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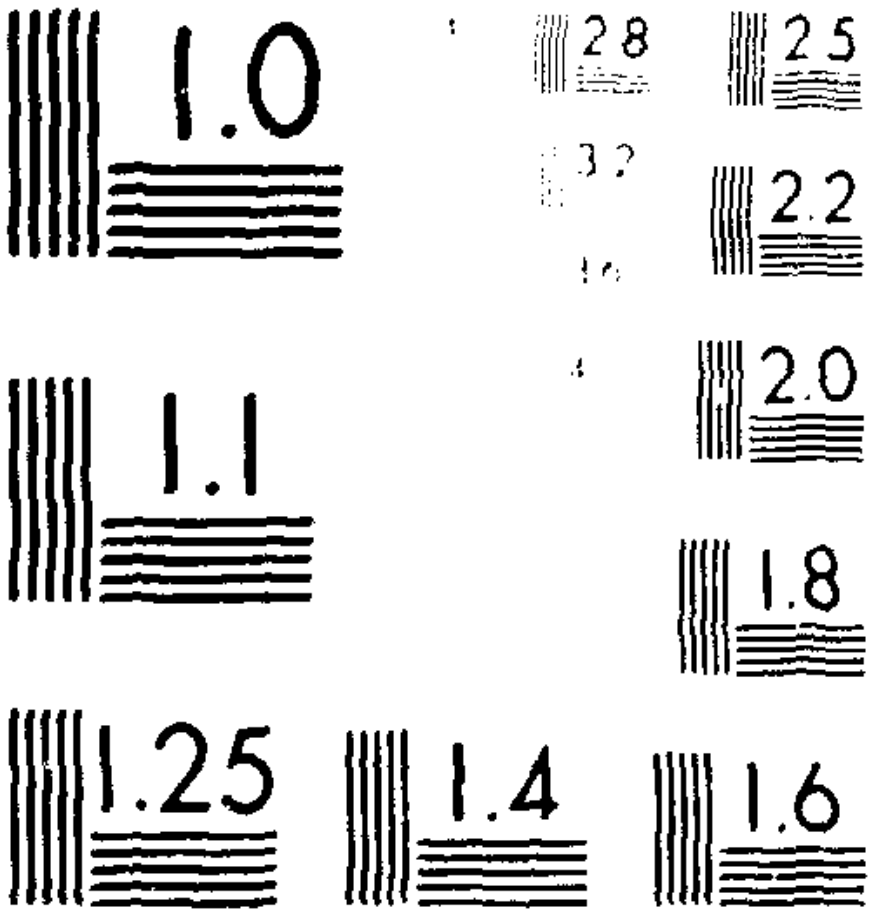
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MINI-HYDRO POWER DEVELOPMENT PROGRAMME IN BURMA*

by

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INTRODUCTION

1. Burma being a mountainous country endowed with plentiful rainfall possesses an abundant water resources potential. Over half the territory of the country is highland dissecting the land by its North-South trend mountain ranges which is the continuation of the Alpine-Himalaya belt. The geographic location is such that it enjoys the rain bearing South-West Monsoon wind resulting in heavy precipitation on the windward slopes and with lesser intensity on its leeward side. As a result, countless streams and riverlets with steep gradients generally traversing East-West direction are the tributaries of the country's main arteries, the Chindwin, Irrawaddy, Sittaung and Salween rivers flowing down south and draining into the Bay of Bengal.

2. Favourable topography and inexhaustible supply of water are suitable for water power developments and it is intended to prepare a comprehensive survey of the hydroelectric power resources of the country. The potential is roughly of the order of 24.000 MW of which only about 2 percent has been exploited. This potential consists of sizeable magnitude projects and limited number of smaller scale (Mini) water power developments. It may be mentioned that Micro or Mini Hydropower projects are identified locally as Power Stations having an installed capacity of 1.000 KW or less.

ORGANIZATION OF ELECTRIC POWER CORPORATION

1. The Electric Power Corporation (EPC) under the Ministry of Industry No.2 is the sole agency for electrical power generation transmission and distribution in the country. As such "EPC" undertakes the survey of potential electric power sources and their development to meet the demands of growing industries and other uses.

2. The functions of the Electric Power Corporation prescribed in accordance with its Constitution are as follows.

(a) Generation, transmission and distribution of electric energy.

(b) Submission of plans and implementation of approved plans.

(c) Release of water for the State organizations and for the public, regulation of water in the navigation locks.

(d) Testing, repair and installation of electrical equipments.

(e) Carrying out investigation works and construction works for the purpose of electric power development.

(f) Complying with the existing laws and procedures relating to generation, transmission, distribution, sale and investigation works and also regulations relating to safety measures.

ELECTRICITY SUPPLY SYSTEM

1. The Electric Supply System in Burma is divided into two parts.

(a) Area of supply from the National Grid and

(b) Non-grid area.

