



**Monitoring report form
(Version 04.0)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Enercon Wind Farm (Hindustan) Ltd in Karnataka
Reference number of the project activity	1259
Version number of the monitoring report	2
Completion date of the monitoring report	03/03/2015
Registration date of the project activity	27/10/2008
Monitoring period number and duration of this monitoring period	06 (01/11/2013 – 31/12/2014; including first and last days of monitoring period.)
Project participant(s)	M/s Wind World (India) Limited ¹
Host Party(ies)	India
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	Sectoral Scope: 1: Energy industries (renewable - / non-renewable sources) Applied Methodology: ACM0002, Version 06
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	173, 667
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	114, 101
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	0
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	114101

¹ With effect from 01/01/2013 name of Enercon (India) Limited has been changed to 'Wind World (India) Limited'

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project activity is installation of 68.8 MW wind power project ("Project") by Enercon Wind Farm (Hindustan) Ltd. in Karnataka state of India to provide reliable, renewable power to the Karnataka state electricity grid which is part of the Southern regional electricity grid. The Project will lead to reduced greenhouse gas emissions because it displaces electricity from grid connected fossil fuel based electricity generation plants.

The project activity consists of 86 WEGs of Enercon make E-48 and each machine capacity is of 800 kW (E-48) totalling to the capacity of 68.8 MW. The WEGs generates 3-phase power at 400V, which is stepped up to 33 kV and connected to 33kV metering points. From 33 kV metering point electricity transmitted to Wind World (India) Limited (hereafter referred as "WWIL") Sub-station. At sub-station electricity is step-up to 220 kV. From WWIL substation electricity is further evacuated to the state electricity grid at 220kV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V \pm 12.5%.

The first machine under the project activity was commissioned on 29/09/2006 and last machine under the project activity was commissioned on 28/12/2006. The expected operational lifetime of the project is for 20 years.

The total emission reductions achieved under current monitoring period (01/11/2013 to 31/12/2014) is 114, 101 tCO₂.

A.2. Location of project activity

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Project activity is located in Karnataka state of India. The turbines are uniquely identified as EWHPL-01 to EWHPL-86. The details of the physical location are as follows:

S.No.	District	Taluka	Village	No. of WEG's
1	Tumkur	Chikkanayakanahalli	Dasudi	20
		Chikkanayakanahalli	Nelenuru	5
		Chikkanayakanahalli	Ganadu	6
		Gubbi	Annenhalli	6
		Gubbi	Siddapura	9
2	Chitradurga	Hosadurga	Chikkabyaledakere	16
		Hosadurga	Kanubehalli	11
		Hosadurga	Arasinagundi	8
		Hosadurga	Elladakere	5
			Total	86

Individual WEG location numbers and coordinates are detailed out in below table:-

S.No.	WEG Unique Identification Number	Location No.	Latitude (N)			Longitude (E)		
			Degree	Minutes	Seconds	Degree	Minutes	Seconds
1	EWHPL 01	1	13	43	20.9	76	31	3.9
2	EWHPL 02	2	13	43	25.4	76	31	1.5
3	EWHPL 03	3	13	43	30.0	76	30	59.0
4	EWHPL 04	4	13	43	34.6	76	30	57.2
5	EWHPL 05	5	13	43	39.3	76	30	55.6
6	EWHPL 06	6	13	43	43.8	76	30	53.1
7	EWHPL 07	7	13	43	50.0	76	30	50.5
8	EWHPL 08	8	13	43	54.5	76	30	48.0

