



ADVERSE EFFECT OF SUBSTANDARD MATERIALS

PHCN EXPERIENCES

Abstract

- Technical as well as financial losses have been incurred by our network in recent times as a result of using substandard materials in the construction and installation of electricity facilities in PHCN network.
- These substandard materials not only degenerate to losses of energy, equipment and revenue but sometimes it involves loss of life.
- The authority is facing unbundling into 11 distribution, 6 Generation and 1-Transmission companies. In addition to these companies, the Federal Government of Nigeria is presently constructing a 4 generating stations and 7 Niger Delta Power Plant to bring the total capacity to 10,000MW by the end of 2007.

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- Other Independent Power Producers and Major Oil companies are into Joint Venture with the FGN in constructing generating plant which will further increase the generating capacity to above 15000MW before 2010.
- The present Management has taken steps to appoint a standard committee to look into the issues of the use of substandard materials in the execution of projects in our network nationwide.
- This issue of substandard materials is very important because it reduces access to electricity in the rural area as well as increasing the cost of access of electricity to the entire populace.

Introduction

- Following the recent unbundling of PHCN to 18 companies, the issue of substandard materials is viewed with all seriousness in our network expansion, either in re-enforcement or constructing of new substation and lines.
- Ideally we don't expect to have most of these substandard materials in Generation and Transmission sector because they go for the best practice and adhere to high quality standards as obtain elsewhere with respect to **Project Design and Construction.**
- These substandard materials are more pronounced in the distribution sector where you have low voltage networks which supply the consumers.

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- In addition, these materials have introduced losses and a lot of instability in the entire system because it cut across the entire length and breadth of the utility network. It is a virus in the system which if not checked or eliminated will even deters the interconnection process of Power highways in West African Sub region as the instability introduced can cascade to a total collapse.
- The following items listed below will be used to X-ray the devastating effects of substandard materials in our network.
 - 1. Poor Quality of supply /Increase in losses.
 - 2. Weather effects on equipment and infrastructural decay
 - 3. Fire Out-break
 - 4. Lack of Training of staff on standard
 - 5. Poor enforcement by standard organisation of the country.
 - 6. Vandalization.
 - 7. Lack of Training and existence of Harmonization of standard in the Sub-region.
 - 8. Effecting changes becomes complex

Poor Quality of Supply

- The use of substandard materials in the lower voltage network leads to high losses of power due to low rate of response and also increases the cost of maintenance and operation of the network.
- A typical example is the use of thick copper conductor as fuse in most feeder pillars, reduction of the cross-sectional area of Aluminium Conductors steel reinforced (ACSR) Overhead line conductors (and multiple joints on the conductors mostly in large load centres of the network.
- The effect of the above reduces the quality of Power supplied by the utility and overloads the system, thus resulting to incessant load shedding.
- The idea of shedding load is to forestall a degenerating network as a result of instability introduced by fault emanating from the substandard equipment or lines being overloaded.
- The safety of our equipment and the staff operating these facilities is at stake and could result to the loss of life and major equipment and or lines that will lead to system collapse.

Fire Outbreak of Installations

- Substandard materials used in the system are vulnerable to faults because they are weak and can not withstand the specified current capacity which original materials can withstand, secondly they are less sensitive to fault which prolongs the stress of the fault current thereby resulting to fire outbreak.
- Whenever such scenarios exist we are bound to loose expensive equipment such as circuit breakers, lightning arrestors and or transformers.
- In addition most industrial and domestic installations loose their properties to fire if one or two materials are substandard and when this happens people find a way to shift blames to PHCN because some of these installation were not certified by a practicing registered Engineers or by PHCN Engineers.

Weather Effects on Equipment and Lack of Infrastructures

- It has been stated that whenever equipment is operated 10°C higher than the normal temperature the equipment life span is halved. The temperature gradient in Nigeria varies from place to place as well as salt water deposits in the coastal areas these two factors could be very devastating on both equipment and materials.
- For the past two decades our installations generally witnessed no replacement of any sort and this equipment are mostly out door installations; due to ageing and our weather constitution which is relatively adverse they are bound to become weak and because of the operational stress, loose sensitivity and decay.
- The present Government is doing something in this area by constructing new injection substations and lines but such projects should be supervised by serious minded and knowledgeable Engineers who should be able to decipher the differences between standard and substandard materials that will be used for this construction. They should be able to interpret standard designs with reference to a known and acceptable standard such as IEC, ANSI and IEEE standards.

