CEBra
Centrum für Energietechnologie Brandenburg

NEWSLETTER

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"Power System Simulator"

In the recent years more and more wind energy and photovoltaic energy installations have been erected. The fluctuating in-feed behaviour significantly affects the requirements for a safe operation of electrical power systems. Hence, the dispatchers are frequently faced with challenging situations to ensure a safely operating transmission system. In view of the outlined challenges and the new ENTSO-E regulations (European Network of Transmission System Operator for Electricity) there is a need for the operational personnel to be trained extensively. Well-trained dispatchers are required in order to handle critical situations effectively and to ensure system security. Dispatchers of the TSO control centres are expected to recognize and to handle critical incidents that endanger stability of the transmission systems. Additionally, they are expected to initiate the necessary measures to restore the transmission systems in case of major disruptions/failures.

An effective method to train the staff is a training simulator. It reproduces real case scenarios and is considered to be the most efficient way to instruct the staff. The technical concept of a system simulator reproduces the complex interactions between generation, transmission and consumption in real power systems. For this purpose a cyclic power flow calculation uses profiles in the basis for the process simulation. This reflects the changing electricity demand throughout the day. Moreover, in-feed schedules of power plants are used to reproduce changing in-feed behaviours over periods of day. Every power plant has its particular operation characteristic, which appropriate models, e.g. power gradients or response characteristics. Also the simulator is able to reproduce the stochastic profile patterns for the in-feed by wind and solar parks.

Within this article a training simulator is describe, which can be used for efficient dispatcher training of transmission and distribution system operators. The configuration of the training simulator is based on the organizational structure of the energy power system and includes nine dispatch centres (see Figure 2). Thus, several trainees can be trained at the same time. They interact as different network operators or power plant operators together on a simulation system. Among other things communication between control centres and coordination in fault situations is trained. The dispatch centres represent control centres of the respective grid or power plant operator. They simulate the realistic system environments with their appropriate operating functions. Each trainee has access to its grid area only. Hence, they can act only there to control actions. Furthermore, there are two dispatch centres for supervisors who have access and control to the whole grid model. Thus, they monitor and control the training sessions. For the development, test and verification of new training scenarios and their integration into the simulation system there are three dispatch centres in a separate room.

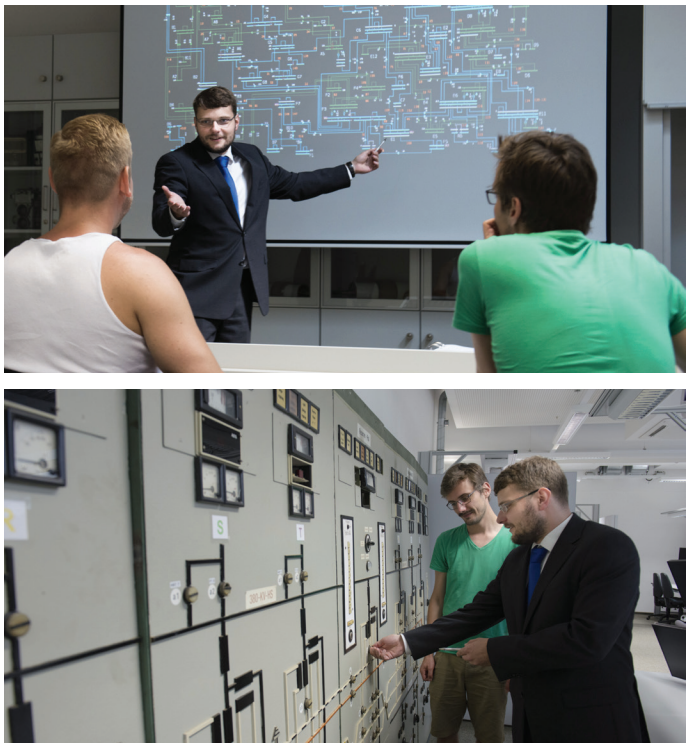

Figure1: Nico Brose texplainign he students the overview of the grid in the power system simulator room

In general, the training simulator could be simultaneously operated with 14 trainees. Within the Power System Simulator arbitrary grids (synthetic grid models as well as real grids) can be implemented.

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Figure 2: Overview room of the simulation system
green = dispatch centres for trainees;
red = dispatch centres for supervisors;
blue = dispatch centres for system administrator

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