



Review of Site location for Electric Vehicle Charging Station

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Abstract : As we know implementation of “Green Energy” is most important part for every country, They Focus how to maximum use of green energy in several area like home, commercial, transportation etc. So that every country implement & encourage to customers use solar energy & it is successful effort for developed country. Now they focus on transportation side, An Electric Vehicle (EV) is most suitable solution for use green energy in transportation side, EV having some limitation as compared to fuel vehicle (FV) but in future EV is a only solution for transportation side. An EV has an important part is “battery”. Every battery has different capacity (Ah), so limited EV run fast and pass more distance compared to FV because FV has more resources to fill a fuel like petrol/diesel pump station, but for EV resources are limited to charge it except charge at home, So Govt. focus to increase charging station, So a first point to consider for charging station is” Location” of charging station which is easily available for every EV owner or drivers. In this paper we give some information about suitable location for charging station and methodology used to implement of charging station in different developed country and which method is most suitable.

Index Terms – Introduction, Electric Vehicle Charging Station, Site Location.

I. INTRODUCTION

In few decades many developed country were suffer in disaster damages, and main reason of this damages only a pollution, many developed countries are progress as fast as they can but also, they give contribution in pollution and consequences they suffer by natural disaster, now in few years developed countries are focused to save them country against natural disaster, so they encourage to public use “Green Energy” instead of conventional energy in different areas. If we focused on transportation side then China is become leading country who installed 6.3 million EV. In China at 2022, representing 26% of China’s total vehicle sales and 59% of EV sales globally including 5.9 million passengers cars, 2,56,000 trucks etc. EVs in China must accelerate if the country is to realize the government’s ambitious target of peaking carbon dioxide (CO₂) emissions by 2030 and achieving carbon neutrality by 2060.[1], A China installed two types of charger one is DC charging station and another is AC charging station, but a DC charging station installed more numbers of AC charger, Same as Europe has installed 13% DC charger and America installed 21%DC charger.

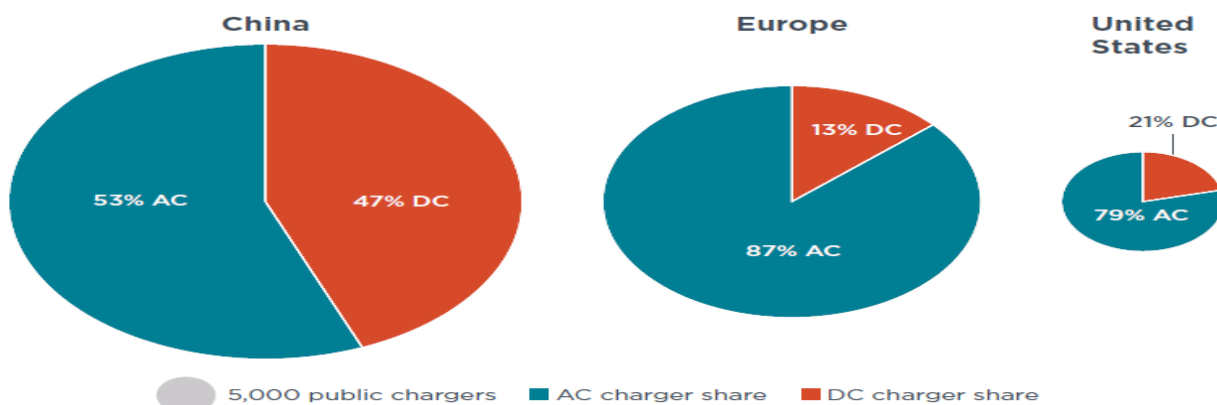


Fig 1 Public charger installed in different countries

When measuring public charger availability, it is need to examine the coverage of public chargers, how public chargers are geographically distributed within a given area. The straight-line distance to the nearest public charging pool is currently used in some Chinese cities to assess public charger coverage; however, it has limitations, as straight-line distances often do not reflect the actual distance that an EV owner needs to drive to get to a charging pool Figures 2 show the geographic distribution of public charger stock in these three markets. Cities in eastern and southern China generally had more public chargers in place than those in western and northern China, resembling trends in EV uptake in the country, which has been concentrated in the east and south.

