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இலங்கை நிலைபெறுதகு சக்தி அதிகாரசபை
Sri Lanka Sustainable Energy Authority



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மின்சக்தி மற்றும் வலுசக்தி அமைச்சின் சட்டரீதியான அதிகாரசபை
A Statutory Authority of Ministry of Power and Energy

Proposed 250MW Mannar Phase-II Grid Interconnection Plan

This is in connection with the earlier correspondence regarding the above subject.

For the power evacuation of the aforementioned project to the national grid, existing 220kV transmission line network from Nadukkuda Wind Collector Substation (WCS) to Mannar Grid Sub Station (GSS) will be utilized, along with the necessary grid modifications. Additionally, the following requirements are related to the Grid Interconnection that was suggested in the 250MW Mannar Phase-II project's Request for Proposal (RFP). However, the aforementioned existing 220kV transmission line network Environmental Impact Assessment (EIA) was already covered under the 103.5MW Mannar Phase-I project's EIA.

Specifications for Grid Interconnection

Wind Turbines of the Wind Farm Facility shall be connected to the WCS at Nadukkuda which will be augmented under the Development of 250 MW Wind Farm Facility. Nadukkuda WCS comprising a medium voltage switchgear as Gas-Insulated Substation (GIS) and high voltage switchgears as Gas-Insulated Switchgears and is located in the village of Nadukkuda in Mannar District. Grid interconnection of the Wind Farm Facility will be at the 33 kV voltage level. 09 Nos. of 36 kV Feeder bays, 3 Nos. of 220/33 kV step-up transformers and associated electrical infrastructure shall be required at WCS for the Wind Farm interconnection. The point of interconnection between the Wind Farm Facility and the CEB System (the "Interconnection Point") will be at 33 kV GIS panel's cable termination of each 09 Nos of feeder bays at the Wind Farm Facility side of the Nadukkuda WCS.

Utilization of the feeder bays and cable routing inside the GSS shall be subject to instructions and approval by the CEB to prevent obstructions by the same on future Wind Farm connections.

The complete interconnection of the overhead Aerial Bundle Cable (ABC) network of Wind Turbines to the Nadukkuda WCS shall be done using 36 kV Cu/XLPE single-core underground power cables inside the WCS by terminating the ABC cables at an outside gantry.

Hope this information finds you well for incorporate in the EIA report.

Thanking you.

Eng. J. M. Athula
Director General
Sri Lanka Sustainable Energy Authority

අංක 72, ආනන්ද කුමාරස්වාමි මාවත, කොළඹ 07, ශ්‍රී ලංකාව.
இல. 72, ஆனந்தகுமார சுவாமி மாவத்தை, கொழும்பு 07, இலங்கை.
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5.2.10 Energy Metering

The primary energy metering for the revenue calculations or any other commercial purpose will be done at the collection substation Interconnection Point and with the equipment installed at each feeder level at the substation. However, for individual wind turbines, metering facilities to record MWh and MVAR or any other required shall be provided. Interfacing the energy readings for each individual machine into the wind farm control system and to the SCADA at the National Control Centre shall be responsibility of the Project Company.

5.3 Specifications for Grid Interconnection

5.3.1. General

Wind Turbines of the Wind Farm Facility shall be connected to the Wind Collector Substation (WCS) at Nadukkuda which will be augmented under the Development of 250 MW Wind Farm Facility. Nadukkuda WCS comprising a medium voltage switchgear as Gas Insulated Substation (GIS) and high voltage switchgears as Gas Insulated Switchgears, as shown in Schedule 2 drawings and is located in the village of Nadukkuda in Mannar District. Grid interconnection of the Wind Farm Facility will be at the 33 kV voltage level. 09 Nos. of 36 kV Feeder bays, 3 Nos. of 220/33 kV step up transformers and associated electrical infrastructure shall be required at WCS for the Wind Farm interconnection. Nadukkuda Wind Collector Substation shall be augmented as per the scope of works document for the WCS. The point of interconnection between the Wind Farm Facility and the CEB System (the "Interconnection Point") will be at 33 kV GIS panel's cable termination of each 09 Nos of feeder bays at the Wind Farm Facility side of the Nadukkuda WCS.

