POLITECNICO DI MILANO

PhD in INGEGNERIA ELETTRICA / ELECTRICAL ENGINEERING - 41st cycle

THEMATIC Research Field: ELECTRIC POWER SYSTEMS AND MARKETS

Monthly net income of PhDscholarship (max 36 months)
1500.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Worldwide, in this area, the research is focusing on the energy transition, generation sustainability, energy communities, electric systems operation and final uses of electricity. Therefore, one of the main pillars of the research carried out at the Department of Energy in these fields includes Generation (as RES, Dispersed Generation), Smart Grids, Storage and Power Quality. In this regard, particular attention is paid to the control, security and optimization of the power system also considering regulatory issues and electricity markets. A particular focus is related to the management of the renewable energy sources and storage systems, both from both the technical and the regulatory perspective . Finally, to provide scientific basis for policy making and public/private investments, decarbonization scenarios are quantitatively assessed, investigating the interaction between technical, regulatory and market dynamics across different time and spatial scales.
Methods and techniques that will be developed and used to carry out the research	System modelling through modern methods based on Operation Research, probabilistic procedures (Montecarlo-based), fuzzy logic, neural networks, artificial intelligence, genetic algorithms, chaos theory, game theory and other theory system analysis, together with traditional mathematical tools and programming, big data analysis, order reduction techniques. On the one hand, to model electricity grids, both RMS and EMT techniques will have to be investigated; on the other, to integrate multiple perspectives (economy, technology, policy, etc.) in

	scenario design tools, integrated assessment models will be of interest. Finally, space will be given to the study of the interoperability requirements to enable the interaction between the parties involved in the coordination of distributed resources (System Operators, BSP, BRP, Facility Managers, Aggregators, etc.).
Educational objectives	Prepare researchers with high scientific qualification, autonomous research ability in the Power System and Energy market/policy areas: this includes specific skills in modelling of both technical and economic issues, simulations, optimization, critical analysis and validation of results.
Job opportunities	The main opportunities are offered, typically, by R&D departments of both small and large innovative companies and manufacturers, research centres, Transmission and Distribution Operators, Regulating authorities, Generation Companies. Finally, the academia is also an option.
Composition of the research group	7 Full Professors 2 Associated Professors 7 Assistant Professors 20 PhD Students
Name of the research directors	Prof. Marco Merlo, prof. Maurizio Delfanti

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

Scholarship Increase for a period abroad	
Amount monthly	750.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Educational activities:
Financial aid per PhD student is available for purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences, instrumentations and computer, etc. This amount is equal to 10% of the annual gross amount, for 3 years.

Teaching assistantship:
Availability of funding in recognition of supporting teaching activities by the PhD student. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer availability: individual use.
Desk availability: individual use.