

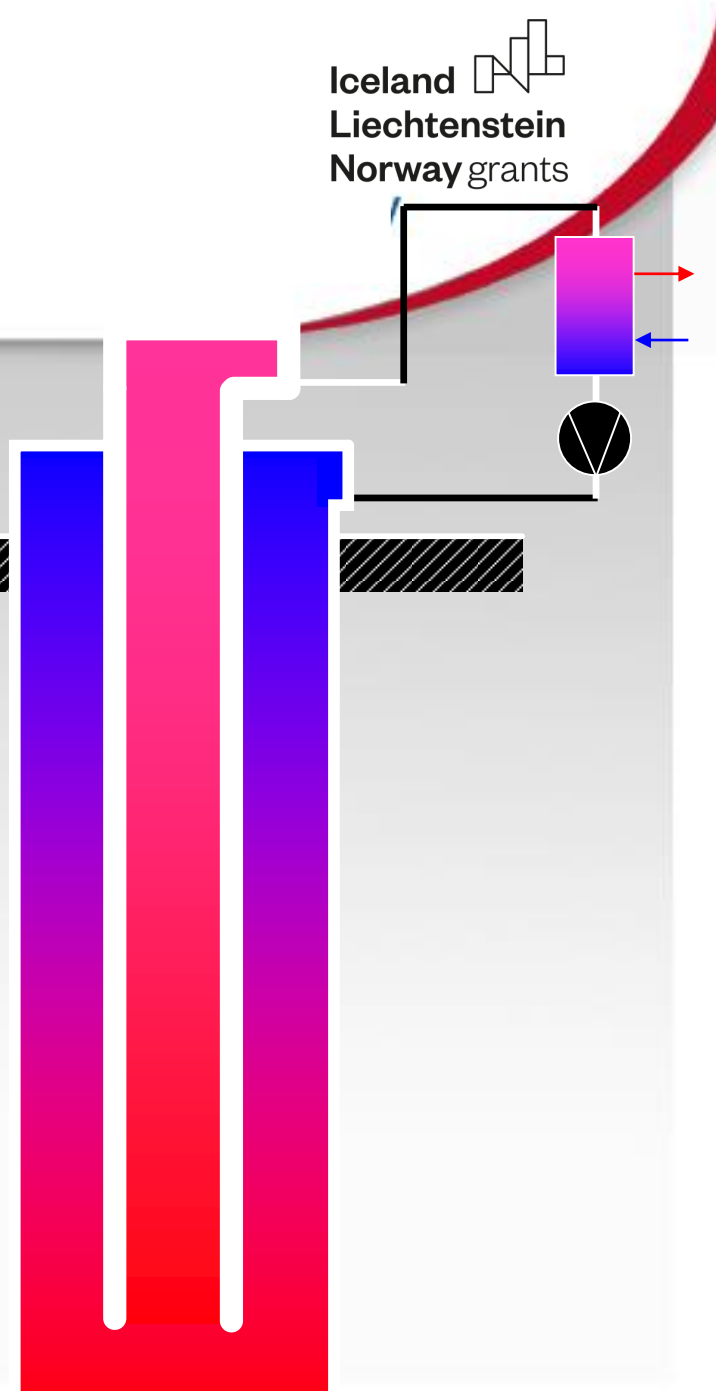
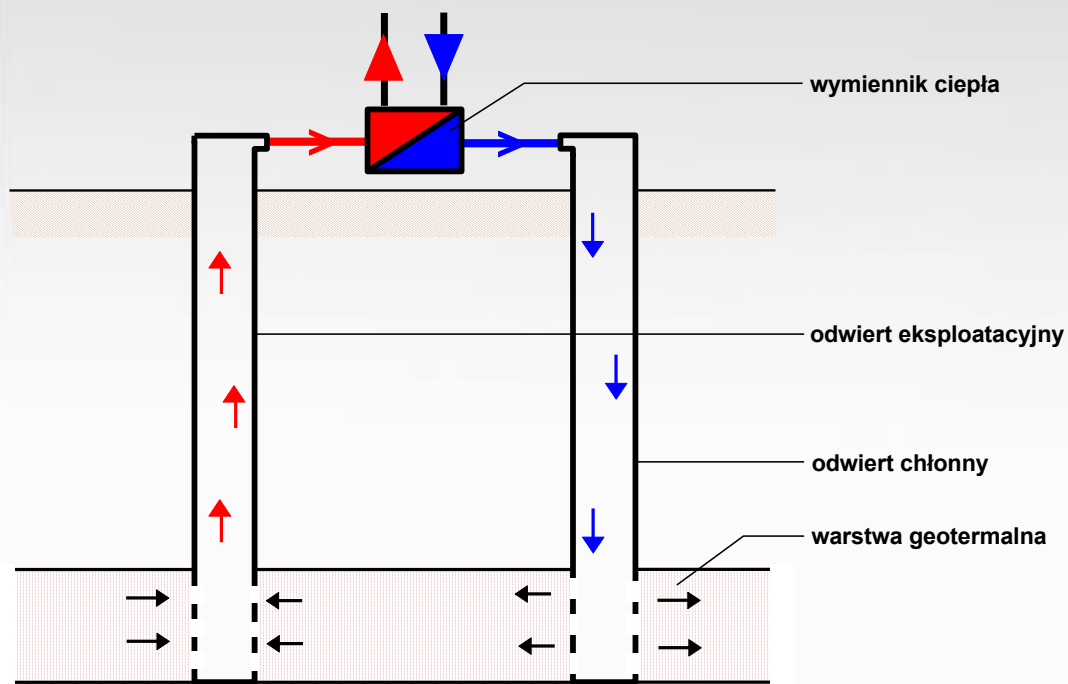
Geothermal in Project partners' works – Drilling, Oil and Gas Faculty AGH UST in Krakow

