DERlab

Network Excellence
for Smarter Grids

DERlab Facilities
Advancing Smart Grids

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Spokesperson of the Board of the DERlab Association

APEC ISGAN Workshop, Washington DC, 24/Jan/2012

DERlab is a network

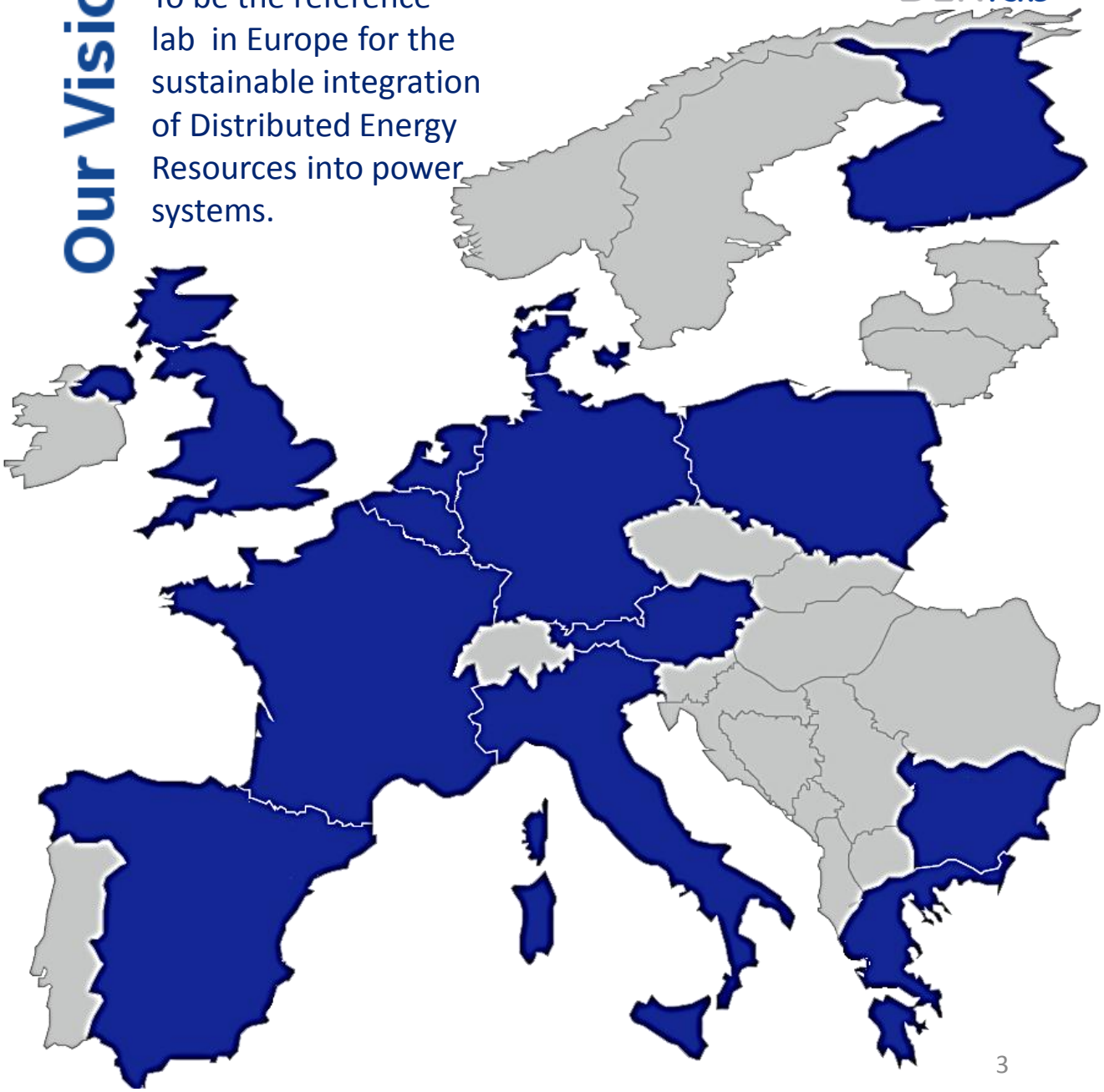
- of 21 institutes working in the field of Distributed Energy Resources (DER) and Smart Grids
- performing accredited testing of DER-units and systems
- supporting Smart Grids development
- organising information exchange on test facilities and DER knowledge
- contributing to national and international standardisation activities

Our Mission

Perform tests, pre-competitive and pre-normative research, as well as training activities, supporting the transition towards more decentralized power generation.