9	EWHPL 09	9	13	44	3.9	76	30	44.9
10	EWHPL 10	10	13	45	33.0	76	31	5.9
11	EWHPL 11	11	13	45	28.2	76	31	6.4
12	EWHPL 12	12	13	45	23.4	76	31	7.0
13	EWHPL 13	13	13	45	18.9	76	31	7.7
14	EWHPL 14	14	13	45	14.3	76	31	8.3
15	EWHPL 15	15	13	45	10.2	76	31	9.5
16	EWHPL 16	16	13	44	54.0	76	31	12.3
17	EWHPL 17	17	13	44	49.2	76	31	13.1
18	EWHPL 18	18	13	44	44.5	76	31	14.7
19	EWHPL 19	19	13	44	39.8	76	31	16.7
20	EWHPL 20	20	13	44	35.4	76	31	19.9
21	EWHPL 21	21	13	44	30.5	76	31	19.8
22	EWHPL 22	22	13	44	25.6	76	31	20.2
23	EWHPL 23	23	13	44	21.7	76	31	26.4
24	EWHPL 24	24	13	44	16.9	76	31	27.7
25	EWHPL 25	25	13	44	12.0	76	31	28.2
26	EWHPL 26	26	13	44	8.0	76	31	29.8
27	EWHPL 27	27	13	43	57.6	76	31	53.8
28	EWHPL 28	28	13	43	54.1	76	31	55.1
29	EWHPL 29	29	13	43	49.5	76	31	57.1
30	EWHPL 30	30	13	43	44.8	76	31	58.6
31	EWHPL 31	31	13	43	40.0	76	31	59.5
32	EWHPL 32	32	13	43	35.4	76	32	1.9
33	EWHPL 33	33	13	43	30.6	76	32	4.8
34	EWHPL 34	34	13	43	0.6	76	32	22.1
35	EWHPL 35	35	13	42	54.7	76	32	19.9
36	EWHPL 36	36	13	42	50.3	76	32	23.0
37	EWHPL 37	37	13	42	45.6	76	32	24.7
38	EWHPL 38	38	13	42	40.9	76	32	26.3
39	EWHPL 39	39	13	42	36.3	76	32	28.5
40	EWHPL 40	40	13	42	31.1	76	32	31.4
41	EWHPL 41	41	13	40	57.2	76	35	58.1
42	EWHPL 42	42	13	40	52.4	76	35	59.4
43	EWHPL 43	43	13	40	47.7	76	36	0.9
44	EWHPL 44	44	13	40	43.1	76	36	2.6
45	EWHPL 45	45	13	40	38.4	76	36	4.2
46	EWHPL 46	46	13	40	33.7	76	36	5.8
47	EWHPL 47	47	13	40	13.7	76	36	10.7
48	EWHPL 48	48	13	40	9.1	76	36	12.6
49	EWHPL 49	49	13	40	4.7	76	36	15.7
50	EWHPL 50	50	13	39	2.8	76	36	34.8
51	EWHPL 51	51	13	38	58.7	76	36	36.8
52	EWHPL 52	52	13	38	54.1	76	36	38.9
53	EWHPL 53	53	13	38	49.5	76	36	41.3
54	EWHPL 54	54	13	38	44.9	76	36	43.1
55	EWHPL 55	55	13	38	40.2	76	36	44.9
56	EWHPL 56	56	13	38	35.6	76	36	46.9
57	EWHPL 57	57	13	38	30.9	76	36	48.7
58	EWHPL 58	58	13	38	26.4	76	36	50.9
59	EWHPL 59	59	13	38	22.3	76	36	56.3
60	EWHPL 60	60	13	38	17.8	76	36	58.8
61	EWHPL 61	61	13	38	11.8	76	37	2.5
62	EWHPL 62	62	13	38	7.2	76	37	4.6

63	EWHPL 63	63	13	38	2.6	76	37	6.8
64	EWHPL 64	64	13	37	58.0	76	37	9.2
65	EWHPL 65	65	13	37	53.5	76	37	11.5
66	EWHPL 66	66	13	37	48.9	76	37	13.7
67	EWHPL 67	67	13	37	44.3	76	37	16.0
68	EWHPL 68	68	13	37	39.8	76	37	18.4
69	EWHPL 69	69	13	37	35.1	76	37	20.3
70	EWHPL 70	70	13	37	30.5	76	37	22.3
71	EWHPL 71	71	13	37	25.9	76	37	24.7
72	EWHPL 72	72	13	32	25.1	76	43	45.2
73	EWHPL 73	73	13	32	30.0	76	43	44.4
74	EWHPL 74	74	13	32	34.8	76	43	44.7
75	EWHPL 75	75	13	32	39.7	76	43	44.5
76	EWHPL 76	76	13	32	44.6	76	43	43.9
77	EWHPL 77	77	13	32	49.5	76	43	42.5
78	EWHPL 78	78	13	32	54.4	76	43	42.1
79	EWHPL 79	79	13	33	6.1	76	43	33.2
80	EWHPL 80	80	13	33	11.0	76	43	34.1
81	EWHPL 81	81	13	33	15.9	76	43	34.6
82	EWHPL 82	82	13	33	20.8	76	43	34.5
83	EWHPL 83	83	13	34	19.9	76	44	0.8
84	EWHPL 84	84	13	34	27.5	76	44	2.3
85	EWHPL 85	85	13	34	50.5	76	44	14.8
86	EWHPL 86	86	13	34	54.9	76	44	14.8

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A (host): India	Private entity A: M/s Wind World (India) Limited	No
...	...	

A.4. Reference of applied methodology and standardized baseline

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Title: Consolidated methodology for grid-connected electricity generation from renewable sources

Reference: Approved consolidated methodology ACM0002 (Version 06, EB 24, Annex 7)

UNFCCC web reference of methodology: http://cdm.unfccc.int/EB/024/eb24_repan07.pdf ; (Refer page no. 1 & 14 for title of baseline & monitoring methodology)

Baseline Methodology: Consolidate baseline methodology for grid-connected electricity generation from renewable sources

Monitoring Methodology: Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources

Tool: Tool for the demonstration and assessment of additionality, version 3.0 (weblink: <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v3.pdf>)

A.5. Crediting period of project activity

>>Type of crediting period : Fixed

Start date of crediting period : 27/10/2008

Length of crediting period : 10 years

A.6. Contact information of responsible persons/ entities

>> Contact detail mentioned in Appendix 1.

SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity**

>> The project activity consists of 86 machines (800 kW) of Enercon make E-48. The first machine under the project activity was commissioned on 29/09/2006 and last machine under the project activity was commissioned on 28/12/2006. Project activity WEGs were commissioned in three phases between 29/09/2006 & 28/12/2006. 56 WEGs under phase-I were commissioned on 29 Sep 2006, 9 WEGs under phase-II were commissioned on 26/10/2006 & 21 WEGs under phase-III were commissioned on 28/12/2006. The commissioning dates for all the machines included in the project activity are given in the table below.

