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THE HYBRID SYSTEM PROJECT WITH MINI-GRID IN GINOSTRA, VILLAGE OF STROMBOLI ISLAND

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Abstract:

Conphoebus has developed a project of a hybrid system for Ginostra, an isolated village of Stromboli Island. The hybrid plant complies with the specific needs of the residents, taking into account the available energy resources and the environmental prescription of Eolian Administration. The above mentioned plant will act as a stand-alone system with an isolated electric mini-grid. The specific peculiarity of Ginostra village is a strong variability of the residents' number, about 50 people in winter and approximately 600 during July and August. At the aim to reach a best exploitation of the production capacity of the Hybrid System, a desalination system could be foreseen as periodical load to store water during the low occupation period (winter) and cover the demand in the summer. In this way it will be possible to optimise the production capacity of the Hybrid System with the low energy demand of the winter months and the overproduction of the PV source, designed for the greater occupation period.

The hybrid plant is based on the following components:

- Photovoltaic Field with a rated power of 100 kW;
- Diesel Generator with a power of 160 kW;
- Battery storage with $C_{10}=3000$ Ah , $V=400$ V;
- N°3 G.I.I.G.E. (integrated group of AC/DC converter, inverter and static switch) in parallel, each with a rated power of 50 kW;
- Desalination system of 3mc/h;
- A control and energy management system.

A specific integrated group of AC/DC converter, inverter and static switch has been purposely developed with particular technical solutions to supply the Hybrid System the necessary safety and reliability characteristics.

In normal conditions, the photovoltaic field and the battery storage deliver power on a DC bus and inverters that play in redundant parallel generate the grid. The diesel generator is connected to the DC bus via controlled rectifiers but it can directly feed the grid through a by-pass switch.

The PLC control will optimise the PV generator contribute and assure the best continuous service through the management of the battery storage and of the diesel generator.