

## Overhead Lines for Transmission and Distribution of Power System and its Consequences in Nigeria

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**Abstract:** From the research, it were observed that the effect of overhead power transmission and distribution ranges from electrocution, felling of poles, fire out break and even death. The electricity providers in Nigeria should take serious measure to mount poles a bit far from the roads and serious public sensitization should be carried out to avert dangers of having contact with high tension lines. Towers/poles for transmission and distribution of electricity should be mounted off from residential buildings as the electromagnetic rays and charges from the lines can cause cancer, leukemia or even death due to electrocution when these poles fell on building or compound. The poles should be mounted strongly on the ground with concrete with stray rod to hold it firmly on the ground. Finally, the use of underground cable transmission and distribution should be recommended to reduce this menace notwithstanding the cost of underground cable transmission.

**Key word:** Overhead line • Underground line • Electricity • Power transmission and distribution • Generating power station • Voltage and Electrocution

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### INTRODUCTION

Generation of electrical energy is at the different generating station. These stations are not necessarily cited at the load centers. Majority of the generating station is constructed away from the load centers. The load centers are the place where the power is utilized maximally. This power when generated is transmitted from the generating station to different load centers through overhead line or underground line transmission [1-3]. The sitting of generated power station is due the following: availability of enough water for thermal station, large scale of land, dam or water availability for hydroelectric station and fuel availability for thermal station. However, these factors are not easily seen in the load center and therefore there is need to construct the generating power station in a place far from the consumers [4-6].

**Overhead Power Line:** An overhead power line is a structure used in electric power transmission and distribution to transport electrical energy over long distances. There consists of one or more conductors suspended by towers or poles. The bare wire conductors on the line are generally made of aluminum (plain or

reinforced with steel or composite material, e.g. carbon or glass fiber).

In power line design, overhead line is used to maintain adequate clearance between energized conductors and the ground so as to prevent dangerous contact with the line and also to provide reliable support for conductors, to reduce storm, ice load, earthquake and other things that can cause damage. Moreover, overhead power transmission is cheaper than underground power transmission and distribution.

Notwithstanding the advantages of overhead line transmission and distribution of electricity, it constitute trait to social wellbeing of the users, hence this research. The use of area below overhead line is restricted because objects must not come in contact to the energized conductors. Overhead line and structure may shed ice, creating a hazard. Radio reception can be impaired under a power line, due to shielding of receiver antenna by the overhead conductors and sharp points of the conductors which creates radio noise [6,9]. In the area surrounding overhead lines, it is dangerous to risk interface, for example flying kites or balloons, using metal ladder or operating machinery. This has resulted to serious electrocution and sometimes has led to death. [6]. Many deaths occur when aircraft crash into overhead power lines [7].

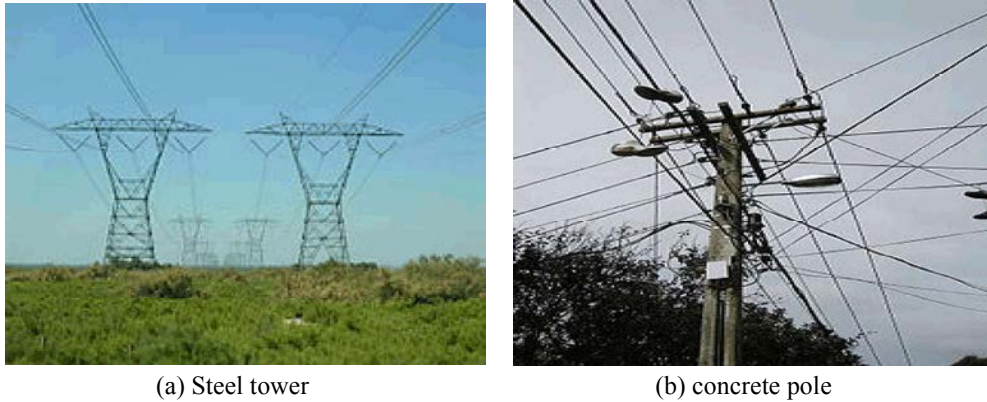


Fig. 1: Overhead line transmission and distribution with steel tower and concrete pole

Table 1: Effect of using Overhead line Transmission and Distribution.

