

Terms of Reference (ToR)
for
A 20kW Solar Charging Station for
Electric vehicles in the Rural Areas of
Bangladesh

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1. Executive Summary

The Centre for Policy Dialogue (CPD), a leading think tank in Bangladesh, is seeking qualified bidders to develop a sustainable solar-powered charging solution for electric rickshaws. This initiative aims to address the energy needs of remote rural areas with limited access to conventional power grids.

The project involves constructing a photovoltaic (PV) microgrid system in Konapara Char, Mymensingh, near the Brahmaputra River. The system will feature a 20-kW solar PV array comprising 36 panels (555 W each) installed over 1,000 square feet, along with ten charge controllers, five battery banks (60 V, 120 Ah), and associated chargers to support the charging of 10 electric rickshaws.

To execute the project, bidders can participate in one or more of the three lots:

1. Solar Panels
2. Battery Banks
3. Mounting Systems

Bidders may choose to bid for a single lot, multiple lots, or all three, depending on their expertise and capacity. Additionally, consortiums are welcome to form and bid collectively for all the lots.

2. Project Description

For this project a photovoltaic (PV) microgrid will have to be built which would be connected to the Solar PV Array for power extraction when it is required. The system would be used for charging 10 Electric Rickshaws. It is expected that a total capacity of 20kW solar PV is required for the smooth operation of the entire system. The loads would be functional for 24 hours however excess power generated from the PV array will be used to charge battery banks that will be used to charge the auto rickshaws in the nighttime. The designed microgrid will ensure net zero power consumption from the utility grid.

This system will consist of PV panels, ten charge controllers for Electric Rickshaws, 5 battery banks and its chargers to provide power at night (Fig. 1).

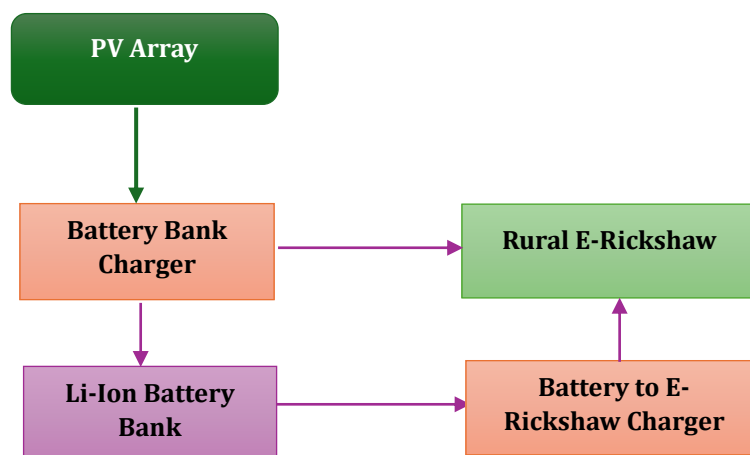


Fig. 1. Solar Charging System Configuration

In the proposed system, a central solar station will be set up which will be connected and used for two different purposes (backup battery bank charging, and direct Electric Rickshaw Charging). Once the vehicle charging is over, the solar panels will be fully used for backup battery bank charging that will be utilized for nighttime charging. So, it will result in minimum wastage of the solar power produced.

The research will be conducted at a field site located on *Konapara Char*, Mymensingh (Fig.2).



Fig. 2. Targeted area to install the system

The targeted area is located very near to Brahmaputra River (300 feet). The area consists of 650,000 m² (65 Hectares) of land. People mainly use electric Tri-wheelers as transportation here. This electric vehicle will be used to carry various loads and for transportation.

In the targeted area, a total of 36 solar panels will be installed for the microgrid system as shown in Fig. 3. This proposed microgrid will consist of ten auto chargers of 10kW, 5 battery bank chargers to charge 5 battery banks of 60V 120AH. Almost 20kW of total power is required to run the whole system combined with a remote monitoring system to centrally monitor and control the system. A field with an estimated area of 1000 square feet will be required to set up the 20kW PV array (36 panels of 555W rating each).



Fig. 3. Solar panel mounting

The vehicle charging system will be operational around the year. A battery bank will be charged through the solar array via the charge controllers. The battery bank will then be used to operate the vehicle charger at nighttime. There will be 5 battery banks. By charging these battery banks, vehicle running will be ensured in the nighttime too.

