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Title: System and cost analysis of stand-alone solar home system applied to a developing country

Author(s) Name: Hossain C.A., Chowdhury N., Longo M., Yaïci W.

Contact Email(s): wahiba.yaici@canada.ca

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Abstract:

Power is one of the key requirements for the development of economies and upgrading of standards of living of developing countries. Countries such as Bangladesh depend largely on fossil fuels such as diesel fuel and natural gas to produce the main proportion of their electricity. However, this country's combination of limited natural gas reserves high fuel prices and escalating costs of transmission and distribution lines has greatly increased the unit cost of electricity generation and it is becoming difficult for customers to pay for electricity. On the other hand, burning fuel causes environmental pollution that leads to global warming which is ultimately responsible for climate change and its devastating consequences. In this study, we have recommended a stand-alone system for the traditional consumption of domestic electric use at residential units in Bangladesh. We have shown a comparison of using the stand-alone photovoltaic (PV) system with the traditional grid connection. Although the initial set-up cost is high, it becomes profitable as people are supplied with electricity, which is being generated from PV as a result minimizing the energy cost from the grid, and in addition, they can later make savings from this system. This paper, therefore, aims at determining the optimum size of the rooftop solar home system that will fulfil all the criteria for powering up electrical appliances at an affordable price. Comparative analysis of both energy systems based on the cost calculation has been performed by means of the Hybrid Optimization of Multiple Energy Renewables (HOMER) software. The validity of this proposal and its usefulness is also analysed. © 2019 by the authors.