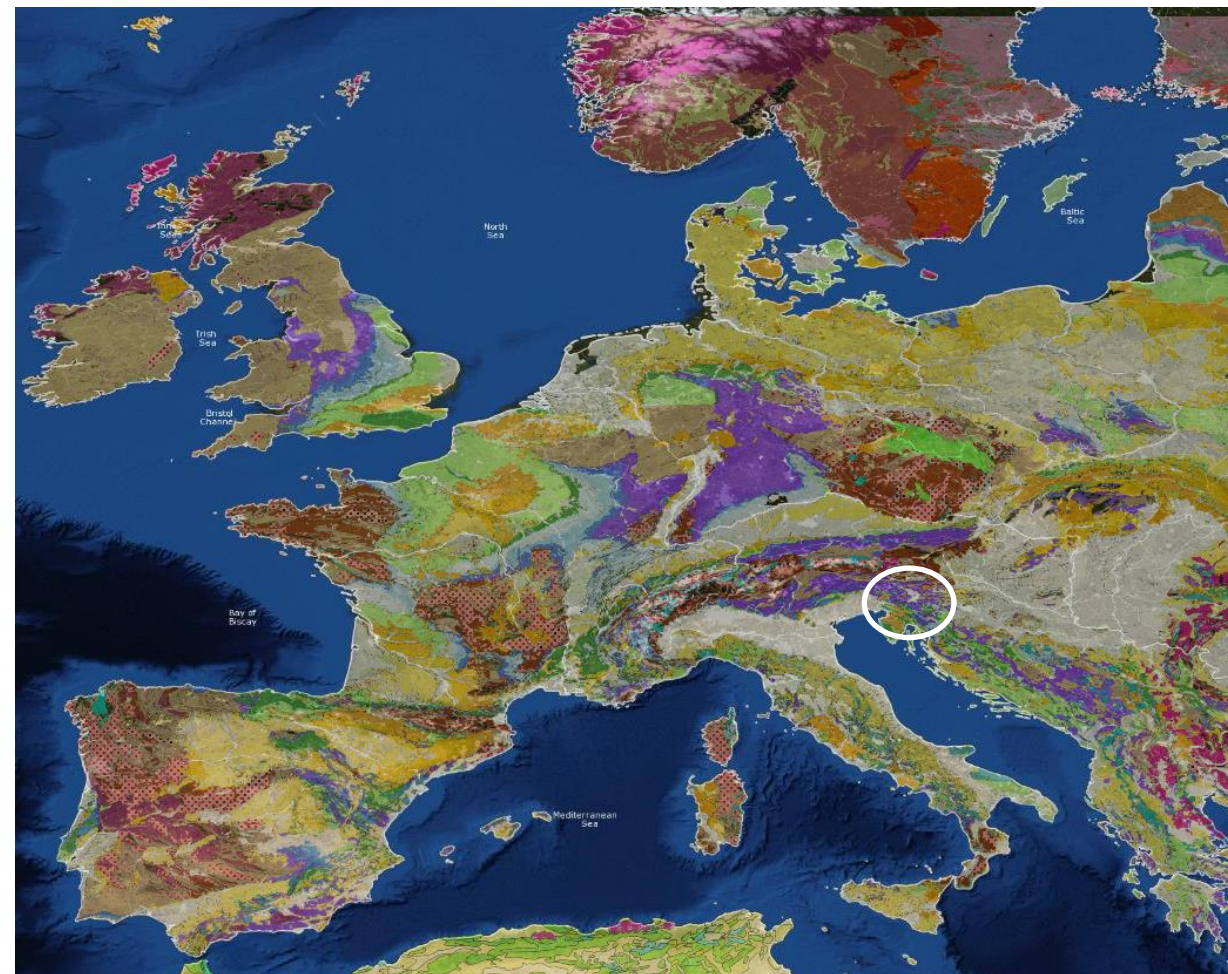


Country update - SLOVENIA

assist. prof. **Nina Rman**, PhD. (nina.rman@geo-zs.si)