Loc. no.	Unique Identification Number	Date of Commissioning
1	EWHPL 01	26/10/2006
2	EWHPL 02	26/10/2006
3	EWHPL 03	26/10/2006
4	EWHPL 04	28/12/2006
5	EWHPL 05	28/12/2006
6	EWHPL 06	28/12/2006
7	EWHPL 07	28/12/2006
8	EWHPL 08	28/12/2006
9	EWHPL 09	28/12/2006
10	EWHPL 10	29/09/2006
11	EWHPL 11	29/09/2006
12	EWHPL 12	29/09/2006
13	EWHPL 13	29/09/2006
14	EWHPL 14	29/09/2006
15	EWHPL 15	29/09/2006
16	EWHPL 16	29/09/2006
17	EWHPL 17	29/09/2006
18	EWHPL 18	29/09/2006
19	EWHPL 19	29/09/2006

20	EWHPL 20	29/09/2006
21	EWHPL 21	29/09/2006
22	EWHPL 22	29/09/2006
23	EWHPL 23	29/09/2006
24	EWHPL 24	29/09/2006
25	EWHPL 25	29/09/2006
26	EWHPL26	26/10/2006
27	EWHPL 27	29/09/2006
28	EWHPL 28	29/09/2006
29	EWHPL 29	29/09/2006
30	EWHPL 30	29/09/2006
31	EWHPL 31	29/09/2006
32	EWHPL 32	29/09/2006
33	EWHPL 33	29/09/2006
34	EWHPL 34	29/09/2006
35	EWHPL 35	29/09/2006
36	EWHPL 36	29/09/2006
37	EWHPL 37	29/09/2006
38	EWHPL 38	29/09/2006
39	EWHPL 39	29/09/2006
40	EWHPL 40	29/09/2006
41	EWHPL 41	29/09/2006
42	EWHPL 42	29/09/2006
43	EWHPL 43	29/09/2006
44	EWHPL 44	29/09/2006
45	EWHPL 45	29/09/2006
46	EWHPL 46	29/09/2006
47	EWHPL 47	29/09/2006
48	EWHPL 48	29/09/2006
49	EWHPL 49	29/09/2006
50	EWHPL 50	26/10/2006
51	EWHPL 51	26/10/2006
52	EWHPL 52	29/09/2006
53	EWHPL 53	29/09/2006
54	EWHPL 54	29/09/2006
55	EWHPL 55	29/09/2006
56	EWHPL 56	29/09/2006
57	EWHPL 57	29/09/2006
58	EWHPL 58	29/09/2006
59	EWHPL 59	26/10/2006
60	EWHPL 60	26/10/2006
61	EWHPL 61	26/10/2006
62	EWHPL 62	29/09/2006
63	EWHPL 63	29/09/2006
64	EWHPL 64	29/09/2006
65	EWHPL 65	29/09/2006
66	EWHPL 66	29/09/2006
67	EWHPL 67	29/09/2006
68	EWHPL 68	29/09/2006
69	EWHPL 69	29/09/2006
70	EWHPL 70	29/09/2006
71	EWHPL 71	29/09/2006
72	EWHPL 72	28/12/2006
73	EWHPL 73	28/12/2006

74	EWHPL 74	28/12/2006
75	EWHPL 75	28/12/2006
76	EWHPL 76	28/12/2006
77	EWHPL 77	28/12/2006
78	EWHPL 78	28/12/2006
79	EWHPL 79	28/12/2006
80	EWHPL 80	28/12/2006
81	EWHPL 81	28/12/2006
82	EWHPL 82	28/12/2006
83	EWHPL 83	28/12/2006
84	EWHPL 84	28/12/2006
85	EWHPL 85	28/12/2006
86	EWHPL 86	28/12/2006

WWIL operation and maintenance activities are ISO 9001:2008 certified and all the events are recorded in the log book available at the project site. Referring to the data available it can be inferred that there have not been any major special events for any of the machines that are included in the project activity. As a part of regular maintenance the machines are stopped for mechanical and electrical maintenance for 16 to 18 hours annually and for visual inspection for 6 to 7 hours quarterly. Further the consolidated performance report of project WEGs during the monitoring period including the down time, machine availability, grid availability, etc. has been added in Appendix 2. During the monitoring period there were no events or situations occurred, which may impact the applicability of the methodology.

The project activity consists of 86 WEGs of Enercon make E-48 and each machine capacity is of 800 kW (E-48) totalling to the capacity of 68.8 MW. The WEGs generates 3-phase power at 400V, which is stepped up to 33 kV and connected to 33kV metering points. From 33 kV metering points electricity transmitted to WWIL Sub-station. At sub-station electricity is step-up to 220 kV. From WWIL substation electricity is further evacuated to the state electricity grid at 220kV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V \pm 12.5%. The other salient features of the state-of-art-technology are:-

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawal (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEG with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking System.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts generation of power at wind speed of 3 m/s

WWIL has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured. Diagram of main component of Enercon make E-48 is shown in below picture:-

