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## The Role of Different Facilities for the Nuclear Qualification of the BB

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This work evaluates the roles of ITER, DONES, and the recently proposed European Volumetric Neutron Source (VNS) in achieving the nuclear qualification of the Breeding Blanket (BB) within the European fusion roadmap. Using a Technology Readiness Level (TRL) framework, it identifies how experimental testing progresses from basic material validation (TRL 4) to full system demonstration (TRL 8). The study shows that while DONES provides valuable early-stage data and ITER supports mid-level integration tests, only a VNS enables complete qualification at TRL 8, involving full-scale segments under realistic fusion conditions. The analysis maps BB qualification needs to facility capabilities, identifies critical gaps, and proposes strategic use of each facility. It concludes that VNS is essential to reduce risks, delays, and uncertainties in DEMO deployment, supporting a reliable path to commercial fusion energy. This conclusion aligns with similar strategies proposed by international actors such as the U.S. FNSF and China's CFETR.

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