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# P4.235 EU DEMO safety and balance of plant requirements. Issues and possible solutions

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The DEMO preliminary safety and operating design requirements are being defined aiming at obtaining the license with a relatively large operational domain.
The DEMO design approach is being organized, by taking into account the Nuclear Power Plant ITER and Generation IV lesson learnt. Outstanding challenges remain in areas exhibiting large gaps beyond ITER. Those require a pragmatic approach, especially to evaluate and improve the readiness of technical solutions through dedicated physics and technology R&D.
Therefore, a system engineering approach is adopted based on an integral plant design analysis which follows immutable goals as safety, availability and power provision to the grid. The immutability of the latter ensures not only the identification of critical interfaces but also the margin of possible solutions and, moreover, the definition of target parameters for technical systems to be met in order to arrive at a feasible DEMO.
The overall DEMO plant design has to be strongly safety and operation-balance of plant oriented; which represents a significant change of the culture in the fusion community.
The paper describes a few important aspects of safety and balance of plant that require early attention and a continuous reanalysis at any significant design change. This includes: (i) safety provisions required by the coolant options following some reference accidents; (ii) tritium inventory limit control considering the substantial throughput; (iii) permeation of tritium through the Primary Heat Transfer System; (iv) conditions for a plasma shutdown, (v) pulsed operation and relevant interfaces with the grid and BoP systems; (vi) layout of the tokamak building to accommodate Remote Maintenance meeting layout and safety criteria.
Any effort to reduce the complexity of a Fusion Power Reactor design through simplification and rationalization of the design and operation of the main systems translates into a more robust plant configuration enlarging safety margins and operational thresholds.

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