An Appraisal of Rural Electrification in Pakistan

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Lenin defined Communism as Peoples' rule and the electrification of the entire country. The assertion is atleast a pointer to the importance of electrification of a land in the overall context of national life. Coming to our own homeland, seventy-eight percent of the total population of Pakistan is rural and the total number of villages in the country are 42736; out of which only 5% are electrified These figures open up a big future challenge of rural electrification in Pakistan in order to make Pakistan a welfare state. In fact, in a dominantly rural economy of ours, the acceleration of our all out development plans for the village population becomes all the more imperative to achieve our national objectives. The yearly progress rate of village electrification has been insignif cant vis-a-vis requirements. The attached curve shows the relevant figures and pattern of work in this respect. A scientific review of the situation becomes inevitable.

1. LIMITING FACTORS.

The factors which have, hither-to, been responsible for low progress are rather simple, and are outlined below :—

(a) Absence of a well-organised Task Force.

(b) Financial Strains.

(c) Shortage or electrical material in the country.

Considering these broad reasons, there has been an absence of a well-planned, target oriented management system for executing the projects of village electrification. It has been done, in the past through small units created within the Power Wing WAPDA and looked after by the engineers having existing responsibilities towards maintenance and operation of the power system.

Consequently, it has been dealt with as an auxiliary or secondary type of work. Similarly, the funds allocation for the projects of Village Electrification, except aided by Foreign Agencies has been insufficient. In the absence of special allocation for the project, the normal way of working out financial feasibility of electrifying a village, keepiug in view the expected investment/revenue return is a limiting factor towards large scale village electrification. Many villages on this principle, remain economically unjustified. With the fast rising costs of electrical material, the routine financial justification formula needs to be relaxed Average cost of electrification of one village is from Rs. 80,000/- to One Lac.

Yet another handicap in the Village Electrification Programme has been the lack of planning for adequate manufacture of electrical material required for the projects. The manufacturers have been facing the problems of Import of Copper and Aluminium billets even for the available manufacture potential. Another handicap in insufficient availability of materials has been the uncertain commitments of the consuming departments of the materials towards the manufacturers.

2. ESSENTIALS OF A GOOD RURAL POWER SYSTEM.

A good power system in rural areas possesses definite characteristics ; our socio-economic needs demand some reorientation of the common practice as prevalent in the developed countries. We may consider the following in this respect :—

(a) Developing Road Communications.

The road communications facilities leading to the prospective or existing electrified villages needs to be satisfactory for the purpose of executing the work of electrification and also for good maintenance of the local distribution system in the long run e.g. attending to faults and satisfactory billing system.

(b) Complaint Centres.

This is a very important factor which is presently responsible for poor power supply in the rural are as. There are no built complaint centres for the gangs to stay there and ensure attendance to supply troubles round the clock. Consequently, the farmers and the villagers face lot of problems in getting supply troubles redressed ; so much so that they, themselves are forced to interfere with the supply system in a desperate bid to get their difficulty solved. It is

highly imperative to build complaint centres and in adequate numbers with residential quarters for power supply personnel to actually stay at site.

(c) MAGNETO PHONE SYSTEM/WALKY TALKIES.

We have not yet developed enough to have telephone facilities in villages. A power supply system requires instant communication to respond to system abnormalities. Our rural system often suffers badly in the absence of any communication facility. To meet the requirement, it is essential for the supply undertaking to have own magneto phones or even Walky Talky Sets which would ensure exchange of information in the event of faults during patrolling, etc.

(d) PROTECTION—AVOIDING LENGTHY FEEDERS.

The present practice of haphazard extension of 11 KV distribution feeders to rural areas including tubewells upto lengths ranging from 20-40 miles from the Grid Station has rendered the rural power supply highly unstable and erractic. Usually the feeders have no proper overhead protection on the feeders to cater for the instantaneous faults. The usual D-Fuse protection on the main 11 KV feeders have proved a bad experience ; yet isolating air-break switches have proved better as overhead-protection. Yet, the best technical solution would be as follows :—

(i) Erecting more Grid Stations by extending EHT lines rather than the 11 KV line. Thus the feeder lengths would be shortened with better voltage distribution.

(ii) Alternatively, more switching stations be built with indoor protection through relays ; this would stablise supply to tail ends.

(iii) Oil break, Pole-mounted switches of sealed type are relatively better than air break switches.

(iv) Pole Mounted substations, should be built, as far as possible under the H. T. Lines and L. T. Lines be extended instead of H. T. Lines.

