European Institute
for Energy Research
by EDF and KIT

22J016 – Internship Proposal

Digital twin for Multi-Energy Microgrids: Development of a load curve generator

Context

The European Institute for Energy Research was founded by EDF and the KIT in 2002 aiming at enhancing collaboration through joint projects applied to industrial issues. With its applied research orientation EIFER is bridging the gap between science and industry since more than 20 years. In the context of the European energy transition, EIFER provides research-based innovative energy solutions for the sustainable growth of cities, local communities and industries.

The team *Local Multi-Energy Systems* is looking for a student (f/m/d) interested in providing support in the design of microgrids in developing countries.

Internship description

Modelling a multi-energy system (MES) involves linking several topics, such as energy resources, energy conversion, energy transportation and consumption. Prior to modelling, technological features and local constrains of the territory must be well known and understood. The boundary conditions such as irradiation, temperature, village electricity demand are key input, because they influence directly the design of the multi-energy system and its optimization.
In concrete projects, especially the electricity demand of the villages is often missing and, when it is available, it is often incomplete. Often the measured data concern small amount of time over the year when they are available. It would be important to have approaches for the extension of the available data to the whole year.
In the frame of LEOPARD, other projects and in-house developments, the work during the internship will contribute to the review on work and literature. This review concerns EIFER internal projects and external literature on electricity demand modelling. In this context, also relevant data shall be collected from different sources. In order to tackle the problem of incomplete data, the candidate will participate in the conception of new approaches, such as the generation of data through simulators and statistical methods. Moreover, the produced data shall be organized and collected.
This work involves research on external sources as well as exchanges with colleagues in the institute.

The assigned tasks involve

- Review on work and literature in electric demand for MES;
- Collection of real data;
- Generation of synthetic data through simulators and statistical approach;
- Multi-Energy modelling for microgrid using the tool MemoGrid: Design and optimize the LEOPARD solution (i.e. PV panels, storage and associated power electronics) in relation with load curves
- Documentation of the accomplished work.

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Required qualifications / skills

- Studies in the engineering field;
- Skills in modelling; knowledge on Java/Python/AnyLogic language and optimisation is appreciated;
- Skills in statistical approaches;
- Basic knowledge of decentralized energy production; skills in technical and economic analysis;
- Interest in energy transition, open-minded to environmental and societal issues.

What you can expect

- A stimulating human-size, multicultural and multidisciplinary environment
- An institute at the intersection between academic research and one of the largest energy utilities
- Practical experience in development of research software for a real-world use case
- Opportunities to explore new technologies and methods if it fits in the context of the project
- A contribution to the key challenge of our era: fight against climate change through the decarbonation of the energy supply

Conditions

- Duration: 6 months
- Starting date: as soon as possible
- Location: EIFER, Emmy-Noether-Str. 11, 76131 Karlsruhe, Germany or remotely (depending on the current corona restrictions for workplaces)
- Working hours: 39.5 hours per week
- Monthly compensation: 450 € for compulsory internship

Contact

If you want to join our motivated team, please forward your electronic application with one single PDF of max. 5MB to jobs@eifer.org (cover letter + curriculum vitae). Please refer to the offer number **22J016**.
For additional information concerning the work, please contact stefano.sanfilippo@eifer.org or jean-sebastien.cardot@eifer.org