LTTT • Universität Bayreuth • 95440 Bayreuth

Universitätsstraße 30
95440 Bayreuth
Tel.: 0921 / 55-7161
Fax: 0921 / 55-7165

Master Thesis Assignment

Topic:

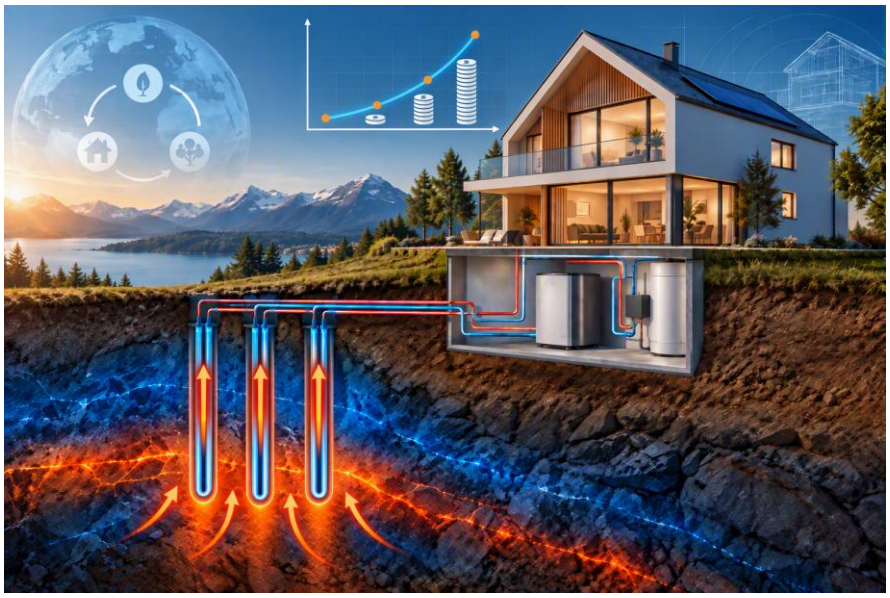
Market Analysis and Thermo-Economic Modeling of Ground-Source Heat Pumps for Single-Family Houses to Identify Trade-Offs between Efficiency and Costs

Objective:

Ground-source heat pumps are a key technology for the decarbonization of residential heating. However, current market solutions differ significantly in efficiency, design, and cost. This thesis aims to identify how today's systems are positioned within the efficiency-cost trade-off and which technical improvements offer the greatest potential for future developments.

The work includes a market analysis of commercially available heat pumps, the development and application of a thermodynamic simulation model, and the investigation of how component-level design changes affect both performance and investment costs. The objective is to identify the most promising technical and economic levers for next-generation ground-source heat pumps.

In addition to working within an active research environment at LTTT, you will collaborate with Exergyn, a pioneer in solid-state heat pump technology developing refrigerant-free heating and cooling systems based on shape memory alloys as a sustainable alternative to conventional vapor-compression technology.



Supervision:

- Jaromir Jessberger, M.Sc. (LTTT, University of Bayreuth); jaromir.jessberger@uni-bayreuth.de
- Prof. Dr.-Ing. Dennis Roskosch (LTTT, University of Bayreuth)
- Exergyn Ltd