GEOTHERMAL ENERGY DEVELOPMENT IN EUROPE AND POLAND. CONTRIBUTION OF THE UNU-GTP GRADUATES

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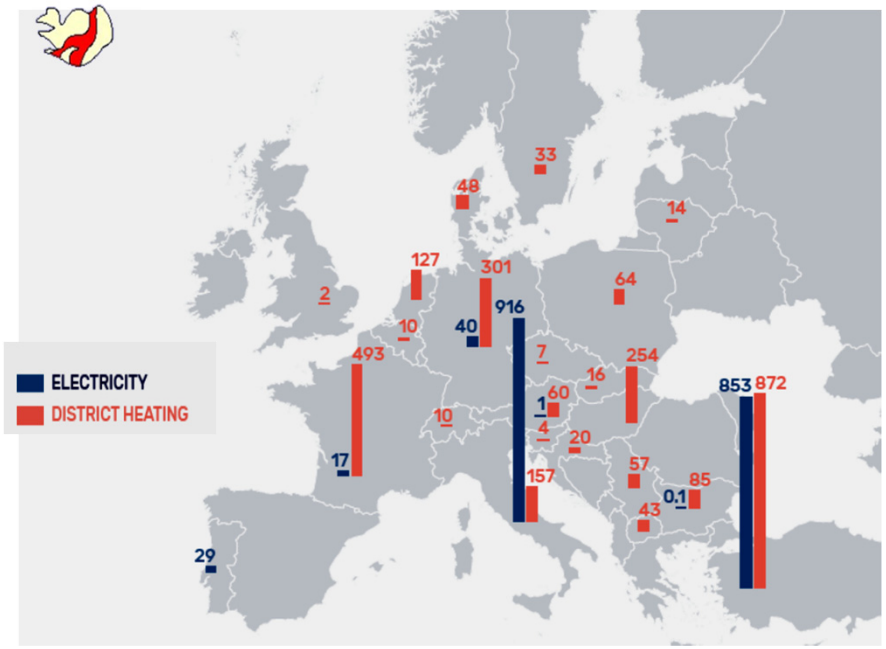
EUROPE – GEOTHERMAL USES, 2016*,**



Europe/continent: installed capacity for electricity and district heating ([MW_e], [MW_{th}]), 2016

Power generation:

- 9 countries
- 10% average annual growth (2011-2016)

