

## Accepted Manuscript

Title: LOW COST, HIGHLY RELIABLE RURAL ELECTRIFICATION THROUGH A COMBINATION OF GRID EXTENSION AND LOCAL RENEWABLE ENERGY GENERATION

Authors: Fabien Chidanand Robert, Sundararaman Gopalan

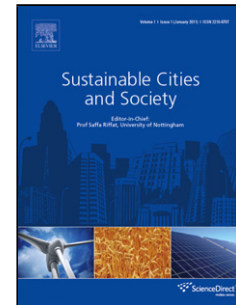
PII: S2210-6707(17)30765-5  
DOI: <https://doi.org/10.1016/j.scs.2018.02.010>  
Reference: SCS 977

To appear in:

Received date: 30-6-2017  
Revised date: 7-2-2018  
Accepted date: 11-2-2018

Please cite this article as: Robert, Fabien Chidanand., & Gopalan, Sundararaman., LOW COST, HIGHLY RELIABLE RURAL ELECTRIFICATION THROUGH A COMBINATION OF GRID EXTENSION AND LOCAL RENEWABLE ENERGY GENERATION. *Sustainable Cities and Society* <https://doi.org/10.1016/j.scs.2018.02.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# LOW COST, HIGHLY RELIABLE RURAL ELECTRIFICATION THROUGH A COMBINATION OF GRID EXTENSION AND LOCAL RENEWABLE ENERGY GENERATION

Fabien Chidanand Robert\*, Sundararaman Gopalan

Department of Electronics and Communication Engineering, Amrita School of Engineering, Amritapuri, Amrita Vishwa Vidyapeetham, Amrita University, India. chidanand@am.amrita.edu, sundar@am.amrita.edu.

\*Corresponding author

## Highlights:

- Additional renewable energy and storage reduce the cost of rural electrification compared to pure grid extension
- The reliability of the central power grid and of the microgrid are introduced as important parameters
- Results on 20 test cases show that these parameters influence the choice of rural electrification strategy
- Local, renewable energy generation reduces drastically the grid losses: from 23.2% to 8.7% in the best scenario.

## Abstract

Globally, 1.2 billion people have yet to be granted access to electricity. Another 2.4 billion receive an intermittent electrical supply due to undersized and unreliable rural power grids. However, existing rural electrification programs focus mostly on extending the central power grid, thus providing an intermittent supply and increasing the losses on the power grid. In the literature, extension of the central grid is unilaterally compared with a stand-alone microgrid solution. In the model for rural electrification presented in this paper, the extension of the central grid is supplemented with local renewable energy generation and storage. The “reliability of the central power grid”, the “expected reliability of electrical supply in the village”, and the “losses” are also introduced as important design parameters. The usefulness and relevance of the proposed model was illustrated through 20 test cases. For Kanjikuzhi, an Indian village, additional renewable energy can reduce the average cost of electricity by 26%, diminish power interruptions by 40% and decrease grid losses by 62.5%, compared to a simple extension of the central power grid.

Keywords: ; rural electrification; microgrid; renewable energy; grid extension; losses; reliability; design; energy shortage.

Download English Version:

<https://daneshyari.com/en/article/6774968>

Download Persian Version:

<https://daneshyari.com/article/6774968>

[Daneshyari.com](https://daneshyari.com)