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

Winter semester 2022/23

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 20, 2022 to Dr. Kuhn (pkuhn@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 20, 2022 in TUMonline for the lab course.
5. By Monday, October 24, 2022 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.

Topics

No.	Topic	Number of students	Brief description	Supervisor (email)	Time slots for meetings
1	**Measurement of the flow velocity of the air in the VF box**	1	Construction of a rod-shaped sensor with several measuring sensors for measuring the flow velocity of the air in the Vertical Farming Box.	Kleeberger, Liedl, Halilovic	By arrangement
2	**Air cooling of the Vertical Farming Box**	2	The test stand set up in the summer semester to simulate the air cooling of the Vertical Farming Box is to be supplemented by the still missing refrigeration machine. More details in a personal conversation.	Kleeberger, Liedl, Halilovic	By arrangement
3	**Temperature measurement technology for the Vertical Farming Box**	2	To check the performance of the air cooling of the Vertical Farming Box, temperature measurement technology is to be integrated into the test stand. More details in a personal conversation.	Kleeberger, Liedl, Halilovic	By arrangement
4	**Energy model for a Vertical Farm**	3	Development of a model for a vertical farm within a thermodynamic simulation program to present the energy flows and energy demands within the system.	Liedl, Halilovic	By arrangement

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5	**Panda Power Project**	4	The rapid development of renewable energy systems requires a rather sophisticated restructuring of the energy infrastructure not at least the transmission and distribution networks. The optimization and simulation of these networks is a key task. The project will work with the simulation software PandaPower. We will first develop some simple models to get used to the simulation environment. The project will then develop a very simple front- and backend to build-up models very easily and which allows making systematic scenario analysis. The backend helps to analyze the results and to create a simple report about each scenario. (Contact: Kuhn)	Hamacher, Kuhn	By arrangement
6	**Hot water consumption**	4	Hot water consumption adds up to roughly 100 TWh/a. In addition, in future, the demand is not expected to decrease and the ration of hot water consumption to space heating consumption is expected to increase in the coming years. In the project, we will develop very simple models of the hot water production and distribution in various buildings and discuss how the consumption or the production can be optimized in future.	Hamacher, Kuhn	By arrangement
7	**Input data for an electric model for the Galapagos Islands in Ecuador**	4	The Galapagos Archipelago was declared by UNESCO as a Natural World Heritage Site in 1978, due to its unique biodiversity. For this reason, is so important to keep its uniqueness in so many levels including the energy field. In this work, the students should look for the Status Quo of the electric system in the Archipelago, the renewable energy potential, and the electric demand. The methodology to use will include QGIS, Multi-Criteria Analysis, and PyGreta.	Godoy, Addanki	By arrangement in presence

No.	Topic	Number of students	Brief description	Supervisor (email)	Time slots for meetings
8	**Renewable Energy Potential for Continental Ecuador**	4	Ecuador is a biodiversity country located in South America. Its power system relies 78.52% in hydropower, 18.78% on fossil fuels, and 1.58% in other renewables (including solar, wind, and biomass). The importance to increase the RE participation is a priority to have a strongest power system not dependent on just one resource. In this work, the students should look for the renewable energy potential including Wind, and Solar. The methodology to use may include QGIS, Multi-Criteria Analysis, and PyGreta.	Godoy, Addanki	By arrangement in presence