University of Southern Denmark

Faculty of Social Sciences, Environmental & Business Economics

MSc Environmental & Resource Management

Reconsidering Botswana's Energy Mix: The Economics of Integrating Renewable Energy Sources

Charles Setobele Mosele

Examination No: 159978

Supervisors: Professor Niels Vestergaard – University of Southern Denmark

Associate Professor Jens Bo Holm-Nielsen – Aalborg University

http://ecee.colorado.edu/~ecen4517/index.html

A Thesis Report submitted in partial fulfilment of the requirements of the Master of Science in Environmental and Resource Management

ABSTRACT

The Government of the Republic of Botswana has decided to use renewable energy sources to provide electricity to rural areas where it does not make economic sense to connect such villages to the national grid. It should be noted that because of the relatively low levels of income in rural areas the rural electrification initiatives are primarily meant to meet the basic electrical needs in these households. Electrical energy is critical to the measure of the standard of living of any given country. Botswana has no hydro potential and the wind speed is below four metres per second. It has some of the highest insolation levels in the world. Botswana has the target of 80% electrical connectivity by the year 2016. CEA tool was used as method of analysis for coming up with the most cost effective strategy to fulfil this goal. The data sources which have been used in this study are comprehensive, and they are generally based on studies done at a national level by major stakeholders in Botswana data dissemination like the CSO, University of Botswana and scientific journals. So it is reliable data that can be used to influence policy. Seronga Village was used as a case study for this exercise. The results revealed that effective maximisation for connecting Seronga was through the supply of electricity using solar power with energy storage (batteries) capacity. Further backup in order of cost effectiveness would be biomass (since Seronga is in the part of the country with the best rains), and diesel generator as the last option.