Financing of Residential Rooftop Photovoltaic Projects Under a Net Metering Policy Framework: The Case of the Colombian Caribbean Region

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ABSTRACT

The inclusion of photovoltaic energy in the Colombian energy matrix has had several difficulties due to the lack of energy policies and regulations in renewable energy projects. The lack of government support with subsidies that extend the coverage of PV energy projects in residential areas has made the collection of funds more challenging. This paper presents a techno-economic analysis for the implementation of grid-connected photovoltaic projects on the roofs of residential areas, under the net metering policy framework. For the profitability analysis, the discounted cash flow (DCF) method was used. The revenues were obtained from the forecasts of the electrical power production of the PV system, based on the characteristics of the Colombian Caribbean Region. For this purpose, the meteorological data (2013-2017) of this region were used as an input for the calculation of the economic benefits that can be achieved with the implementation of PV systems. Based on the technical sizing and economic assumptions, it was proved that the DCF method allows to accurately determine the optimal debt ratio. After evaluating the three scenarios proposed, it was demonstrated that profitability and self-sustainability, with investment from creditors, is obtained from the implementation of PV systems of at least 3 kWp.

Keywords: PV Systems, Net Metering, Discounted Cash Flow Method, Optimal Debt Ratio