

## Insufficient space or power? Let "PV storage+charging" settle it

### --Solution for EV charging station construction problem

#### 1. Background

Electric vehicle with no doubt has become a trend in today's global automobile industry and an integral part of people's green lifestyle. Therefore speeding up the construction of charging infrastructure has also become an urgent demand. The charging infrastructure as an important supporting facility, is of the most significance, as its quantity and distribution directly decide the charging convenience.

#### 2. Construction dilemma for charging station

##### 1) Land resource

As the most fundamental EV charging infrastructure, the construction of charging station should take convenience and fast charging service as premise, thus the site selection is particularly important. Home users can choose to install chargers in the yard or garage without installation limitation. While public charging stations require

much more land which makes it harder to find suitable land resources in the areas in demand.

##### 2) Utility grid

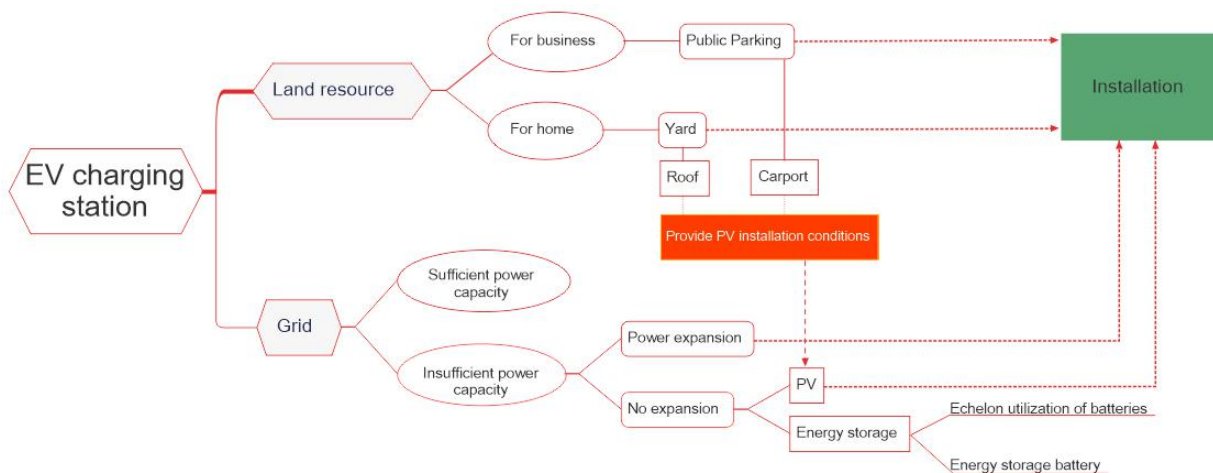
Another element for building a charging station is electricity. On the basis of the present power condition, adding the new power consumption facilities (EV chargers) should take two aspects into consideration: whether the current power consumption capacity meets the requirements and whether the increasing new power consumption at current location is feasible. Existing commercial areas like office buildings, public parking lots and other places, some can meet the requirements, though there are hidden peril on power expansion or the power consumption margin does not meet the installation requirements. Though power expansion can resolve the problem thoroughly, the investment cost as well as the investment return period will be greatly increase, which makes the project not bankable.

Domestic users usually choose to install low-power AC chargers which do not rely on the utility grid. But in the long run, the electricity demand for charging is lasting and the arising electricity bill should be also taken into account.

### 3. Solution

In view of the charging station construction problem, ATESS puts forward the solution of "PV + storage charging", which effectively solves the

limitation of power distribution. Through energy storage and configuration optimization, the local energy production and load consumption are basically balanced. It can interact with the power grid flexibly and operate independently according to the needs, and use new energy as much as possible to relieve the utility grid pressure caused by EV charging; On the other side the energy storage battery is used to charge the car power battery directly, which improves the energy conversion efficiency.



#### 1)Public charging solution

The existing space of a public parking lot can be used to build EV chargers, providing a good charging condition, and the charging demand is concentrated, which are natural advantages for operating charging station.

Carpports could be built in the open-air parking

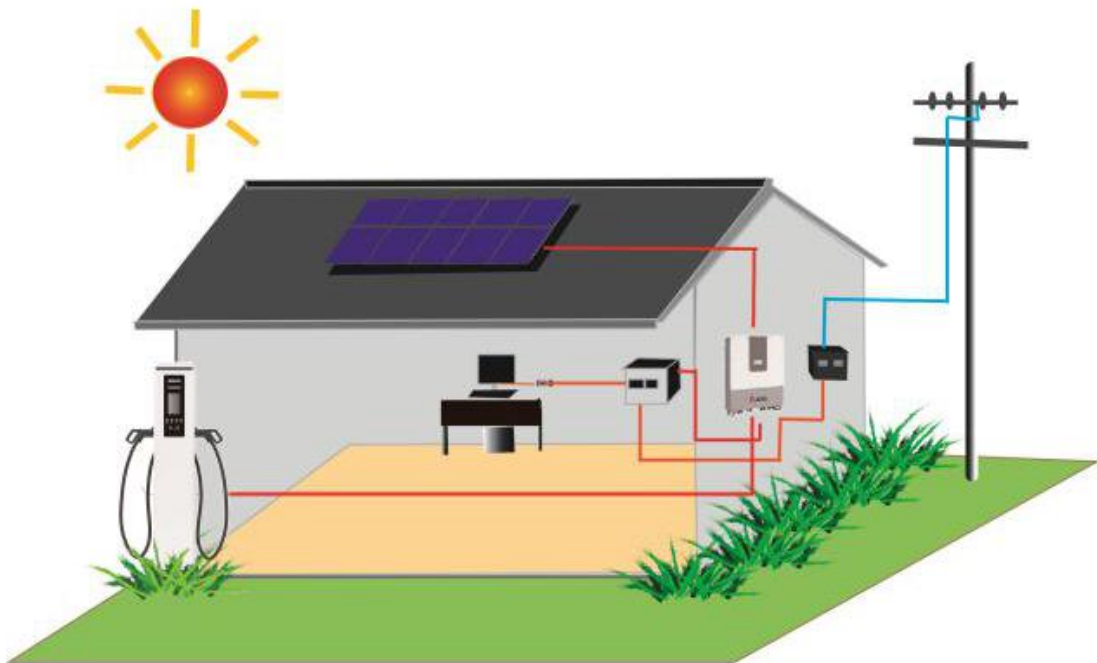
area, the top of it could be integrated with PV panels to build PV power systems, and work together with storage inverter to fulfill EV charging power demand.



