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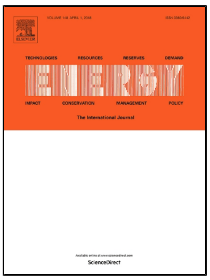

Study and simulation of the energy performances of a grid-connected PV system supplying a residential house in north of Algeria

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Study and simulation of the energy performances of a grid-connected PV system supplying a residential house in north of Algeria

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Abstract

The distribution of energy consumption by sector shows that the consumption rate of the building is very high. On a worldwide scale, the rate varies between 30 and 40%. In Algeria and according to the energy balance published by the Ministry of Energy, the residential household sector represents of about 42% of the total energy consumption. The main objective of this paper is to study the performance of the grid-connected photovoltaic system and the energy balance in the residential building. A case study is applied in the northern region of Algeria. The photovoltaic system supplies the house with electricity during the sunny days, and during the night or the cloudy-days, the house is powered by grid. The calculation of energy performance is based on the optimization, rationalization and saving energy approach. This takes into account the energy profiles of residential homes, real data and meteorological conditions. The results show clearly that the use of saving energy and grid-connected photovoltaic system allows a positive annual electricity balance of the studied residential house. The PV system generated 67.6% of the overall energy used in the house. Only, 33.4% are purchased from the grid. An energy positive balance of 2 kWh/day is observed.

Keywords: Photovoltaic; Grid-connected; Energy performance; Energy balance; Bioclimatic housing; load profile

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