

Technical specifications

General specifications

- Total power: 210 kVA
- Triphase systems

Power electronics converters

- 4 x 15 kVA AC/DC converters
- 2 x 75 kVA AC/DC converters
- Configurable as AC/DC/AC
- 1 x 90 kW DC/DC converter

Battery

- Energy: 47.5 kWh
- Li-ion cells
- Battery management and protection system

Configurable loads

- 30 kW three-phase balanced
- 30 kW three-phase unbalanced

Configurable busbar system

- Up to 5 triphase separate microgrids
- 1 main bus bar
- 5 secondary bus bars
- Monitoring of voltages and currents
- Protection systems

Real-time targets

- 4 industrial PCs
- Converter control
- Matlab/Simulink® programming interface

SCADA system

- Based on NI compactRIOs®
- Microgrids control
- Design using LabVIEW®

Tools

- Matlab/Simulink®
- LabVIEW®
- PowerWorld®
- Standard CanBus®
- Standard EtherCat®
- Standard KNX®

www.energy.imdea.org



Nº Registro: 368



Contact:

contact.energy@imdea.org

tel. +34 91 737 11 20

fax +34 91 737 11 40

Avda. Ramón de la Sagra, 3
Parque Tecnológico de Móstoles
E-28935 Móstoles, Madrid, Spain

institute
imdea
energy

SEIL

Smart
Energy
Integration
Lab



Smart Energy Integration Lab



The Institute IMDEA Energy has a modern laboratory for electricity network studies: the **Smart Energy Integration Lab (SEIL)**. The lab approximate capacity for power processing is 210 kVA and it consists of a set of power electronics converters, resistive load banks, 47.5 kWh battery system, distribution panels and monitoring and control systems. This laboratory is a member belonging to the Network of Laboratories Redlab with registration No 368.

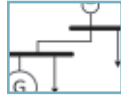
The **SEIL** platform allows analysis, development and testing of realistic scenarios for energy integration in both AC and DC networks and also operation of distribution power networks, islanded networks and microgrids. The results obtained from this test environment are more reliable and accurate than any computer based simulation.

What makes **SEIL** a unique installation is the flexibility in implementation of control algorithms and simple access to all test and management data from any part of the network. The lab microgrid is capable of recreating a number of scenarios and events that occur in real power networks and, therefore, represents a useful tool when it comes to research, development and implementation of energy management algorithms.

Control algorithms are programmed by using Matlab/Simulink® and are then executed in real time on industrial PCs. Real-time data exchange provides access to all control variables and parameters during the test. In this way the desired flexibility in reproducing real dynamic characteristics of any energy source, generator or load is achieved.

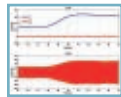
The monitoring and control system allows an independent, remote, real time access to **SEIL** resources including the network reconfiguration, control of contactors and connection to the external power grid.

Lines of work



Simulation of electrical grids

- Stability analysis
- Flow management
- Reactive power compensation
- Smart Grids



Control strategies

- Algorithms for power interfaces
- Microgrids control
- Power network control
- Disturbance compensation



Energy management

- Optimal power dispatch
- Integration of storage systems
- Self-consumption strategies



Electrical vehicle

- Battery charging strategies
- Services based on distributed storage
- Increase in the grid capacity
- Demand management & dispatch



Integration of renewable resources

- Integration of intermittent generation
- Balancing electrical energy supply & demand
- Optimization of local consumption



Power electronics applications

- Active filters
- FACTS
- SNOOP technologies
- HVDC systems



Electronic systems prototyping

- Power electronics converters
- Control and acquisition systems
- Domotic systems

Services



- Emulation of power networks in operation
- Implementation of energy management scenarios
- Power integration of generation systems
- Design and evaluation of control systems
- Energy efficiency studies
- Power electronics design & control



Advantages



- Flexible and reconfigurable system
- Completely automatized
- Easy access to data
- Simple integration of new elements
- Modeling and emulation of generator operation
- Rapid prototyping

