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Electro-thermal Modelling of three technologies including SC, SSB, and semi SSB

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Public Summary

The deliverable of the AENEAS project “Electro-thermal Modelling of SC, SSB, and SSSB” includes a comprehensive description and creation of new enhanced models of Supercapacitors (SC), Solid-State Batteries (SSB), and Semi-Solid-State Batteries (SSSB). The electrical and thermal behaviors of these ESS are essential to be modeled in a way for easy integration in maritime power systems, and this is why the report calls for the development of electro-thermal models. It considers and calculates the extraction of parameters like internal resistance, thermal conductivity, specific heat capacity, and SoC evolution during the process. These parameters are crucial for the analysis, assessment, and prognosis of behavior and reliability of ESS under various operating modes. The models introduced are derived from the Equivalent Circuit Models (ECMs) extended by thermal components which contribute to the precise reproduction of practical scenarios. In addition, the deliverable provides information about the verification of these models with the help of the experimental data, it aims to prove that these models are accurate and have a high degree of measurement. Apart from that, the Balance of Power (BoP) is seen from the cell-level integration. Cell safety in such circumstances is also taken into account since marine application stipulates crucial effects from environments that also constrain ESS performances. The findings developed are meant to be applied towards enhancing thermal control of ESS in marine conditions, to improve safety, efficiency, and sustainability of energy applicative within shipborne transport.