FOSS
Research Centre for Sustainable Energy

ELECTRA

Title: "Modernising the distribution grid for enabling high penetration of photovoltaic electricity through advanced data analytic operational observability and management"

The FOSS Research Centre for Sustainable Energy of the University of Cyprus announces the commencement of the project with acronym **ELECTRA** (**"Modernising the distribution grid for enabling high penetration of photovoltaic electricity through advanced data analytic operational observability and management"**), which is co-financed by the European Regional Development Fund and the Republic of Cyprus through the Research and Innovation Foundation, under the programme **"Integrated Projects – Smart Growth"**. The project has a *total budget of €1,168,600* and is coordinated by the University of Cyprus (Coordinator: *Dr. George Makrides* - Research Fellow at the FOSS Research Centre for Sustainable Energy).

The main objective of the integrated project is to fuse together extensive interdisciplinary scientific research in the field of grid integration of renewable energy sources (RES) and to target the major challenges and barriers to boost the integration of RES, by covering the whole research and innovation (R&I) wide spectrum of enabling dynamic, automated and cost-effective management of smart distribution grids.

Essentially, the main aim of the ELECTRA project is to pave the way for increased penetration of distributed generation (DG) systems (predominantly solar photovoltaic systems), to be integrated and optimally managed at the distribution grid. Since the strong growth and uptake of the photovoltaic sector (future dominant renewable technology at the distribution system) is also associated with the potential of the grid to accommodate the variability of DG, a key factor that will boost the further increase and uptake of the technology is to enable the efficient and reliable operation of future distribution systems with high DG shares. This can only be achieved by modernising the distribution grid for real-time predictive observability and automated control with the use of advanced data analytics that leverage machine learning principles. An important aspect of this project is also the development of an adaptive multi-service distribution management architecture (end-solution) that will provide and deliver the required bi-directional electricity flow control and flexibility in distribution grids with high RES shares.

European Union
European Regional Development Fund

Republic of Cyprus

Structural Funds
of the European Union in Cyprus

The scientific breakthrough of this project lies primarily in the holistic approach to address critical challenges that prevent high levels of photovoltaic penetration in power system networks by implementing smart distribution system planning tools, novel grid control functionalities through programmable automation controllers and coordinating interaction of RES system assets (inverter, energy storage and demand-side management programs) through grid operation-state estimation models for distribution feeders with high RES shares. In addition, by balancing demand and supply of electricity through flexibility activities (supply-side - forecasting RES production and demand-side - through demand side management) and storage, potential grid constraints will be mitigated by introducing energy flow scalability and adaptability.

For the successful implementation of the project and establishment of the new integrated centre for photovoltaic electricity-to-grid integration, the project will be executed by a transnational consortium comprising of the **University of Cyprus** (UCY-Cyprus), **Austrian Institute of Technology** (AIT-Austria), **Technical University of Denmark** (DTU-Denmark), **Electricity Authority of Cyprus** (EAC-Cyprus), **GESOLAR Ltd** (GESOLAR-Cyprus), **Deloitte** (DT-Cyprus), **Cyprus Energy Agency** (CEA-Cyprus), **Ministry of Energy, Commerce and Industry** (MECIT-Cyprus), **Cyprus Energy Regulatory Authority** (CERA-Cyprus) and **Cyprus Certification Company** (CCC-Cyprus). The Project Coordinator is Dr. George Makrides, a Research Fellow at the FOSS Research Centre for Sustainable Energy, who has extended expertise in the area of RES performance and modelling, renewable grid integration issues and smart energy landscapes.

Finally, it should be noted that the development of new infrastructure, intelligent grid pilots, smart grid emulators and subsequent local research capacity in this timely domain has strategic importance for the FOSS Research Centre and the Engineering School of the University of Cyprus towards developing a competitive edge in research of RES grid integration and grid modernisation to enable high RES shares at local, regional, and international level. Moreover, the links that will be created between the research institutions are expected to yield long-term academic and research benefits including sharing of research infrastructures, joint projects and exchange of researchers.

FOSS
Research Centre for Sustainable Energy

For more information, please contact the project coordinator:

Dr George Makrides
University of Cyprus
FOSS Research Centre for Sustainable Energy

+357 22894397
makrides.georgios@ucy.ac.cy
http://www.foss.ucy.ac.cy/george_makrides.php

PI Electra Project - Dr George Makrides is the Head of Renewables, Grid integration and Smart Grids group of FOSS. He is involved in research topics related to RES power systems (focal point solar photovoltaic technologies), grid integration of variable renewable sources and smart grids. He has published over 100 papers in international journals and conference proceedings and has coordinated and participated successfully in various National and European research funded projects.

European Union
European Regional Development Fund

Republic of Cyprus

Structural Funds
of the European Union in Cyprus