Workshop on the Danube Region Geothermal Concept (DanReGeotherm)

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Geological and Geophysical Institute of Hungary

Country update: HUNGARY

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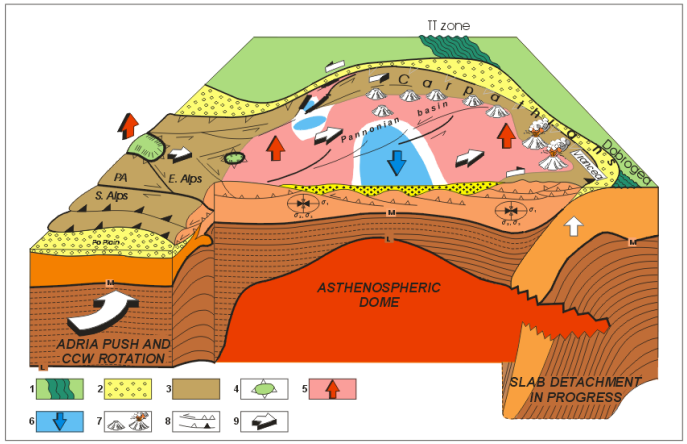
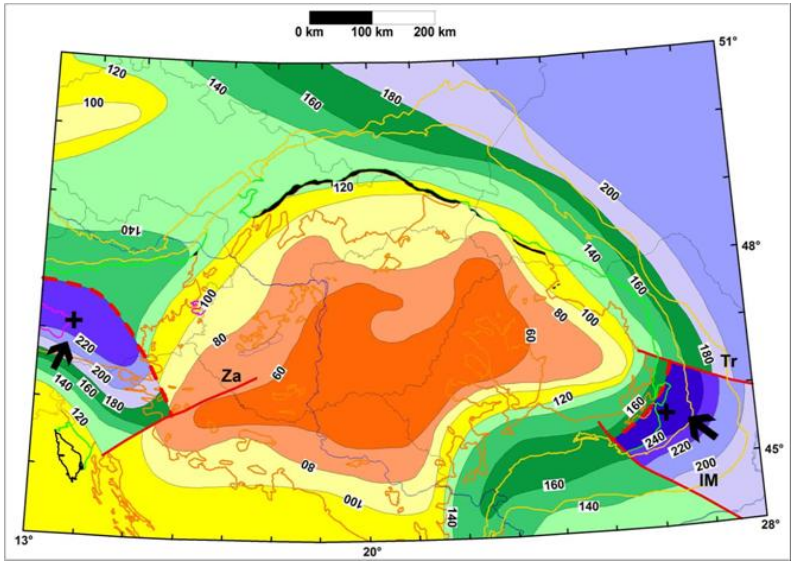
Main deep geothermal reservoirs



