



### Institute of New Energy Systems (InES)

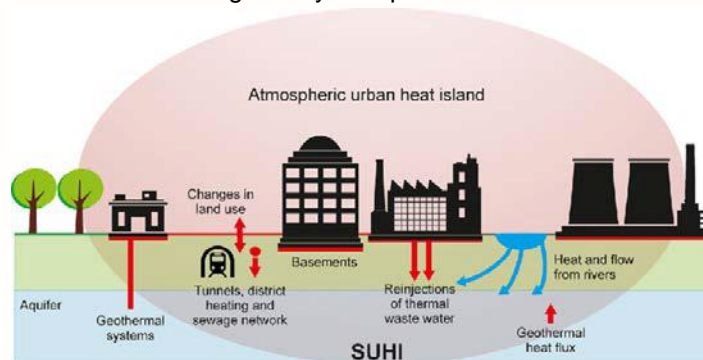
The Institute of New Energy Systems (InES) is one out of three institutes for applied research at Technische Hochschule Ingolstadt (THI). The research activities of InES are focusing on the following fields of research: Bio Energy Technology, Energy Systems Technology, Geoenergy, Networking & International Projects and Solar Energy Technology. Six 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.

### MSc thesis

Investigation of subsurface urban heat islands: Temperatures and processes

#### Background:

Numerous factors yield large-scale thermal anomalies beneath urban settlements. A schematic cross section through a city with potential heat sources is depicted below:



We call these regional manifestations of elevated temperatures “subsurface urban heat islands” (SUHIs). In several previous projects, we have examined temperatures, hydraulic conditions as well as the sources of increased heat input. Still, our insight is limited and new measurement programs are needed in further cities and districts. Currently, the German Research Foundation supports – for the first time at THI – a collaborative research project with Karlsruhe Institute of Technology (KIT) and Nanjing University (China)

#### Objective:

The overarching objective of this thesis is to contribute to our running projects on SUHI, and by this improve our understanding of temporally and spatially variable trends of temperatures in urban groundwater systems.

#### Tasks:

We invite students with different skill sets and interests to become member of THI's Geoenergy group. Focus can be set on:

- Conduction of repeated field measurements in urban groundwater wells, e.g. in Ingolstadt, Neuburg or Cologne; data collection and interpretation.
- Spatial data analysis of regional and local trends; statistical methods and time series analysis; use of geographical information systems (GIS) and MATLAB; long-term-prediction of SUHI evolution in the future
- Analytical and/or numerical simulation of heat transport processes and groundwater flow with existing tools; scenario and sensitivity analyses; identification of controlling processes and factors.

#### Target Group:

Curious, passionate and skilled candidates studying

- Renewable Energy Systems
- Mechanical engineering, computer science (engineering)
- any related degree program

**Start:** From now

**Supervision:** Prof. Dr. Peter Bayer, Dr. Ingo Dressel, Hannes Hemmerle

**Contact:** [abschlussarbeiten\\_ines@thi.de](mailto:abschlussarbeiten_ines@thi.de)