ELECTRIFICATION OF ISOLATED COMMUNITIES IN MEXICO: THE CASE OF WIND AND SOLAR ENERGY OPTION

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ABSTRACT

The Mexican government, supported by international organizations, has financed a myriad of rural electrification projects. However, high costs and a lack of trained staff in isolated regions have obstructed the expansion of the grid to all rural areas, particularly in the poorest regions of the country.

An alternative solution to conventional projects is to create autonomous microgrids powered by solar and wind sources. Technological developments in renewable technologies and in battery storage provide promise of lower costs and smarter infrastructure, specially in the case of wind turbines (EIA, 2016). An independent grid can be a better option than a connected system since it provides an ad-hoc solution and, therefore, no idle capacity is built. For Mexico, the CFE, plans according to an overestimated usage of electricity. A microgrid is also relatively easy to operate, and it has been shown in several attempts that community engagement can be helpful to continue the operation with no significant outside intervention.

The general objective of this thesis is to determine the most cost-effective option to complete the electrification of unconnected communities in the State of Chiapas, Mexico, and sort them based on the optimal cost. The optimal cost of electrification at a minimum is the cost required to connect each isolated town to the national grid and to build an independent system powered by wind energy, accompanied by a set of batteries, either for each town on its own, or as a member of a regional group. One extra case is explored in which the government can subsidize a wind-energy company to settle in a specific town.

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