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## THE USE OF GEOTHERMAL ENERGY IN SOUTH MORAVIAN REGION

**Lincová H.**

Department of Applied and Landscape Ecology, Faculty of Agronomy, Mendel University in Brno, Zemedelska 1, 613 00 Brno, Czech Republic

E-mail: LincovaHelena@seznam.cz

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### ABSTRACT

Our objective consists in getting a general knowledge about the geothermal energy in our conditions, especially in the South Moravian Region. Methodically the work comes from the study of domestic and foreign relevant literature, the analysis of available statistical data, consultation with experts of the offices of state administration and self-government, based on field research and sociological methods (questions perceptions locals eventually visitors). The research contained three case studies. Each of them was focused on another type of a geothermal utilization. The first explored the Pasohlávky waterpark, which was opened in June 2013. The other two studies compared different heat pump systems (collector surface and a vertical borehole) for heating houses. All three studies were concentrated on the influence of a particular type of utilization geothermal energy to the surrounding countryside in all its layers concerned. The study was focused on using of geothermal energy at the present. But if we do not want to limit of exploration existing heat pumps, we have to deal with other potential sources of geothermal energy, which currently are not being used.

**Key words:** renewable resources, geothermal energy, geothermal systems, balneology, heat pumps, The South Moravian Region

**Acknowledgments:** This study is supported by grant project IGA FA MENDELU TP7/2013.

## INTRODUCTION

Since joining the EU in 2004, Czech Republic has been obligated to rise up the share of energy production from renewable resources. At the present the share is about 10 %. In 2020, the percentage will supposed to be on 13.5. It is clear, that geothermal energy is one of the most conceivable way to get this number.

The main goal of this study consists in getting a general knowledge about geothermal energy in our conditions, especially in South Moravian Region. The results can be used in learning process, scientific research and studies relating to Rural Development or as a basis for region's municipalities.

## MATERIAL AND METHODS

The first step was mapping natural and other conditions for the renewable energy production. It was therefore an issue of geomorphological, hydrological and climatological characteristics.

The second step required getting an overview of the existing state (separately in The Czech Republic and The South Moravian Region). The resulting data were entered in the cartographic base.

Afterwards an ideal case studies were chosen. The research contained three case studies. Each of them was focused on another type of a geothermal utilization. The first explored the Pasohlávky waterpark, which was opened in June 2013. The other two studies compared different heat pump systems (collector surface and a vertical borehole) for heating of houses. All three studies were concentrated on the influence of a particular type of utilization geothermal energy to the surrounding countryside in all its layers concerned.

In conclusion, the study tried to generalize about findings and create a basis, which could be used in many fields. For this purpose a special workshop took place, where SWOT analysis was made.

Methodically the work comes from the study of domestic and foreign relevant literature, the analysis of available statistical data, consultation with experts of the offices of state administration and self-government, based on field research from sociological methods (questions perceptions locals eventually visitors).

## RESULT AND DISCUSSION

Geothermal energy is probably the only natural renewable resource that can provides a continuous source of electricity. What is also very important to know, is that geothermal resource is usable only for a local scale. (MYSLIL, 2007) In terms of how to use the geothermal energy, resources are divided into two categories. The first are high temperature resources (the temperature above 150 ° C), which are applied for direct energy production. The second are low temperature resources (the temperature below 150 ° C). Those are applied in the first place for direct use (heating, agriculture and spa purposes). (HURTIG, 1992).

A lot of studies were focused on the determination of the geothermal potential of the Czech Republic. The Final Report of the Research and Development Project MŽP/630/3/99 of 2002 provides the most comprehensive view on this topic. Based on it's results there are only low

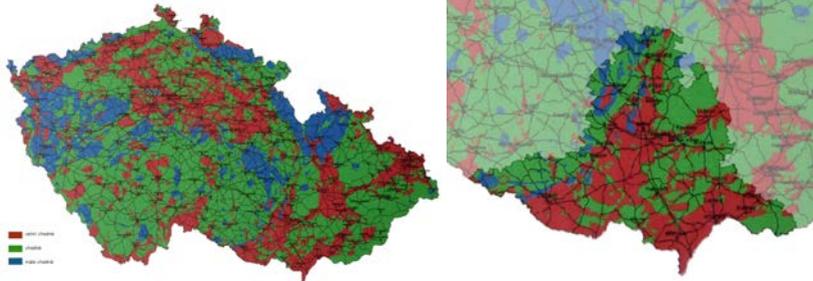


Fig. 1 Classification of the suitability of using Earth's heat (The Czech Republic and The South Moravian Region), source: VaV/630/3/99

#### CASE STUDY PASOHLÁVKY



Fig. 2 District of Pasohlávky in 2006 and 19th century ( source: mapy.cz, adjusted by author)

The first case study examines the impact of balneologic use over the countryside. The Moravia Thermal Waterpark is located in Pasohlávky district. It is situated next to the northern edge of a water reservoir Nové Mlýny near the two significant sites – The Pálava Biosphere Reserve and the Lednice-Valtice Area (entered in the UNESCO World Heritage List). The area is situated by the E461 motorway, which goes to the Austrian border. Thanks to this location the Moravia Thermal Waterpark was planned as a supraregional projects. The waterpark is located at the foot of the hill Hradisko, which is a significant archaeological site (former Roman legion). In connection with this a new archaeological project “the Rome Hill” has been preparing since 2010. It should be an archaeological park with a scientific centre and a public museum.

In terms of impact on the landscape and its inhabitants, the study evaluated positively:

- new job vacancies
- comprehensive use of GTE (both heating and spa treatments)
- The Rome Hill
- position in the lowland landscape (the object is practically visible only from the road)

On the contrary a negative value is connected with problems:

- suspicious conclusion of the proceeding (infiltration wells were treated separately and therefore there is nothing in the way of construction)
- effects on aquatic ecosystems ( a sewage solution)
- the impact of a transport

## CASE STUDIES PÍSTOVICE AND MORAVANY

The other two case studies compare the effect of the heat pump (ground/water) surface collector and collector vertical in a small municipalities (up to 5,000 inhabitants).



Fig. 3 Case studies Pístovice and Moravany ( source: mapy.cz, adjusted by author)

The issue of this “invisible” source lies in the land grab. From this point of view the surface collectors are much more problematic than vertical collectors. Installation of surface collectors requires an extensive area of land. Such large plots can be mostly found in suburban areas. Despite of the fact that local householders are trying to save money and environment by using this type of renewable energy, they are spending much more money and CO<sub>2</sub> on day to day commuting. As a consequence of this, surface collectors have a negative impact on the development of urban structures.

## CONCLUSIONS

The main goal of the study consisted in getting a general knowledge about geothermal energy in our conditions, especially in the South Moravian Region. The results (handbook) could be used in learning process, scientific research and studies relating to Rural Development or as a basis for region’s municipalities.

The study was focused on using of geothermal energy at the present. But if we don’t want to limit the exploration of existing heat pumps, we have to deal with other potential sources of geothermal energy, which currently are not being used.

The Research and Development Project VaV/630/3/99 of 2002 mapped more than 600 boreholes with a maximum value of about 159 ° C (VRT Him-2, depth 5493 m) in The South Moravian Region. Although this temperature is not sufficient for the implementation of power plant, it offers the possibility to use for direct heating or for other combined systems

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