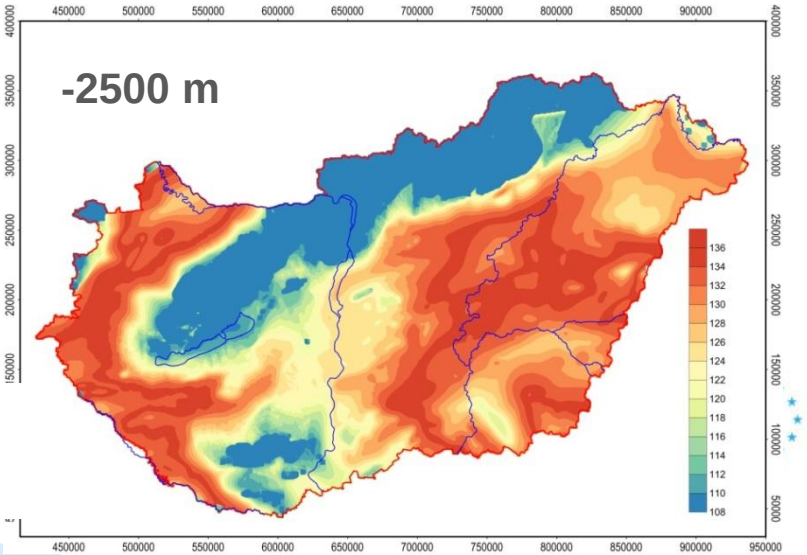
Thickness of the lithosphere



Favorable conditions due to Miocene basin formation

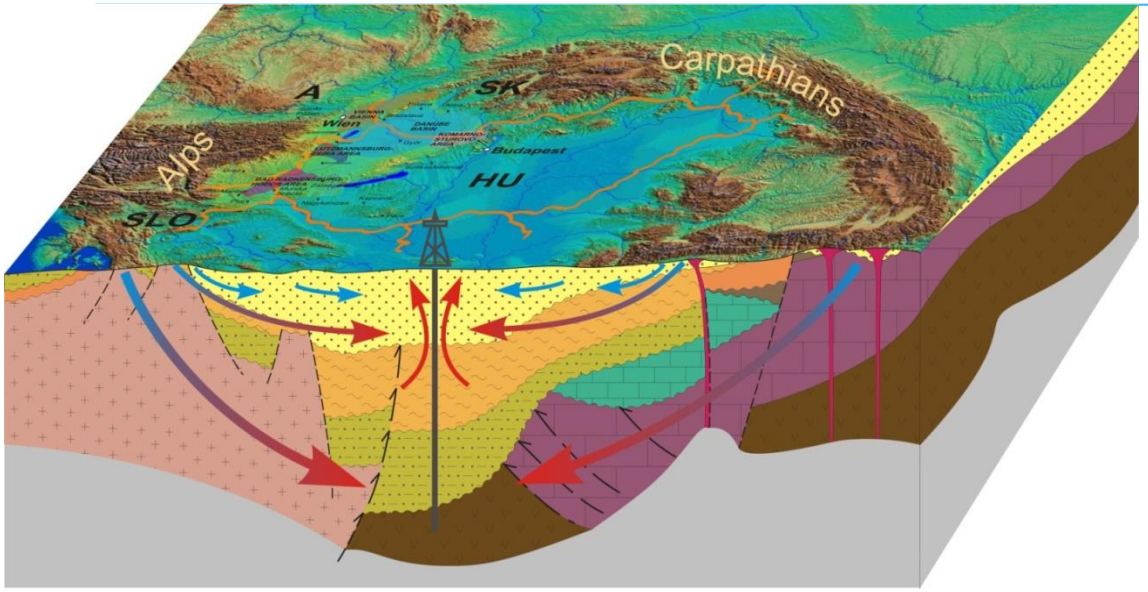
Average terrestrial heat-flow: 100 mW/m^2

Geothermal gradient: 45 C/km



Subsurface temperature distribution (C)

