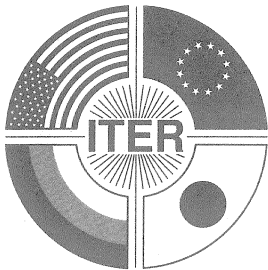


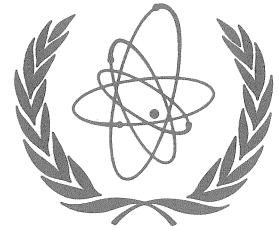
INTERNATIONAL THERMONUCLEAR EXPERIMENTAL REACTOR



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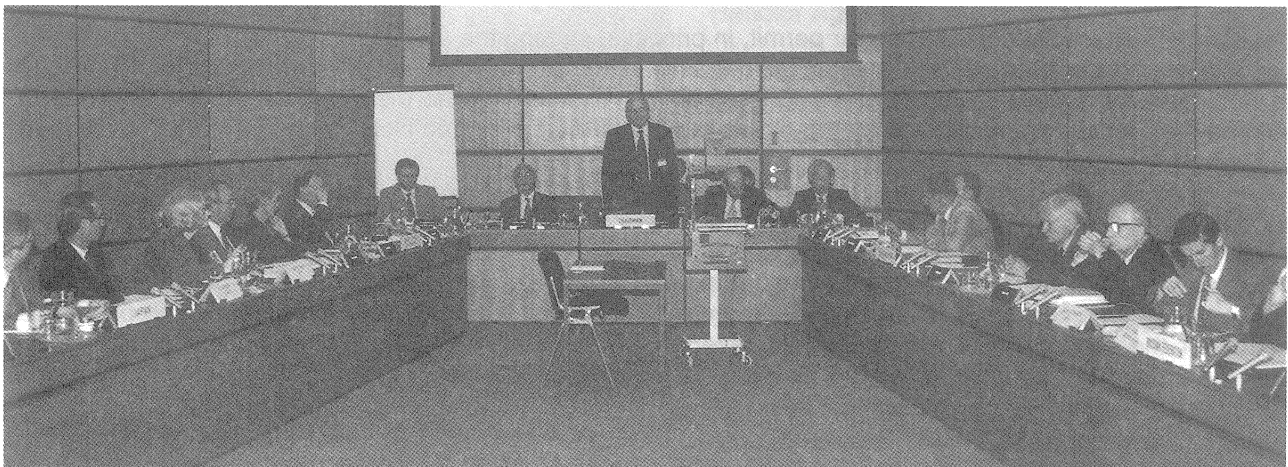
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CELEBRATION OF THE ACHIEVEMENTS OF THE ITER ENGINEERING DESIGN ACTIVITIES 1992 - 1998



Participants in the Ceremony

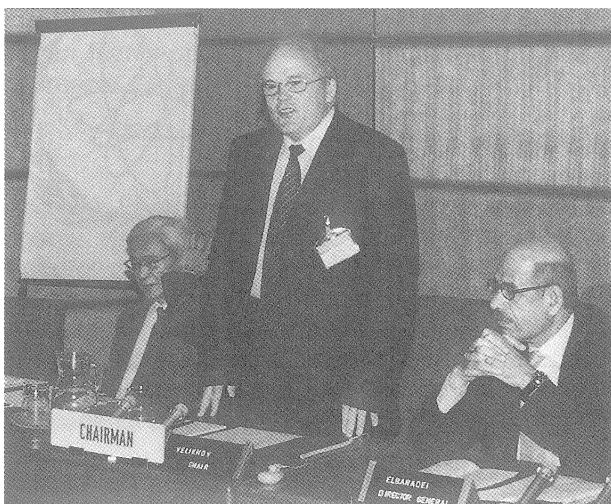
In conjunction with the ITER Council Meeting, a ceremony was held at the IAEA Headquarters in Vienna on 22 July to celebrate the achievements of the ITER Engineering Design Activities during the period 1992-1998. The Director General of the IAEA, Dr. M. ElBaradei, and his Deputy for Research and Isotopes, Dr. S. Machi, the Representatives of the four ITER Parties, the ITER Council Members, the ITER Director, Experts and Observers, participated in the ceremony.

Academician E.P. Velikhov, Chair of the ITER Council, opened the ceremony telling about the history of the ITER Project (the text of his opening remarks as well as of the other speeches held at the ceremony are given on the following pages). Then the floor was given to the Director General, M. ElBaradei, who spoke about the importance of nuclear fusion as a future energy source and congratulated the ITER participants on their success. Then, the ITER Director, Dr. R. Aymar, told the audience about the technical accomplishments achieved as the result of the large-scale international collaboration of the Home Teams of the ITER Parties and the ITER Joint Central Team.

