

# A SOCIO-ECONOMIC MODEL FOR ELECTRIC VEHICLE OWNER IN SMART GRID STRUCTURE

**Hitesh Datt Mathur**

Birla Institute of Technology and Science, Pilani, India

**W**ith increasing demand of clean power, focus is rapidly shifting towards integration of renewable sources of energy in the grid. Present day technology has reached to a level of maturity in terms of integrating conventional sources of renewable energy like solar, wind, biomass to the grid. In order to mitigate pollution and to manage depleting reserves of oil based fuels, electrical vehicles are being promoted by various governments across the globe. This is posing another challenge in power system operation and control. This work proposes a solution to address this problem with societal and economical approaches. The first part of the problem discusses the development of a detailed mathematical model with vehicle to grid (V2G) aspect for a microgrid setup having different sources of energy such as wind, solar, battery energy storage, fuel cell and diesel generator (DG). The critical parameters mainly frequency and voltage will be monitored with varying loading conditions as well as changing power generation from intermittent sources of energy present in microgrid. The second part will be to evolve an economical model for electric vehicles (EVs) participating in supporting active power when other sources exhaust on certain load demand. EVs need to be incentivised as per the number of electric units they contribute in balancing frequency. In smart grid scenario with dynamic pricing approach, this incentive model will be a boost to EVs market as well as on the other hand social problem of air pollution gets limited to a large extent. EV owner will charge (buy) when price is low particularly during night time and will discharge (sell) during peak hours at higher price as per his desire to a load (whoever offers him a higher price). Therefore, this work proposes a unique incentive based solution with win-win situation for both EV owner and load owner.

mathurhd@pilani.bits-pilani.ac.in