IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, April 2025
Impact Factor: 7.67

Development of Electrical Vehicle Charging Station with Renewable Energy Integration

PardeshiAkash Ganesh[1], Sonawane Om Subhash[2], Pawar Dhiraj Sonu[3], Wavdhane Ganesh Rajendra[4], Bhagat Tushar Dattatray[5]
Department of Electrical Engineering,
SND College of Engineering & Research Center, Yeola, Maharashtra , India

Abstract: *The rapid growth of the electric vehicle (EV) market underscores the urgent need for sustainable and efficient charging infrastructure. This project focuses on the development of an electric vehicle charging station (EVCS) that integrates renewable energy sources, particularly solar and wind power, to support the widespread adoption of EVs while minimizing environmental impacts. The integration of renewable energy sources into EV charging stations not only supports decarbonization goals but also enhances grid stability and promotes energy self-sufficiency. The proposed EVCS design prioritizes a hybrid approach by combining solar photovoltaic (PV) panels and wind turbines as primary power sources. This dual-source strategy aims to optimize energy production by taking advantage of varying weather conditions, ensuring a more reliable and continuous supply of renewable energy. The charging station will incorporate battery energy storage systems (BESS) to store excess energy generated during peak production periods, thereby enabling the station to operate during non-ideal weather conditions and at night. This feature ensures that EV users have access to a consistent power supply, even when natural energy generation is low. One of the key aspects of the project is the deployment of advanced energy management systems (EMS) to regulate the flow of power between the renewable sources, storage units, and EV chargers. The EMS will utilize smart grid technologies and predictive analytics to optimize the use of generated energy, thereby minimizing reliance on conventional grid power and reducing overall energy costs. The EMS will be capable of monitoring real-time energy consumption and generation, adjusting the charging load as needed, and communicating with grid operators to manage energy input and output efficiently.*

Keywords: electric vehicle

DOI: 10.48175/IJARSCT-24914