

Techno Economy Comparison of Conventional Generating Unit and Lithium Battery Energy Storage as a Primary Frequency Regulation of Variable Renewable Energy Penetrated Grid System, Case Study: Southern Sulawesi of Indonesia

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Abstract.

Integrating higher shares energy mix of variable renewable energy (VRE) technologies, such as wind and solar PV, in the energy transition process presents many challenges in its operation. One of the required services needed in this activity is the Primary Frequency Regulation (PFR). Many studies have studied various ways to provide PFR services, such as using the Conventional Generating Unit (CGU) and Lithium Battery Energy Storage (LiBESS). This paper presents several battery sizing methods used for comparison between the Levelized Cost of Electricity (LCOE) of a CGU and the Levelized Cost of Storage (LCOS) of a LiBESS, which used as PFR of a VRE penetrated grid system in a case study: the grid of southern Sulawesi, Indonesia. The results show that the LCOE of LiBESS is still below the LCOE of the CGU, but for projections in 2030, the LCOS LiBESS shows a competitive number compared to the LCOE of CGU.

Keywords: PFR services, CGU, LiBESS, LCOS, LCOE