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# ANALYSIS OF PHOTOVOLTAIC RAILWAY NOISE BARRIER CONFIGURATION FOR GREEN ENERGY GENERATION

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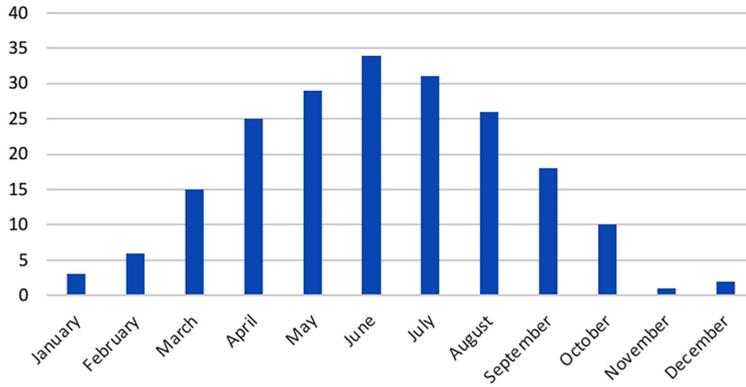
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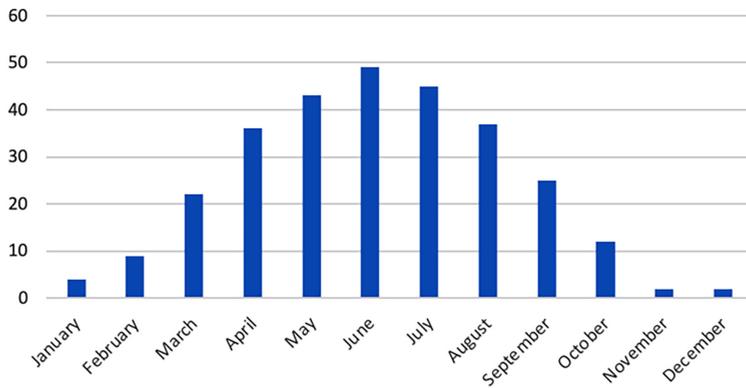
**Abstract** – Sustainable energy is a crucial aspect of our urban development, with a rising demand for energy resources, having the ability to integrate sustainable energy generation technologies with the existing infrastructure represents a possible solution for the high energy demand in populated regions. The regulations in the European Union state the maximum allowable noise levels to be 55 dB(A) in residential areas during the day and 55 dB(A) during the night, with the rising demand for reliable means of transportation, railways are becoming an essential part of the urban infrastructure. The use of Photovoltaic noise barriers (PVNBs) is expanding globally to meet those needs, and different studies are being conducted to evaluate the performance of this technology in various scenarios and configurations. This study focuses on the performance of the Photovoltaic integrated panels without affecting the overall efficiency of the noise reduction barrier. The primary results for energy generation evaluation show that the best results can be obtained from a bifacial PVNB, meaning that the Photovoltaic segment is in a vertical configuration mounted on top of a railway noise barrier, as shown in the following figure, where three different configurations for the PVNB were studied and based on the results it is clear that bifacial PVNB outperforms the other configurations, with a difference of almost one-third in the AC energy generated. This study was conducted using PVWatt calculator. This tool was developed by the national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. Although it is optimal to use the vertical configuration for the PVNB, noise mitigation efficiency is still an aspect to consider.

**Keywords** – *Efficiency; photovoltaic noise barrier; PVWatt calculator; sustainability*

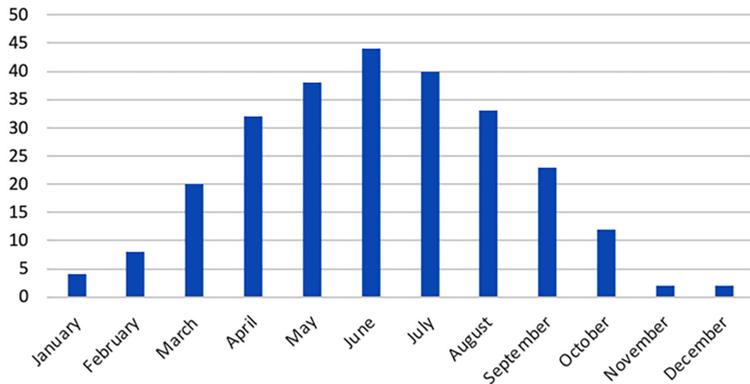
AC Energy (kWh) for the Horizontal PVNB



AC Energy (kWh) for the bifacial PVNB



AC Energy (kWh) for the 36 degree tilted PVNB



Comparative evaluation of green energy generated by three different configurations of the PVNB