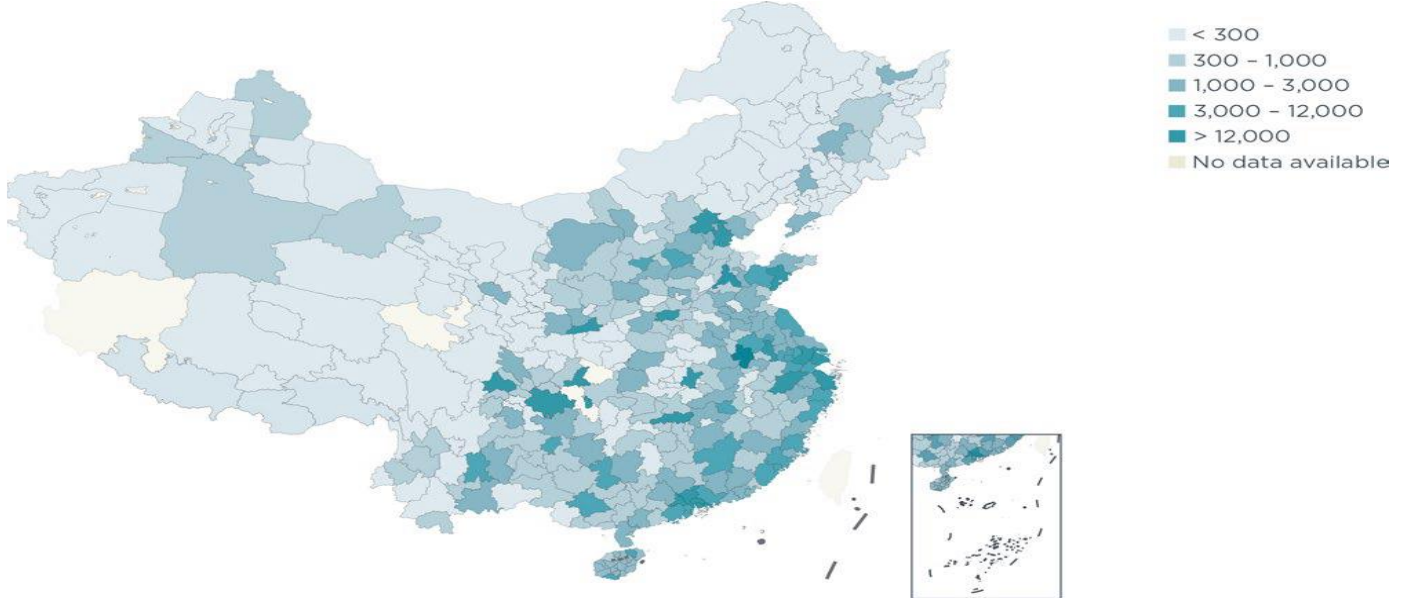


Fig 2 Public charging station in different cities in China 2022

A similar concentration of both public charger stock and EV uptake was also seen in northern and western Europe and along the east and west coasts of the United States.

