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| **WPPWIE Deliverables Status Report** | | | | | **Date:** | | | 01-Sep-2022 | | |
| **Subproject:** | SP-ADC /  *Advanced Divertor Solutions for Power Exhaust in DEMO* | | | | **Deliverable ID** | | | PWIE-SP ADC.F.T-T002-D005/D008 | | |
| **Deliverable owner:** | A. Järvinen (VTT)  L. Aho-Mantila (VTT) | | | | **Deliverable due date** | | | 31-12-2022 | | |
| **WP Leader:**  **SP Coordinator:** | S. Brezinsek (FZJ)  G. Calabrò (ENEA) | | | |  | | |  | | |
| **Task title:** | SP-ADC.F / *Modelling of advanced divertor configurations for DEMO and PEX solutions* | | | | | | | | | |
| **Deliverable title:** | Development of simplified models based on simulation results for XD and SX to suggest validation methods for the PEX experiments (VTT)  DEMO CDN modelling including drifts/core radiators with SOLPS-ITER (VTT) | | | | | | | | | |
| **Status:** |  | **Completed** |  | **Partially completed** | |  | **Delayed** | |  | **Cancelled** |
| Please write a short status report (max. ½ pages) here.  Please check the status of the deliverable(s) with a “x” in the row above.  If the deliverable(s) are delayed, please also indicate an estimated completion date in the report text.  If the deliverable(s) include machine time, please indicate the number of days that have been used for the deliverable(s) in the report text.  For reference, the specification of this task from the PMP is given below. | | | | | | | | | | |
| **Reference from PMP:** | | | | | | | | | | |
| The SP-ADC are addressing the physics work regarding the advanced divertor solutions for DEMO and the compatibility with engineering constraints. The physics part is covering predictive modelling of the most favorable solutions post an assessment end of 2020 by WPADC-DTT. Subproject SP-ADC.G will be devoted, to improve the 2020 predictions of detached regimes in ADCs including:   * (i) the effects of kinetic neutrals and * (ii) sensitivity studies for the most uncertain input parameters regarding e.g. plasma transport.   Plasma conditions and physical mechanisms determining the onset of detachment and operational window will be analyzed for each configuration by SOLPS-ITER code and EMC3-EIRENE The observed dependencies will be used as a basis for building simplified models and to suggest validation methods for the PEX experiment. Plasma conditions and physical mechanisms determining the onset of detachment and operational window will be analyzed for each configuration. The observed dependencies will be used as a basis for building simplified models and to suggest validation methods for the PEX experiments. Strong link with WPDES, WPTE and TSVVs is foreseen, PWIE – SP D (neutral modelling activities for pumping design). | | | | | | | | | | |
| **Inputs required:**   * ADC Equilibria for SOLPS-ITER mesh generation (delivered by WPADC-DTT’s final report)   Engineering constraints to be considered on SOLPS-ITER mesh generation (delivered by WPADC-DTT’s final report and reviewed by SP-ADC.I) | | | | | | | | | | |
| **Tasks to be performed:**   * Understanding the effects of connection length and flux flaring on power exhaust in the XD and SX configurations, identification of most potential solution, without kinetic neutral simulations * Consideration of potential effects of kinetic neutrals in ADCs based on the relevant SN solutions * Physical understanding of potential benefits of SF- and the sensitivity of this configuration to the level of separatrix separation * Investigating the effects of drifts and core radiators in the CDN configuration, without kinetic neutral simulations   Initial set-up of DDN simulations (provisional, depending on the outcome of the CDN simulations) | | | | | | | | | | |
| **Deliverables:**   |  |  | | --- | --- | | **Deliverable ID:** | **Deliverable Title:** | | D001 | Analysis and SOLPS-ITER modelling of DEMO XD considering the roles of connection length, flux flaring and neutral model (ENEA) | | D002 | Analysis and SOLPS-ITER modelling of DEMO SX considering the role of the neutral model and the dimensions of the outer divertor leg (ENEA) | | D003 | Analysis and SOLPS-ITER modelling of DEMO SF- including several configurations to understand the sensitivity of the solutions to the levels of separatrix and X-point separation (MPG) | | D004 | Analysis and SOLPS-ITER modelling of DEMO SF- including several configurations to understand the sensitivity of the solutions to the levels of separatrix and X-point separation (EFPL) | | D005 | Development of simplified models based on simulation results for XD and SX to suggest validation methods for the PEX experiments (VTT) | | D006 | Sensitivity studies (transport coefficients, input power) for XD and SX configurations using SOLPS-ITER (IPPLM) | | D007 | Support on mesh creation and enhancing credibility of fluid neutrals results for all configurations applying hybrid numerical models (LPP-ERM/KMS) | | D008 | DEMO CDN modelling including drifts/core radiators with SOLPS-ITER (VTT) | | | | | | | | | | | |
| **Management Information**  **Human Resources (2022)**:   |  |  |  |  | | --- | --- | --- | --- | | **Deliverable Owner** | **Beneficiary** | **PM** | **Deliverable (Team)** | | F. Subba | ENEA | 2.5 | D001 (F. Subba, L. Aho-Mantila and SP F team) | | G. Rubino | ENEA | 2.5 | D002 (G. Rubino, L. Aho-Mantila and SP F team) | | T. Lunt | MPG | 4 | D003 (O. Pan, L. Aho-Mantila and SP F team) | | C. Colandrea | EPFL\* | 3 | D004 (C. Coandrea, L. Aho-Mantila and SP F team) | | A. Järvinen | VTT | 3 | D005 (A. Järvinen, L. Aho-Mantila and SP F team) | | P. Chmielewski | IPPLM | 3 | D006 (P. Chimielewski, L. Aho-Mantila and SP F team) | | M. Blommaert | LPP-ERM/KMS | 5 | D007 (M. Blommaert, S. Van den Kerkhof, M. Baelmans, ...) | | L. Aho-Mantila | VTT | 2 | D008 | | **Total** |  | 25 |  |   \* only when EPFL participates in EUROfusion  **Machine Resources (2022):**   |  |  |  |  | | --- | --- | --- | --- | | **Device** | **Beneficiary** | **Days** | **Related Deliverable** | | n.a. |  |  |  | |  |  |  |  |   **Other resources:**   * HPC request   **Collaborations:**   * WPTE, WPDES * EU-CHINA   **Other information:**  Connected to TSVVs associated with WPPWIE | | | | | | | | | | |