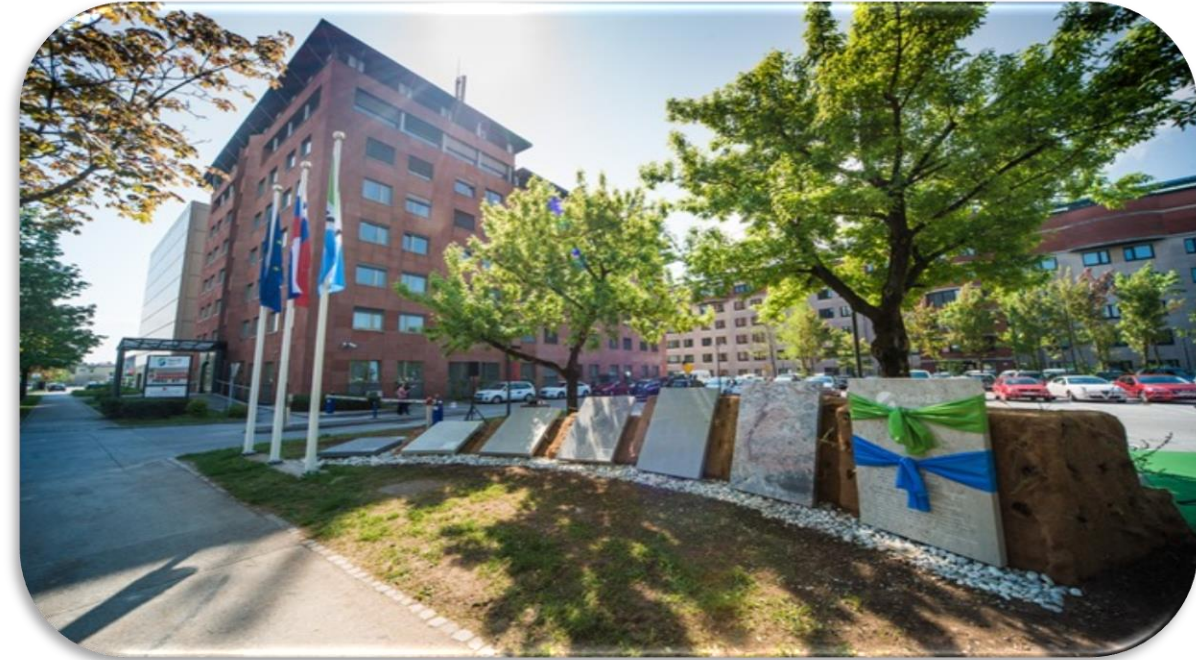
ATES workshop by IEA Geothermal TCP and GEOTHERMICA

Hoorn, NL, 20. 4. 2023



Geological Survey of Slovenia (GeoZS)

- Public research institute founded in 1946
 - Ministry of Education, Science and Sport
 - Ministry of the Environment and Spatial Planning
 - Ministry of Infrastructure
- Approximately 120 employees
- Annual turnover of app. 6 M€
 - **Research group Geoenergy**
 - 5 research programmes
 - 9 research projects
 - 37 EU projects
 - Numerous applicative projects



<https://www.geo-zs.si/>:

