

Renewable Energy Source Based Hybrid Power Plant for Electric Vehicle (EV) Charging Station in Rural Area

Liney Ajay J¹, Dhananjayan S. P², Gowtham V³, Venkatesh S⁴

Assistant Professor, Department of Electronics and Electrical Engineering¹

UG Student, Department of Electronics and Electrical Engineering^{2,3,4}

SRM Valliammai Engineering College, Chennai, India

Abstract: An electrical vehicle charging station is a charging power supply for electrical vehicles. This paper proposes design of a model for a PV based electrical vehicle that forecasts total power output under particular conditions of Ankara city. First PV cell parameters are determined and then PV array formed including cells designed in order to calculate cumulative effect. Using actual irradiation and temperature values we try to catch an approximation of output power for the future needs. Electric vehicles offer many advantages ranging from easy access and abundance of electrical energy sources. The objective of this paper is to obtain the best configuration of the hybrid power systems for charging station in a rural area such as Labuan bajo, Indonesia. Thus, the best configuration obtained is then installing with three types of energy storage namely Lead Acid and UNS Lithium battery such as Lithium Ion and Lithium Ferro Phosphate (LFP) to determine the minimum cost of operation and energy cost in a year. The results showed by implementing hybrid systems from PV and DER is the best configuration for off grid charging station. The most optimal battery in off grid system achieved by installing UNS LFP batteries. As a conclusion, by utilizing hybrid power generation technology, the potential for renewable energy in rural areas can be the main key in realizing the availability of charging stations in rural areas with affordable price for supporting electric vehicles infrastructure.

Keywords: Photovoltaic (PV), Lithium Ferro Phosphate (LFP), Electric Vehicles (EVs), Three-port Integrated Topology (TPIT), Distributed Energy Resource(DER)

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