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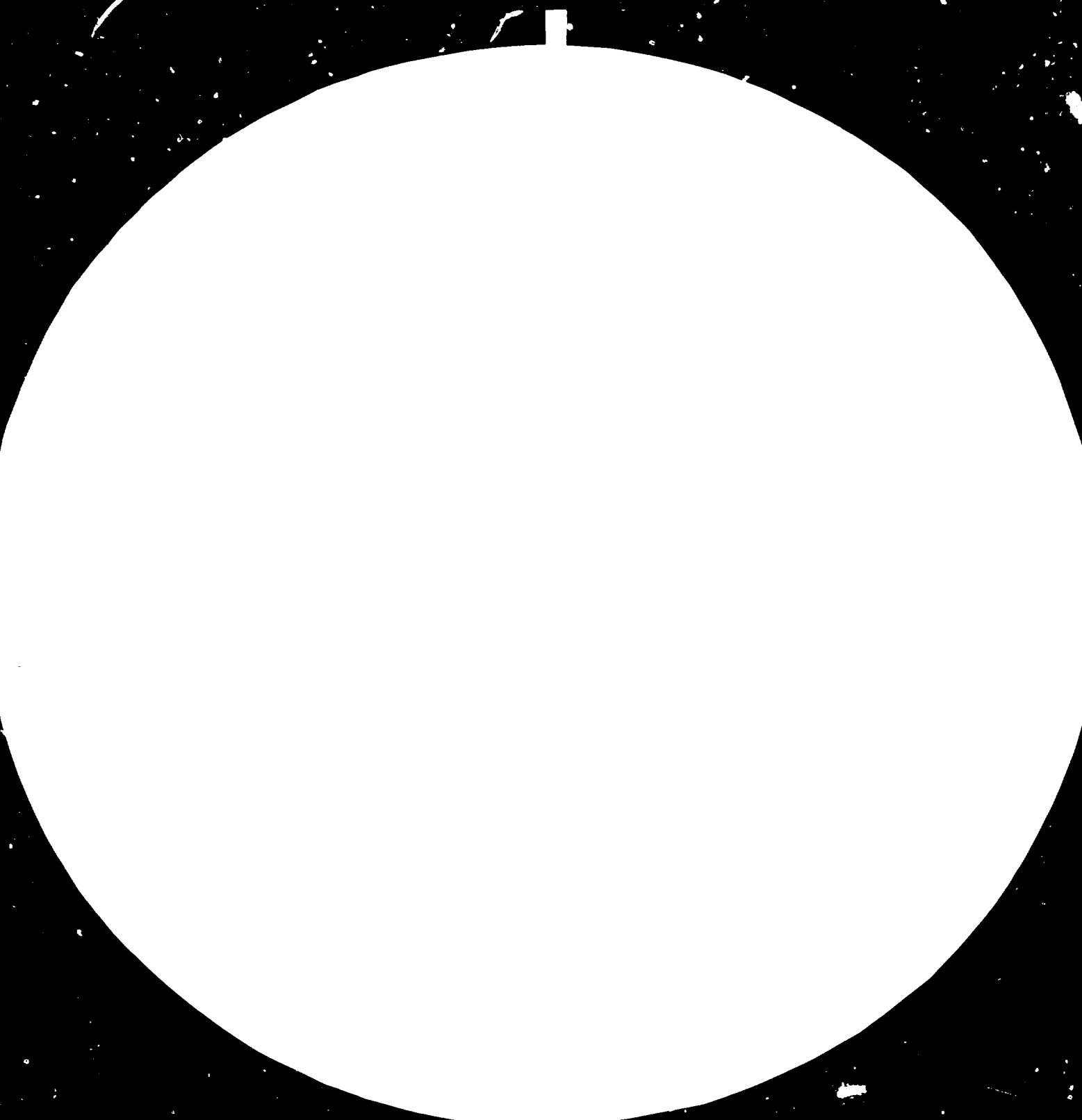
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Distr.
LIMITED

ID/WG.305/42
15 May 1980

United Nations Industrial Development Organization

ENGLISH

Seminar-Workshop on the Exchange of
Experiences and Technology Transfer
on Mini Hydro Electric Generation Units

Kathmandu, Nepal, 10-14 September 1979

PROJECT OF MICRO-HYDRO-GENERATION UNITS IN
COLOMBIA, SOUTH AMERICA*

by

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With the following lecture we will try to inform the participants about the project with which the government of Colombia through the Ministry of Mines and Energy and its adscribed organism, the Colombia Institute of Electric Energy ICEL, advances the campaign to integrate to the development of the country, numerous nucleus of the population which are actually marginated from progress, because of their special geographical location. Isolated from development centers by distance or by difficult topographical conditions, these groups of people discard from a technical and economical point of view the short run solution of having the benefits of energy through transmission or thermic generation, and dictate as a reasonable solution the hydroelectric generation, conditioned to the existence of useful water sources near to the villages. The object of the microgenerating project is to make this solution a reality. The methodology to follow and its initial development will be exposed in general terms.

