Poland – District Heating and Renewable Opportunities

Geothermal energy:
current state and development prospects
in district heating and other applications

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SUSTAINABLE DISTRICT HEATING CONFERENCE – EEA GRANTS – CLIMATE CHANGE AND RENEWABLE ENERGY
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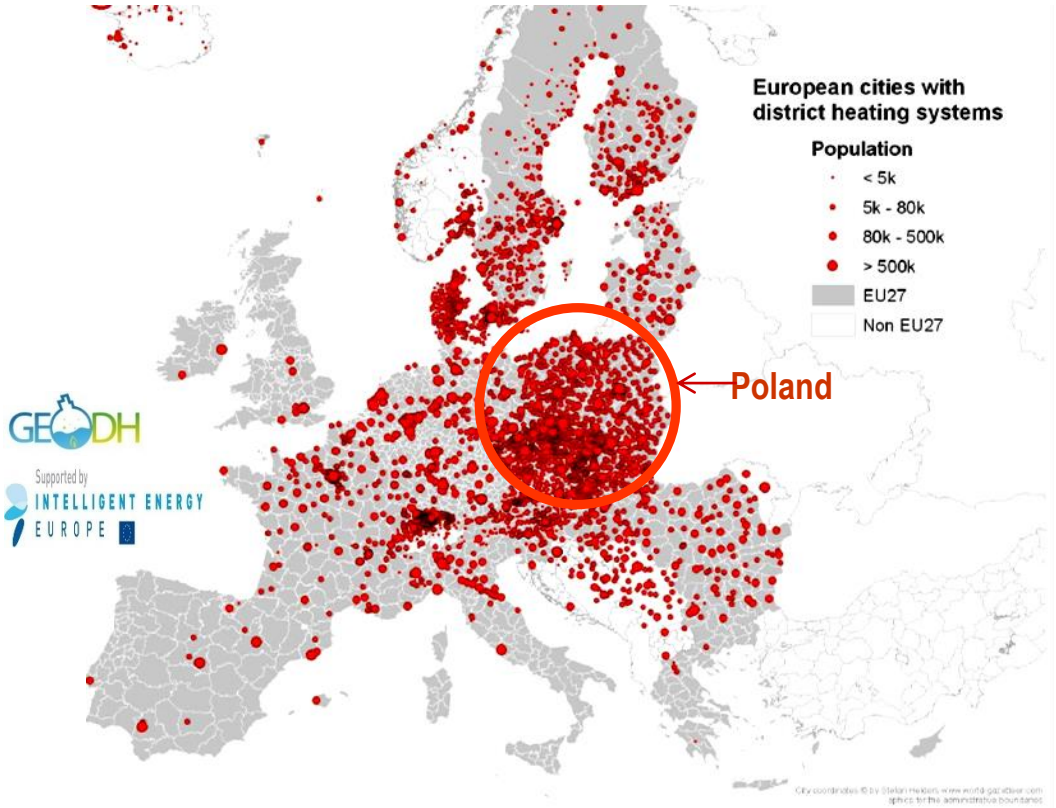
‘¼ of EU population lives in areas where geoDH is possible’
www.geodh.eu

District heating – main sector for geothermal uses in Europe / Poland



District heating systems in Europe according to the current content of the HUDHC database (June 2012)

Source of map:
Persson et al. (2012) – HUDC Database 2012
/The Halmstad University District Heating and Cooling Database/

Europe, 2018:

~ 5000 DH systems
~ 300 geoDH, next in progress

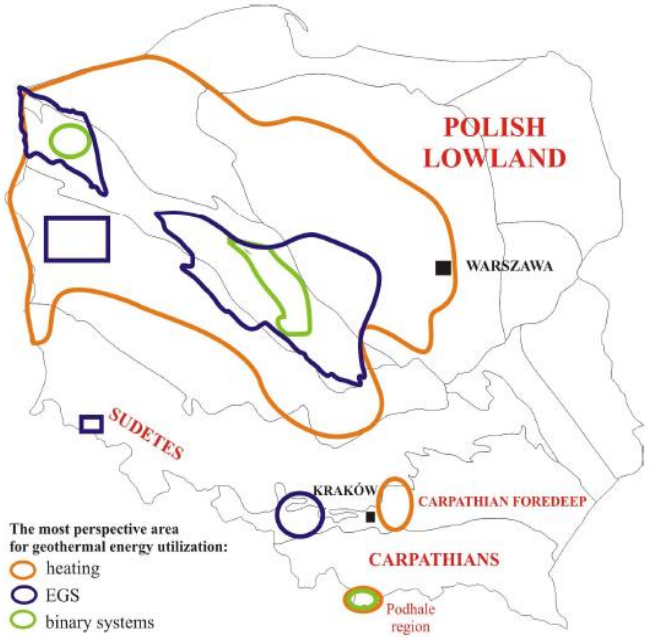
Poland, 2018:

~ 500 DH systems
6 geoDHs

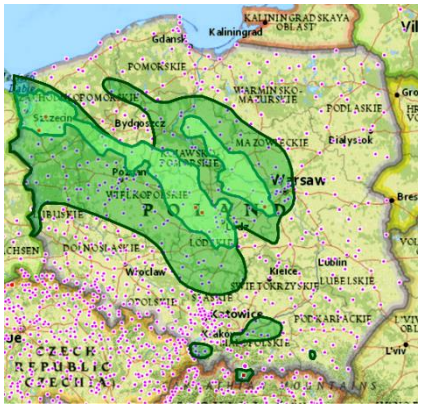
Particular chance for geoDHs in Europe and Poland:

introducing geothermal heat into existing DH systems (many prospective for geoDH)

Poland – areas prospective for geothermal heating / other uses



Map: Hajto, Sowiżdżał, Górecki, 2016



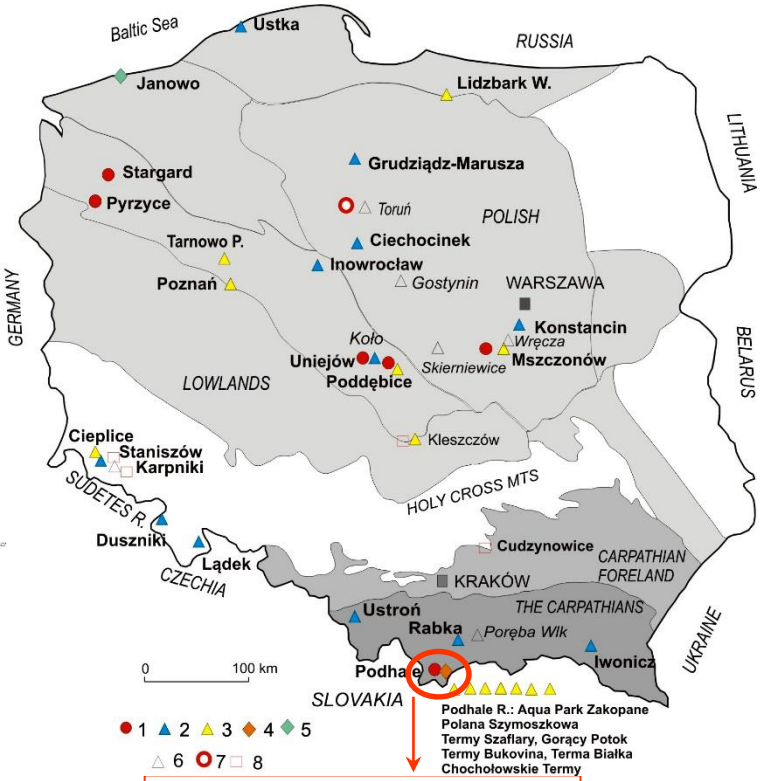
[in:] Geothermal DH Potential in 14 EU-countries, 2014.
Pink dotes – district heating grids (ww.geodh.eu),
Author of map: M. Hajto

- Polish Lowlands
- Inner Carpathians (Podhale Region)
- Outer Carpathians, Carpathian Foredeep (some areas)
- Sudetes (some localities)

Main reservoir parameters:

- Depths of exploited aquifers: 1–4 km
- Water temperatures: 20–97ºC
  (locally >100ºC found/expected)
- Water mineralization: ~ 0.4–160 /300 g/dm^3
- Water flow rates / well: some – 153 L/s
- Main reservoir rocks: sandstones, carbonates

