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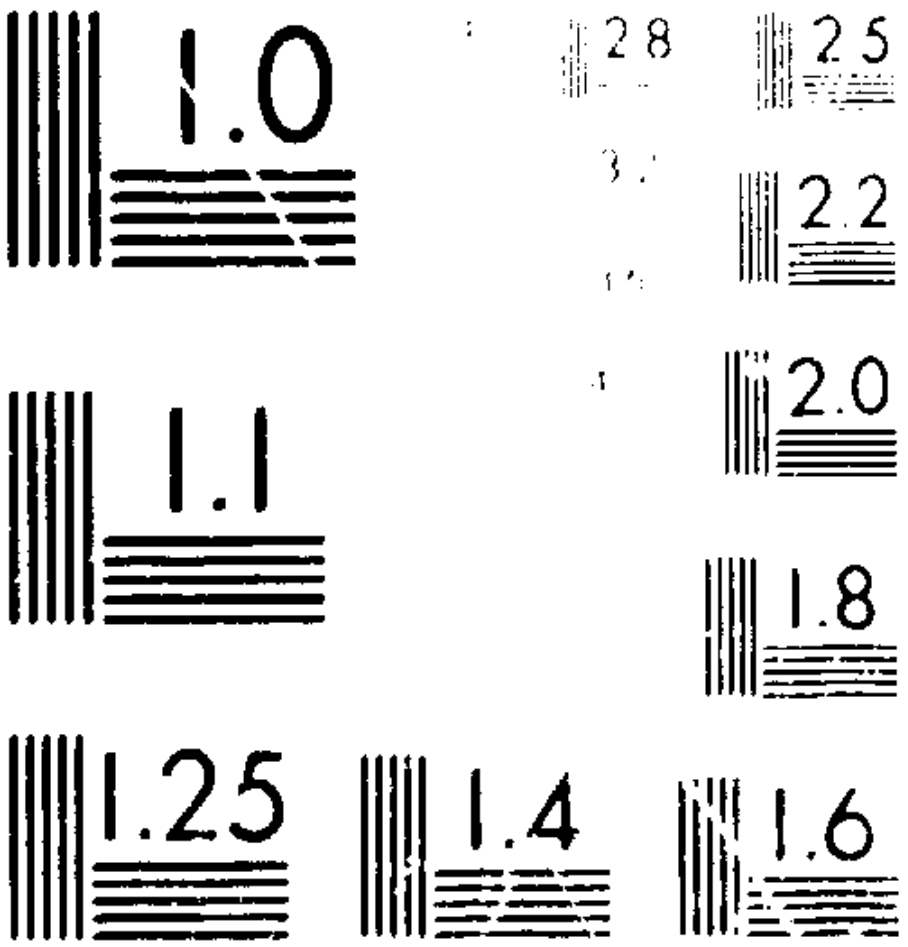
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SOME ASPECTS OF SMALL HYDRO POWER PLANNING AND IMPLEMENTATION in Ethiopia*

by

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I BACKGROUND

The hydro-electric potential of Ethiopia is so enormous that something like 60 TWH ($60x10^9$ whr.) a year could be developed only from the eight major rivers of the country. The figure does not take into account the energy of Small Hydro Power (SHP) resources. At present however, only 3% of the known available energy has been developed. The per capita energy consumption is as low as 30 kwhr. per year. This is mainly because commercial electrical energy is made available only to a small number of urban centres which consume most of the energy from major hydro sources.

II CENTRALIZED POWER PLANNING

The Ethiopian Electric Light and Power Authority (EELPA) which is responsible for the country's integrated power planning and implementation has two systems of operations;
- The ICS - The Interconnected system of the main grid
- The SCS - The self-contained-system

The ICS which serves the main load centres of the country distributes 95% hydro-electric energy. The SCS on the other hand consists of a number of local and isolated small plants both thermal and hydro ranging from 100 Kw to 7000 Kw. Only 10% of the energy of the SCS comes from hydro power sources (S.H.G.).

In the past EELPA's traditional Power Planning system has been limited to the installation of a major hydro power plant every 7-8 years and extend cost intensive high voltage lines to consumption areas when such interconnections proved viable.

The SCS was introduced primarily on Government's instructions to electrify some of the remote areas. The power stations in the SCS (90% Thermal) have been very few in the initial stage. Nowadays, the number has increased more than ten fold as a result of which subsidy from hydro power energy sales no longer supports operations of SCS. So far EELPA has not come up with specific targets and strategies for a long-term plan of rural electrification.

