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Free energy option and its relevance to improve domestic energy demands in southern Nigeria

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ABSTRACT

The aim of this paper is to seek an energy option that would benefit the growing energy demands. Domestic energy demands in southern Nigeria had increased greatly due to failing power programs and seasonal migrations. The fossil fuel option is gradually fading away due to environmental pollution and recent dynamic cost. The renewable energy option had been celebrated with little success in the coastal area of southern Nigeria. At the moment, the renewable energy option is very expensive with little guarantee on its efficiency with time. The data set used for this study was obtained from the Davis weather installation in Covenant University. The free energy option was considered. The cost and its environmental implication for domestic use were comparatively discussed alongside other energy options — using the Life cycle cost analysis. It was found out that free energy option is more affordable and efficient for domestic use.

1. Introduction

Alternative energy has the advantage that it can be conserved; do not harm or pollute the environment; do not deplete natural resource i.e. it is generated naturally and continuously replenished. The sub-classification of alternative energy is controversial. The generally accepted sub-classification of alternative energy sources include solar, bio-fuels, wind energy, biomass digester, geothermal, hydro e.t.c. Each of the classification shows varying challenges. For example, solar and wind can be affect by regional climate perturbations (Emetere and Akinyemi, 2015). The biomass option is dependent on biodegradable waste which may be gotten from living things or dead organisms. The biomass option has less green house effect on the social or earth surface than fossil fuel. The inclusion of the free energy as an alternative energy may be appropriate depending on its source. However, the free energy option has been suppressed and not considered in the third world countries. Based on established conspiracy theory, it is believed that free energy suppression is linked to government, corporations, or advocacy groups (Robert, 2000). Hence, free energy option has not been seen to be technologically viable, pollution-free, and at no-cost. The inclusion of free energy as a sub-classification of alternative energy may be premised on the known advantages of the later i.e. sustainability, cost, less greenhouse effect, job creation and its economy viability. In this research it was proposed that the free energy option has the potential to meet global energy demands in the third world countries.

Domestic energy demands in southern Nigeria had increased greatly due to failing power programs and uncontrolled influx of migrants from neighbouring countries. The fossil-fuels option is also becoming gradually expensive due to scarcity, dynamic purchasing cost and global fall in crude oil prices. More so, the environmental pollution from the fossil fuel is dangerous because of the massive release of anthropogenic pollution (Emetere and Akinyemi, 2013; Emetere, 2013). Nevertheless, a lot of people patronize the fossil-fuels option because it is available and affordable. The reliance on renewable energy-solar option has proven to be more expensive in the long run. In the study location, solar option is the most patronized. Little awareness is created for other renewable options.

Nigeria's government built only 12 power plants—all of them now in disrepair. At the moment, only 40% of Nigerian electricity consumer are connected to the commercial grid which generate little less than 4000 MW (Owoyemi, 2014). Those connected to the national grid barely have 5 h power supply daily. Aside the usual challenges of very old equipment in the grid, there are lots of issues with the national grid. For example, the major challenge of the national is the dilapidated distribution line as shown in Fig. 1(a)–(d).

Therefore high power loss is expected both in the transmission and distribution lines. In the developed countries, the grid