Poland – geothermal district heating and other uses, 2018



Podhale R.:
Geo-heat sales ca. 450 TJ/2018
One of the biggest geoDHs in Europe

1. District heating, 2. Health resorts,
3. Recreation centers,4. Wood drying,
5. Fish farm, 6. Recreation centers in realisation,
7. Heating system in realisation, 8. Individual heating
([in] Kępińska, 2019 for WGC2020)

- **District heating:**
  - 6 geothermal district heating systems (geoDH)
  - Geo-heat sales: ~813 TJ /2018, 74 MW installed
  (12-13 place among European countries)

- **Balneoteraphy, recreation:**
  12 health resorts, 14 recreation centres

- **Other single uses:** fish farm, wood drying, heating up of a football pitch, food processing, minerals and CO_2 extraction, cosmetics' production

- **Shallow geothermal** (heat pumps, GSHPs):
  > 56 000 units (high market dynamics in recent yrs)

- Extension of existing geoDHs (incl. drilling new wells)

- **2016-2019**: several new exploration wells drilled, several in progress (aimed at geoDHs).

Funding by 2016, 2019 state support programs for geothermal drillings and other geoDH infrastructure

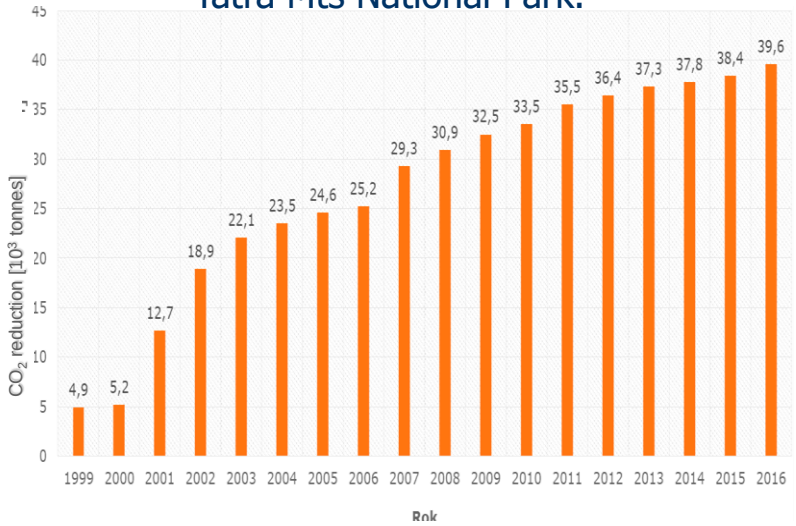
Poland – geothermal district heating, 2018

Location	Outflow water temperature [°C]	Maximum water flow rate [m^3/h] / L/s	Mineralisation [g/dm^3]	Installed geothermal capacity [MW_{th}]	Total installed capacity [MW_{th}]	Geothermal heat sales [TJ]	Ongoing works, plans (some)
Mszczonów	42	60 / 17	0.5	3.7	8.3	15.5	Extension, optimisation
Poddebice	68	252 / 70	0.4	10	10	50	Extension, etc.
Podhale R. *(one of the biggest in Europe)*	82–86	1090 /303 (3 wells)	2.5	38.8	77.9	450	Extension, optimisation
Pyrzyce	61	200 /55	120	6	22	57	New production well since 2017
Stargard	83	180 / 50	150	12.6	12.6	230	Drilling 2 from 4 new wells
Uniejów	68	120 / 33	6	3.2	7.4	9.6	Optimisation, etc.
Total				**74.3**	**138.2**	**813.1**	

Data provided by geoDHs' operators

Ecological effects of geoDHs – examples

Zakopane, Podhale R.: big tourist centre. Tatra Mts National Park.



Zakopane: CO_2 reduction thanks to geoDH (since 2001). Source: PEC Geotermia Podhalanska S.A.)

