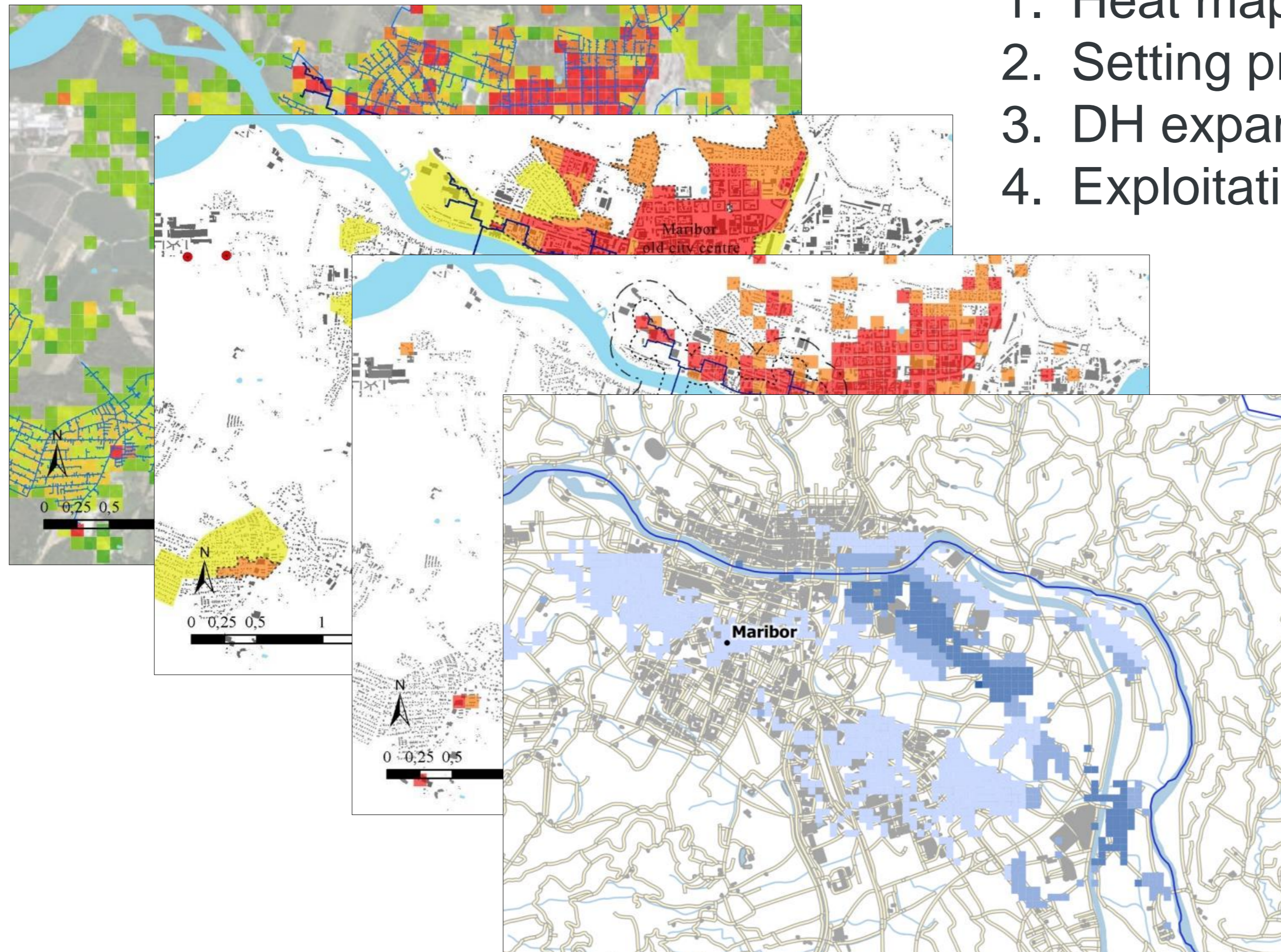
Letna raba toplote za ogrevanje stavb in STV [MWh/ha]



Heat map research

From needs to supply options

1. Heat map
2. Setting priority areas
3. DH expansion potential
4. Exploitation of potential



Ongoing research is focusing on identification of local potential of:

- **geothermal energy,**
- **solar energy and**
- **DH expansion.**

Shallow geothermal potential

Methodology

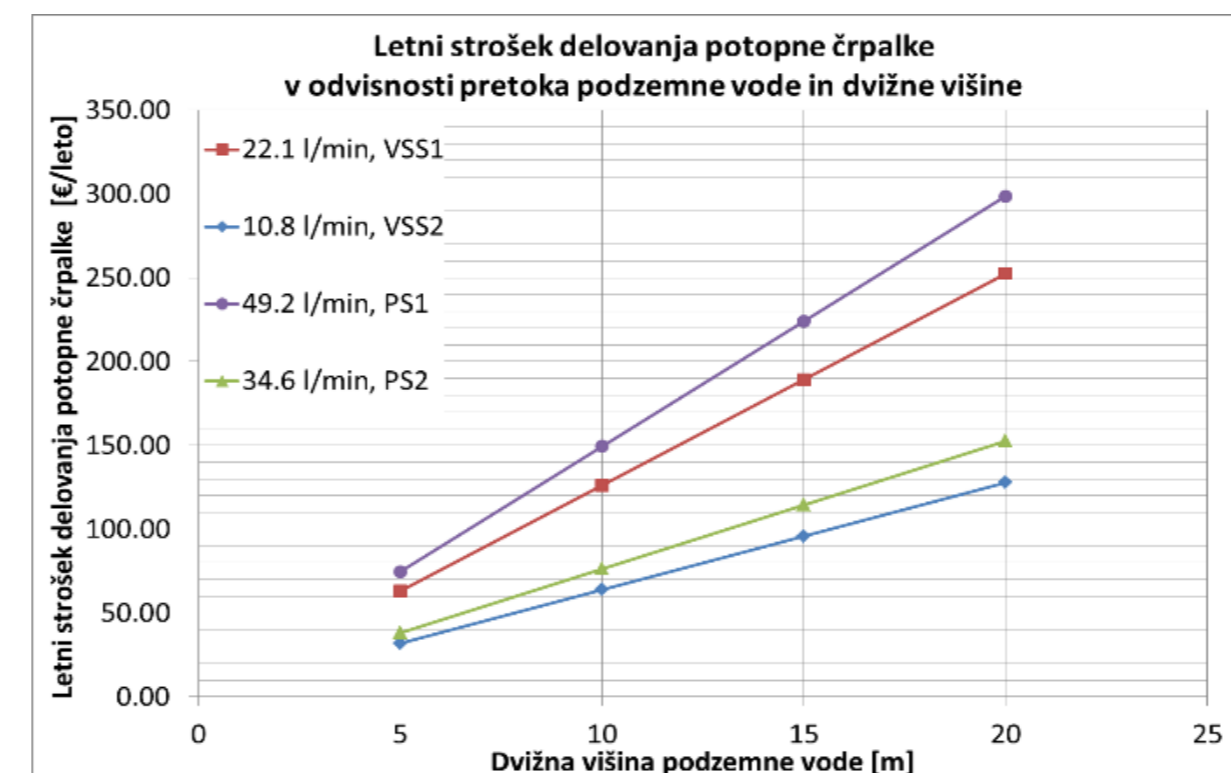
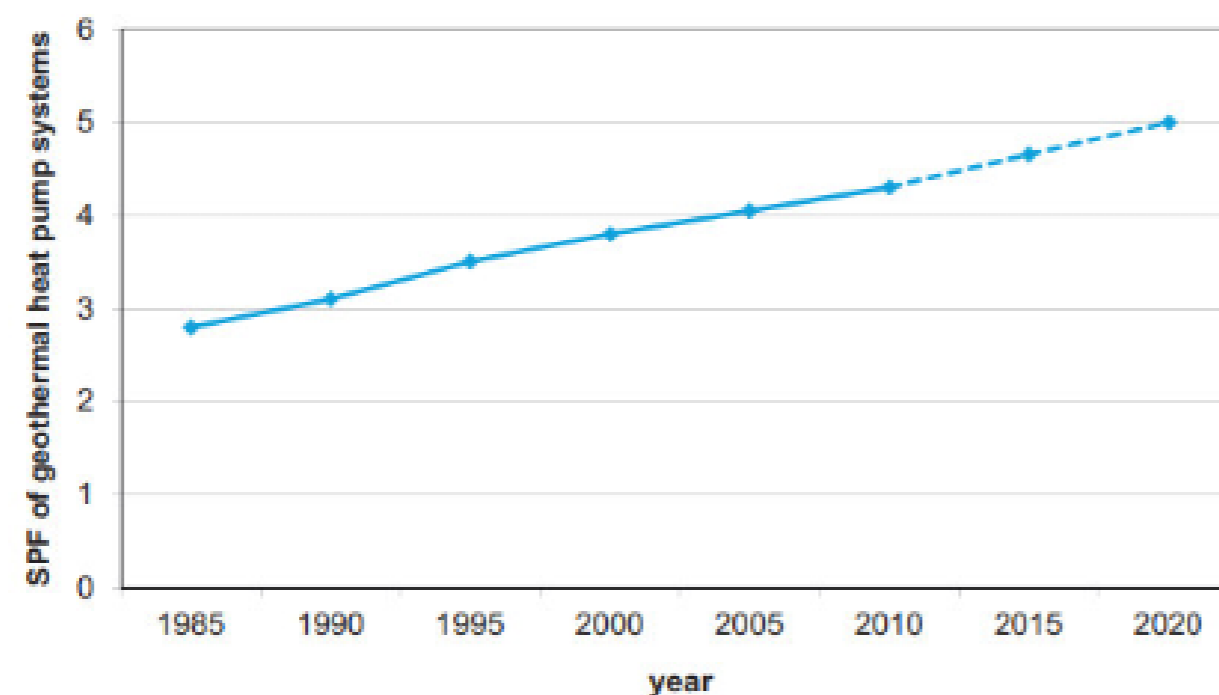
1. Heat map
2. Identification of geothermal energy potential of densely populated areas (economical aspects, constraints, factors)
3. Mapping of geothermal energy exploitation for new DH areas or for support to existing DH
4. Mapping of geothermal energy exploitation as decentralized systems