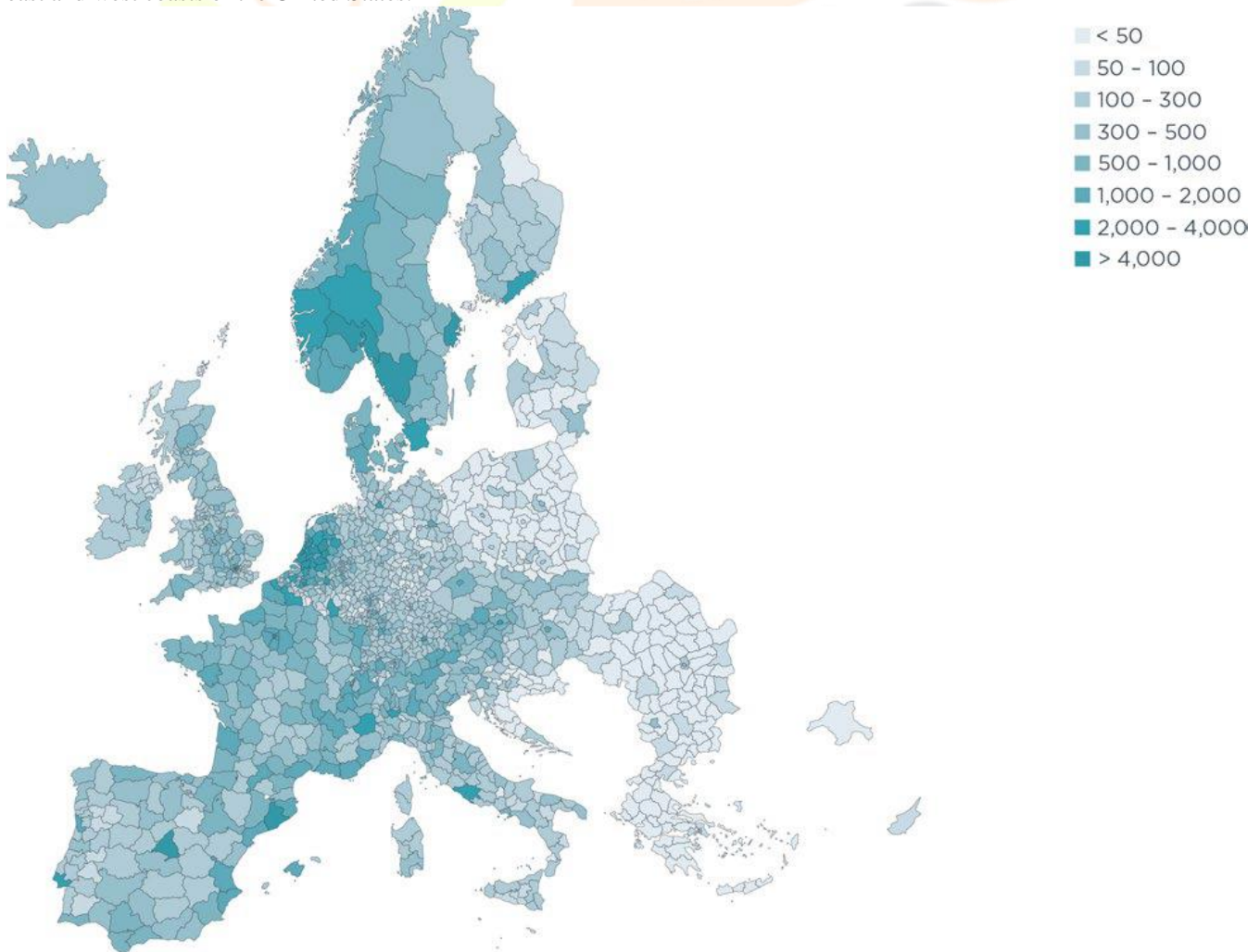


Fig 3 Public charging station in different cities in Europe 2022

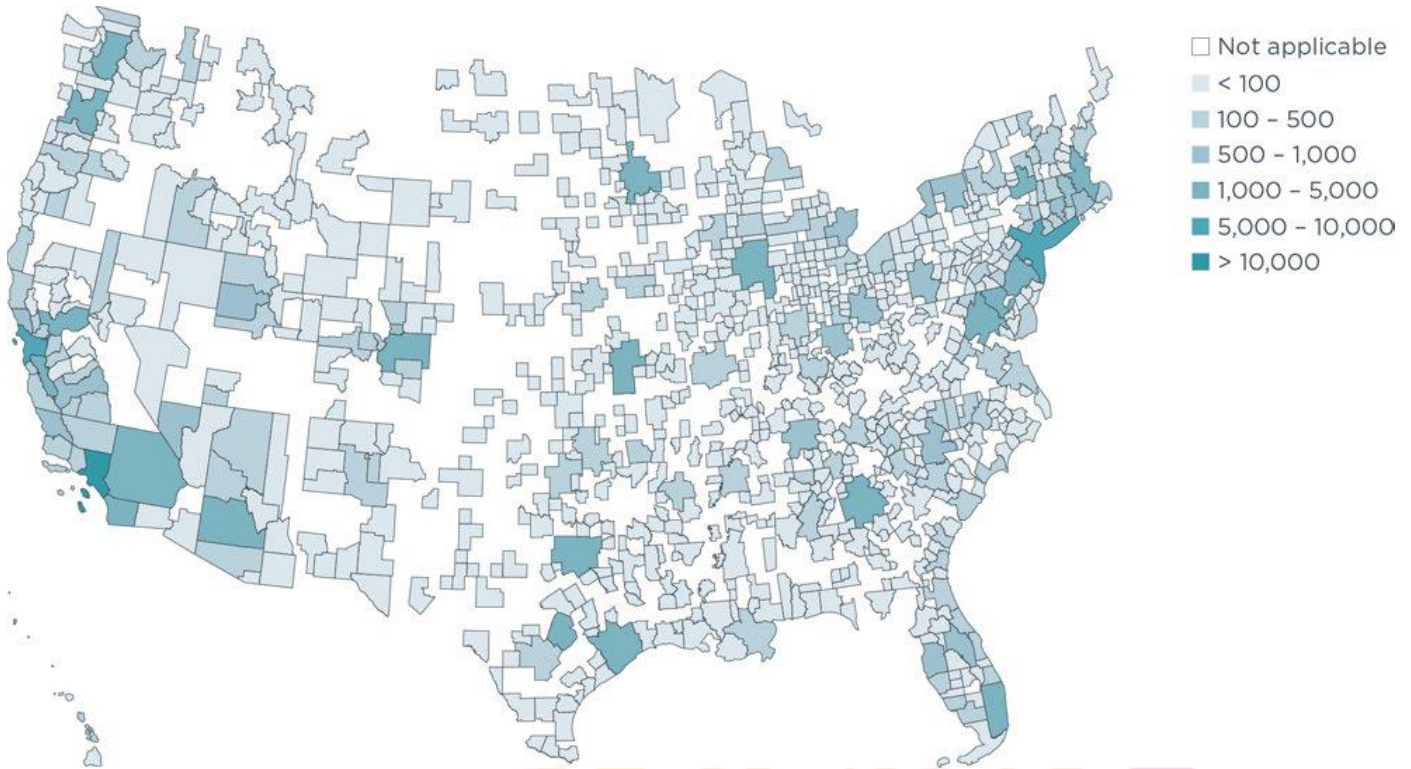


Fig 4 Public charging station in different cities in America2022

II. Factors for site selection

A factors which affect to selecting a site for EV charging station are given below :

1. Connection to power: There are two sources used for electric charging station (1) AC(2) DC, In China DC fast charging stations are more compared to AC, but in America they have three types of charging station which is differentiate by level of voltage like [2]

Level-1 Charging: 120-volt (V) AC plug and requires electrical installation per the National Electrical Code.[3]

Level-2 Charging: 240-V (typical in residential applications) or 208-V electrical service.

DC Fast Charging: DC fast-charging EVSE (480-V AC input 3-Phase) enables rapid charging at sites such as heavy traffic corridors and public fuelling stations.

