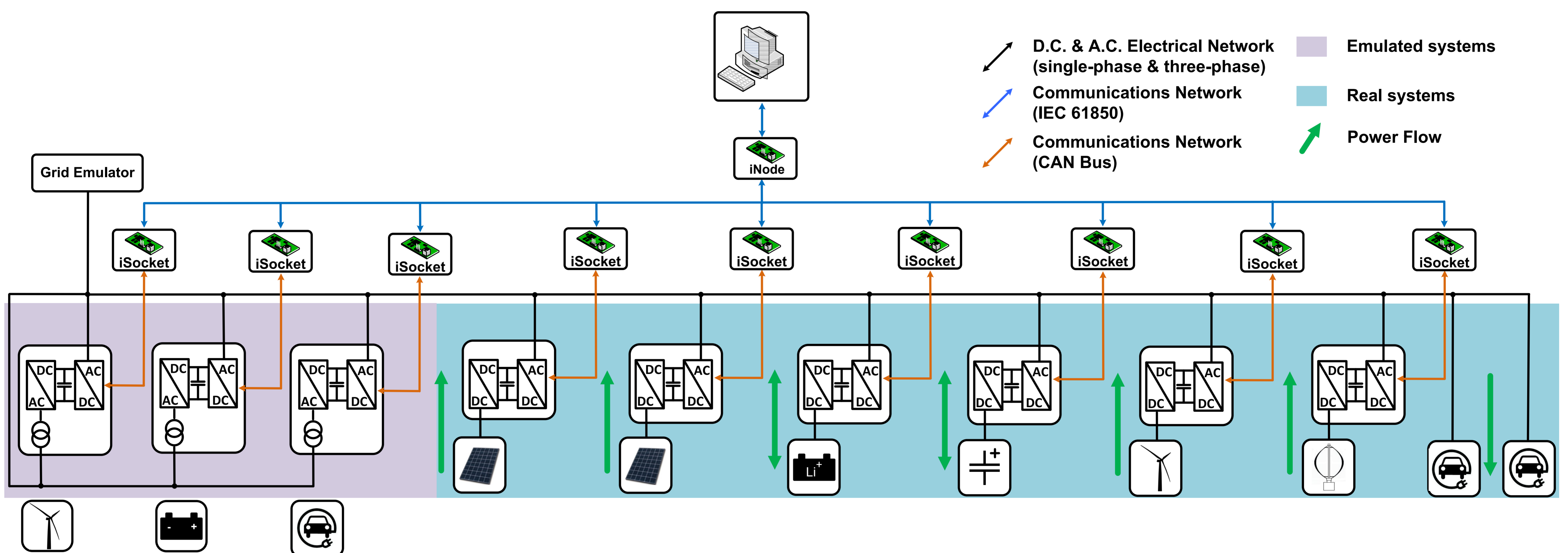


STOCHASTIC OPTIMAL MICROGRID MANAGEMENT

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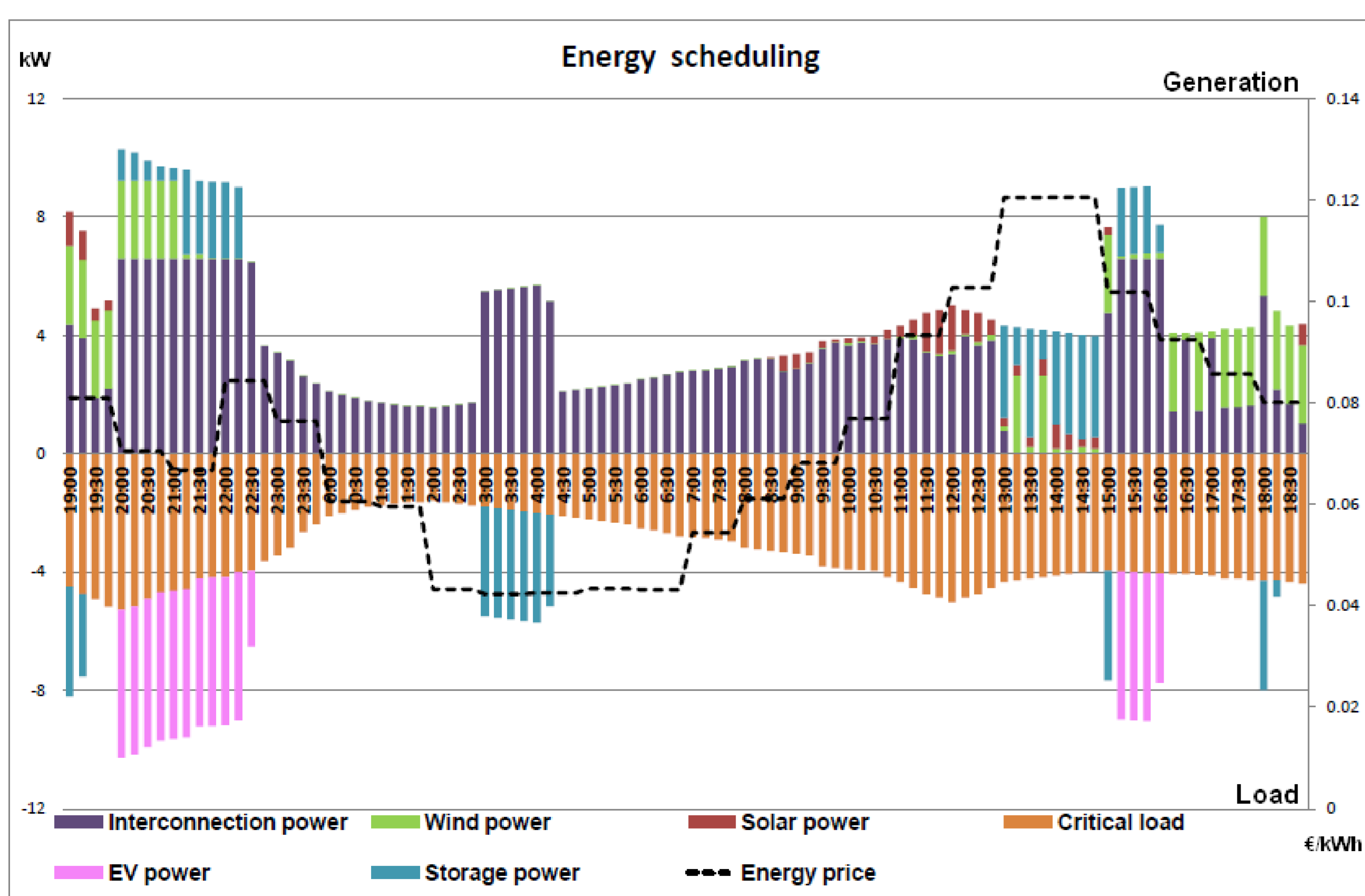
Economic optimization of microgrids

Microgrids are modern, **small-scale versions of the centralized electricity system**. They achieve specific local goals, such as **reliability, carbon emission reduction, diversification of energy sources, and cost reduction**, established by the community being served. Like the bulk power grid, smart microgrids **generate, distribute, and regulate the flow of electricity to consumers**, but do so locally. **Smart microgrids** are an ideal way to **integrate renewable resources** on the community level and allow for **customer participation** in the electricity enterprise. They form the **building blocks of the Perfect Power System**.



Objective

To build the stochastic version of the current IREC optimization algorithm. The objective is to include the stochasticity of the weather data into the control strategies of the microgrid. The algorithm must run in IREC's test facilities.



Requirements

- Capacity to work in a team, flexible, with initiative and ability to innovate. High level of analysis and synthesis skills.
- Knowledge on operations research, mathematical modeling, stochastic optimization or other optimization techniques are required.
- Programming languages (C, ..) and modeling languages (Gams, ...) knowledge is required.

What do we have already?

An advanced optimization tool with three levels: primary, secondary and tertiary which represents different levels of energy control.

This tool optimally decides the energy flow between the different elements included in the microgrid representing for example a smart house, an e-parking, a charging station, ...

What would we like to have?

The different configurations of the microgrid include renewable resources such as micro wind turbine and solar panels. These elements depend closely on the weather conditions.

One natural way to introduce this dependence is the stochastic programming techniques.

Main tasks to be done in the TFM

- To study the stochasticity of the parameters (forecast values, simulate distributions, ...)
- To include this stochasticity into the current deterministic model (scenario generation, stochastic parameters calculation, ...).

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