Chair of Renewable and Sustainable Energy Systems
School of Engineering and Design
Technical University of Munich

Master thesis, IDP (Deutsch/English)

Full-stack development of a web-based user interface for mini-grid planning

Background

Seed Himalaya is a project committed to bringing sustainable energy solutions to remote mountain communities in the Himalayas. The project goal is to develop decentralized renewable energy systems that are not only technologically advanced but also socially inclusive and economically viable. One central aspect is the investigation of synergies between productive energy use and mini-grid capacities.

Therefore, this project focuses on the full-stack development of a user-friendly web-based interface for optimizing the sizing and design of renewable mini-grids in rural Himalayan communities. The platform will consider critical inputs such as energy sources, solar radiation, water/wind potential, and hardware costs to provide users with efficient and sustainable solutions. The primary goal is to simplify the complex process of mini-grid planning, making it accessible to users without extensive technical knowledge, by guidance in a step-by-step process through the planning of the system.

Requirements

- Experience/knowledge in frontend and backend development
- Programming skills (preferably Python)

Expected work areas

- Interfaces and APIs
    - Communication between frontend and backend
    - Interfacing between backend and optimization framework
- Docker architecture (possibly GitLab CI/CD deployment)
- Data management and handling
    - User data storage and management of previous results and setting
    - Time series data handling (ea. electric load profiles)
- Frontend & backend development
    - Database interface for storing and retrieving timeseries data
    - Token based status check for results
    - Visualization and meaningful representation of the results

Contact

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