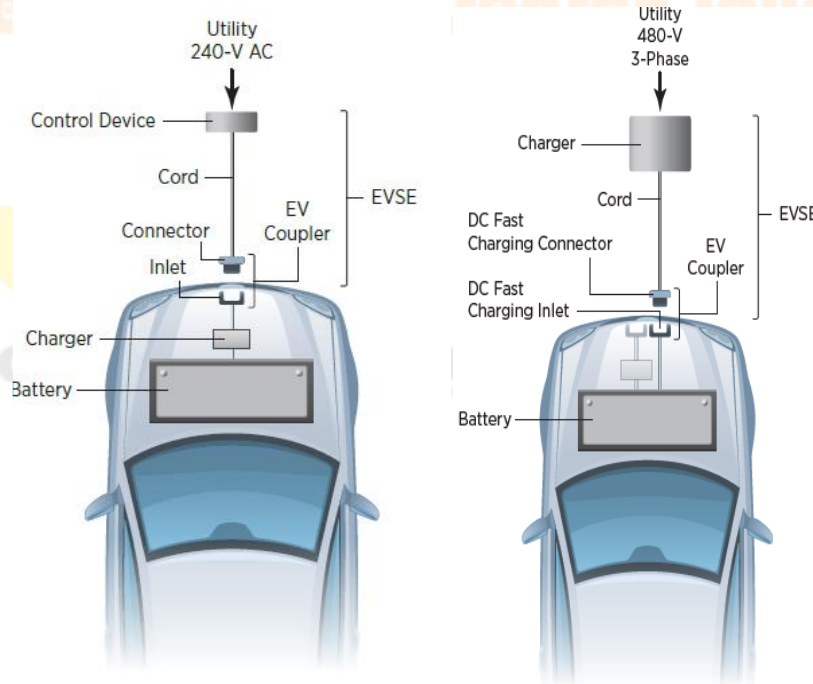


Fig 5. Level-1 &2 and fast charging scheme

Same as in India AC and DC both charging station are installed and levels are

Level-1 : 120V AC ,Level -2 : 240 V AC ,Fast Charging

Electrical connection for EV charging station planned for new construction, new conduit wiring which is not exceed 25 feet of conduit from panel to EV charging. Most facilities have accessible 120V circuits sufficient to power level 1 EVSE. Level 2 charging requires 208-240 volts and at least 15-30 amps. Many jurisdictions require or recommend a dedicated branch circuit for level 2 charging.

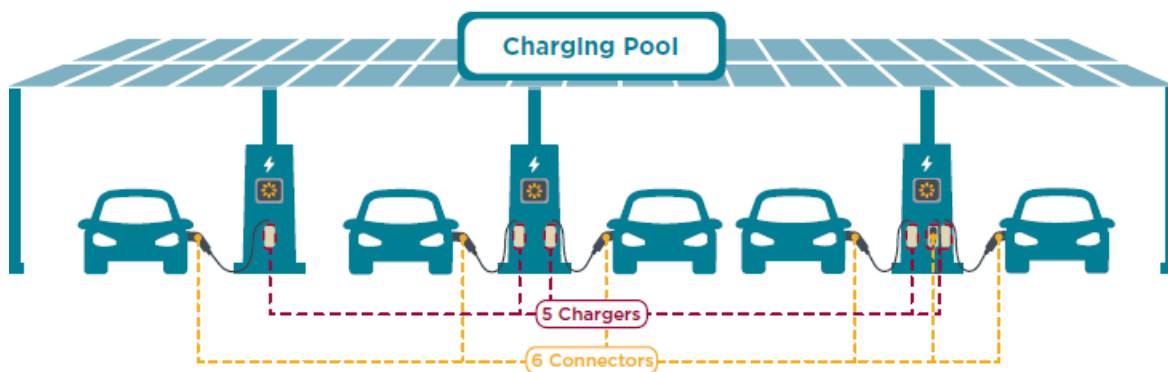


Fig 6 Electric connection for Charging station

2. Network and communication: Most public Electric charging station will contain an advanced metering system and link to a network that tracks usage, bills customers and manages electrical loads. Some Electric charging station will connect to telecommunications networks using wi-fi, Ethernet or cellular connections. This type of communication is especially important for managing user messaging and other technology advances that regulate information about available charging stations and when a driver's charging is complete. Complications for network connections arise in garages, where repeaters may need to be installed in order to guarantee network signals. Potential installation sites should be assessed for their network connection ability.
3. Infrastructure: For infrastructure an element such as landscaping, walkways, curb cuts and other structural elements should be considered in an Electric charging station site plan. These elements add costs for removal or relocation, in addition to acting as barriers to accessible charging. Trenching, curb cuts and drilling through hardscaping or structural elements to add new conduits to connect Electric charging station to power sources can also be cost prohibitive.

III CHARGING STATION LOCATION: [2]

An ideal electric charging station should be convenient and easy to see, there are various sites suitable for charging station like various business and government sites, The level 2 charging, which provides a substantial charge over several hours, is well suited to retail stores as well as other locations with similar characteristics, such as restaurants, theatres, hotels, shopping malls, and museums because visitors may park their vehicles several hours for their activities like shopping, seeing movies etc. even though level 1 charging is also suitable for long time charging.



