

Cooperation of research and development activities in Smart Grid project

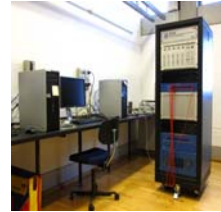
Introduction IET-AAU

The Institute of Energy Technology, Aalborg University (IET-AAU) carries out research in all areas of energy technologies, and targets for technological solutions of effective utilization of the energy resources, enhanced security of supply and a better environment. IET-AAU has good experiences in wind power, modern power systems, power electronics, and control technology.

IET-AAU has a number of multi-disciplinary research programs as the directions of institutional research and developments. Two of these research programs, **Modern Power Systems** and **Wind Power Systems**, are closely related to the key issues of the Smart Grid concepts. Within these two research programs, IET-AAU has led and participated in many research and industry projects to improve the system security, reliability, efficiency and economics, which would effectively promote the national economy and global competitiveness, and deal with environment/climate change.

The IET-AAU team has conducted high quality research in the fields of electrical engineering, including wind power, power system operation, control and protections, distributed generation systems, power electronic applications and electric machines. The team has published numerous high quality papers, books and reports and gained very good international reputation, the team also has good cooperation relationships with industry, most of the research projects have industrial partners involved to address real problems and demonstrate the practical values of the research results.

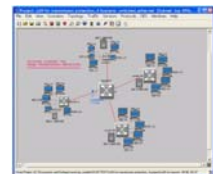
IET-AAU has very wide national and international cooperation, and have been /are participating in many national and international cooperation projects, including European projects, such as FP6-UPWIND, North Sea Region Programme POWER Cluster, DSF and PSO grants etc.



Smart Grid related research topics at IET-AAU

IET-AAU has many projects related to the SmartGrid themes, for example, IET-AAU has investigated/ is investigating the following relevant topics:

- Grid structural security assessment and networks renewal and innovation methods (DSF 09-067255)
- Optimal operation of electricity market in the mixed pattern power system (DSF 09-067255)
- Real time control strategy with adaption, prevention and self-correction functions (DSF 09-067255)
- Advanced emergency and protection approaches based on wide area measurement (WAM) technology (DSF 09-067255)
- Intelligent automation and control of distributed generation systems with virtual power plant concept (DSF 09-067255)
- An interactive energy system of grid, heating and transportation system with plug-in electric vehicles (DSF 09-067255)
- Optimal on-line electricity pricing, demand side management (DSM) in a power system with large scale of wind power and energy storage systems (PSO 6316, DAWE)
- Control Strategies of islanding distributed generation system with renewable generation units (PSO 6316)
- Probabilistic modeling and analysis of modern power systems with large scale of renewable energy and CHP generation units. (DSF 2104-05-0043)
- Integration and control of wind farms in the Danish electricity system (PSO 4102)
- CEESA (Coherent Energy and Environmental System Analysis) (DSF 2104-06-0007)
- Local Compensation of the distribution network, including a Dynamic voltage restorer (DVR), and Custom Power Systems (CUPS) in the distribution network.



In addition to the above listed topics, IET-AAU also has conducted/is carrying on many relevant projects, covering power system communications, micro-grid, grid stability, HVDC, FACTS and wind turbines/wind farms, etc.

The above work provides solid foundation and experiences for conducting high quality work in Smart Grid activities.

Facilities

IET-AAU is well equipped with high level laboratory equipment and simulation tools.

In addition to conventional power lab equipment, the latest lab facilities include Real Time Digital Simulator (RTDS), dSPACE with Labview, Microgrid, which may perform real time simulation and hardware in-loop test for the developed control, protection and power electronic integration as well as large scale power system study.

The simulation packages includes: PSCAD/EMTDC, DigSilent, PowerWorld, OPNET, MATLAB/Simulink etc. which can be used to study the grid frequency and voltage control, protection, stability, power market economics, communication control systems. Many models developed in house can be easily integration into various studies.

The above mentioned facilities establish efficient platforms for high quality research and development project.

We would like to cooperate to work in the Smart Grid project.

