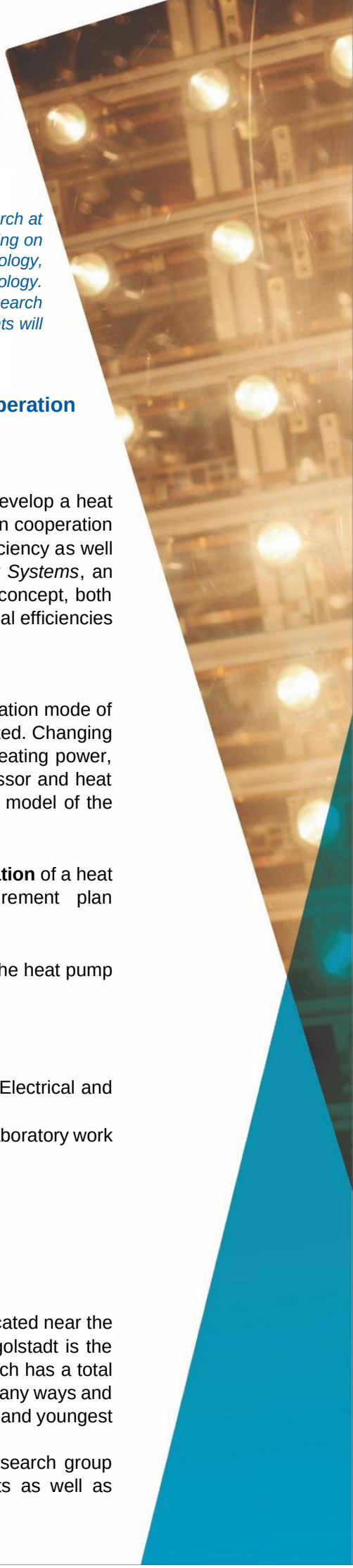
Technische Hochschule Ingolstadt
Institute of new Energy Systems



Institute of New Energy Systems (InES)
The Institute of New Energy Systems *is one out of three institutes for applied research at* Technische Hochschule Ingolstadt (THI). *The research activities of InES are focusing on the following fields of research: Bio-Energy Technology, Energy Systems Technology, Geothermal Energy, Networking & International Projects and Solar Energy Technology. Five professors and about 20 researchers and Ph.D. students carry out applied research projects in the field of renewable energy technologies. Bachelor and master students will find excellent career opportunities at the InES.*

Bachelor Thesis/Student assistant: Analysis of the inverter control of air source heat pump operation for the research project *WP2Q*

Research project and background:

The project **Heat Pump with 2 Heat Sources (WP2Q)** project aims to develop a heat pump, which is able to use both air and an ice storage as heat sources in cooperation with an industry partner. This is supposed to both increase the yearly efficiency as well as reduce the necessary collector size. At the *Institute for new Energy Systems*, an existing prototype will be adapted to allow experimental analysis of the concept, both energetically and technologically. Based on the experimental result, annual efficiencies as well as intelligent control strategies will be tested within a simulation.

Objective of the thesis:

For a deeper understanding and precise modelling of the air source operation mode of the heat pump in WP2Q, further experimental analysis has to be conducted. Changing the rotational frequency of the compressor has various effects on the heating power, electrical power and therefore the efficiency. The effects on the compressor and heat exchangers have to be analyzed experimentally to be included into the model of the heat pump.
Depending on the scope of the thesis, this can include:

- **Experimental analysis of the inverter-driven air source operation** of a heat pump prototype in a climate chamber, including measurement plan development and conduction of experiments
- **Evaluation of the measured data**
- **Approximation of the effects into a mathematical model** for the heat pump model in MATLAB/Simulink

Target Group:

Students of the subject areas/study courses:

- Energy Systems and Renewable Energy Systems, Mechanical, Electrical and Industrial Engineering, Physics, or similar
- Knowledge about thermodynamic behaviour of heat pumps and laboratory work is advantageous
- Fluent in either English or German

Period of time: Starting immediately, 3-6 months
Contact: Tobias Reum (M.Eng.), email: abschlussarbeiten_ines@thi.de

University, region and research group

Our institute is part of the Technische Hochschule Ingolstadt, which is located near the historic centre of Ingolstadt and the former Bavarian State Fortress. Ingolstadt is the fifth largest city in Bavaria and part of the Munich Metropolitan Area, which has a total population of more than 5 million. It combines tradition and modernity in many ways and is due to living experience and the atmosphere one of the fastest growing and youngest cities in Germany.
During your thesis, you will be integrated in our young and aspiring research group *Building Energy Systems* with around ten researchers, Ph.D. students as well as national and international trainees.