Finally, the following Representatives of the four ITER Parties presented their congratulatory remarks:

Mr. J. M. Costa LaFarga, Counsellor of the Mission of the European Commission to the IAEA and Dr. C. Maisonnier, Directorate General XII, European Commission, Brussels - for the European Union;
Mr. A.V. Yakovenko, Acting Resident Representative of the Russian Federation to the International Organizations in Vienna - for the Russian Federation;
Ambassador Y. Ikeda, Resident Representative of Japan to the IAEA - for Japan;
Ms. L. Kennedy, Deputy Head, Chargée d'Affaires ad interim, U.S. Mission to the IAEA - for the United States of America.

OPENING REMARKS BY ACADEMICIAN E.P. VELIKHOV



E.P. Velikhov

In an unprecedented 20-year co-operation (in 1978 INTOR, in 1988 the ITER Conceptual Design Activities and, in 1992, the ITER Engineering Design Activities started), specialists from the European Atomic Energy Community, Japan, the Russian Federation, and the United States of America, while developing the world's first thermonuclear experimental reactor, came to the two following major breakthrough achievements:

- Physics results obtained from the JET and JT-60 installations, including, in particular, the production of 16 MW thermonuclear power, controlled under laboratory conditions;
- Development of the Engineering Design of ITER, which demonstrated the real possibility of constructing a 1.5 GW thermonuclear reactor, based on currently existing technologies and materials.

These and other results achieved so far permit, in principle, starting the adaptation of the ITER machine to a construction site and starting the construction in the near future. However, the current, unclear situation with the signing of the Extension Agreement creates a difficult situation for the thermonuclear community, which could be appropriately paraphrased by the old saying that "if a ship has no clear course, even following wind will not help."

Any delay in selecting this course may lead to serious consequences for thermonuclear science and will negatively affect the joint development of possible future mega-projects of global significance. In any case, such a delay will significantly raise the mutual expenses for a thermonuclear experimental reactor. For instance, if such a reactor is built not earlier than in 10-15 years, we might also have to build, in parallel, a reactor for the production of tritium, current reserves of which are decreasing, as a result of its natural radioactive instability, by approximately 50% every 12 years.

REMARKS BY DIRECTOR GENERAL M. ELBARADEI



M. ElBaradei and S. Machi

It is a pleasure to address this meeting to mark the successful completion of the ITER Engineering Design.

Since its very beginnings, the development of nuclear energy has drawn two reactions: hopes and apprehensions. The hopes - for a safe, environmentally friendly, cost efficient and virtually unlimited source of energy - are even more relevant today to meet the growing energy demand that is essential for development and to help mitigate global climate change.

The apprehensions - concerning nuclear safety including radioactive waste disposal, nuclear weapons and proliferation - have been underscored by a number of events which have cast a shadow, for the public, on the desirability of nuclear energy.

The IAEA was established over 40 years ago precisely to help to bring the hopes and potential of nuclear energy to fruition and to assist in curbing the apprehensions. These two objectives are interdependent.

A core function of the Agency is thus to be a catalyst for the scientific community and a hub for state-of-the-art nuclear technology. We also have the responsibility, both from our Statute and from the NPT, to foster scientific and technical information exchange as well as training to ensure accessibility to our Member States in general, and to assist developing countries in particular.

Nuclear fission already produces some 17% of global electricity supply and accounts for the avoidance of about 8% of global carbon emissions. In non-energy sectors, nuclear techniques are also making a valuable and expanding contribution to human health and sustainable development.

But we have clearly not reached the full potential of nuclear science and technology to contribute to the benefit of humanity. Nuclear fusion is a prime example of a potential that has not yet been realized. The path to realize this potential is complex and expensive and requires the highest levels of international co-operation.

In pursuance of our mandate, the Agency has organized and supported fusion research activities since 1961. In the 1980s, the IAEA organized the International Tokamak Reactor (INTOR) Workshop to define the next major tokamak. The success of the INTOR project led to the launching in 1988 of the ITER Conceptual Design Activities. This was followed in 1992 by the Engineering Design Activities (EDA), whose achievements we mark today.

The Engineering Design of ITER is a striking example of international collaboration in fusion research. The advantages of international co-operation - avoidance of duplication, cost sharing, and accelerated progress from knowledge sharing and increased workforce - have been demonstrated also by the excellent progress that has been made worldwide in nuclear fusion research. As a result, tokamak devices have already demonstrated fusion powers over 10 MW and plasma conditions equivalent to breakeven.