Fig. 7. EV charging station installed in Public places

Types of Charging station location:

A common location of charging station which is benefits for business as well as visitors own electric vehicle charging:

1. Retails Stores
2. Parking Gurage
3. Offices Parking
4. Different unitalities
5. Government sites

There are many benefits to select a charging station in retail store, including attract a customer like

- Charging and parking fees
- Cost saving
- Advertising opportunity etc.

For example, some may offer free charging to maximize customer attraction, whereas others may generate revenue directly via charging or parking fees. When designing charging strategies, utilities must work within the restrictions created by their state Public Utility Commissions. The “Smart-charging” incentives provide PEV owners with convenient, low-cost charging in exchange for giving the utility some control over the charging schedule for grid-stabilization purposes. Although governments install charging stations to benefit their jurisdictions rather than generate profits, they may charge fees as a way to offset costs of station installation and operation.

IV METHODOLOGY

A site location for different electric vehicles a location model can be divided into two parts

1. Flow capturing location model
2. Point demand location model
 - In flow capturing model path of the trip point is considered and objective of this model is to facilities to capture a flow as much as possible
 - In point demand model location of demand in distinct place and demand is polygonal area based spatial object in a geographic space[3]

❖ **Site Selection Process:** Site selection process as below:[4]



Fig 8 Process of Site Selection

1. Target: A target is to identify the location in local state regional level by different types of plans
2. Identify: Identify potential charging station locations that are available and safe for public access including country Act accessibility, signage, lighting, and vandalism prevention. Location must be highly visible and trackable area. Appropriately distanced from other charging stations considering vehicle range and routes. Also different amenities like Wi-Fi drinking water restroom etc. are available
3. Engage: Engage with the site host to determine if they are willing to add EV charging stations to their site
4. Power: Area is engaged with power. Utility partner to understand site limitations and costs related to electricity supply at the potential site location, including grid-level constraints. Confirm that the utility can support the full power of the electricity required by the charging stations.
5. Services: It engages with the EV service provider to understand the charging station model connection speed and signal strength requirements so confirm availability sustainability of wireless internet connection for service
6. Expansion: Consider opportunities for future site expansion, such as increased electrical capacity and sufficient space to accommodate additional EV charging stations as demand increases.
7. Cost: Estimate costs, including available incentives, project costs, ongoing expenses/fees, construction costs, and electrical upgrade costs.

V. REGULATORY AUTHORITIES

Many countries has different authorities to manage a EV charging station process here we only discuss a authorities in India : [5]

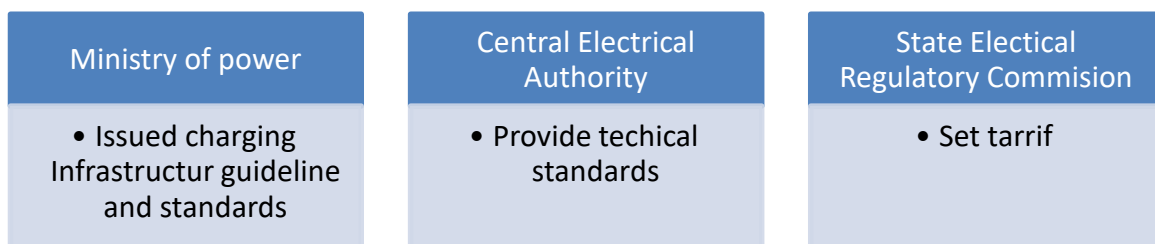


Fig 9 Regulatory Authorities in India

1. Ministry of Power (MoP): They provide Charging infrastructure guideline and standards for charging infrastructure, which enabling framework for implementation
2. Central Electrical Authority: This authority is responsible to provided technical standard and regulation for charging station
3. State Electrical Regulatory: They set the EV tariff and other regulations concerning electricity supply for EV charging.

Apart from land and electricity supply, EV charging standards are defined by the Bureau of Indian Standards (BIS), the standards-making body of the country. Annexure A provides a detailed overview of GoI notifications, guidelines, and regulations for EV charging infrastructure.

VI CONCLUSION:

After review this paper we concluded that to select a site for charging station is focusing on EV owners for them better charging facilities, Location should be good accessible easy to available and benefits for customer and companies.

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