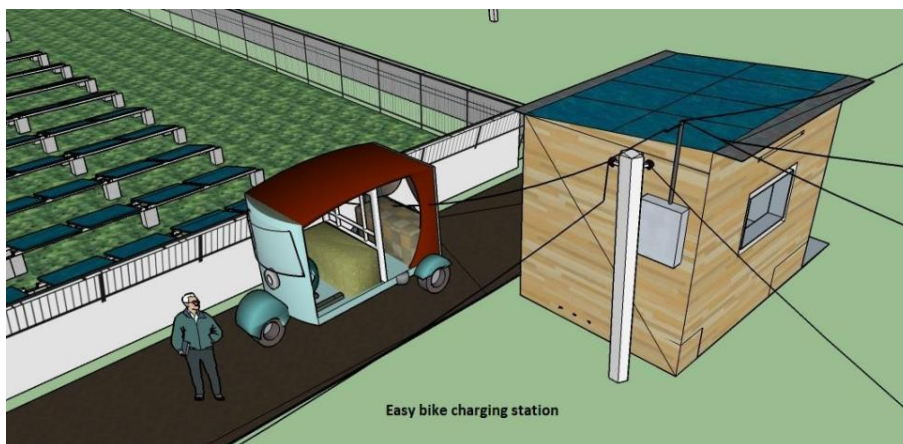


Fig. 4: Easy bike charging station

3. Scope of Work for the Bidder

As outlined in the executive summary, bidders can bid for any one or all three of the lots. The materials required and task descriptions for can be found below. If a bidder chooses to compete only in Lot 1, they will be responsible for providing a quotation for the materials required in Lot 1 and delivering those materials to the project location.

The same principle applies to Lot 2. If a bidder chooses to compete in Lot 2, they will be responsible for providing a quotation for the materials required in Lot 2, delivering those materials to the project location. Therefore, for Lot 1 and Lot 2, bidders are advised to prepare a budget that includes transportation costs.

However, for Lot 3, bidders are responsible for delivering the materials required for Lot 3 to the project location as well as constructing the charging station using additional materials procured from Lot 1 and Lot 2. Therefore, if a bidder chooses to participate only in Lot 3, they must secure the items required for Lot 3, deliver them to the project location, and establish the EV charging station using materials from Lot 1, Lot 2, and Lot 3.

If a bidder wants to compete in Lots 1, 2, and 3 simultaneously, they will be responsible for securing all the required materials, ensuring their delivery, and establishing the charging station. The materials required for each lot are outlined below.

Lot 1: Supply of Solar Panels for a 20 kW Solar Charging Station for Electric Rickshaws in Rural Areas of Bangladesh

To compete in this lot, bidders must submit a quotation for the materials listed in Table 01 below. Additionally, bidders are responsible for delivering the materials to the project location.

Parameters	Specifications
Total Module	35
Wattage	550 - 555 Wp
Cell	Mono
Weight	27 - 28 kg
Dimension	2256 x 1133 x 35 mm or 7.4 x 3.7 x 0.1 feet
No. of Cells	144 (6x24)
Module Efficiency	21.5-21.7 %
Open Circuit Voltage (Voc)	46-47 V
Short Circuit Current (Isc)	11.0-11.5 A
Voltage at Maximum Power (Vpm)	39 -40 V
Current at Maximum Power (Ipm)	10-11 A
Maximum Power (Pmax)	550-555 Wp

Table 01: Materials for 20 kW Solar Charging Station

Lot 2: Supply of Battery Bank and Charger for the Electric Rickshaw Charging Station

To compete in this lot, bidders must submit a quotation for the materials listed in the table 02 and table 03 below. Additionally, bidders are responsible for delivering the materials to the project location.

