US National Academy of Sciences
Committee on Burning Plasma
Meeting: 29 August 2017

Remarks

Thank you very much for this opportunity to meet with your committee and for your interest in the ITER Project. I am happy to participate to this meeting jointly with Dr. Ned Sauthoff, illustrating perfectly that we now work in the most integrated way between the ITER Organization as Project Leader and the Domestic Agencies which are in charge to procure in-kind 90% of the value of the construction. We are pleased to offer you a few thoughts regarding the value of the ITER Project and—in particular—its relevance to the U.S. objective of achieving a burning plasma and to the U.S. goal of developing innovation in all the critical technologies ITER requires and preparing its industrial champions to successfully compete in the world market. I deeply believe that it is worth it for the science community as well as for the whole of humanity to understand whether magnetically confined fusion plasma works and whether we could rely on it for part of the world sustainable energy supply in the future—I mean for many centuries and millennia.

As you know, world energy supply is already a critical issue for some countries and I do believe it will be for all, not today, but over the medium- and long-term. Regardless of background, every energy expert agrees on one thing—that our current global pattern of energy usage will not be sustainable before the end of this century.

This means we need innovative alternatives. Fusion is one important option we need to assess.

To achieve the practical application of fusion-generated electricity, we know there are several possible approaches. We have chosen magnetic confinement. It is clear for me that this approach offers the most promising possibilities and has—by far presently— the best basis in research.

To achieve a burning plasma with magnetic confinement fusion, there is no alternative to a large facility that integrates multiple advanced technologies. Superconducting electro-magnets. Extensive use of vacuum systems. Complex cryogenics. A broad range of high performance diagnostics. Remote handling and robotics, with massive size and weight capacity, coupled with ultra-precise tolerances.

It is in this context that ITER offers the best added value with its unique international collaboration arrangement. No country has the combination of scientific and engineering expertise, industrial capacity, workforce, financial resources and long-term political will, to undertake such a project alone in a reasonable time.

International cooperation is therefore a pre-requisite for success. ITER offers a unique framework for fair cooperation. Each ITER Member supplies its best expertise; and each ITER Member receives the full know-how.

This large international cooperation is also a challenge to align the diversity of culture, expertise, and ways of working. With this degree of technical complexity, international cooperation demands an exceptional level of management performance. We have learned a lot from our initial errors and

from other complex international science and technology projects: I have two examples in mind where the US is participating as a leader or a key player, CERN in high energy particle physics and the International Space Station in space discovery and earth observation.

We all know that ITER did not start out on the best footing. But we have been reactive, in a positive way, to external scrutiny—including, notably, the appropriate and very helpful influence of a U.S.-led audit in 2013—which led to my appointment 2½ years ago, and to broad organizational reform. We have accepted these external recommendations, and put solutions in place. We are now working in a fully integrated way, with effective decision-making, a reliable schedule after a thorough project review, and sustained success in meeting agreed project milestones.

To put it simply: I consider that the future of fusion—like the future of science—is partnership. The ITER Project is built on this condition: if our partnerships perform well, each partner contributes its expertise they commit themselves, we each learn from each other, the interfaces are well-managed, the project succeeds, and everyone wins.

A critical outcome of this success is for each country to properly articulate the benefits of ITER in the context of its domestic fusion program. I strongly advocate for every ITER Member not to place its domestic program in opposition to international cooperation with ITER. China, for example, has enthusiastically embraced this aspect—incorporating ITER R&D into the Chinese national fusion program, in parallel with their experimental program at the EAST tokamak, and a national R&D roadmap that leads through a

industrial fusion reactor—with strong support at the highest political level and across the domestic fusion science community. I could say the same about Japan, Russia, and the European Union.

In my view, this context highlights the value of your work under the U.S. National Academy of Science. I sincerely thank you for the time and effort you are putting into this study. A clearly articulated U.S. domestic fusion program will—in my view—be of great benefit both to the U.S. and to the global research community.