Government of
Democratic Socialist Republic of Sri Lanka

Ministry of Power

CEYLON ELECTRICITY BOARD

Request for Proposals
Development of 100 MW_{AC} Solar PV Power Plant on Build, Own and Operate (BOO) Basis and Construction of 132 kV Transmission Facility on Turnkey Basis

REQUEST FOR PROPOSALS
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SCOPE OF WORK (TRANSMISSION LINE)

APPENDIX 4-A

SCOPE OF WORK
TRANSMISSION LINE

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1 SCOPE OF WORK- 132 KV TRANSMISSION LINE

1.1 GENERAL DESCRIPTION

The 132 kV transmission line to be constructed under this Contract forms an extension to the Ceylon Electricity Board transmission system and is destined to link the proposed grid substation at Siyabalanduwa 100 MW solar power collector and Monaragala grid substation. The Contractor shall coordinate his work with the other works in progress. The relevant geographical locations are shown on drawings.

1.2 EXTENT OF CONTRACT

132 kV double circuit, three-phase, Aluminium Conductor Steel Reinforced (ACSR) single Zebra transmission line with one Optical Fibre Ground Wire (OPGW) and one Galvanised Steel Wire (GSW) shall be constructed from Siyabalanduwa Solar Power Collector to Monaragala existing grid substation having approximately 27 km route length.

At Monaragala Grid Substation, a line bay gantry will be constructed, at which the transmission line from the proposed Siyabalanduwa Solar Power Collector substation shall be terminated.

This construction includes the design, manufacture, testing, supply, galvanising, painting (where specified), insurance, packing for export, shipment to a tropical climate, custom clearance, delivery to the site, unloading, soil investigation, clearing for and provision of access roads where necessary, complete erection, grounding, setting to work and defect liability for twelve (12) calendar months of the specified transmission line.

The preliminary survey will be carried out by the Employer. Profile Survey, including the check survey, plotting of support positions and pegging out, shall be carried out by the Contractor. The Contractor shall be responsible for terminating the phase conductors and earth wire connections at the substation gantry. The OPGW connections shall be terminated at the communication room of the respective grid substations. The construction will require the necessary skills and equipment to work near energised transmission lines.

Material shall be provided by the Contractor for the connection of slack spans to substation equipment where mentioned by the Employer. Erection of connections between the slack spans and the substation equipment shall be carried out by the Contractor under the supervision of the Employer. Where down-dropper connections to substation equipment require conductors or/ and different configurations to that for slack spans conductor, a suitable conductor, spacers (where necessary) and connectors shall be provided. They shall have a current-carrying capacity not less than that of the complete phase conductors. Post Insulators shall be provided as additional supports in places where essential electrical clearances are required.

During tower spotting and profiling, other than existing terrain conditions, the Contractor shall consider factors such as future infrastructure developments like roads, agriculture, housing schemes, etc. Additional clearances shall be kept as recommended by the Environmental safeguard documents and instructed by the Employer during Contract implementation.

In case if the proposed transmission lines shall be made to cross over other existing transmission lines and method of providing such crossings shall be decided based on the results of the detailed survey. When typical transmission line towers cannot be accommodated to make such crossovers due to inadequate land clearances, special towers shall be designed by the Contractor having taller body extensions with narrow bases. The cost for such towers shall be determined based on the per rate steel cost of the additional steel weight. At the same time, to make such crossings, gantries could be used by the Contractor. If gantries are used, they shall have the necessary mechanical withstanding capability (wind and weight span requirement) to absorb all forces imparted by the line conductors.

All new transmission towers shall be of lattice-type vertical formation double circuit with double peak configuration having I or V-shaped insulators in suspension towers as specified in clause 1.2.1 below. Glass or Porcelain type, standard profile, ball and socket insulators shall be used.

RTV coating of insulators shall not be required for this package.

The summary of the major equipment/item of the line is as follows.

- Conductor - ACSR Zebra
- Optical Fibre Ground Wire - Aluminium alloy/clad stranded line having 24 fibres
- Insulators - Standard Glass or Porcelain discs
- Hardware - fittings for insulators strings, GSW and OPGW
- Towers - Lattice Steel double circuit vertical configuration
- Foundations - Pad & Chimney, Pile or Rock anchor

1.2.1 TRANSMISSION LINE CONFIGURATION

Transmission towers shall be a typical double circuit, double peak, I-insulator configuration. Zebra ACSR conductors are used for three-phase double circuits with one Optical Fibre Ground Wire (OPGW) and one Galvanised Steel Wire (GSW) for shielding purposes. The Fibre link of OPGW is used for communication purposes.