The auto reclosers on the lines are considered to be a good line protection especially against temporary faults on rural lines. The use of this protection is highly recommended and its maintenance must be looked after according to specifications. These reclosers are oil filled and employ sutomatic reclosing mechanism operating after few minutes.

The temporary faults on rural lines, more often result from the tempering of Pole Mounted D-Fuse Units, by farmers themselves resulting in temporary short-circuits from phase to phase and phase to earth. Farmers, oftern indulge in this practice in the absence of proper complaint centres or for undue burry to get restoration of power supply.

Too many temporary interruptions in power supply often cause damage to the horses of agricultural tubewells owing to frequent and sudden variations in water pressure maintained in the tubewell.

(e) Installation of Capacitor Banks.

The rural lines have predominantly a motive load marking the power factor operating at low levels. Properly designed capacitor banks must be installed on rural feeders for better voltage and minimum losses.

(f) Patrolling Problems.

In oue rural areas, we normally don't have good road communication or at least a widespread network. It is theretore imperative that the new lines be planned, as far as possible along the available/future roads to facilitate maintenance of the lines. Yet economic considerations would sometimes handicap planning along the roads. In such cases, helicopters are used in developed and rich countries.

(g) Foundations.

All rural lines must be provided foundations for mechanical stability of the lines in marchy/soils of low bearing capacity. The design of the foundations should be changed according to the soil conditions. Presently, our rural supply system suffers from a large-scale absence of foundations. These need to be provided as a crash programme. In rice growing areas where water is often standing in the fields, provision or foundations is an absolute necessity.

In fact, a problem of mechanical unstability of lines has been often faced, in rural areas whereby the guys (especially those of the angles and agaiust storm) get uprooted due to animals and also by farmers using tractors while ploughing. This should be checked by a strict warning and punishments to offenders. The electricity patrolling personnel ought to keep a vigilant eye in this respect.

(h) Design Review.

The task of rural electrification apart from the general line construction standards should accord with some essential de ign principles not observed at present, resulting in unsatisfactory state of power supply in rural areas.

(a) Mapping and Voltage Drop Cousiderations.

The new electrification work should be undertaken after complete mapping of the existing system and optimum location of T-Off points. The existing conductor type & sizes, grid station capacities as well as the previous length of the 11 KV feeders, will have to be given due thought. The new lines be proposed after undertaking voltage drop calculations with reference to the existing tail end voltages.

(b) Technical Feasibility.

The technical feasibility of the new lines should take precedence over all other considerations. The economic justification normally worked out on the basis of prospective loads in a village does not hold valid in the case of aided programmes. This justification is calculated on the basis of cost/benefit ratio. Nevertheless, preference should be given to villages falling close to the lines so as to electrify maximum aillages in minimum cost.

(c) Mains in the Village.

The present practice of just erecting a pole mounted sub station inavillage and leaving the mains to be laid subsequesly on cost/benefit ratio basis has sometimes defeated the object of rural electrification. In such cases, the load growing in village is too small to justify laying of costly mains. It is therefore imperative to lay L.T. mains as a part of the Project in the principal streets of the 'electrified' village. In this connection, disputes have often taken place in respect of particulars location of the lines between some rival groups in the village. The best course would be to lay mains upto the mosque of the village which would be an acceptable criterion for the disputing parties. A model layout of a village to be electrified is shown separately.

(d) Antitheft Measures.

A tendency has lately developed whereby the transformers/conductors are stolen by thieves resulting in loss of revenue and inconvenience to rural consumers. This problem is however minimised with provision of lines along the

roads, quick mobility of personnel to check thefts, wireless communication as well as by locating line staff in the field by erecting accommodation.

Yet, it would also be helpful in reduction of theft if the transformers are welded to the pole structure. The transformer cover shonld also be either rivetted or welded or atleast the bolts caps be disfigured. The conductor theft can be minimised if the retrial of the tnipping grid station OCB is dnoe after 10-15 minutes instead of the routine method of 2 minutes, thus giving surprise to the thieves. Furthermore, the copper conductor should not be used on rural lines, which is highly vulnerable to theft. Police help be activsly sought to check thieves and also the Electricity Officials risking to apprehend thieves must get adequate encouragement.

(3) ORGANISATIONAL IMPERATIVES.

To achieve a well-tergeetted programme of village electification, a proper organisation is a sine-qua-non, so as to adopt suitable measures to accomplish the task. Some proposals are given in this regard;

(a) Problem of Materials/Funds.

