Batteries for Grid Energy Storage

Uğur Kazancıoğlu[1], Osman Zenginal[2]
Pomega Enerji Depolama Teknolojileri A.Ş., Polatlı, Ankara
Kontolmatik Teknoloji Enerji ve Mühendislik A.Ş., Sarıyer, İstanbul

The future of renewable energy, primarily solar and wind, depends on the development of energy storage technologies and their safe, longer lasting and cheaper applications. Since the power produced from solar and wind has grown quickly over the past decade, further integration of those in the grid is becoming increasingly difficult based on their unpredictable and intermittent nature. This challenge for the grid brings the popularity of energy storage systems, offering absorbing electricity from the grid when it is plentiful and release when needed.

Energy storage systems (ESS) increase the renewable portion of electricity delivered to the customers and thus significantly reduce emissions associated with fossil fuels. Those systems also help overall grid performance by making grid's conventional power plant management easier and providing more options in case of emergency. Other than renewable energy integration, grid services including energy arbitrage, peak shaving, spinning reserves and frequency regulation are mostly used and dominant services that ESS easily handle. In spite of the fact that the certain types of ESS such as redox flow, electrochemical batteries and compressed air provide those services, lithium-ion batteries appears to be the most suitable technology with its cumulative advantages.

ESS installation is projected to grow 15x installed capacity in 2021 to reach 1194 GWh by 2031 [1]. Li-ion-based especially Lithiumiron phosphote based ESS is likely to dominate for the next decade due to price competitiveness, while emerging non-Li-ion technologies progress towards demonstrations/commercialization for utility markets.

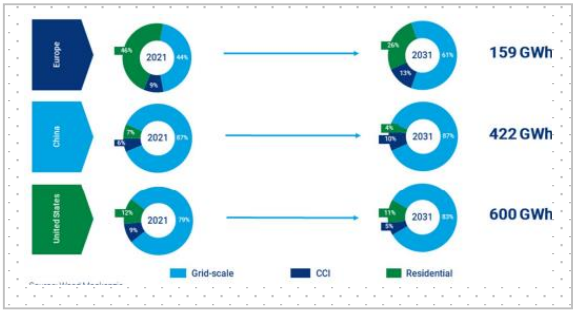

Figure 1. The cumulative energy storagemarket by segments (Gwh **)**

ESS system grid services' cumulative effectiveness with its safety, quality and reliability from single Lithiumiron phosphote cell to huge high voltage battery clusters is the main topic for R&D activities in Pomega Energy Storage Technologies Inc.

Pomega Energy Storage Technologies Inc., one of the subsidiaries of Kontrolmatik Technologies, is the first and only private company for the Lithium Iron Phosphate Battery Cell Giga factory in Türkiye and Europe. The plant, which will be commissioned in the third quarter of 2023, will reach a total annual production capacity of 2.25 GWh when all phases are completed by 2024.

Pomega Energy Storage Technologies Inc. responds to the increasing demand of the industry by producing Lithium Iron Phosphate battery cells, battery packs and energy storage systems. These products are the best solutions for power plants, national grids, factories, household applications, and areas requiring high power.

The applications for Pomega Batteries are cabin type, container type, and household energy storage systems, electric car charger mobile support systems, hybrid renewable storage containers, and stationary energy storage products that provide energy storage solutions to network operators, electricity market components, industrial customers, and operators of electric charging stations.

Battery packs including BMS are offered for heavy electric vehicles such as construction machinery, trucks, and buses and light commercial vehicles such as forklifts, golf carts, and man lift.

References

[1] The Battery Report 2022.

[2] Michael Berger, Sustainable batteries roadmap to 2030 and beyond, 2022.

Uğur Kazancıoğlu completed his undergraduate and graduate education at METU Electrical and Electronics Engineering Department. By starting his career in Aselsan Inc. in 2004, he continued R&D activities on control and power electronics as a design engineer, a team leader and a power&control systems department manager up to 2018. He worked as R&D Manager for Basari Energy Inc. and Megart Technology Inc. which are developing technologies for renewable energy and defense sector between 2018 and 2022. He contributes to R&D activities on lithium-ion battery systems from single cell to complete ESS and storage power converter systems as R&D Manager in Pomega Energy Storage Technologies Inc. since 2022.
Presentating author: Uğur Kazancıoğlu (M.Sc.), e-mail: ugur.kazancioglu@pomega.com tel: +90 312 4443001