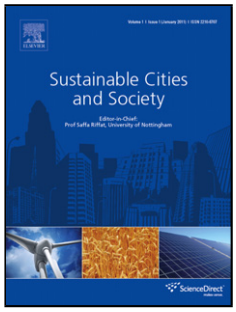

Title: Feasibility Assessment and Design of Hybrid Renewable Energy Based Electric Vehicle Charging Station in Bangladesh

Authors: Ashish Kumar Karmaker, Md. Raju Ahmed, Md. Alamgir Hossain, Md. Mamun Sikder

PII: S2210-6707(17)31661-X
DOI: https://doi.org/10.1016/j.scs.2018.02.035
Reference: SCS 1002

To appear in:

Received date: 6-12-2017
Revised date: 22-1-2018
Accepted date: 23-2-2018

Please cite this article as: Karmaker, Ashish Kumar., Ahmed, Md Raju., Hossain, Md Alamgir., & Sikder, Md.Mamun., Feasibility Assessment and Design of Hybrid Renewable Energy Based Electric Vehicle Charging Station in Bangladesh.*Sustainable Cities and Society* https://doi.org/10.1016/j.scs.2018.02.035

Feasibility Assessment & Design of Hybrid Renewable Energy Based Electric Vehicle Charging Station in Bangladesh

Ashish Kumar Karmaker [1,*], Md. Raju Ahmed [1], Md. Alamgir Hossain [1,2] and Md. Mamun Sikder [1]

[1] *Department of Electrical and Electronic Engineering, Dhaka University of Engineering & Technology, Gazipur1700, Bangladesh; ashish1631988@gmail.com (A.K.K); raju97eee@yahoo.com (M.R.A.); alamgir_duet@hotmail.com (M.A.H.); mms_b4u@yahoo.com (M.M.S.)*

[2] *School of Engineering and Information Technology, University of New South Wales-Canberra, Canberra, Australia*

* *Corresponding author*. Tel.:+880-1916184846;
E-mail address: ashish@duet.ac.bd

HIGHLIGHTS:

- An EV charging station, which reduces the CO_2 emissions as compared to the conventional grid-based EVCS, is designed.
- A novel model that integrates a PV module and biogas generators to generate electricity for charging EVs is developed.
- The techno-economic, socio-economic and environmental feasibility of the proposed model are analysed.

ARTICLE INFO: Article history: Received 00 December 00 Received in revised form 00 January 00

ABSTRACT

The rapid increase in electric vehicle (EV) in Bangladesh requires more energy to run these vehicles. Moreover, the transportation sector produces Green House Gas (GHG) especially CO_2 emissions. Due to the excess power needed to recharge these EVs, the national grid has to supply more than 500 MW daily. This paper proposes an Electric Vehicle Charging Station (EVCS) based on solar and biogas to reduce the burden on the national grid. The proposed EVCS integrates a combination of a solar PV module (10 kW), three biogas generators (10 kW), 25 lead acid batteries (each 100 Ah), a converter (10 kW) and charging assemblies. This paper analyzes the technical, economic and environmental feasibility of the proposed EVCS using the Hybrid Optimization of Multiple Energy Renewables (HOMER) Pro software. This configuration estimates a Cost of Energy (COE) of $0.1302/kWh, total net present cost (NPC) of $56,202 and operating cost of $2540. In addition, the proposed model reduces the CO_2 emissions by 34.68% compared to a conventional grid-based charging station. The designed EVCS saves approximately $12–$18 per month to recharge an EV which increases the socio-economic standard of EV owner.

Peer review under responsibility of xxxxx.

Hosting by Elsevier

xxxx-xxxx/$ – see front matter © 2014 xxxxxxxx. Hosting by Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.aebj.2014.10.012