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An Overview of the EU Breeding Blanket Strategy as Integral Part of the DEMO Design Effort

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As an important part of the Roadmap to Fusion Electricity, Europe is conducting a pre-conceptual design study of a DEMO Plant to come in operation around the middle of this century with the main aims to demonstrate the production of few hundred MWs of net electricity and to demonstrate feasibility of operation with a closed-tritium fuel cycle.

This paper provides an overview of the newly revised design and development strategy of the breeding blanket in Europe that has been defined to take into account the input from the DEMO pre-conceptual design activities, the findings and recommendations of a thorough technical and programmatic assessment of the breeding blanket program and the EU TBM program, for ITER recently conducted by an independent expert panel [1]. This was conducted to identify, among the available options, the most mature and technically sound breeding blanket concepts to be potentially used as “driver” blanket in DEMO [2] and as “advanced” blanket (to be installed and tested in properly designed segments), having the potential to be more attractive for a First-of-a-Kind (FoaK) reactor, the remaining technical gaps and to align and strengthen the supporting R&D Program. To ensure a coherent and efficient Program, a change of the EU TBM options to be tested in ITER is proposed in order to obtain important and useful information from the two considered breeders (solid and liquid) and the two coolants (helium and water).

[1] M. Gasparotto et al., TBM/DEMO BB Programs Review, Final report September 2017.

[2] i.e., the near-full coverage blanket to be installed by day-1 to achieve electricity production and to achieve tritium self-sufficiency

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