**Aneta Sapińska-Śliwa, Stanisław Nagy,
Rafał Wiśniowski, Tomasz Śliwa (sliwa@agh.edu.pl)**

18 September 2017 r.

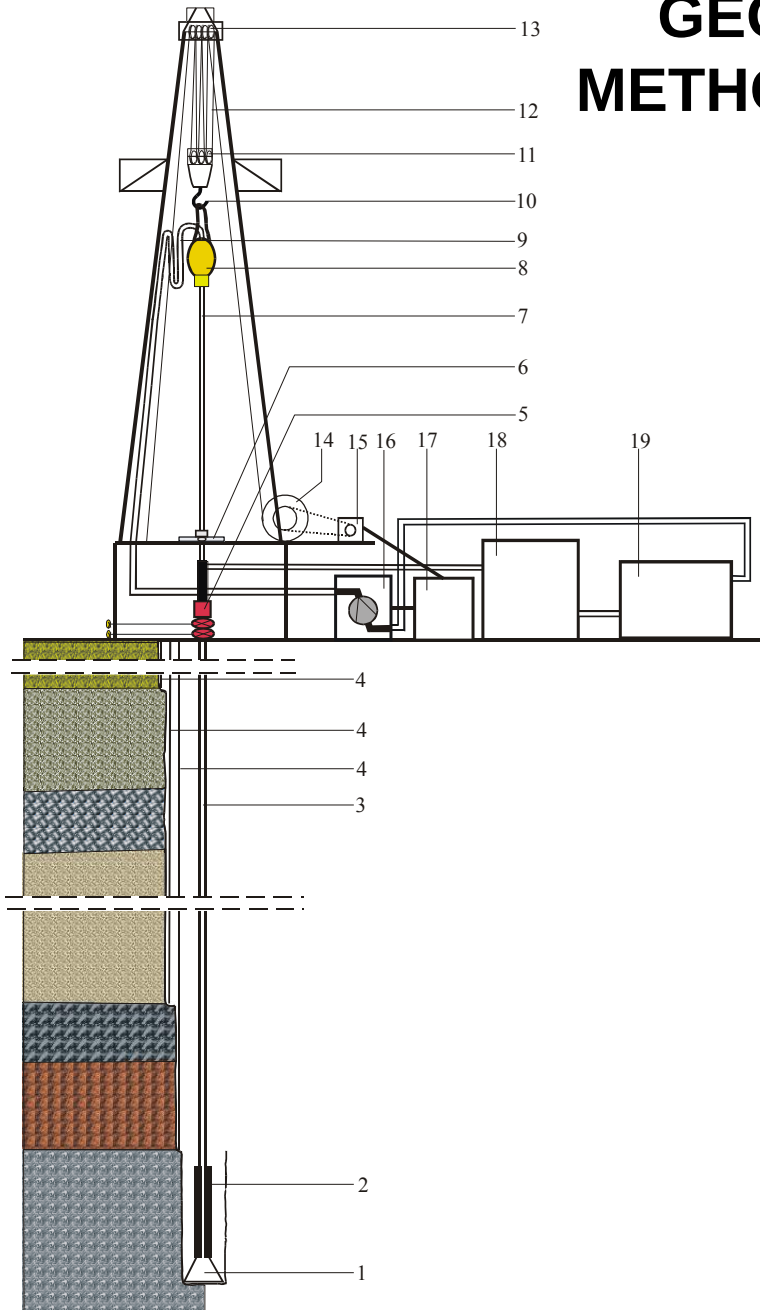
GEOHERMAL DRILLING METHODS AND TECHNOLOGY