- e-Geologija
- e-Vrtine
- e-Teren
- Geohazard
- Mining book



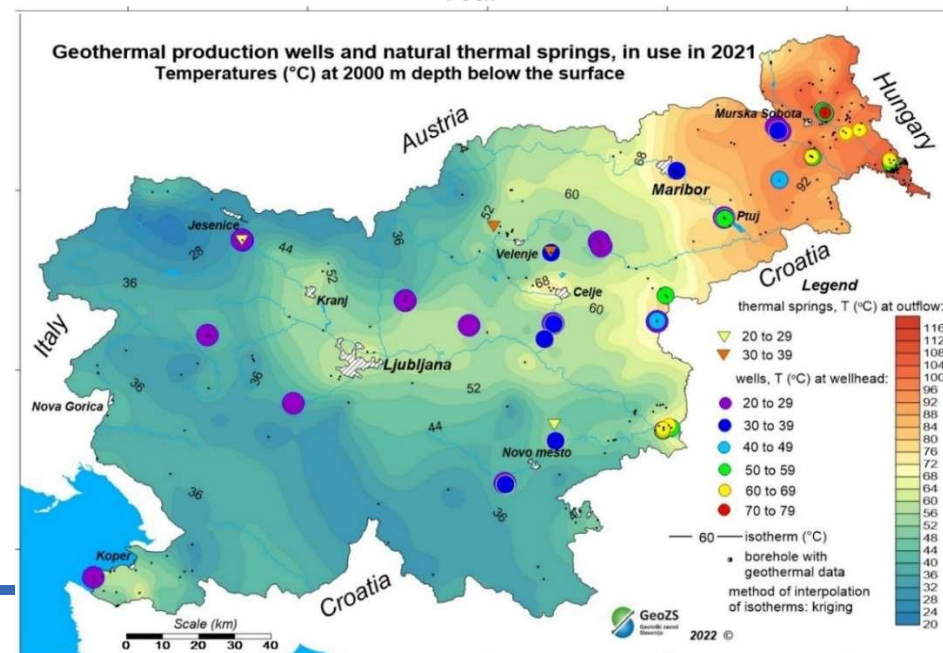
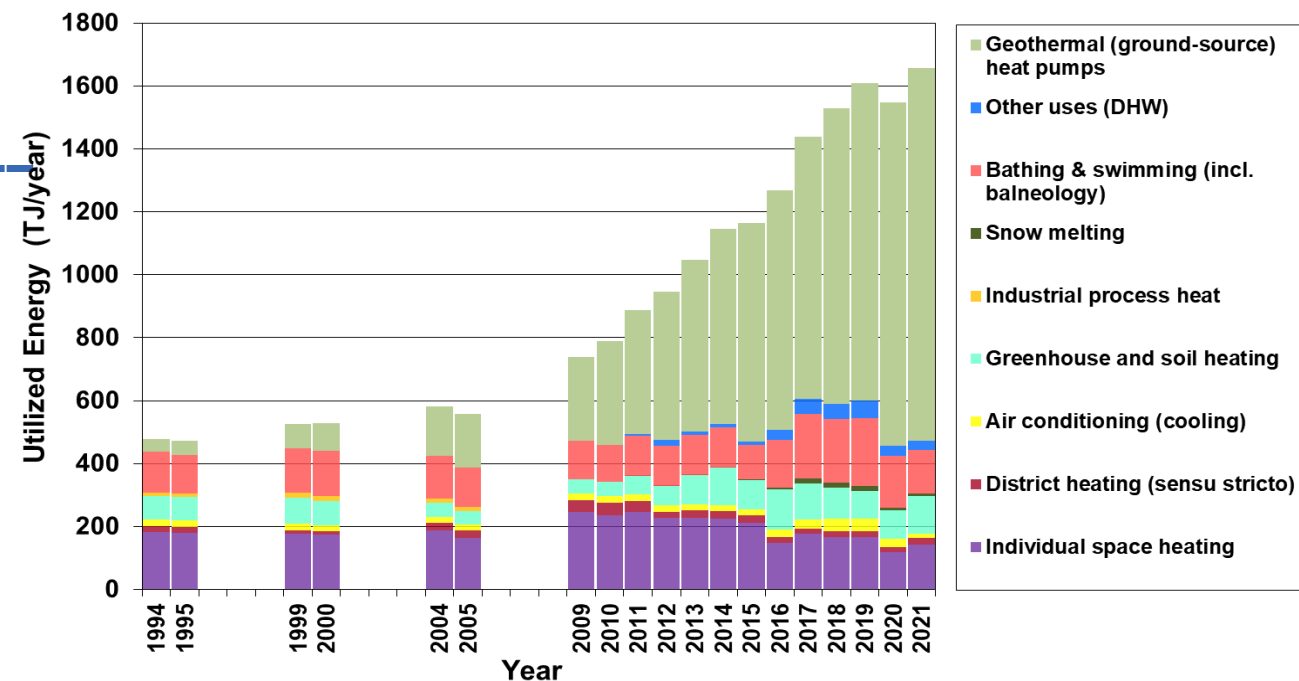
Geothermal in Slovenia

GeoZS provides annual overview in Mineral resources

In 2021:

- 14 818 GSHP with 237.7 MWth and 1185.3 TJ
- 31 users with 60.3 MWth and 472.1 TJ
- 1 deep reinjection well
- Severe fear of reinjection failure

