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Overview of DEMO Safety R&D and the Potential Future Role of IEA ESEFP IA

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A fusion DEMO reactor, like other advanced nuclear energy systems, must satisfy several goals including a high level of public and worker safety, low environmental impact, high reactor availability, a closed fuel cycle, and the potential to be economically competitive. The experience of the ITER project will facilitate DEMO programs in developing a safety approach and a safety design, performing safety analyses under the scrutiny of a nuclear regulator, ensuring device availability, managing the radioactive waste, and conducting economic assessments. However, there are still large scientific and technological gaps between the current ITER and DEMO reactors. In this paper international fusion safety research relevant to DEMO will be summarized following the lessons learned from ITER. The main scientific and technological challenges will be presented by considering the differences between fission and fusion reactors as well as the corresponding implications on DEMO design and operation, with perspectives not only from fusion energy development but also from the development of Generation-IV fission reactors. Potential research topics for international collaboration will also be addressed with emphasis on the International Energy Agency (IEA) implementing agreement (IA) on a cooperative program on Environmental, Safety and Economic aspects of Fusion Power (ESEFP).

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