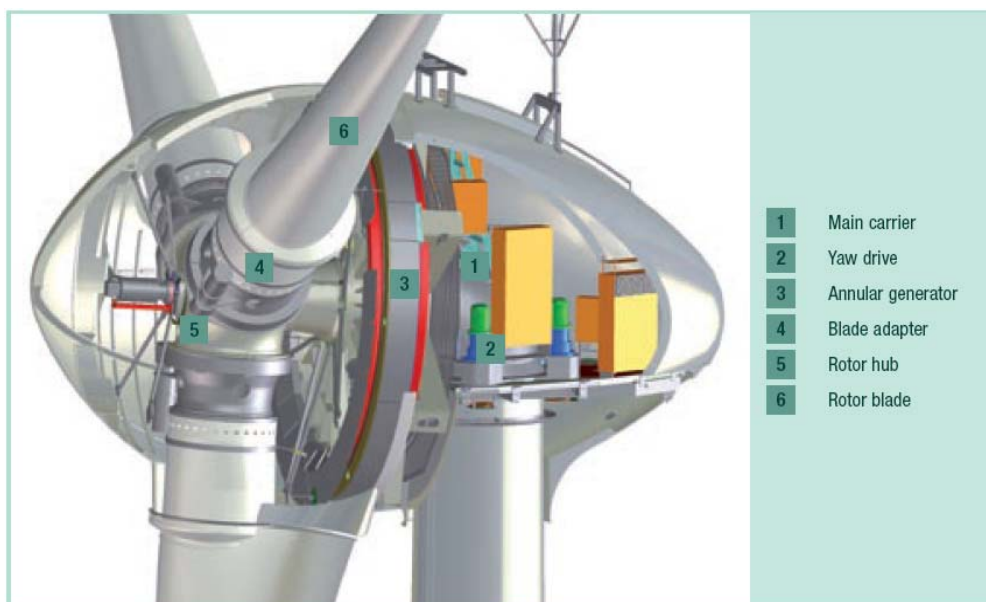


Figure: Enercon make E-48 Diagram.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

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Not applicable

B.2.2. Corrections

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A revision in the PDD has been approved on 08/01/2013 by UNFCCC. Reference of revised PDD: Version 6, dated 03/09/2012.

B.2.3. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

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A revision² in Monitoring Plan has been approved on 15/03/2011 by UNFCCC.

B.2.4. Changes to project design of registered project activity

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Not Applicable

B.2.5. Changes to start date of crediting period

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Not Applicable

² <http://cdm.unfccc.int/Projects/DB/DNV-CUK1185356859.49/view>

B.2.6. Types of changes specific to afforestation or reforestation project activity

>> Not Applicable

SECTION C. Description of monitoring system

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Approved monitoring methodology ACM0002 / Version 06, Sectoral Scope: 1, "Consolidated methodology for grid-connected electricity generation from renewable sources" --- Version 6, by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

This approved monitoring methodology requires monitoring of the following:

- Electricity generation from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where ex post determination of grid emission factor has been chosen

Since the combined margin emission factor has been fixed ex-ante in the PDD during validation, hence the monitoring of operating margin emission factor and build margin emission factor is not required. Value of operating margin, build margin & combine margin has been fixed throughout the crediting period. Further, wind based electricity generation is not associated with any kind of leakages. Hence, the sole parameter for monitoring is the electricity generated by the project activity and supplied to the state utility which is part of southern grid.

There are two main and check meters dedicated to project activity at 33 kV metering point for the project activity. The one set of main and check meter is connected to 56.8 MW and other set of the main and check meter is connected to 12 MW of the project activity. In addition to this there is one set of main and check meter (bulk meter) at 220 kV metering point at the WWIL substation is connected to the machines of the project activity and the machines commissioned by the other project developers. Therefore in order to determine the net electricity supplied to the grid by the project at 220 kV at the WWIL substation, the state utility applies the transmission loss to the meter reading recorded at the 33 kV metering point.

For the current monitoring period; at 220kV sub-station only the WEGs of project activity are connected and there is no WEGs of other customers while at the time of validation WEGs of other project activity were also connected to same 220kV sub-station that's why the generic procedure of apportion is mentioned below. Further it may be noted in future WEGs of other project activity might be connected to 220kV same sub-station depending on the requirements. Monitoring system and apportioning procedure mentioned below is given to provide the generic scenario and method of calculation to arrive the net electricity export of individual customers in case there is other project WEGs are also connected to same 220kV sub-station. This procedure of apportioning is applied by state utility only.

The transmission loss calculated by the state utility is endorsed / confirmed jointly by the representatives of WWIL and the state utility. The transmission loss applied to the project activity by the state utility is reflected in the joint meter readings (Form B) recorded at 33kV metering point. Net electricity supplied to the grid is calculated by applying transmission loss to the meter readings taken at 33 kV metering location of the project activity.

The procedure for calculation of transmission loss as given in the PPA is set-out below:-

$$Z = \frac{(X1 + X2+ X3+ X4+....+ Xn) - Y}{(X1 + X2+ X3+ X4+....+ Xn)} \times 100$$

Where,

$Z =$ Percentage transmission loss for export incurred in transmission line between the meters located at 33 kV metering point (including the machines of the project activity and other project developers) and the meters located at 220kV metering point (bulk meter: main and check) at high voltage side of receiving sub-station. **Refer Annex 3 for schematic of the flow diagram.**

Summation of meter readings at 33 kV metering points for all the project developers connected to receiving substation (including the machines of the project activity and other project developers)

$$= (X_1 + X_2 + X_3 + X_4 + \dots + X_n)$$

$X_i =$ Energy Export Reading (X_i) noted at energy meter installed at 33kV metering point where i vary from 1 to n which represents the meters connected to project activity and other project developers. $X_1, X_2, X_3, \dots, X_n$ are the meters that are installed at 33kV metering point (including the machines of the project activity and other project developers) and further connected to the receiving substation at 220 kV by internally connected lines. **Refer Annex 3 for schematic of the flow diagram**

$Y =$ Energy Export Reading at bulk meter installed at high voltage side of transformer of the receiving sub-station at 220 kV connecting machines of the project activity and other project developers. **Refer Annex 3 for schematic of the flow diagram.**

Energy Export by the project activity at 33 kV metering point is as follows:

$$EG_{\text{export}} = X_1 + X_2$$

Where, X_1 & X_2 is the export reading recording at 33kV metering points for project activity.

