

## **TUTORIAL: Modeling and simulation of electrical distribution systems.**

The increasing and future adoption of small-to-medium scale low carbon technologies such as wind power, photovoltaic systems and electric vehicles is and will pose significant technical and economic challenges on distribution networks. Medium and low voltage circuits have been designed to have no or limited controllability and hence are largely unmonitored. However, it is likely that they will become one of the first bottlenecks towards the decarbonisation of our power systems. Therefore, it is important to understand the impacts and the potential solutions in the context of Smart Grids. For this purpose, it is crucial to use simulation tools designed specifically for distribution networks and flexible enough to carry out sophisticated studies.

This 4-hour tutorial will give the attendees the opportunity to learn about the basic and advanced applications of OpenDSS, an open source state-of-the-art distribution network analysis software package developed by EPRI (USA), in the context of Smart Distribution Networks. The tutorial includes hands on aspects for a direct familiarisation with OpenDSS as well as details of the modelling frameworks needed to produce more advanced studies. Two industrial Smart Grid projects in Costa Rica are presented considering the interactions with other analysis software packages (e.g., Matlab) and programming languages (e.g., Python).

### **LECTURER: Jairo Quirós**

He received the B.Sc. and Licentiate degrees with honors in Electrical Engineering from the University of Costa Rica, Costa Rica, in 2008 and 2009 respectively, and the Ph.D. degree in Electrical Engineering (emphasis in Power Systems) from The University of Manchester, U.K., in 2014.

He worked as postdoctoral research associate at The University of Manchester from February 2014 until January 2016 in the integration of electric vehicles to the distribution networks.

Currently, he is Associated Professor at the University of Costa Rica, the Director of the Electric Power System group, and the coordinator of the Electric Power & Energy Research Laboratory at the School of Electrical Engineering at the same institution. His current research interests include network integration of distributed energy resources and future low-carbon distribution networks.