Shallow geothermal potential

Economical aspect

Taken into account:

- Ground-coupled and groundwater heat pump systems
- Capture of energy with BHE
- Capture of energy with groundwater systems
- Yearly maintenance costs and lifetime of technology



Shallow geothermal potential Constraints

Exclusion areas: water protection areas, artesian aquifers

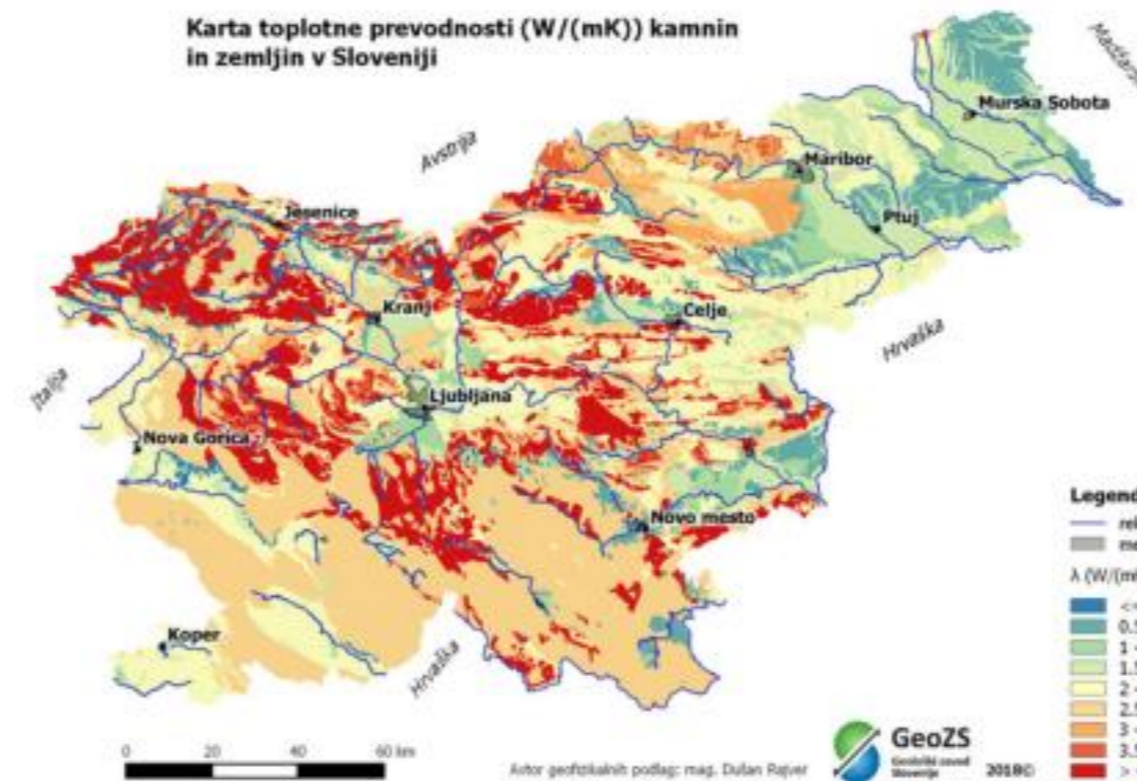
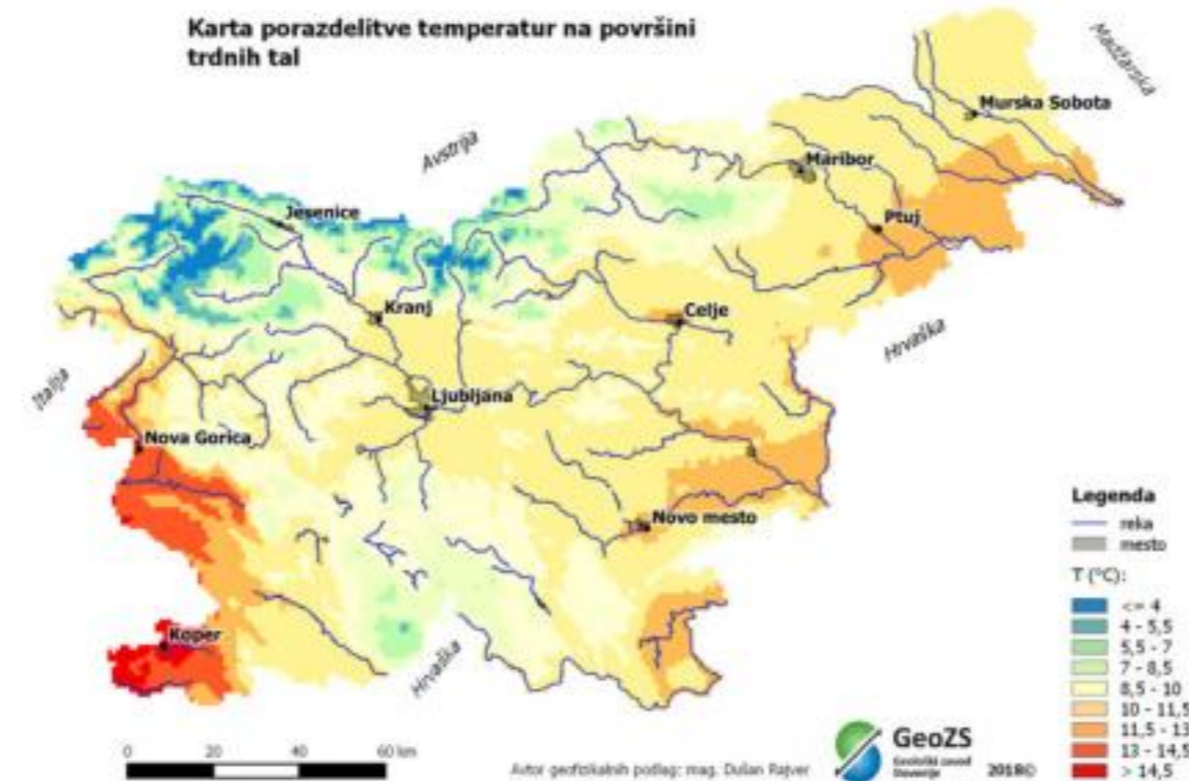
Warning areas:

- aquifers, groundwater just below the surface, hanging aquifers, areas with aquifers one above the other, aquifer with mineral water, aquifer with thermal water, emerges of gas, unstable grounds, polluted land, karst areas, ingress of salt water
- avalanches
- higher karstification
- areas of presence of anhydrite
- the proximity of water resources coverage not protected by water protection areas

Shallow geothermal potential

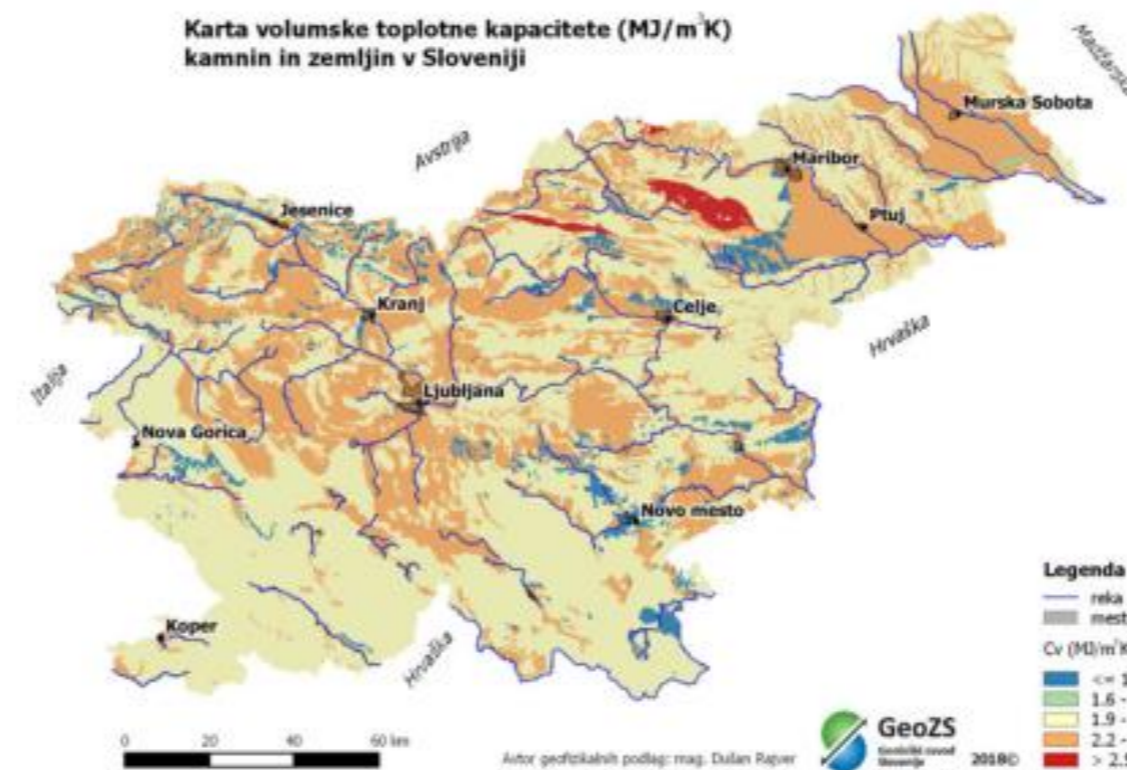
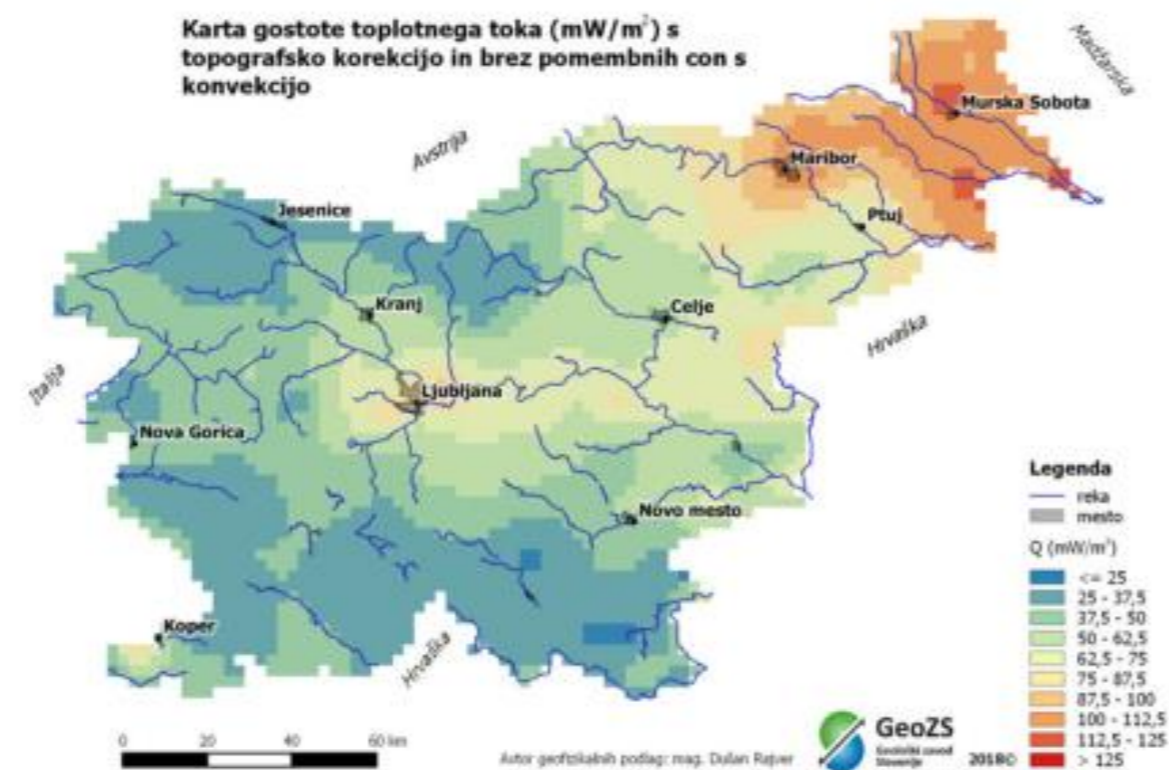
Factors

