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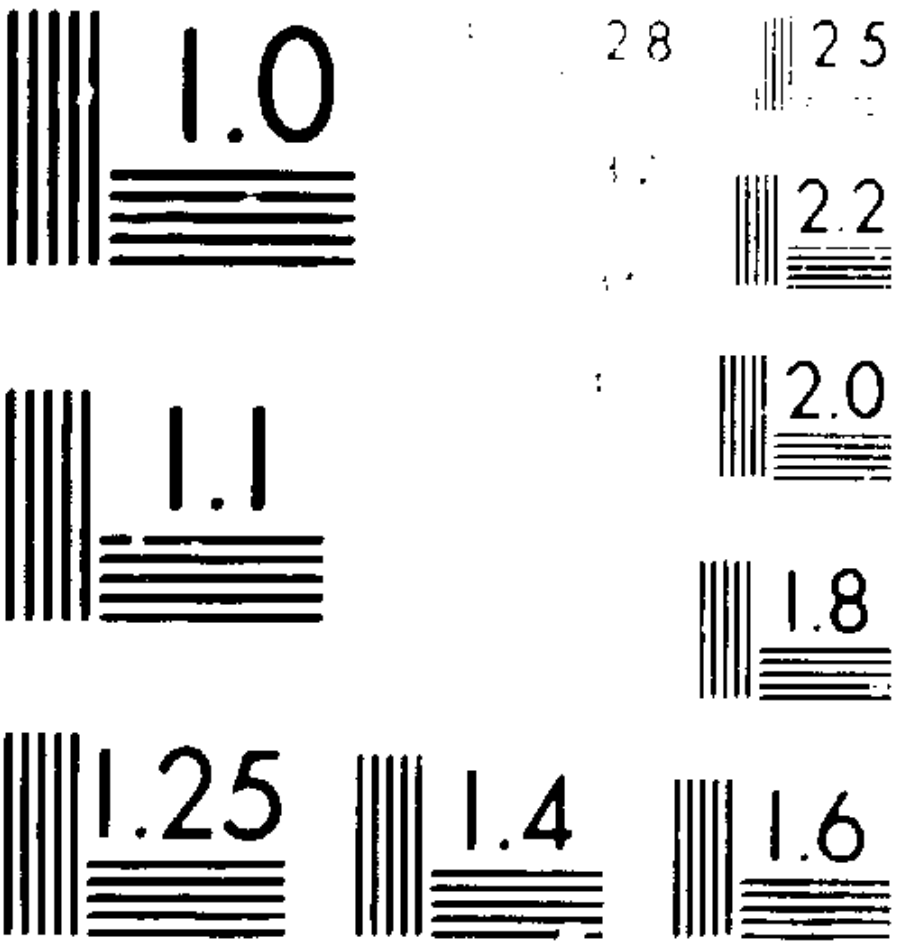
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SMALL HYDRO POWER DEVELOPMENT, The Socialist Republic of the Union of Burma*

by

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TABLE OF CONTENTS

	Page
Introduction	1
Basic Principles for Development of Mini Hydro Power	1
Arrangements for Cost Reduction	4
Management of Small Hydro Power Developments	5
Conclusion	5

INTRODUCTION

(1) Burma, being a country endowed with plentiful rainfall possesses an abundant water resources potential. Over half the territory of the country is highland dissected 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 form 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 and Gulf of Martaban.

(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 108,000 MW of which only about 1 percent has been exploited. This potential consists of sizeable magnitude projects and number of smaller scale (Mini) hydropower developments.

BASIC PRINCIPLES FOR DEVELOPMENT OF MINI HYDROPOWER

(1) Electrification of an area plays a vital role in the activities of the population of that area. It is one of the basic requirements for development of the infrastructure of the country in the social and economic sector. As the world is facing limited resources of fossil fuel, it is evident that means must be sought not only to conserve this form of energy to the extent permissible but also drastic measure must be taken for exploration and exploitation of alternative resources of fuel and energy in an intensive and sustained manner. Thereby balancing the alternative resources and the fossil fuel resources in conjunction with replacement of fossil fuel with alternative resources of energy. Since Burma is

a country of huge hydropower resources and hydropower being a replenishable energy the basic source for replacement of fossil fuel is hydropower. In the hydropower development scheme of the country three catagories of development is planned. Huge bydropower development,medium hydropower development and mini hydropower development. In rural and remote areas of Burma domestic fuel needs forced the population to fell down trees extensively resulting in rapid deforestation implicating not only the 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 fuel needs, lighting and also to promote small scale cottage industries relatively cheap and uninterrupted supply of electricity is urgently needed especially in remote parts of the country and those parts of the country which are not easily accessible to the National Grid.