Program Location

The Colombian territory is divided into departments, Intendencias and Comisarias. The Colombian Institute of Electric Energy advances its own projects through electrifying enterprises organized in each department and are in charge of the programs of generation transmission and administration in their assigned areas.

These enterprises have already contributed to the identification of the areas marginated from the benefits of electric energy. Also through them we have obtained a great part of the economic and social information which was useful for the definite selection of the study locations.

Reach of the Program

35 locations have been chosen according to the following priority:

1. Locations with the greatest information about restitution charts and water volume.
2. Locations with restitution charts but no water volume information.
3. Locations with information about water volume but no restitution charts.

Program Characteristics

In the elaboration of the study program for the construction of micro-hydro-generation units the following points have been outlined:

1. The studies will be developed only with Colombian personnel.
2. The equipment and elements to be used during the construction will be as far as possible Colombian.
3. In general, will be considered locations that can count on water sources with a high average volume because it's very possible that useful water currents have no registered historical data, and even in the case they existed, they aren't very reliable. In these cases the best advise would be to calculate the installable power, according to the minimum volume.
4. It will be tried to standardize the equipment to diminish as far as possible the problems in maintenance and to make easier the transportation and installation.
5. To avoid an excess in the costs of transportation usually with very difficult access, it will be tried to use as far as possible, the materials locally available.

Program Execution

The program of micro-hydro-generation units has been divided into three steps:

- Step a) Preliminary inspection
- Step b) Factibility study
- Step c) Design and planning of construction

In the most simple projects, stages b and c will be developed in only one stage.

For the execution of the program various consulting national firms were invited, between which, five have been selected that in the present advance in their studies, with a total of seven locations per firm.

The studies began in the last quarter of 1978, and will be finished during the middle of next year, so that once this stage has been finished the opening of the licitation for the construction can begin.

In the first quarter of this year, step (a) was finished and now stage (b) is being developed.

The results obtained in the first stage of preliminary inspection have been very satisfactory, not only because of the technical level of the corresponding studies, but because of the great number of attractive locations found that endue the continuation of the design and factibility steps. The following results have been obtained once the stage of preliminary inspection has been fully accomplished:

- a) 27 of the chosen locations justify a continuation in the studies.
- b) The locations in the country frontiers were given priority for their importance in the deference of national boundaries even though their development implies high costs.
- c) The development capacities with a 15 year projection exceeded in very few cases the 5.000 Kw. limit.
- d) The suspension of the studies in certain locations obeyed to the following general causes:
 1. Excessive cost of the generated Kw.
 2. Absence of water sources with a possible hydro-electric use, at reasonable distances from the villages.
 3. Water sources with a possible hydroelectric use near villages, but of a much bigger magnitude to that established for a micro-hydro-generation units.
 4. The possible supply of energy through extension of centralized national grids.

It is important to outline the identification within the studied zones, of poulation nuclei with a relative importance, whose supply of energy although not considered by the initial program, can be realized with the installed capacity, enlarging in this way the economic and social benefits that constitute the principal object of the micro-hydro-generation program.

This fact rises considerably the amount of favored populations, compensating in great extent those that had to be eliminated.

Conclusions

1. The generosity of the program is undeniable in any considered way, though from an economical point of view because of its low or no rentability, this plan wouldn't have any justification, we expect the multiplying effect will take place, that according to the British economist Keynes can be ascribed to this type of investments, considering an energy service as a basic point in the development.
2. The population groups which have been object of this study, constitute a statistical sample of the potential in specific resources, totally identified, in the areas of mining, agriculture, stock breeding, fishing, forestal reserves and even in tourism.
3. Parallel to this it has been evident that in most of the human groups studied the social conditions are very low.
4. It is also important to outline that the installation of the micro-hydro-generation units will make possible the development of small industries and crafts which will contribute to the highring of the social conditions.
5. The use of hydroelectrics avoid the alternatives of thermic generation with its high costs and low confiability given the difficulties in fuel supply and maintenance. On the other hand, it is obvious for anyone, that a hydroelectric solution is the most advisable with the presert world energetic problems.