Ground surface temperature Thermal conductivity of rocks and soil



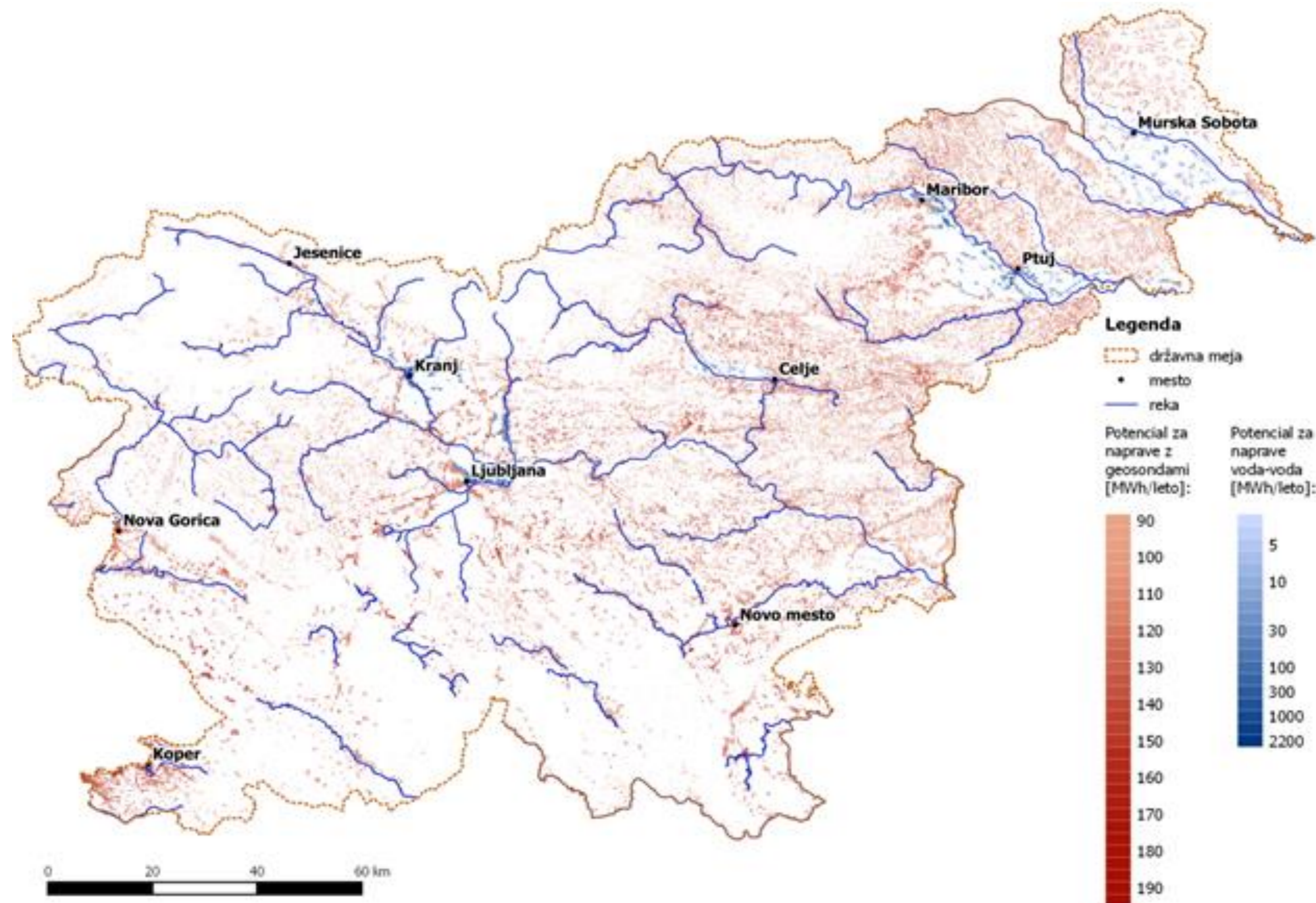
Density of geological layers

Volume heat capacity



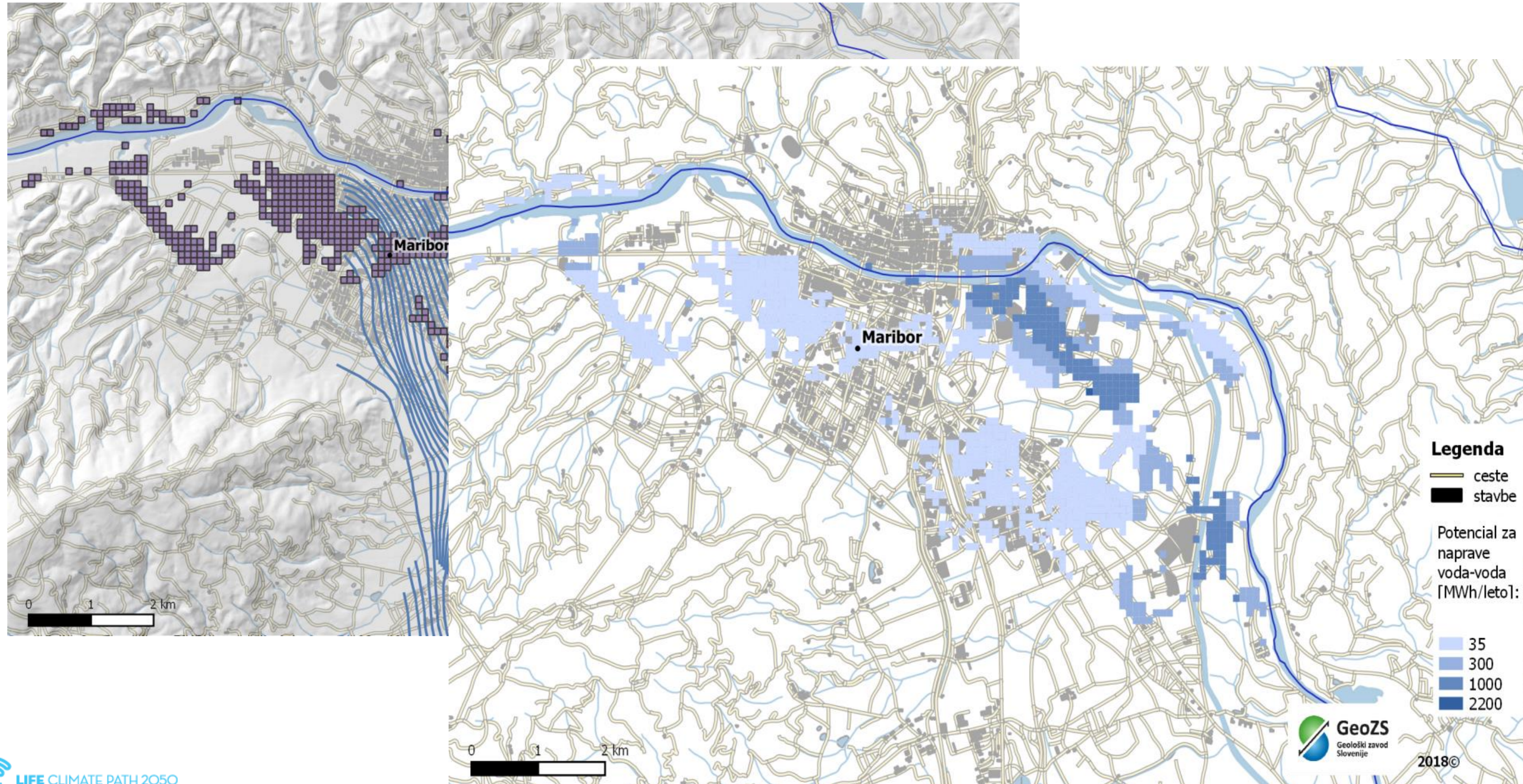
Shallow geothermal potential

Results on national level



Shallow geothermal potential

Results on local level



Shallow geothermal potential

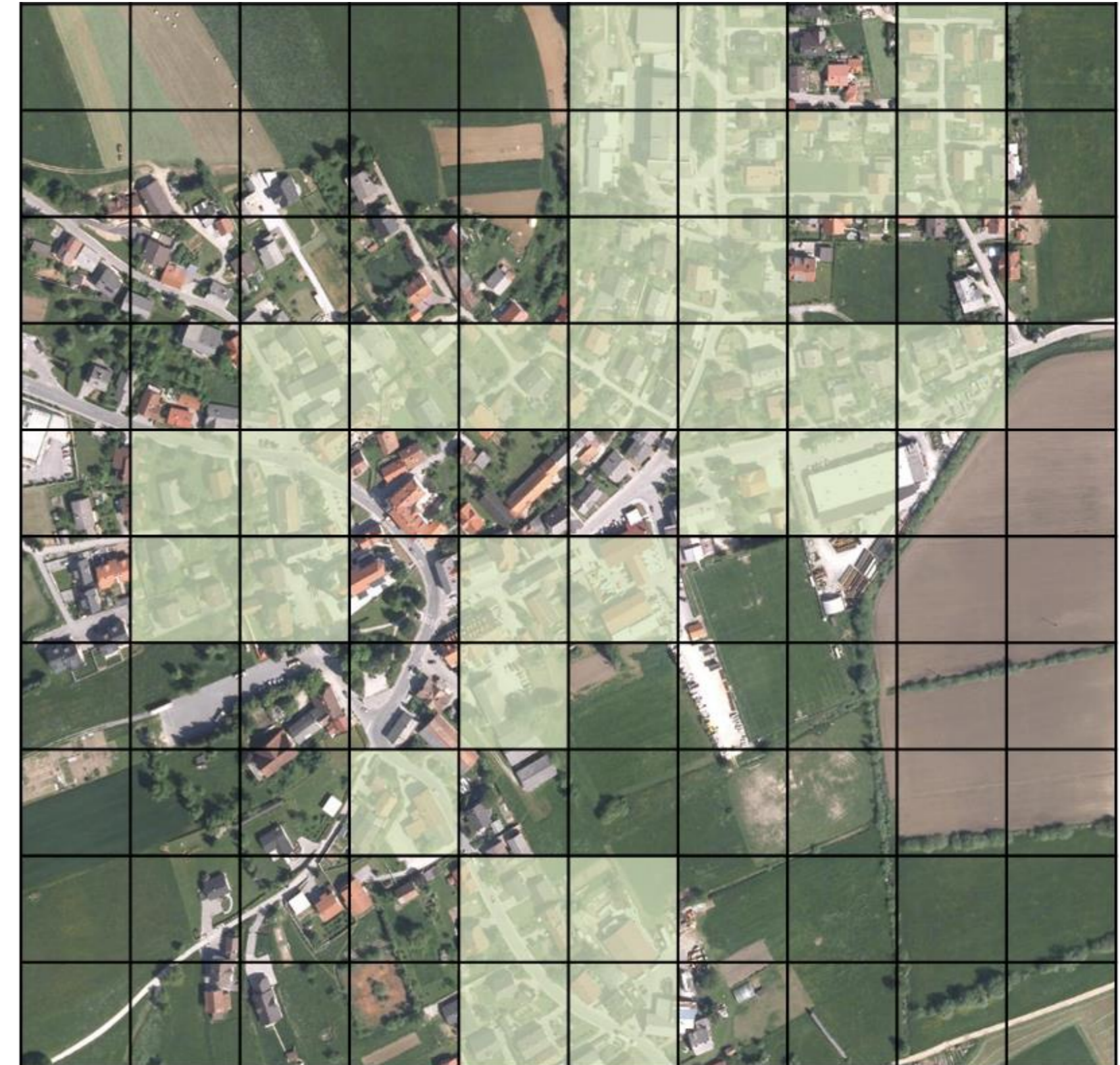
New centralized systems - METHODS

Areas with potential: > 35 GWh/a

