AIMS Energy, 10(3): 533–534.
DOI: 10.3934/energy.2022026
Received: 22 June 2022
Revised: 22 June 2022
Accepted: 22 June 2022
Published: 23 June 2022

http://www.aimspress.com/journal/energy

Editorial

Editorial to the 'Special Issue—Distribution network reliability in Smart Grids and Microgrids' of AIMS Energy

Santi Agatino Rizzo*

Department of Electrical, Electronics and Computer Engineering, University of Catania, Viale Andrea Doria 6, Catania, 95125, Italy

* **Correspondence:** Email: santi.rizzo@dieei.unict.it.

The increasing diffusion of renewable dispersed generators, electric vehicles and actively-involved customers combined with the more and more wide application of ICT systems involves the planning and management of the distribution network are challenging. Remote control and automation systems are key factors for improving reliability but the transformation of the distribution network into a cyber-physical system may involve cyber-attacks that worsen the reliability.

The Smart Grids orchestrate the actors of the distribution systems to ensure a reliable and resilient distribution network able at satisfying load demand and environmental needs. Distribution network reliability improvement in the Smart Grid can be improved thanks to the autonomous Microgrids. When a fault occurs, the distribution network operator could operate in autonomous mode on the healthy portions of the network that can not be temporarily supplied by the main grid.

In this challenging scenario, the works published in this special issue have analysed different important aspects.

A review of the challenges in the design of microgrids has been reported in [1]. It has critically categorized the multi-microgrids into different architectures according to their interconnections, analysing also different control techniques and protection aspects. Potential areas of future research that would improve the operational aspects of microgrid clusters have been discussed.

A study and optimal design of a hybrid hydro-kinetic/Photovoltaic/Biomass system integrated with the grid to serve electricity in a residential area has been presented in [2]. Similarly, multi-objective optimization to minimize load-generation mismatch and costs is utilized in [3] for designing a hybrid system considering PV/WG/BESS/Biomass.

A load frequency control scheme in renewable energy sources power system by applying model predictive control has been proposed in [4]. Storage devices, demand-response techniques and renewable energy sources output control to compensate for the system frequency balance have been also considered.

For prevention of system destruction during a fault, the protection of DC microgrid has been considered in [5]. In particular, a combination of two-way Hybrid Solid-State Circuit Breakers with a self-adapt DC short current limiter, ultra-fast switch, and power electronic switch has been proposed for efficiently and fast fault current limiting response with low conducting loss and appropriate cooperation among protective components.

The work presented in [6] focuses on determining the transmission reliability margin for brownout using Gamma distribution incorporated with available transfer power. Moreover, it shows how the transmission reliability margin is affected by the variation in the probability of sensitivity.

References

1. Sampath Ediriweera WEP, Lidula NWA (2022) Design and protection of microgrid clusters: A comprehensive review. *AIMS Energy* 10: 375–411. https://doi.org/10.3934/energy.2022020
2. Ur Rehman Tahir M, Amin A, Baig AA, et al. (2021) Design and optimization of grid Integrated hybrid on-site energy generation system for rural area in AJK-Pakistan using HOMER software. *AIMS Energy* 9: 1113–1135. https://doi.org/10.3934/energy.2021051
3. Gamil MM, Lotfy ME, Hemeida AM, et al. (2021) Optimal sizing of a residential microgrid in Egypt under deterministic and stochastic conditions with PV/WG/Biomass Energy integration. *AIMS Energy* 9: 483–515. https://doi.org/10.3934/energy.2021024
4. Liu L, Kato T, Mandal P, et al. (2021) Two cases studies of Model Predictive Control approach for hybrid Renewable Energy Systems. *AIMS Energy* 9: 1241–1259. https://doi.org/10.3934/energy.2021057
5. YAQOBI MA, Matayoshi H, Prabaharan N, et al. (2021) Interconnected standalone DC microgrid fault protection based on Self-Adaptive DC fault current limiter with hybrid solid state circuit breaker. *AIMS Energy* 9: 991–1008. https://doi.org/10.3934/energy.2021045
6. Nadia A, Hossain Md. S, Hasan Md. M, et al. (2021) Determination of transmission reliability margin for brownout. *AIMS Energy* 9: 1009–1026. https://doi.org/10.3934/energy.2021046