III THE TEN YEAR ENERGY INDICATIVE PLAN

The growing realization that the benefits of growth in the urban centres have not "trickled down" to the rural poor has stimulated special interest at Government level to follow up rural development schemes. In particular problems of rural energy have attracted widespread

attention. Consequently, the Central Planning Council has launched a study program of integrated planned economy for the next ten years which required the support of a serious energy plan for the rural areas. This study shows that of the 100% total energy balance only 7% comes from commercial energy sources (Electricity and fuel oil). The rest (93%) comes from fire wood, agricultural waste and cow dung. The implication regarding the use of fire wood merits special considerations and that the share of commercial energy in the total energy balance should be increased substantially if the fast rate of deforestation of the country is to be checked in time. Since the country at present depends on imported oil for thermal energy, the most economical source of electrical energy is cheap hydropower.

IV RURAL ELECTRIFICATION & S. H. G.

Todate EELPA has no definite energy plan for the rural areas. As a result of increasing farmers associations in the outlying areas more and more urban centres are developing to require rural energy in the form of lighting, cooking and for cottage agro-industry. Sometimes the people come up with funds they have raised for the purpose and request assistance for their self help electrification schemes. Usually the alternative source is a diesel generator whose operation becomes so cumbersome in time that either the Electric Authority is eventually requested to take over or the whole outfit is abandoned. There are a number of locations in the country where SHG powerplasts can be developed to supply power at costs well below those of oil fired thermal plants. However, the absence of a independent body to study, and implement SHG plants on a sizeable scale together with the lack of a crash programme at least to replace existing oil fired stations have remained causes for the slow pace at which SHG plants develop in the SCS.

V ALTERNATIVE SOURCES IN THE SCS:

There are two regions in the country one in the North and the other in the West both of which are in the SCS. In the Northern region the source of energy is SHG. Whereas the Western region which is relatively more of a commercial and agricultural area (coffee growing, processing etc) has been electrified by means of diesel generators for a long time. The load here has not grown in proportion to the initial capacity because of restricted supply of power, load shading etc.. Meantime, the generators have grown old that replacement at todays cost of generators and fuel poses a serious decision. The viability time for interconnection to the main grid for the area falls in 1986.

On the other hand, the Northern region which had a very low initial load a few years back has shown a drastic increase in the load factor as a result of which the original 4 MW SHG plant is currently being improved to a 15 MW capacity plant. About 400 km of 66 kv and 15 kv lines of local grid have been extended in various directions to meet the energy requirements of the towns and villages of the region. The load growth of the region is so steady that its connection to the main national grid (300 km away) has proved to become viable much faster than the Western region.

The foregoing example was cited to show the role which SHG stations play not only to electrify outlying areas of a developing country with low initial load but also fascilitate the load growth of the region which in turn enables faster interconnection to the national grid.

As regards to centralized versus decentralized system of project planning & implementation, the writers experience is that centralized planning has the merit of evaluating the energy needs of a country (from the point of view of the total energy balance), choosing the most economical source mix. setting out the priorities, optimization of energy etc.

This system on the other hand has drawbacks unless a separate organization for rural electrification is set up. The absence of such an entity is the major problem in Ethiopia. Such an organization should not only serve as a focal point for S.H.G. technological development but also influences those decision makers with conservative attitudes. The representation of administrative units of the rural areas in this type of set up helps to expedite the goal of "reaching out" as well as in cost reduction schemes of SHG as a result of the direct participation of the people of the region in the construction aspects.

The decentralized system may encourage the people and administrative units of a region to promote their selfhelp schemes in accordance with the local needs, problems and resources. It could also encourage inter regional competition in the development of SHG sources. Nevertheless, the system has certain drawbacks which should be noted with interest. One such drawback may be the problem of eventual coordination with and incorporation in the national energy plan. It is true that the decentralized system of project planning and implementation should be geared to the long term energy plan of the country if development is to expected with due regard to the time factor. The writer's experience however is a situation where in most cases regional (Decentralized) efforts in selfhelp schemes including S.H.G. development are hindered by the absence of a centralized energy plan, or by the conservative thinking of the decision makers.

VI ROLE OF S. H. G. IN ETHIOPIA

Some 30 S. H. G. potential sites have been identified about two years ago. So far only five of these have been studied to the prefeasibility stage and three advanced to the feasibility stage. The major constraints are:-

I) Lack of insight by the decision makers

II) Lack of institution build up and team work

III) Lack of basic data and suitable maps.

UNDP assistance during the last two years has encouraged S.H.G. studies to a certain extent. UN experts in S.H.G. (although some of them prefer the advisory role than to conduct S.H.G. studies themselves) are doing their best to compile some feasibility studies for EELPA. Since no appropriate counterparts are assigned to work with the experts, there is no sign of developing the required national capacity which should eventually take over the responsibility of intensive S.H.G. development when the need arises. There is no doubt in the near future and already the conditions dictating S.H.G. intensification are in evidence.