Emission type	Before introducing geoDHl [Mg/y]	2017 56% geothermal share in DH [Mg/y]	2017 ecological effect [Mg/y]
NOx	263.0	5.05	257.95
CO	2760.0	0.37	2759.63
Dust	241.0	0.02	240.98
CO_2	85938.0	2680.70	83257.30
SO_2	1158.0	0.00	1158.00

Pyrzyce town - geoDH

Source: PEC Geotermia Podhalańska SA

Prospects for wider geothermal development

- **Space heating - district heating (geoDH)**
- **Locally – CHP (binary systems)**
  (water T> 80 – 100ºC, hundreds kW_e–1– 2 MW_e)
- **Agriculture, aquaculture, food processing, etc.**
  (incl. organic-agriculture, biotechnologies, etc.)
- **Recreation/balneotherapy**
- **Shallow geothermal (heat pumps)**
- **Geothermal waters for drinking, mineral water production, etc.**

In several dozen of cities geothermal can be introduced into existing DHs !


Podhale geoDH


Poddebice geoDH


Uniejów health resort

Important factor to enhance geothermal development *,**: Public support by Ministry of Environment, 2015/16, 2019

(programs operator: National Fund for Environment Protection & Water Management)

- **2015/16 - Program of financial support for geothermal development**
- **July 2019 – Geotermia+ Program**

- Other financing opportunities: national, EU-, NFM and EEA programs by 2020 and beyond (related to various thematic areas/objectives where one may find the space for geothermal)

- 2018: proposal (by PGS, others) of Executive program for geothermal development (wider geoDHs' development, R&D, education, etc.) – follow-up of proposed State Raw Materials' Policy

* *For energetic uses – geoDH / heating / CHP*

** *More information: ppt by Mr Piotr Bogusz, Ministry of Environment*

Nowy Targ - air pollution generated by burning coal, coal dust, wastes, etc. for heating
(photo P. Jamiński, [in] N. Bachulska, 2019)

Nowy Targ (Podhale Region) awaiting for introducing geothermal heat into part of municipal DH (project initiated in recent years) – one of localities which will benefit from 2015/16, 2019 public programs supporting geothermal development

Poland – the-so-far results of geoDHs and other uses

- Reduction of CO_2 and other emissions – Effective tool for climate protection
- Improved life quality
- Axis of modern sustainable economic development and source of income
- Green employment places
- Arguments for developing next geoDHs and other uses

⇩

Even though Polish energy sector is based on fossils / coal
there are many opportunities for geothermal development

and

for international cooperation – also within EEA / NF mechanisms

GeoDH, other uses – areas of potential international cooperation

- Continue contacts and works on Investment projects' proposals elaborated within the EEA GeoHeatPol project, 2017 (applications for funding?),
- Training activities tailored for specific needs of target groups
- Research, modeling, simulation of geothermal systems (L-T)
- Advanced technologies in drilling, maintenance and management of geothermal wells, fluids, systems, infrastructure …
- Geothermal heating, CHP, other uses
- Energy efficiency, reduction of CO_2 (others pollutants), LCA
- Assessement and optimalisation of geothermal energy uses
- EU, EEA / NF projects, networking, exchange of information, expertise, best practices, study visits, joint events, …

Geothermal energy in EEA, NF programs – Poland *

Period 2009-2014: 3 first pre-defined EEA projects for Poland (2016-2017):

- Geothermal energy potential in Poland – town Poddebice 2016-2017 (MEERI PAS, AGH, NEA, + experts from Poddebice)
- Geothermal energy – a basis for low-emission heating, improving leaving conditions and sustainable development. Preliminary study for selected areas in Poland 2017 GeoHeatPol (MEERI PAS, AGH-UST, PWr, NEA, CMR, EGEC, + experts)
- Geothermal4Pl 2017 (Polish Geological Institute, CMR)

Period 2014-2021: in preparation (2019):

- Capacity Building of Key Stakeholders in the Area of Geothermal Energy (MEERI PAS, NEA)
- Some other applications submitted to EEA regional programs (partners from Pl, Is, Hu, No, Sk)

* Results of long efforts of some UNU GTP graduates, Polish Geothermal Society, people from NEA, UNU GTP, Icelandic ministries, Promote Iceland, ambassadors, Polish ministerial representatives (Min. of Economy, Chief Geologists, Min. of Environment (DEF, DG&GC), NFEP&WM, positive decisions of donor countries, FMO.

Podhale R.: first production well
for geoDH in Poland (since 1992/93)
Banska IG-1, MEERI PAS

Many thanks

for kind attention !

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