

Assessment of Power Quality Impact of Photovoltaic Integration: A Case Study of a Government Building in Malaysia

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Abstract : The integration of photovoltaic (PV) systems in government buildings represents a crucial step toward enhancing energy efficiency and promoting sustainability. However, the adoption of PV systems can introduce challenges in maintaining power quality due to the intermittent nature of solar generation. The effect of a self-consumption photovoltaic system on the power quality characteristics of a Malaysian government building is examined in this study. Total harmonic distortion of current (THDi), total harmonic distortion of voltage (THDv), voltage (Vrms), current (Irms), and power factors are among the important parameters that were examined both before and after the PV system was installed. Power quality data were collected over several weeks by using a power quality analyzer Fluke 1750, and a comparative analysis was conducted to evaluate changes in these parameters. The results show significant fluctuations in the power factor, particularly during periods of high solar generation, with notable variations in THDi across the three phases. These fluctuations highlight the potential interactions between solar generation and load demand, emphasizing the need for harmonic mitigation. Despite these issues, Vrms and THDv remained within acceptable limits, ensuring compliance with power quality standards. This study provides insights into the power quality behaviour of self-consumption PV systems before and after the installation of photovoltaics.

Keywords : power quality, power factor, harmonics, photovoltaic

Conference Title : ICEPE 2025 : International Conference on Electrical and Power Engineering

Conference Location : Sydney, Australia

Conference Dates : January 30-31, 2025