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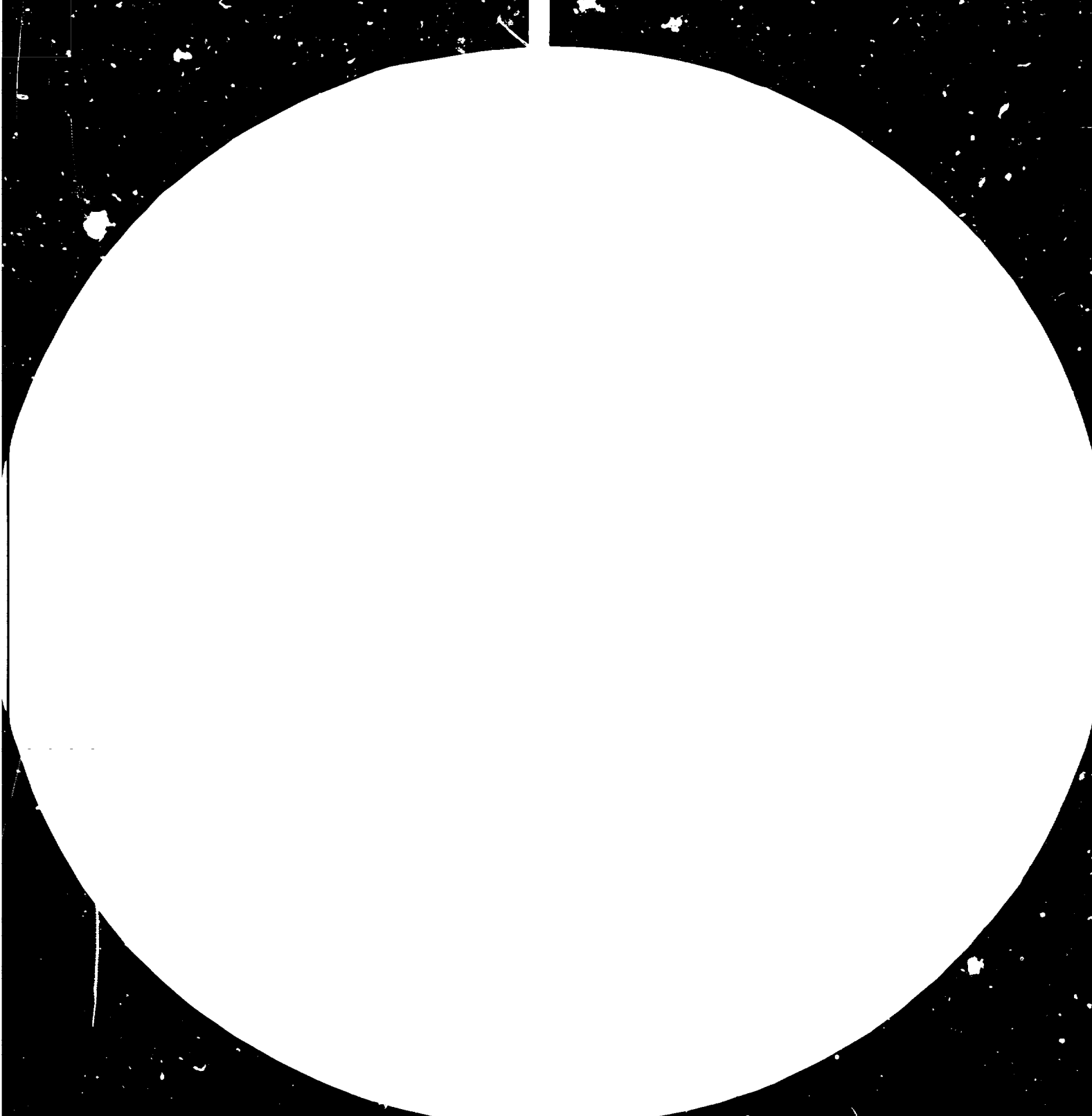
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A STATUS REPORT ON MHG IN BANGLADESH
AND NEED FOR INTERNATIONAL CO-OPERATION *

by

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1.00 BACKGROUND:

Bangladesh with a population of 88 million in a relatively small area of 144000 sq.km. is hard pressed with economic problem. About 87.5% of 88 million people live in the villages. Agriculture accounts for about 56 percent of gross domestic product (GDP) and is the mainstay of economy. 75% of country's labour force is engaged in agriculture. Average per capita income of about \$ 109 (1980) at current prices, is among the lowest in the world.