Grid size: Areas where DH energy price competitiveness is ensured.

Economic feasibility: investment, distribution, O&M (HRE D2.3)

Competitiveness: LCC comparison with the cheapest and “clean” technology available in dense areas (HP air-water)



Shallow geothermal potential New centralized systems - results

Potential for:

new DH areas:

1,67 TWh/a in 757 systems

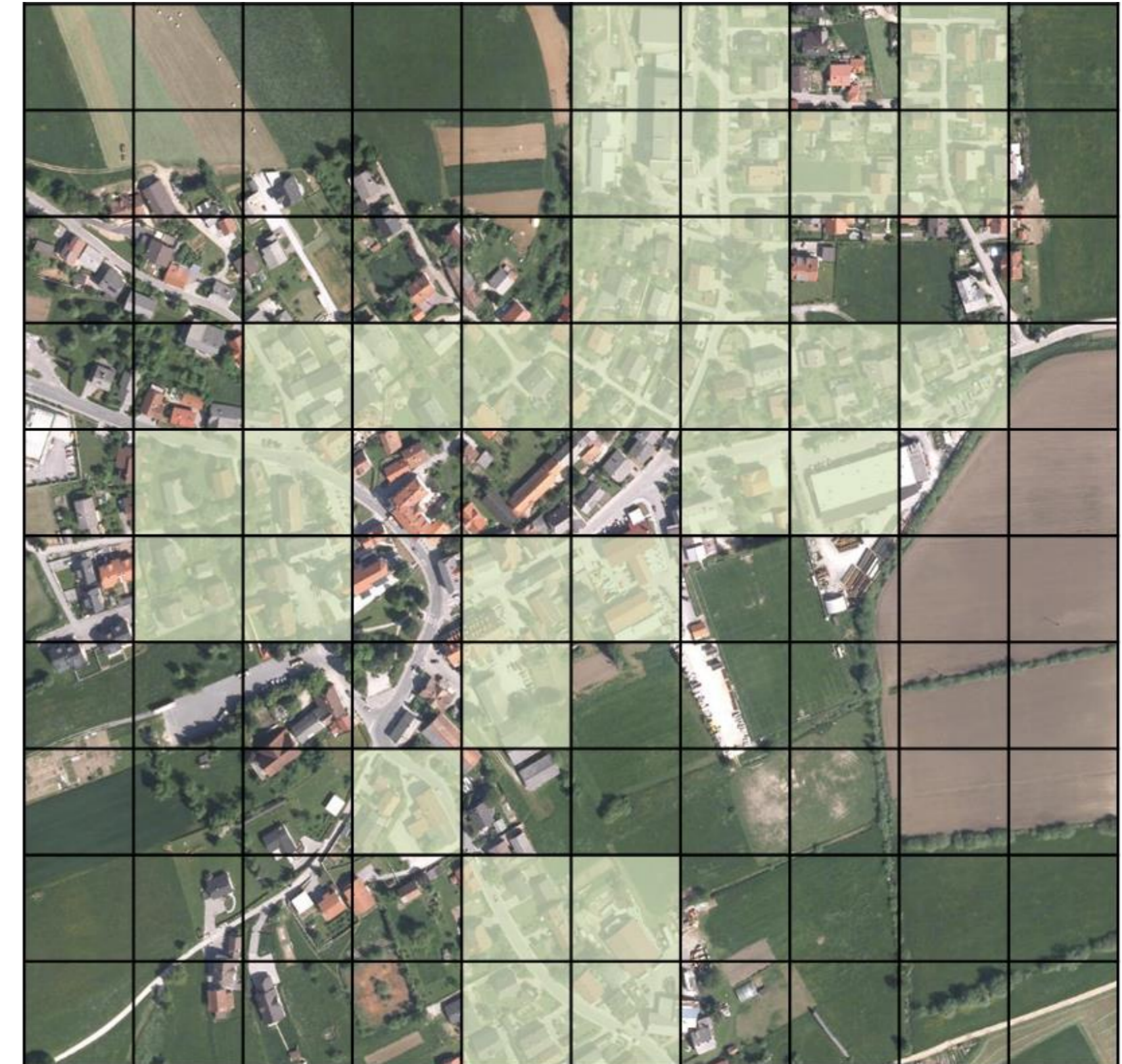
micro DH:

0,94 TWh/a in 1640 systems

COMPARISON

Geothermal energy consumption in
households in 2017:

0,092 TWh/a



Shallow geothermal potential

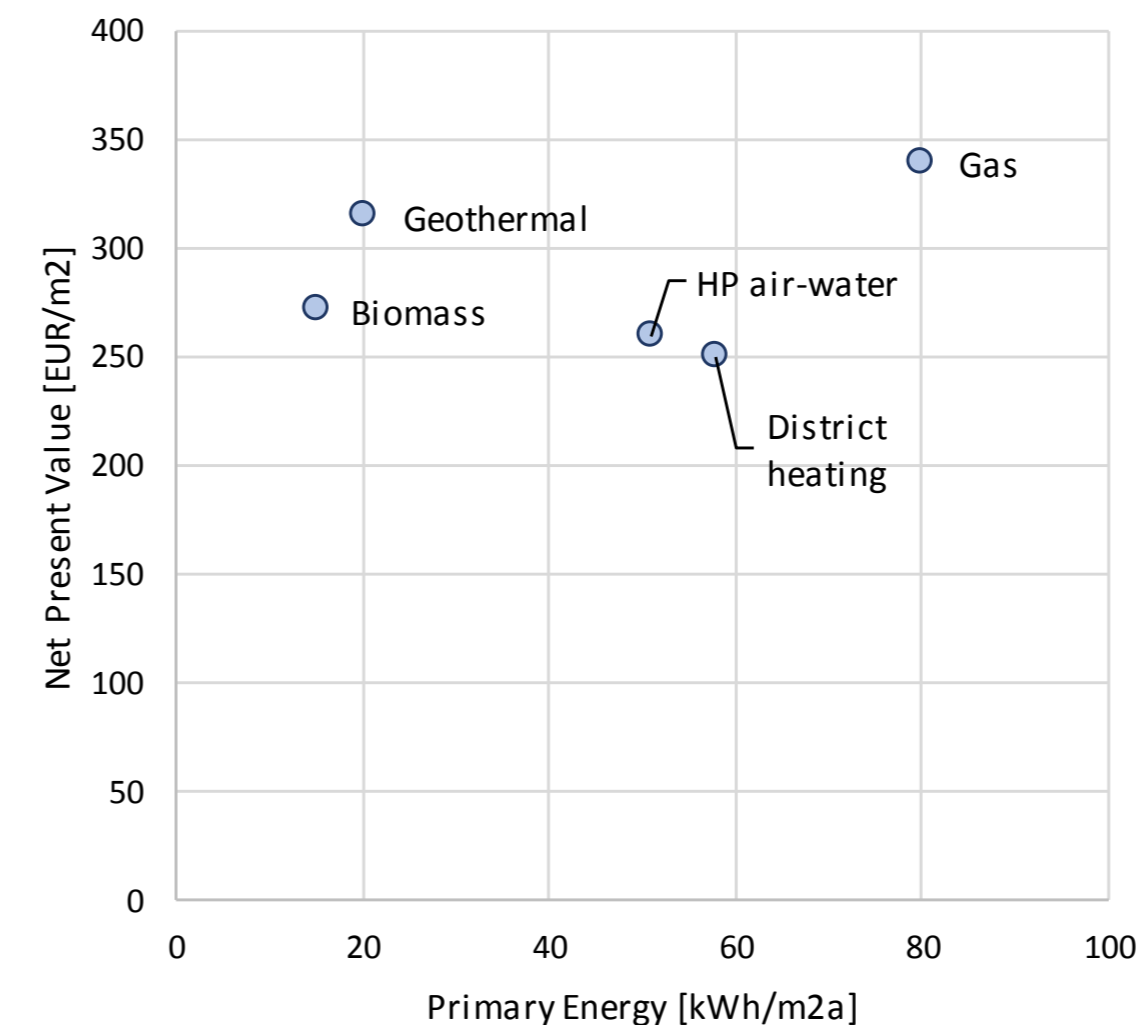
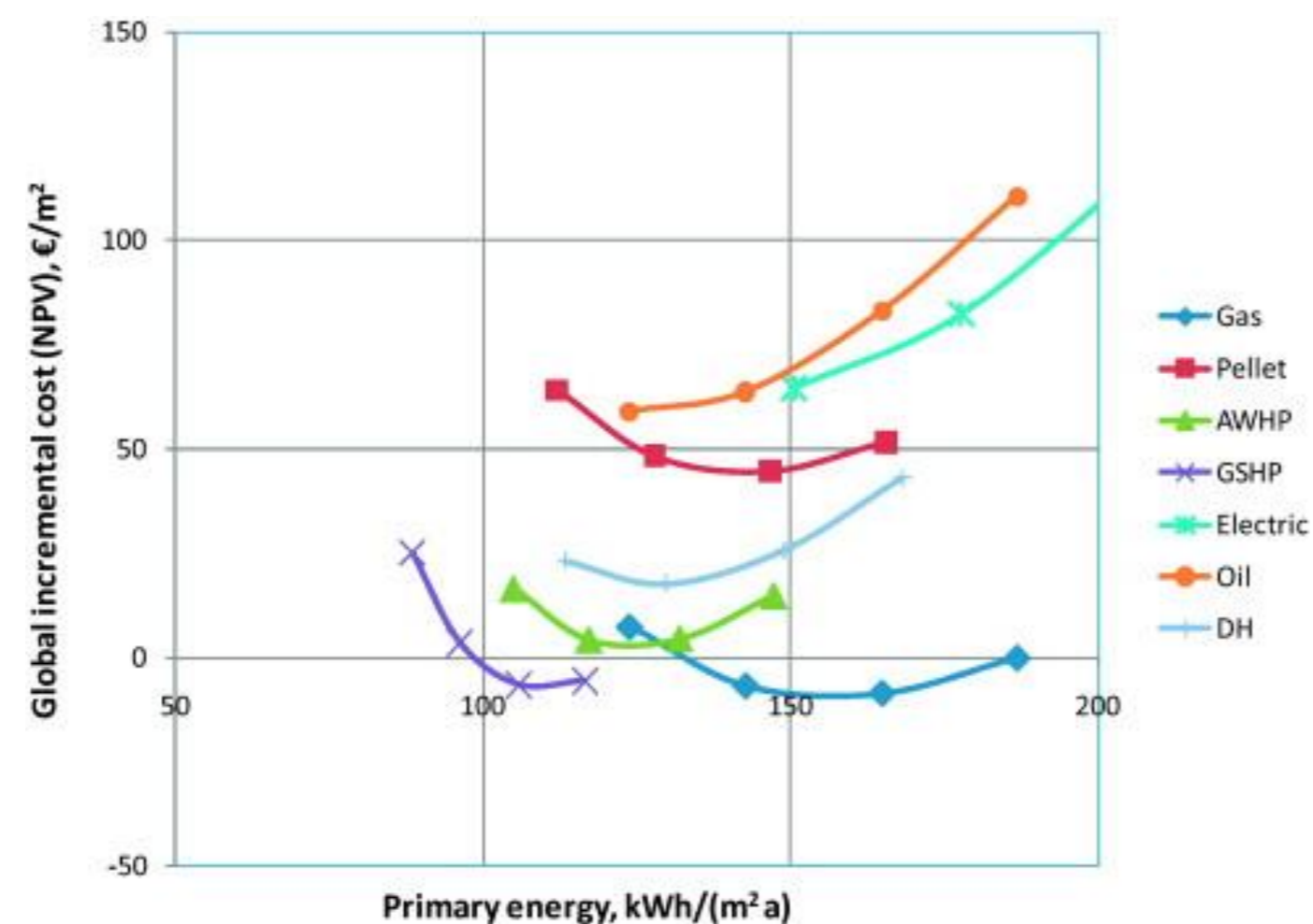
Decentralized systems

Areas with potential: < 35 GWh/a

Areas considered: Areas with no DH potential.