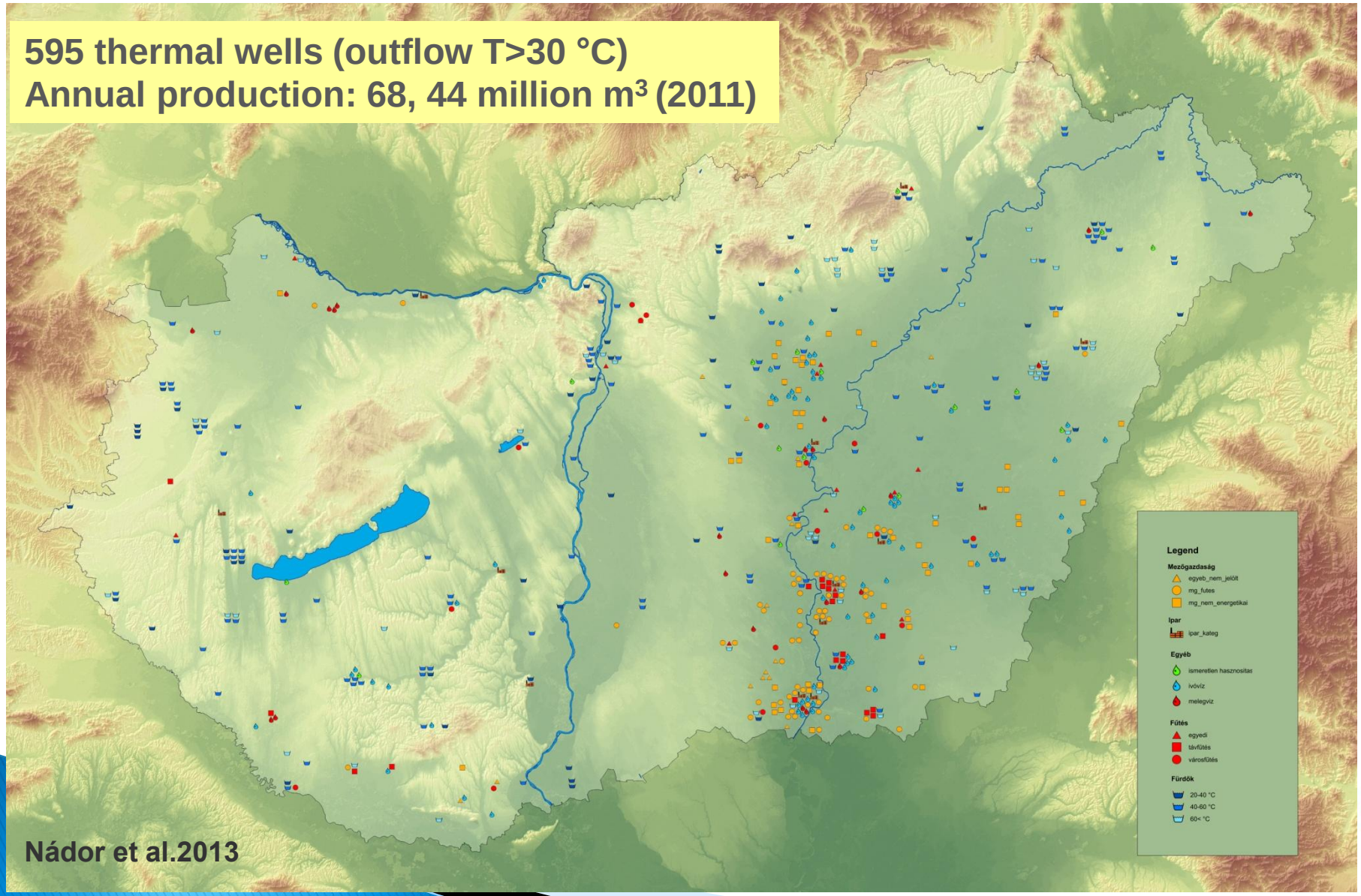
Main deep geothermal reservoirs: HSA



- high heat flux
- thermal „insolation" of basin fill sediments
- regional groundwater flows driven by hydraulic potential between recharge and discharge areas

Main geothermal reservoirs	Paleo-Mesozoic fractured, karstified basement rocks	Miocene porous and carbonate reservoirs	Mio-Pliocene porous basin fill: multi-layered sandstones, shales
depth (top)	>2-3000 m	Basement highs	600-1500 m
temperature	>100-150 C	50-150 C	50-100 C
prospect	power, CHP	CHP, direct heat	direct heat, balneology