Our Vision

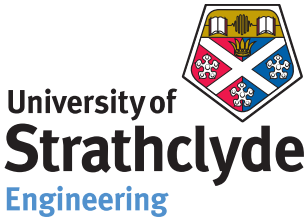
To be the reference lab in Europe for the sustainable integration of Distributed Energy Resources into power systems.



European Distributed Energy Resources Laboratories e.V.

DERlab

Member institutes



DERlab's Infrastructure and facilities

Impression of FPGLab testing facility

Electrical testing of DER components (inverters, grid protection devices & systems, storage devices, etc.)

- Performance
- Reliability
- Safety
- EMC

Testing in SYSLAB. (T. Nielsen)

Testing of DER systems and power system services from distributed units

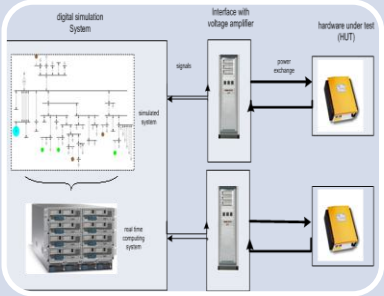
- Microgrids
- Virtual Power Plants
- Control strategies
- SCADA

NetPower DEmoLAb in Luxemburg

Communications and IT security

- Communication technologies
- Smart metering
- Cyber security

Methods and Techniques applied by DERlab



Full scale testing of DER components

- Lab capabilities up to the MVA range, LV to HV
- Dedicated facilities for all RES technologies
- Compliance testing and validation of all grid relevant functions
- Performance, safety and reliability

Lab and field testing of DER systems

- Testing and validation of power system (ancillary) services from distributed units

Interoperability and communications

- Laboratory platforms able to test the interoperability between DER units
- Testing of communication interfaces according to international standards

Power and Controller Hardware in the Loop (P-HIL/C-HIL)

- Synthesis of simulation and hardware experiments
- Allows equipment to be validated in a virtual power system

Highlights of DERlab's testing facilities

Fraunhofer IWES

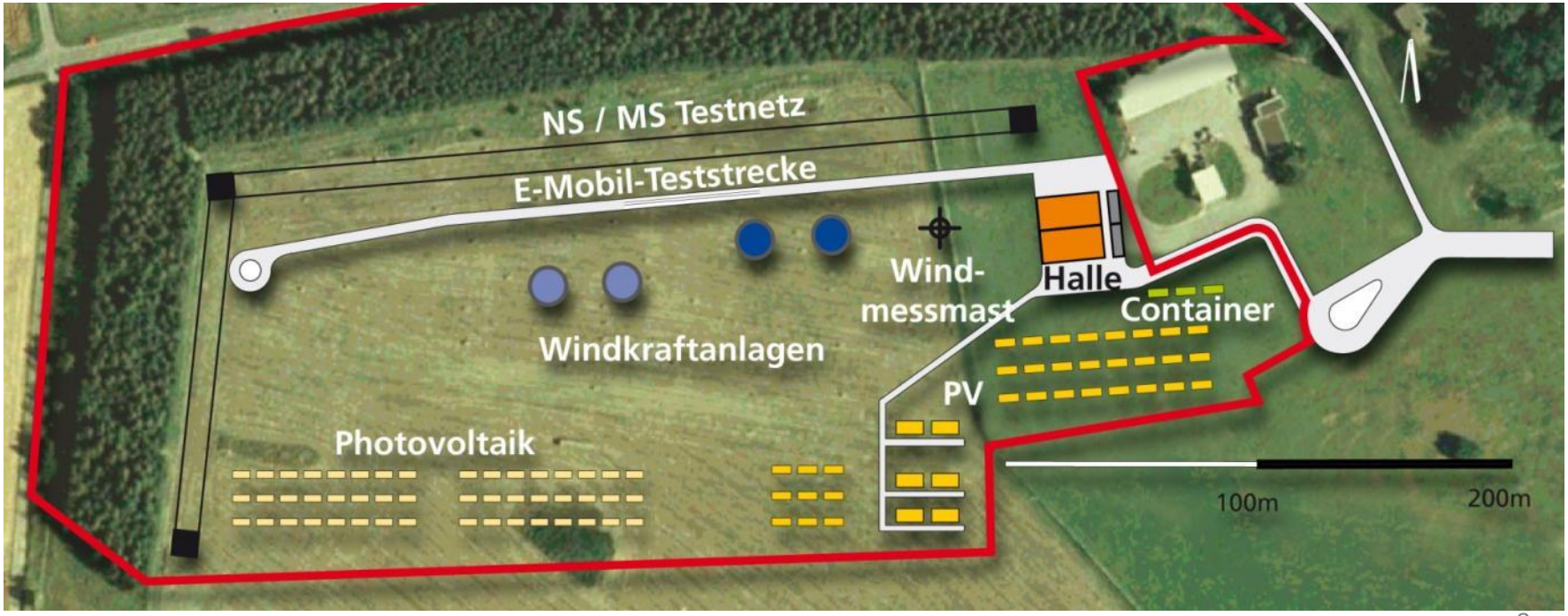
Test Centre for Smart Grids and Electromobility (SysTec)