Transmission Loss in Export (T_E) = Transmission Loss (Z) * Energy Export at 33kV metering point (EG_{export})

Empirical Formula for Energy Export after adjustment of transmission loss (Equation 1)

Net Energy Export after adjustment of transmission loss = $EG_{\text{export}} - \text{Transmission Loss } (T_E)$

The transmission loss in export is generally less than 5%. However in case of Energy Import, the state utility conservatively applies adjustment of 15% to the import values noted at 33 kV metering point.

Transmission Loss in Import (T_I) = 15% * Energy Import at 33kV metering point (EG_{import})

Empirical Formula for Energy Import after adjustment of transmission loss (Equation 2)

Net Energy Import after adjustment of transmission loss = $EG_{\text{import}} + 15\% * EG_{\text{import}}$
 $= 115\% * EG_{\text{import}}$

Therefore Energy Supplied to Grid after adjustment of transmission loss is difference of equation 1 and 2 as given in the joint meter readings (Form B) signed jointly by WWIL and the state utility.

$$EG_y = EG_{\text{export}} - 115\% * EG_{\text{import}} - \text{Transmission Loss } (T_E)$$

The Joint meter reading noted at 33 kV metering location contains the following data:-

1. Electricity Export (EG_{export})
2. Electricity Import (EG_{import})
3. Transmission Loss (T_E) between 33 kV metering point and 220 kV metering point at WWIL substation
4. Net Electricity supplied to the Grid [$EG_{\text{export}} - 115\% * EG_{\text{import}} - T_E$]

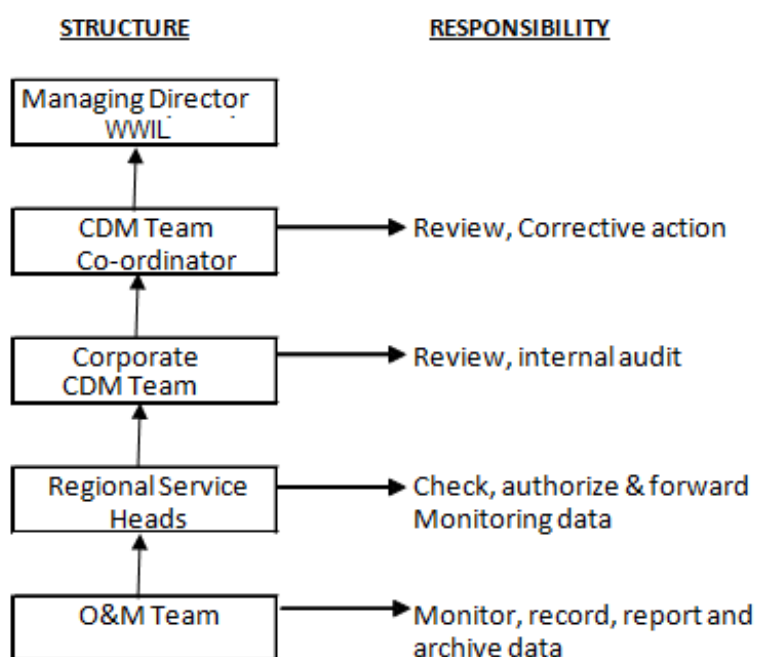
Joint meter reading (Form B) is signed by the representatives of WWIL and the state utility. The meter readings (both export and import), transmission loss and net electricity supplied to the grid are recorded in the joint meter readings (Form B) (33 kV metering point). Hence all these values will be reproduced from the joint meter readings (Form B) for calculation of emission reductions.

In addition to the joint meter readings (Form B) at 33kV metering location for the project activity, the following documents have been provided to the DoE for verification:

1. Joint Meter Readings (Form B) at 220kV metering point (bulk meters: main and check) at WWIL substation
2. Transmission loss calculation endorsed / confirmed jointly by the representatives of WWIL and the state utility.

The net electricity supplied to the grid can be cross checked from the invoices raised on the state utility for supply of net electricity supplied to the grid. Refer Annex – 2 for an illustration of the provisions for measurement methods.

The Project is operated and managed by WWIL. The operational and management structure implemented by WWIL is as follows:



Training imparted to the Personnel

Wind World (India) Limited has been instrumental in imparting training to the persons it recruits to serve in the organisation. Wind World (India) Limited has a separate training facility, called Wind World (India) Limited Training Academy, which gives training to the persons who are to be deployed On-Site to take care of all the activities starting from project construction to operation to maintenance. The training facility is located at Daman and is fully functional and equipped with qualified trainers, training equipments, classrooms and hostel facilities. The training academy has a fixed schedule which is applicable to all those who reside in the training academy. The training schedule and the training period depend upon the role the trainee has to perform. The trainers are well equipped to judge the capabilities of the trainees. All trainees, who are to be associated to the technical side of project are given six to twelve months' rigorous training on all the aspects of wind turbine installation and maintenance depending upon the requirements. Wind World (India) Limited conducts periodical test to rate the trainees and thus they are deployed as per the outcomes of their performance during the training period.

