

Integration of PV Systems in Residential Buildings: A Solution for Supporting Electrical Grid in Kuwait

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Abstract : The paper presents a solution to enhance the power quality and to reduce the peak load demand in Kuwait electric grid as a solution to the shortage of electricity production. Technical, environmental and economic feasibility study of utilizing integrated grid-connected photovoltaic (PV) system in residential buildings for supplying 7.1% of electrical power consumption in Kuwait is carried out using RETScreen software. A 10 KWp on-grid PV power generation system spread on the rooftop of the residential buildings is adopted and investigated and the complete system performance is simulated using PSIM software. Taking into account the international prices of electricity and natural gas, the proposed solution is investigated and tested for four different types of installation systems in terms of power generation and costs which includes horizontal installation, 25° tilted angle, single axis tracking and dual axis tracking. Results shows that the 25° tilted angle fixed mounted system is the most efficient type. The payback period as a tool of benefit analysis of the proposed system is calculated and it found to be 2.55 years.

Keywords : photovoltaics, residential buildings, electrical grid, production capacity, on-grid, power generation

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