Methods of geothermal heat extraction



GEOHERMAL DRILLING METHODS AND TECHNOLOGY

Iceland
Liechtenstein
Norway grants



- **Geothermal wells**
- **Borehole heat exchangers**

- **Deep wells**
- **Shallow wells**

- **Rotary drilling**
- **Rotary-percussion drilling**

GEOHERMAL DRILLING METHODS AND TECHNOLOGY

Iceland
Liechtenstein
Norway grants

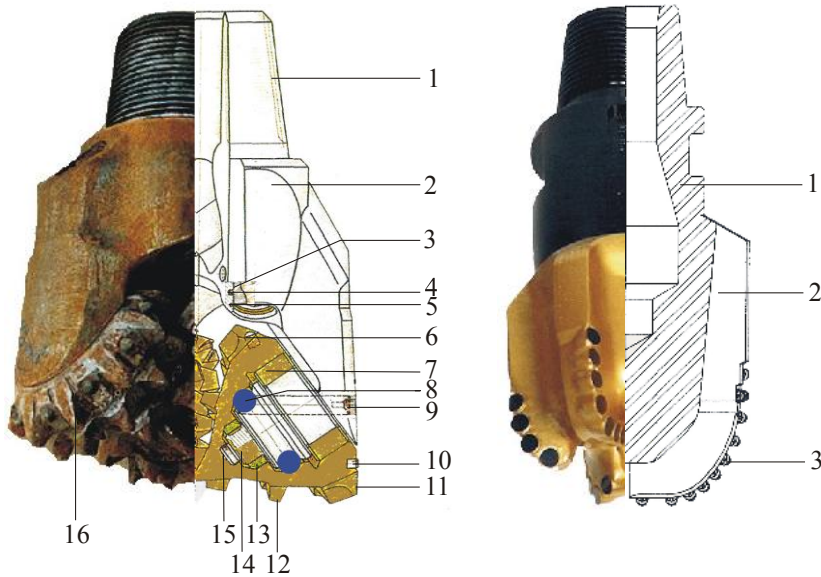
- **Energy piles**



GEOHERMAL DRILLING METHODS AND TECHNOLOGY

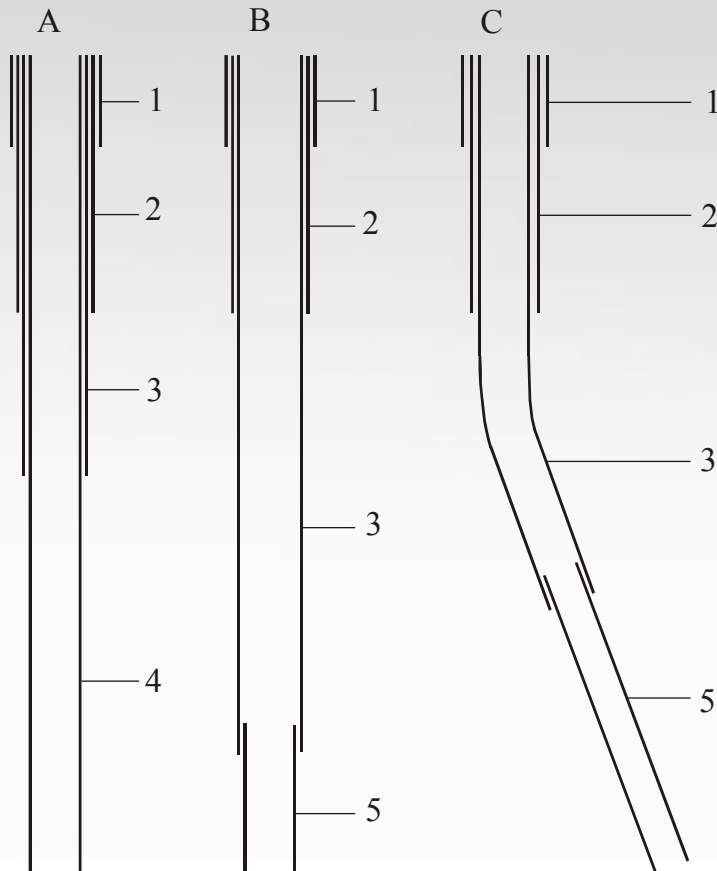
Iceland
Liechtenstein
Norway grants

Deep drilling



GEOHERMAL DRILLING METHODS AND TECHNOLOGY

