Poland – District Heating and Renewable Opportunities

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

Beata Kępińska

Mineral & Energy Economy Research Institute, Polish Academy of Sciences
Polish Geothermal Society
‘¼ of EU population lives in areas where geoDH is possible’

www.geodh.eu

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

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)

Source of map:
Persson et al. (2012) – HUDC Database 2012
/The Halmstad University District Heating and Cooling Database/
Poland – areas prospective for geothermal heating / other uses

- **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: 20–97°C (locally >100°C found/expected)
- Water mineralization: ~ 0.4–160 /300 g/dm³
- Water flow rates / well: some – 153 L/s
- Main reservoir rocks: sandstones, carbonates
Poland – geothermal district heating and other uses, 2018

- **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 CO₂ 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


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

Podhale R.: Asua Park Zakopane
Polana Szynosza
Termy Szafiary, Goracy Potok
Termy Bukowina, Terma Bialka
Chocichowskie Termy

142x21]SUSTAINABLE DISTRICT HEATING CONFERENCE – EEA GRANTS – CLIMATE CHANGE AND RENEWABLE ENERGY
OCTOBER 24 – 25, 2019, ICELAND
### Poland – geothermal district heating, 2018

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</thead>
<tbody>
<tr>
<td>Mszczonów</td>
<td>42</td>
<td>60 / 17</td>
<td>0.5</td>
<td>3.7</td>
<td>8.3</td>
<td>15.5</td>
<td>Extension, optimisation</td>
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<td>Poddebiec</td>
<td>68</td>
<td>252 / 70</td>
<td>0.4</td>
<td>10</td>
<td>10</td>
<td>50</td>
<td>Extension, etc.</td>
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<tr>
<td>Podhale R.</td>
<td>82–86</td>
<td>1090 /303 (3 wells)</td>
<td>2.5</td>
<td>38.8</td>
<td>77.9</td>
<td>450</td>
<td>Extension, optimisation</td>
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<td>(one of the biggest in Europe)</td>
<td></td>
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<tr>
<td>Pyrzyce</td>
<td>61</td>
<td>200 / 55</td>
<td>120</td>
<td>6</td>
<td>22</td>
<td>57</td>
<td>New production well since 2017</td>
</tr>
<tr>
<td>Stargard</td>
<td>83</td>
<td>180 / 50</td>
<td>150</td>
<td>12.6</td>
<td>12.6</td>
<td>230</td>
<td>Drilling 2 from 4 new wells</td>
</tr>
<tr>
<td>Uniejów</td>
<td>68</td>
<td>120 / 33</td>
<td>6</td>
<td>3.2</td>
<td>7.4</td>
<td>9.6</td>
<td>Optimisation, etc.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>74.3</strong></td>
<td><strong>138.2</strong></td>
<td><strong>813.1</strong></td>
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</table>

Data provided by geoDHs’ operators
Ecological effects of geoDHS – examples

<table>
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<tr>
<th>Emission type</th>
<th>Before introducing geoDHI [Mg/y]</th>
<th>2017 56% geothermal share in DH [Mg/y]</th>
<th>2017 ecological effect [Mg/y]</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx</td>
<td>263.0</td>
<td>5.05</td>
<td>257.95</td>
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<tr>
<td>CO</td>
<td>2760.0</td>
<td>0.37</td>
<td>2759.63</td>
</tr>
<tr>
<td>Dust</td>
<td>241.0</td>
<td>0.02</td>
<td>240.98</td>
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<tr>
<td>CO₂</td>
<td>85938.0</td>
<td>2680.70</td>
<td>83257.30</td>
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<tr>
<td>SO₂</td>
<td>1158.0</td>
<td>0.00</td>
<td>1158.00</td>
</tr>
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Zakopane: CO₂ reduction thanks to geoDH (since 2001). Source: PEC Geotermia Podhalanska S.A.

Pyrzyce town - geoDH
Prospects for wider geothermal development

- **Space heating - district heating (geoDH)**
- **Locally – CHP (binary systems)**
  (water T > 80 – 100°C, 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!
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

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 CO₂ 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\textsubscript{2} (others pollutants), LCA
- Assessment 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 Poddebiece)

- 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)


- 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.
Many thanks for kind attention!

bkepinska@interia.pl