Economic feasibility: investment, energy consumption, O&M

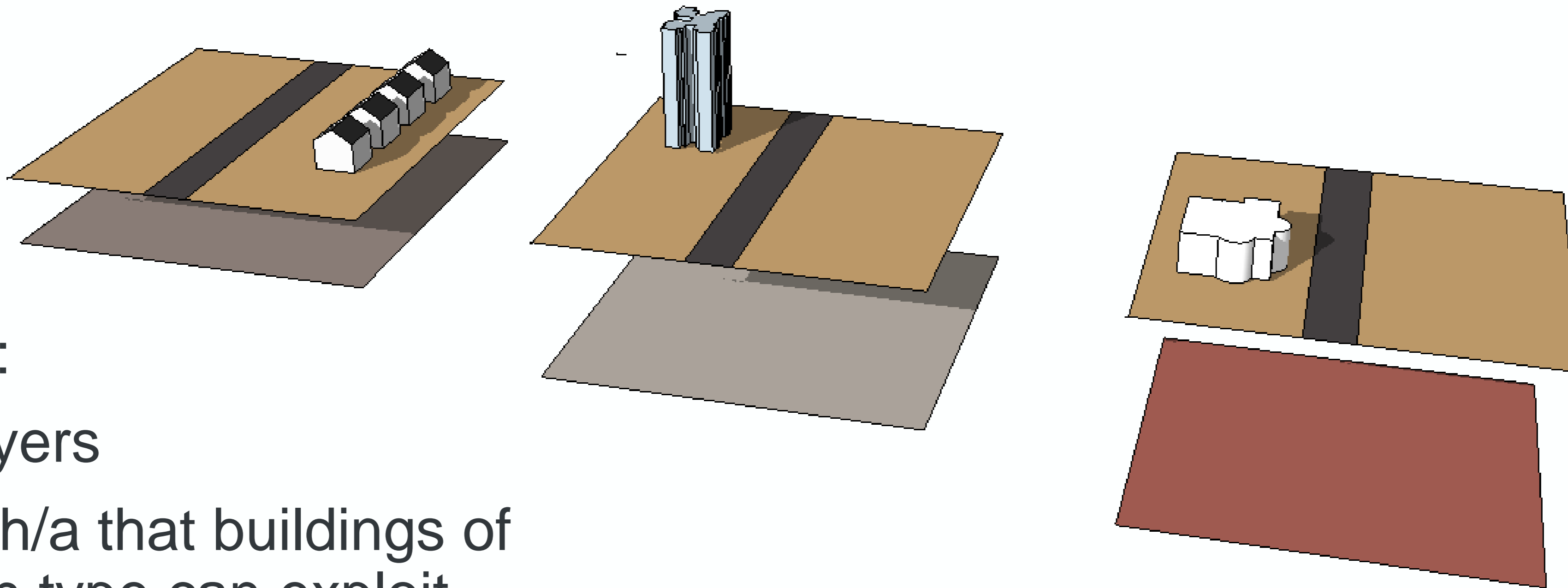
Competitiveness: LCC comparison with other technologies



Shallow geothermal potential

Decentralized systems

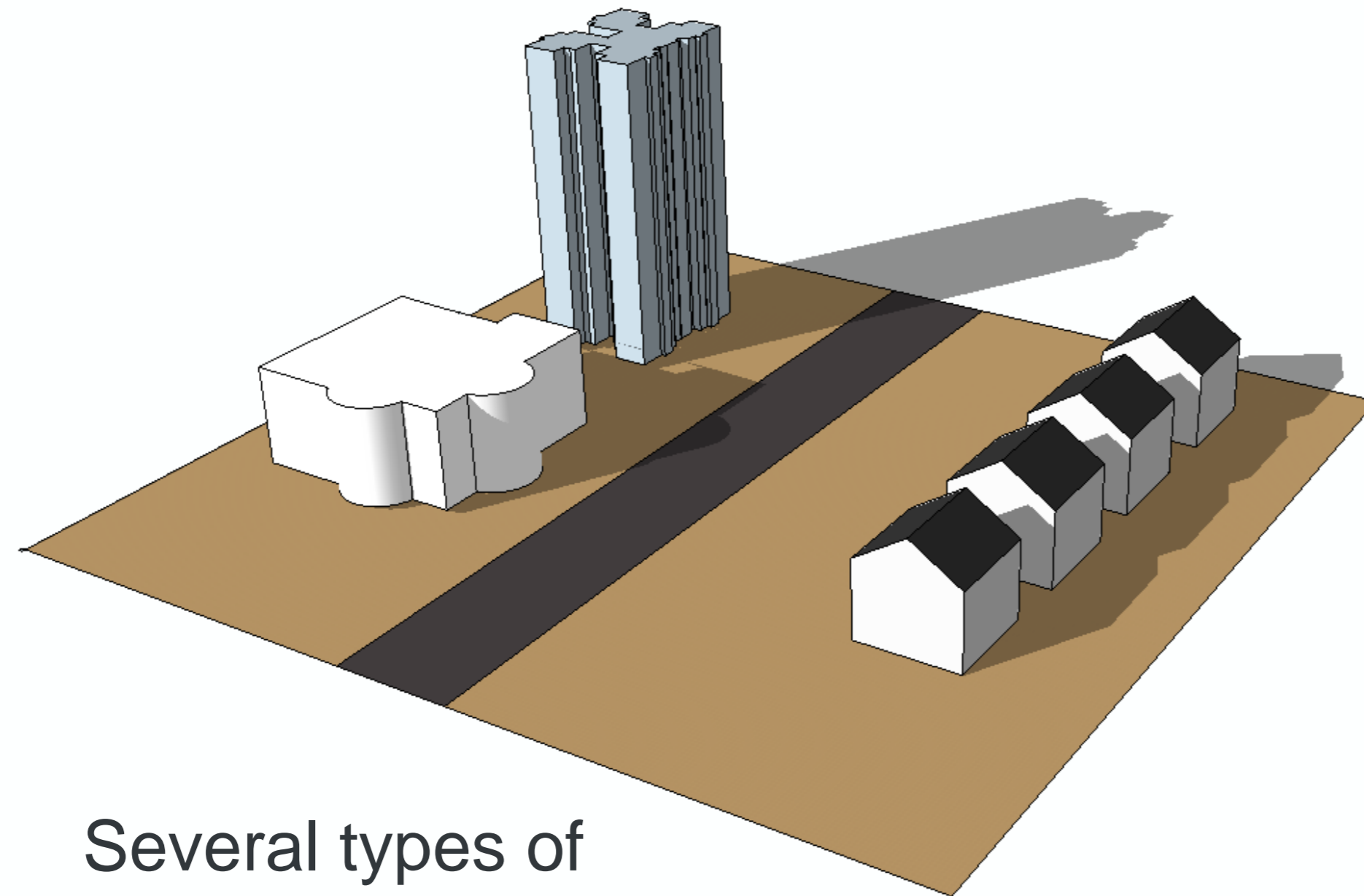
For each 100x100m cell in Slovenia SGP was calculated with prevailing building type (single-, multi-family building and office building).