Highlights of DERlab's testing facilities

Fraunhofer IWES

SysTec outdoor facilities

- Photovoltaic systems, wind energy systems (planned), and hybrid systems
- Test grids: Low and Medium Voltage
- Charging infrastructure e-mobility
- Route inductive charging

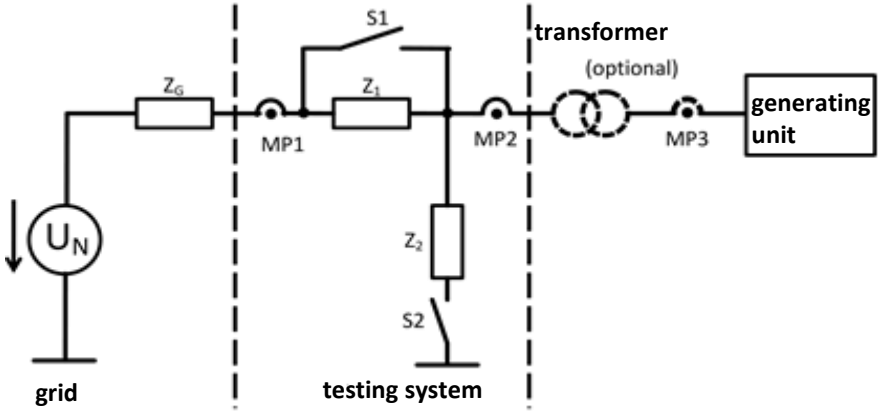


Highlights of DERlab's testing facilities

Fraunhofer IWES

FRT container

- Performance tests: 0,25…6MVA
- Rated voltage: 10/20 kV
- Short circuit power: 80…350 MVA
- Decoupling impedance: 140…280 mH