(i) In the area of supply from the National Grid, the bulk of power comes from Lawpita hydropower station whose installed capacity is 168 MW. This power station feeds Rangoon and Toungoo areas with 250 miles of 230 KV transmission line.

Two steam power stations, each 30 MW installed run in parallel with the Lawpita hydropower station to feed Rangoon Load centre and also act as a spinning reserve.

Lawpita power station also feeds the Northern part of the country up to Mandalay, Sagaing, Thazi and Chauk load centres with 314 miles of 132 KV transmission lines.

In addition a gas turbine power station at Kyunchaung with an installed capacity of 54.3 MW is inter-connected with the National Grid system at Chauk substation.

Another gas turbine power station at Myanaung having an installed capacity of 49.2 MW at present supplies the power requirements of Myangaung, Kyankin cement mill and Prome area. A 66 KV transmission line is being constructed to feed Henzada, Bassein and Myaungmya towns. Steps have already been taken to connect Myanaung and Rangoon with a 230 KV line thus interconnecting this station with the National Grid.

(ii) In areas remote from the existing power grid system, 6 to 1000 KW diesel generating stations operate mostly as isolated stations but some relatively big stations operate as central stations to feed neighbouring towns and villages.

BASIC PRINCIPLES FOR DEVELOPMENT OF MINI HYDROPOWER

1. Electrification of an area plays a vital role in the activity of the population in the area. It is the basic requirement for development of the community as well as for the advancement of the country. As the world is

facing scarcity with fossil fuel, it is evident that means must be sought to conserve this form of energy of the extent permissible. This country though possessing natural reserves of fossil and other fuel, favours to limit its use excessively and substitute it with hydropower. Domestic needs urged the population in rural and remote areas to fell down trees resulting in rapid deforestation implicating not only loss of valuable timber but also impairing the stability of mountain slopes, increasing sediment transport, larger magnitude of flood occurrences and adverse changes in hydrologic regimes.

2. Hence for nature conservation and primarily to cater for domestic needs and also to promote small scale cottage industries and other electro-mechanical workshops, relatively cheap and uninterrupted supply of electricity is urgently needed especially in far off remote parts of the country where accessibility is limited.

3. As electrification of areas with concentrated activity - urban and industrial areas-by means of power production plants of suitable size and means and by interconnecting grid system has to a certain extent been carried out, the power supply system needs to be extended to periphery areas with sparser population and less concentrated activity, i.e. to rural areas.

4. Emphasis on the electrification of small communities and rural areas are placed in parallel with the urban development plan so that these shall not lag behind in relation to the development of the supply services in urban areas. Moreover, the people living in such remote areas are eager to take an active role in the implementation of the power development plans, that is to say, to effect electrification in practice.

5. In response to the needs of the community and in line with the country's development plan, Electric Power Corporation has formulated the following principal concepts for priority to develop relatively inexpensive mini hydropower as part of its rural electrification programme.

(a) The site must be technically feasible.

(b) The area must be outside the periphery of the National Grid power system.

(c) Accessibility is difficult and the area remote.

(d) The community/area is least developed.

DEVELOPMENT PLAN OF MINI HYDROPOWER RESOURCES

1. Presently EPC has formulated a long term mini hydropower development plan for the whole country.

The main objectives of the mini hydropower development are:

- to supplement hydropower to the existing power supply;
- to provide more economical and reliable power supply and extend it to more rural areas to stimulate economic activity and spread social welfare to a larger cross-section of the population;
- to substitute the use of petroleum products and natural gas with a renewable energy resource available in abundance locally for power generation; and
- to conserve kerosene and petrolium products used for lighting and other purposes in rural areas and remote locations.

2. Under this plan a few medium and mini hydropower projects are presently in various stages of construction and several new projects are being proposed for investment decisions. At present seven mini hydropower plants are under construction. Out of these seven power plants , four are conventional run-off river type, and the remaining three are bulbtype or turbine generator set for installation at existing irrigation outlets. The installed capacity ranges from 60 KW to 4000 KW having the total installed capacity of 6950 KW. Site surveys, investigations, design and construction are being undertaking by EPC, however, Turbines, Generators, Switch gears and other electrical equipments will be purchased from abroad. The foreign currency portion of the total project cost is being financed by the Austrian Government.

EPC have identified ten medium and mini hydropower schemes for seeking financial assistance from the Asian Development Bank. Arrangement for preparation of feasibility study for the above schemes are expected to be made with the Bank's Technical Assistance.

