Comparative assessment of off-grid solar photovoltaic (PV) system: Technical & investment analysis

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Keywords: Solar PV hybrid system (SPVHS), Integrated Solar PV system (ISPV), off-grid, lifetime cost

This paper demonstrates the type of solar Photovoltaic (PV) system and technology for off-grid Rural Electrification Program (REP) in Malaysia. Centralized off-grid solar PV system, normally referred to as Solar PV Hybrid System (SPVHS) is widely implemented by several REP initiatives. Even though SPVHS is considered successfully implemented for REP in rural Malaysia, several issues arise such as reliability of power supply, environmental issue, land requirement and lifetime cost. Thus, this study introduces Integrated Solar PV system (ISPV) to compliment the gap created by SPVHS. Comparative analysis on technical and economy was conducted on both systems. Technically, ISPV shows advantages as compared to the SPVHS. ISPV system is more reliable in providing daily energy required, environmentally friendly that the CO_2 emission reduces by 68% and efficient energy storage system. Furthermore, ISPV creates community involvement that part of the system operation is operated by the community. This model can guarantee sustainability of the REP. The project owner, in this case the Government can save 47% of project lifetime cost compared to the cost to implement SPVHS. Therefore, based on the explanations and analysis provided in this report, it is recommended that ISPV to be considered as future off-grid solar PV system.