

PV-ANALYTIC

Advanced photovoltaic system monitoring and analytics solution enhanced with intelligent interoperable data-driven features for efficient big data real-time analysis, failure diagnosis, automated management and integrated micro-grid control

Project duration: from 11.2019 to 10.2022

Report submitted: 03.2022

Publishable Summary

A main challenge in the scope of ensuring high photovoltaic (PV) plant performance and fully flexible plant operations towards smart grid concepts, is to ensure reliability by increasing and safeguarding production through advanced, robust and cost-effective PV system monitoring and operational control that is enhanced with efficient automatic artificial intelligent (AI) data-driven functionalities. Along this context, the key battlegrounds of technical solutions that support high PV power plant performance and smart grid integration functionalities, are associated with the capabilities of intelligent data analytic methods that provide proactive and real-time energy loss diagnostics, automated reactive maintenance and integrated control functions.

It is with this background that the PV-ANALYTIC project has been initiated in order to primarily assess PV system big data performance monitoring and control requirements, formulate procedural functions for the acquisition, aggregation and interoperability of new technologies (battery energy storage systems and smart inverters) and develop novel data-driven health-state analytics. The algorithms will be integrated to an edge computing solution with cloud-connectivity which will be an innovative multi-service interoperable health-state monitor and advanced PV power plant controller (PPC) that is enhanced with user-friendly visualisations and financial components in the cloud.

The project is expected to have significant impact on the value chain of the technology given the reduction of PV electricity costs, by increasing the lifetime output, improving the operational efficiency and optimizing system operations. Targeting further enhancement of lifetime, quality and sustainability of PV is in-line with the primary objectives of the European Strategic Energy Technology Plan (SET Plan) for Operation and diagnosis of PV plants and new communicative, automated and interactive developments such as Solar 3.0, Internet of Things (IoT) and Industry 4.0 concepts. This is the first time such a system will be demonstrated with functionalities well beyond the current state-of-the-art, and is well anticipated in the fast growing PV market with continuously narrowing profit margins and intelligent grid supportive operational functionalities.

In addition, the advanced monitoring system can further act as the buffer between PV power plants and the smart grid, contributing with the control algorithms to supportive functions for grid stability especially for the important task and requirement by many distribution/transmission system operators (DSO/TSO) for PV power plant flexibility with the utilization of PV, smart inverters and battery energy storage systems (BESS). The proposed system is therefore of prime interest to a large stakeholder target group ranging from policy makers and utilities, plant operators,

engineering procurement construction (EPC) contractors, module producers and investors.

Finally, the project is based on a bilateral collaboration (Austria – Gantner Instruments GmbH and Cyprus – University of Cyprus) that will assist in materialising its objectives, contributing to solar energy ambitions as well as generating an innovative commercial product that will enhance the competitiveness of their research and industries.

Project consortium

Coordinator and all contact details:

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Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Austria	1	300 000	150 000
Cyprus	1	160 080	160 080
	2	460 080	310 080

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Austrian Research Promotion Agency (FFG)	873782, eCall: 24771531
Cyprus Research Promotion Foundation (RPF)	P2P/SOLAR/0818/0012 – PV-ANALYTIC