



# **TUMiVolt Charging Station: E-Bus Performance Assessment Competition (EB-PAC) in China**

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## Background

- By the end of 2020, there are 466,147 New Energy Buses were in operation in China. The share of New Energy Buses (NEB) in the overall bus market increased from about 1% in 2013 to 66% in 2020.
- More than 90% of the newly procured NEBs are Battery Electric Buses
- Over 80% of the batteries are Lithium Iron Phosphate Batteries
- The average operating mileage of Battery Electric Bus is 133 km/day, that of the Plug-in hybrid is 167 km/day



# Introduction of the E-Bus Performance Assessment Competition (EB-PAC)

## Objective:

- Advocating the “Green Mobility and Bus Prioritization” development principle
- Pushing forward NEB technology and the application of AI in bus sector
- Testing the performance of E-bus in road environment similar to the real operating environment

## Host:

- China Academy of Transport Science
- China Highway and Transportation Society
- China Road Transportation Association
- National Bus Quality Supervision & Inspection Center

Organizer: Chongqing Vehicle Assessment Institute

## Supervisor:

Department of Transportation Service, Chinese Ministry of Transport



# Introduction of the E-Bus Performance Assessment Competition (EB-PAC)



- Participating buses to perform the required tasks
- Assessment
- Award ceremony
- Forum





## Introduction of the E-Bus Performance Assessment Competition (EB-PAC)

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Three type of prizes are awarded:

- Overall Winner
- Energy Efficiency Winner
- Driving Range Winner

Participating buses are divided into 3 categories :

- 8-9 meter
- 10-11 meter
- 11-12 meter

Location:

- The city of Chongqing (with live cast through various media)



# Technical Indicator

NO	Category	Indicator	Test Method	Weight
1	Energy Efficiency	Electricity Consumption per 100 kilometer	<p>Electricity consumption is measured through a dynamometer during the whole trip. The per 100 Kilometer Electricity Consumption is calculated based on the average electricity consumption.</p> <p>The total driving distance is 55 km. All buses are required to start with State of Charge (SOC) over 80%.</p>	40%
2	Mileage	Driving range	Estimated according to the electricity consumption and real time battery capacity during the 55 km trip.	20%

# Technical Indicator

NO	Category	Indicator	Test Method	Weight
3	Power	Gradeability	The time used to climb from the bottom to the top of the designated slope.	15% (40%)
		Acceleration	All buses are required to start on the flat ground and keep an even speed of 30 (29-31) km/h and then go with full speed to 60km/h.	15% (60%)

# Technical Indicator

NO	Category	Indicator	Test Method	Weight
4	Comfort	Noise Level	Noise levels are measure on two locations within the car (near the driver and at rear area) when buses are driving on an even speed of 50 km/h.	25% (70%)
		Smoothness	The time used to accelerate from 30km/h to 60km/h  All buses are required to start on the flat ground and keep an even speed of 30 (29-31) km/h and then go with full speed to 60km/h.	25% (30%)



# Technical Indicator

NO	Category	Indicator	Test Method	Weight
5	Safety	Capability to pass through water	All buses are required to pass through watered section (depth of water: 300 mm) at an even speed of 10km/h.	Veto
6	Electromagnetic Compatibility (EMC)	Intensity of low frequency Electromagnetic	<p>The intensity of low frequency electromagnetic measured near driver's head on the following circumstances:</p> <ul style="list-style-type: none"> <li>• the bus SOC is at over 20%</li> <li>• When buses stops</li> <li>• When buses drive on an even speed of 40km/h</li> <li>• When buses drive on an even speed of 60km/h</li> </ul>	Extra

## Discussion

- Impact of EB-PAC
- Replicability in other countries/regions
- Other



**Thank you!**