

Zero Emission Bus Certificate

Customer:	Switch Mobility Ltd				DYNAMOMETER SETTINGS		
Customer Address:	Hurricane Way South, Sherburn in Elmet, LS25 6PT	Telematics Capability	Yes	Test Weight	9290	kg	
Test Purpose:	Zero Emission Bus Testing	Maximum Speed (km/h)	80 km/h	F ⁰	-208.26	N	
Vehicle Manufacturer:	Switch Mobility Ltd	Seated Capacity	29	F ¹	-0.1802	N/kmh	
Vehicle Model Name:	Metrocitiy EV	Passenger Capacity	60	F ²	0.17004	N/kmh ²	
Powertrain Technology	Battery Electric	Declared Unladen Weight (kg)	7800	Equivalent test passengers	15	passengers	
Powertrain Configuration	Direct Drive	Gross Weight (kg)	13000	Measured Unladen Weight	8270	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	Kriesel	Plug Type	CCS2 & AC Type 2	Fuel Cell Manufacturer	N/A		
Battery Chemistry	NMC	Max Charge Capability (kW)	Up to 84kW / 44 kW	Fuel Cell Power Rating (kW)	N/A		
Battery Installed Capacity (kWh)	226	Charger Compatibility	DC / AC	Hydrogen Storage Capacity (kg)	N/A		
Battery Usable Capacity (kWh)*	208	Charge time from 20-80% SOC**	2-5 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 ₂ O (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	6.57	1.01	123.41
Inner Urban	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.41	1.36	165.60
Rural	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.60	0.75	91.78
LBC Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.98	1.11	135.17
UK BUS Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15.58	0.95	115.54

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

Test Charger Used	22 kW	Total measured energy consumed on vehicle (kWh) ¹	96.00	Max ZE Range at 100% SOC (km)	219
Hydrogen Energy Over Test (kWh)	N/A	Measured grid energy during charging (kWh)	117.00	Max ZE Range at 80% SOC (km)	175
Hydrogen Delivered to Vehicle (kg)	N/A	Grid-to-Wheel efficiency (%) ²	82%	Test Distance Travelled (km)	65

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 CO₂ equivalent emissions over test

Test Phase	Fuel Energy (MJ / km)	Fuel WTT*GHG Emissions (g CO ₂ e / km)	Electrical Energy (MJ / km)	Electricity WTT* GHG Emissions (g CO ₂ e / km)
Outer Urban	N/A	N/A	4.44	322.78
Inner Urban	N/A	N/A	5.96	433.10
Rural	N/A	N/A	3.30	240.03
LBC Average	N/A	N/A	4.87	353.53
UK BUS Average	N/A	N/A	4.16	302.17

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	302.2 g CO ₂ e / km
WTW CO ₂ per passenger km (@ Max Pass Capacity)	5.0 g CO ₂ e/pass km
Overall Zero Emission Bus Performance	
WTW GHG saving	743.0 g CO ₂ e / km
% WTW GHG saving	71% g CO ₂ e / km
Maximum Theoretical Zero Emission Range (km)	
Vehicle Energy Consumption (kWh/ km)	
219.2	
0.95	
Approved as Zero Emission Bus? (50% GHG saving or more)	
YES	

* WTT : Well-to-Tank

** TTW : Tank-to-Wheel

*** WTW : Well-to Wheel

COMMENTS: Emission results marked in red are below detection levels. LBC = London Bus Cycle - Inner & Outer Urban phases of UKBC only. Tests 2 & 3 were not consecutive due to test in between containing a missed hill during the test, rendering it invalid.

Heating Requirement	Cell	Lower Saloon	Upper Saloon
Target Temperatures ±2 (°C) :	10	17	17
Average Temperatures across testing (°C)	10.00	19.43	N/A

Test Numbers: 20220831_1114_2xUKBC, 20220831_1621_2xUKBC

Certificate approved by: On behalf of Bus manufacturer	Tom Cox 23/03/2023	Certificate Approved by: On behalf of DTF / Zemo Partnership	Tim Griffen 21.03.2023
-----------------------------------------------------------	-----------------------	-----------------------------------------------------------------	---------------------------