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# Assessment of technical and financial benefits of AC and DC microgrids based on solar photovoltaic

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## Electrical Engineering

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## Abstract

Microgrid deployments are expanding around the world as the most suitable solution to integrate distributed renewable energy sources to meet the increasing load demands and to power-up the remote areas. The installation of DC microgrid can improve system efficiency and reduces the cost of electrical infrastructure compared to the AC microgrid. However, the main challenge of implementing DC microgrid is the existing structure of the AC distribution system. In addition to the previous researches performed on DC microgrids, this paper proposes a framework to assess the technical and financial benefits of implementing the AC and DC microgrids. The power loss, voltage drop and system efficiency have been investigated for the AC and DC microgrids during the steady-state condition. Furthermore, the dynamic behaviors of AC and DC microgrids have been analyzed

when each system subjected to disturbance such as short-circuit fault, aiming to evaluate the system response. In the next stage, techno-economic analysis has been carried out to determine the optimal size of solar PV system connected to each AC or DC microgrid with its energy storage, according to the meteorological and load profile data of the selected remote area in Sarawak (Malaysia). The study presented in this paper justifies that DC microgrid is potentially more beneficial than AC microgrid. However, the stability of the system during fault condition is the main problem in the DC microgrid. Therefore, it can be concluded that the protection and control of DC microgrids should be the key areas of future researches.

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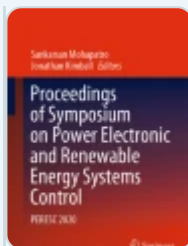
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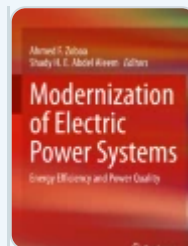
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## Ethics declarations

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