

Title: „Advanced Power Electronics Control Solutions: The Experimental Test Case at Energy Lab 2.0”

Abstract: To address the challenges of the green energy transformation, academia and industry are introducing at fast pace many novel energy solutions. This fast evolution, however, makes extremely challenging to properly address their impact on the energy systems when they are installed in the field. Classical approaches to develop prototypes and to perform weeks- or months-long field testing cannot cope with the pace of these innovations. There is a concrete risk that the field-testing represents the pace-bottleneck for introducing new technologies in the market and thus to enable the green transition.

To accelerate the introduction to market of new energy technologies, the concept of Power Hardware In the Loop (PHIL) has been proposed in recent years. The PHIL is based on simulating an electrical circuit in a digital real time simulator that is connected to the hardware under test by means of a power interface. The PHIL allows to flexible change the testing environment varying the simulation parameters, while keeping high experimental validation fidelity.

This talk will provide an overview on the work done in the recent years by the “Real Time Systems for Energy Technologies” group at the Karlsruhe Institute of Technology, Germany. The focus will lie on the development and PHIL experimental validation of advanced power electronics-based and energy storage-based solutions to increase the grid stability and flexibility.



Prof. Giovanni De Carne is currently W3 (full) professor at the Institute for Technical Physics at the Karlsruhe Institute of Technology, Karlsruhe, Germany, where he leads the “Real Time Systems for Energy Technologies” Group and the “Power Hardware In the Loop Lab”. He is currently supervising PhD students, managing academic and industrial projects, and developing multi-MW Power Hardware In the Loop testing infrastructures for energy storage systems and hydrogen-based drives.

His research interests include power electronics integration in power systems, solid state transformers, real time modelling, and power hardware in the loop.