Meter Test Checking Details:

The metering equipments were inspected & tested by State Utility. Meter details for the all the main and check meters are as follows:-

Parameter	Type of meter	Meter description	Meter Serial No.	Make	Accuracy class	Meter Type
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KBCWP-01 (68.8 MW)	220 kV Bulk meter	Main Meter	6605121	L&T	0.2	All the meters are two-way Tri-vector meters capable of recording import and export of electricity.
		Check Meter	6605122	L&T	0.2	
KBCWP-02 (56.8 MW)	33 kV billing meter	Main Meter	5389967	L&T	0.2	
		Check Meter	5389970	L&T	0.2	
KBCWP-03 (12 MW)	33 kV billing meter	Main Meter	5463844	L&T	0.2	
		Check Meter	5463845	L&T	0.2	

Details of meter test checking during monitoring period are as follows:-

Parameter	Meter description	Meter Serial No.	Meter Test Checking Frequency	Meter Test Checking detail before monitoring period	Meter Test Checking during current monitoring period	Due Date of Meter Test Checking
KBCWP-01 (68.8 MW)	Main Meter	13191156	Annual	17/01/2013	30/12/2013 & 01/02/2014 & 20/11/2014	31/01/2015 & 19/11/2015
	Check Meter	14194655				
KBCWP-02 (56.8 MW)	Main Meter	5389967		17/01/2013	22/08/2014	21/08/2015
	Check Meter	5389970				
KBCWP-03 (12 MW)	Main Meter	5463844		17/01/2013	22/08/2014	21/08/2015
	Check Meter	5463845				

The main and check meters are tested for accuracy on annual basis by state utility and in case of error beyond permissible limit; meters are calibrated by state utility. Further during the annual meter testing, all the meters were under the permissible limit of error and accordingly none of the meter was calibrated during the current monitoring period.

Main Meter was changed from Sr no. 6605121 to Sr. No 13191156 on 01/02/2014.

Check Meter was changed from Sr no. 6605122 to Sr. No 14194655 on 20/11/2014.

The line diagram showing all relevant monitoring points for the project activity has been given in Annex 3.

Meter calibration of the main & check meters were due on 16 Jan 2014 but the next calibration for these meters were performed on 22 Aug 2014 so as per conservative approach we have applied error factor of (-) 0.2% on export and (+) 0.2% on import for the months Jan 2014 to Aug 2014.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data / Parameter:	$EF_{CM,v}$
Unit:	tCO ₂ e/MWh

Description:	Combined Margin Emission Factor of Southern Regional Electricity Grid.
Source of data:	<p>"CO2 Baseline Database for Indian Power Sector", version 1.1, published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The "CO2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm</p>
Value(s) applied:	= 0.93204
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	None

Data / Parameter:	$EF_{OM,y}$								
Unit:	tCO2e/MWh								
Description:	Operating Margin Emission Factor of Southern Regional Electricity Grid								
Source of data:	<p>"CO2 Baseline Database for Indian Power Sector", version 1.1, published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The "CO2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm</p>								
Value(s) applied:	<table border="1"> <tr> <td>2002 – 03</td><td>0.99702</td></tr> <tr> <td>2003 – 04</td><td>1.00937</td></tr> <tr> <td>2004 – 05</td><td>1.00376</td></tr> <tr> <td>Average</td><td>1.00338</td></tr> </table>	2002 – 03	0.99702	2003 – 04	1.00937	2004 – 05	1.00376	Average	1.00338
2002 – 03	0.99702								
2003 – 04	1.00937								
2004 – 05	1.00376								
Average	1.00338								
Purpose of data:	Calculation of Baseline Emissions								
Additional comment:	None								

Data / Parameter:	$EF_{BM,y}$		
Unit:	tCO2e/MWh		
Description:	Build Margin Emission Factor of Southern Regional Electricity Grid		
Source of data:	<p>"CO2 Baseline Database for Indian Power Sector", version 1.1, published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The "CO2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm</p>		
Value(s) applied:	<table border="1"> <tr> <td>2004 – 05</td><td>0.71799</td></tr> </table>	2004 – 05	0.71799
2004 – 05	0.71799		
Purpose of data:	Calculation of Baseline Emissions		
Additional comment:	None		

Please refer Annex 1 for combined margin calculation.

There is an inconsistency in the decimal places between the values in section B.6.2 and Annex 3 of the revised PDD. The value mentioned in the Annex 3 of the revised PDD is being consistently used in this section and annex 1 of this MR.

