

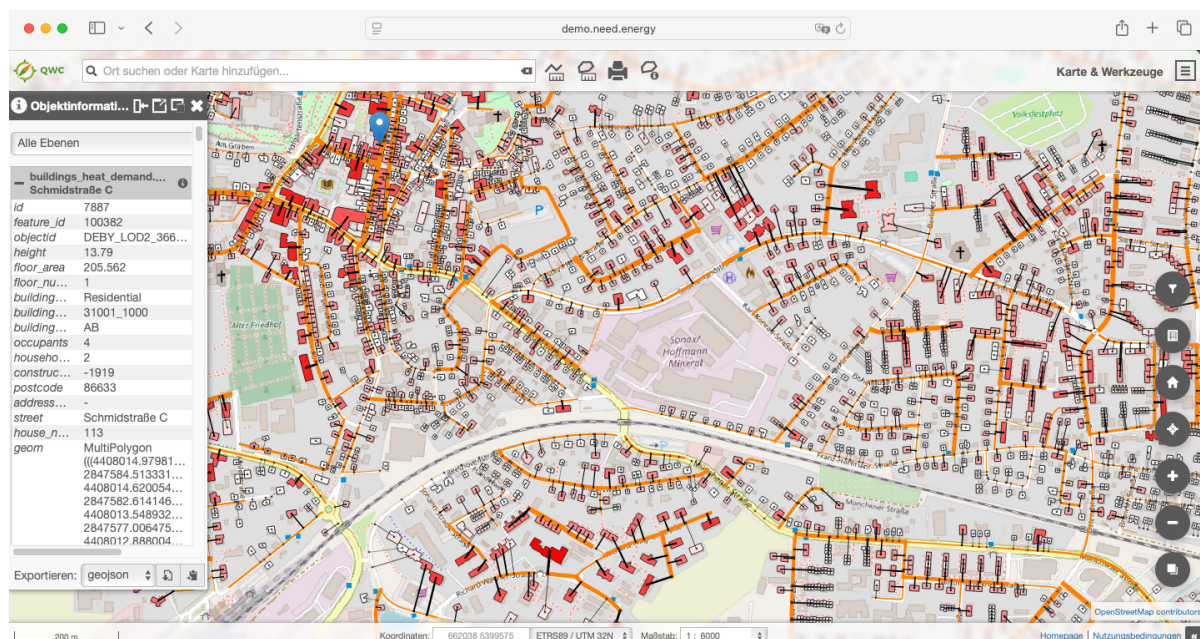
IDP, Research Internship (2-3 people) (Deutsch/English)

Development of infDB - An user-friendly open-source database for infrastructure and energy related data

Background

Our chair is currently developing a user-friendly, platform-independent, and open-source data infrastructure as a foundation for energy system analyses called infDB. It offers a flexible and easy-to-configure data infrastructure with essential services, minimizing the effort required for data management. We want to improve this data infrastructure by including more features as well as more data sources. This project enables you to advance your database skills while also ensuring user-friendliness to make the tool accessible to a broad audience beyond our chair. Depending on the project's progress, you might become part of a paper describing the infrastructure database. So, if you're eager to apply your technical skills and contribute to the energy transition, we invite you to join this impactful open-source project! More information on <https://github.com/tum-ens/InfDB>.

The infDB architecture and its data is for example used to determine the aggregated heat demand of streets as the very first preliminary results show at <https://demo.need.energy>.



If you are interested, please send us your academic record, your CV, and your GitHub/GitLab handle in your application. Applications by groups are preferred but not mandatory.

Goals

- Continuous development of the infDB database to make it robust and scalable
- Integration of new features and data types (schemata) into the database
- Ensuring usability and a good user experience for a broad audience

Technology Stack Requirements

- **Mandatory:**
 - Very good command of python, SQL and git
 - Ubuntu basics (Server OS)
 - Experience with Docker Compose and Dev Container
- **Nice-to-have:**
 - Experience with PostgreSQL with extensions TimescaleDB, PostGIS, PGRouting and [3DCityDB](#)
 - Web Visualization by QGIS Web Client (QWC)
 - FastAPI, nginx, pygeoapi
 - Knowledge about data management and metadata handling
 - Knowledge about energy system modeling

Work Packages

Examples – allocation depending on student skills and interests:

- **Data Engineering and Modeling skills**
 - Expand the existing open data basis by available data sources (e.g. OSM)
 - Expand the existing open data basis by adapting existing internal or external toolchains to the infDB (e.g. emobpy for mobility demand, When2Heat for heatpump efficiencies, Smart-meter distribution tool for electrical demands...)
 - Validate and improve existing methods for data disaggregation and imputation
 - Improve data quality by using Data Science and Machine Learning technics
 - Improve orchestration of data pipelines with dagster-dbt
- **Software development & Deployment skills:**
 - Build CI/CD pipelines for automatic deployment
 - Work on database structure and schemas according to best practices
 - Work on Dockerfiles for better performance
 - Implement new features by using dev containers
 - Implement and deploy infdb-python-package on pypi.org
 - Implement tests to ensure software quality and proper functioning
 - Implement APIs to interact with different software interfaces

Learning outcomes

- Application of learnt computer science know-how in the realm of energy system modeling
- Becoming proficient in the entire process of database design and data management
- Experience on working with GIS (Geographic information system) data and tools
- Hands-on software engineering in the following areas: software integration, database design and management, programming, software testing, version control, documentation

Contact

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