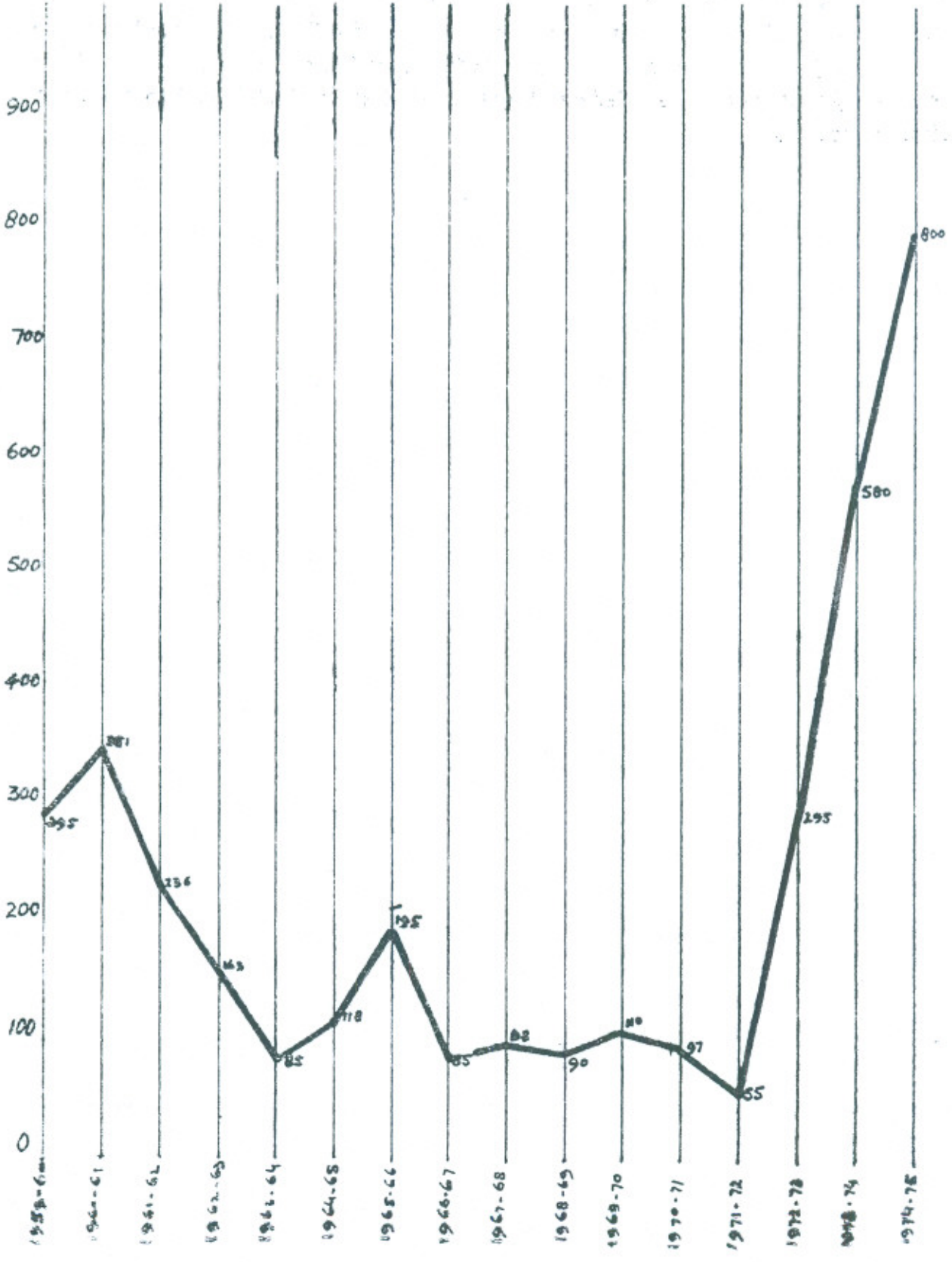
A prompt system to provide sufficient availability of electrical materials is essential for the village electrification projects. In the past, the programme has faced serious handicaps on account of this factor. It is imperative to plan manufacturers of the material within the country, well ahead of time in consultation with the manufacturers in the country. The question of imoprt of raw material like the Aluminium and Copper billets should not on in redtaped procedures otherwise this can jeopardise the entire programme. It is proposed that the Government should empower the executing agency for import of raw material required for the electrical items of stores and equipment. For this purpose, it is equally necessary to allot adequate funds for the procurement of electrical material. Thematerial thus planned for the village projects should not be utilised eisewhere such as indulstrial & tubewell loads and also the maintenance works. For the jobs other than rural electritication,separate procurement policies need to be planned.