Utilization of the feeder bays and cable routing inside the GSS shall be subject to instructions and approval by the CEB to prevent obstructions by the same on future Wind Farm connections.

The Project Company shall propose the optimum electrical connection arrangement of the Wind Farm Facility using prudent industry practices subject to the specifications provided in this document. The complete interconnection of the overhead ABC cable network of Wind Turbines to the Nadukkuda WCS shall be done using 36 kV Cu/XLPE single core underground power cables inside the WCS by terminating the ABC cables at an outside gantry, using necessary supporting structures, clamps, terminations, joints and all necessary and related works by the Project Company. Arrangements of the Wind Farm Power Collector System (WFPCS) and the selection of cable sizes shall be in such a manner that the energy loss in the cable network at the rated power output level of all Wind Turbines shall be as per Chapter 3 of Appendix 5-A of this document. The Bidder shall submit a detailed design report including the selection of cables sizes in complete overhead ABC line, UG cable sections inside WTG general area and inside GSS, calculation of energy losses, voltage rise expected at the high voltage terminals of each Wind Turbine transformer and the layout of the WFPCS with the proposal as described in Chapter 3 of Appendix 5-A of this document.

The Project Company shall calculate and submit a report on the maximum fault contribution by the Wind Farm Facility at the Nadukkuda WCS. Notwithstanding the specifications provided in this

document, the Project Company shall ensure the adequacy of the short circuit ratings of the equipment proposed for the interconnection.

5.3.2. Equipment for Interconnections

Each Wind Turbine shall be equipped with a Wind Turbines and connected to the Wind Farm Power Collector System (WFPCS) through a Ring Main Unit (RMU).

The proposal shall include the final Wind Farm layout and the corresponding final layout of the WFPCS considering the indicated turbine locations and the given complete site layout.

WFPCS shall be design, as per the specifications in Chapter 3 of Appendix 5-A, along the approach roads, second row main access road and inside the substation. These roads are properties of the local authorities hence, prior approval shall be obtained for all construction work done along these roads. Employer will only assist the Project Company in obtaining necessary approvals upon timely request for such assistance. Supply and installation of materials for cable connections at Nadukkuda WCS complying with the technical requirements and physical dimensions to suit the cable sockets in the 36kV GIS shall be the responsibility of the Project Company.

The Wind Turbines shall have adequate facilities to isolate their electrical systems from the grid, in case of upstream faults. Earthing of Wind Turbine electrical systems shall be proposed in such a manner to facilitate the above requirement. All necessary protection, measuring, switching/breaking and isolating equipment shall be supplied and installed by the Project Company as part of the Contract.

Temporary over voltage (TOV) situations that affects the WFPCS and transient recovery voltage levels (TRV and RRRV) that affects the switchgear at the Wind Collector Sub-Station (WCS) feeders shall be considered in the design of the Wind Turbine control and protection systems.

The Wind Turbines equipment shall be protected from impacts due to direct and indirect lightning strikes on the WFPCS. The magnitude of direct and indirect lightning levels selected as per the guidelines given in IEEE or CIGRE.

5.3.3. Grid Requirements

Wind Farm Facility and their accessories shall be ensured to be capable of operating safely and reliably within the grid conditions specified as below. These requirements are mainly based on the specific grid connection requirements for interconnecting the proposed Wind Farm Facility to the Nadukkuda WCS.

5.3.4. Wind Power Plant Control and Monitoring Capability

The proposed 250 MW Wind Farm shall be equipped with a Wind Farm Control and Monitoring System (WFCMS):

- i. With permanently installed and operational disturbance monitoring facilities for key variables including each input and output, and