Main types of current utlization of geothermal energy



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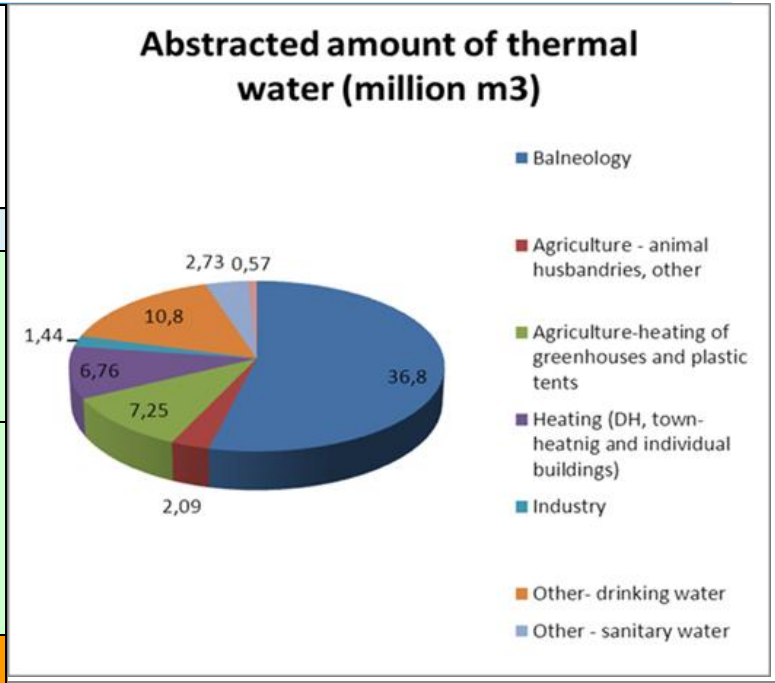
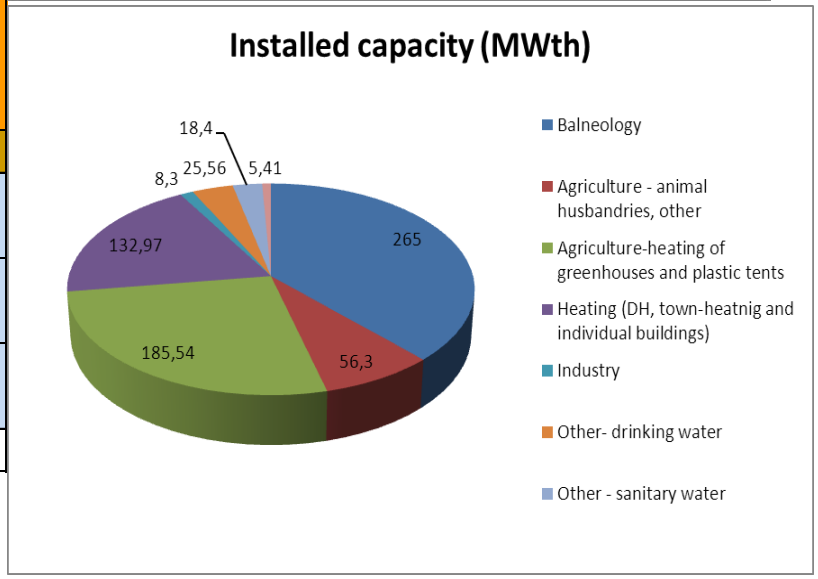
Main types of current utlization of geothermal energy

	No. of thermal wells	Abstracted amount of thermal water (million m^3)	Installed capacity (MW_{th})	Annual use (TJ/y)
Balneology	249	36,8	265	5285
Agriculture - animal husbandries, other	68	2,09	56,3	750
Agriculture-heating of greenhouses and plastic tents	86	7,25	185,54	2050
Heating (DH, town-heatnig and individual buildings)	51	6,76	132,97	1350
Industry	15	1,44	8,3	170
Other-drinking water	87	10,8	25,56	350
Other - sanitary water	22	2,73	18,4	220
Other-undefined	17	0,57	5,41	80
TOTAL	595	68,44	697,48	10255





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Data policy

Mining Law 1993. XLVIII: geological and geophysical data produced before 1992 are state owned and they are accessible free *(except for areas of production / exploration)*

