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Estimation of photovoltaic energy generated in urban environments, case: Medellín Metropolitan Area (MMA) (Colombia)

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This work considers photovoltaic solar energy as an alternative to promote the diversification of the energy matrix and contribute to improving access to the citizens of Medellín (MMA) Metropolitan Area, Colombia. The objective is a more sustainable and resilient energy use. To achieve this, we assess how much of the energy demand can be generated within the city, integrated into the urban morphology at the roofs of existing buildings. We use meteorological information and power measurements from three experimental solar panels. We analyze the photovoltaic energy potential in these Representative Urban Areas (RUA) and provide information relevant to the whole Valley's context to guide sustainable and resilient energy planning. One particular result is about the energy reduction factor due to cloudiness, which quantifies how energy would vary under the region's cloud conditions.