

**Guidelines on Power Evacuation
from Wind Power Projects in Andhra Pradesh**

1. The Wind power projects are mostly developed as cluster. The power evacuation scheme for such cluster projects consists of the following:
 - (a) Laying of 33 KV feeders for evacuation of power from all Wind projects in a site.
 - (b) Construction of Extra High Tension Substation (EHT SS) (Receiving / Pooling SS) for grouping the total Wind power and step up to higher Voltage level.
 - (c) EHT Line for interfacing Pooling SS to existing nearest APTRANSCO network.
2. In case of Wind power projects which may come up as independent projects at a particular location, they will normally be interfaced to nearest grid SS at available Voltage level.
3. The Power Evacuation from prospective Wind power projects will be governed by the guidelines mentioned below:
 - (i) **Voltage level of evacuation:**

At 33 KV level:

The Wind power projects supply intermittent energy. These are seasonal and operate at low capacity. As such, evacuation of Wind power at 33 KV level is permitted as mentioned below duly taking into consideration of the type of conductor to be used and corresponding current carrying capacity as per the Bureau of Indian Standards (BIS) vide IS398/Part-IV:

Sl. No.	Project interfacing		Type of AAAC Conductor (size)	Current carrying capacity at 45 ^o ambient temp. as per standard	Calculated power carrying capacity at 33 KV level	Proposed Wind power capacity on each 33 KV line considering the temp. rise in conductor
	From	To				
(A)	(B)	(C)	(D)	(E)	(F) = ($\sqrt{3}$ x 33 KV x Current X PF at 0.9)	(G)
1	Wind project	Existing 33/11 KV DISCOM SS	55 sqmm	173 Amps	8.91 MW	8 MW
			100 sqmm	254 Amps	13.08 MW	10 MW*
			150 sqmm	370 Amps	19.05 MW	
2	Wind project	EHT Pooling SS or existing EHT APTRANSCO SS	55 sqmm	173 Amps	8.91 MW	8 MW
			100 sqmm	254 Amps	13.08 MW	12 MW
			150 sqmm	370 Amps	19.05 MW	17 MW

*Capacity is restricted considering less load availability in DISCOM SS.

At EHT level:

Project interfacing		EHT Level	Existing permissible capacity	Proposed Wind power capacity
From	To			
Pooling SS	Existing APTRANSCO EHT SS	132 KV	40 MW	(i) Up to 50 MW on SC Line (ii) Above 50 MW to 100 MW on DC Line
Pooling SS	Existing APTRANSCO EHT SS	220 KV	80 MW	Above 100 MW

The above evacuation facilities are permitted specifically for Wind power projects only, considering the following:

- (a) The Wind power projects are renewable and have low Capacity Utilization Factor (CUF).

(b) The Wind power projects are seasonal and operate at lesser capacity during most of the time.

(c) The optimum utilization of infrastructure will help the Wind power projects to enhance financial viability.

The above provisions shall not be adopted for other Non-conventional power projects, Conventional power projects and any other projects.

(ii) **Metering Point and energy accounting:**

(a) For Wind power projects coming under cluster scheme:

The common metering for Wind projects connected to a Pooling Substation (SS) shall be provided at EHT side of Power Transformer (PTR) in Pooling SS. This point shall be considered as Interconnection point where energy is delivered by each Wind power project to grid for sale. Also, metering for each individual project shall be provided at Project's switchyard (on 33 KV side of 415 V/33 KV Generator Transformer). As such, each Wind power project will have two metering points, one at Project's switchyard and another metering point is common metering point at EHT Pooling SS.

The DISCOM Officers & Wind Power Producer's representative shall take Joint meter readings for individual meters (at Project's switchyard) and common meter (at EHT side of pooling SS) every month.

The DISCOM will make payment to each Wind power project for delivered energy, which shall be calculated as per the formula mentioned below:

Delivered Energy to be billed for an individual project = $X_1 - (X_1 \times Z\%)$

Where

X₁ is the reading of the energy meter installed at the Project Site.

Z is the percentage line loss incurred in the 33 KV line between the Project and the Pooling (Receiving) Station and shall be:

$$Z = \left\{ \frac{(X_1 + X_2 + X_3 + X_4 + \dots) - Y}{(X_1 + X_2 + X_3 + X_4 + \dots)} \right\} \times 100$$

Where

Y is the reading of the common meter installed on EHT side of the Pooling SS and X₁, X₂, X₃, X₄ etc. are the readings of the energy meters installed at the various individual Wind projects connected to the Pooling Station.

(b) For Wind power projects coming as individual projects:

Metering shall be provided at designated APTRANSCO /DISCOM SS. The DISCOM Officers & Wind Power Producer's representative shall take Joint meter readings every month. The DISCOM will make payment for the energy recorded by the meter provided at SS.

(iii) Cost of power evacuation:

(a) For Wind power projects coming under cluster scheme:

The Cluster Project Developers and Wind Power Producers shall bear the entire cost for interconnecting the Wind projects with the grid and delivery of energy for sale, but not limited to, cost of 33 KV networks for interfacing individual Wind power projects to the Pooling SS, the cost of Pooling SS, Metering at individual project sites & Pooling SS etc., and cost of EHT line for interfacing Pooling SS with APTRANSCO network including cost of additional infrastructure on APTRANSCO side, required if any.