- **Hungarian Office for Mining and Geology (MBFH):** authorised manager for state geological data (www.mbf.hu)
- All data are stored in the **National Geological and Geophysical Archive** handled by MBFH: mostly hard copy of reports (e.g. well-documentations), no uniform digital databases
- Although state data are free, but service fee for data handling, (compilation of various datasets, copies) is requested by MBFH
- Digital geological databases (boreholes, maps) available at the Geological Institute of Hungary (www.mafi.hu), digital geophysical databases at the Eötvös Loránd Geophysical Institute (www.elgi.hu
- „Data policy": no raw data, but value-added interpretations

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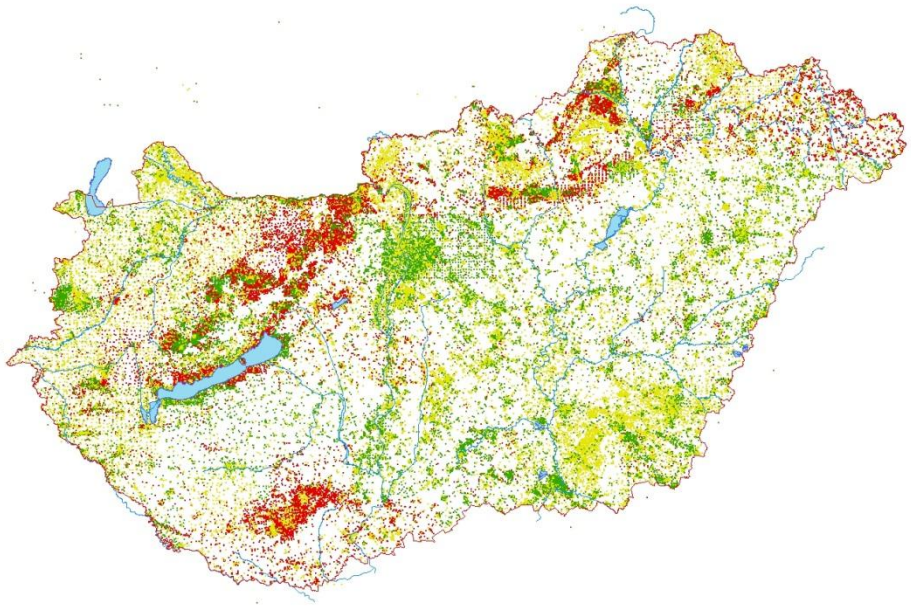
Data policy

