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Energy Theft and Illegal Connection - A Recipe To Solving
These Problems [theft & illegal connections]

By

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1. INTRODUCTION

The prime objective of any power supply authority (such as NEPA) is to provide a RELIABLE, SAFE, EFFICIENT, AFFORDABLE and ENVIROMENTALLY FRIENDLY supply to all consumers. This is in order to ensure that the service is sure, continuous, safe, protective, cost effective and efficient. There are therefore technical, managerial, governmental and financial considerations to be considered in order to arrest the theft and illegal connection problems. Also the cost of installation of a system must be recovered considering parameters like breakeven point and possibility of future expansion.

2. SCOPE OF THE THEFT AND ILLEGAL CONNECTION PROBLEM

To steal is to take without legitimate authority. If meters are tampered with such that the load consumed per Kwh measure is inappropriate and fictitious, then a theft has taken place. This customer is legally a client with the power authority but a thief. Also, there are a category of people who desire to benefit from the use of energy without officially applying to the supply authority. These ones run service lines to their various premises at their own accord and constitute an illegal connection. This in itself is a theft situation.

The above consideration are personal illegitimate efforts culminating in thefts and illegal connections. However, the most frightening cases of theft and illegal connections are facilitated by the supply authority itself by using contractors without requisite technical capabilities to erect transmission, distribution and services lines with substandard conductors and cables. Also due to service unreliability and erratic supplies some consumers are forced to tap supply from more than one substation into their premises. Even NEPA itself run many distribution substations without functioning meters and badly protected systems thereby encouraging theft and illegal connections.

3. IMPLICATIONS ARISING FROM THE SCOPE OF THE PROBLEM

Presently there is evidence that individual and corporate attitudes contribute to the theft and illegal connection problem. The bottom line is loss of revenue arising from whatever angle to be considered. However the problems result due to selfish interest, lack of adequate purchasing power, lack of focus, dissatisfaction, improper implementation of policy (subsidy), lack of understanding of existing proposals (commercialisation and privatisation), inadequate exploitation of alternative sources to commercial levels. Thefts and illegal connections results in overloads, back feeding, and loss of lives and property aside direct financial losses.

4. RECIPE FOR SOLVING THE PROBLEM

The objective of power supply to meet demand is clear to everyone. However, it has been very impossible over the years to meet the objective (goal) of the supply authority (NEPA),

viz the provision of a stable, safe and uninterrupted power supply. Such will be efficient and cost effective. Consideration as to why this will be considered under subheadings amongst which are: technical incapability, managerial incapability, government intervention and lack of financial resources.

In a bid to profer a recipe to solve the problems the following shall be considered: Towards consumer satisfaction, towards effective feeder/distributor monitoring (protection); policies towards proper revenue generation. It is hoped at the end to revamp the supply authority and ensure consumer satisfaction through better service for better financial rewards capable of recovering investment cost and reliasation of enough money to keep the system going viz-a-vis making a reasonable profit and creating more jobs for competant hands. In concluding the author will consider making positive moves amidst scarcity (want) by making an appropriate choice.

4.1 BACKGROUND TO THE WAY THE SYSTEM IS PRESENTLY RUN

The system is presently runing at a loss with production per kilowatt-hour put at ₦1.20 and selling at ₦0.62/kwh. This amount to a loss of forty-nine percent (49%) of the investment. The main problems usually is improper pricing even if production capacity was full, balancing off demand and supply.

4.2 PROBLEMS MILITATING TOWARDS UNRELIABLE POWER SUPPLY

(a) TECHNICAL INCAPABILITY: There is the need to know at all times what you are doing and the technical implications. The technical

problems faced by the system include: ready availability of spare-parts locally, foreign exchange availability for a poorly financial performing industry, failed safety or protection devices (usually removed or bypassed simply to keep the plant/system running).

This results in potential disasters with much greater damage and loss of equipment for sometime. Communities today have stayed in darkness for upwards of 4-12months if not more in darkness simply by the loss of a 200KVA distribution transformer. Also the number of existing competent technical staff, well motivated to work is in shortfall.

6. MANAGERIAL INCAPABILITIES

Chief executive officers (General overseers or managers) and submanagers should have undergone enough managerial courses in order to properly comply with the company's objective (s). Such knowledge is new development today and technical manpower is gradually embracing it. Consumers however, require a reliable supply free from interruptions and voltage surges, this is to forestall blackouts which are a nuisance to domestic users and a disaster to industrial users. Power supply outside standard provisions will damage equipment and the life span of same is reduced by surges.