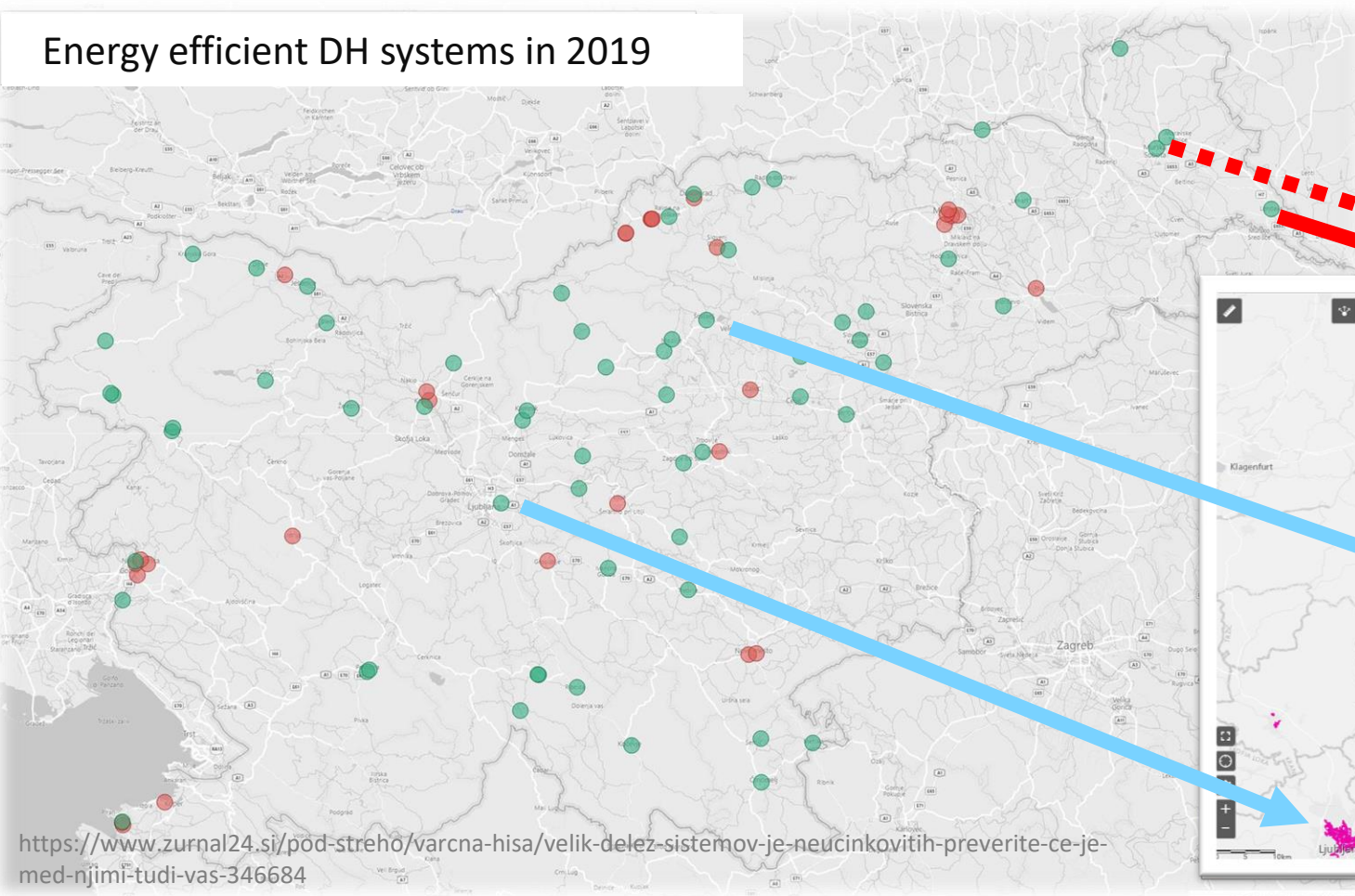
Trends of utilized geothermal energy by categories of direct heat use in Slovenia



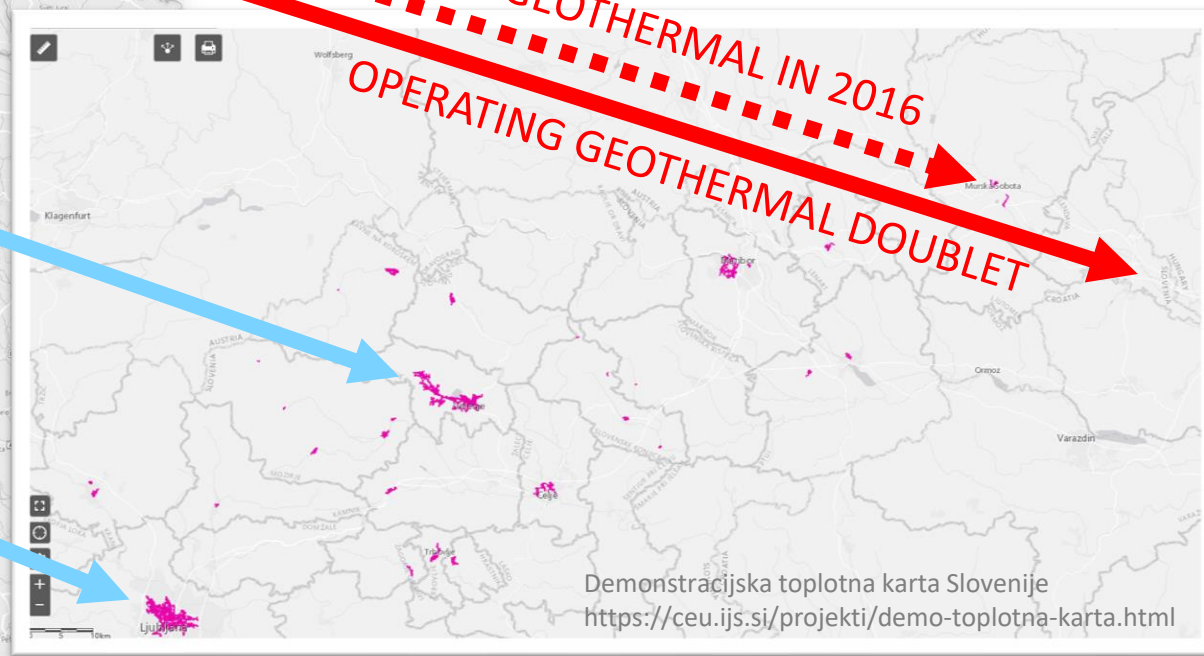
District heating system indicators in Slovenia for 2021

Energy efficient DH systems in 2019

- 69 municipalities with 109 792 users
- 67% of 112 systems energy efficient
- Monthly price for homes: 95.8 €/MWh



