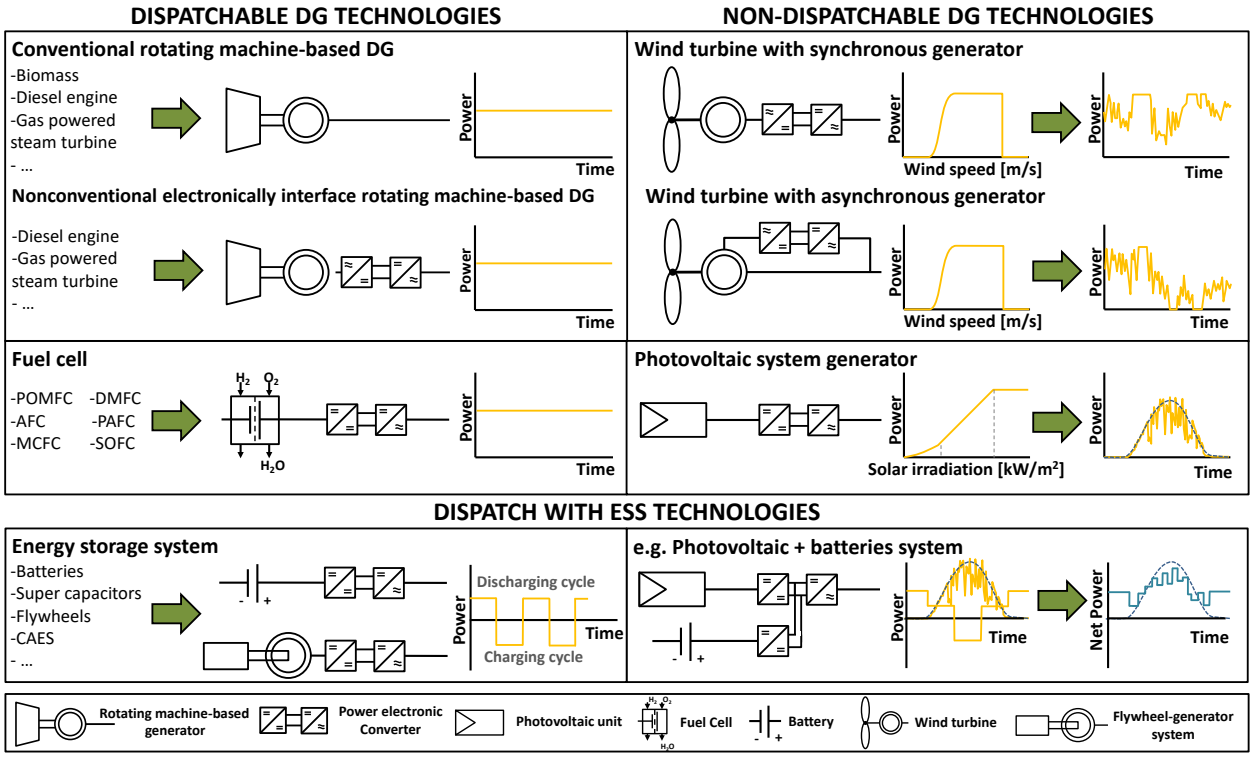
Institut für Automatisierungstechnik

Master Thesis

Modelling of distributed and multimodal energy resources for the expansion planning of microgrids and smart power cells

Background Microgrids are self-controlled active distribution networks that can operate in both grid-connected and islanded mode, while a Smart Power Cells is defined as a controllable subsection of the power system where electric distributed generators, storage devices and conventional, as well as flexible loads are interconnected via medium and low voltage AC-DC networks and power-electronics-based multimodal interfaces to generate, distribute and consume electricity locally (inside of the cell), and simultaneously exchange power and services with the main transmission grid, neighboring cells or multimodal power-to-gas (P2G) or power-to-heat (P2H) interfaces.



Distributed energy resources

The expansion planning of microgrids and smart power cells requires the modell of their distributed and multimodal energy resources. The main purpose of this research topic is to identify mathematical modelling strategies for different technologies and implement them in Matlab and Python for quasi-dynamic and steady state power flow and optimal power flow simulations.

Literature

- Kwasinski, A., Weaver, W., & Balog, R. S. (2016). Microgrids and other Local Area Power and Energy Systems. https://doi.org/10.1017/CBO9781139002998
- Chowdhury, S., Chowdhury, S. P., & Crossley, P. (2009). Microgrids and Active Distribution Networks. https://doi.org/10.1049/PBRN006E

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