For the plant and system to function as required is a difficult task to accomplish if the staff^{is} inexperienced and lacks confidence. Thus several competent operators are required to maintain continuous supply. Competent hands versed with the job requirement in this industry is lacking in the required numbers.

Poor billing and revenue collection results in losses, these are non-technical losses and have serious impact on NEPA'S ability to function. At least seventy-five percent (75%) of consumers today

are billed on estimation due to lack of enough personnel to cover certain areas with respect to reading meters and also most consumers serviced in the last five years have no meters in their premises even though they have paid for same.

(c) GOVERNMENT INTERVENTION

Every government has the right to protect its citizens by subsidising public utilities (electricity, water, health) and putting in place appropriate policies. However, this action is not to militate against the norms of commercial operations and values or the basic laws of demand/supply. NEPA is a nationalised institution controlled by government with very little autonomy. This utility is run at a loss because it is not economically motivated and sound. Government buildings, street lighting maybe "free of charge" as bills maynot be readily honoured. For the utility to be seen in an economically sound way would mean subsidy be promptly paid by government to meet the shortfall by government fixing of tariff and price of primemovers (like gas). There is need for partnership in this industry and or parallel competitive alternative suppliers of energy.

(D) LACK OF FINANCIAL RESOURCES

The amount of investment required to put the utility in place is enormous and usually a substantial part of the money is burrowed. However, the loaning bodies usually dictate the manner in which the money has to be spent viz which contractor, or equipment or design is to be used and so on. This leaves the authority for a long time struggling to offset the loan which is further complicated by ^{the} wrong

pricing of power and the fact that the per capita income of the consumers is very low (the purchasing power of their income is not good enough).

4.3 A RECIPE FOR THE SOLUTION OF THE PROBLEM

(i) TOWARDS CONSUMER SATISFACTION

The reason for power theft and illegal connections are varied. The aim maybe continuity or to ensure stable supply or to jump NEPA Bills. An unstable supply may include surges resulting in overshoots or dips. This means supply is available but not meeting standard provisions. This situation (especially low voltages) is common in the utility (power supply) today. The best way to handle this situation is to use voltage switches and regulators. This will serve as one of the requisite requirements just like the meters and mcBs or cut-out fuses which the consumer pays for at the time of application for connection (that is the unit will be a component part of the application fee). These theft and illegal connection is not a common phenom throughout the entire system, the voltage dip menace is of like manner therefore those areas badly affected will benefit from this and the entire system consumers will benefit if it is a general provision and requirement. The Switch regular device is a booster as well as a stabilizer, Figure 1 shows a block diagram of the scheme.

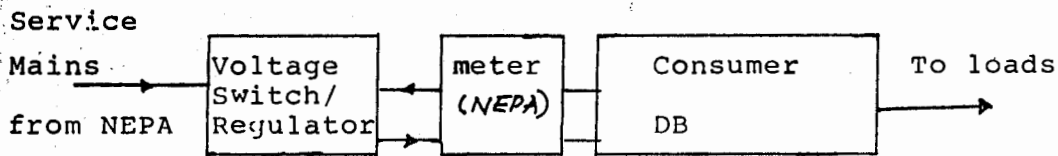


Fig. 1: VOLTAGE SWITCH/REGULATOR SCHEME

The voltage switch handles both voltages above normal and subnormal values such that the output is kept constant. However there is a limit as to the fluctuations at the input which for the working prototype spans 100-500volts. The merit of the unit is such that whenever there is supply in the premises as low as 100V, an output which is stable is guaranteed. The same is true for the highest voltage level. This in effect provides for supply continuity, reliability and stability.

The unit is an electromechanical one using relays and associating electronic components and devices to achieve switch modes as shown in Fig 2.

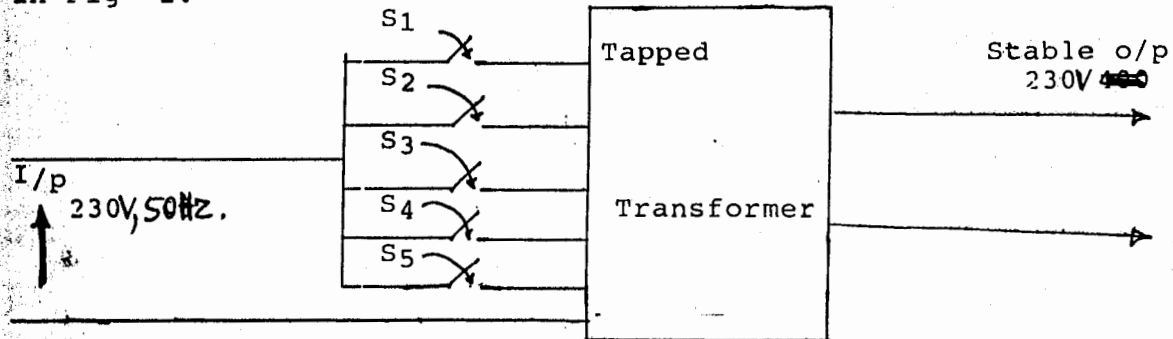


Fig 2: Switch mode.

