

Suitability Assessment and Potential Use Case Definition for the Application of Electric Energy Carriers in Electrified Aircraft

Abstract The emerging electrification of aircraft aims to extensively reduce emissions. One near term mitigation strategy can be the implementation of electrical energy storage systems (EESSs) such as batteries, flywheels, and supercapacitors to power subsystems of more electric aircraft. However, these EESSs are subjected to various advantages and drawbacks. Therefore, this study provides a detailed assessment of the suitability of integrating these systems for aircraft applications. For this purpose, aircraft design criteria relevant for the analysis are derived and their relative importance is determined through pairwise comparison. To ensure comparability among the subsystems, they are categorized based on their operating time. The subsequent rating of the EESSs suggests, that supercapacitors may be best suited to short- and medium-duration operations, while batteries seem to be more beneficial for long-duration applications. However, flywheels appear to be unsuitable for either. For further assessing the feasibility of integrating EESSs in aircraft, the weight penalty associated to each system can be investigated.