

INTISARI

KAJIAN LITERATUR REDOX-FLOW BATTERY (RFB) BERBASIS POLIMER DENGAN RADIKAL 2,2,6,6-TETRAMETHYLPIPERIDINYL- N-OXYL (TEMPO) UNTUK APLIKASI PENYIMPANAN ENERGI LISTRIK MASSAL

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Penggunaan bahan bakar fosil untuk produksi listrik memengaruhi perubahan iklim global. Untuk mengatasi masalah tersebut, penggunaan bahan bakar fosil dikurangi dan penggunaan sumber energi terbarukan ditingkatkan. Namun dikarenakan sifat energi terbarukan yang intermiten, integrasi pembangkit listrik energi terbarukan menjadi sumber risiko ketidakstabilan dalam sistem transmisi energi listrik. Dengan demikian, dibutuhkan sarana yang dapat menyimpan energi listrik secara massal untuk menjaga kestabilan sistem transmisi energi listrik.

Baterai litium-ion dan *redox-flow battery* (RFB) berbasis vanadium telah diterapkan secara komersial untuk aplikasi penyimpanan energi listrik massal. Namun, baterai litium-ion dan VRFB memiliki karakteristik yang kurang sesuai dengan kebutuhan aplikasi penyimpanan energi listrik massal (dikarenakan potensi risiko dan biaya). Kajian yang telah dilaksanakan merupakan studi literatur terhadap kesesuaian aplikasi RFB polimer organik untuk penyimpanan energi listrik massal. Kajian bertujuan untuk mengetahui efisiensi biaya, tingkat risiko, kemampuan peningkatan kapasitas, serta perbandingan RFB polimer organik terhadap baterai jenis lain. Ditemukan bahwa baterai RFB polimer organik berpotensi untuk lebih murah dibanding VRFB dan baterai litium-ion, memiliki tingkat risiko yang rendah, dapat ditingkatkan kapasitas selama tempat tersedia, dan memiliki beberapa kelebihan dibandingkan dengan VRFB dan baterai litium-ion dalam sifat dan aplikasi.

Kata kunci: energi terbarukan, penyimpanan massal, baterai polimer, RFB

ABSTRACT

LITERATURE STUDY OF POLYMER-BASED REDOX-FLOW BATTERY (RFB) WITH 2,2,6,6-TETRAMETHYLPYPERIDINYL-N-OXYL (TEMPO) RADICAL FOR MASS ELECTRICITY STORAGE APPLICATIONS

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The use of fossil fuel to generate electricity has had an impact on global climate change. To mitigate such a problem, the use of fossil fuel was reduced and renewable energy use was raised in conjunction. However due to intermittency, the integration of renewable energy introduced risk of instability to the electricity transmission system. As such, facilities to store electricity on a massive scale are needed to maintain stability in the electricity transmission system.

Lithium-ion batteries and vanadium-based redox flow batteries (VRFB) has been commercially adopted for mass electricity storage. However, lithium-ion batteries and VRFB have certain characteristics which made them unsuitable for mass electricity storage (in relation to potential risk and costs). The research that has been done is a literature study about the suitability of organic polymer RFB for mass electricity storage. The research aims to determine cost efficiency, level of risk, capacity increase capabilities, and comparison of organic polymer RFB to other types of batteries. It is found that organic polymer RFB has potential to be cheaper than VRFB and lithium-ion batteries, has low level of risk, can be indefinitely increased in capacity where space is available, and have advantages compared to VRFB and lithium-ion batteries in relation to battery characteristics and application.

Keywords: renewable energy, grid storage, organic polymer, RFB