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Autonomous Electricity Supply to German Households from Solar Photovoltaic Systems

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Abstract

A kWh household electricity bill in Germany consists of about 60% of costs related with electricity transmission, distribution and taxes. Household has to pay grid access costs to the utilities when a house is newly built. Those costs could be avoided if a stand alone solar photovoltaic (PV) system is installed in order to fulfill the household electricity needs. This possibility has been analyzed in this paper. Daily and monthly average household electricity consumption trend has been analyzed and this, together with climate data, is used to design the PV system for Cologne, Germany. Detailed cost benefit analysis of the proposed PV system has been made. An experience curve has been extrapolated for the period 2006-2060 to project the time series PV module price decrease in the future and these values are used to calculate time series kWh PV electricity generation costs. Estimating 4% annual growth rate for grid electricity price, breakeven and grid parity years for PV system have been calculated. Results are compared with a scenario if there were no seasonal variations in available solar radiation and household electricity consumption pattern.

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