

Ph.D. Call for Applications

Subject: Real-time simulation, analysis and optimization of a power plant operation with a high penetration of renewable energy for island grids

Keywords: renewable energy power plant, island grids, storage systems, power converters, wind turbines, photovoltaic panels, ...

Contract: 3 years.

Laboratory: ESTIA-Recherche, ESTIA Institute of Technology

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Context

ESTIA is the engineering school of the Chamber of Commerce and Industry of Bayonne Basque Country. Public institution, ESTIA offers graduate programs in the fields of electrical engineering, mechanical engineering, information technology and industrial organization.

Trilingual school, ESTIA is a member of the "Conférence des Grandes Ecoles" and it is entitled to deliver the engineer degree.

In addition to the training mission, ESTIA develops:

- Collaborative projects with industrial companies from Aquitaine region, France and Europe,
- Projects of basic and applied research through ESTIA-Research laboratory,
- Expertise and consulting for companies on innovative topics.

Laboratory

The research work will be carried out within "EneR-GEA" team from ESTIA-Research in BIDART (Basque Country), France. The research orientations of this group are clearly positioned in the field of renewable energies, in particular on the following problems: "*how to make possible a better grid integration of the energy produced by the renewable energy sources*".

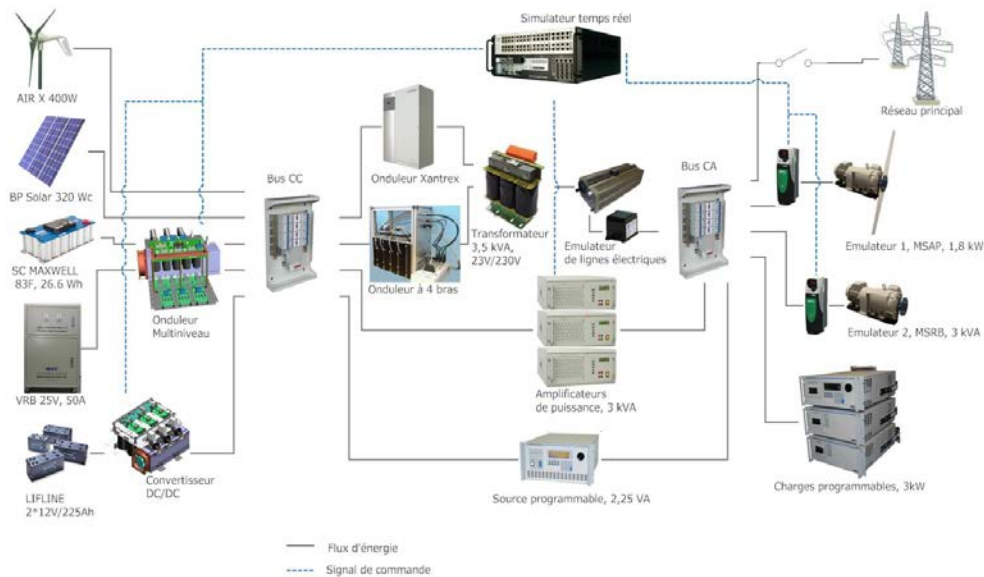
Subject

The post-doc subject is part of INSUL'GRID project whose objective is to develop a new type of hybrid "smart" power plant, able to combine real-time energy resources produced by different intermittent renewable energy systems and several storage technologies. Thus, the operator will be positioned as a responsible supplier of renewable electricity in charge with both the quality and the quantity of electricity injected into the network. The project aims to develop up to industrialization and tests in real conditions the tools and systems needed to design and drive a hybrid power plant able to supply electrical energy:

- Generated over 80 % by renewable energy sources,
- Compatible with the use and characteristics of the electrical grid, in any situation,
- A level of stability and reliability according to the standards,
- At a production cost similar or less than the "conventional" systems.

The subject of the thesis will be the integration of all the models (renewable energy generation, model of the storage system including the aging, meteorological predictions, electrical conversion) developed

by the different project partners, the quantitative and qualitative constraints and the economic aspects in order to analyse and optimise the operation of the hybrid power plant through real time simulations. In order to exceed the limit on the penetration level of the renewable energy sources in an island grid, the stability of the grid must be intrinsically ensured. Therefore, solutions for the management of the storage system and algorithms for the control of the different power electronics converters of the hybrid power plant will be developed during the thesis with the objective of proposing Ancillary Services to the local electric grid manager and of facilitating the stability of island grids. The implementation of the simulations must allow verifying that the designed hybrid power plant is capable of obtaining the desired quality and quantity of energy and of responding to the considered prevision, production and consummation scenarios. An existing laboratory level microgrid platform, which is designed to respond to several questions concerning the multi-source systems, will allow experimentally validating the defined solutions (refer to the figure).



Experimental platform

Candidates Profile

Electrical/electronics engineer graduated in an Engineering School or in a University, who has obtained a master degree or an equivalent one.

The following competences will be strongly appreciated:

- Power electronics converters and their control.
- Modelling and simulation of dynamic systems in Matlab/Simulink software.
- Real-time simulations in Opal-RT (or an equivalent system like dSpace).
- Fluency in technical English.

Your rigour, sense of responsibilities and scientific curiosity will be your main assets for this PhD thesis.

Application Deadline

March 27, 2014: CV with a cover letter and all necessary documents to justify your skills (send by email)

Mid-April: selection of the successful candidate

Position Start Date: Available immediately