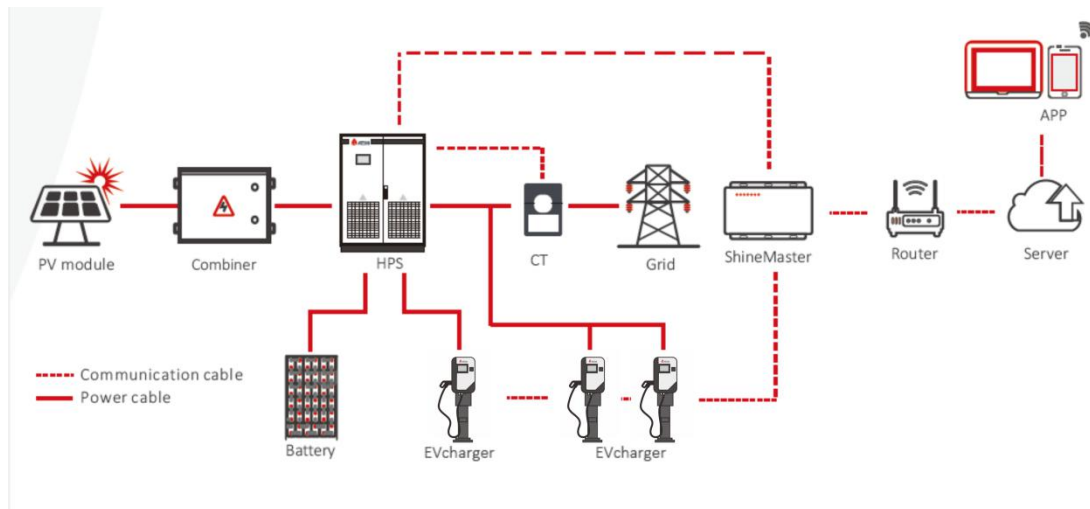


## 2) Domestic solution

"PV storage+charging" mode means using the user's roof or domestic carport to build PV power system and store the solar energy. Part of the stored electric energy can be used for charging or self-consumption, so as to reduce charging cost.



## 4.Operation mode



A “PV storage+charging” system is composed of three parts: PV system, energy storage system and EV charger.

### 1) Daytime:

During peak hours in daytime, PV system generates power to supply for load or EV charger, maximizing the self-consumption; when the energy management system detects the power demand increasing and PV power is insufficient to catch up, the energy storage system will discharge; When neither PV or storage system can satisfied the demand, energy manager will control to take

power from grid to compensate.

### 2) Nighttime:

In the non-valley hours at night, the energy storage system supplies preferentially to the load or EV charger. When power is insufficient, the system will take power from utility grid through energy manager’s control. In the period of valley hours, the energy storage system will store the power taking from grid. Through reducing the dependence of local power demand on utility grid, the purpose of cutting electricity bill is achieved.



## 5. Advantages

### 1) Solve land resources shortage and site selection problem

A lot of land resource is required for public charging stations, so it is difficult to find suitable site for station construction in demand concentrated areas. However, the public charging station can use the existing open-air space to build EV chargers and carport, which not only solves the land shortage problem, but also provides great PV installation condition. Most of the private chargers are AC type, which can be installed nearby the parking area. Meanwhile, domestic rooftop could be used to build PV storage system to reduce the power cost.

### 2) Smart coordination with power grid

PV+ energy storage system offers an alternative to resolve insufficient power distribution or power expansion difficulty when constructing a EV charging station. By utilizing the bi-directional energy flow of the storage system and peak-valley electric price, in another word, "low price store and high price use", it can on one hand realize

the low cost for charging, and on the other hand reduce the load power consumption in the peak hours to save electricity bill.

### 3) Echelon utilization of power battery to reduce energy storage cost

The power batteries for electric vehicles are mainly lead-acid and lithium batteries, which are also commonly used in energy storage systems. Power batteries retired from electric vehicles usually have 60-80% residual capacity and still have certain service life. The echelon utilization of power battery can not only improve power supply stability and reduce charging cost, but also cut the cost of storage system and prolong its service life, which boost the development of renewable energy.

## 6. ATESS core technology

ATESS offers a comprehensive product line for PV hybrid, energy storage, EV charger and micro-grid projects, which has been verified by users and application cases worldwide. The main equipment in the above scheme are all produced by ATESS,





including storage inverter, storage battery, EV charger and monitoring device, combiner box, providing integrated solutions for customers.

## Product portfolio

