

An analysis of renewable energy technology integration investments in Malaysia using HOMER Pro

ABSTRACT

Renewable energy systems are technologies that can generate electricity from solar, wind, hydroelectric, biomass, and other renewable energy resources. This research project aims to find the best renewable energy technology combinations for several scenarios in Malaysia. The strategies are analysed by evaluating the investments in the renewable energy systems in each of the decided scenarios in Malaysia, Pekan, Pahang and Mersing, Johor, using HOMER Pro software. The finding shows that the PV–wind hybrid system has a better net present cost (NPC) than the other systems for both scenarios, which are USD –299,762.16 for Scenario 1 and USD –642,247.46 for Scenario 2. The PV–wind hybrid system has 4.86-year and 2.98-year payback periods in Scenarios 1 and 2. A combination of RE technologies yielded fewer emissions than one kind alone. The PV–wind hybrid system provides a quicker payback period, higher money savings, and reduced pollutants. The sensitivity results show that resource availability and capital cost impact NPC and system emissions. This finding reveals that integrated solar and wind technologies can improve the economic performance (e.g., NPC, payback period, present worth) and environmental performance (e.g., carbon dioxide emissions) of a renewable energy system.