

Analisis Tekno-Ekonomi Pengembangan Sistem Isolated terhadap Sistem Interkoneksi 150 Kv di Wilayah Terpencil = Techno-Economic Analysis of Isolated System and High Voltage Interconnected Grid Development in Remote Area

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Abstrak

Pulau Seram merupakan salah satu dari ribuan pulau yang ada di Indonesia. Karena kondisi geografis, sistem kelistrikan di Pulau Seram masih isolated hingga saat ini. Berdasarkan Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) 2019-2028, terdapat rencana pengembangan sistem interkoneksi 150 kV di Pulau Seram dan beberapa pembangkit skala menengah. Namun demikian, pertumbuhan beban yang rendah menyebabkan reserve margin di Pulau Seram akan menjadi sangat tinggi hingga melebihi 100%. Dengan kondisi ini, rencana pengembangan sistem ketenagalistrikan di Pulau Seram berpotensi tidak optimal secara tekno-ekonomi. Penelitian ini akan menganalisis pengembangan sistem isolated sebagai alternatif terhadap rencana pengembangan sistem interkoneksi 150 kV untuk mendapatkan alternatif terbaik yang dapat diterapkan di Pulau Seram. Kedua alternatif ini akan dibandingkan secara tekno-ekonomi. Analisis teknis dilakukan dengan menggunakan software ETAP untuk mengevaluasi kualitas sistem, sedangkan analisis ekonomi dilakukan dengan menghitung beberapa parameter finansial serta faktor penentu yaitu nilai Levelized Cost of Electricity (LCOE). Hasil analisis menunjukkan bahwa nilai LCOE sistem isolated berada di bawah BPP Pembangkitan Pulau Seram saat ini yaitu 20,85 cents USD/kWh, serta dapat menghasilkan kualitas sistem yang baik sesuai ketentuan grid code.

.....Seram Island is one of the thousand islands in Indonesia. Due to geographical condition, the power system in Seram Island is currently remain isolated. However, based on Electricity Power Supply Business Plan (RUPTL) 2019-2028, there are power system development plan including 150 kV interconnected grid and several medium-sized power plant in this island. Unfortunately, as demand growth is low, reserve margin in related system tend to be very high, which will be exceeding 100%. With this circumstance, the development plan based on RUPTL 2019-2028 will not be viable both technically and economically. This study will analyze isolated system development as an alternative to high voltage interconnected grid in order to perceive optimum configuration for Seram Island. These two alternatives will be compared both technically and economically. Technical analysis will be conducted using software ETAP to investigate power quality. For economical analysis, several economics parameter will be evaluated as well as Levelized Cost of Electricity (LCOE) to perceive the most economically viable alternative. The result shows that isolated system yield lower LCOE than existing generation cost in Seram Island that is 20,85 cents USD/kWh, as well as complying the grid code requirement.