Efficiency Assessment of a DC House at Low and High Distribution Voltages

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ABSTRACT
Direct Current (DC) power distribution has gained attention in the Residential Nanogrids (RNGs) due to the substantial increase in the number of roof-top Photovoltaic (PV) systems and internally DC appliances used in buildings. Using DC distribution improves the efficiency of the RNGs compared to AC distribution. This paper investigated the efficiency of a DC RNG for low and high distribution voltage levels by exploring reasons for power losses. The studied DC RNG consisted of various types of local loads, on-site PV generation, and battery storage systems. The realistic load, PV profiles, and converter efficiency curves were used to make the analysis more accurate. In addition, three load profiles with low, medium, and high-power consumptions were considered to study the load impacts on the overall system efficiency.

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