Military Institute of Science and Technology

Department of Electrical Electronic and Communication Engineering

Thesis On

Cost Analysis and Simulation of Stand-alone Hybrid Renewable Energy System (HRES)

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CERTIFICATION

This thesis paper titled “Cost Analysis and Simulation of Stand-alone Hybrid Renewable Energy System (HRES)” submitted by the group as mentioned previously has been accepted as satisfactory in partial fulfillment of the requirements for the degree B.Sc. in Electrical, Electronic and Communication Engineering on December 2014.

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DECLARATION

This is to certify that the work presented in this thesis paper titled "Cost Analysis and Simulation of Stand-alone Hybrid Renewable Energy System (HRES)" is the outcome of the investigation and innovation carried out by the following students under the supervision of Dr. Mohammad Jahangir Alam, Professor, Department of Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh. It is also declared that neither of this thesis paper nor any part thereof has been submitted anywhere else for the award of any degree, diploma or other qualifications.

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DEDICATION

TO OUR BELOVED PARENTS

AND

RESPECTED TEATCHERES

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We are thankful to the Almighty Allah for his blessings for the successful completion of our thesis. Our heartiest gratitude, profound indebtedness and deep respect goes to our supervisor Dr. Mohammad Jahangir Alam, Professor, Department of Electrical and Electronic Engineering (EEE), Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh, for his constant supervision, affectionate guidance and great encouragement and motivation. His keen interest on the topic and valuable advices throughout the study was of great help in completing our thesis. We are especially grateful to the Department of Electrical, Electronic and Communication Engineering (EECE) of Military institute of Science Technology (MIST) for providing their support during the thesis work. Finally, we would like to thank our families and our course mates for assistance, patience and suggestions during the course of our thesis.

ABSTRACT

For the development of any country electricity in every moment is a basic requirement for the present civilization. Power crisis is one of the major barriers for economic development of our country. Day by day the gap between demand and production is increasing. Bangladesh lacks in fossil fuel reservation. In this situation renewable energy sources can provide us with a great solution. Energy generation by hybrid system reduces the generation cost and will help in balancing the cost of energy.

Again Bangladesh has been ranked fourth among 91 countries with worst urban air quality in the latest air pollution monitoring report of 2014 by World Health Organization (WHO). This environment pollution is becoming a great concern for our country day by day.

In this situation a standalone renewable hybrid energy system will reduce load demand from the grid and will be an eco-friendly energy system. This thesis paper proposed a cost effective design of standalone hybrid power system in Bangladesh. Renewable energy sources considered in this study are: algae fuel, biogas and solar energy. It was tried to analyze the potential implementation of hybrid energy system for an off-grid community (Tongi, Bangladesh) for satisfying the electricity demand. To find out the most reliable and environmental friendly hybrid energy system, a techno-economic feasibility study of the off-grid power system has been carried out using Hybrid Optimization Model for Electric Renewables (HOMER) simulation software.

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