<https://www.zurnal24.si/pod-streho/varcna-hisa/velik-delez-sistemov-je-neucinkovitih-preverite-ce-je-med-njimi-tudi-vas-346684>

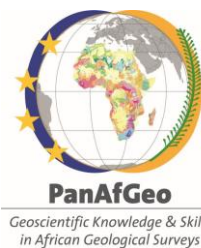


Demonstracijska toplotna karta Slovenije
<https://ceu.ijs.si/projekti/demo-toplotna-karta.html>

Geothermal projects of GeoZS



GeoCOOL FOOD

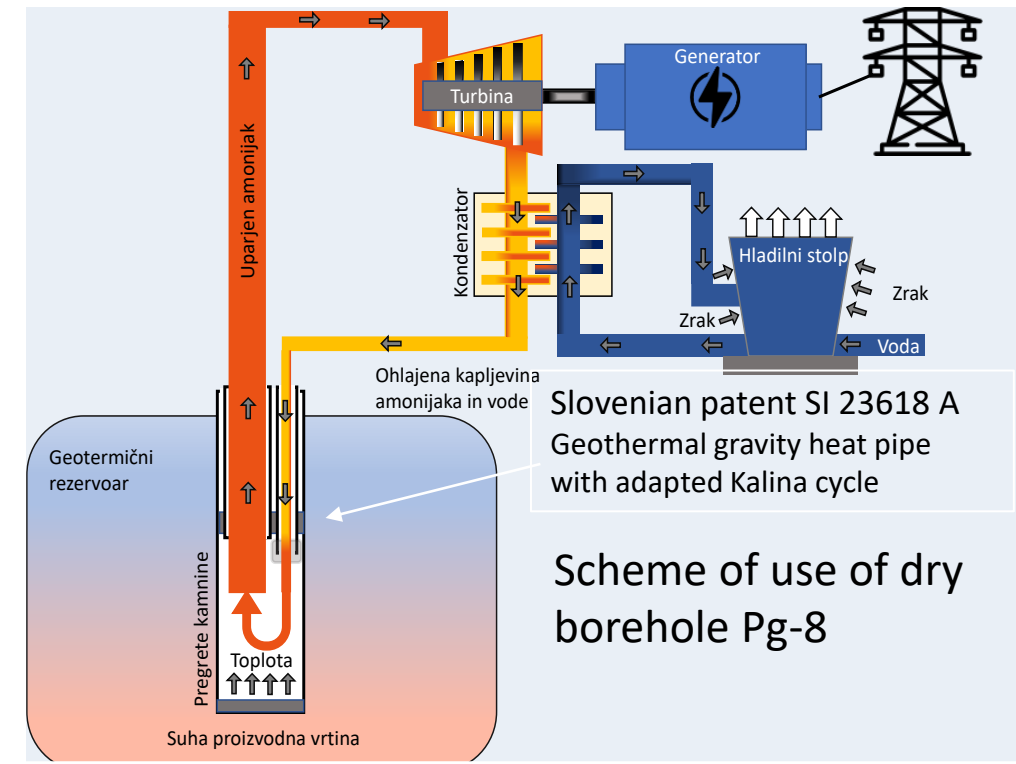


EEA grants project Si-Geo-Electricity

Pilot geothermal power plant on an existing gas well

Pg-8, pilot project

- Duration: 5. 2022 – 4. 2024
- Budget: 900.210,98 €, 81% co-financing
- Production from a dry HC well Pg-8 with 155 °C at 3 km with capacity 50 kWe and production 400 MWh_e/y
- Local geol. and geoth. models of Petišovci (2023)
- Mapping of technical potential (2024)
- Guidelines for similar projects (2024)



<https://si-geo-electricity.si/en/home-english/>

https://www.geo-zs.si/index.php/en/?option=com_content&view=article&id=1150



EEA grants project INFO-GEOTHERMAL

Supporting efficient cascade use of geothermal energy by unlocking official and public information