(b) For Wind power projects coming as individual projects:

The entire cost of evacuation shall be borne by the Wind Power Producer along with metering facility at SS and cost of necessary modifications/augmentations required, if any, at Grid SS.

(iv) **Owning & O & M of infrastructure for lifetime:**

The ownership of 33 KV network along with Pooling SS will be with the Wind Power Producers, who will own the Wind power projects connected to the Pooling SS. It shall be the duty of the Wind Power Producers, being the owners of the generating companies to operate and maintain the 33 KV network and Pooling SS as per the rules and regulations made for the purpose.

After completion of work, the ownership of EHT Line from Pooling SS to APTRANSCO grid shall be transferred to APTRANSCO and APTRANSCO shall carryout O&M of EHT line.

(v) **Power evacuation scheme finalization & sanctioning of estimate:**

The Cluster Project Developer or Wind Power Producers shall approach APTRANSCO with the details of proposed Wind power project scheme, which shall include proposed Wind power capacity, the location of Project, the proposed site & capacity of Pooling SS, nearest APTRANSCO grid to which the project is intended for interfacing, EHT Line voltage level etc.

APTRANSCO will study the proposed scheme and will intimate the feasibility for power evacuation. The APTRANSCO will approve the power evacuation scheme and also sanction the necessary estimates. APTRANSCO will also approve necessary drawings.

With regard to 33 KV networks, the Cluster Project Developer or Wind Power Producers shall approach the concerned DISCOM, who will sanction necessary estimates and drawings.

(vi) **Execution of Power evacuation work & Synchronization of Wind power projects with grid for commercial operation:**

APTRANSCO / DISCOM will take up the evacuation work on payment of total estimated cost by the Cluster Project Developer and / or Wind

Power Producers. Alternatively, the Cluster Project Developer and / or Wind Power Producers can take up the work on turnkey basis by paying supervision charges to APTRANSCO / DISCOM.

The supervision charges applicable to Wind power projects will be as follows:

- (i) 5% supervision charges on 33 KV network from Wind power projects to Pooling SS.
- (ii) 5% supervision charges on EHT Pooling Substation upto common metering point on HV side, which will be the interconnection point with the grid.
- (iii) 10% supervision charges on EHT System beyond interconnection point.

The above concessional supervision charges are applicable specifically for Wind power projects only, considering the following:

- (a) Wind power projects are renewable in nature and there is a need to encourage such renewable sources of power.
- (b) Andhra Pradesh is having one of the highest Wind potential but lowest investments. There is a need to maximize the utilization of such potential of renewable power.

The above concessional supervision charges are applicable to Wind power projects only and shall not be adopted for other Non-conventional power projects, Conventional power projects and any other projects.

The concessional supervision charges are applicable only for estimates to be sanctioned in future for evacuating energy from Wind power projects.

Where works are entrusted on turnkey basis, APTRANSCO Officers along with concerned DISCOM Officers shall supervise the evacuation works awarded on turnkey basis. The Cluster Project Developer and Wind Power Producers shall strictly adhere to the conditions stipulated in sanctioned estimate.

The Cluster Project Developer or Wind Power Producers shall file an application with DISCOM and obtain Temporary Power Supply for construction purpose. The Cluster Project Developer or Wind Power Producers shall have to pay all applicable charges for availing temporary power supply.

The metering for Wind projects shall be provided as per the standards laid down by APTRANSCO / DISCOM from time to time. The meters shall be tested at Central Government approved laboratory before installation. The Meters shall be installed and sealed by the authorized Officers of APTRANSCO and DISCOMs only.

After complete erection of the power evacuation infrastructure, the concerned Officers of APTRANSCO & DISCOMs shall inspect the same and confirm readiness for energisation. The Cluster Project Developer and / or Wind Power Producers shall obtain required approvals from Chief Electrical Inspector to the Government (CEIG) and other Government agencies as required from time to time.

The APTRANSCO & DISCOM shall issue permission for extending temporary supply for testing of Wind projects along with associated equipment. Power supplied from the grid to Projects during testing will be charged at HT-I Temporary Tariff and will be collected by DISCOM. The energy pumped into the grid during testing, if any, up to commencement of Commercial Operation shall be free of cost. This energy need not be taken into account for billing. The Officers of DISCOMs & APTRANSCO will witness testing and satisfactory performance of Wind projects.

The concerned DISCOM will issue permission for synchronization of Wind projects with the Grid for Commercial Operation and date on which 1st Wind generator of Project synchronizes with the grid for Commercial Operation shall be the Commercial Operation Date (COD) of the project.

(vii) Addition of loads to Pooling SS:

Whenever necessity arises, the Wind Power Producers shall permit APTRANSCO & DISCOM to connect loads to the Pooling SS at EHT level after the metering point without asking any compensation. However, the APTRANSCO & DISCOM shall ensure that connection of loads to Pooling SS will not have adverse effect on power evacuation from Wind power projects.

The APTRANSCO & DISCOM shall bear cost of new infrastructure proposed and also shall bear the cost of O & M of new infrastructure.

(viii) Execution of PPAs:

The Power Purchase Agreement (PPA) between the wind power producer and the Discom shall be as per the standard format approved by Andhra Pradesh Electricity Regulatory Commission (APERC).

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