Iceland Liechtenstein Norway grants

Norway grants

The User4GeoEnergy project (No. 2018-1-0502) is funded by Iceland, Liechtenstein and Norway through the EEA and Norway Grants Fund for Regional Cooperation

Improving the energy efficiency of geothermal energy utilisation by adjusting the user characteristics

Project background and objective

The use of geothermal energy for heating and its efficiency is becoming more and more important, in contrast to heating by fossil fuels. In the area covered by the project (Central Europe, Norway, Iceland), energy used in the residential sector for space and water heating accounts for more than 80% of the final energy consumption, being several times greater than the energy used for cooking, lighting and powering household equipment.

A heating system is characterised by certain technical requirements, e.g. supply temperature and required flow of water. Heat demand and the temperature of the return water are mainly dictated by the efficiency of the heating systems and weather conditions, but also the characteristics of the user(s) and the technology used. The selection of appropriate parameters and management of the system is referred to as the control of power delivery. Suitable equipment and software control the work of an energy source. The inability to reach the temperature required by the energy user (the installation that the user uses) results in the need to use additional supporting heat sources (peaking sources). The peaking sources generate additional investment outlays and their use occurs when the supply temperature isn't high enough.

Fossil fuels are most frequently used as additional supporting heat sources, therefore the main goal of the project is to improve the characteristics, efficiency and share of geothermal heating in order to reduce the use of fossil fuels for heating during peak hours. By decreasing the use of fossil fuels to meet heating needs, the User4GeoEnergy project also aims to decrease air pollution and CO2 emissions, and to contribute towards mitigating climate change.

Additionally, this should lead to less investment and lower operating costs for peak heating. The amount of energy generated by peak sources can be reduced or eliminated by adjusting the needs of the heat recipients to the capabilities of the source. This, however, also requires changes in heating systems.

As it involves changes in parts of the installation that are not owned by the energy supply companies, energy companies do not usually undertake such activities. It is also easier to match the capabilities of the energy source to the customer's requirements.

Currently available and commonly used technologies in some cases enable the required supply temperature to the customer's heating system to be reduced to below 40°C (e.g. floor or wall heating). It is also possible to lower the return temperature of the working medium. The development of the heat exchange surface and the use of other activities favouring the reduction of customer requirements can significantly reduce energy supply costs and improve the condition of the natural environment. Lowering the temperature of the return water in heating systems also significantly reduces the demand for the extraction of geothermal water, thus protecting geothermal resources. The User4GeoEnergy project provides a quantitative assessment of these activities. The considerations are aimed at determining whether changes in the heat recipients' installations can bring measurable economic, energy and environmental benefits.

Project main activites

- ☑ Exchange of good practice in the management of geothermal district heating between the donor countries (Iceland, Norway) and the beneficiary countries (Poland, Slovakia, Hungary), that will increase economic as well as environmental and climate benefits for all.
- ☑ Mathematical modelling of geothermal systems (energy source – heat distribution – end users), in order to identify optimal solutions for the supply of geothermal heat in the beneficiary countries, considering geothermal conditions and heat prices on domestic markets.
- ☑ The focus will be on individual customers in their homes by providing knowledge, experience, and technical solutions to improve the efficiency of geothermal heating. This will be based on data utilisation and the roles of public and individual sustainable solutions. The project will also focus on encouraging customers to modify heating installations in their homes in order to increase their heating efficiency.

Implemented by:

ORKUSTOFNUN National Energy Authority

NORCE

Project Partners

Mineral and Energy Economy Research Institute Polish Academy of Sciences (Project Leader)

SLOVGEOTERM a.s.

InnoGeo Research and Service Nonprofit Public-benefit Ltd

National Energy Authority

NORCE Norwegian Research Centre AS

Mineral and Energy Economy Research Institute Polish Academy of Sciences

SLOVGEOTERM a.s.

InnoGeo

Project Duration

01.10.2020 – 30.09.2023

Total budget

1 319 681 €

Grant funding

1 215 217 €

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