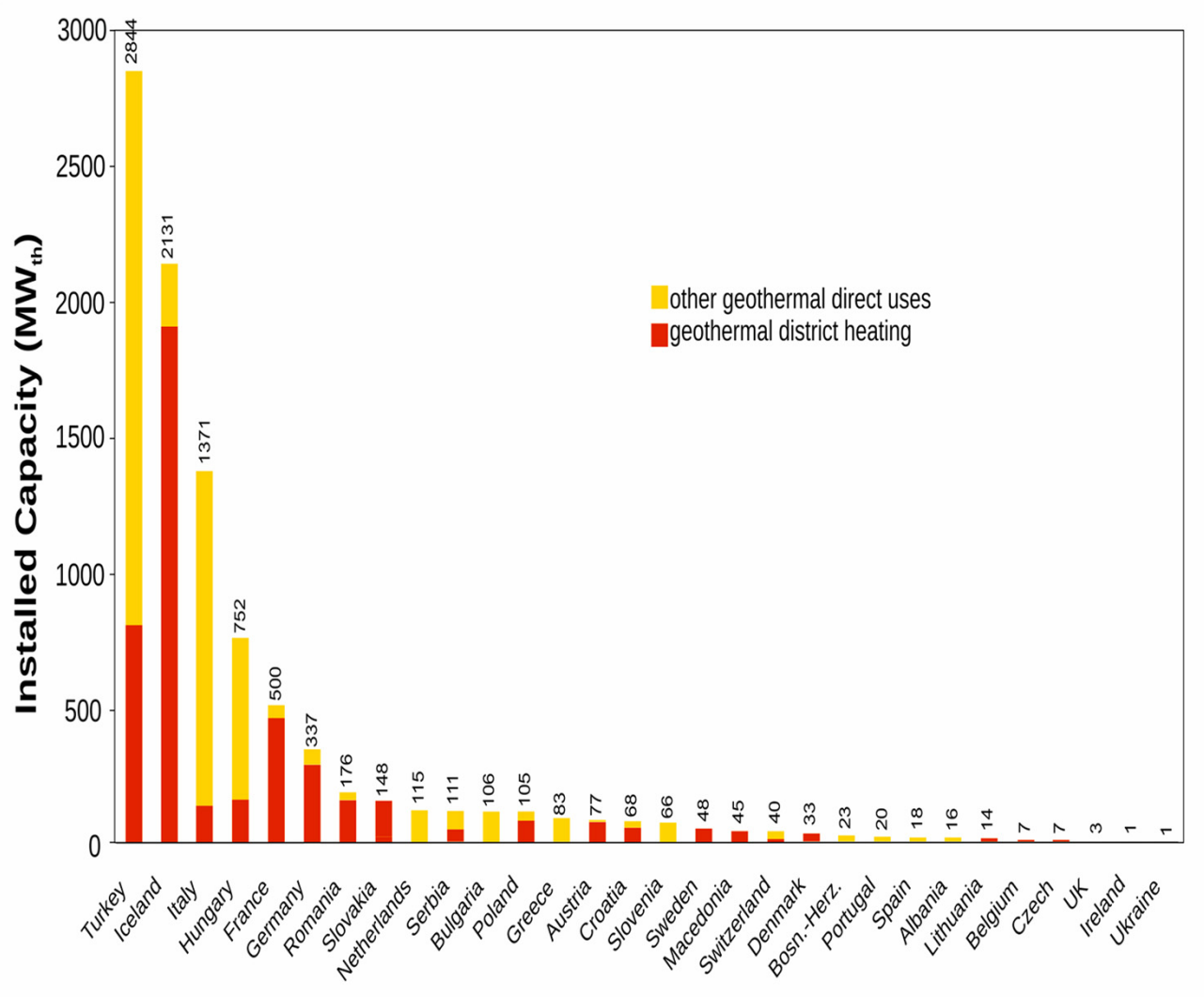
Direct uses:

33 countries

District heating systems – most important:

- 3% average annual growth, 10% EU-states (2011-2016)

* EGEC Geothermal Market Report, 2016, Antics et al., 2016
** Gudmundsdottir and Ketilsson, 2016

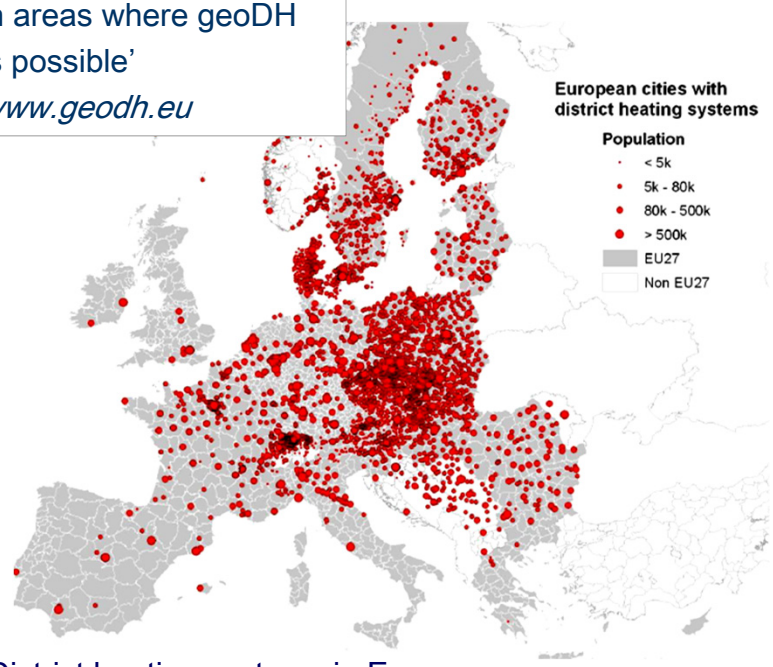


Installed capacity for geothermal district heating and other direct uses in European countries, 2015

