can be utilized in any real scenario. The benefit of the deload method realized for PV and wind power is that it reduces the use of expensive ESSs. The optimization involving the use of both renewable deloading and ESS should be further studied.

References

[1] International Energy Agency, “Electricity market report 2023,” February 2023

[2] K N. Akpinar, B. Gundogdu, O. Ozgonenel and C. Gezegin, An Intelligent Power Management Controller for Grid-connected Battery Energy Storage Systems for Frequency Response Service: A Battery Cycle Life Approach, *Electric Power Systems Research*, Vol. 216, 2023.

[3] U. Datta, A. Kalam and J. Shi, Battery Energy Storage System Control for Mitigating PV Penetration Impact on Primary Frequency Control and State-of-Charge Recovery, *IEEE Transactions on Sustainable Energy*, Vol.11, No.2, 2020, pp. 746-757.

[4] R. Aljarrah, B. B. Fawaz, Q. Salem, M. Karimi, H. Marzooghi and R. Azizipanah-Abarghooee, Issues and Challenges of Grid-Following Converters Interfacing Renewable Energy Sources in Low Inertia Systems: A Review," *IEEE Access*, Vol.12, 2024, pp. 5534-5561.

[5] A. F. Hoke, M. Shirazi, S. Chakraborty, E. Muljadi and D. Maksimovic, Rapid Active Power Control of Photovoltaic Systems for Grid Frequency Support, *IEEE Journal of Emerging and Selected Topics in Power Electronics*, Vol.5, No.3, 2017, pp. 1154-1163.

[6] C. Zhong, Y. Zhou and G. Yan, A Novel Frequency Regulation Strategy for a PV System Based on the Curtailment Power-Current Curve Tracking Algorithm, *IEEE Access*, Vol.8, 2020, pp. 77701-77715.

[7] J. Chang, Y. Du, E. G. Lim, H. Wen, X. Li and L. Jiang, Coordinated Frequency Regulation Using Solar Forecasting Based Virtual Inertia Control for Islanded Microgrids, *IEEE Transactions on Sustainable Energy*, Vol.12, No.4, 2021, pp. 2393-2403.

[8] M. T. Hagh and T. Khalili, A Review of Fault Ride through PV and Wind Renewable Energies in Grid Codes, *International Journal of Energy Research*, Vol.43, 2019, pp. 1342-1356.

[9] E. Serban, M. Ordonez and C. Pondiche, Voltage and Frequency Grid Support Strategies beyond Standards, *IEEE Transactions on Power Electronics*, Vol.32, No.1, 2017, pp. 298-309.

[10] T. D. Reddy, J. R. Dash and P. Agarwal, A New Control Strategy of a Single Stage PV System for Providing Frequency Support to the Power Grid," *2023 IEEE IAS Global Conference on Emerging Technologies (GlobConET)*, London, United Kingdom, pp. 1-5, 2023.

[11] C. Rahmann and A. Castillo, “Fast Frequency Response Capability of Photovoltaic Power Plants: The Necessity of New Grid Requirements and Definitions, *Energies* 2014, Vol.7, pp. 6306-6322.

[12] A. Narang, H. D. Tafti, J. Pou and G. Konstantinou, Dynamic Reserve Power Point Tracking in Grid-Connected Photovoltaic Power Plants, *IEEE Transactions on Power Electronics*, Vol.38, 2023, pp. 5939-5951.

[13] E. I. Batzelis, G. E. Kampitsis and S. A. Papathanassiou, Power Reserves Control for PV Systems With Real-Time MPP Estimation via Curve Fitting, *IEEE Transactions on Sustainable Energy*, Vol.8, No.3, 2017, pp. 1269-1280.

[14] I. Mahmud, N.-A. Masood and Atik Jawad, Optimal Deloading of PV Power Plants for Frequency Control: A Techno-Economic Assessment, *Electric Power Systems Research*, Vol.221, 2023.

[15] K. V. Vidyanandan and N. Senroy, Primary Frequency Regulation by Deloaded Wind Turbines using Variable Droop, *IEEE Transactions on Power Systems*, Vol.28, 2013, pp. 837-846.

[16] L. M. Castro, C. R. Fuerte-Esquivel and J. H. Tovar-Hernández, Solution of Power Flow with Automatic Load-Frequency Control Devices including Wind Farms, *IEEE Transactions on Power Systems*, Vol.27, 2012, pp. 2186-2195.

[17] M. Dreidy, H. Mokhlis and S. Mekhilef, Inertia Response and Frequency Control Techniques for Renewable Energy Sources: A Review, *Renewable Sustainable Energy Reviews*, Vol.69, 2017, pp. 144-155.