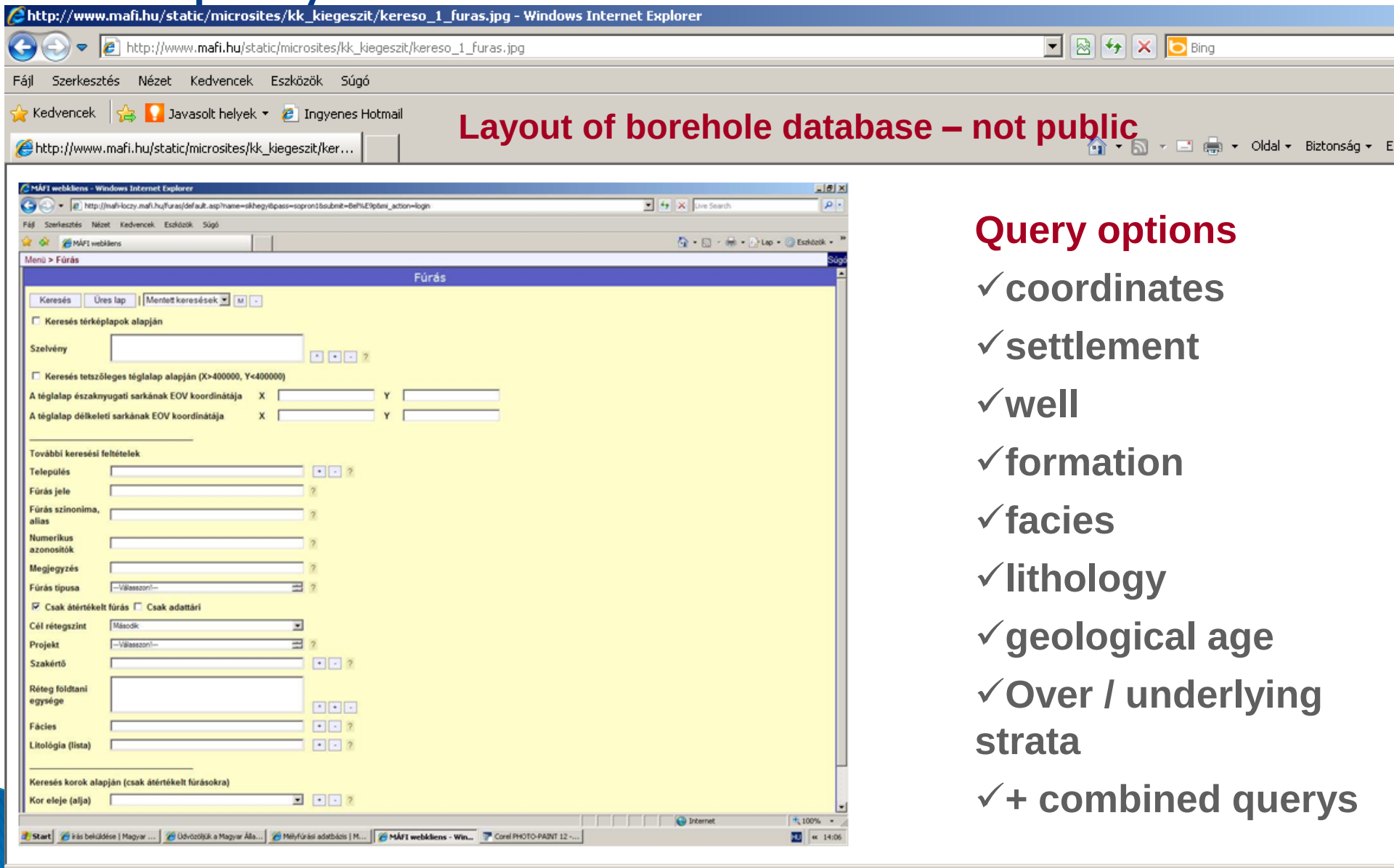


- re-evaluated stratigraphy
- basic litostraigraphy
- no geological data

borehole database (~200 000 boreholes: basic data + geology)

~8 000 hydrocarbon wells
~n x 10 000 water prospecting wells including ~1000 thermal water wells
~n x 1 000 structural-geological exploration („basic boreholes”)
~n x 10 000 mineral resource exploration boreholes

