Interreg Alpine Space
EUROPEAN UNION
Greta
EUROPEAN REGIONAL DEVELOPMENT FUND

GRETA NEWSLETTER

News from GRETA Near-Surface Geothermal Energy Project

Forthcoming events in the geothermal energy field

April

8-13 April 2018. Vienna (Austria) – EGU General Assembly 2018

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12 April 2018. Bulle (CH) –Congrès des professionels romands de la pompe à chaleur

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18-19 April 2018. Utrecht (NL). The Geothermal Cross Over Technology Workshop

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19-21 April 2018. Izmir (Turkey). 5. Expo Geothermal

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24-26 April 2018. Reykjavik (Iceland). Iceland Geothermal Conference 2018

June

11-14 June 2018. Copenhagen (Denmark) – 80th EAGE Annual Conference and Exhibition

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17 -22 June 2018. Yokohama (Japan) – Grand renewable energy 2018

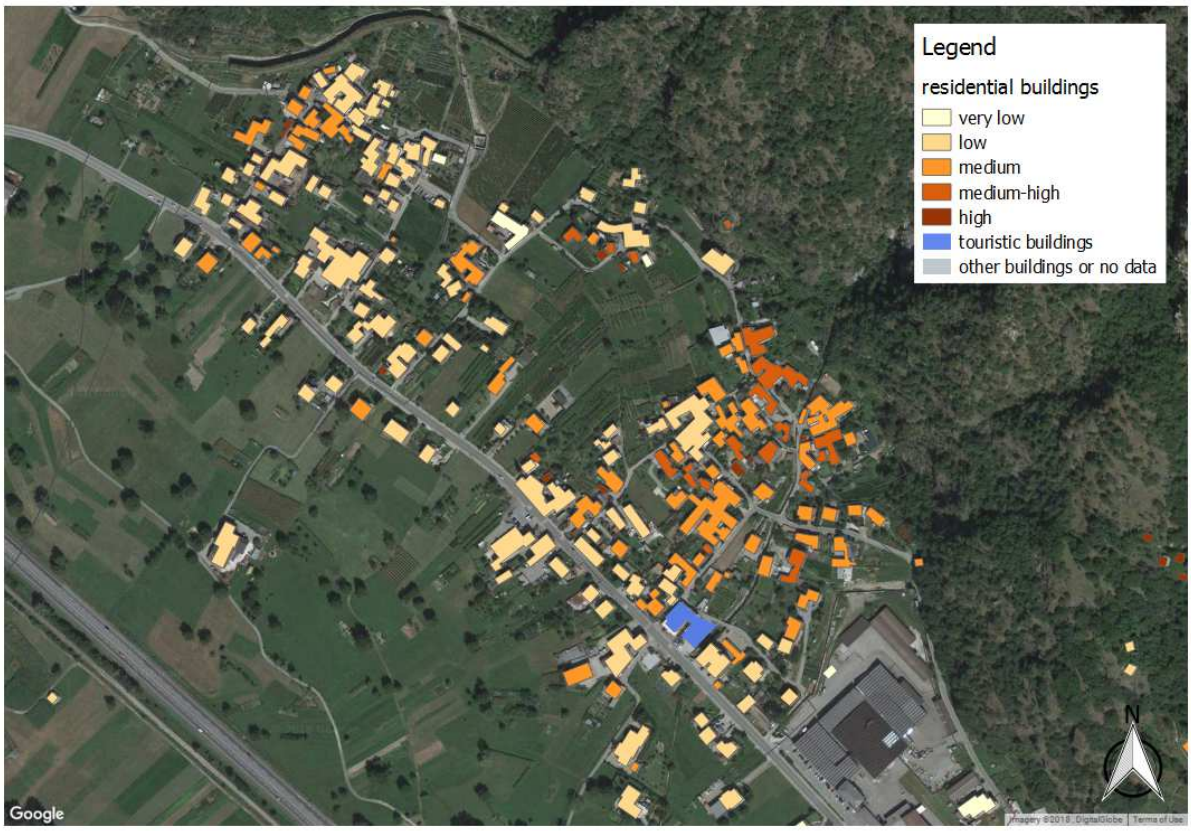
A Spatial Decision Support Tool to estimate the thermal energy demand of the buildings

