

A Multicriteria Analysis of Energy Poverty Index: A Case Study of Non-interconnected Zones in Colombia

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Abstract : Energy poverty considers a population that does not have access to modern energy service. In particular, an area of a country that is not connected to the national electricity grid is known as a Non-Interconnected Zone (NIZ). Access to electricity has a significant impact on the welfare and development opportunities of the population. Different studies have shown that most health problems have an empirical cause and effect relationship with multidimensional energy poverty. Likewise, research has been carried out to review the consequences of not having access to electricity, and its results have concluded a statistically significant relationship between energy poverty and sources of drinking water, access to clean water, risks of mosquito bites, obesity, sterilization, marital status, occupation, and residence. Therefore, extensive research has been conducted in the construction of an energy poverty measure based on an index. Some of these studies introduce a Multidimensional Energy Poverty Index (MEPI), Composite Energy Poverty Index (CEPI), Low Income High Costs indicator (LIHC), among others. For this purpose, this study analyzes the energy poverty index using a multicriteria analysis determining the set of feasible alternatives - for which Colombia's ZNI will be used as a case study - to be considered in the problem and the set of relevant criteria in the characterization of the ZNI, from which the prioritization is obtained to determine the level of adjustment of each alternative with respect to the performance in each criterion. Additionally, this study considers the installation of Micro-Grids (MG). This is considered a straightforward solution to this problem because an MG is a local electrical grid, able to operate in grid-connected and island mode. Drawing on those insights, this study compares an energy poverty index considering an MG installation and calculates the impacts of different criterias in an energy poverty index in NIZ.

Keywords : multicriteria, energy poverty, rural, microgrids, non-interconnect zones

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