(3) 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 for their basic needs.

(4) In response to the needs of the community and in line with the country's development plan, Electric Power Corporation (EPC) has formulated the following principle concepts for priority to develop relatively economically viable mini hydropower as part of its rural electrification program.

(a) The site must be technically feasible

(b) The area is not easily accessible to the National Grid power system.

(c) Accessibility is difficult and the area remote.
(d) The community / area is least developed.
(e) Economically viable in relation to other resources.

(5) Presently EPC has formulated a long term hydropower development plan for the whole country.

The main objectives of the 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, natural gas and fire wood with a renewable energy resource available in abundance locally for electric power generation; and
- to conserve kerosene and petroleum products used for lighting and other purposes in rural areas and remote locations.

(6) 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 bulb type 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 undertaken by EPC, however turbines, generators, switch gears and other electrical equipments are purchased from abroad. The foreign currency portion of the total project cost is financed by the Austrian Government.

EPC has identified eleven medium and mini hydropower schemes with financial assistance from the Asian Development Bank. Preparation of feasibility study for the above schemes are being carried out with the Bank's Technical Assistance.

ARRANGEMENTS FOR COST REDUCTION

(1) It is the intention of the Electric Power Corporation to carry out implementation of the future mini hydropower development projects with its own engineers so as to save design and supervision charges. Electrical and mechanical equipments for the time being shall have to be imported.

(2) For promotion of local design and manufacture of electrical & mechanical equipment investigation has been carried out by Heavy Industries Corporation (HIC) in close co-operation with EPC.

(3) HIC is a manufacturer of heavy vehicles, light vehicles, agricultural machines, machine tools, electrical and electronic products.

In the field of Electrical Generation and Distribution it produces power transformers up to 300 KVA 11 KV, diesel driven generators 2 KVA and 4 KVA, electric power meters, House hold electrical fittings, switches accessories etc;

HIC is also studying plans for production of generators up to 50 KW, LT and HT switchgear in the near future.

HIC has extensive casting and forging plants and machining facilities.

(4) As to local manufacture of equipment for small hydropower generation, HIC started in 1981 by manufacturing a Pelton turbine (100 KW) designed by EPC. This machine is soon to be installed at site. Prototype of smaller Pelton turbines coupled to 2 KVA, 4 KVA generators have been produced and are being tested. An electronic governor is also been tested. Further, HIC is making studies to produces turbines for lower heads (Kaplan and Francis) mini hydropower generation auxiliaries such as valves, nozzles penstock etc :

Although HIC has engineering facilities to manufacture various mini hydropower generation items, it needs more technological experience in design and development works.

MANAGEMENT OF SMALL HYDROPOWER DEVELOPMENTS

EPC's investigation and design section is performing all feasibility studies and design.

Purchase of equipments are done from Rangoon Head Office. A project manager acts as laison officer between Head Office and site. Each project has a Project Officer , responsible for all activities at site.

CONCLUSION

(1) The world energy situation as it has emerged since 1974, 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 being unreliable. In this context, it would be prudent to conserve oil and gas and to balance and replace the fossil fuel with alternative energy resource and confine this fossil energy use to sectors for which substitutes are not available.

(2) Planning and implementation of medium and large scale hydro and thermal power projects to be amalgamated into the National Grid power system are underway. Concurrently, Burma has set forth to develop small hydropower projects as an initial step to rural electrification.

(3) 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.

(4) Priority given to the small hydropower projects, enthusiasm of the rural population, possibilities of voluntary labour and local resources are positive assets to the successful development of the projects.