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Overview of the JET Results

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The European fusion programme is moving into the phase of implementation of its Roadmap. In this context, the JET programme has focused on consolidation of ITER design choices and preparation for ITER operation, with a specific emphasis given to the Bulk Tungsten Melt Experiment that has been crucial for the final decision on the material choice for the day-one tungsten divertor in ITER. In the first JET campaigns with the ITER-like Wall (ILW) fuel retention and material migration studies were a high priority. Now the focus of JET experiments has shifted towards integrated scenario development with the goal of addressing issues such as plasma-facing component (PFC) heat loads and W impurity accumulation in conjunction with high performance. In particular, during the last year, the importance of the magnetic geometry in the divertor area, strike point location and divertor pumping were established as key aspects for achieving good H-mode confinement, in combination with avoiding tungsten accumulation using ICRH. Moreover, significant effort was devoted to the use of impurity seeding to produce core-divertor compatible reference scenarios at good confinement which are essential for ITER, as well as high radiative scenarios which are required for DEMO. ITER-relevant conditions for steady-state operation have been achieved for over 7s at 2.5MA/2.7T and 21MW input power with H98(y,2)=0.85 and low divertor target power loads and partial detachment between ELMs. In parallel, post-mortem analyses of the PFCs retrieved from the first ILW campaigns have confirmed the previously reported low fuel retention obtained by gas balance. These studies show that the reduced material erosion and migration leads to reduced trapping of fuel in deposited Be layers which have less incorporated fuel in comparison with Carbon layers. In addition, the pattern of deposition within the divertor has changed significantly with the ILW in comparison with JET carbon wall campaigns due to the much-reduced level of chemical erosion. Transport to remote areas is almost absent, with the only significant Be deposits (15µm) found on the apron of the inner divertor.

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Presenter: Mr ROMANELLI, Francesco (European Commission)

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