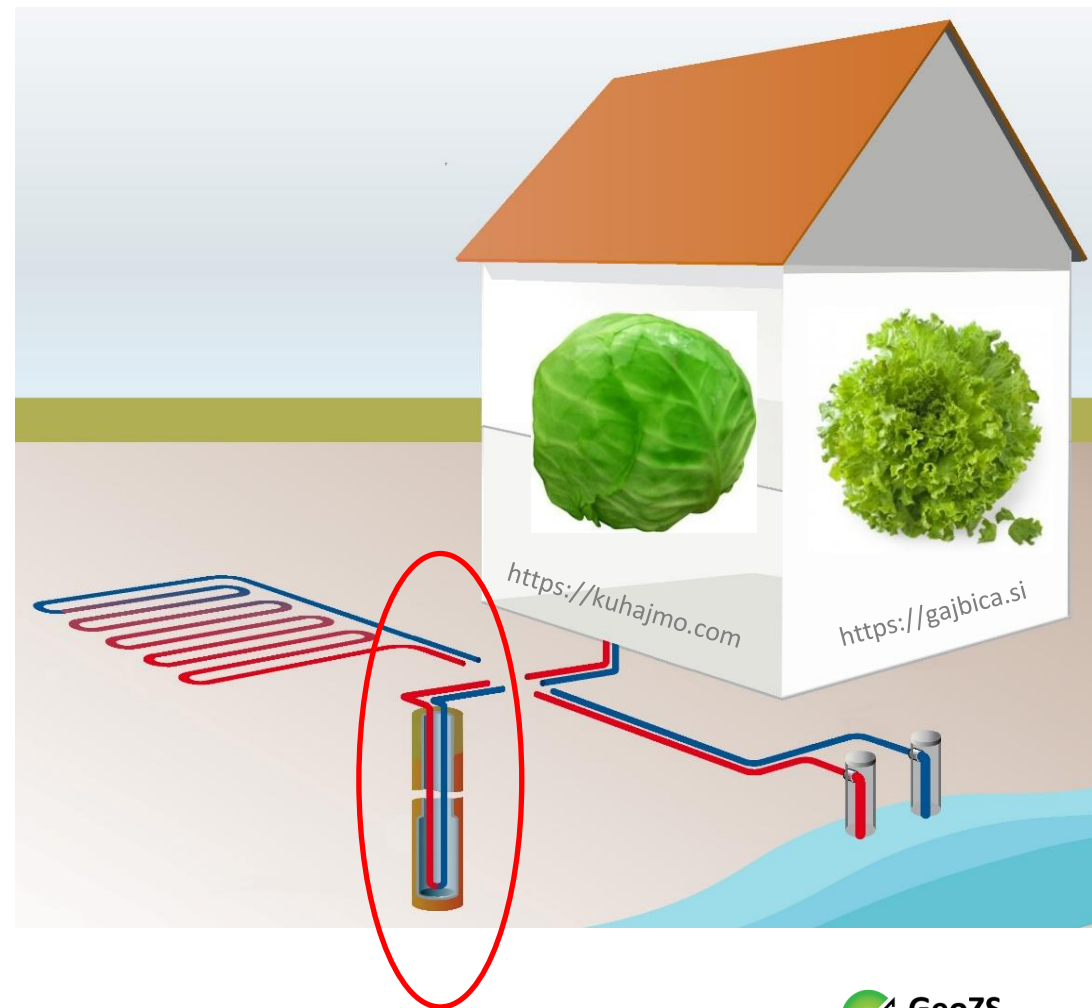
- Pre-defined project B.1.1: Improved capacity to develop less established renewable energy sources
- Duration: 9. 2022 - 4. 2024
- Budget: 1 073 529.41 €
- **2 legislation amendments:** geological risk insurance schemes and on reinjection & cascade use
- Publication of 3D model of NE Slovenia, potential development areas in 2 municipalities (2023)
- Visit to Iceland (2022) and of Icelanders at a summer school and a workshop (3.-12.7.2023)
- Guidelines on deep geothermal development (2024)
- Establishment of a Slovenian national geothermal network (2024)

<https://www.norwaygrants.si/projekti/projekti-programa-blazenje-podnebnih-sprememb-in-prilagajanje-nanje/info-geothermal/>
https://www.geo-zs.si/index.php/en/?option=com_content&view=article&id=1120



Cold food storage using shallow geothermal energy

- Duration: 10. 2022 - 9. 2025
- Budget: 140 000 €
- Database of agricultural (not industrial) cool storage systems in Slovenia
- Analysis of their cold use/excess heat for vegetables
- Methodology for quantification of the seasonal storage potential (ATES, BTES) and subsurface model approaches
- Technical guidelines for geoprobes for cooling



https://www.geo-zs.si/?option=com_content&view=article&id=1156

In search of ATEs in Slovenia - politics

- No 4G and 5G grids
- Poorly known technology
- Fear of low injectibility & DW interaction
- No legislation procedures developed
- No targeted support schemes

- Huge investments into solar
- Obligatory annual plans on intersectoral coupling
- Geothermal summer school every 2 years

NEPN, 2020:

- Storage of excess produced RES (electricity)
- Connection of grids for electricity storage
- Solar plants with energy storage

LIFE Climate Path 2050 C3.2, 2020:

- Enlarge DH systems & connect to RES electricity
- Power-to-heat & storage

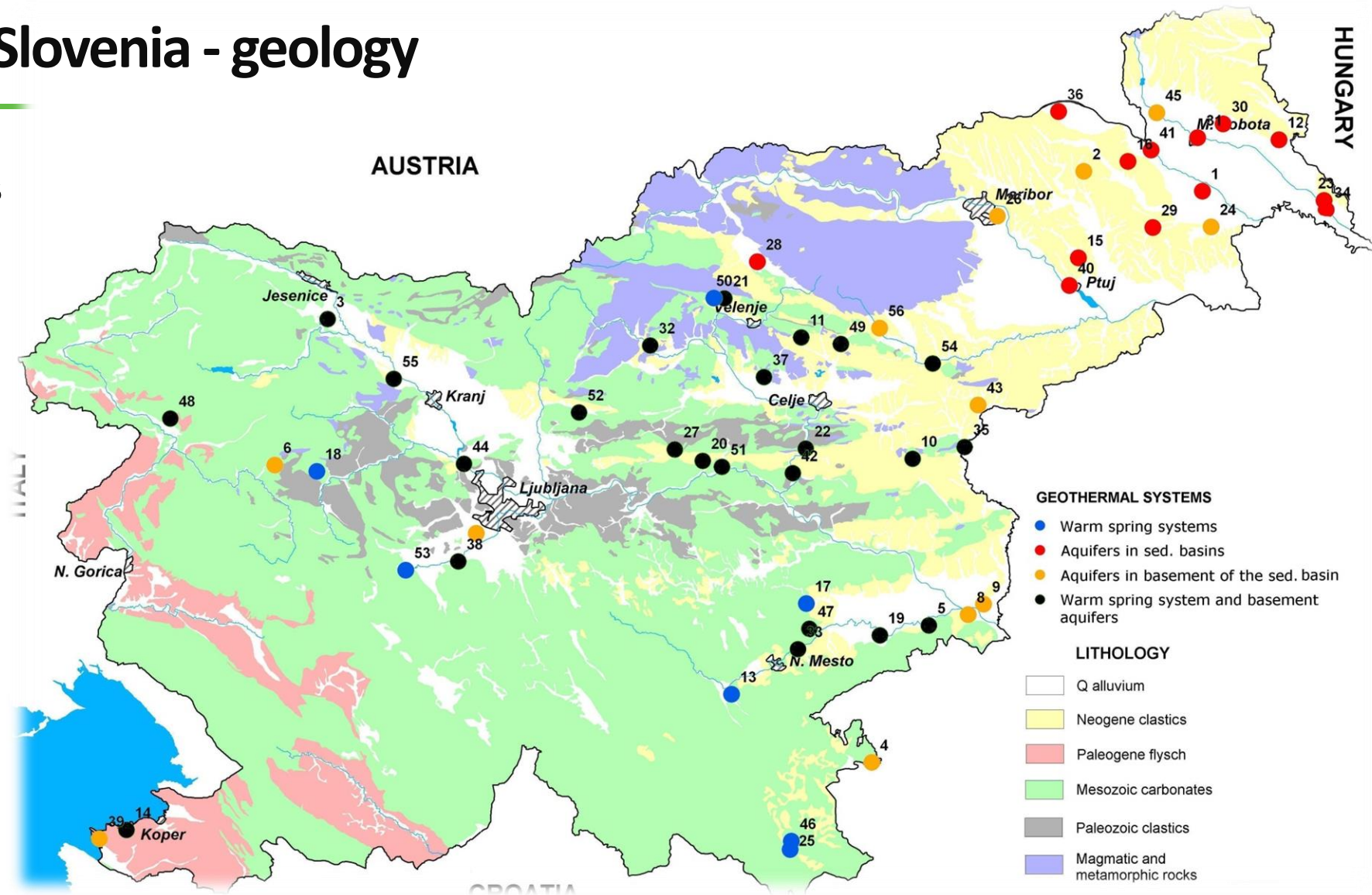
Restructuring coal regions, 2021:

- electricity storage (H₂, batteries)

Common understanding of authorities “Storage does not increase RES”

