

Technical Specification

Test Facility 3 - Electrical Power System Stability Laboratory (EPSSL)

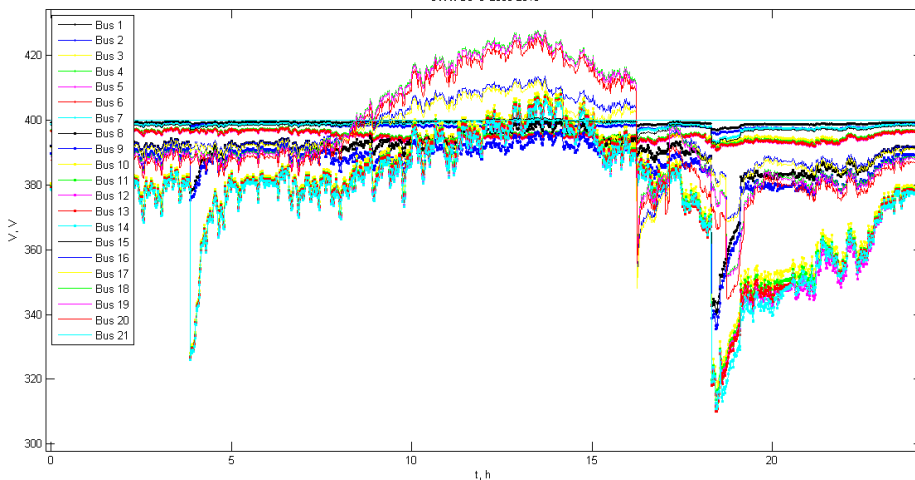
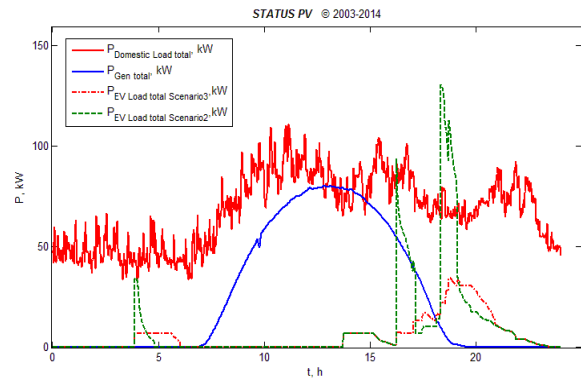
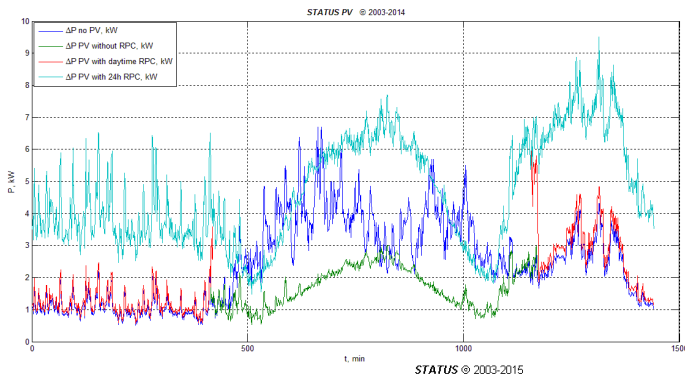
The research focus of the Electrical Power System Stability Laboratory is in the area of modeling, analysis and management of Electrical Power Systems.

Proposed services:

- Power Flow Analysis of electrical networks with Distributed Energy Resources (DER)
- Autonomous, Micro and Mini Grids
- Power Generation Prediction of DER
- Energy and Power Management Systems
- Intelligent Power System Automation and Control
- Modeling and simulation of Smart Grid Systems and Components
- Model/Software/Hardware-In-The-Loop experiments
- SCADA systems of distribution and micro grids
- Voltage, Angular and Frequency Stability Analysis
- Transient Processes
- Power Systems Dynamics
- Energy Storage Systems



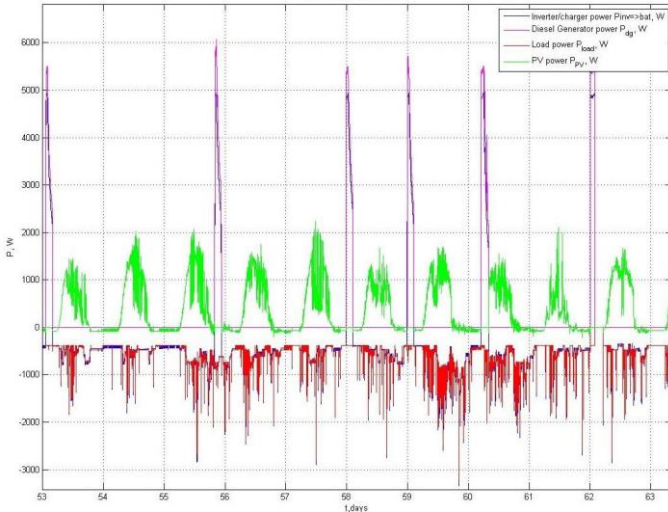
The computational platforms allow static and time domain estimation of the impact of EV charging, DER control and smart load and storage control strategies on the network. The infrastructure allows also power system stability studies in case of cyber security violations.



A test case of distribution network with EV charging and DER - load and PV generation power, voltage profiles and power over 24 h simulation period.

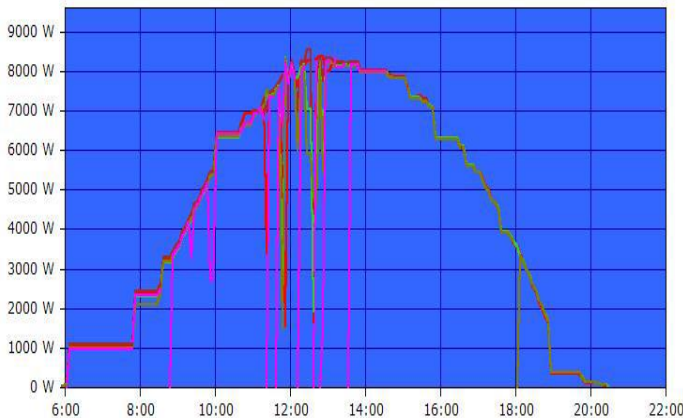
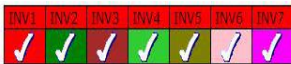
Exemplary research activities:

Active power control strategies of isolated microgrid



- PV generator: 10 pc. of 230 Wp polycrystalline modules
 - Storage: 27pc. of 800Ah, 2V, lead acid sealed gel battery
 - Inverter/Charger: 8kW, 48VDC/230VAC
 - Solar charge controller: 40A, 48VDC
- Test results of microgrid power balance over 10 days period under real operational conditions. The load variation and the PV production are stochastic variables which determine the operational mode of the diesel generator and the storage of the microgrid.

PV generator connected to weak distribution network



- PV inverters connected to a weak distribution network with high power line impedance.
- PV modules : 314 pc. of 235 Wp polycrystalline modules
 - Inverters: 7 pc. 10kW, 400VAC , 3ph grid inverters
- Due to the voltage increase Significant power limitations for the most distinct inverters can be observed.

Current researcher
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