

RIKA Project

« Electricity control and trading with renewable energies »

Background

The extensive use of renewable energies raises major issues for today's electric power grids. Electricity has to be produced in the moment of consumption. But the most important renewable generators – solar and wind power plants – produce electricity independent of the consumer's needs. Storing large amounts of electrical energy is expensive and has limited efficiency. Approaches for solving the issue in large power grids such as the Synchronous Grid of Continental Europe are selling spare energy to countries where it is currently needed and controlling parts of the power consumption.



Work Description

The topic given to all student groups of the project-laboratory “Design and Realization of a Telematics System” addresses this issue in a smaller scale. The electric power grid of a large island has no electric connection to the main land. Four operators (the student groups) are responsible for controlling the power grid of a part of the island (a control zone). They have a wind farm, a solar farm, a controllable fuel generator, and energy storage (a battery) to produce the amount of electricity currently needed. Consumers are a factory whose production and power consumption can be controlled and uncontrollable customers. In addition, electric power can be sold or bought from or to other control zones.

The goal of each student group is to design and implement the control software for their control zone. The software accesses a simulator provided by the institute via network. It needs to robustly balance production and consumption of electricity in the control zone and trade energy with other control zones. A committee of all groups need to define the protocol for trading. In addition the software needs to provide a user interface to monitor and control the system. At the end of the semester the systems of the student groups will participate in a competition. The goal of this simulation run is to make as much money as possible.

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