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Integration of Solar with Electric Vehicles

SOLAR POWER

Integration of Solar with Electric Vehicles



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Integration of renewable energy will make EVs truly cleaner than conventional fuel vehicles taking into account the lifetime CO₂ emissions. Distributed solar energy will help reduce transmission and distribution losses, thereby reducing the lifetime CO₂ emissions as well as the operating cost of EVs further, and accelerate their commercial feasibility. Distributed solar will also help curtail the CAPEX requirement for the upgradation of transmission and distribution infrastructure resulting from additional demand from EV charging.

Introduction

India targets to have 6 to 7 million hybrid / electric vehicles (EVs) on road by the year 2020 and go 100% electric by 2030. These goals are undoubtedly welcome, considering that India has 16 times out of the world's 10 most polluted cities in terms of PM 2.5.

However, while adopting these strong targets, we must be cognizant of the fact that EVs will increase the overall demand for electricity and will require massive upgradation in power transmission & distribution infrastructure. Simultaneously, in order to make EVs 'green' in true sense, the demand for additional electricity required for charging of the EVs cannot come from thermal power plants. Integration of renewable energy, especially in distributed form, accompanied with friendly policies will help alleviate these challenges. In this article, we will cover why EV adoption and increase in solar energy integration has to go hand-in-hand.

Green-house emissions

The main objective behind the push for electric vehicles is to have zero emissions on road. But, given our current power mix where almost 75% of the electricity is generated from thermal power plants (using coal, oil/gas as fuel), if the trend persists, we will be just moving the emissions from ground to remote locations of these power plants, and in fact increasing the global emissions. Airgonne Propulsion compared the lifetime emissions (the sum of emissions during manufacturing of the vehicle, direct emissions either on road or at the power generation plant for EVs, and indirect emissions caused during transport and conversion of primary fuel to usable form) of vehicles by different fuel type- Electric vehicles from an Indian OEM (with ~6 km/kWh) as well as one of the global OEMs (with 4.7 km/kWh) were included in this study. As shown in Figure 1, lifetime CO₂ emissions from electric vehicles were found to be greater than those from an heavy duty petrol hatchback.

Today, EVs are more polluting than equivalent petrol vehicles largely because the energy generating plants emit average CO₂ emission of 0.771 kg/kWh of electricity used to charge the EVs. However, if we meet the renewable integration target of 175GW by the year 2022 and 375 GW by 2027, CO₂