Review of the Project Group:

Group Code:
ESBWR 33

Full title:
General features, principles, and basic design parameters of the Economic Simplified Boiling Water Reactor (ESBWR)

Intended learning outcome (ILO)	**Grade (0-3)**	**Explanation for the grading of the evidences of achieving respective ILO. Suggestions for improvements and other comments**
1. *Collect information on* General design specification of the nuclear power plant with selected reactor type (Task 1, ILO1, ILO2)	2	• Terms like RPV and SLCS are not listed in their full form, only their abbreviations. • Since this section is about the general design of the reactor, I would like to see a table for a clear understanding to list the various design parameters of the reactor in the report next time. • The description of fuel and cladding is missing. • The concepts of reactor core, BoP, etc. are well presented in detail.
2. *Describe* Operational principles of the power plant. (Task 2, ILO1, ILO2)	2	• The overall operational principles of the power plant are well explained. However, the description of base load and load-following scenarios, as described in the "Project Work Description," is missing. This should be added in the future.
3. *Explain* Safety features of the power plant. (Task 3, ILO1, ILO2)	3	• I liked the breakdown of the various safety features, including ICS, ECCS, and PCCS, and the detailed explanations.

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4. *Calculate* Selected core parameters (Task 4, ILO3)	1	• No reference on Table (4.1). • Missing expression for the Haaland formula. • The density was expressed as a function of the core height, z, in the report. I would like to see an expression that explains why the density varies with height. • Gravity acceleration, g, was used for gravity acceleration in the report, but there is no explanation what value is used. Did you use $9.8 m/s^2$? • There needs to be an explanation of the symbols used to replace concepts such as exit quality and viscosity, etc. (Example: x_e is the exit quality) • Equation (4.12) seems to use Z_{Sub} instead of Z_{Sat}. See page 31 of Thermal-Hydraulics Lecture 7. or page 250 of "The Collection of Models and Equation." • For Equation (4.13), the corresponding r_3 multiplier formula can be used under the assumption that the power of the core is uniformly distributed. However, as I have seen in Equation (4.1). It seems like this report considered the power as non-uniform distribution. Therefore, I need further explanation of what assumptions allow us to use Equation (4.13) when the power distribution is non-uniform. • The explanation of the void fraction using HEM in (4.15) is missing. Although an expression for the void fraction is expressed in Equation (4.31), it may be necessary to move the order of Equation (4.31) forward in order to express Equation (4.15). • For expression (4.16), it is missing an explanation of how the HEM local two-phase multiplier can be calculated. • The graph in Figure (2.2) considers the orifice pressure drop, but there is no explanation of the orifice pressure drop and no result for the orifice coefficient. • I need help understanding what z_{l-1} in Equation (4.19) means. • The report states that DFM was used to express Equation (4.27). However, in the DFM expression in "The Collection of Models and Equation.", the coefficient of drift velocity is expressed as 1.41 for the bubbly flow pattern. I would like an explanation if there is a special reason for using 2.9.

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5. *Calculate* CHF margins in a hot channel (Task 5, ILO4a)	2	• It would be better to have an explanation of what MCRP means and why it is an important parameter. • The explanation of the peaking factor in Equation (5.2) is missing. The axial peaking factor is explained through Equation (4.4), but the radial peaking factor is not explained, so it is necessary to explain the radial peaking factor in Equation (5.2). • The reference to the Levitan-Lantsman correlation in Equation (5.5) is missing.
6. *Calcaulte* Maximum cladding and fuel pellet temperature (Task 6, ILO4b)	1	• The description of T_∞ in Equation (6.1) is missing. • Results for axial temperature drops are missing. Based on prior knowledge, we can guess the centre of the fuel pellet has the highest temperature. However, the axial temperature drops may be slightly off from our expectations. As the "Project work description" required the highest temperature at cladding and fuel and the whole project wants us to discuss based on different results which we calculated, it will be better if there are axial temperature drops figures and calculation with an analysis and discussion. • I hope you change the x-label in Figure (6.3), specify exactly what 'r' is, and clarify what equations the 'r' is