Parameters	Specifications
Battery Type	LiFePO4 (Lithium Iron Phosphate Battery)
Battery Specifications	Voltage: 60V, Capacity: 120Ah
Minimum Warranty	2 years
Life Cycle	4000 charge-discharge cycles
No of unit required	5

Table 02: Specifications of Battery Bank Charger

<i>Parameters</i>	<i>Specifications</i>
Battery Charger	60V, 20A
Efficiency	90% or higher
Display	Shows SoC, voltage, current, and temperature.
Bluetooth Connectivity	Yes
Battery Management System (BMS)	100A
Minimum Warranty	2 years
Safety Measures	The battery should include adequate safety features to prevent overcharging, over-discharging, short circuits, and thermal runaway.
No of unit required	5

Table 03: Specifications of Battery Bank Charger

Lot 03: Solar Panel Mounting, Site Preparation, Transmissions and equipment installation of Charging Station

To compete in this lot, bidders must submit a quotation for the materials listed in Table 04. Additionally, bidders are responsible for delivering the materials to the project location and constructing the charging station using the additional materials procured from Lot 01 and Lot 02. If a bidder chooses to participate only in Lot 03, they must secure the items listed in Table 04, deliver them to the project location, and establish the EV charging station using materials from Lot 01 and Lot 02 in addition to Lot 03.

20 kW Solar Panel mounting bracket/ Structure/ Frame	Frame Structure (L)	Material: 6061-T6 or 6063- T5 aluminium
		- Length: 27', Thickness: 2-3 mm
		No. of unit: 10
	Pillar (RCC)	- Length: 8", Width: 6"
		Height: 8'
		No. of Pilers: 40
Solar Panel installation site preparing and fencing	Fencing: Silver Iron Barbed Wire	Length 260'
		Width 6'
	Pillar for fencing (RCC)	Dia-8"
		Number of Pilers: 27
		Height: 9'

	Door (SS)	Length 6' width 5'
	Piller (RCC) for door	Length 12' width 10'
		Number of Pilers: 2
Electrical wire, Control and Protection Board	Connection Wire	Size: 12 AWG
		Capacity: Up to 20 A
		Length: 380'
	DC Circuit Breaker (MCCB) 2 Set	Current Rating: 50 A (with a safety margin for surge currents)
		Voltage Rating: At least 350 V DC (to match the operating voltage of the system)
		Breaking Capacity: Minimum of 1,000 A (to handle potential short-circuit currents)
		Number of Poles: 2-pole (for balancing the load in a dual-phase system)
	DC Fuse -2 Set	Current Rating: 70 A (for load protection)
		Voltage Rating: 350 V DC (to match the operating voltage)
		Fuse Holder: Mounting bracket for secure installation
		Breaking Capacity: Minimum of 1,000 A (to safely interrupt a short-circuit)
		Type of Fuse: Fast-acting fuse to quickly respond to overcurrent conditions
		Size: Select a standard size (e.g., Class K, Class J) to ensure compatibility with available holders.
DC Isolator Switch- 2 Set	Current Rating: 100 A (to match the system's maximum current)	
	Voltage Rating: 350 V DC (to ensure safe operation)	
	Clear ON/OFF indicators	
Transmission cable, Electrical Pole, Meter	Transmission Cable	Wire Size: 2 AWG
		Ampacity: 115A (sufficient for 50A)
		Voltage Drop: 2.01% over 450 feet (7.03V drop)
	Transmission pole	Number of Pole 10
		Height: 20' Diameter Bottom: 8 to 10 inches, Top: 5 to 6 inches
	Digital Meters (power, Voltage, Current)	No. 6 (DC)

E-Rickshaw Charge Controller	1000VA Charge Controller	Input Voltage: 250 ~350 Vdc
		Output Voltage: 40 ~70 Vdc
		Current Rating: ~15- 20A dc
		Power Rating: 1 kW
		Efficiency: Up to 95%
		Quantity: 10

Table 04: material for Solar Panel Mounting, Site Preparation, Transmissions and equipment installation

4. Submission Procedure

Bidders are requested to submit their proposals via email to procurement@cpd.org.bd by **December 04, 2024**. Proposals submitted after this deadline will not be accepted.

When submitting, bidders must use the subject line **Proposal for Solar Charging Station for Electric Vehicles** and include the relevant lot number(s) in brackets. For example, if bidding for Lot 1, the subject line should read: **Proposal for Solar Charging Station for Electric Vehicles (Lot 1)**. If bidding for Lots 1, 2, and 3, the subject line should read: **Proposal for Solar Charging Station for Electric Vehicles (Lot 1, Lot 2, Lot 3)**.