Date	Area	Nature of Effect
10/3/2015	Isu in Onicha L G A	Electrocution by high tension overhead line during changing of phase
15/07/2015	Nkaliki road	Electrocution by high tension overhead line
12/08/2015	Opposite FETHA II, Abakaliki	Electrocution by high tension overhead line resulting to death
20/08/2015	Abakaliki Afikpo road	Felling of poles due to heavy down pour resulting to cutting of overhead lines
24/12/2015	Abakaliki Enugu road	Felling of poles hit by vehicle
10/06/2016	Nkaliki area	Blackout due to felling of poles due high wind and heavy down pour
12/06/2016	Mile 4 area	Electrocution by high tension overhead line
13/07/2016	Nkaliki Road	Electrocution by high tension resulting to death
15/07/2016	Ezza road	Fire out break due to coming together of two phases due to high wind and heavy down pour
20/08/2016	Water works road	Fire out break due to phases coming together
21/08/2016	Hatchery road	Electrocution by high tension resulting to death
	Ogoja road	Felling of poles hit by vehicle

**Voltages Transmitted by Overhead Line:** The range of voltages transmitted and distributed in overhead lines, are classified by electrical power industry as follows:

- Low voltage LV, less than 1000 volts are used for connection in residential or small commercial customers and utility.
- Medium voltage MV, distribution is between 1000 volts (1kV) and 69 kV are used for distribution in urban and rural areas.
- High voltages HV, sub-transmission is less than 100 kV, or transmission of voltages between 115 kV and 138 kV. There are used for sub-transmission and transmission of bulk quantities of electric power and connection to very large consumers [8].

**Structures and Conductors Used in Overhead Lines:** The poles used for overhead lines have a variety of shapes depending on the type of line. It can be simple, that is wooden pole mounted directly on the earth with cross arms beam to support the conductors. Also tubular poles are used in urban areas and high voltage lines are carried on lattice-type steel tower or pylons as shown in Fig 1. [9]

A single circuit transmission line carries conductors for only one circuit. Then for three-phase system, it has three conductors. Also a double circuit transmission line has two circuits and for three phase system, each tower support and insulates six conductors as shown in Figure 1 [9].

**Data Collection:** The data is collected from Enugu Electricity Distribution Company, EEDC in Abakaliki in Ebonyi State is shown in Table 1 [10].

## DISCUSSION

From the data collected on table 1, we can see the effect of overhead power transmission and distribution which ranges from electrocution, felling of poles, fire out break and even death. Transporters sometimes, spill off the road and hit the poles mounted along the road side and in some case it results to fatal road accident which claims some life. Poles are mounted by side of the road, during heavy down pour; these poles fell on the road and sometimes obstruct the movement of commuters. In some cases, the bare conductors of different phases come in



Fig. 3: A man electrocuted at opposite FETHA II, Abakaliki



Fig 4: A man electrocuted to death at Nkaliki Road, Abakaliki, Ebonyi State

contact due to heavy wind and it results to heavy spark which may damage some electrical appliance or even cause fire outbreak.

In 12<sup>th</sup> August, 2015, two people was seriously electrocuted which later resulted to death at Federal Teaching Hospital Abakaliki, FETHA II hospital. The victims were using metallic ladder to paint three storey building at Eguogboriga Estate which mistakenly touched the high tension overhead line as shown in Fig 3.

Also in 13<sup>th</sup> July, 2016, a man was electrocuted at Nkaliki road in two storeys building in his attempt to paint the building. The metal ladder he was using had contact with high tension wire and these results to heavy electrocution that resulted to instant death as shown in Fig 4.

## CONCLUSION

The disadvantages of using overhead line transmission and distribution of electricity are enormous. Electricity providers should be cautions of the dangers of using overhead lines to transport electricity. Awareness should be created on the users to be conscious of the dangers inherent in the use of overhead lines transmission. The use of underground line transmission should be encouraged to reduce the incidences of electrocution.

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