Vandalization

- This is another factor which is very rampant in our network; it is another means through which substandard materials find ways into the network. When part of the network is vandalised, the lines are catered away resulting to loss of power to various areas of the network. In addition the problem of ensuring that original materials are used for replacing the vandalised part is very important to avert network failure. Whilst in Distribution Sector, the right size of over head conductor should be used because anything short of that right size is substandard.
- It will be important to mention here that most of our networks are still operated as radial network and so if a line or substation is vandalized whether in transmission or distribution sector the result is a shock on the network resulting to instability and loss of revenue to the utility in both ways. i.e. no collection of revenue from clients and also they have to source for funds to replace the vandalized section of the network.
- There will be a little relief if we introduce redundancy in most of our circuit and operate it as a loop or ring network, then we can say that our system is partially secured because we should be able to feed load centres from at least two sources within the network.

Training

- In- adequate training for the maintenance and operating staff leads to inefficient operation and loss of man-hour since equipment failure could be natural and or human resulting from manufacturers defect or mal-operation.
- If the installed equipment fails the standard test and it is installed unknowingly by the construction Engineer. When this equipment is commissioned, it will fail eventually after some time thereby causing a set back and loss of power and revenue for the utility.
- It is my suggestion that Engineers be trained on standards before sending them out to witness standard test for most of our expensive equipment in the field and overseas. To be candid we should have a standard division/department in Generation, Transmission and Distribution sectors. Engineers to be recruited in this division must be experienced and versatile in their various disciplines in the field of Engineering and they should be affiliated to the **Standard Organisation of Nigeria**.

Poor Enforcement of standards by Government

- The Government of Nigeria should ensure that the standard organisation of our country be on alert and should be motivated in a way that they will have job satisfaction in order to be able to say no when they detect substandard engineering materials at our borders.
- This is one of the reasons why we should have the standard division in the Utility because you don't expect someone who does not know what a circuit breaker looks like to certify a circuit breaker at the land border or the sea port it is the duty of these engineers in the generation, transmission and distribution to be able to ask for the relevant factory test certificates, decipher it before accepting the equipment into the country.
- It is a known fact that most of our electrical installation at home does not last for 6 months e.g. sockets, fluorescent tubes, bulbs, switches, extension links and cables to mention a few. The malfunction of these facilities sometimes results to fire outbreak, power loss and loss of revenue.

Changes Become Complex

- If a substandard material is used in the substation or in the network it becomes very difficult and complex if the equipment is faulty and in a state of disrepair, assuming it is affected by fire, the name plate may be burnt such that replacing it becomes difficult and complex.
- However the right equipment should always be used to replace a faulty one and should be carried out by a competent hand, by so doing the cost of maintenance and operation will be reduced.

The Use of Standard Energy Meters

- 1. The use of substandard or inferior energy meters result to incorrect and inefficient energy reading recorded by the operators. Some of the meters may not comply with our weather condition, hence the computer or digital device end up with its surface blank indicating no reading due to high temperature on the meter as a result of long exposure to severe sun rays.
- 2. This issue of incorrect result with these energy meters resulting to energy losses or theft is the area that affects the three interface – Generation-Transmissions-Distribution and should be viewed with all seriousness.
- 3. Sometimes the meter may be faulty/dead, the operators keep on estimating the energy.

Standard Test and Communication Equipment for Maintenance Crew and Engineers Operators

- The protection control and metering division may not have the correct testing equipment that will assist them find solution to faulty equipment such as VT's, CT's , transducers and the relays. If this is provided, the standard value from these equipment will indicate during trouble shooting as substandard equipment may tend to give wrong values which will translate to the type of maintenance that the equipment will receive which may be wrong.
- Sub-standard telecommunication equipment gives rise to wrong information being transferred. If there is a lot of noise in the background of a VHF radio, there is every tendency for the operator to record and transmit wrong information through the radio therefore a radio with a high signal to noise ratio should be used in our operations

Conclusion

- There is need for the distribution zones in PHCN to have a standard task force that will go round the system to carry out inspection or equipment auditing on some relief programme in the form of re-inforcement to ensure that standard and the best practice of installation with respect to construction, installation and testing of facilities are complied.
- The reference standard IEC should endeavour to organise seminars and workshops where these zones can send their staff to update themselves with respect to Power quality and standards while being trained by their respective sectors on standards.
- There should be a standards department or division to be included into safety division in every district or zone this will help in reducing the use of substandard material in the network.
- The standard organisation body of Nigeria should carry the utility along in vetting specification on imported material on arrival of these consignments.
- PHCN to request that the nominated staff be made to work hand in hand with standard organisation with a view of detecting and rejecting these materials.

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- The Government to enforce the stoppage of the use of substandard materials.
- PHCN to provide their PC&M, Electrical and Lines with standard test kits to facilitate their maintenance work.
- System operators to be equipped with good communication equipment for the dissemination of the right information and signals.
- PHCN to encourage the use of standard energy meters at our various interface in order to forestall the loss of revenues in areas where they are installed and provide more for places where there are non in order to reduce energy theft, this applies to residential home as well.



THANK YOU

Dr. Inugonum T.A

Power System Planning Division.

POWER HOLDING COMPANY OF NIGERIA.