Open positions - CITCEA-UPC: Project Engineer / PhD Student

TOPIC: Artificial intelligence applications to smart distribution grids: data science and data analytics for the monitoring, operation, maintenance and planning of distribution grids with large penetration of renewable energy sources.

REQUIREMENTS: Master studies in Electrical Engineering, Computer Science, Mathematics or studies with background on energy systems. Candidates should bring knowledge/ high interest in machine learning and optimization. Programming experience is required (Python and/or R is valued). High level of oral and written English and excellent communication skills are required. Knowledge of Spanish or Catalan is valued. Capacity of team-working is required. Knowledge about European culture is valued.

Subtopic 1. Grid monitoring and supervision of distribution grids.

The increasing number of controllable devices in electrical power systems requires a continuous monitoring and supervision of the status of the different variables that allow to ensure the appropriate grid operation and control. The monitoring and supervision of variables like voltage and current in the three phases, together with the suitable data analytics and simulations allow the detection of measurement errors, the assessment of network stability, the estimation of non-technical losses and the generation of grid indicators.

Subtopic 2. Operation and maintenance of distribution grids

Currently, monitoring systems in distribution grids do not have information regarding real time performance of the distribution equipment. For instance, there is often lack of information regarding transformers load, status of switches and transformer tap changes, status of distributed resources and consumer demand. This also imposes difficulties in condition-based maintenance. Furthermore, distribution grids scale and its equipment tend to increase, worsening the before mentioned problem. The traditional maintenance in distribution grids relies mainly on human periodical inspections and inventories, which might not always be possible or accurate. The amount of data available from the grid is changing it. Machine learning techniques can be used to solve many problems in the electrical field such as predictive maintenance on the network to bring better practices in the renewal of equipment like transformer, cables, fuses, etc.

Subtopic 3. Asset and investment planning of distribution grids

The demand growth and the new distributed energy resources to be connected to the current distribution grids will require an appropriate expansion of the distribution network. In order to address the planning of distribution grids, it is useful to consider the rollout of massive renewable energy generation and storage devices, the demand response capabilities and the huge amount of data available during operation. Based on the inputs of the actual grid structure and the already existing short-term reinforcements, several scenarios need to be created to consider the directions of the future grid investments. Different grid expansion criteria will be defined (for instance, congestion alleviation, renewable generation increase, power quality enhancement) for guiding the grid expansion planning for a specific time horizon. The zones of reinforcement will be identified and a list of eligible technologies, useful for the grid reinforcement, will be elaborated.

Interested candidates, please send your CV, transcripts, motivation letter and references information to monica.aragues@upc.edu with email subject “Positions CITCEA-UPC” before 30th November 2019.