1.2.2 CONDUCTORS

The selected conductor is Zebra (BS 215) ACSR (Aluminium Conductor Steel Reinforced). The outermost layer of the Aluminium conductor shall be stranded with right-hand lay. The core shall be made with galvanised steel, and all the accessories, including the conductor, shall withstand continuous operation up to 75°C. This item includes fittings such as mid-span joints and repair sleeves.

1.2.3 OPTICAL FIBRE GROUND WIRE (OPGW)

The OPGW shall be a centre tube type having 24 loose fibres. The maximum allowable temperature for the one-second duration is 190°C. The OPGW will serve as a ground wire to protect the transmission line, and the fibre embedded in it shall serve as the carrier for the communication system (i.e., used for; 2 channels for Voice – PLTS & ADMIN 4 channels for SCADA). OFAC (Optical Fibre Approach Cable) shall be used from the terminal tower to the substation gantry. This item includes all the fittings such as tension sets, suspension sets, joint boxes and Optical fibre patch panel units.

1.2.4 GALVANISED STEEL WIRE (GSW)

Galvanised steel wire shall conform to BS 183 or BS EN 50189, having 7/3.25 mm strand wire.

1.2.5 INSULATORS

Insulators shall be typical standard type Glass or Porcelain. This item also includes all the hardware fittings related to the following types of insulator strings, including dead ends and suspension clamps.

-Suspension insulator string

-Tension Insulator string

-Jumper suspension insulator string

-Heavy suspension insulator string

-Light duty/ Inverted light-duty tension insulator string

1.2.6 TOWER TYPES

Tower Configuration shall be a double circuit, double peak, I-type insulator configuration where the phase conductors are in a vertical arrangement.

Body extensions used: -3, +3, +6, +9, +12, +15, +18

Leg extensions used: -3 to +6

Tower Notation shall be as follows;

1	*Suspension Tower (0°- 2°)*	*TDL*
2	*0° - 10° Line Deviation Tower*	*TD1*
	0° Section Tower	
	2° Heavy Suspension Tower	
3	*10° - 30° Line Deviation Tower*	*TD3*
4	*30° - 60° Line Deviation Tower*	*TD6*

5	*60° - 90° Line Deviation and Terminal Tower (0°- 45° in line side & 0°- 90° in slack span)*	*TD9/TDT*

Towers shall include all accessories such as nameplates, number plates, danger boards, Air Observation plates, anti-climbing guards, step-bolts etc.

1.2.7 HARDWARE FITTINGS

Hardware fittings shall include Insulator string fittings, midspan joints, Vibration Dampers, etc.

1.2.8 FOUNDATIONS

All types of foundations shall be designed to withstand uplift, settlement, overturning and sliding when subjected to the specified conditions of tower loading. The allowance shall be made in foundation design for hydrostatic pressure where this may occur and the effects of seasonal rains, drying out, cyclic loading and wind-induced vibration of tower members.

Foundation Types

Suspension or Tension towers;

- Concrete pad and chimney
- Rock anchor
- Special foundations raft and pile foundations.

1.2.9 EARTHING ANGLE SET

Each leg of the tower shall be earthed by an earthing angle. Counterpoise earthing shall be provided if the earthing resistance is more than 10 ohms.

1.2.10 DESIGN SERVICES

The Complete Tower design and Profile design, including stringing charts, shall be carried out using the PLS Software Package developed by Power Line Systems, 5400 King James Way, Suite 300, Madison, Wi 53719, USA.

1.2.11 ADHERENCE TO THE ENVIRONMENTAL MITIGATION METHODS

Bidders are requested to comply with the requirements stated under Clause 1.25, Chapter 1 of Technical Specifications- Transmission Lines and the environmental safeguard measures described in the following documents.

– Environmental Safeguard Documents Prepared under the requirements of the National Environment Act (NEA)

– EIA – Environmental Impact Assessment Procedure