Data policy



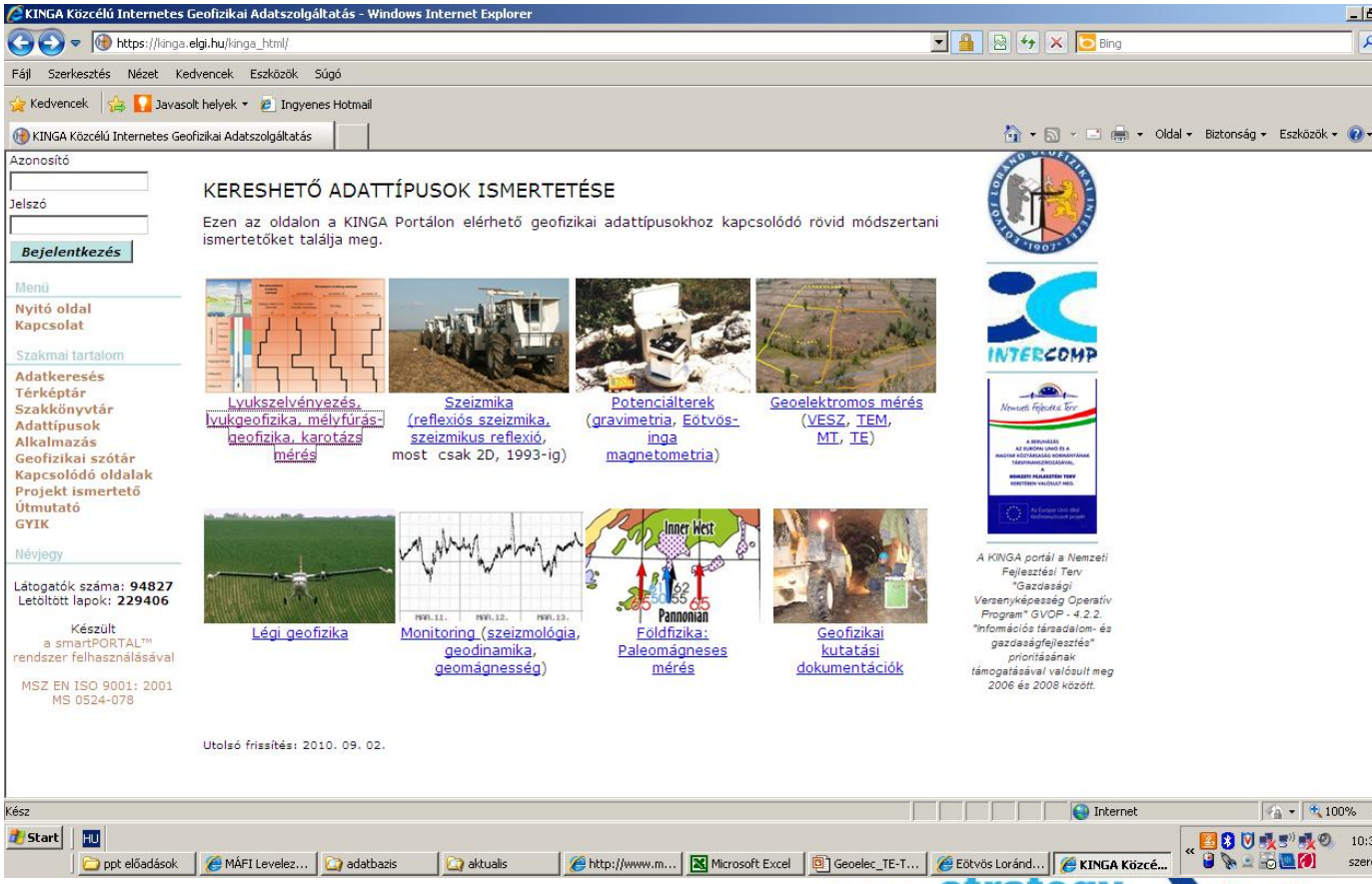
Layout of borehole database – not public

Query options

- ✓coordinates
- ✓settlement
- ✓well
- ✓formation
- ✓facies
- ✓lithology
- ✓geological age
- ✓Over / underlying strata
- ✓+ combined querys

Geophysical databases

- ✓Seismics (2D reflectional)
- ✓Well-logs (partly hard copyl)
- ✓Geoelectric
- ✓Magnetotelluric
- ✓Gravity
- ✓Air geophysics