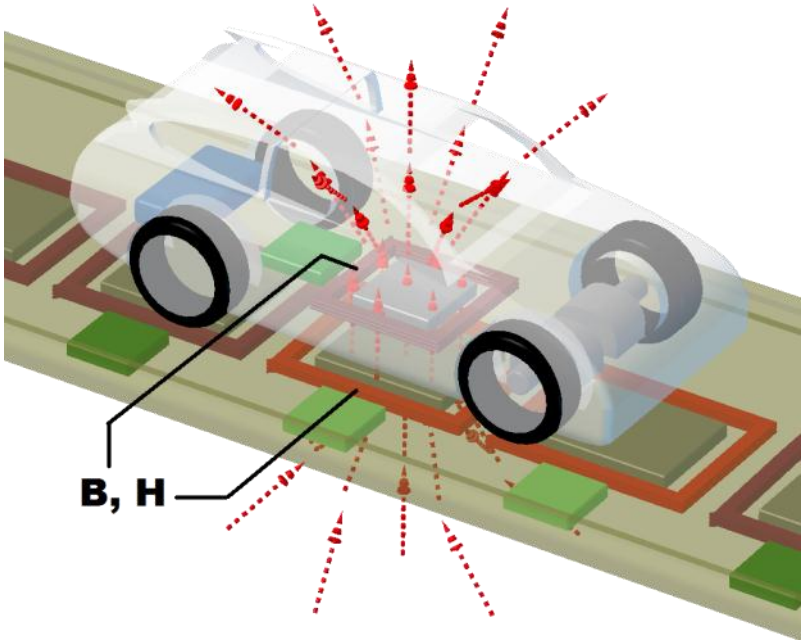


Highlights of DERlab's testing facilities

Fraunhofer IWES

Wireless Drive (planned)

- Qualification of inductive power supplies for electric vehicles
- Development of magnetic sensors
- Field calculations



Highlights of DERlab's testing facilities

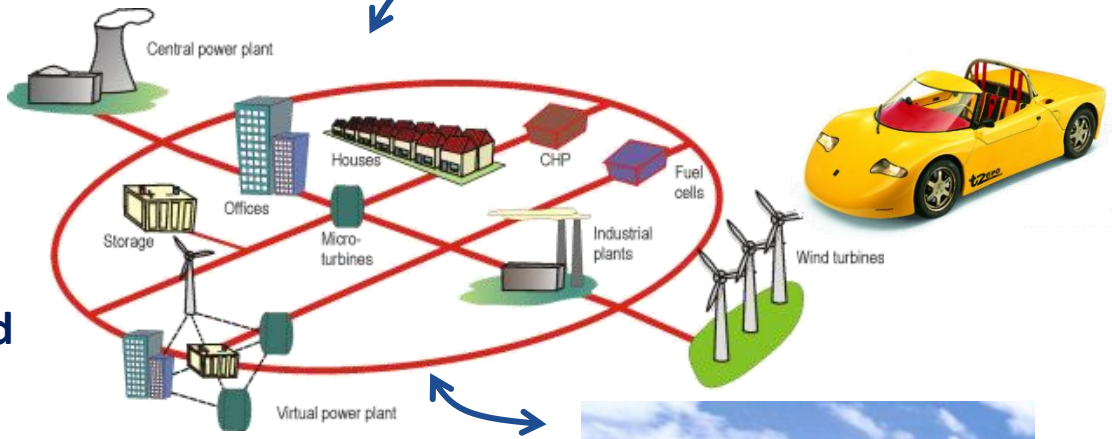
Flex Power Grid Lab (FPGLab)

Highlights of DERlab's testing facilities

Flex Power Grid Lab (FPGLab)

- **Independent laboratory dedicated to DER and RES integration in Smart Grids**
- **Power electronics development and testing for industrial high voltage (24kV)**
- **Power up to 1MVA**
- **Offering a predefined "bad" grid or load**

applications

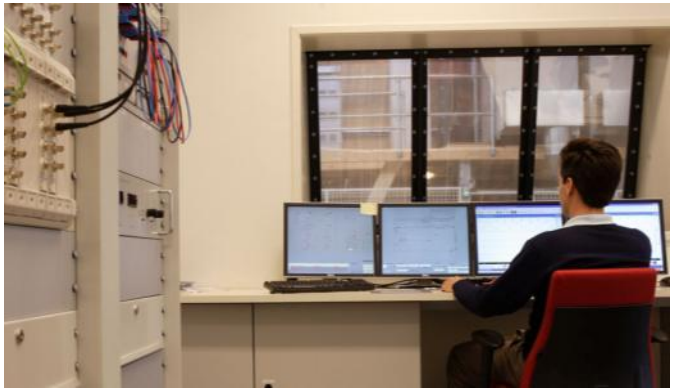


Highlights of DERlab's testing facilities

Flex Power Grid Lab (FPGLab)