1.02 Consumption of electricity estimated at 30 kwh/capita, is also among the lowest in the world, per capita gross energy consumption is estimated at 0.17 TOE¹ or even less (0.2 TOE has been estimated as the requirement of subsistence economy by Dr. Jean Romain Frisch² of France). Hydro-electricity accounted for only 1.9% of all commercial energy used in 1980. Out of 0.17 TCE per capita, commercial energy accounted for only 0.03 in 1980.

1.03 Total fossil fuel resources so far discovered and available are shown below:

FOSSIL FUEL RESOURCES IN BANGLADESH

Type	Reserves x 10 ⁶		TOE x 10 ⁶ Recoverable	Remarks
	In place	Recoverable		
Coal *	1053 tons	242 ton	16.8	Not yet exploited
Peat	57 TCE	14 TCE	9.8	No extraction yet
Natural Gas (liquid)	3.2 TCE	1.2 TOE	1.2	Being exploited
Natural Gas		2.83x10 ^{5,3} M ³	251.18	Being exploited
Oil	-	-	-	Not yet discovered
Total Recoverable			430.18 x 10 ⁶ TOE	

1 TOE Tons of oil equivalent
 2 L'EVOLUTION DES CONSOMMATIONS D'ENERGIE DANS LA MONDE
 presented at World Energy Conference, 1980

TCE Tons of Coal equivalent

* Coal is available in the western part 1000 m below surface.

1.04 Only gas is being exploited now, but for want of country-wide network of pipe line or other alternate mode of supply a substantial part of commercial energy supply is met by import.

To meet the demand of commercial energy, Bangladesh had to import about \$700 million worth of fuel in 1981 which accounted for 70% of export earning and 7% of per capita income.

1.05 Government has been trying to raise the living standard of the people through a number of development programmes. Top priority has been given to agriculture sector. Traditional agriculture, which depended on nature, has to be discarded in favour of modern methods. Mechanical irrigation and fertilizer are being provided to cultivable lands. Out of 49,000 of various capacity and type of pumps, about 41,000 are still run by diesel engines.

Under intensive programme, more canals are being excavated and reexcavated and more low lift, shallow and deep tubewell will be added. More central pumping stations are being developed.

1.06 Note worthy among various socio-economic programmes, is the Area Coverage Rural Electrification(ACRE). An estimated 10% of area has already been taken up for total electrification since 1977. Many tube-well or low lift irrigation pumps, rice husking mills will be soon converted to electric drives from diesel. ACRE programme alone will create 369 MW in electrical demand in the rural area by 1990. Present power demand of the country, excluding industry's in-house generation, is about 620 MW.

Other rural programmes such as health, education, cottage industries, cold storage etc. will create new demand for energy, no doubt, importantly, this will be incident as electrical demand.

1.07 Even at a very conservative estimate, total gross requirement of energy in the year 2000 A.D. may be 36 million TOE. Of this, about 24 to 30 MTOE must be in the form of commercial energy. Compared to this total indigenous reserve is rather small (Total recoverable reserve 430.18 MTOE).

There is a strong feeling that natural gas available in the country should be conserved for use as feed-stock rather than burning as fuel. Therefore renewable source must be tapped.

Renewable resources include, among others, hydro power potential. Theoretical hydro potential of the country has been unofficially estimated at 52000 Gwh of which only about 800 Gwh has already been exploited in conventional hydro. One estimate suggests that it is technically possible to harness another 7700 gwh of which about 1000 Gwh may be out of mini and small hydro plants. (")

- 1.08 The immediate and direct beneficiary of minihydro will be the rural areas of Bangladesh including the tea gardens and remote hilly areas. Besides this, thousands of river craft which are manually operated along numerous inland waterways can generate electricity from inexpensive submersible turbine generators to substitute imported kerosene which they use normally for night time lighting.

The concept of MHG has been well taken in the country but no breakthrough has yet been possible.

