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

Winter semester 2023/24

Project Lab Renewable and Sustainable Energy Systems

Notes on registration

If you are interested in participating in this project internship, please proceed as follows:

1. Select the topic relevant to you for the project internship in the topics listed below. Also consider which other topics would be suitable for you.
2. Get in touch with the supervisors of the topics of your choice and make an appointment for a short video call.

   Procedure of the video call:

   a. First, the supervisors will give you a brief overview of their topic.

   b. Afterwards you have the possibility to speak with the supervisors for 3-5 minutes in order to get an impression of whether the topic is suitable for you.
3. If you would like to apply for one or more topics after talking to the supervisors, please send an email at the latest on Thursday, October 19, 2023 to propens.ens@ed.tum.de. Indicate the topics (no more than three) and please make it clear which topic would be your first priority.
4. Please register at the latest on Thursday, October 19, 2023 in TUMonline for the lab course.
5. By Monday, October 23, 2023 at the latest, we will inform you whether and, if so, in which topic you can work on the project internship.

If you have questions concerning the organization of the lab course, please contact Dr. Kuhn (pkuhn@tum.de).

If you have any questions about the content of the different topics, please contact the supervisor directly.

Please be sure to pay attention!

In order to participate in the project internship, it is essential that you

1. had a **short video-call with the supervisor** of the topic **AND**
2. write an **email which the topic selection you apply for** to Dr. Kuhn **AND**
3. register **in TUMonline for the course**.

If you do not meet one of the three requirements, you will not be included in the selection for participation.

Organizational matters

Weekly attendance times are mandatory for the project internship. These are planned to take place in presence. However, to some extent a "hybrid" format with online meetings is also possible. The format of the weekly meetings will be agreed for each group with each supervisor.

Unless noted otherwise, each topic is available in both German and English.

In the winter semester, we also offer the internship *"Interdisciplinary Project Internship Concept Development of a Renewable Energy System in a Developing Country".* Perhaps there is also a suitable topic for you here.

Topics

No.	Topic	Number of students	Brief description	Supervisor (email)	Time slots for meetings
~~1~~	~~GIS-based scenario creation for an agent-based energy modeling tool~~	~~3-5~~	~~The objective of the topic is to automatically create scenarios for an existing agent-based energy modeling tool from GIS data (e.g. OpenStreetMap)~~ ~~Background: The European energy system has been under a lot of pressure lately. The steady increase of renewable generation technologies, such as wind and solar, as well as new loads and consumers such as electric batteries and vehicles, pose significant technical challenge. One stakeholder that will be important in the future energy system is the distribution system operator (DSO) where most of these components will be installed. Due to their lack of awareness about the state of their grid and operation, they are not capable of assessing the impact. A possible method of circumventing this problem is a simulation based on GIS data, which has been researched. Another area for improvement is that traditional energy models work with perfect forecasts and low resolutions fail to capture the flexibility and potential of new stakeholders such as electric vehicles and heat pumps. New tools incorporate these aspects by simulating each stakeholder (agent) individually. The goal of this project is to combine the GIS-based grid creation with an existing energy modeling tool to enable DSOs to assess the impact of the energy transition on their grids.~~	~~Doepfert~~	~~By arrangement~~

Cancelled

No.	Topic	Number of students	Brief description	Supervisor (email)	Time slots for meetings
2	**EcoEats: a carbon footprint assessment of Campus Garching cuisine**	4-5	The aim of this project is to undertake an assessment of the carbon footprint associated with hypothetical menus offered at the Campus Garching Canteen. To facilitate this study, students will be tasked with formulating these hypothetical menus, drawing upon various data sources including personal experiences, surveys conducted at the canteen, and relevant statistical data. Utilizing specialized life cycle analysis (LCA) software, databases, and scientific literature, the students will conduct a comprehensive LCA analysis. The ultimate outcomes of this analysis will serve as a valuable resource for students in their meal selections, thereby providing guidance towards adopting a more sustainable lifestyle.	Cristina de la Rua, Lisa Weber	Wednesday
3	**Green Adventure on the Summits: Unveiling the carbon footprint of a German Alpine Club**	4-5	Mountain sports are often linked with a respect for nature and the environment. Nevertheless, like any activity, they inherently contribute to greenhouse gas emissions. This project aims to analyze the activities of a small mountain club affiliated with the German Alpine Club and assess the carbon footprint generated by its activities throughout a year. The assessment will include factors such as the nature of the activity (be it hiking, ski mountaineering, mountain biking, etc.), the number of participants, the modes of transportation utilized by participant and type of activity, and wherever feasible, the impacts derived from overnight stays in mountain huts and dietary choices will also be incorporated.	Cristina de la Rua,	Wednesday

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4	**EduGrid: Photovoltaic MPPT charge controller**	4-5	MPPT controllers optimize the performance of photovoltaic modules, which is crucial to achieve the maximum energy yield from solar radiation. The goal of this internship is to reinforce previously learned fundamentals in various areas of electrical engineering by developing an efficient MPPT charge controller. Working in a team on a real project will add to the technical challenges, such as micro-controller programming, circuit board design and power electronic circuit design, as well as learning how to work in an organized way in a group. The charge controller will then be used in further internships to illustrate its operation.	Michael Erhart	By arrangement