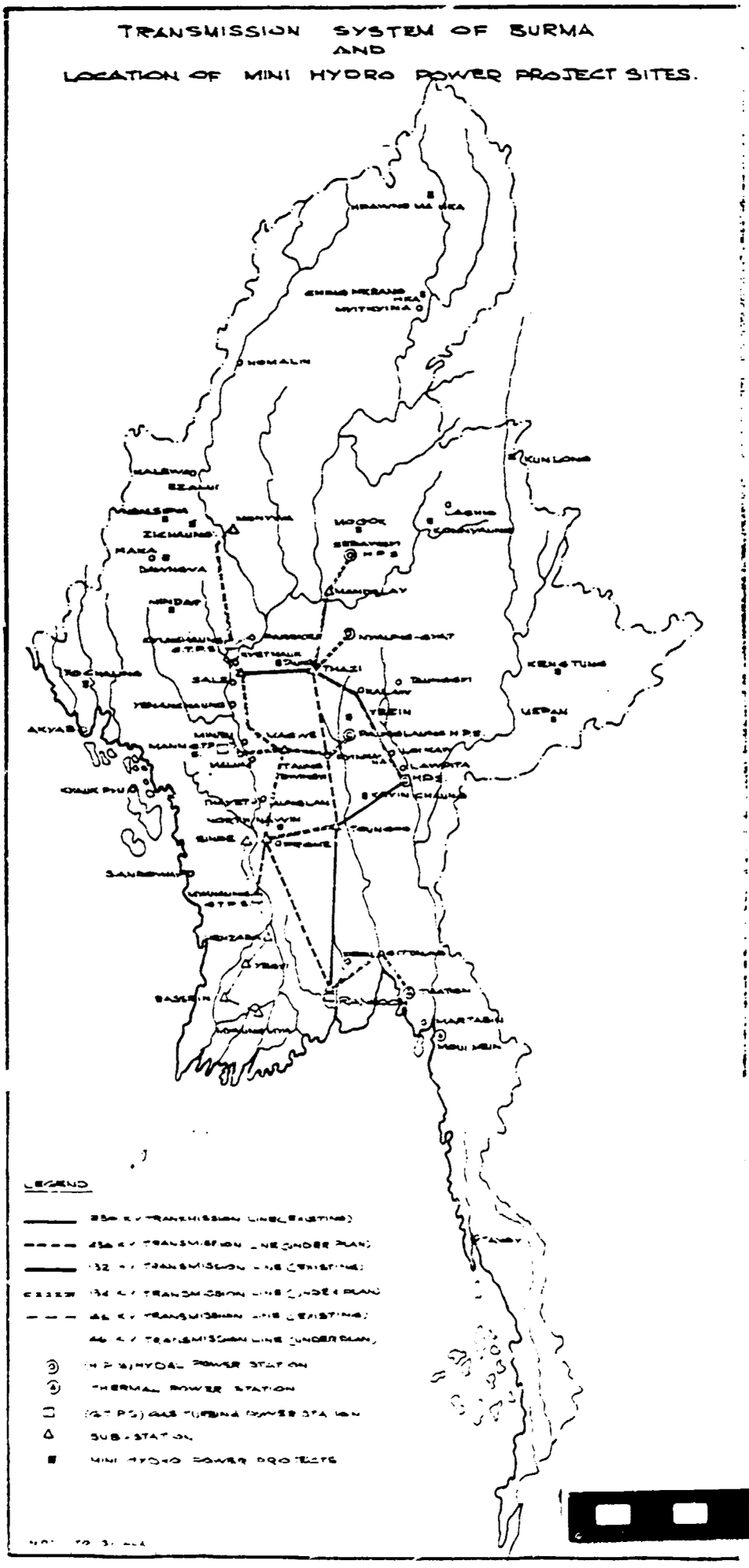
3. It is the intention of the Corporation to carry out implementation of the proposed mini hydropower development projects with its own engineers. Electrical and mechanical equipments for the present shall have to be imported. However, small water turbines are being manufactured locally as an experiment with a view to setting up manufacturing plant for bigger production in future.

CONCLUSION

1. The World energy situation as it has emerged since 1973, and the developments in the last few years are clear indications of growing uncertainties in the availability of oil and gas, and their price in the international market. In this context, it would be prudent to conserve oil and gas and confine their use to sectors for which substitutes are not available.

2. It is evident that in most developed countries during the 1900 electrification of the country is characterized by a very large number of small water power stations which supplies the bulk of the power requirements. As the case may be, Burma has set forth to develop small (mini) water power projects as an initial step to rural electrification. Concurrently, planning and implementation of medium and large scale hydro and thermal power projects to be amalgamated into the National Grid power system are also underway. Unlike the heavy investments required for implementing large scale hydro and thermal power projects, mini hydropower developments need less investment. Such being the case mini-hydropower developments become quite attractive for developing countries.

3. Mention should be made that the priority of projects selected as outlined by the Electric Power Corporation's formulated principles mentioned in Part 5, paragraph 1, when combined with the rural area population's welcoming attitude whose social system is very differenct from that of urban area population, possibilities of voluntary labour and local resources availability when implementing the plans are positively an asset to the successful development of the projects.


TRANSMISSION SYSTEM OF BURMA
AND
LOCATION OF MINI HYDRO POWER PROJECT SITES.
KUN LONG
KENG TUNG
LEGEND
SUB-STATION
MINI HYDRO POWER PROJECTS