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TECHNICAL BENEFIT OF AN INTERNATIONAL PROJECT*

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ABSTRACT

One critical issue examined in the present phase of the International Tokamak Reactor (INTOR) has been an evaluation of the technical benefit of dividing up the design and component production tasks of all major advanced technologies among all participants. Two approaches were evaluated: (a) a "splitting" approach in which each country provides 1/4 of the components of each major system (e.g., 3 of 12 TF coils), (b) a "branching" approach in which each country provides all components of selected major systems (e.g., first country provides all TF coils, second country provides all torus sectors, etc.). Quantitative cost and schedule estimates were developed for each of the two approaches and compared to the cost and schedule of the entire device if it were produced only by one country. The results of the U.S. evaluation indicated that the ratio of total estimated cost to the "national" cost was 1.66 for "splitting" and 1.20 for "branching." The cost per participant was 0.41 and 0.30, respectively. The increase in the construction schedule was estimated to be 2.6 years.

INTRODUCTION

Deciding to make INTOR an actual construction project would result in several identifiable benefits to the multinational participants; the benefits are the new fusion scientific knowledge produced at a financial cost substantially less than required for any single participating nation to do the same project alone. This benefit is readily identifiable. A less obvious, but critically important, aspect of such a large project is the overall design and fabrication of the major systems and components. It is judged that sharing both the design and the fabrication among the participants would be very desirable and of inestimable benefit to each participant. Therefore, it seems natural to want to have each participating nation derive the technical benefit associated with all developments that occur during design and manufacture of the actual hardware of the major advanced technologies.

This study was undertaken by the INTOR Workshop to determine the technical feasibility of partitioning the detailed design and component production tasks so as to benefit all participants in the development of all major technologies. Where necessary, this study is based on the INTOR design concept and test programs of Phase 2A, Part 1; the study assumes that INTOR will be built as an international joint project.

This study consisted of establishing a reference framework for performing the tasks, identifying the major systems and components to be evaluated, identifying the possible ways of achieving the technical benefit by each participant, and evaluating as quantitatively as possible the technical benefit to be derived by the participants.

TECHNICAL BENEFIT DEFINITION

In the context of the present study, the term "technical benefit" means the development of industrial capability and experience to permit moving forward with the development of future fusion technology. Therefore, the concept of partitioning the design and fabrication of all of the major advanced technology components and systems was put forward for evaluation. This study, therefore, focused on establishing as concisely as possible, the technical benefit to be derived by each participant from conducting the project on an international basis. How this is best done is not clear, and approaches needed to be evaluated. This was done. Quantitative information was developed where possible. Qualitative judgments and perceptions were obtained as well and are presented. The end goal was to determine the technical feasibility of partitioning the design and fabrication among the participants so that each participant can derive the

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