What is needed next is a powerful experiment to demonstrate satisfactory resolution of the remaining technical issues to prepare the way for a demonstration power plant. As in so many other areas, for a sceptical public, seeing is believing.

The IAEA is proud to be associated with the ITER EDA. As part of our auspices arrangement, the IAEA has been pleased to act as publisher for the considerable amount of technical information produced by ITER and made available to all Member States, thereby enabling developing countries as well as the ITER Parties to benefit from this work. The Agency also publishes the ITER Newsletter, provides a trust fund mechanism for handling common costs, contributes important technical input from its nuclear, atomic, and molecular data activities and co-ordinates the biennial Fusion Energy Conference, including its special session on ITER.

We congratulate you on the successful engineering design, which achieves the difficult goals that were specified six years ago. We wish you well as you refine the design and approach the beginning of ITER construction. The world will benefit greatly from the successful development of economical fusion power, and a long-pulse burning plasma experiment is the next major step on the path to that goal.

I urge you to continue your extraordinary record of co-operation to turn hopes into reality.

REMARKS BY R. AYMAR



R. Aymar

Mr. Director General, Ambassadors, IC Chair and Members, Representatives of the four Parties, dear colleagues,

I am most honoured to have led the ITER Engineering Design Activities, the achievements of which we celebrate today. When the ITER EDA Agreement was signed in July 1992, many were sceptical about the possibility of fulfilling the objectives - controlled ignition and burning plasma for long periods (>1000 s) - facing the challenges to be overcome.

Mr. Director General, let me use the opportunity of this celebration to tell everyone that the six years of Engineering Design Activities by fully dedicated teams - four Home Teams and the Joint Central Team - have been completely successful:

- a complete, fully integrated design of the ITER machine is available;
- the R&D done to date has resulted in the qualification of the technical solutions adopted, and the ongoing tests of models and prototypes will define the operational margins;
- the safety and environmental analyses of ITER, done with the collaboration of safety experts of the four Parties, have shown how small the hazards from ITER are, as a prefiguration of a future fusion reactor. The impact of ITER on the environment is minimal under normal operation and, even in the worst case, hypothetical accident sequence, no public evacuation is required.

During the past six years, ITER has benefitted from the contributions of laboratories and industries of the four Parties. Conversely, the fusion research activities have benefitted even more from the focus on essential key issues identified for ITER by the collaboration. Results are such that:

- **In physics**, voluntary contributions by all present experimental facilities to build large reliable databases, complemented by theory and modelling, have led to the general recognition that no difficulty of principle should preclude achievement of the physics goals assigned to ITER;
- **in technology**, development at the laboratory level has been followed by manufacturing of models and prototypes of ITER systems by industrial firms in all four Parties, providing confidence in the feasibility and cost of ITER construction;
- **in safety**, taking benefit of the essential characteristics of the fusion process and its low hazard (no power runaway, no melting possible because of low decay heat, low active inventory) and of an applied methodology of defence in depth, ITER has been shown to be suitable for construction and operation in the territory of any of the four Parties with only small adaptations.

All these results make us confident that ITER can be built, operate safely and fulfil its objective to demonstrate the scientific and technical feasibility of fusion energy for peaceful purposes.

The demanding goals set by the ITER EDA Agreement would not have been achieved without the complete dedication of the members of the JCT, the Home Teams and the Parties' experts for which they should be highly commended.

I should add, Mr. Director General, that your institution has also been instrumental in providing effective dissemination of the achieved results, through the IAEA ITER Publication Series and the ITER Newsletter and through your biennial Fusion Energy Conferences. Moreover, the model calculations for ITER have made ample use of the Atomic and Nuclear Databases established through the IAEA expertise. I thank you for the support that the IAEA has provided and that you have just again kindly confirmed for the future.

May I take this opportunity to express my personal thanks to the numerous participants throughout all parts of the ITER Framework who have contributed to our success to date. With the achievements of six years of EDA that we celebrate here today, the four Parties have been provided with all that is needed to decide on the realization of the project which may eventually lead to a new energy source for the benefit of humanity. Thank you.

REMARKS BY J.M. COSTA LAFARGA AND CH. MAISONNIER



Ch. Maisonnier

Speaking for the European Union, Mr. J.M. Costa LaFarga, said that before his current appointment to Vienna he had had a chance to visit the ITER San Diego Joint Work Site. Though having been, at that time, a complete newcomer to the ITER activities, he had been, nevertheless, deeply impressed by the organization of work at the Site and the spirit of international co-operation dealing with difficult scientific and technological issues. Then he passed the floor to Dr. Ch. Maisonnier.

