Zemo Partnership | **Zero Emission Bus Certification ID:** **BYD BD11E02** | Approved Test facility UTAC

Zero Emission Bus Certificate

Customer:	**BYD**			**DYNAMOMETER SETTINGS**		
Customer Address:	**Shenzhen, Guangdong, China**	*Telematics Capability*	Yes	Test Weight	16414	kg
Test Purpose:	**Zero Emission Bus Testing**	*Maximum Speed (km/h)*	100 km/h	F°	-413.30	N
Vehicle Manufacturer:	**BYD**	*Seated Capacity*	62	F¹	-8.3360	N/kmh
Vehicle Model Name:	**BD11E02 - LOC06S44N2P0000003**	*Passenger Capacity*	84	F²	0.232229993	N/kmh ²
Powertrain Technology	**Battery Electric**	*Declared Unladen Weight (kg)*	13750	*Equivalent test passengers*	31	passengers
Powetrain Configuration	**Hair Pin hub motor x 2**	*Gross Weight (kg)*	19500	*Measured Unladen Weight*	14306	kg
Zero Emission Heating	**Heat Pump**	*GVW Check*	**OK**	Number of consecutive tests completed	4	Tests

Battery Specification		**Charging and Refuelling Capability**		**Hydrogen Specification**	
Battery Manufacturer	**BYD Blade**	**Plug Type**	**CCS2**	**Fuel Cell Manufacturer**	**N/A**
Battery Chemistry	**LFP**	**Max Charge Capability (kW)**	**Up to 500 kW**	**Fuel Cell Power Rating (kW)**	**N/A**
Battery Installed Capacity (kWh)	**532**	**Charger Compatibility**	**DC**	**Hydrogen Storage Capacity (kg)**	**N/A**
Battery Usable Capacity (kWh)*	**532**	**Charge time from 20-80% SOC****	**1.3 - 2 hours**	**Hydrogen Storage Pressure (bar)**	**N/A**

* Recommended manufacturer guideline, subject to warranty ** Based on manufacturer estimate

Declared fuel, properties and source plus carbon conversion factors

Well-to-Tank Factor:	***Electricity***	**72.65**	**g CO2e / MJ**	*Fuel Provider*	**UK market standard**	*WTT evidence*	**DBEIS Conversion 2022**
Well-to-Tank Factor:	***Hydrogen***	**N/A**	**g CO2e / MJ**	*Capacity of Tanker (kg)*	**N/A**	*Fuel Type / Pathway*	**UK Grid Electricity**
Energy Density	***Hydrogen***	**N/A**	**MJ / kg**	*Transport Distance of Hydrogen (km)*	**N/A**	*Energy Source*	**UK Grid**

Emissions and Energy consumption results from approved test facility - Average 4 tests

Test Phase	HC (g/km)	CO (g/km)	NOx (g/km)	PM (g/km)	CO_2 (g/km)	CH_4 (g/km)*	N_2O (g/km)*	Total Energy Consumption (kWh)	Vehicle Energy Consumption (kWh/km)	Grid Electrical Energy Consumption (kWh/ 100km)
Outer Urban	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.50	0.70	79.18
Inner Urban	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.30	0.92	104.49
Rural	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.20	0.57	64.65
LBC Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.80	0.76	86.24
UK BUS Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11.00	0.68	**76.48**

Zero Emissions (Z.E.) Range: Energy consumption and charging efficiency

Test Charger Used	**156 kW (UTAC)**	**Total measured energy consumed on vehicle (kWh)[1]**	**54.72**	**Max ZE Range at 100% SOC (km)**	**788**
Hydrogen Energy Over Test (kWh)	**N/A**	**Measured grid energy during charging (kWh)**	**61.98**	**Max ZE Range at 80% SOC (km)**	**630**
Hydrogen Delivered to Vehicle (kg)	**N/A**	**Grid-to-Wheel efficiency (%)[2]**	**88%**	**Test Distance Travelled (km)**	**72.84**

[1] Total measured energy may include energy used during the 23 minute warmup, this is needed for charge efficiency calculation.

[2] Grid to Wheel efficiency represents the total energy losses between the grid and the wheels of the bus.

Calculated total Well-to-Wheel GHG CO_2 equvialent emissions over test

Test Phase	Fuel Energy (MJ /km)	Fuel WTT*GHG Emissions (g CO_2e / km)	Electrical Energy (MJ / km)	Electricity WTT* GHG Emissions (g CO_2e / km)
Outer Urban	N/A	N/A	2.85	207.09
Inner Urban	N/A	N/A	3.76	273.28
Rural	N/A	N/A	2.33	169.08
LBC Average	N/A	N/A	3.10	225.54
UK BUS Average	N/A	N/A	2.75	200.02

Data Generated by (On behalf of Test facility): *Date:*

Data Approved by: *Date:*

Zero Emission Bus Certificate Summary

Test Vehicle			*Average Euro VI Diesel Equivalent*		
Greenhouse Gas Emissions: Well-to-Wheel	**200.0**	**g CO2e / km**	**Average Diesel GHG Emissions Equivalent**	**1271**	**g CO2e / km**
WTW CO2 per passenger km (@ Max Pass Capacity)	**2.4**	**g CO2e/pass km**	**WTW CO2 per passenger km (@ Max Pass Capacity)**	**15.1**	**g CO2e/pass km**

Overall Zero Emission Bus Performance

WTW GHG saving	**1071.3 g CO2e / km**	**Maximum Theoretical Zero Emission Range (km)**	**787.9**
% WTW GHG saving	**84% g CO2e / km**	**Vehicle Energy Consumption (kWh/ km)**	**0.68**
Approved as Zero Emission Bus? (50% GHG saving or more)		***YES***	

**** WTT : Well-to-Tank*** ***** TTW : Tank-to-Wheel*** ****** WTW : Well-to Wheel***

COMMENTS: LBC = London Bus Cycle - Inner & Outer Urban phases of UKBC only. **Note rear doors did not close at 5393 secs causing reduced average cabin temps - Test vehicle included extra equipment (weight) than production vehicle intent, measured weight used as baseline for test to ensure worst case.**

Heating Requirement	**Cell**	**Lower Saloon**	**Upper Saloon**
Target Temperatures ±2 (°C) :	**10**	**17**	**17**
Average Temperatures across testing (°C)	10.00	15.18	15.94

Test Numbers: 20241030_1533_2xUKBC, 20241030_1759_2xUKBC

Certificate approved by:
On behalf of Bus manufacturer Yichao Wu - Product Director Yichao Wu 10-04-2025

Certificate Approved by:
On behalf of DfT / Zemo Partnership Andy Eastlake - Chief technical consultant