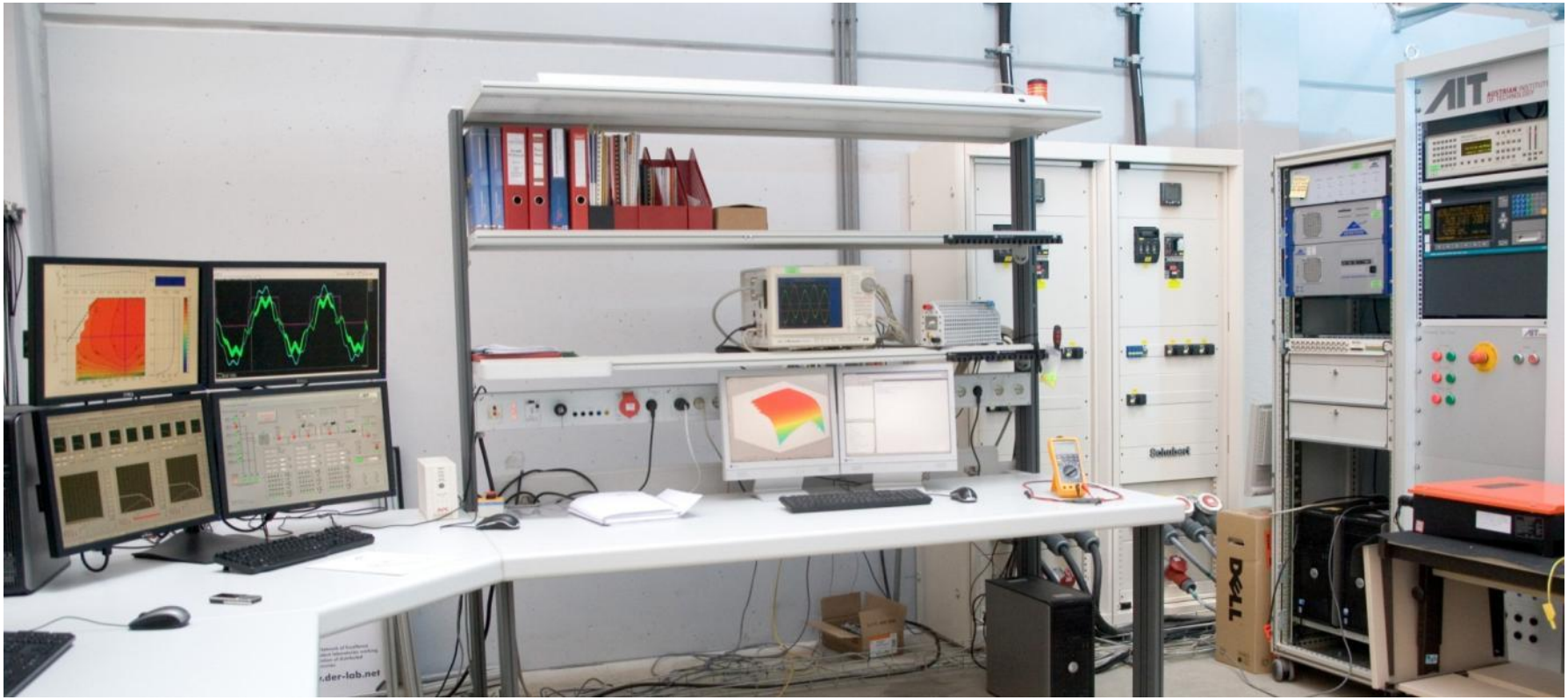
FPGLab – fully programmable grid

- Voltage level up to 24 kV
- DC to 75 Hz frequency range
- Continuous power up to 1 MVA
- Up to >25th harmonics
- 4 Quadrant operation
- Synchronization with other source
- Controllable power exchange
- Adjustable loads (0.5MW, 1MVAr)



