

## **Technological and Engineering Challenges of Fusion**

David Maisonnier and Jim Hayward  
*EFDA CSU Garching*  
*Boltzmannstr. 2, D-85748 Garching*  
*david.maisonnier@tech.efda.org*

The current fusion development scenario in Europe assumes the sequential achievement of key milestones. Firstly, the qualification of the DEMO/reactor physics basis in ITER, secondly, the qualification of materials for in-vessel components in IFMIF and, thirdly, the qualification of components and processes in DEMO. Although this scenario is constrained by budgetary considerations, it assumes the resolution of many challenges in physics, technology and engineering.

In the first part of the paper, the technological and engineering challenges to be met in order to satisfy the current development scenario will be highlighted. These challenges will be met by an appropriate share of the work between ITER, IFMIF, DEMO and the necessary accompanying programme, which will have to include a number of dedicated facilities (e.g. for the development of H&CD systems).

In the second part of the paper, the consequences of a considerable acceleration of the fusion development programme will be discussed. Although most of the technological and engineering challenges identified above will have to be met within a shorter timescale, it is possible to limit the requirements and expectation for a first fusion power plant with respect to those adopted for the current fusion development scenario. However, it must be recognised that such a strategy will inevitably result in increased risk and a reduction in the economy of the plant.