Review of: "Assessing Reliability and Economic Viability of Different EV Charging Station Configurations"

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Potential competing interests: No potential competing interests to declare.

The paper addresses a crucial and timely topic of optimizing EV charging station configurations to enhance reliability and economic viability. Given the global push towards electric vehicles (EVs) as a sustainable mode of transportation, this paper provides valuable insights for stakeholders in the energy and transportation sectors.

General Comments:

1. Methodological Strength: The methodological approach combining reliability assessments, cost estimation procedures, and voltage stability analysis for different EV charging station configurations is comprehensive. The use of binomial distribution for reliability assessment and the detailed analysis of uniform and non-uniform port arrangements contribute significantly to understanding the challenges and opportunities in EV charging infrastructure development.

2. Practical Implications: The results regarding the reliability and maintenance costs of uniform versus non-uniform port configurations offer practical guidance for the design and operation of EV charging stations. This research could help in making informed decisions regarding port configuration to optimize both economic and reliability outcomes.

Specific Comments and Questions:

1. The introduction of a 56-ported design incorporating both uniform and non-uniform arrangements is intriguing. How does this specific configuration compare with existing charging station designs in terms of space utilization and user convenience?

2. The application of binomial distribution for evaluating port reliability is a novel approach. Could you elaborate on the choice of this method over others and how it enhances the accuracy of reliability assessments for EV charging stations?

3. The paper mentions the calculation of maintenance costs based on port failure rates. It would be beneficial to understand the model or formula used for this cost estimation. Additionally, how do these maintenance costs influence the overall economic viability of different port configurations?

4. The section on ensuring voltage stability provides valuable insights into the challenges of integrating EV charging stations into the power grid. Could the authors detail the implications of their findings for power system engineers and grid operators? How can these insights inform the strategic placement of charging stations to mitigate voltage instability?

5. The conclusion highlights the balance between reliability and cost-effectiveness in EV charging infrastructure. Are there

specific areas of research the authors consider critical for further exploration to overcome the challenges identified in this study?

6. Every study has its limitations. What are the limitations of this research, particularly regarding the generalizability of the results to different geographical and grid conditions?

7. Considering the study's implications for the deployment of EV charging infrastructure, what policy recommendations would the authors make to support the development of reliable and economically viable charging stations?

8. The paper compares uniform and non-uniform configurations, but does it consider or suggest hybrid models that might leverage the advantages of both? If not, is there potential value in exploring such models in future research?