In EU households, heating and hot water alone account for almost 80% of the total final energy use. Therefore, identifying the energy demand of the building stock is the indispensable starting point of any effective low-carbon policy. Eurac Research, one of the GRETA partners, has developed a Spatial Decision Support Tool (SDST) for local authorities; this tool aims to integrate different input data to improve the analysis of the thermal energy balance of a city or a region, considering the physical features of the residential building stock. The presented GIS-based evaluation method focuses on the thermal energy demand of residential buildings of the Valle d'Aosta region, one of the GRETA pilot areas. The final aim of the tool is to support local decision-makers in developing energy plans targeted to improve both the energy production from renewable energy sources (RES) and the energy renovation of the existing building stock.

Since geothermal energy is tightly linked to the energy demand, especially if compared to other RES, the thermal energy demand needs to be well described and consequently the residential building stock must be characterized. The tool developed by Eurac proposes a method to estimate and extract the required values (mainly geometrical features) when this information is unavailable for each single building. The method elaborated for the spatial evaluation of the thermal energy demand starts form the three main morphological features of the buildings (surface, height and volume). These morphological characteristics are

combined with the information on the period of construction of buildings to differentiate the building stock among several categories. The step forward is to assign to each building category, given by the combination of construction typology and age, the most appropriate energy parameters to estimate the energy demand.

The required data are gathered from different sources. To obtain the morphological features two digital models are used, both derived from airborne Light Detection And Ranging (LiDAR) data, which are becoming commonplace in municipal and regional datasets. For the age of the buildings, the data are gathered from the last general Italian Census (year 2011) on buildings and apartments. About the energy performance parameters, one can use different datasets depending on the availability of data for each case study. In this case, data from energy performance certificates of buildings are used. In addition, supplementary context data are added during the analysis, i.e. heating degree days, solar radiation, and average number of residents per building. It is worth underlining that all the data processing is done using open-source software and programming language (i.e. GRASS GIS, QGIS, R and Python).



Example of the spatial evaluation of the thermal energy demand (kWh/m^2) of the building stock in the Valle d'Aosta region.

Our work in GRETA

Work Package 1 - Management: the Technical University of Munich (TUM) is the project leader.

WorkPackage 2- Regulations: the Slovenian Geological Service (GEOZS) will edit guidelines aimed to foster the harmonization of regulations concerning thermogeology

WorkPackage 3 - Operational criteria: the Austrian Geological Survey (GBA) deals with the most technical aspects used in geothermal installations and their suitability in different geographic situations.

WorkPackage 4 - Mapping: the Turin Polytechnic (DIATI) will edit general and local maps of the geothermal potential, available in WebGIS

WorkPackage 5 - Energy planning: the research institute EURAC of Bolzano will develop a methodology for the integration of thermogeology in local energy plans.

WorkPackage 6 - User Interaction: the Regional Protection Agency of the Aosta Valley (ARPA VdA) deals with the involvement of private and public Stakeholders in the project, and the coordination of the GRETA HyperText

WorkPackage 7 - Communication: the French Geological Service (BRGM)

Thermogeology in Poland and other countries of Central Europe.

Profile:

Name: Wiesław Kozdrój
Age: 56
Education: PhD in Earth Sciences
Activity: Researcher in the Polish Geological Institute – National Research Institute
Lives in Wrocław, Poland
Experience in the thermogeology sector: 5 years
Geographical working area: Poland

We met Mr. Kozdroj in Salzburg during the joint conference between GRETA and GEOPLASMA, an Interreg project focused on shallow geothermal energy in Central Europe, in which the Polish Geological Institute is a partner.

From your experience in the GEOPLASMA Project, what are the main differences between the Shallow Geothermal Energy development in Central Europe and the Alpine Space?

Geologically, in general, the whole territory of Central Europe is suitable enough for shallow geothermal energy applications. We can find here very diversified rock units (formations, complexes), many of which, like magmatic and metamorphic rocks of the Bohemian massif show very good thermal parameters, especially for installation of geothermal heat pumps of closed loop system. In that sense the Alpine Space is different, as it is characterised by predominant high altitude mountainous areas of the Alpine orogeny with many carbonate rocks occurrences, which are rather not suitable for heat pumps of closed loop system (problems related with karst formations), but instead, sometimes good for open loop system due to rich resources of ground waters. The Alpine region has also vast occurrences of large alluvial aquifers in the Northern foreland basins and in the Po plain, which can be

extensively used by water/water geothermal heat pumps, also in big cities like Munich, Vienna or Milan.