(Antics et al., 2016 – European Geothermal Congress 2016)

EUROPE – GEOTHERMAL DEVELOPMENT PROSPECTS

'¼ EU population lives in areas where geoDH is possible'
www.geodh.eu



District heating systems in Europe
(acc. To Halmstad University District Heating & Cooling Database (Persson et al., 2012))

Europe:
~ 5000 DH systems,
~ 280 geoDH, 160 in development or investigations

Poland:
~ ca. 500 DH systems
- 6 geoDH, next 5 in early development

- **District heating:**
  (specially introducing to existing DHs:
  ca. 5000 DHs – some suitable for geoDH)
- Agriculture, aquaculture, etc.
- Health treatment / recreation
- Power generation – H-T, binary
  (some localities, areas)
- Shallow geothermal (heat pumps)

! Above uses prospective also in countries of UNU-GTP graduates

! Growing acceptance of geothermal energy by decision makers and other stakeholders

POLAND: GEOTHERMAL USES, 2017/18

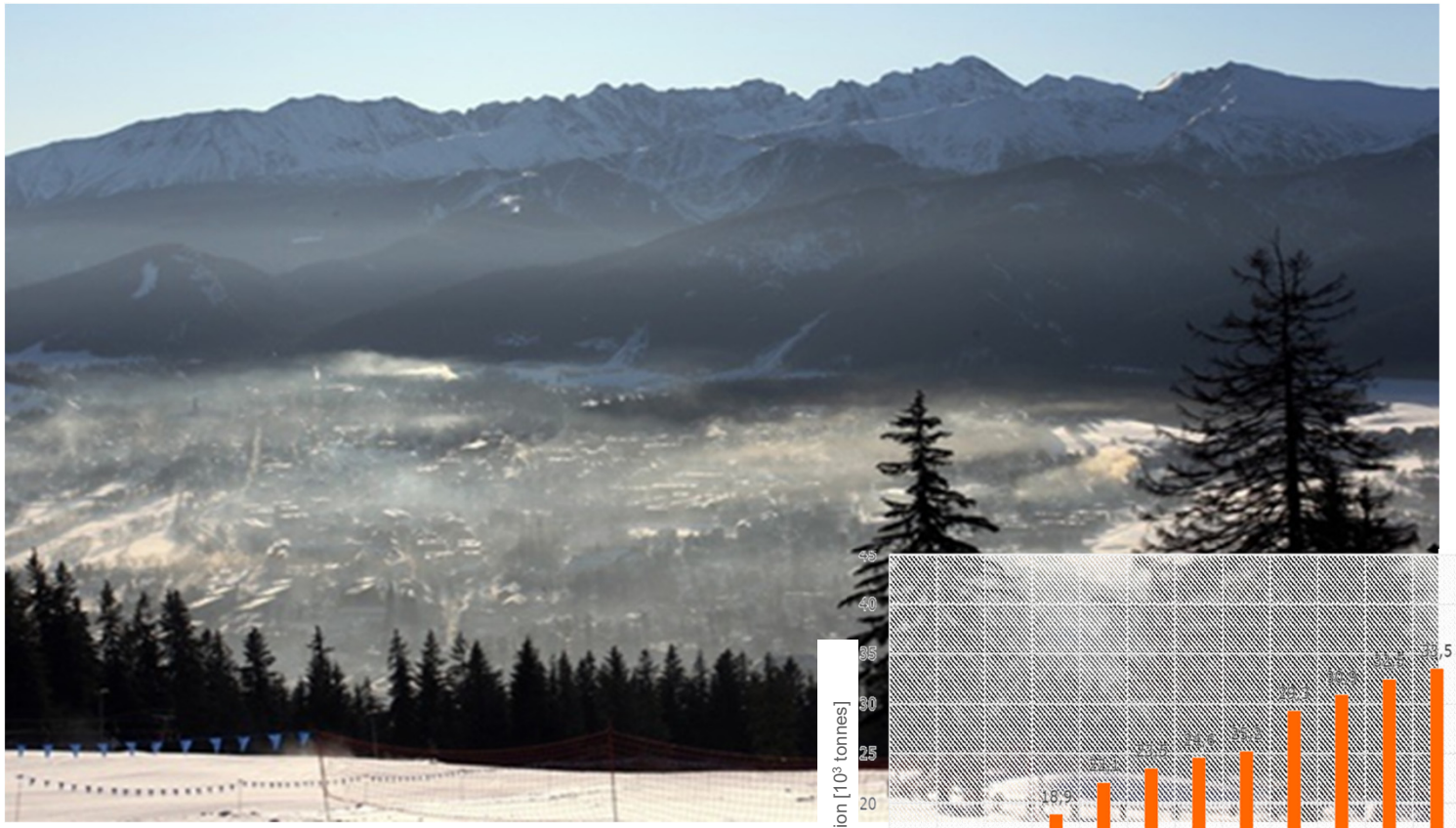
Podhale Region:
Geo-capacity ca. 42 MW/ total ca. 83 MW
Geo-heat sales ca. 450 TJ/2017
One of the biggest geoDH in Europe