Proposals should be concise and must include three parts: **technical proposal, financial proposal and relevant documents**.

a. Technical Proposal:

In the technical proposal the bidders are requested to:

- Provide a detailed description of the tasks to be undertaken, including a clear and concise strategy for completing the activities, without replicating the Terms of Reference (ToR).
- Prepare a timeline for task delivery, including a brief description and a Gantt chart.
- Provide a description of why the bidding organization is well-suited for the task.
- Provide brief descriptions of previous experiences with similar work, including contact information for at least two organizations where such work has been successfully completed.
- Provide a brief description of the project personnel and their relevant experience.

b. Financial Proposal:

For the financial proposal the bidders are requested to:

- Provide a detailed breakdown of the costs for each material and task.
- Include applicable VAT and taxes as per the government rules.

c. Relevant Documents

For this part, bidders are requested to provide:

- Acknowledgment receipt for the last annual TAX return
- TIN Certificate
- Bank Account details
- Incorporation certificate
- Provide the contact information of the organization.
- Contact information of the project focal person.
- CVs of the project personnel

Table 05 below outlines the page limit for the contents of the proposal.

Topic	Page limit (max.)
Cover page	1
Table of content	1
Technical Proposal	
Detailed description of the tasks and strategy.	3
Timeline for task delivery	1
Suitability of the organisation	1
Brief descriptions of previous experiences	1
Brief descriptions of the project personnel	1
Any other relevant information (if necessary)	1
Financial Proposal	
Budget detailing out the total fee (including VAT and tax as per the government rules)	1
Relevant Documents	
Acknowledgment receipt for the last annual TAX return	1
BIN Certificate	1
Bank Account details	1
Incorporation certificate	1
Contact information of the project focal person	1
*CVs of the project personnel	N/A

Table 05: Page Limits for Proposal Contents

Note: *The CVs of the personnel involved in the project work can be sent as a separate file annexed to the proposal; they should not be included as part of the main proposal document.

5. Evaluation Criteria

Table 06 below outlines the evaluation criteria

Area(s)	Criteria	Weight
Technical	Understanding of the assignment	25
	Qualification of the key team members	5
	Timeline and strategy for the assignment	5
	Experience in similar projects	30
Financial	Competitive pricing with a reasonable and justifiable financial proposal	35
Total		100

Table 06: evaluation Criteria

6. Finance Related Special Notes

- All payments for the selected vendor will be made through Account Payee Cheque in favour of the selected vendor.
- CPD will deduct TDS from the billed amount as per Section 52A, Income Tax Ordinance 1984.
- Selected vendor will need to provide CPD Mushak-6.3 with the bill at 15% rate, as per Statutory Regulatory Order (SRO) 235.
- The selected vendor must provide Mushak-6.3.
- The selected vendor will need to produce original invoices for each delivery made under each Purchase Order within this contract period.

7. Disclaimers

- CPD reserves the right to select or reject any vendor who will drop the proposal for providing the service.
- Any attempt to unlawfully acquire and/or persuade to get the assignment will lead to immediate rejection of the respective service-provider, and CPD may also take legal actions, if required.
- Failure to deliver according to the terms of the contract shall subject the vendor to penalties as will be stipulated in the final contract.
- CPD will not be liable to indemnify any third party in respect for any claims, debt, damage, or demand arising out of this contract.
- CPD will not accept any Liability for the compensation for death, disability or hazards. Which may be suffered by the Supplier/Supply chain through this contract while supplying CPD, no such claims will be made against CPD.
- If the bidder breaches any term or condition of this agreement (part or all), or the conditions set out in any given Purchase Order/Contract, including, but not limited to, quality of the Goods/Services, Price and Delivery requirements, the buyer shall be entitled to immediately purchases goods/services from any other source/Suppliers, in addition to any remedy available in law or equity.
- Bidders must avoid actions conflicting with CPD's principles or creating real or perceived conflicts of interest and must uphold integrity, independence, and impartiality, refraining from public statements that could harm their relationship with CPD.
- CPD enforces zero tolerance for fraud, corruption, or terrorist financing, requiring vendors and consultants to act with honesty and integrity. Violations may result in disciplinary measures, legal action, and reporting to law enforcement for prosecution.
- CPD may unconditionally terminate any agreement if a supplier violates national labour laws or fails to protect children's rights, including safeguarding them from violence, abuse, exploitation, or harm.
- CPD enforces zero tolerance for sexual exploitation and abuse (SEA) and requires adherence to its Safeguarding Policy by all staff, vendors, and associated personnel.

8. Contact Information

For further official information on ToR the bidders are requested to contact:

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