Note:

S₃ in the normal position 230V input and 230V output.

S₅ is 100V input

S₁ is 500V input

Irrespective of switch position, a steady output of required level results.

(ii) TOWARDS EFFECTIVE FEEDER/DISTRIBUTOR MONITORING

The kind of theft and illegal connection here is that which denies NEPA credibility the thieves here are some of the NEPA contractors and the illegal connection here is concerned with using substandard materials and maybe subsequent vandalisation. A feeder or distributor that is strung with conductors of inadequate sizes and tensioning results in unnecessary sags and voltage drops on load which in the long run constitute losses to the power authority's system and consumer dissatisfaction, and high down time/plant use of the installed capacity. However serious this problem maybe, it is solely NEPA's management that can adequately handle this matter. The best way is a combined effort between NEPA and the communities concerned in order to effectively monitor the contractors at work. Also discipline and professional ethics has to be instilled in the service engineers and their co-technicians who supervise and sanction the completion of these projects. On the other hand, the guidelines for the selection of contractors for electrical works by NEPA officials have to be seriously implemented or reviewed.

The solution here is one of educating the public and staff of certain required standards through the mass media and training/retraining inhouse or out of house seminars, workshops, conferences of the state-of-the-art as is required of them respectively.

Another way to handle the problem is to use multiple protection including autoreclosers which to some extent exist now. However in some cases bypasses have been used in order to be in continuous service due to lack of spares and ignorance or neglect on the part

of the systems operators.

iii) TOWARDS EFFECTIVE REVENUE GENERATION AND JOB CREATION

Any viable company rendering service should be operated such that the company can continue to render its services effectively and efficiently. This is only possible when certain fixed costs and overheads are taken care of. Also to be borne in mind is the possibility of future expansion and profit. The present state of operation of NEPA negates these norms as energy is sold at about fifty (50%) of the production cost per kwh. This is further compounded by the fact that revenue collection can hardly be put at about sixty (60%) percent. The net effect is that only about thirty (30%) of the net investment per KWh is recoverable as income. It therefore, becomes clearer that under such conditions a very unsatisfactory service provision prevails. This effectively results in load shedding, blackouts, low voltages (or candle lights) situations. Thus, consumers who are also part of the problem plus power brokers resort to other methods of getting power supply . These methods include theft and illegal connection or the use of personal generator units.

At unity power factor, a 200KVA distribution substation is capable of supplying 12 MW in one hour or 200 KW per minute. This amounts to about ~~N14,400~~ per hour, N345,600 per day or ~~N10,368,000~~ per month of 30 days at a rate of N1.2 per KWh. In a small estate with about 10 such units, NEPA loses N144,000 per hour of power failure or N 103,680,000 per month of power failure. For the small estate in question, this amount can readily and effectively pay staff to man the stations,

collect revenue, monitor the lines and maintain the units in good state. A mere critical look at this will show that even now, if corporate interests are considered in a co-operative manner, shared participation and so on, some good service can still be obtained from NEPA with proper pricing of the utility just as was done for petrol. It is worthy to note that people will willingly pay for the commodity once supply is guaranteed.

To check the menace of theft and illegal connections therefore, one would recommend small holder participation in the existing scheme whereby substations are manned at street levels. In this way autonomy and decentralization will be encouraged and more returns are guaranteed taking a cue from the present operation of the toll gate.

If this idea is extended to the other arms of the system viz, generation and transmission it is obvious that maximum benefit can be derived from the entire scheme, that is, groups of corporation will take place at interfaces. This limits the scope of involvement of the subgroups hence enhancement of efficiency in terms of monitoring, revenue generation, outages, job creation and so on.

iv) OTHER GENERAL CONSIDERATIONS - NEW FRONTIERS IN ENERGY GENERATION AND MANAGEMENT.

The prime movers for the various existing power stations are water and gas. Seasonal effects and supply politics have adversely affected these factors over the years such that installed capacities are greatly under utilised. Mini-hydro/thermal plants as well as alternative energy sources for prime movers can be considered in a very localized manner. These if properly harnessed will improve supply efficiencies to end users thereby discouraging thefts and illegal connection.