

The uncertainty of atmospheric processes in planning a hybrid renewable energy system for a non-connected island

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Non-connected islands to the electric gird are often depending on oil-fueled power plants with high unit cost. A hybrid energy system with renewable resources such as wind and solar plants could reduce this cost and also offer more environmental friendly solutions. However, atmospheric processes are characterized by high uncertainty that does not permit harvesting and utilizing full of their potential. Therefore, a more sophisticated framework that somehow incorporates this uncertainty could improve the performance of the system. In this context, we describe several stochastic and financial aspects of this framework. Particularly, we investigate the cross-correlation between several atmospheric processes and the energy demand, the possibility of mixing renewable resources with the conventional ones and in what degree of reliability, and critical financial subsystems such as weather derivatives. A pilot application of the above framework is also presented for a remote island in the Aegean Sea.

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