

INESC TEC

INESC TEC is an Associated Laboratory coordinated by INESC Porto, a private nonprofit institution having as associates the University of Porto, INESC and the Polytechnic Institute of Porto.

INESC TEC is spread in four locations in the city of Porto, has a major pole in Braga (with the University of Minho) and a smaller pole in Vila Real (with the University of Trás os Montes and Alto Douro). The activity is conducted by 600 researchers, from which 200 hold a PhD degree. Its budget reaches 14 million Euros, from which some 35% result from direct R&D contracts with industry and some 30% is international activity.

Under INESC TEC, 12 Units are active in research, technology transfer, knowledge valorization and launching of spin-off companies. Its main areas are Telecommunications and Multimedia, Power Systems, Manufacturing Systems, Industrial Management, Information and Computer Graphics Systems, Optoelectronics and Electronic Systems, Robotics and Intelligent Systems, Artificial Intelligence, Real Time Systems, Computer Science, Critical Software Systems and Innovation.

The activity at INESC TEC runs under the paradigm of the knowledge to value production chain: knowledge and results generated at basic research are typically injected in technology transfer projects and therefore they receive added social relevance. The existence of an Innovation and Technology Transfer Unit assures the effectiveness of this model.

The Power Systems Unit (USE) is INESC TEC main actor in the area of electrical energy. The Unit employs close to 70 collaborators, including 16 PhD holders. It is internationally recognized for its expertise in problems relating to the integration of wind power and renewable energy in general in power systems. USE is also recognized in the areas of distributed generation and smart-grids, the areas traditionally associated with planning and operating power systems.

The high level of expertise developed has allowed specialists at USE to take on key roles in important EU projects as part of the successive framework programmes that led to notable scientific and technical advances with considerable impact on industry. This has led to contracts for development and consultancy with companies manufacturing equipment, generation, transmission and distribution companies, regulators, government agencies and investors in Europe, South America, the United States of America and Africa.

The Power Systems Unit develops expertise in several research areas, namely:

Integration of renewable energy sources in transmission systems – development of studies for the Portuguese and Spanish TSOs to evaluate reserve requirements of each system through reliability analysis, with large scale integration of renewable sources; participation in EU project ANEMOS.PLUS on the optimal management of electricity grids linked to large-scale wind power generation; and development of steady-state and dynamic behavior analysis for the integration of wind parks for wind park developers. Participation in the EU-funded TWENTIES project, aiming to design operation schemes for multi-terminal HVDC grids connecting offshore wind farms.

Microgeneration and microgrids – participation in the EU-financed MICROGRIDS and MORE MICROGRIDS projects aiming to study technical/economic feasibility of large-scale integration of microgenerators along with controllable loads and storage devices in LV grids.

Electric vehicle integration in distribution grids – Scientific coordination of the EU-financed MERGE project aiming at evaluating the impacts of EV on the EU electric power systems regarding planning,



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operation and market functioning and the national REIVE project in collaboration with the Industry, where the impacts of EV in LV networks will be evaluated in a test bed, under a laboratorial environment where the major elements of a LV network are present.

Development of a technical architecture for the implementation of a fully active distribution network – INOVGRID project, which involves the installation of 6 million of smart-meters and was launched by the Portuguese DSO, addresses the need to introduce more intelligence to manage and control distribution networks in order to progress towards the smart grid paradigm, giving support to all new smart metering and commercial processes.