



Institute of New Energy Systems (InES)

As research institution for applied energy research, the Institute of new Energy Systems (InES) forms part of Technische Hochschule Ingolstadt. At InES, five professors and more than 40 researchers are working on future-oriented technologies in the field of renewable energies and rational use of energy. They focus on industrial and domestic energy systems, energy systems technology as well as on technology transfer and international projects. Bachelor and master students will find excellent career opportunities with InES. For more details about our research activities please visit <https://www.thi.de/energie>.

Bachelor/Master Thesis

Exploring and Applying Techno-Economic Assessment Methods for Sensible sTES Simulations of incampus

Research project and background:

Seasonal thermal energy storages (sTES) are a key technology for the integration of renewable energy and the decarbonization of heating systems. One promising concept under investigation at InES is a water-tank storage at incampus. A set of simulations (12 runs with varying parameters) has already been carried out in MATLAB/Simulink to study its thermal performance. While the technical results are available, the open challenge is to connect these outputs with existing techno-economic assessment (TEA) methods.

Objective of the thesis:

The aim of this thesis is to identify, evaluate, and adapt techno-economic assessment methods that can be applied to simulation results of a seasonal water-tank thermal energy storage. The work will clarify what information is already available, what additional data would be required, and which methodologies are best suited for future performance assessments.

Tasks:

1. Review existing techno-economic assessment methods for sTES from the literature.
2. Analyze which inputs and indicators each method requires (e.g., cost data, efficiency metrics, operational parameters).
3. Compare these requirements with the available simulation results.
4. Identify gaps: what data is missing, what assumptions would be needed.
5. Recommend one or more suitable assessment methods for application to the simulation results.
6. (Optional) Demonstrate a first application of a selected method to part of the dataset

Requirements:

- Background in energy engineering or a related field.
- Interest in renewable energy systems, thermal energy storage, and techno-economic analysis.
- Basic knowledge of energy system economics (e.g., efficiency, costs, payback, LCOE) or willingness to learn.
- Analytical and structured way of working, especially in comparing methods and identifying data gaps.
- Good literature research skills and ability to critically assess scientific sources.

Additional Information:

- Can be structured as Bachelor or Master Thesis
- Work can be conducted in English or in German

Start Date: as soon as possible

Duration: 6 months

Contact: abschlussarbeiten_ines@thi.de (please include CV)