In his remarks, Dr. Maisonnier noted that in ITER, today, the situation is obviously very different from what it was six years ago, when, under the well appreciated auspices of the IAEA, the ITER EDA Agreement was signed. As for any big international project, when the hard time of construction decision is approaching, difficulties associated with the realization appear in their full light. What is the situation in ITER?

After years of excellent technical work performed by the ITER Teams, under the efficient leadership of the Director, and firmly based on the substantial progress made in fusion physics and technology in the laboratories and industries of the four Parties, we have what the Parties wanted: the first complete, fully integrated and technically credible engineering design of an experimental fusion reactor. And the success of the ITER collaboration has been acknowledged recently by the Heads of States at the G-8 Meeting of Birmingham when they stated: "We acknowledge successful co-operation on the pilot project of the International Thermonuclear Experimental Reactor (ITER) and consider it desirable to continue international co-operation for civil nuclear fusion development." But we also know that the construction of this device would cost between 6.000 and 7.000 mio. Ecus.

Under the present circumstances, it was felt that this is indeed a very large amount of money. Therefore, the design of a lower cost, but of course unavoidably reduced scope, option of ITER has been undertaken.

We are, I think, all confident that this new task will be developed at the same level of professionalism as the previous one, providing a sound technical basis for a decision to construct a device of more affordable cost. The European Party fully supports this new approach.

REMARKS BY A. YAKOVENKO



J.M. Costa LaFarga and A.V. Yakovenko

We note with satisfaction the successful realization of the International Thermonuclear Experimental Reactor Agreement.

Undoubtedly, ITER is one of the largest and most important technical projects for humanity. It was acknowledged by the G-8 at the Birmingham Summit. Extensive work had been done by the Parties in accordance with the Agreement.

Russian scientists believe that the fusion project has a great future. The specialists consider that thermonuclear fusion can meet energy demands of the world civilization.

Recently, the Russian side signed the extension amendment to the ITER Agreement. We are prepared to continue the work on the Project and hope for further co-operation with our partners.

REMARKS BY H.E. Y. IKEDA



Y. Ikeda and L. Kennedy

Dr. ElBaradei, distinguished guests, ladies and gentlemen,

On this occasion, and on behalf of the Japanese government, I should like to congratulate the participants of the International Thermonuclear Experimental Reactor Engineering Design Activities (ITER EDA) on their achievements.

Nuclear fusion energy could be a promising option for the future energy of humanity. In this regard, we hold the view that the development of nuclear fusion is of great significance and the ITER EDA is an important step for the development and realization of nuclear fusion energy.

Research and development efforts under the ITER EDA have been conducted successfully during six years of close co-operation between the Joint

Central Team and the individual Home Teams, under the auspices of the IAEA. I would like to thank the staff of the Joint Central Team and its leader, Dr. Aymar, as well as the staff and leaders of each Home Team for their contributions to the ITER EDA Final Design Report.

Japan highly appreciates the results of the research and development carried out under the ITER EDA, expresses its support for the continuation of this project and urges all Parties to extend their support.

REMARKS BY L. KENNEDY

Although I have only recently arrived in Vienna, I have long been acquainted with the efforts to develop an energy supply using nuclear fusion - the energy source that powers "the sun and stars" as Academician Velikhov put it. I was serving at the U.S. Embassy in Moscow in the 1970s when a U.S. Air Force plane delivered a huge magnet component for the Russian MHD project. That early scientific co-operation was emblematic of the international partnership that has been created to pursue an experimental thermonuclear reactor. Today, politics, economics and societies are increasingly global and interdependent. ITER not only reflects a shared human desire for a safe, affordable and unlimited energy supply, but also our recognition of the benefits of international co-operation in meeting humanity's needs.

I would like to join my colleagues in hailing the achievements of the ITER Engineering Design Activities. On behalf of the U.S. Government, I offer our congratulations and appreciation to Director General ElBaradei, ITER Council Chairman Velikhov and the many distinguished scientists and officials who are so effectively co-operating to bring the ITER project to fruition.

Items to be considered for inclusion in the ITER Newsletter should be submitted to B. Kouvochinnikov, ITER Office, IAEA, Wagramer Strasse 5, P.O. Box 100, A-1400 Vienna, Austria, or Facsimile: +43 1 237762, or e-mail: c.basaldella@iaea.org (phone +43 1 206026392).

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