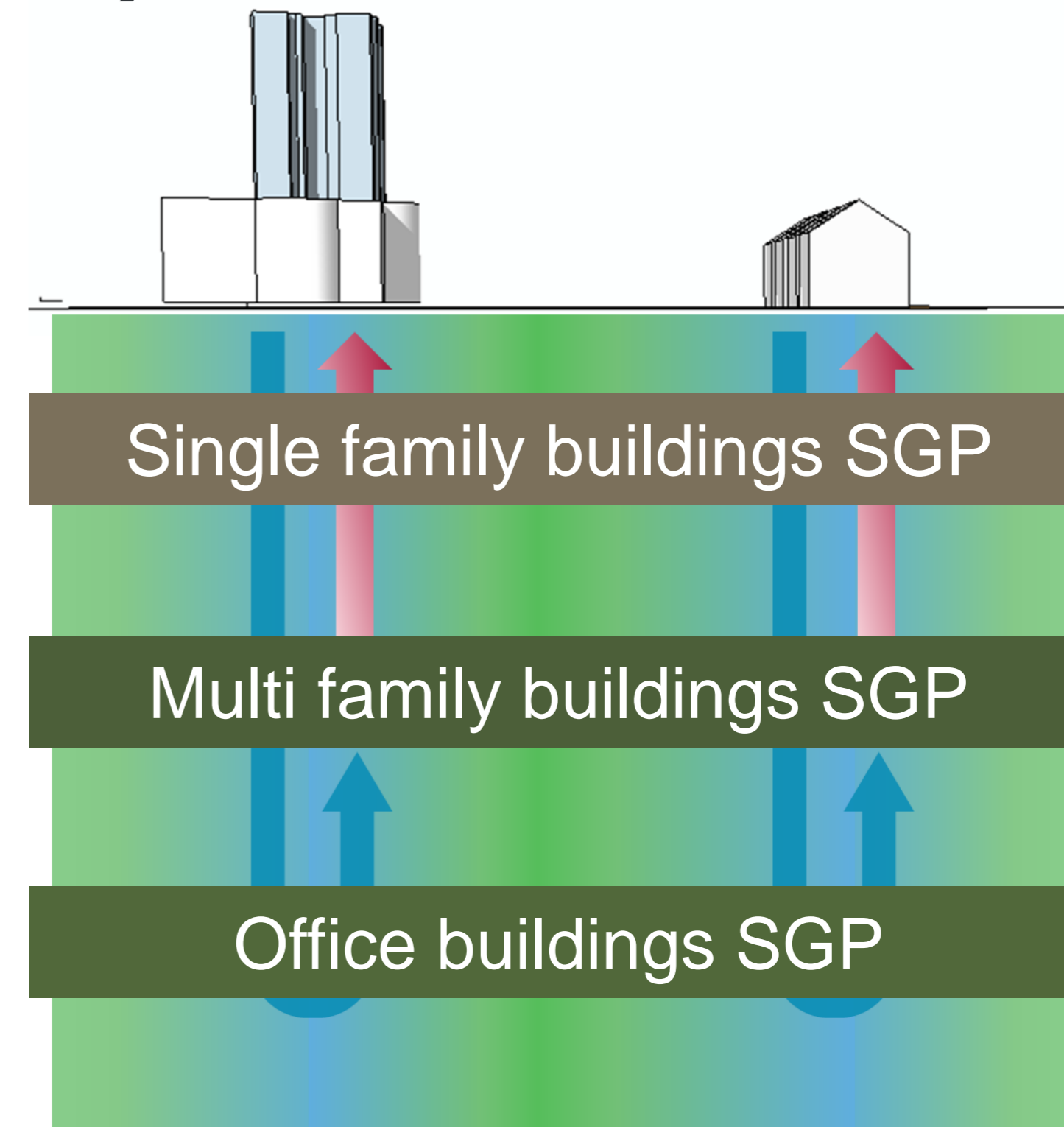
Result:

- 3 layers
- MWh/a that buildings of each type can exploit

Shallow geothermal potential (SGP) Decentralized systems – example



Several types of buildings with different levels of energy need.



Identification of potential:

1. Finding the biggest consumer
2. Supply the energy 100% from SGE
3. Repeat step 1 until SGP is fully exploited

Shallow geothermal potential Decentralized systems

Technical geothermal energy potential
used for heating and DHW:

6,93 TWh/a

COMPARISON

Fuel oil energy consumption in households
in 2017:

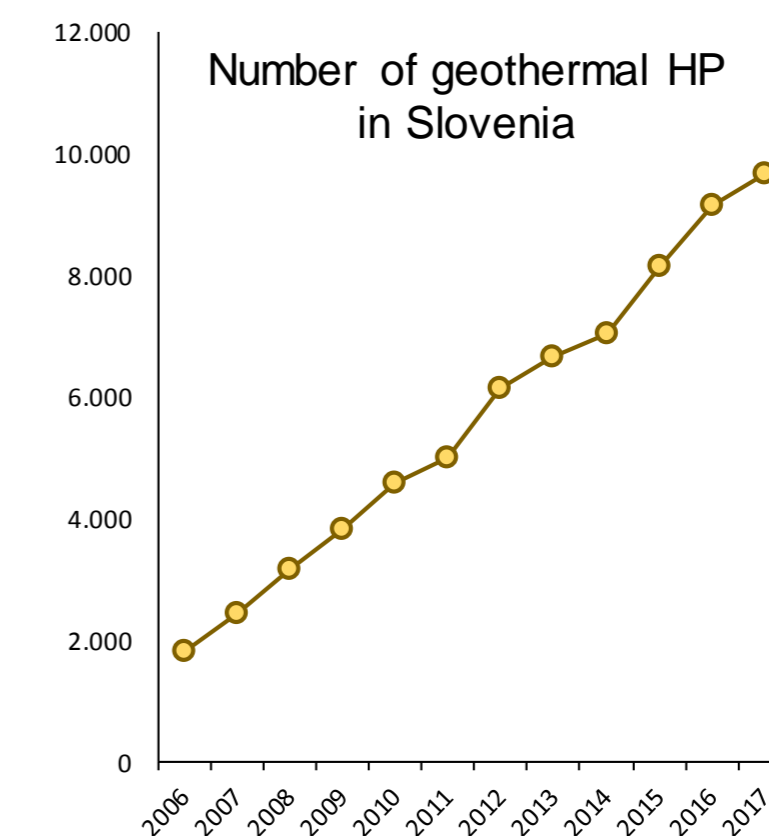
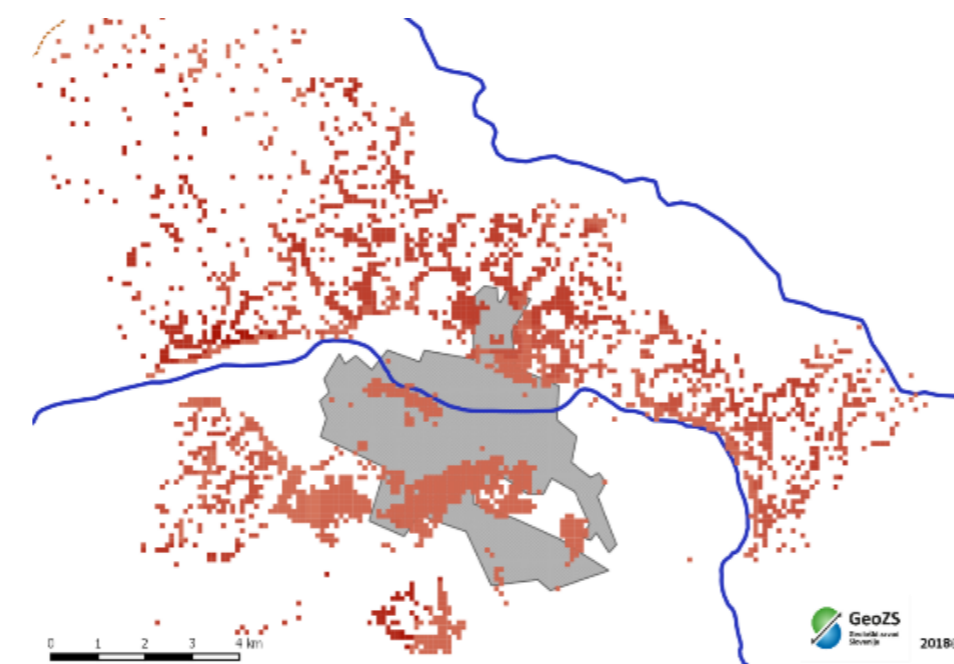
0,93 TWh/a



Shallow geothermal potential

Conclusions

- The use of geothermal energy in buildings has been increasing rapidly.
- Economic and technical potential for new centralized systems is substantial, but could rarely be used as the only source for heat energy production.
- Shallow geo. potential is proving to be an opportunity for decentralized systems especially for new buildings. LCC analysis should be performed for renovation scenarios to prove economical feasibility.
- When placing HP into energy scenarios, electric grid load should be taken into account.



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Thanks!

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