PRESS RELEASE

Clean Mobility: Study recommends electric vehicle charging stations powered by solar rooftop photovoltaic technology

For Immediate Release

Bengaluru: 22 December 2021

India has 21 of the 30 cities with the worst air quality in the world. Every year, we keep exploring options to curb air pollution. The transport sector is a significant contributor to air pollution in the cities. The electric vehicle (EV) segment could play a key role in decarbonising the sector. However, to realise green mobility in its truest sense, electric vehicles (EVs) need to run on clean energy. India's power grid is predominantly coal-based at the moment. To demonstrate the use of clean (solar) energy for charging EVs, the Center for Study of Science, Technology and Policy conducted a pilot project on the Bangalore Electricity Supply Company (BESCOM) Corporate Office premises and released a report titled ***Solar Energy–Based EV Charging: A Pilot and Techno-Economic Study***.

Solar rooftop photovoltaic (SRTPV) is a popular technology to source clean energy and could be easily scaled within cities. SRTPV systems offer a number of advantages in EV charging. They are easy to install because of their modular design, they are a cost-effective alternative to charging from the grid, and they could help reduce the detrimental effects of a surge in EV charging demand on the grid. CSTEP's study explored the possibility of using SRTPV technology for achieving a greener and more sustainable mode of transportation.

The study indicates that SRTPV energy could be an economically viable option for EV charging in addition to being a green source of energy. The mismatch between solar energy generation and consumption could be solved by deploying net metering at charging stations. The study examined the commercial aspects of using grid-connected SRTPV with and without a battery energy storage system (BESS) to power an electric vehicle charging station (EVCS). A helpful parameter used in the study to estimate the economic benefits of using solar energy and BESS for EV charging was the levelised cost of charging (LCOC). LCOC considers all the costs incurred over the lifetime of assets.

CSTEP's analysis includes the effect of charger utilisation, initial subsidies, and the contribution of grid electricity on the LCOC. The levelised cost of energy generated by the solar plus storage power plant is strongly influenced by the utilisation of the battery storage. Higher utilisation of battery storage increased the cost of energy from the power plant. The levelised cost of EV charging service from an EVCS was evaluated and compared with three cases: a baseline case where the EVCS is solely reliant on grid electricity and two other cases where it is connected to RTPV and RTPV plus energy storage systems.

An RTPV system size of 40 kWp was considered for the analysis. The EVCS connected to the RTPV (without battery) under the net-metering policy served as the best-case scenario with the lowest LCOC. This is predominantly because the cost of energy from SRTPV is becoming increasingly competitive (in certain cases cheaper) with grid electricity. A battery storage capacity equal to 40 kWh was considered for the analysis, which stored approximately 16% of the total daily solar energy (on average) generated. From the analysis for these system specifications, the costs of upstream electricity for the cases of the grid only, PV only, and PV

plus BESS were calculated to be INR 5 (within BESCOM limits), INR 4.6, and INR 8.9 per unit, respectively. The net-metering policy plays an important role in lowering costs, which otherwise would increase owing to the mismatch between energy generation and consumption.

The full report is available **here**. For quotes from researchers and details of the study, please mail us at cpe@cstep.in

About CSTEP

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