
Contribution ID: **521** Type: **Invited Oral**

# WCLL breeding blanket design and integration: lessons learned in 2016 and follow-up

*Tuesday 6 June 2017 11:00 (20 minutes)*

The Water-cooled lithium-lead breeding blanket (WCLL) is a promising viable option for European DEMO nuclear fusion reactor. The liquid lithium-lead is the breeder-multiplier flowing at low velocity and low temperature (i.e. about 330℃). Pressurized water is in charge to cool the structure and to transport the heat towards the power conversion system (PCS) and the energy storage system (ESS). The structural material is the EUROFER. The WCLL breeding blanket studied during 2016, in the framework of EUROfusion Project, is based on the single module segment approach. Basically, it is a breeder unit, which is repeated along the poloidal direction. The power is removed by means of radial-toroidal (i.e. horizontal) water cooling tubes in the breeding zone. The lithium-lead flows in radial-poloidal direction. A 100 mm thick plate will connect the breeding blanket segment with the vacuum vessel (VV), through an attachment system. All these components shall be designed to withstand the loads during normal operation and accidental conditions. Water and lithium lead manifolds are designed and integrated with a consistent primary heat transport system and the lithium lead system.
The paper discusses the WCLL breeding blanket design features through selected relevant thermo-mechanic, thermo-hydraulic and neutronic analyses. The lessons learned from the design review will be pointed out in order to present the reasons for the improvements and the needed analyses.

## Eligible for student paper award?

No

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**Session Classification:** T.OA3: Blankets and Tritium Breeding: Liquid Breeders

**Track Classification:** Blankets and tritium breeding