Smart Facility for EV 10 Trends in EV Charging Infrastructure

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Trend 1: Charging Time Close to Refueling



- In the next few years, EV Charging will be close to a refueling experience:
- Contributing factors:
 - 1. Upgraded charging voltage of passenger vehicles
 - 2. Increased charging power of chargers
 - Shortened charging time to 10-15 mins



Trend 2: Improvement of Charging Facilities and Durability

Adapt to complex and harsh operating environments:



Dust





Plants



Condensation

Improved quality of components prone to damage







Trend 3: Green and Efficient

Improvement in charging infrastructure efficiency will have a large effect on reducing carbon emission



40+ Million EVs in 2025



330 Billion kWh Annual Charging Capacity

If the efficiency is improved by 3%



8 million Tons CO₂ Annual Reduction



Trend 4: Standardization of Core Components



 Different Ports
Various communications protocols

- Different charging guns
- Different power module
- Various power distribution component

Various Models



- Incompatible components from different vendors
- Different modules from same vendor cannot be installed together



Standardized Core Components

- Charging guns and power module
- Dimensions and terminals



Unified Port Communication protocols and port dimensions

Supporting replacement and upgrade



Universal Spare Parts

Simple Management



Trend 5: Ubiquitous and Environmentally Friendly

Large scale deployment of charging devices leads to advances:



Trend 6: Low-Power DC charging

Vast majority of future vehicle charging will go from AC to low-powered DC charging facilities around residential and campuses



- Faster Charging (20kW DC vs 7 kW AC)
- Easy Plug & Play with no code scanning



- networkEase for solar access
 - and adding battery

- Save cost as vehicles no longer require an on-board charger
- Reduce components and maintenance cost
- Save space on the vehicle layout

Trend 7: Diversified Charging Solutions

Industrial Usage





Heavy Truck - Battery Replacement

Commercial Usage





Taxi & Bus - Super Charging

Private Usage





Private Car

- Low Power DC
- Wireless Charging



Trend 8: Intelligent Charging Infrastructure

Digitization of the charging network allows for big data analysis



Intelligent Vehicle-Pile Interaction

- Plug & Play charging
- Dual protection for charging safety



Intelligent Equipment

- ✤ Fault warning
- Remote Operations & Maintenance
- ✤ Remote upgrade



Intelligent Charging Station

- Teamwork control for group charging
- Orderly charging



Trend 9: Security, Trustworthiness & Privacy Protection

- As the charging infrastructure becomes more than just a charging device, further requirements becomes necessary:
 - * High Network Security: capable of defending against online and local malicious attacks
 - High Availability: redundancy processing capability for defects
 - High Resilience: robustness to interference, strict privacy protection, and compliant use of personal and vehicle privacy data







Trend 10: Charging Infrastructure is a Node for Multi-Network Convergence

- The Charging Network, Power Grid, and Internet of Vehicles converge into single node to support each other
- The charging infrastructure will become a key entry point for the "Energy Internet"



Urgent : Hong Kong Should Use GB Standard

Rationale:

- 1. All car manufacturer should have the technical capability to comply with GB standard (Tesla in China is also using GB)
- 2. This will reduce EV charger infrastructure complexity (instead of investing in different charging guns, the money can be invested into more charging bays)
- **3**. To enable HK vehicles to travel to GB area, GB standard is a must (otherwise we are not helping the GBA collaboration)
- 4. With Chinese EV market being the biggest in the world, and there are many EV brands. Therefore consumers would have more choices
- Considerations: For cars already on the road, car makers can convert to GB with a service fee (we should set the standard when the EV population is still small)

Thank you

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