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STUDIES OF NUCLEAR POWER COSTS

Report by the Board of Governors

I. INTRODUCTION

1. By resolution GC(IV)/RES/86 the General Conference requested the Board of Governors:

(a) To continue carrying out nuclear power surveys in Member States, at their request, in accordance with the recommendations of resolution GC(III)/RES/57;

(b) To pursue and develop such general studies of nuclear power costs, nuclear power costing methods and nuclear power evaluation methods as may appear advisable for the purpose of collecting, analyzing and distributing all relevant information on the subject, so as to harmonize the methods of evaluation; and

(c) To report to the General Conference periodically, and in the first instance at its fifth regular session, on the results of these studies.

2. Activities in the two areas specifically outlined by the General Conference have therefore been pursued by carrying out nuclear power surveys in Member States at their request, by continuing to make available to them the latest cost data on power reactors and by analyzing the nuclear costing methods at present in use in various countries. Under the program initiated in compliance with resolution GC(II)/RES/27 a continuing study is also being made of the technology and economics of small and medium-sized power reactors most suitable for the economic development of less-developed countries.

II. SURVEYS OF NUCLEAR POWER PROSPECTS IN MEMBER STATES

3. Finland. The joint study undertaken by the Agency and the Finnish Atomic Energy Commission on the prospects of nuclear power in Finland was published in December 1960. [1] It is noted in the study that Finland, which hitherto has been relying almost exclusively on hydroelectric power would make a transition to a hydro and thermal system in the next ten years since one-half of its total water resources have already been exploited. Two of the prerequisites for the possible introduction of nuclear power - sufficiently large plant sizes and high utilization factors - are likely to be met towards the end of the decade. A comparison of the costs of producing power in a nuclear and a coal-fired plant, both operating at a high load factor, is included in the study, on the basis of variable assumptions as to future coal prices, interest rates and other relevant factors.

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[1] Prospects of Nuclear Power in Finland, Technical Reports Series No. 2, IAEA, Vienna (1960), STI/DOC/10/2.

4. The Philippines. In January 1960 the Government of the Philippines requested the assistance of the Agency in undertaking a survey of the prospects of nuclear power in the Philippines over the next decade. Referring specifically to resolutions GC(II)/RES/27 and GC(III)/RES/57, the Government indicated that the findings of the survey might be of significance to inquiries in other Member States facing similar power conditions. Pursuant to this request a mission composed of two specialists of the Agency and an expert on conventional energy problems made available by the United Nations was dispatched to the Philippines. It received the full co-operation of the Government and especially of the Atomic Energy Commission in securing comprehensive factual information on the energy and electric power situation in the country. After four weeks in the field, the mission returned to headquarters to draft a report which is to be published in the third quarter of 1961. [2]

5. The existence in the island of Luzon of an interconnected power system with a rapid rate of growth and a relatively large base load, together with the relatively restricted possibilities of developing hydro power in this area in the near future, would indicate the need for the introduction of medium to large base load thermal units in the late sixties. An analysis of the limited domestic fuel resources and of the present oil import terms has led the mission to conclude that nuclear power plants might over the period of their life be competitive with oil-fired thermal stations built in the late sixties, and that a more advanced cost comparison based on international bids appears fully warranted.

III. NUCLEAR POWER COSTS AND METHODS FOR THEIR EVALUATION

6. Cost data. The Board is of the opinion that the General Conference would find the latest data available to the Secretariat on the costs of nuclear power a useful complement to the general studies for which it has asked. The Board is accordingly requesting the Director General to bring up to date the review of the subject which it presented to the General Conference last year [3], and to communicate the new edition to the General Conference for information [4]. It is understood that the introductory material in last year's review remains largely valid, but the new edition will contain additional data on the smaller reactors and more extensive information on the components of fuel costs.

7. Methods for the determination of nuclear power generating costs. With the assistance and guidance of a panel of experts a study has been made of the methods currently in use for the estimation of nuclear power generating costs. The report on the work, [5] which will be published shortly and will be followed by broader studies, is intended to assist Member States in arriving at preliminary estimates of nuclear power costs on the basis of published data, the scope and treatment of which are not always clearly defined. The document will contain a full list of the main cost items likely to be incurred in the construction and operation of a nuclear power plant, and a survey of the methods at present used to determine generating costs with a view to facilitating their application or adjustment to specific conditions in different countries.

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[2] Prospects of Nuclear Power in the Philippines, Technical Reports Series No. 3, IAEA, Vienna (1961), STI/DOC/10/3 (in preparation).

[3] GC(IV)/123.

[4] The new edition will be issued as document GC(V)/INF/38.

[5] Introduction to Methods of Estimating Nuclear Power Generating Costs. STI/PUB/44 (in preparation).

IV. STUDY OF THE TECHNOLOGY AND ECONOMICS OF SMALL AND MEDIUM-SIZED REACTORS

8. During the third regular session of the General Conference, the United States of America invited the participation of the technical staff of the Secretariat in the design, construction, start-up and operation of a 20-megawatt pressurized-water power reactor. [6] The Secretariat felt that it would be more profitable for it to receive pertinent information on not only one but on several power reactor projects, and to follow their development through brief visits by staff members at intervals of about six months. After discussions with officials of the United States Government, the original offer was broadened to include in the program seven projects representing five reactor systems.

9. In connection with this offer, two staff members were sent to the United States in June 1960 and January 1961, for about three weeks, during which they visited the headquarters of the United States Atomic Energy Commission and its operations offices, inspected the reactor sites, held discussions with the designers, manufacturers and builders of the plants, and met representatives of the utility companies in order to gather relevant information on subjects such as design objectives, reactor safety, construction experience, cost breakdown, training of personnel, start-up, fuel handling, operation and maintenance, and integration with existing networks.

10. The United States Atomic Energy Commission has extended its full co-operation to this program and has made available full facilities for gathering necessary data and information. The possibility is being discussed of a few Agency fellows receiving on-the-job training in one or more of these projects. The Agency is giving its views on special features which may be incorporated in power reactors to make them more suitable for conditions in less-developed countries and is providing reports of special studies on the prospects of nuclear power in various Member States visited by its missions. A comprehensive report summarizing the experience gained through participation in the program will be made available to the General Conference for information during the fifth regular session.

[6] See document GC(III)/COM.1/OR.22, paragraph 92.