GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

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GÖTTINGEN CAMPUS PLUS

Sustainable Energy in Harz Region
- Energy Survey of a Private Residence

Abstract
This interdisciplinary paper is the product of a cooperation between engineering students of Clausthal University of Technology and social science and politics students of University of Göttingen. The task was to show the applicability of sustainable energy in the Harz region on the example of a private residence. As a result, a reasonable concept for the energy efficiency, energy consulting and a heat pump system could be implemented, in combination with a demographic and stakeholder analysis to show the different groups involved in projects of this kind.

GEOTHERMAL ?

CLEAN	AFFORDABLE	RELIABLE
Renewable and no emissions	Low operating costs	Available 24 hours

➢ There will be a significant increase in energy supply from geothermal, solar, wind, biomass resource.

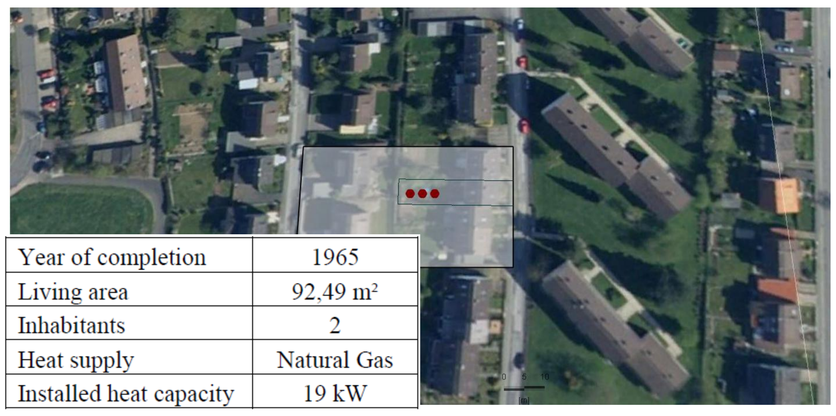
➢ Geothermal energy shows the great potential for long term (continuous) heat and electricity supply.

1. State of the building and energy consulting

The row house is located northwest of the Osterode city center. The resulting specific heat demand of the building equals to 195 kWh/m²*a. According to this value, the building is classified as efficiency class "F".
With an optimization of the exterior wall with polystyrene insulation , the specific heat demand of the building results in 118 kWh/m²*a . According to this new heat demand, the building would be classified as efficiency class "D".

2. Design of a shallow geothermal heat pump system

A further option for an energy efficiency measure would be the installation of a shallow geothermal heat pump system, to replace the natural gas heating system. The chosen heat pump system Vitocal 300-G provides 10.36 kW total thermal power which covers the demand for the house.
The geothermal system was simulated using simulation program FEFLOW. As a result, this system provides around 9.2 kW thermal energy for the heat-pump evaporator, which is more than demanded value of 8.43 kW



Year of completion	1965
Living area	92,49 m²
Inhabitants	2
Heat supply	Natural Gas
Installed heat capacity	19 kW

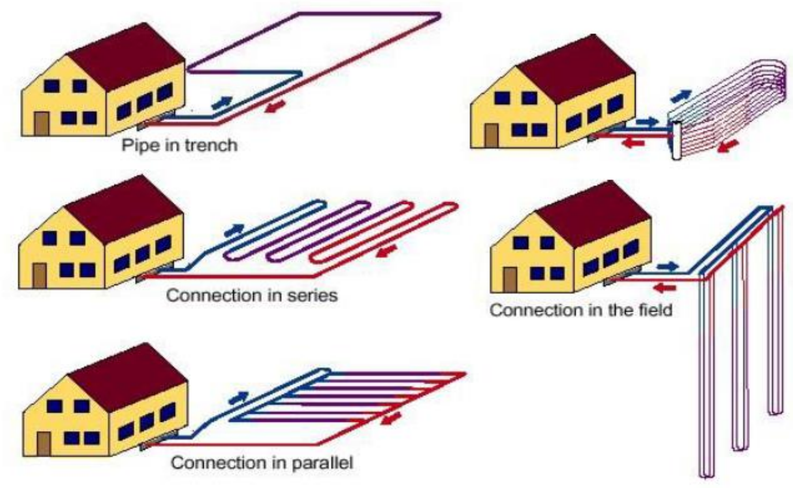


Figure 8: Different types of closed loop ground heat exchangers [Sanner]

3. Demographic and statistic analysis of the region

Economic and socio-economic data is needed for the economic estimate of geothermal energy in the Osterode. Demographic and socio-demographic data are intended to illustrate the first opportunities and risks for the project. Furthermore law regulations for house sanitations should be investigated.

4. Stakeholder analysis

The stakeholder analysis is used to examine attitudes and relevance of certain key players. It is estimated the influence of certain players on the final result and their general attitude to geothermal energy. Mostly these are certain advantages and disadvantages or fears of geothermal energy.

5. Survey of private homeowners

A survey of the private homeowners provides the project with more detailed information of the main target group. A random sample private homeowners will be interviewed and their economic situation, socio-demographic data, their knowledge and their fears about geothermal energy will be collected and evaluated.

Conclusion

All together, these participants broaden the horizon of the project, without focusing on one field only. Regarding the technical side of this project work, clear results could be obtained.

- Potential for energy consulting and shallow geothermal systems
- Potential for more interaction with local house owners
- Systematic approach needs to be carried out
- Connection of social acceptance and demographic structure leads to a broader applicability of the project approach

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