Fraunhofer IWES

FRAUNHOFER INSTITUTE FOR WIND ENERGY AND ENERGY SYSTEM TECHNOLOGY IWES

MICROGRID PORTFOLIO BY FRAUNHOFER IWES

Jan von Appen[1], Dominik Geibel[1], Martin Braun[1,2], Thomas Degner[1], Philipp Strauß[1,3]
Contact: Jan von Appen, Phone: +49 561 7294 276, Mail: jan.vonappen@iwes.fraunhofer.de
[1]Fraunhofer IWES, Königstor 59, D-34119 Kassel, Germany, [2]University of Kassel, Germany, [3]DERLab e.V., Germany

EXPERTISE

Fraunhofer IWES offers an integrated approach to analyze the entire microgrid value chain: economic planning, electrical component and system simulation, component development, laboratory testing of components and supervising the commission of the microgrid.

CONTROL APPROACH FOR MICROGRIDS:

To achieve an optimal and robust microgrid operation, the Fraunhofer IWES control concept follows a two-fold approach:

- Model predictive control to derive cost-efficient operation schedules for controllable microgrid units such as batteries and CHP units considering load and RES uncertainty
- Fraunhofer IWES has developed its own self-synchronization control approach which is implemented in state-of-the-art market systems such as SMA's Sunny Island battery inverter.
  - Realization of inverter dominated networks using one or multiple battery inverters as network builders
  - Selfsync® algorithm enables synchronization of network builders without communication
  - Load sharing among inverters using droops
  - Control of renewable energy resources without communication using voltage and frequency

TECHNICAL CONSULTING:

Fraunhofer IWES has conducted a board variety of studies within island and microgrid context:

- Development of a control approach for microgrid operation of an office building of Jiangxi Province Electric Power Research Institute (JXEPRI), China.
- First fully inverter based microgrid deployment and operation based on the selfsync® concept on Kythnos, Greece.
- PV-diesel-battery system for a Galapagos island, Ecuador (incl. components sizing, control architecture, and reliability analysis).
- Generation and grid adequacy study for a large scale integration of PV and storage systems for the island of Curaçao

LABORATORY AND TEST FACILITIES

Our laboratory SysTec allows to test LV to MV microgrids in grid-connected and off-grid mode.

COST-EFFICIENT MICROGRID OEPRATION

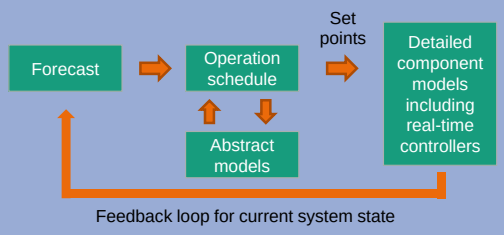

Fig. 1: Model predictive control approach for microgrids.

SELFSYNC® CONTROL CONCEPT

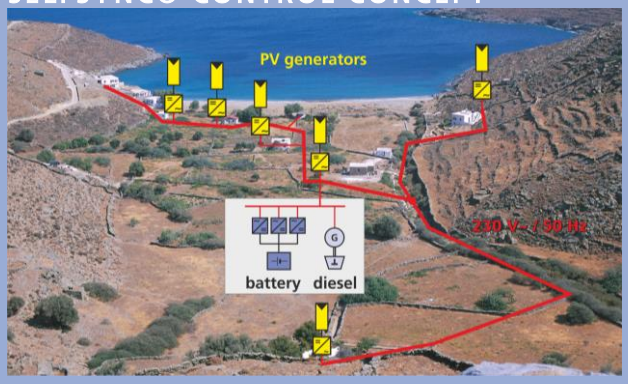

Fig. 2: Microgrid on the island of Kythnos, Greece.

GENERATION AND GRID ADEQUACY STUDIES

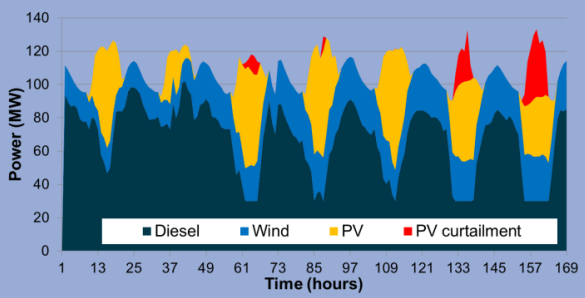

Fig. 3: Operation of DER for increased RES integration on Curaçao.