Geothermal wells construction

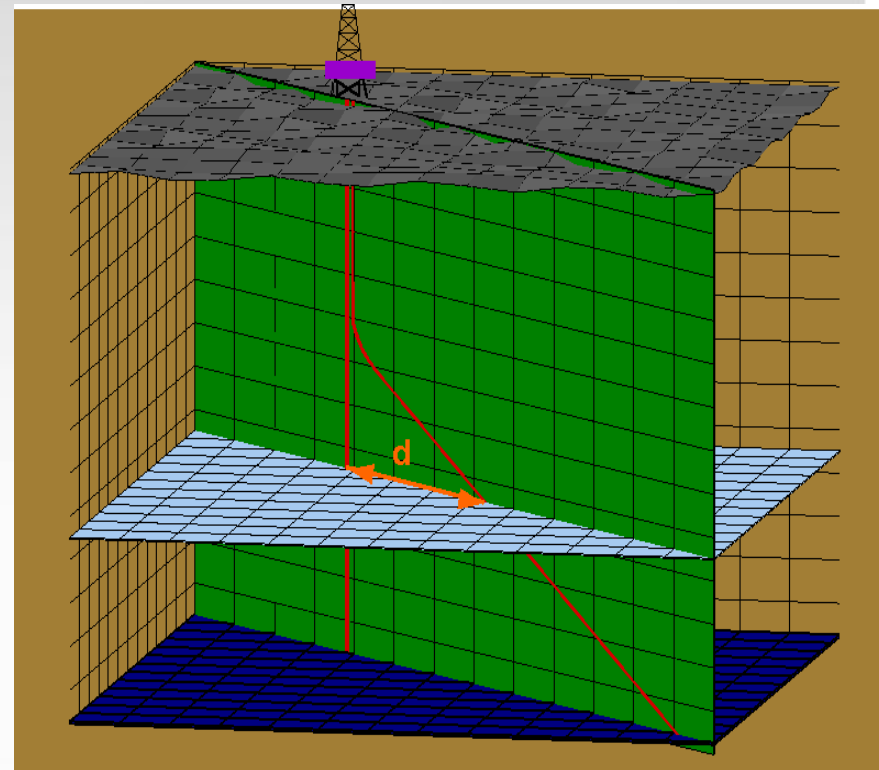
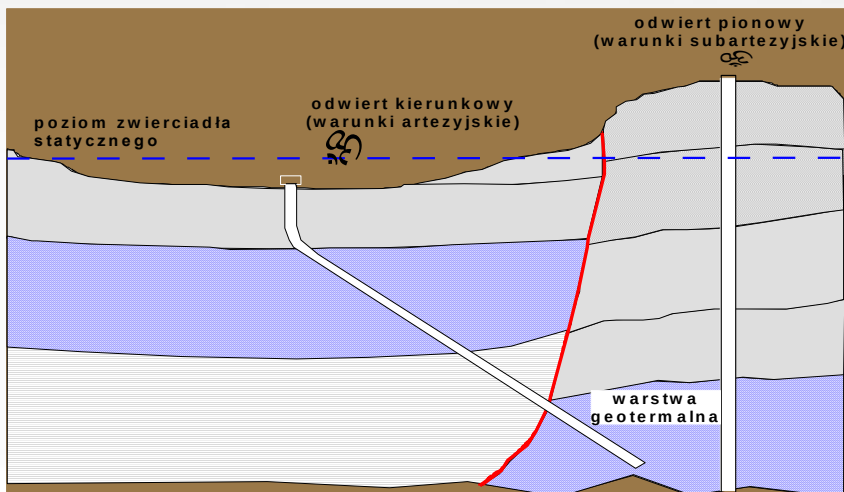


**Directional wells
Podhale,
Stargard Szczeciński**

GEOHERMAL DRILLING METHODS AND TECHNOLOGY

Directional wells in geothermics:

- Reduction of surface installation costs, reduction of corrosion,
- Reduction of colmatation,
- Single drilling pad, in urban areas environment protection,
- Selfproduvtion instead of pumping (fig.),
- Bigger production and injection area as result of not vertical drilling in horizontal geothermal llayers (fig.),
- Easier instalation and reservoir management.j.



