Section 5a: Schedule of Requirements and Technical Specifications

#	Item to be supplied Description/Specifications[1]	Quantity	Delivery Date	Other Information
1	**New standard electric buses. ~9-meter bus for urban application**	**2**	**28-Feb-2023**	**See Spec. Below**

SPECIFICATIONS FOR BATTERY OPERATED ELECTRIC BUSES FOR URBAN APPLICATIONS

Project Overview
Title: Towards Low Carbon Transport: Piloting e-mobility within Belize's Public Transport System
Donor: European Union
Implementing Partner: Ministry of Public Utilities, Energy, Logistics, and e-Governance
Administrating Agency: United Nations Development Programme (UNDP)

Project Objective
Promote capital investments in the development of a sustainable transportation ecosystem with a view to reduce transport related greenhouse gases (GHG) emissions in Belize. The Project will help to mitigate climate change; engage and build the technical capacity of transport-related policymakers, regulatory and other government agencies, financial institutions, and the private sector.

The Project, in partnership with private sector, central and local government institutions, will finance the piloting of e-mobility as a means of satisfying growing public transportation demands for modernization. The Project will focus on demonstrating conditions and early experience for e-mobility integration into the national public transportation system, informing sector growth and investment planning.

Use Case
The transport of goods and passengers within urban environments is a major contributor to the emission of GHG but also to noise pollution; declining air quality and road congestion. In response to the call for the modernization of Belize's public transportation sector, and with the financing support of the European Union, the Belize City Council, within the framework of its Sustainable City Agenda is piloting the climate-friendly transformation of urban transportation systems through the deployment of electric buses on key routes within Belize City.

The e-mobility solutions integrated into urban transportation system will provide for real-life testing of the efficiency of new modes of urban mobility and demonstrate the positive effects and technological as well as economic viability of sustainable transportation solutions with small-scale pilot projects.

[1] *Clustering items by lots, if any, is recommended, especially if partial bids will be allowed.*

For reasons of equipment scoping the following demonstrative route in Belize City is being presented. The route will connect north side residents with the Belize City commercial center as well as link residents of south side Belize City to educational facilities on north side Belize City. The route is ~19.2 km long and the estimated number of miles per bus on route per day is ~249.6 km. The route covers 3.49 square km of Belize City (~9.4% of its overall area) and targets 3,432 commuting passengers per day. The intent is to operate the buses from 06:00 a.m. to 7:00 p.m. at half hour intervals with each bus operating for a maximum of one circuit per hour: a total of 13 runs/day per bus.

The Belize City Council in partnership with Belize Electricity Limited will establish a primary charging station. The charging station will provide for Level II and Level III charging: during the workday Level III charging will be required to quickly top up the buses for redeployment; otherwise the buses will be charged using Level II chargers. A secondary SMART charging facility which allows for opportunity charge will be investigated to service the approved route. Opportunity charging extends the e-bus range, making them suitable for longer routes.

Required Services
Supply of two (2) new standard electric buses. ~9-meter bus for urban application. Financial proposal must include the following:

1. Maintenance and repair package (three years)
2. Capacity building package
   - Driver training/ precision docking
   - Maintenance and troubleshooting
   - Charging best practice and battery care
   - Major repair diagnostics
   - Safety systems
3. Recommended spares list

Procurement Method
Open Tender Single Stage

General Specifications

The climate is tropical; maximum shade temperatures at 45° C and maximum humidity of 90% at sea level.

The charging of traction batteries is expected to be done primarily at nighttime during off-peak hours (10.30 p.m. - 05.30 am) from the national grid (120/240V @ 60Hz) at the depot station, where charging units are to be installed. During the workday only top-up charging will be performed.

MINIMUM FUNCTIONAL SPECIFICATIONS (Commuter buses)	
01. VEHICLE PARAMETERS	
(i) Type	Left hand drive
(ii) Payload	Not less than 4,200 kg
(iii) Overall length	12000 mm (max)

(iv) Width	2600 mm (max)
(v) Turning circle (dia.)	21 m (max)
(vi) Max. speed	70 km/h
(vii) Driving range	≥ 400 km
02. ELECTRIC PARTS	
(i) Driving Motor	Dual independent synchronous motor Supplier to specify peak, intermediate and continuous power rating; and location of motors
(ii) Traction battery	Lithium-ion /$LiFePO_4$ (guaranteed life span of 10 years) Total energy (kWh) to be specified C-rate to be specified Number of deep cycles before battery reaches capacity fading of 80% to be specified Supplier to state max charging rate (kW) for Level III charging (Supplier can provide alternative battery options reflective of new emerging technology)
(v) Altoona Efficiency	Bidder to give details (kWh/Km and KPG_e) at SLW with HVAC
03. TRANSMISSION	Direct drive/ automatic transmission
04. SUSPENSION	Electronically controlled air suspension with kneeling function
05. BRAKE SYSTEM	Full air front and rear disc /drum brakes, ABS, regenerative braking, spring actuated parking brakes
06. STEERING	Integral power steering
07. TYRES	275/70R22.5
08. BODY	Monocoque body structure Body structure & paneling to be of electro-coated galvanized steel Floor height to be low and adjustable (one step entry/exit) with kneeling option and mechanical wheelchair ramp

	Interior PVC coated steel paneling & non-skid flooring Large windscreen (Split Windscreen) Large windows with curtains Rustproof poles and passenger handrails Electronic destination indicators at front and rear Electric bell with adequate no. of operating switches fitted on both sides Exterior painting of buses to be in conformity with Blue Green Colour palette (Bidder should attach a copy of the proposed paint scheme however, the final decision will be taken by the purchaser)
09. PASSENGER CAPACITY	Sixty**:** 40 seated; 20 standing Seats, where possible, should be double molded, vandal resistant lightweight aluminum or vinyl (hard plastic) with slip resistant features.
10. FLOOR HEIGHT	Floor height to be low and adjustable (one step entry/exit) with kneeling feature
11. PASSENGER DOORS	Front & center dual internal swing doors(minimum width 1,100 mm), to be electrically operated by the driver. Safety feature of inability to drive without closing doors should be available
12. EMERGENCY EXIT	There should be an emergency exit of size not less than 1,370mm x 750mm, behind the rear most seat
13. AIR CONDITIONER	If not standard, bidder to quote as optional with price
14. ACCESSORIES	Reverse monitor Fire extinguisher in drivers' compartment Certified Bus First aid box Tool kit Electronic clock Multi-function GPS tracking unit and CCTV ICT/ WiFi Connectivity: Bluetooth, Apple CarPlay and Android Auto optional USB charging at each seat

	PA system
15. <u>WARRANTY</u> 5 years or 300,000 Km minimum (In addition to the specifications also applicable for conventional buses, the manufacturer will supply information regarding: o Battery warranty with the warranty conditions (max. SOC, min. SOC, max. C factor to be applied). o Agreement on battery degradation o Vehicle availability: in case of turnkey agreement with bus manufacturer	
16. <u>CHARGING STANDARDS</u>	Level II: o Voltage: Single or Three Phase AC 240V o Peak Current: 80A o Max Power 19.2 kW o Connector/Coupler: SAE J1772 Level III: o Voltage: DC 200-600V o Peak Current: 400A o Max Power 240 kW o Connector/Coupler: SAE J1772/CCS1 Opportunity charging @ 5-minute intervals (supplier to state additional range to be gained) Time to 80% charge ≤ three hours
17. **<u>AVAILABILITY OF SPARES</u>**	Bidder to certify availability for 10 years
18. **<u>WORKSHOP FACILITIES</u>**	Bidder to certify availability with details