

Commentary for Sihui Battery Charging and Swap Station

Section I : Introduction

Presentation venue: the square in front of Sihui Battery Charging and Swap Station

Distinguished leaders, welcome to Beijing Sihui Battery Charging and Swap Station.

Located in the east of Sihui Hub and to the south of Beijing-Tongzhou Expressway, Sihui Battery Charging and Swap Station covers a total area of 2,208 square meters. The station mainly serves public transport vehicles shuttling along Chang'an Avenue and in areas surrounding Sihui, which can meet the swap needs of 160 buses on a daily basis. The construction of the station answers to the municipal government's vision of building Beijing into a "cosmopolitan city with Chinese characteristics", to the campaign of "People's Beijing, Hi-Tech Beijing and Green Beijing", and to the practices of integrating "smart grid" with road transport.

Lying in the west of the station is the main building of Sihui Hub, covering a floor area of 97,000 square meters. With a highest full-day capacity of 410,000 passengers, the main building becomes a large-sized comprehensive passenger terminal featuring the functions of inter-provincial long-distance transfer and public transport transfer. As an important part of Sihui Hub, the station, dedicated to electric vehicles, highlights the awareness of energy conservation and environmental protection as well as the efficient, smart services of the hub, while promoting the dissemination and demonstration of the concept of "Green Travel".

The main structure of the station is two-storied: the battery swap workshop, monitoring room, secondary equipment room and distribution room are on the first floor, and the lecture hall and panoramic tour platform on the second floor. To have a clear picture of the operation of the station, I would like to invite all of you to proceed with the tour.

Section II : Vehicle Guidance System

Presentation venue: under the southern corridor on the second floor

Distinguished leaders, the LED screen up in front of us is exactly the main display of the intelligent guidance system used at Sihui Battery Charging and Swap Station. For the intelligent guidance system, its main function is to usher EVs to the swap position within the shortest time. When a bus is led to the area before the covered bridge, the main display can show the information needed to guide the bus to the designated channel so that the driver can park the bus to complete battery swap.

The whole system is composed of the outdoor guidance screen, indoor guidance screen, detection terminal, control computer, etc., which is a fully automatic and intelligent system incorporating guidance and swap position detection functions. The use of intelligent guidance system not only helps effeciently solve the distribution problem of swap positions, but also provide considerate, convenient service for public transport vehicles.

Please let me show you around the inside of the workshop.

Section III:Battery Swap Operation

Presentation venue: battery swap workshop

Distinguished leaders, here we are at the battery swap workshop, the core area of Sihui Battery Charging and Swap Station. It consists of four swap positions that can be shared by four buses at the same time. Each position is equipped with 110 battery chargers, 30 battery cabinets and 2 robots.

When an on-site vehicle enters the swap position, our technican will check whether there is any problem with the vehicle; if not, the monitoring personnel will be informed to give the swap order, thus achieving fully automatic battery swap operation.

Ahead of us, the public electric vehicle in the process of battery swap has 8 cases of batteries, including 2 big cases with a weight of 279kg each and 6 small cases with a weight of 172kg each, totaling 1.6 tons. The complete set of battery pack has a rated energy of 138.7 degree, providing a fully charged time of 3 hours. A fully charged bus can run for an average 100 kilometers.

To ensure the balance of the vehicle during battery swap, the robots adopt the

method of cross-battery swap. The whole procedure of battery swap is as follows: first, for the robots on both sides, one takes the battery from the battery rack and the other takes it out of the vehicle, then they rotate to push the new battery into the vehicle and put the swapped battery into the battery rack. The combined time of battery swap for a complete vehicle is 10 minutes.

Each robot has a frame structure with four fixed columns, featuring a large carrying capacity and an effective load-bearing of 2.4 tons. The built-in rotating mechanism is available to achieve the reversing of battery box, ensuring the safety of the person, vehicle and equipment during battery swap. In addition, its visual analysis system and the capacity of self-adaption to the highly changed vehicle allow the battery swap operation to be done in an orderly and efficient way.