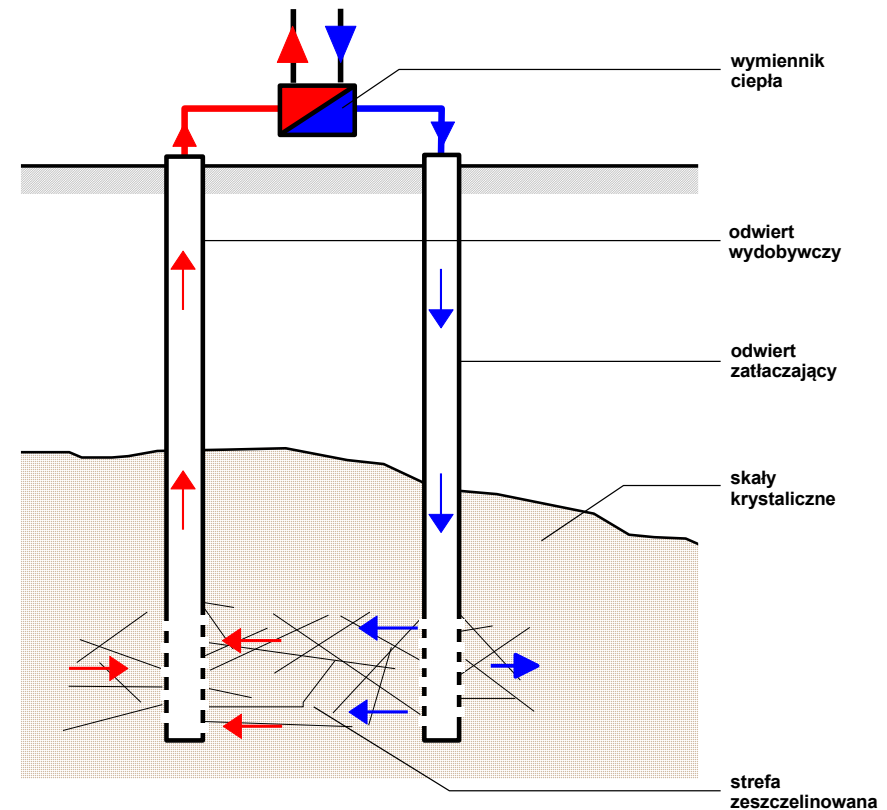
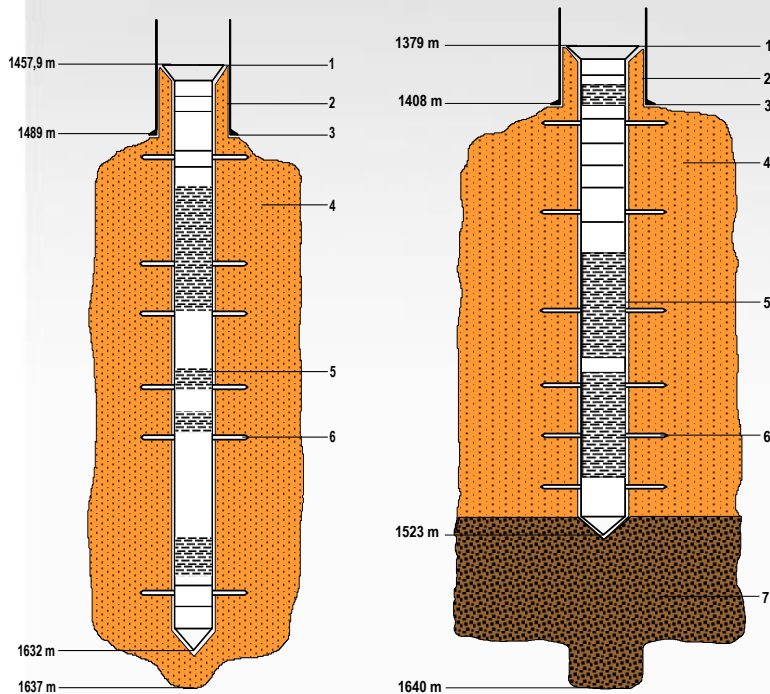
GEOHERMAL DRILLING METHODS AND TECHNOLOGY

- Drilling muds (underbalance drilling)
- Fiberglass casing and surface pipes
- Casing sealing:
 - thermal stresses
 - heat losses



GEOHERMAL DRILLING METHODS AND TECHNOLOGY

Production and injection improving: - borehole diameter expand, - acidation, - fracturing.



Thank you!

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