(b) Task Force Units.

To execute a massive rural electrification programme, it is obligatory to organise efficient task force units which are charged to carry out the job. The executing machinery should be exclusive and autonomous in character and the

work will have to be done as serious job and not as a supplementary and joint responsibility. For this purpose, it may be worthwhile even to establish autonomous corporation in the public sector on the pattern of NPCC. The new body may execute the jobs and hand over to Wapda for operation and maintenance. Such an executing unit may be at Federal level or even at Provincial level to meet the desired objectives.

VILLAGES ELECTRIFIED IN WEST PAKISTAN



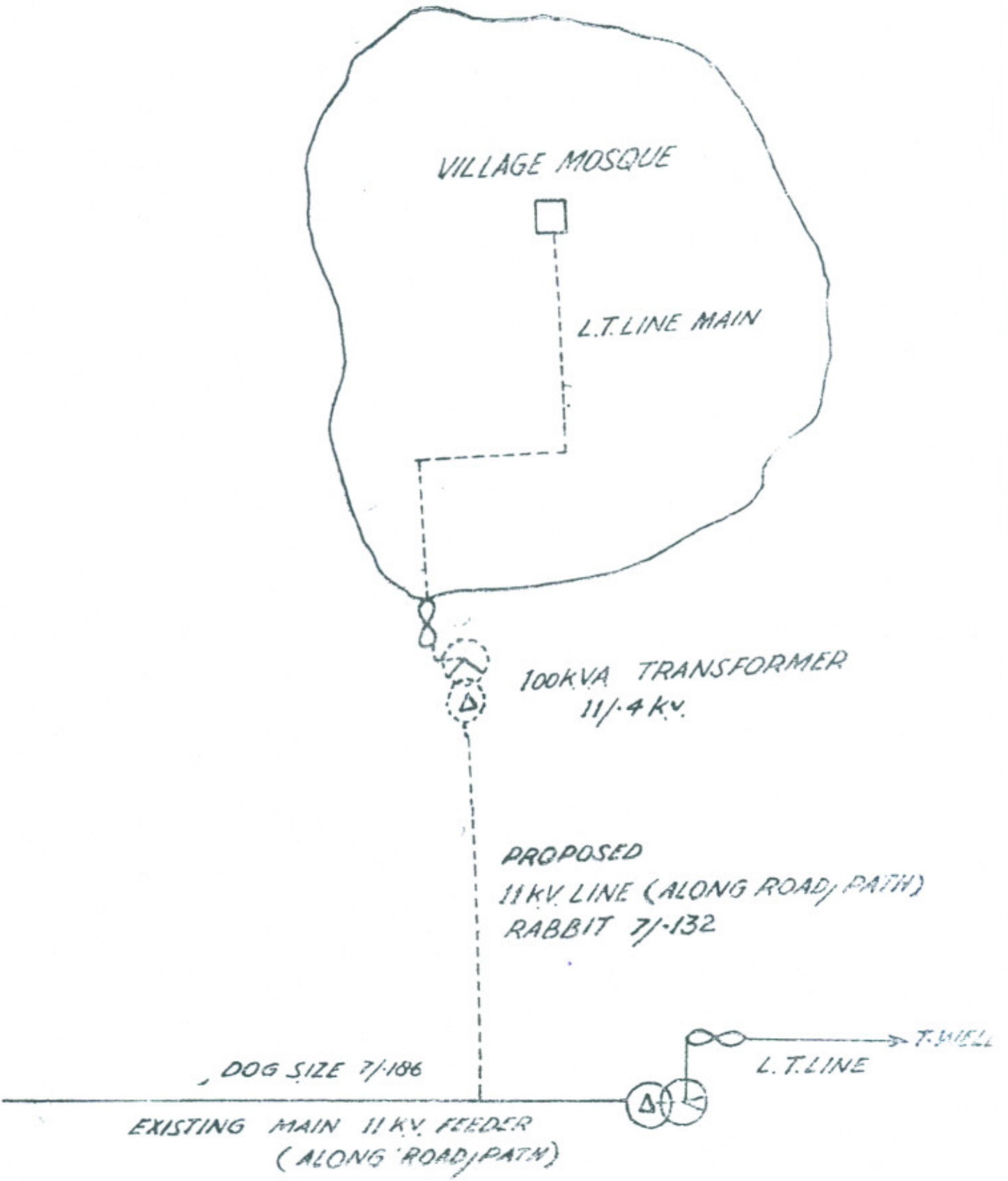


FIG. LAYOUT OF A VILLAGE
To Be Electrified.