



**Project Acronym :** UNIFLEX-PM

**Project Title :** Universal and Flexible Power Management in Future Electricity Networks

**Coordinator :** AREVA T&D LTD (United Kingdom)

**Website :** <http://www.eee.nott.ac.uk/uniflex/index.html>

## ABSTRACT

The objective of this project is to develop advanced power conversion techniques to meet new application needs in the Future European Electricity Network, and to validate these techniques in hardware. The key technical advance will be the validation of modular power conversion architecture and associated control structures which have the required flexibility and performance to make a major impact in all aspects of the Future European Electricity Network. Within this arena, power converters can provide: optimized connection of distributed energy resources, integration and management of energy storage, optimized utilization of the transmission/distribution infrastructure, high quality of supply and coordinated control across the network, for example. To be acceptable in the marketplace, converters must have low energy losses, very high reliability, small size, high performance and low economic costs. The modular power conversion architecture, using advanced components, will meet all of these requirements and can be applied across the range of applications. The modular concept relies on the use of medium frequency (MF) transformer isolation modules. Research will be directed at optimizing the MF transformer to gain the desired performance and insulation and on the associated switching elements to achieve a practical isolation module with very low losses and low size. Research on converter configurations will be informed by application characterization studies to ensure close mapping to application requirements and will incorporate new and emerging wide band-gap (eg SiC) power devices. Research on control strategies will aim at achieving desired dynamic interactions with the grid, with high power quality, whilst maintaining the lowest possible converter losses. Reliability and economic assessments studies will be undertaken. Finally, hardware validation of the modular architecture and its control will be undertaken at a representative power level ( $\approx 500\text{kVA}$ ).

## PARTNERS

Areva T&D Ltd - **United Kingdom**; European Power Electronics and Drives Association - EPE – **Belgium**; Dynex Semiconductor Limited - DSL – **United Kingdom**; ABB Secheron SA – ABB – **Switzerland**; Università degli Studi di Genova - UGDIE – **Italy**; Ecole Polytechnique Fédérale de Lausanne – EPFL – **Switzerland**; Aalborg Universitet - AAU – **Denmark**; The University of Nottingham - UNOTT - **United Kingdom**.