2.00 STATUS OF MINIHYDRO PROGRAMME IN BANGLADESH

UNIDO has played an important role for MHG movement to gain some popularity in this country. From Kathmandu to Hangzhou, the movement has stimulated many countries to go ahead with their programmes. Necessity of minihydro programme has been acknowledged in various national forum. Planning Commission of Bangladesh and the concerned ministry have also positive attitude towards this.

- 2.01 Minihydro committee : A working committee was formed by the erstwhile Ministry of Power, Water Resources and Flood Control with water and power engineers in February 1981 to make a preliminary assessment and submit report with recommendations.

The committee submitted its report in August 1981. Among the recommendations following are noteworthy:

- *) Creation of a Directorate of Planning Design for mini-hydro power project.

Present consumption 0.17 MTOE present population 88 million. 2000 A.D. consumption 0.25 MTOE 2000 AD population 146 million.

(*) Possibility of Hydro potential to meet Energy Demands of Bangladesh - S.T.S. Mahmood.

*) Comprehensive study to be taken up throughout the country to explore the possibility of mini-hydro power generation.

Moreover the committee recommended 12 sites for immediate detail investigation which were estimated to yield 1275 kw.

No further progress has taken place since the submission of the committee report in August 1981. This was because the Ministry which previously was in charge of both water and power was bifurcated towards the end of 1981 and continuity was suddenly lost. It appears that this has to be now co-ordinated from the Planning cell of Ministry of Energy, Bangladesh Power Development Board will have to take up the responsibility of developing both mini-hydro and conventional hydro as the sponsoring agent.

2.02 UNDP Assistance

In the meantime, on request of the government, UNDP engaged a two-man team for reconnaissance. Their findings were presented in a report which was positive. The report is under consideration.

2.03 NRECA/USAID

USAID also showed interest. A team from NRECA (National Rural Electric Co-operatives Association) came and visited the sites. In their report dated November 1981 they agree to the committee findings and recommended as below:

- (1) A permanent Hydroelectric Directorate should be created with a staff drawn from the Water Development Board and Power Development Board. The new Directorate should deal with all new hydroelectric projects, small and large. It must have a strong irrigation engineering capability.
- (2) A thorough reconnaissance of all streams with apparent generating potential should be undertaken.
- (3) Prefeasibility studies including power and irrigation should be initiated at once for the following sites:

Soalack in the Chittagong Hill Tracts
Chota Kumira in the Chittagong District
Nikhari in the Sylhet District
Marisi in the Jamalpur District
Talma in the Dinajpur District
Teeste canals in the Rangpur District

- (4) The project showing the best benefits should be evaluated further with full feasibility study leading to implementation. A project with a barrage (Marisi Talma) would be preferable as a pilot project because most small hydro in Bangladesh will be of this type.
- (5) An engineering team should be sent to the USA to study design details, construction, plant operation and generating machinery of small, low head plants. California would be most suitable because of the large number of combined hydro-electric-irrigation projects in various stages of completion.
- (6) The feasibility of manufacturing small, low-head turbines, or components thereof, at existing Bangladesh facilities should be determined. This should include designs, modified to the capabilities of Bangladeshi industry."

The NRECA was supposed to submit a proposal for feasibility study but nothing has been received so far.

3.00 PRIORITY ORDER FOR DEVELOPMENT OF MHG

Without an institutional arrangement nothing can proceed and therefore, an exclusive Directorate must be established first. Four distinct phases are foreseen through which the MHG and SHG programme may proceed.

- (1) Creation of an exclusive office to conduct investigation, studies and design for MdG.
- (2) Immediate investigation, design and implementation of canal drop hydro on the Teesta Irrigation canals.
- (3) Detailed investigation and feasibility for 12 sites recommended by the committee and implementation of a pilot project.
- (4) Country-wide survey for mini-hydro and preparation of a Master Plan.

Multipurpose approach in large Irrigation Projects is desirable. In irrigation projects involving dams, the hydro power aspects should be looked into and facilities incorporated as a matter of national policy.

4.00 DIFFICULTIES

(1) Institutional problem has proved already to be the greatest hurdle next to finance. In a sense, institutional problem is even more critical as without this a programme cannot be adequately worked out to start with, local expertise is also inadequate as far as MHG is concerned as no local experience is there.

(2) Financial. It would be premature to say that there was any problem in this respect. All is meant by this is that the report submitted by the committee did not have any deliberation nor a decision taken on it yet. Of course, it is quite natural and expected that finance in terms of detailed feasibility, technology transfer and project aid would be needed from abroad.