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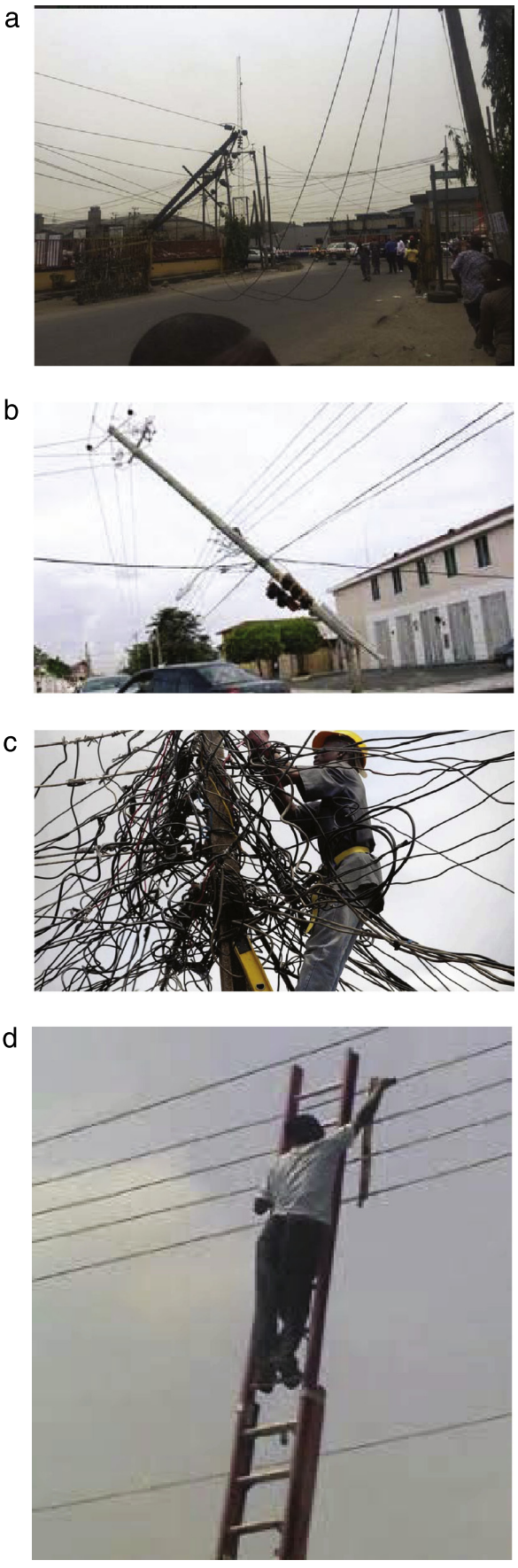

Fig. 1. Different challenges of the distribution line (Unknown, 2014a,b,c,d).

has the following challenges: constructing new transmission lines; recuperating the initial construction cost; connecting the renewable energy generation sites to the power grid; and protecting the grid from physical and cyber security attacks. The challenge of the power grid have all of the above challenges but not limited to: illegal connections; inefficient bill collection system; overhead distribution system which makes it vulnerable to illegal agents; lack of regulations and standards in the distribution sector; century old, legacy bulk power grid; and climate issues. In the light of the above, it is more convenient for consumers to stay-off the national grid to seek a more comfortable way of tackling their individual energy challenges.

The situation at the moment and the economy state of the area cannot permit financial frivolity on the side of the teeming population as they seek to solve their domestic energy demands. The objective of this research is to explore the free energy option as a way to salvage the power generation challenges. In section two, the challenges of the renewable energy options were considered. In section three, we considered a brief introduction on the free energy option. The free energy technologies were considered in section four. The cost implications were discussed in section five. In section six, we made salient recommendation based on already established research.

2. Renewable energy options and its current challenges over study area

The public awareness on the renewable energy option is enormous with a major setback on which of its energy-type is affordable for domestic use only. The most popular renewable energy option is the solar energy option. The performance of the solar photovoltaic (PV) panel in southern Nigeria is plagued with its natural climate system (Emetere and Akinyemi, 2015). The earliest groups of customer who patronized the solar-energy option are already counting their losses. The major challenge of the solar energy option is the durability of its PV panel.

Solar PV panels are made up of solar cells i.e. an array of photovoltaic (PV) cells. The primary requirement for a material to be used for solar cell application is its band gap. The band gap of the solar material is expected to be between 1.1 and 1.7 eV (Tyagia et al., 2012). Solar cells are classified based on their inherent band gap. Types of solar cell includes silicon solar cells, III–V group solar cells, thin films solar cells e.t.c. PV modules do not only convert solar irradiation directly into electric but it also produces plenty of waste heat, which can be recovered for thermal use (Tian and Zhao, 2013). Materials used to fabricate the PV panels are mono-crystalline silicon, polycrystalline silicon, micro-crystalline silicon, copper indium selenide, and cadmium telluride (Razykov et al., 2011). The technology behind Solar panels varies with respect to its manufacturer. Recently, the production solar cell from silicon semiconductor is one of the latest inventions of the PV technologies. The concentrating Solar Power (CSP) technology is another recent technique for improving the functionality of the PV module. A typical CSP-plant consists of three main subsystems: solar collector field, solar receiver and a power conversion system (Jamel et al., 2013). The CSP option includes the collector and the receiver, parabolic trough, solar tower or central receiver, linear Fresnel and dish Sterling (Py et al., 2013). The efficiency of the CSP is high in the tropical region. However, the efficiency of the CSP is greatly reduced in coastal region which is characterized by high convective activity and solar shading. Most importantly, how many persons in the third world can afford CSP for domestic use?

The second renewable option is the wind-energy option. The wind energy potential via mini wind turbine is an ongoing research. The wind data set were collected from the Davis weather station that was positioned 20 m above the ground. We assume