



Photovoltaic-based combined electricity and clean water production for remote small islands

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ABSTRACT

Most remote small islands of the Mediterranean area suffer from insufficient and high-cost electricity generation as well as significant water scarcity, considerably hindering the local development activities. The problem is much more pressing during the summer period due to the increased touristic activity. On the other hand, the entire Mediterranean region has significant solar potential, which is almost unexploited. In this context, the current paper investigates the opportunities of combined electricity and clean water production on the basis of the available solar potential. To that effect the currently proposed energy system comprising of photovoltaic (PV) generators and energy storage is combined with a small desalination unit. Actually, the maximization of the properly defined solar energy “value” is attempted on the basis of an appropriate allocation and planning of the PV generators either for covering directly the electrical demand of the local society or by providing the energy required for the seawater desalination process. According to the results obtained from the application of the proposed solution to a representative small Aegean Sea island, the production cost of both electricity and clean water through the desalination plant are favorably compared with the respective cost of the already existing electricity and water supply solutions.

Keywords: Stand-alone; Desalination; Energy autonomy; Solar potential

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