Highlights of DERlab's testing facilities

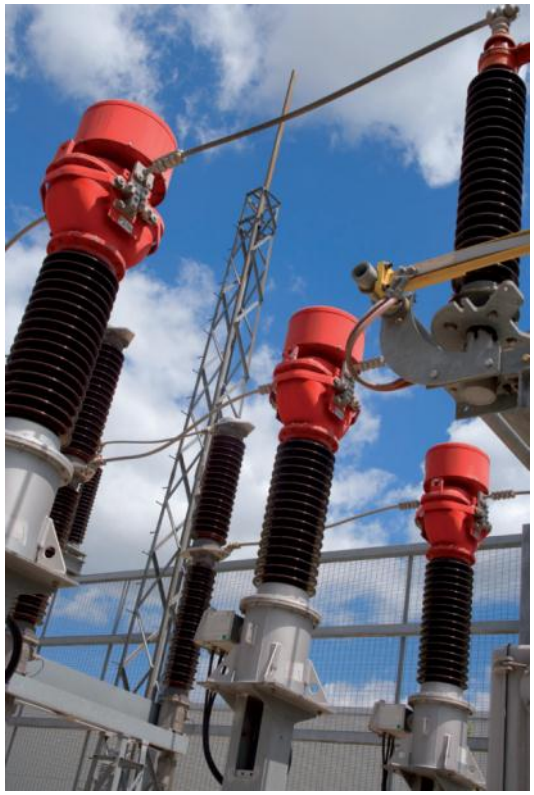
DR Inverter testing laboratory

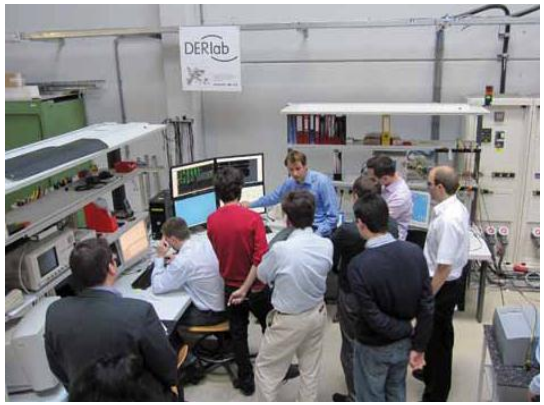


Highlights of DERlab's testing facilities

DER testing facilities

- DR Inverter test-bed with full Power Hardware in the Loop capability (30 kVA, LV)
- High-current and high voltage test-labs
  - AC currents up to 120 MW /150 kA
  - DC currents up to 30 MW / 30 kA
- Environmental simulation
  - heat / cold / climate / vibration / corrosive gas
- Battery laboratory
  - safety tests
  - aging tests
  - chemical analysis





Highlights of DERlab's testing facilities

AIT Simtech Laboratory
(to be inaugurated in autumn 2012)

- DER component laboratory with highly flexible grid and primary energy source (e.g. PV) emulation
  - LV up to 800 kVA
  - Parallel & serial components
- Simultaneous testing of power and control interfaces of DR components under controlled environment conditions
- Power-Hardware-in-the-loop environment

Highlights of DERlab's testing facilities

University of Strathclyde Glasgow

Power network demonstration Centre

Highlights of DERlab's testing facilities

University of Strathclyde Glasgow

Power network demonstration Centre

- Reconfigurable 11kV & LV network
- Islanded operation using M-G Set
- Real-time hardware-in-the-loop
- Capability to throw faults
- Industry standard equipment complemented by extensive instrumentation systems
- Control room with DMS

Research & Services

- Network control algorithm demonstration
- Generator/storage technology & control testing and demonstration
- Primary and secondary device characterisation
- Soak tests of new components
- Smart grid systems integration including communications

Highlights of DERlab's testing facilities

University of Strathclyde Glasgow

Testing infrastructure for Smart Grids

Facilities

- Extensive desktop simulation tools
- Real time simulation + RT- PHIL
- Network monitoring and WAMS data sets
- Control room simulator
- Industrial control & monitoring platforms

Conclusions

- DERlab's Infrastructure and facilities cover all aspects of DER and their integration into Smart grids
  - **Electrical testing of DER components**
  - **Testing of systems and services**
  - **Control, communications and security**

- Testing capabilities and techniques
  - **DER components up to the MVA range, LV to HV**
  - **Dedicated facilities for all RES technologies**
  - **Interoperability and communications**
  - **Testing of communication interfaces according to international standards**
  - **Power and Controller Hardware in the Loop (P-HIL/C-HIL)**

- The association's researchers and laboratory infrastructure offer the necessary expertise and equipment for DER in a coordinated manner.

Contact us:

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