Research on Power Profiles in Microgrids

Brief Description of the Project:

Understanding the dynamics of various stakeholders within a microgrid is critical for effective energy management. In every moment of operating an electric grid the balance between demand and supply needs to be met. More detailed usage profile of energy demand and supply enhances simulation accuracy, contributing to the development of a more effective and intelligent energy management system for microgrids. Therefore, in this research internship, the student will conduct a mini-research project focusing on different stakeholders in a microgrid, including private households, industrial and other loads, along with corresponding energy supply components such as wind turbines, PV systems, etc. The primary goal is to identify and develop typical energy usage profiles for each stakeholder, enabling a realistic simulation of microgrid behavior. Students have the flexibility to decide the level of detail in the development of these profiles, ranging from a high-detail approach for fewer components to a lower detail scale covering a broader range of components.

Key facts:

Supervisor(s): Sebastian Zieglmeier and Paal Engelstad (Department of Technology systems, ITS)

Preferred Background of Candidate(s): Electrical Engineering, Computer Science, Renewable Energy Systems, Mathematics or related fields are encouraged to apply.

Number of Available Projects: 1-3 (As stated above there is a broad range in this project also providing flexibility for students to explore special aspects of energy systems in which they are particularly interested. The possibility for group work exists.)

Preferred Project Period: The project period is flexible and will be determined collaboratively between the supervisor and the selected student.

Background and Outline of Project Work:

Ensuring a balanced energy flow within an electric grid is a fundamental requirement for sustainable and efficient microgrid operation. The selected student(s) will undertake a mini-research project to identify and develop typical energy usage profiles for diverse stakeholders within a microgrid. This includes private households, industrial loads, and the transport sector, as well as corresponding energy supply components. The project approach is open-ended, allowing students the freedom to choose the level of detail in developing usage profiles, tailored to their specific interests.

Tasks may include (not all necessary):

1. Identifying stakeholders within a microgrid, encompassing various components from households to industrial loads and energy supply systems.

2. Developing typical energy usage profiles for identified stakeholders, considering the dimension of detail based on student preferences.

Expected Output:

The research internship is expected to yield a brief report documenting the research findings, including the developed usage profiles as useable data.

Depending on the project's findings, there is potential for a publication or further cooperation e.g. in form of a master’s thesis.

This internship offers a unique opportunity for motivated students to contribute to the ongoing research at ITS. Selected candidates will gain valuable experience in energy dynamics and sustainable energy solutions. The autonomy provided allows students to tailor their research direction based on their interests in collaboration with the supervisors.