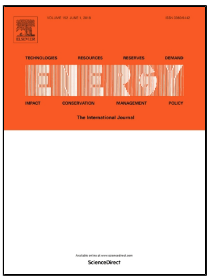
Accepted Manuscript



Analysis of some renewable energy uses and demand side measures for hotels on small Mediterranean islands: a case study

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PII:	S0360-5442(18)30973-3
DOI:	10.1016/j.energy.2018.05.139
Reference:	EGY 12974
To appear in:	*Energy*
Received Date:	29 December 2017
Accepted Date:	22 May 2018

Please cite this article as: M. Beccali, P. Finocchiaro, M.G. Ippolito, G. Leone, D. Panno, G. Zizzo, Analysis of some renewable energy uses and demand side measures for hotels on small Mediterranean islands: a case study, *Energy* (2018), doi: 10.1016/j.energy.2018.05.139

Analysis of some renewable energy uses and demand side measures for hotels on small Mediterranean islands: a case study.

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ABSTRACT

Tourist activity strongly influences the energy consumption and the overall load profile of communities with isolated energy systems. One example is hotel sectors on small islands that are not connected to mainland energy distribution grids. The use of solar energy systems could be a smart option for reducing energy consumption and tackling seasonal fluctuation. The operation of a weak and isolated electric grid requires attention to the management of power profiles in very short time frames. Energy storage (thermal or electric), as well as building automation control technologies, can be utilised for these aims. In this context, the present paper illustrates a study conducted at a hotel located on Lampedusa Island (Italy) that was considering some energy-retrofit scenarios dealing with the exploitation of renewable energy sources and building automation control technologies. The hotel is equipped with an air-to-water heat pump able to fulfil air conditioning and domestic hot water demands. Data concerning the hotel's energy consumption was measured during summer months while yearly data was provided by the local electric utility company. Detailed simulation models have been validated by this data and used to assess the efficacy of retrofit scenarios and their effects on the average daily electric profile.

KEYWORDS

BAC, RES, TRNSYS, energy saving, hotels, small islands.

1. INTRODUCTION

The majority of the small islands in the Mediterranean basin are not connected to the mainland's electric grid nor to natural gas pipelines. Consequently, most of the islands' energy needs, including heat, are fulfilled by electric devices [1] fed by local thermal power plants. In addition, these plants mainly rely on imported fossil fuels. The increase in oil prices and the increased attention on emissions mitigation strategies make this kind of energy system unsustainable at socioeconomic and environmental levels. In order to overcome these issues, it is advisable to increase use of local renewable energy sources (RES) in order to enhance energy efficiency and to implement flexibility and resilience on the electricity generation-distribution-use chain. One option that's been investigated is increasing the efficiency of existing traditional thermal power plants by retrofit actions, enabling combined heat and power (CHP) plants, and constructing district heating/cooling networks [2]. Nevertheless, studies conducted on six Italian islands demonstrated that CHP technology is only moderately economically attractive when public economic support mechanisms exist. Better results are achieved when hybrid renewable poly-generation systems are considered, but once again, huge