FAU students practicing transmission system operations in Switzerland

Four FAU students successfully finalised, confirmed by related certificates, their one week internship at Swissgrid Control. The control centre is considered the heart of the Transmission System Operator (TSO) of Switzerland - Swissgrid. The practice was organised in the framework of the international cooperation between the Institute of Electrical Energy Systems (EES) and Swissgrid. The students could experience practical aspects of the ongoing energy transformation process (called in Germany "Energiewende").

Since summer semester 2014, EES has launched a new lecture "Transmission System Operations and Control" for students of the Master Program Energy Technology (ET). The lecture provides the students with many aspects of system operations. It comprises technical and organizational aspects for interconnected systems operations including load and frequency control, voltage and reactive power control as well as load-flow management. The focus here is on security of electricity supply. It is also explained why and how the electricity market has been implemented. The lecture is given in English since necessary cooperation among TSOs and other parties in the electricity sector requires now a common technical terminology and communication language. The lecture is supported by exercises with elements of modelling.

To make the educational process even more complete, an on-site practice, as a pilot project, for the best students was organized in cooperation between EES and Swissgrid. This was possible thanks to the positive attitude to the idea of Mr. Pierre-Alain Graf – CEO of Swissgrid - and outstanding commitment of Dr.-Eng. Walter Sattinger, who personally took care for the general course of the practice, as well as his colleagues involved in the individual subjects. Thanks to their efforts the students could learn, among others things, the advanced processes necessary to prepare the system for real-time operation and finally, how to control the system on-line.

Operations of transmission systems have become more complex and challenging in recent years. After the liberalisation of electricity markets and the unbundling of vertically integrated utilities into transmission, distribution and generation sectors, the European TSOs became responsible for a reliable, efficient and secure operation of the continental interconnected transmission network. In many countries, TSOs are in charge of the extension of the grid infrastructure as well.

In addition, a large scale integration of renewable sources like wind and solar power and a huge increase in market-related cross-border electricity trading and transmission of a massive power flows have changed the very nature of the power system. Thus, the TSOs in Europe have expanded their operations and strengthened their cooperation to ensure a secure supply of electricity. It is a necessity to coordinate and to regulate electricity flows within the grid that extends right across Europe, while at the same time keeping the system in stable operational conditions.

This is also why the operation of the transmission system nowadays and in the future requires more and more a very broad knowledge of the physics of the system itself and its individual components, such as single generators, transformers, or lines. Also operators have to be familiar with adjacent

transmission systems. Those new challenges create room for new research studies and for the implementation of new technologies capable of supporting operations of the whole system.

This was the first time ever that students had the opportunity to use their knowledge gained from lectures, to work together with experts in the control centre of a TSO. Students have very highly evaluated the program of the practice as well as its modern ways capable of injecting more value into the educational process.

And how do they personally evaluate the practice?

Nadine Wehner: "*This practice was definitely one of the most valuable experiences in my studies. It supplied me with a comprehensive overview of how transmission system operation is done in practice and how the different tasks, like operational planning and real-time-operation, are organised.*"

Maiko Friedrich: *In the practice at Swissgrid in Laufenburg we got a deep insight in the different parts of network control. It was a very interesting time, full of informative discussions, detailed presentations and practical demonstrations. Thank you to Mr. Pierre-Alain Graf, Dr.-Eng. Walter Sattinger and Dr.-Ing. Iwona Biernacka, who made this practice possible! I hope some more FAU-Students will get this opportunity within the next years!*

EES makes an effort to launch this kind of cooperation also with other European TSOs.

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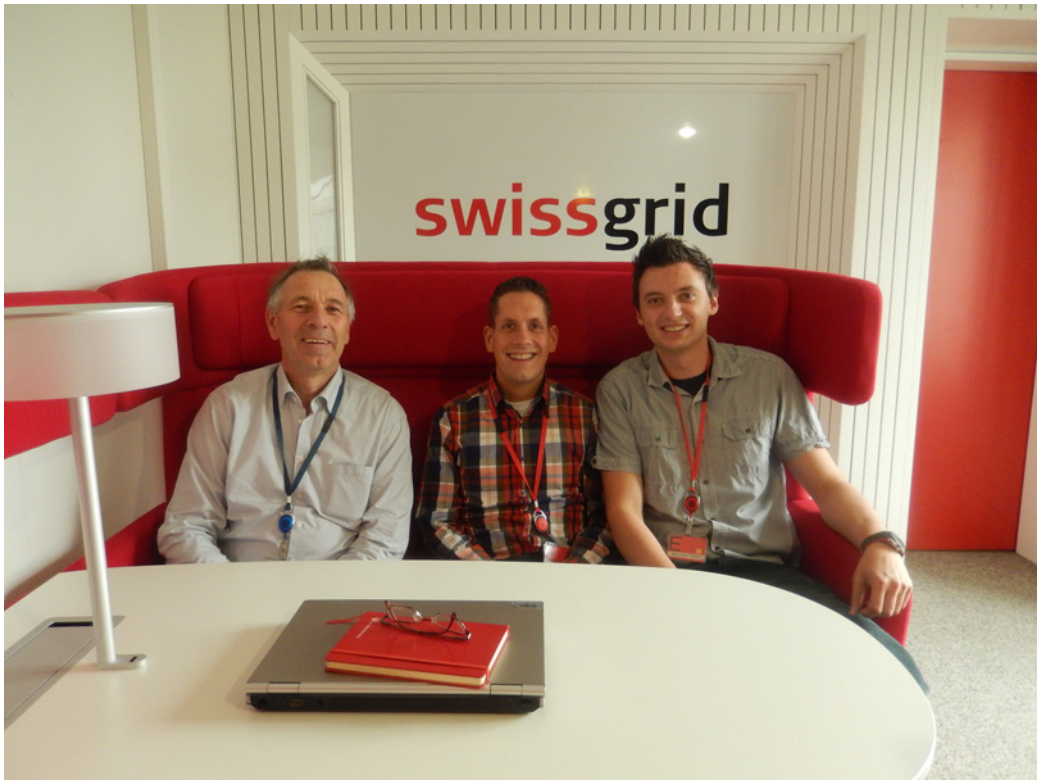
Source: Swissgrid

From left to right: Jonas Schlund (FAU), Dr.-Ing. Walter Sattinger (Swissgrd), Nadine Wehner (FAU), Christian Welti (Swissgrid)



From left to right: Dr.-Ing. Walter Sattinger (Swissgrid), Michael Richter (FAU), Maiko Friedrich (FAU)