

KU LEUVEN – ENERGYVILLE

Research Interests

The interests of the Power Electronics (PE) Research Group of KU Leuven – EnergyVille cover a broad area that includes the power conversion in applications of smart grids, renewable energies, electric mobility, storage, etc. In particular, we have experience in:

- 1) Integration of semiconductors in package together with gate drivers, sensors and additional circuitry.
- 2) Specialized use of Si, SiC, and GaN semiconductors in the design and optimization of power converters.
- 3) Characterization and testing of magnetic materials (Ferrites, Nanocrystalline, Amorphous, Electrical steel, SMC, etc.) for transformers, inductors, and machines.
- 4) Modelling of iron losses in magnetic materials, and copper losses in conventional and complex (Litz) wires.
- 5) Integration of photovoltaics (PV) in buildings, and design of module-level power converters for adequate installation and high performance.
- 6) Design and operation of Low Voltage DC grids and their integrations in buildings with emphasis on safety issues, regulation, fault tolerance, and communication.
- 7) Electrical tests and characterization of power electronics systems for ease of installation and commissioning.
- 8) Design automation of power converters where several objectives need to be met (efficiency, power density, cost, voltage gain, etc.).

With our partners at EnergyVille, we are also involved in the development and



performance testing of batteries (solid state and li-ion), battery management systems (BMS), PV modules and systems, and semiconductors (GaN).

Facilities

The Power Electronics group disposes of two facilities where powers up to 600 kW and 100 kW can be tested. A platform is available for testing smart grid products and systems both for AC and DC systems (monopolar and bipolar). Various equipment for characterizing and developing power electronic converters and power semiconductor devices, based on state-of-the-art high power AC and DC supplies and loads, climate chambers, energy storage elements, electric machines, high frequency measurement equipment, and power analyzers for accurate efficiency measurements. Finally, a multifunctional lab with grid emulator capabilities is available for demonstrations. In addition, with-

in EnergyVille, we feature clean room and dry room labs for batteries and PV, reliability test facilities, as well as metrology for PV, low and medium voltage, digital emulation, and thermo-technical activities. More info at www.energyville.be/en/labs

Collaborations

KU Leuven - EnergyVille counts on the collaboration with industrial partners who seek research support in the field of power electronics.

Within the EnergyVille framework, KU Leuven collaborates with VITO (BMS, Battery, etc.), imec (Semiconductors, PV) and Hasselt University (Reliability, PV).