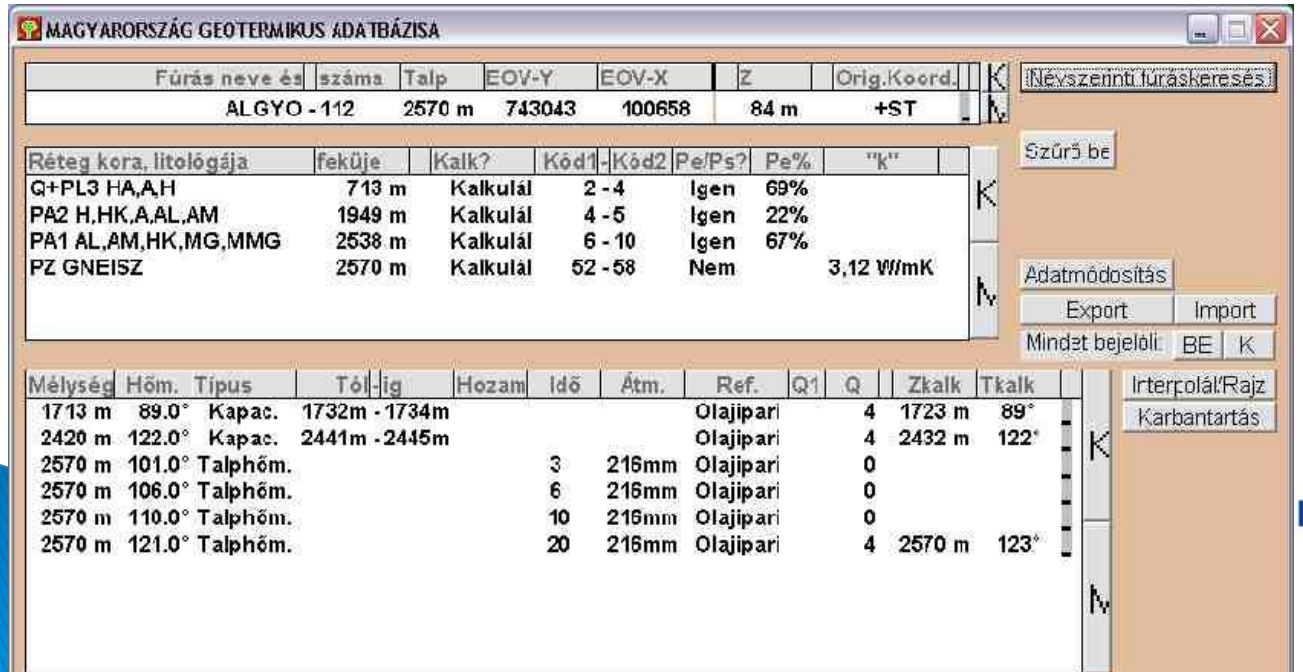


strategy Energy

Geothermal database

based on compilation of P. Dövényi at Eötvös Loránd University

- 4477 wells (drilled before 1993, mostly CH wells)
- deeper than 200 m, temperature higher than 30 C
- 55 000 temperature measurements (T- depth datasets + simplified lithology. e.g. basement carbonate)
- Types of measurements:
  - steady state condition measurements (majority, mostly BHT)
  - measured during production tests (DST)
  - T data calculated from outflow water temperatures



corrections needed!

Hydrogeological databases

ownership, data handling, access rights are shared among water management authorities and institutions – not clear

National Environmental Institute (NeKI), Regional Inspectorates for Environment, Nature and Water („green authorities"), National Water Management Chief Authority (OVF), etc.

cadastral register of thermal water wells: basic data, screened intervals, static and dynamic groundwater level, yield, outflow temperature, status of well

quality and quantity databases of groundwaters related to the integrated river basin management plans (Water Framework Directive) (www.vizeink.hu)

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Data policy

Licensing of exploration and production: regulation is based on depth (-2500 m concession) and type of production

Depth below surface (m)	Type of production	Licensing Authority
0-20		
20-2500 Open area	Closed loop, no water produced (GSHP)	Regional Mining Inspectorate
	Abstraction of thermal water	Regional Inspectorates for Environment, Nature and Water *water permit also considered as a license for prospection, exploitation and utilization of geothermal energy*
Below 2500 Closed area	Not relevant, Concession procedure	Hungarian Office for Mining and Geology: CVIA Minister signs concession contract Regional Mining Inspectorates: designation of geothermal protection zones

Main stakeholders of geothermal projects

Pannergy
MOL-CEGE
EU-Fire (Mannvit)

Aquaprofit
SWR-Geopower

Local municipalities
(19 towns with GeoDH)

Agriculture

Hungarian Geothermal Association
Hungarian Thermal Energy Association

Private consulting companies

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