AGH Research Offer

Expansion of the AGH Geoenergy Laboratory - Innovative borehole heat exchangers and a geothermal doublet in research field B AGH Geoenergy Laboratory

Technical description:

The installation consists of several forms of obtaining the Earth's heat and storing energy. It includes:

a) a doublet of wells, which are designed to produce and inject groundwater carrying heat. The water flowing in the doublet between the two wells reaches the evaporator of the heat pump. Due to the mineralization of the water, an intermediate heating carrier was used in the form of a water solution of monopropylene glycol and an additional heat exchanger made of corrosion-resistant materials. In connection with this, a glycol heat pump operates in the installation, transferring heat for heating purposes in pavilion D2;

b) two borehole heat exchangers with direct evaporation. They therefore constitute the evaporator of a special (second) heat pump in the installation.

The boreholes are equipped with thermometers placed every 10 m to the final depth, i.e. 30 m below ground level;

c) two horizontal exchangers, one of which is installed with a double U-pipe made of PE DN40 pipes in a hole made using the HDD (horizontal directional drilling) method, and the other is installed in an existing pipe under the street separating pavilions A4 and D2 on the AGH campus in Krakow. The horizontal borehole heat exchangers work as low-temperature heat source for earlier egsisted two brine heat pumps;

d) three boreholes to a depth of 30 m below ground level, two of which are used to store energy in the form of pressure, constituting a volume for storing compressed air. The third borehole stores energy in the form of potential. The weight placed in it can move up and down. Thanks to this, it creates a storage, where the lower position of the weight means a fully discharged, and the upper position means a fully charged storage. All three boreholes are used to store excess electrical energy from photovoltaic panels.

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More details: /equipment/rozbudowa-laboratorium-geoenergetyki-agh-innowacyj/

Access type: External

Type of accreditation / certificate: Not applicable

Contact person: Śliwa Tomasz

Contact person url: https://skos.agh.edu.pl/osoba/tomasz-sliwa-4348.html

Responsible body: Department of Drilling and Geoengineering

Group / laboratory / team: Laboratory geoenergy

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Year of commissioning: 2023

IDUB research areas:

(PRA 1) Sustainable energy technologies, renewable sources of energy, energy storage, and resource management. Design, production, application, synergy, and process integration

Research capabilities:

The infrastructure has the capacity to:

a) study the impact of operating parameters on the efficiency of borehole heat exchangers,

b) study the flow resistance and hydraulic power losses of borehole heat exchangers,

c) study the energy efficiency of heat extraction from groundwater,

d) study various designs of borehole heat exchangers (different pipes),

Conditions for providing infrastructure:

The research infrastructure is made available for research through the employees of WWNiG AGH. The research, based on appropriate agreements with AGH UoK, will be carried out by representatives of the Geoenergetics Laboratory AGH.