

Embracing the Green Communication Initiative in Powering Telecommunication Networks in Nigeria

Alenoghena Caroline O,

Dept of Telecommunication Engr'g,
Federal University of Tech,
Minna, Nigeria.
alenca2@yahoo.com

Ambafi James G.

Dept of Electrical/Electronic Engr'g,
Federal University of Tech,
Minna, Nigeria.
ambafi@futminna.edu.ng

Dauda Umar S.

Dept of Electrical/Electronic Engr'g,
Federal University of Tech,
Minna, Nigeria.

Abstract—The threats to global substance necessitated by effects of global warming call for the embrace of green energy initiatives. The powering of telecommunication equipment is an enormous burden for the operators in Nigeria since it has the smallest per capita electricity consumption in the world. In this paper, the challenges faced by telecommunication service providers in powering their infrastructures are reviewed. The green energy options available for powering our telecommunication infrastructure in Nigeria are analyzed. The paper ends with a frame work on modalities to having safer and efficient power source for communication service delivery. It is anticipated that this paper will bring to light the plight of the public and telecommunication operators in sustaining good quality of service. It will also hasten the need to embrace alternative power supply that is clean and reliable in powering telecommunication base stations for better service delivery.

Keywords- Base Station, Green Energy, Power, Telecommunication, Infrastructure

I. INTRODUCTION

The advent of telecommunications can be traced to 1838 when the first telex system was invented by Samuel Morse, and the subsequent invention of the first wireless communication device by Bell in 1880. The introduction of cellular technology by Bells laboratories in 1947 boosted the communication capacity of wireless systems [1]. The telecommunication industry experienced a great leap in the mobile sector with the release of the first handset in the UK by Vodafone in 1985. Later the introduction of Global System for Mobile Communication (GSM) Services (operating on cellular technology), has seen mobile phone users grow steadily best described as a revolution. The world mobile cellular subscribers rose from less than 1 million in 1991 to over 6.8 billion subscribers in 2012 [2], with GSM been acclaimed as the most trendy and common personal technology on the planet [3].

In Nigeria, GSM service was introduced in August 2001, following the liberalization of the telecommunication sector and introduction of a new telecommunication policy in the year 2000 [4]. Prior to GSM introduction, telecommunication service was limited only to privileged few. GSM service in Nigeria has led to increase in the number of

telecommunication users from about 500,000 in 2001 to over 120 million in 2013 with prospect for more market. As at March 2013, 97.36% of telecommunication users in Nigeria rely on the GSM platform [5]. The contribution of telecommunication sector to the gross domestic product (GDP) of Nigeria rose from 0.62% in 2001 to 8.53% in 2013 [5]. In terms of growth, Nigeria is ranked the largest and fastest growing telecom markets in Africa and among the ten fastest growing telecommunication markets in the world [6].

As the number of mobile subscribers increase, the need for more GSM base stations (BTS) to be able to meet the demand for services becomes a necessity. The growth in the number of GSM subscribers has resulted in the multiplication of the number of base stations in Nigeria. The Base stations erstwhile were very few, seem to have appeared everywhere from residential, commercial centers to highways and bye ways. As more base stations are built, the energy provision to power these facilities and their health effects becomes a cause for concern. Research has shown that mobile operators are among the top energy consumers (Telecom Italia is the second largest energy consumer in Italy). Though ICT consumes only 3% of worldwide energy its power consumption is rising at 16-20% per annum doubling every 4-5 years [7]. Globally there are about 640,000 base station sites primarily powered by diesel generators. In Nigeria 52% of the base station sites are strictly powered by diesel generators [8]. Diesel generators result in the emission of Carbon IV Oxide (CO₂) in the already polluted atmosphere further warming up the climate system. Currently companies believe that the use of green energy options could transform the telecommunications industry for the better.

In this paper, we review the green communication initiative and also the grid power supply situation in Nigeria as it affects the telecommunications industry. The viable green power options are presented with a cost estimate for setting up a 10 kVA solar power plant. The paper is rounded up with a cost analysis for powering a base station with different power options.

II. THE GREEN COMMUNICATION INITIATIVE

The presence of telecommunication infrastructures in our environment has become a subject of debate, litigation and