After the bus driver parks the vehicle that needs battery swap at the station, a ferry driver will drive it into the designated position for battery swap according to the guidance system, and at the same time the dispatching personnel will maintain the normal operation order of buses. At present, at the station there are 40 public transport vehicles serving two bus lines, namely Lines 455 and 496, starting from Sihui Hub both and extending to Nanhuayuan and Jingkangli respectively. The round trip for each line measures roughly 23 kilometers. Swapping the battery twice, a bus driver can make 6 round trips every day.

From September 16, 2013 on which it was officially put into use to June 30, 2014, the station swapped a total of over 18,100 batteries, powering buses to run 1.38 million kilometers. The accumulated power consumption reached 1.43 million kWh, the average number of batteries swapped per day pointed to 65.9, and carbon emission was reduced by 1,242 tons. As of the end of 2014, the station would be serving 120 EVs.

In terms of revenue, the relevant charging standard issued by Beijing municipal government is followed, that is, the service charge for battery charging and swap is RMB 33,000 per vehicle per year, and the electric charge for charging is in accordance with the general price standard for industrial and commercial power use. Assuming the station serves 120 EVs, we can see that the annual service charge for battery charging and swap is RMB 3.96 million and the all-the-year electric charge RMB 4.5 million.

The first floor is divided into the office area and the battery swap workshop. The office area includes the monitoring room, secondary equipment room and offices,

etc.

Now, let's enter the monitoring room to get an understanding of the whole monitoring system.

Section IV: Monitoring System

Presentation venue: monitoring room on the first floor

Distinguished leaders, here we are at the monitoring room of Sihui Battery Charging and Swap Station. This is the center of Sihui Battery Charging and Swap Station.

(Turning on the operating management system) The operating management system for EV battery charging and swap service network is a platform where Beijing Electric Power Company performs network-based management to all battery charging and swap stations within the jurisdiction, mainly including centralized monitoring, video surveillance, operation management, asset management, data analysis and other functions. Centralized monitoring and video surveillance modules can achieve real-time monitoring and analysis of facilities' condition as well as chargers, batteries, charging points and other equipment within the battery charging and swap station, enabling the operators to control the operating conditions of all of our battery charging and swap stations. Operating management and asset management modules enable a daily inspection tour of and performance maintenance and equipment management for the facilities at a battery charging and swap station. Our company has built a data monitoring network for operating management system and station grade monitoring system, unleashing the advantage of "independent management and centralized monitoring" of all the battery charging and swap stations in Beijing.

This is our operating management system at the corporate level, and now we proceed with the station-grade monitoring system.

(Turning on the main interface of the monitoring system) The monitoring system used at the battery charging and swap station is easy to operate. The whole interface is designed based on the actual placement of the workshop batteries. Every square represents a case of batteries, with the red light representing battery in charge and the green one indicating battery fully charged. In their daily work, monitoring personnel can charge the batteries just by pressing the lower operation

button, and achieve linked battery swap by controlling the robots at swap positions. The upper function menu enables monitoring personnel to inquire about and analyze the historical data and operation records of chargers and batteries, and prepare a report. (Turning on the sub-interface of the monitoring system) On the sub-interface of the monitoring system, we can see the real-time information about charging, including important data like the condition of chargers in service, charging voltage, current and electric quantity, charging status of each pack of batteries, voltage of single cell, and temperature of battery pole, as well as failure information on charger and battery in charge and so on (showing the leaders data items displayed on the screen). By monitoring the state of charger and battery on a real-time basis, we can perform segment-based intelligent charging to lithium-iron-phosphate batteries, improving the safety of charging and discharging of lithium-iron ones, and extending the lifecycle of batteries. On the strength of science and technology, the three characteristics of being “efficient, sustainable, and safe” can be embodied and coexist in clean energy battery.

Conclusion:

Distinguished leaders, let’s call it a day. Thanks for your presence and guidance again. If you have any problem, please feel free to tell me.