



## AIT SmartEST LABORATORY FOR SMART GRIDS

The SmartEST (Smart Electricity Systems and Technologies) Laboratory established by the Austrian Institute of Technology provides a unique research and simulation infrastructure to analyze the interactions between components and the grid under realistic conditions. Potential devices under test range from inverters, storage units, grid controllers and CHP units to charging stations for electric vehicles.



The **AIT Energy Department** is developing solutions designed to ensure a sustainable energy supply for the future. Our research services are based on longstanding experience, scientific excellence, state-of-the-art laboratory infrastructure and international cooperation in the key areas of tomorrow's energy systems: smart grids, photovoltaics, thermal energy systems, smart cities and smart buildings. We act as a leading innovation partner for national and international industry providing applied research services that give our customers a cutting edge in future markets.

### AIT Austrian Institute of Technology GmbH

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### SmartEST Lab Services

Testing of components and systems with simulated grids and primary energy sources

- Electrical, functional and performance tests according to grid codes
- Simultaneous testing of power and communication interfaces of components
- Performance and lifetime testing under controlled environmental conditions
- Simulation and testing of single components as well as complete generation systems and plants
- Power hardware-in-the-loop (P-HIL) experiments by means of real time simulation and multi-domain co-simulation (rapid modelling and prototyping of systems and components)
- Simulation of smart grid scenarios

### Accreditation and Certificates

- Accreditation according to EN ISO/IEC 17025
- Certification according to ISO 9001





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**SmartEST Technical Specifications**

**Grid simulation**

- 3 independent laboratory grids with variable network impedances for up to 1000 kVA, flexible star point configuration and grounding systems
- 2 independent high bandwidth grid simulators: 0 to 480 V 3-phase AC, 800 kVA
- 3-phase balanced or unbalanced operation
- Facilities for LVRT (low voltage ride-through) and FRT (fault ride-through) tests

**Line impedance emulation**

- Adjustable line impedances for various LV network topologies: meshed, radial or ring network configuration
- Freely adjustable RLC loads up to 1 MW, 1 MVar (capacitive and inductive)
- Individual control of RLC components for performance testing of islanding detection systems
- Anti-islanding tests up to 1 MW with Quality Factor = 1

**Environmental simulation**

- Test chamber for performance and accelerated lifetime testing

- Full power operation of equipment under test inside chamber
- Max. size of equipment under test: 3.60 x 2.60 x 2.80 m (Length x Width x Height)
- Temperature range: -40°C to +120°C
- Humidity range: 10% to 98% relative humidity

**DC sources**

- 5 independent dynamic PV array simulators: 1500 V, 1500 A, 960 kVA

**Real time P-HIL simulation**

- Multicore Opal-RT real-time simulator
- P-HIL and C-HIL experiments at full power in a closed control loop

**DAQ and measurement**

- Multiple high precision power analyzers with high acquisition rate
- Simultaneous sampling of asynchronous multi-domain data input

**General specification**

- Floor space: 400 m<sup>2</sup>
- Indoor and outdoor test areas suitable for ISO containers