5.00 NEED FOR REGIONAL CO-OPERATION

Inter-change of experience is essential for any new development. It cannot be denied that some time some nation does a pioneering job and others are benefitted from it. In the traditional way this has taken centuries but in modern times peoples of the world hasten the process. Nations who are to start from a scratch have the greatest need for regional co-operation. Therefore, Bangladesh would welcome the establishment of a network of regional co-operation.

5.01 It is presumed that regional co-operation for mini-hydro has got three aspects:

1) Popularising Mini-Hydro

There is a traditional outlook toward hydro development. Viewed from such outlook mini-hydro may arouse misgivings in many minds. Leader exchange programme involving politicians, bureaucrats, economists and senior engineers in top management of allied fields is sure to popularise the concept.

ii) Exchange of Information

Approach to mini-hydro programme may be different in different socio-economic environment, but a lot of it may be common.

Therefore, nations will be benefitted through exchange of information on national programme, strategies, implementation plan, development of new machines, cost data etc.

- iii) Transfer of Technology . This may be in the form of planning and engineering for MHG or SHG development. This may also be in the form of manufacturing know-how of hydraulic machines. P.R. China and the Republic of the Philippines are known to have already started such co-operation. It is believed that where possibilities are many such co-operation is meaningful and rewarding.

6.00 NEED FOR RESEARCH AND DEVELOPMENT AT THE NATIONAL LEVEL

Nations of the region and rest of the world will appreciate that the human endeavour in the development of renewable sources of energy is a right step. Energy potential in the flowing rivers and streams must be harnessed to conserve fossil fuel as much as possible.

It is felt that there is a need for R+D in the following:

- i) Hydrology + Hydraulics Bangladesh Water Development Board has got the institutional arrangement and specific investigation may be carried out in these institutions.
- ii) Low cost manufacturing methods and materials.
- iii) Low cost machine technology. There are machines of low output (100-200 watts) which can be submerged in a canal and can generate electricity converting the power in the flowing water. There is a tremendous prospect of such machines in rural areas and country boats in Bangladesh, but unless these machines are very cheap, practical application will be inhibited.

Bangladesh should be interested in this research.

7.00 NEED FOR TRAINING

When the proposed Directorate will have been established there would be a need for training a number of engineers in the fields of (1) hydrology for MHG (2) Hydraulic and structure for MHG (3) hydraulic machine application (4) selection of generators, speed controls, voltage controls etc. Two participants in each field would be sufficient to start with.

8.00 PROPOSED REGIONAL CENTRE AT HANGZHOU

Selection of Hangzhou as the regional centre of research and development for mini-hydro programme is a welcome action indeed. This is in line with the decision at second MHG workshop. P.R. China which can boast of its outstanding achievement in minihydro would be an appropriate country for the centre. The centre of excellence at Hangzhou will be immensely benefitted from the vast experience of China. It is hoped that China will extend its unreserved support for the R+D and regional co-operation in the years ahead.

8.01 The centre may have multi-disciplinary activity concerning research, development and propagation of minihydro.

Research activity may include the following:

- i) Development of low cost technology
- ii) Development of simple machines that can be handled like bicycle.
- iii) Investigations in to specific problems of member countries.
- iv) Extension works like participation in pilot schemes in member countries.
- v) Dissemination of the results of R+D efforts in technical bulletins, both done at the centre and in member countries.

8.02 Preparation of manuals concerning small dams and hydraulic structure, cataloging of standard machines and price information etc. can also be undertaken by the centre.

8.03 The centre should be manned by appropriate expertise raised from member countries.

- 8.04 The centre should operate with a motto to build a better world, without prejudice or bias to political dissention, with a view to offer positive contribution towards development of mini and small hydropower in member countries. All national centres of research should have affiliation to the centre.
- 8.05 Fund must be raised from grants from the United Nations as well as member countries to defray its expenditure.

These and other proposals suggested by the distinguished delegates may be discussed in the expert group meetings that will be held between 12th through 17th July 1982 at the city of Hangzhou in the People's Republic of China.

Bangladesh will be benefitted from the proposed regional co-operation and would be looking forward to the outcome of this working group.