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter:	EG_y
Unit:	MWh (Mega-Watt hour)
Description:	Net electricity supplied to the grid by the Project
Measured/ Calculated / Default:	Calculated
Source of data:	Electricity supplied to the grid as per two joint meter readings (Form B) taken at 33 kV metering point.
Value(s) of monitored parameter:	Net electricity supplied to the grid by the Project = 122,421.779 MWh
Monitoring equipment:	Since it is calculated value, hence not applicable.
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Refer section C and Annex – 2 for details.
Calculation method (if applicable):	The procedures for calculation of net electricity supplied to grid has been followed as per the provisions of the power purchase agreement and details of calculation method has been explained in monitoring plan under section C of monitoring report.
QA/QC procedures:	QA/QC procedures were implemented by state utility pursuant to the provisions of the power purchase agreement except or otherwise explicitly stated in the PDD. The values of net electricity supplied to the grid mentioned in the two joint meter readings (Form B) of the project for 56.8 MW and 12 MW at 33kV metering point can be cross checked with values mentioned in the invoice raised on the state utility. Further no inconsistency was found between the values as mentioned in Form B & invoices raised on state utility during the current monitoring period. All main & check meters connected at metering points with RR. No. KBCWP 01 (220kV metering point), KBCWP 02 (33kV metering point) & KBCWP03 (33kV metering point) (please refer project layout Annex 3) were tested for accuracy on annual basis by state utility and in case of error beyond permissible limit; meters are calibrated by either of KPTCL or BESCO. Further during the annual meter testing, all the meters were found under the permissible limit of error and accordingly none of the meter was calibrated during the current monitoring period. Refer Annex – 2 for an illustration of the provisions for QA/QC procedures. Refer Annex 3 for location of metering points at 33kV and 220 kV.
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data has been archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period

Data / Parameter:	EG_{export}
Unit:	MWh (Mega-Watt hour)

Description:	Summation of electricity Export recorded at meters (two main and two check) connecting 86 machines of the project activity and can be sourced from two joint meter readings (Form B) issued by BESCOM for 56.8 MW and 12 MW at 33 kV metering point
Measured/ Calculated / Default:	Measured
Source of data:	Electricity export to the grid as per two joint meter readings (Form B) taken at 33 kV metering point.
Value(s) of monitored parameter:	=123,620.258 MWh
Monitoring equipment:	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, meter test checking frequency, date of last meter test checking and validity under the heading 'Meter Test Checking Details'
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly. Further all the meters have the capability of continuous measurement of data. Refer section C and Annex – 2 for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	-
QA/QC procedures:	QA/QC procedures were implemented by state utility and the PP except or otherwise explicitly stated in the PDD. Refer Annex – 2 for an illustration of the provisions for QA/QC procedures.
Purpose of data:	Calculation of Baseline Emissions (EG_{export} is used to calculate Net electricity supplied to the grid by the Project which is used to calculate baseline emissions)
Additional comment:	The data has been archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.

Data / Parameter:	EG_{import}
Unit:	MWh (Mega-Watt hour)
Description:	Summation of electricity Import recorded at the meters (two main and two check) connecting 86 machines of the project activity and can be sourced from two joint meter readings (Form B) issued by BESCOM for 56.8 MW and 12 MW at 33 kV metering point.
Measured/ Calculated / Default:	Measured
Source of data:	Electricity import from the grid as per two joint meter reading (Form B) taken at 33kV metering point.
Value(s) of monitored parameter:	=47.304 MWh

Monitoring equipment:	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, meter test checking frequency, date of last meter test checking and validity under the heading 'Meter Test Checking Details'
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Further all the meters have the capability of continuous measurement of data. Refer section C and Annex – 2 for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	-
QA/QC procedures:	QA/QC procedures were implemented by state utility and the PP except or otherwise explicitly stated in the PDD. Refer Annex – 2 for an illustration of the provisions for QA/QC procedures.
Purpose of data:	Calculation of Baseline Emissions (EG_{import} is used to calculate Net electricity supplied to the grid by the Project which is used to calculate baseline emissions)
Additional comment:	The data has been archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.

Data / Parameter:	T_E
Unit:	MWh (Mega-Watt hour)
Description:	Transmission loss for export between the metering location at 33 kV point and the metering location at 220 kV at the WWIL substation.
Measured/ Calculated / Default:	Calculated
Source of data:	Transmission Loss for export has been sourced from the joint meter reading (Form B) taken at 33kV metering point for the project activity
Value(s) of monitored parameter:	=1,144.072 MWh
Monitoring equipment:	Since it is calculated value, hence not applicable.
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Refer section C and Annex – 2 for details.
Calculation method (if applicable):	Transmission loss calculation has been done exclusively by officials of electricity board (EB) and PP has no role in calculation of transmission loss. Transmission loss value has been sourced directly from certified joint meter reading (Form B) recorded at 33kV metering point. Please refer section C of monitoring report for calculation method of transmission loss applied by EB officials as per the provision of PPA.
QA/QC procedures:	QA/QC procedures were implemented by state utility and the PP except or otherwise explicitly stated in the PDD. Refer Annex – 2 for an illustration of the provisions for QA/QC procedures.
Purpose of data:	Calculation of Baseline Emissions (T_E is used to calculate Net electricity supplied to the grid by the Project which is used to calculate baseline emissions)

Additional comment:	The data has been archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.
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D.3. Implementation of sampling plan

>> Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

"The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO₂e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO₂e/kWh) as described in revised PDD.

$$BE_y = EG_y * EF_y$$

Where,

BE_y is baseline emissions in year y, tCO₂e

EG_y is the net electricity supplied to the grid in year y and is applied directly from joint meter readings (Form B) certified by state utility. This value can also be cross checked from monthly invoice.

EF_y is the CO₂ emission factor of the grid (0.93204 tCO₂e/MWh fixed ex-ante).

