

DESIGN AND OPERATIONAL CONTROL OF THE AGIOS EFSTRATIOS ISLAND MICROGRID

Stathis Tselepis, John Nikolettatos
Department of Photovoltaic Systems and Distributed Generation
CRES
19th km Marathonos Ave., 19009 Pikermi, Athens, Greece
Phone +30 210 6603370
E-mail: stselep@cres.gr

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ABSTRACT

The paper deals with the design, operational control, simulation and sensitivity analysis of an autonomous island grid with central main components consisting of wind turbines, photovoltaic systems, bi-directional converters, storage of electricity to match the load demand of the island grid of Agios Efstratios, in the Aegean sea, Greece. This work was initiated by the project “Green Island - Ai Stratis”, which is a research-demonstration project funded by the Greek state, where mature technologies in Renewable Energy Sources (RES), storage and control will be implemented. The innovation of the project is mainly in the integration and operational control of variable renewable energy generation and storage considering also the appropriate management of the resources and of certain non-critical loads. The project is aiming at least 85% RES contribution of the annual electricity demand. The proposed system shall substitute power production of the existing thermal power plant where expensive and polluting diesel fuel is being used. The new power system will use the existing grid infrastructure incorporating RES and storage units and monitoring, control and communication infrastructure that is necessary to maintain power availability, quality, reliability and safety respecting the technical requirements of the Public Power Corporation and the Hellenic Distribution Network Administrator, who are the owner and operator of the power system.