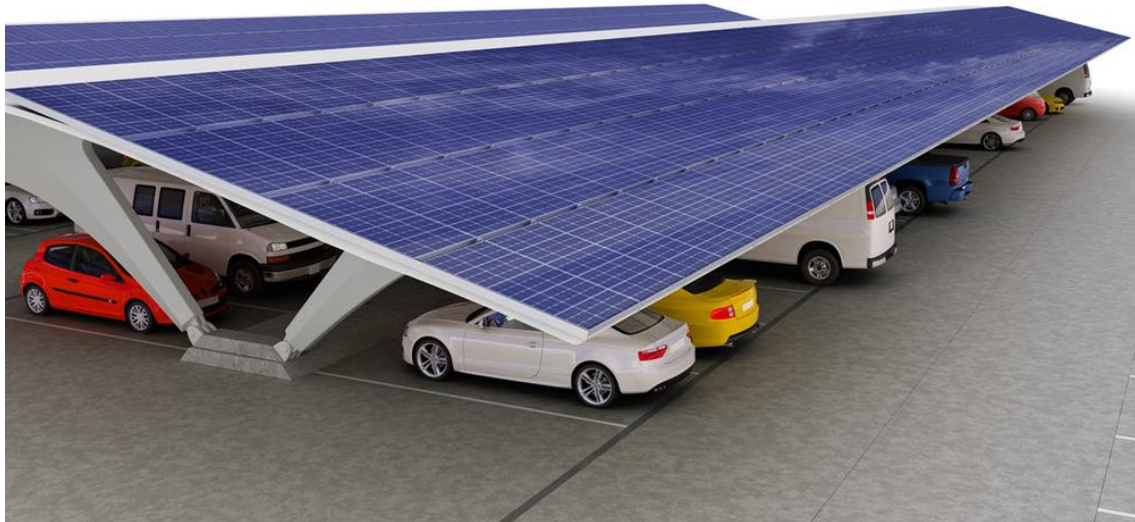


EV Fast Charging Solar Carport Station (EVFCCS)



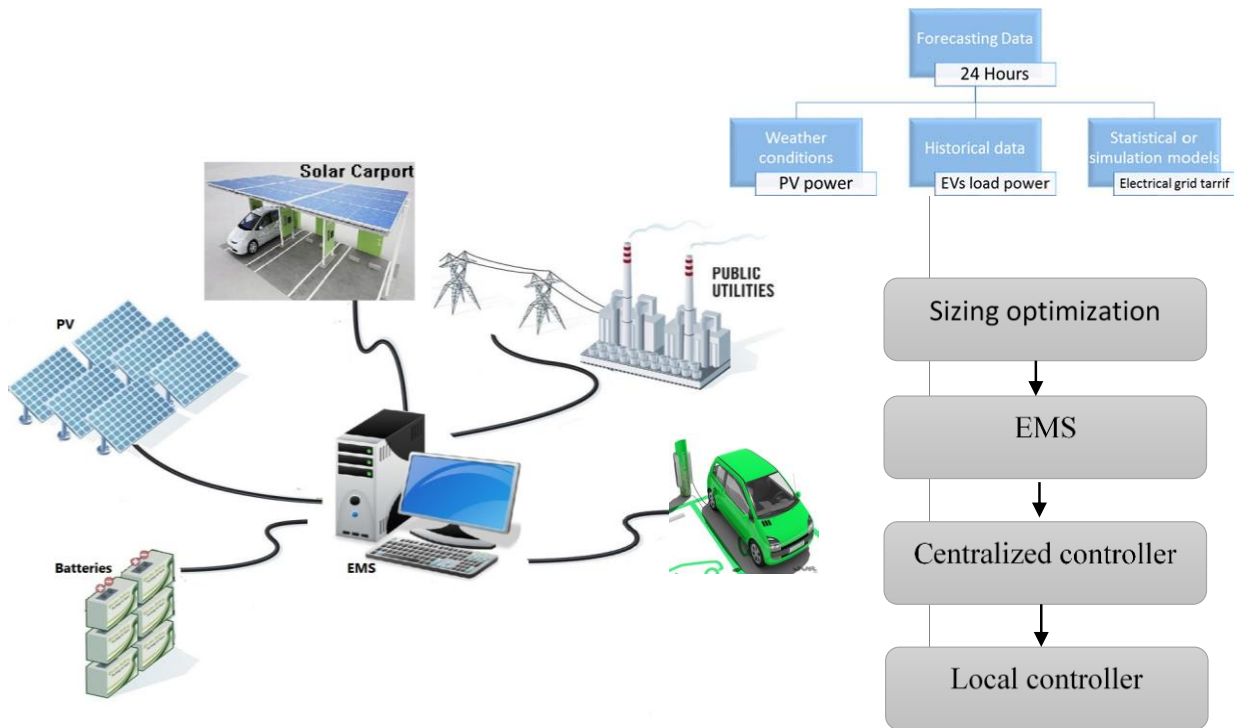
Overview

The prospective spread of Electric vehicles (EV) and plug-in hybrid electric vehicles arises the need for fast charging rates. High required charging rates lead to high power demands, which may not be supported by the grid. The parking area can be converted to a hybrid fast charging station. Where, the parking roof can be used to install the PV panels. In this proposed system, an optimal power flow technique of a PV-battery powered fast EV charging station is presented to minimize the operation cost and installation cost. The objective is to help the penetration of PV-battery systems into the grid to support the growing need for fast charging of EVs. Our proposed system used V2G topology to use customer EVs battery energy to charge others EVs battery. The customers that want to get profit from their EVs they can park their EVs in the charging station and sell their energy to the others. Thus, the hybrid system sizing can be reduced and also the demand to be withdrawn from the grid is reduced. Proposed energy management algorithm can control power flow and communicate with customer for monitoring and sell/buy process.

Benefits

- The electric vehicles (EVs) as a potential means of transportation are one of the important solutions for the fossil fuel shortage.
- The benefits of this research consisted of three parts:
 - 1- The charging time of the EVs is a primary concern for the potential consumers. Thus, the research interest has grown in developing fast-charging stations.
 - 2- Minimizing the amount of power absorbed from the grid by minimizing the system running cost.
 - 3- Design a new technique that minimize the size of PV/Battery system (minimize the installation cost) by using V2G, V2V, and G2V power transfer.

- The main advantage of the proposed technique is to help the penetration of the PV/battery systems into the grid and to support the growing need of fast EVs charging rates. This is achieved by continuously minimizing the system running and installation cost.
- Customers can get profit by selling their power to the proposed system.



Installation Process:

As part of our system installation, we will provide the following services along with our solution:

- We will conduct one visit to collect information about your parking area, to perform profile analysis for accurate estimation of the station capacity.
- Our technical team will perform system sizing and finalize the integrated system design and configuration
- Our installation team will visit your parking area to install our solution, which includes: electrical and structural installation, PV panels, solar carports, Batteries, fast charging panels and bidirectional smart meters.
- Our team will conduct onsite customized training sessions to help you monitor and operate your system efficiently.
- We will provide post-installation technical support 24/7 with lifetime warranty and maintenance.

System Model:

The system consisted of a lot of parts:

- 1- Sizing optimization for the PV panels and Batteries.
- 2- 24-hour forecasting data which include: weather, EVs load power and grid tariff forecasting.
- 3- Energy management system to minimize the total operational cost.
- 4- Centralized controller
- 5- Local controller that control the power flow, voltage and current in the whole Microgrid.