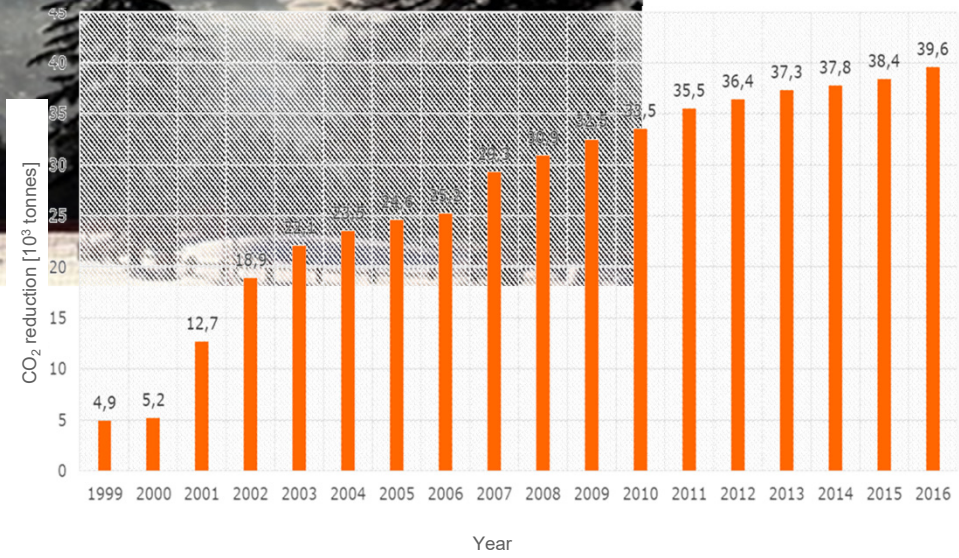
- Exploited water temperatures: 20−95ºC
- 10 health resorts, 15 recreation centers
- **District heating**: 6 systems
  (Total ca. 77 MW_{th} and 870 TJ /2017)
- Shallow geothermal (heat pumps):
  > 45 000 installations
  (constant growth in recent years)
- Some further geoDHs expected

1. Geothermal district heating, **2**. Health resorts, **3**. Recreation centers, **4**. Recreation centers in construction, **5**. Fish farming, **6**. CHP /early stages/, **7**. Exploration wells to drill in 2018/19 (state support), **8**. GeoDHs under development, **9**. Wood drying