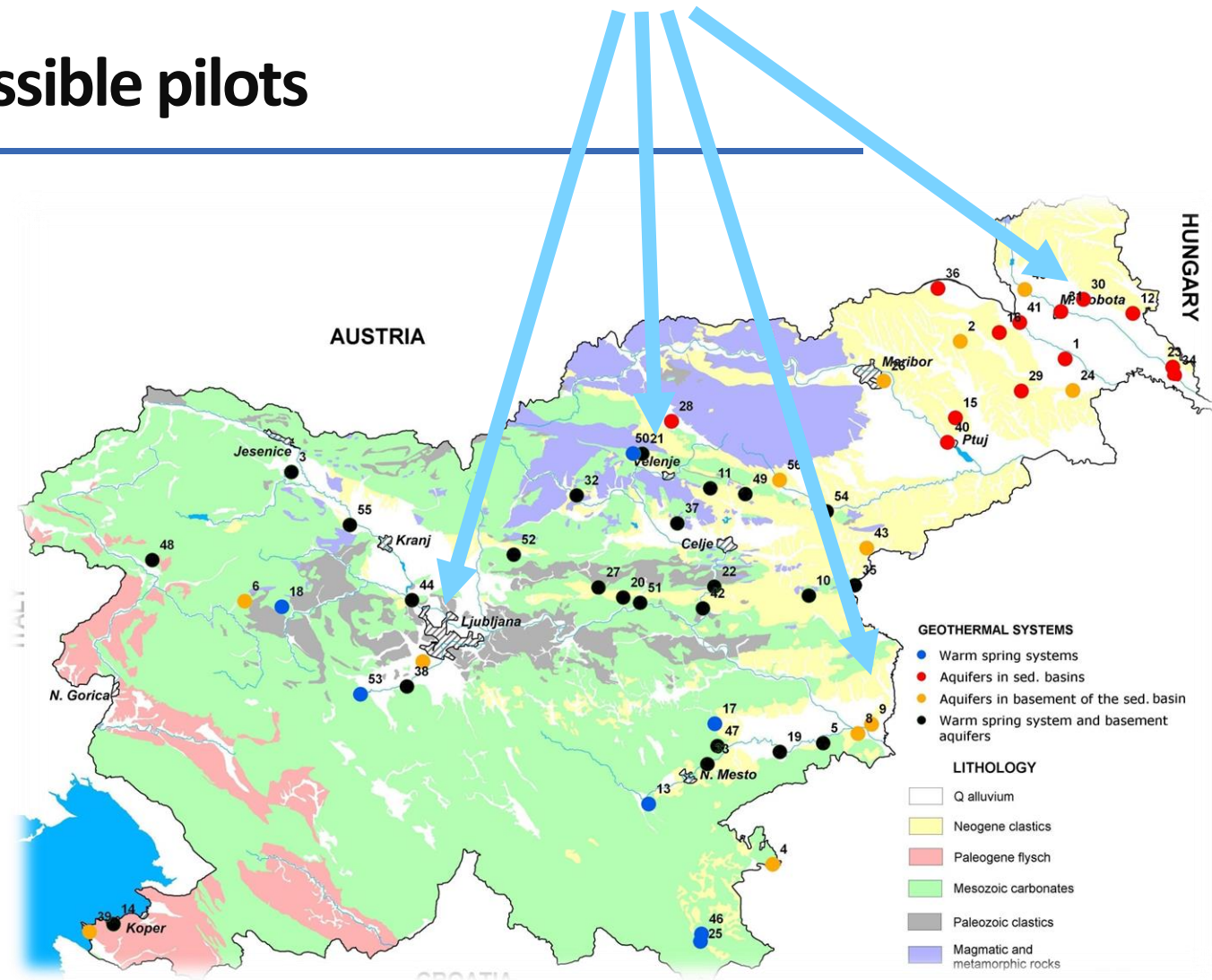
In search of ATEs in Slovenia - geology

- >95% of drinking water is groundwater
- >20% surface is WPA
- Low gradient, slow flow
- Confined aquifers
- PI-Q aquifers
- Pliocene to Miocene sands



In search of ATEs in Slovenia – possible pilots

- GeoZS young researcher (2023-2027) on geo-hydro-thermal characterization and injection processes
- **MTES** : first investigations at mining areas
- **HT-ATES** : reinjection into Pannonian basin sediments is **FAR FROM** being solved + ATEs
- **LT-ATES** : no interest yet from investors



Acknowledgements



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA KOHEZIJO IN REGIONALNI RAZVOJ

Iceland 
Liechtenstein
Norway grants

The project INFO-GEOTHERMAL benefits from a 1,073,529.41 € grant from Iceland, Liechtenstein and Norway through the EEA Grants. The aim of the project INFO-GEOTHERMAL is to support efficient cascade use of geothermal energy by unlocking official and public information. <https://www.norwaygrants.si/projekti/projekti-programa-blazenje-podnebnih-sprememb-in-prilagajanje-nanje/info-geothermal/>

Project "SI-Geo-Electricity - Pilot geothermal power plant on the existing gas well Pg-8, pilot project" is co-financed by Iceland, Liechtenstein and Norway with the EGP Financial Mechanism resources in the amount of € 622.600,00 and the corresponding Slovenian participation in the amount of € 109.800,00. The purpose of the project is to increase renewable electricity by building the first pilot geothermal power plant in Slovenia. <https://si-geo-electricity.si/en/home-english/>

www.eeagrants.org

www.norwaygrants.org



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA KMETIJSTVO,
GOZDARSTVO IN PREHRANO



ARRS

SLOVENIAN RESEARCH AGENCY

The project GeoCOOL FOOD, No. V1-2213, is performed through the targeted research programme "Our food, countryside and natural resources", financed by the Slovenian ministry of agriculture, forestry and food (Contract No. 2330-22-000245) and the Slovenian research agency (Contract NoS. 630-21/2022-5, 630-20/2023-1). https://www.geo-zs.si/?option=com_content&view=article&id=1156



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Geološki zavod
Slovenije