In Central Europe the fostering of geothermal applications is often politically and practically hampered by the still wide diffusion of fossil fuels. Coal is more "traditional" while thermogeology is unknown; Are people still skeptical about its use?

Yes, the use of coal for heating is still the most popular energy source in the Central Europe, especially in Poland, where hard coal reserves are the biggest in Europe and are currently being exploited from several mines. There are more than 3 million coal-fired furnaces in single-family houses in Poland, and this is the main cause of severe air pollution. The habit of using coal is widespread and it will be very difficult to change this situation, for many reasons, mainly financial and educational. A strong barrier existing in both Central Europe and Alpine Space territories is the lacking of harmonisation in laws and regulations. I think that we all really need a sort of "geothermal guideline" at a European level, which can act as a model to be followed by the EU Member States.

Which are the main obstacles faced by thermogeology in Poland?

From a political point of view, unfortunately the government does not foster very much shallow geothermal energy and other renewables, preferring rather to keep the use of coal in future, while it is interesting to note that heat obtained from deep geothermal energy is strongly supported by the State.
We don't have an official census of the existing geothermal heat pump installations. Anyway from draft assumptions based on sales results in the last 10 years, we can assume that there are about 45 000 units, most of them represented by closed loop installations in private, single family houses. However, in recent years we observe an increasing number of installations in public buildings, such as hospitals or schools, created with the financial support of the state and funds from EU programs. Legislation is not very tight, for instance there are different rules regarding different depths of boreholes made for vertical heat exchangers. There is a set up maximum depth of boreholes (30 m) above which you do not need to declare the intention to do them to a local (district) geological authorities. This is the reason that many such drillings are not registered and not subjected to sufficient environmental control. Another depth of borehole - deeper than 100 m - makes you obliged to provide a special "traffic plan" required for mining areas. This regulation results in that very often drillings are "officially" stopped just few meters above this depth in order to avoid bigger bureaucracy.
In general, other geological obstacles for thermogeology like karst or swelling rocks are rather rare and not significant phenomena in Poland.

Does the illegal diffusion of thermogeology lead to environmental problems?

Existence of unregistered drillings for heat pumps is dangerous due to the possibility of incorrect sealing and contamination of groundwater by hazardous solutions from circulating brine in heat exchanger. However, the current recognition of this problem is also weak due to the lack of an environmental monitoring system for geothermal heat pumps in Poland. It remains to be hoped that these illegal practices, i.e. existence of heat pumps outside the official register, will be somehow better than breathing smog emitted from coal-fired ovens….

How would you improve the diffusion of thermogeology in your country?

Present geothermal heat pump market in Poland, with around 5000 sold units per year,is rather steady and shows considerable potential for growing. For many local communes and cities there are existing plans of exchange of heating systems in housing sector. Hence, there is a real chance that when promotional actions are undertaken and incentive and subsidy programs are running, people will be convinced to install effective and environmental friendly geothermal heat pumps in their homes. But first of all - to "make our dreams come true" – preventive education by and other promoting campaigns on advantages of geothermal energy are necessary. That is what we are doing in our twin GRETA and GeoPlasma projects.

[Please note that opinions expressed in this interview are those of the interviewees and do not necessarily represent the views of GRETA's stakeholders or project members].

Get in touch! Do you have salient issues or events that you might like to tell us to bring up in the next Newsletter? Let us know!

Link to the winner video of Alpine Space projects: https://www.youtube.com/watch?v=JO0agacgW4I

http://www.alpine-space.eu/projects/greta/en/home

https://www.facebook.com/greta.alpinespace/?ref=search

https://www.linkedin.com/company/greta-project/

GRETA is co-financed by the European Regional Development Fund through the Interreg Alpine Space programme. Send us an email at contact@greta-alpinespace.eu and see more about GRETA at www.alpine-space.eu/projects/greta