Main energy source in Poland: coal

PODHALE R. – CO_2 REDUCTION THANKS TO GEOTHERMAL HEATING





Zakopane, Podhale R. – main tourist area in Poland

Low-emission before geoDH introduction (1990s)

Source: PEC Geotermia Podhalańska SA

DISTRICT HEATING – KEY SECTOR FOR GEOTHERMAL DEVELOPMENT IN POLAND. RECENT SUPPORTING INITIATIVES

- Many DHs suitable to transfer from coal into geothermal

Recent state initiatives, 2016 – 2017:

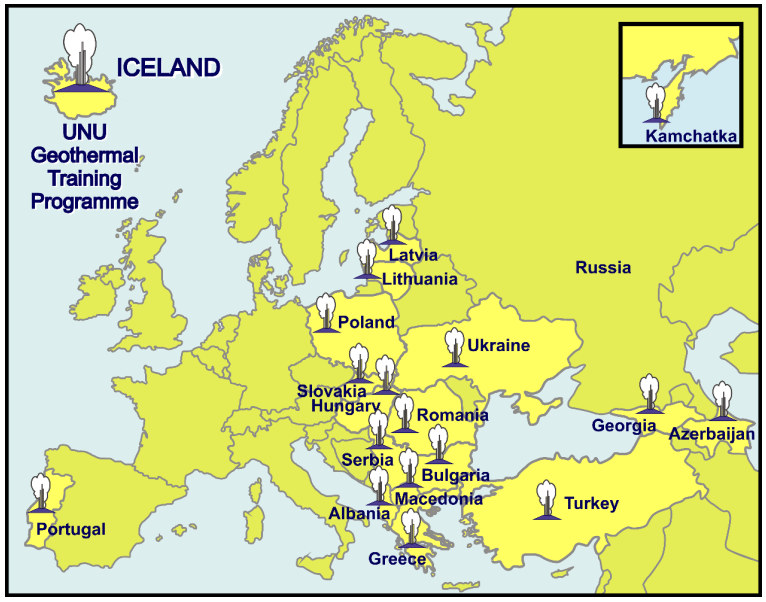
- Support for exploratory geothermal wells (up to 100%), subsidies / loans for other infrastructure – since 2016

Other provisions facilitating geothermal /RES in:

- Strategy for Responsible Development:
  - Local energy use to strive for energy self-sufficiency, increase energy security, improving the environment
- State Raw Materials' Policy (in preparation):
  - Pillar II. „Acquiring mineral deposits and Earths' heat":

geothermal treated as resource of regional / national importance – a breaktrough for the sector

UNU-GTP and FELLOWS FROM EUROPE



1986 – 2016:

75 UNU-GTP graduates

from 17 European countries

UNU-GTP graduates in geothermal activities, eg.:

- Leading scientists and experts in their countries
- Pioneering projects (1st Geothermal Heating Plant, PI)
- Initiators of geothermal /RES training (Ro, Tr, PI)
- IGA BoD, WGC Organising, Steering Committees
- Aid programs for developing states (UNESCO,UNDP)
- Cooperation with UNU-GTP experts in some cases
- Contribution to include geothermal into EEA/NF* funds and projects with Icelandic partners (PI, Ro)

* EEA/NF – European Economic Area / Nordic Funds

UNU-GTP CONTRIBUTION TO GEOTHERMAL DEVELOPMENT IN EUROPE

- The UNU-GTP has essentiall share in building professional manpower for geothermal development in 17 European countries

- It is hoped that the UNU-GTP involvement will be continued – several European countries still need professional support in training own experts to develop geothermal resources

CONGRATULATIONS

on the occasion of the 40th Anniversary of the UNU-GTP

to:

Current and past UNU-GTP Directors and Staffs

Orkustofnun, Government of Iceland

UNU Headquarters

All Lecturers, Supervisors, Persons and Institutions involved

Further successes of the UNU-GTP – the leader in education activities performed worldwide for geothermal development !

UNU-GTP graduates from Europe and their institutions