1) Generation details for meter KBCWP-02 (56.8 MW)

Month	Export (kWh)	Import (kWh)	Transmission loss (kWh)	Net Export to grid as per joint meter readings (Form B) (kWh)
	[EG _{export}]	[EG _{import}]	[T _E]	[EG _y]
01/11/2013 to 30/11/2013	4,871,250	-	64,252	4,806,998
01/12/2013 to 31/12/2013	5,970,000	3,750	74,327	5,891,360
01/01/2014 to 31/01/2014	5,385,000	-	65,266	5,319,734
01/02/2014 to 28/02/2014	2,992,500	3,750	31,122	2,957,066
01/03/2014 to 31/03/2014	4,125,000	3,750	46,076	4,074,611
01/04/2014 to 30/04/2014	3,622,500	7,500	39,232	3,574,643
01/05/2014 to 31/05/2014	6,708,750	-	53,335	6,655,415
01/06/2014 to 30/06/2014	14,370,000	-	121,858	14,248,142
01/07/2014 to 31/07/2014	20,058,750	-	156,659	19,902,091
01/08/2014 to 31/08/2014	13,533,750	3,750	99,202	13,430,235
01/09/2014 to 30/09/2014	9,791,250	3,750	83,226	9,703,711
01/10/2014 to 31/10/2014	3,420,000	3,750	38,543	3,377,144
01/11/2014 to 30/11/2014	4,785,000	3,750	48,855	4,731,832
01/12/2014 to 31/12/2014	4,545,000	-	36,360	4,508,640

2) Generation details for meter KBCWP-03 (12 MW)

Month	Export (kWh)	Import (kWh)	Transmission loss (kWh)	Net Export to grid as per joint meter readings (Form B) (kWh)
	[EGexport]	[EGimport]	[TE]	[EGy]
01/11/2013 to 30/11/2013	892,800	900	11,776	879,989
01/12/2013 to 31/12/2013	1,284,300	-	15,990	1,268,310
01/01/2014 to 31/01/2014	1,320,300	-	16,002	1,304,298
01/02/2014 to 28/02/2014	900,000	1,800	9,360	888,570
01/03/2014 to 31/03/2014	1,283,400	900	14,336	1,268,029
01/04/2014 to 30/04/2014	773,100	2,700	8,373	761,622
01/05/2014 to 31/05/2014	1,246,500	1,800	9,910	1,234,520
01/06/2014 to 30/06/2014	2,476,800	-	21,003	2,455,797
01/07/2014 to 31/07/2014	3,247,200	-	25,361	3,221,839
01/08/2014 to 31/08/2014	1,802,700	900	13,214	1,788,451
01/09/2014 to 30/09/2014	1,831,500	900	15,568	1,814,897
01/10/2014 to 31/10/2014	706,500	1,800	7,962	696,468
01/11/2014 to 30/11/2014	973,800	900	9,942	962,823

Baseline Emission Reductions calculation for project activity:-

Duration	Net electricity supplied to the grid by the Project 68.8 [MWh] *	Baseline Emission Factor (tCO ₂ e/MWh)	Baseline Emissions (tCO ₂ e)
	[EGy]	[EFy]	[BEy]
01/11/2013 to 31/12/2013	12846.657	0.93204	11,973
01/01/2014 to 31/12/2014	109575.122	0.93204	102,128
	122421.779	Total	114,101

* Summation of Net Export to grid as per joint meter readings (Form B) recorded at meters KBCWP 02 & KBCWP 03.

E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

Since the project activity is a renewable energy project which generates electricity using wind power and hence does not result in project emissions.

E.3. Calculation of leakage

>>

No leakage is considered from the project activity as per approved methodology ACM0002, Version 06.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
Total	114, 101	0	0	114, 101

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	173, 667	114, 101

E.6. Remarks on difference from estimated value in registered PDD

>> The CERs for the current monitoring period is 34.21% lower than the estimated volume in the PDD. This is primarily due to seasonal nature of wind power projects. During the monitoring period CERs are low due to considerably low monsoon availability and low wind availability leading to low PLF. As calculated, PLF of project activity during the monitoring period (01/11/2013 – 31/12/2014) comes out 18.75%, which is well below than the annual PLF of 26.5% as mentioned under the registered PDD, which clearly shows the low wind availability of wind and less generation and correspondingly less CERs as compared to estimated value in registered PDD.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO ₂ e)	-	114, 101

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Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
Organization name	Wind World (India) Limited
Street/P.O. Box	Wind World Tower, A-9, Veera Industrial Estate, Veera Desai Road, Andheri (W)
Building	
City	Mumbai
State/Region	Maharashtra
Postcode	400 053
Country	India
Telephone	+91-22-6692 4848
Fax	+91-22 - 67040473 / 66921175
E-mail	yogesh.mehra@windworldindia.com
Website	www.windworldindia.com
Contact person	
Title	Managing Director
Salutation	Mr.
Last name	Mehra
Middle name	
First name	Yogesh
Department	Corporate
Mobile	+91-98200 40301
Direct fax	+91-22-6692 1177
Direct tel.	+91-22-6702 2832
Personal e-mail	yogesh.mehra@windworldindia.com

Annex 1**BASELINE INFORMATION**

The Operating Margin data for the most recent three years and the Build Margin data for the Southern Region Electricity Grid as published in the CEA database version 1.1³ are as follows:

Simple Operating Margin

	tCO₂e/GWh
Simple Operating Margin - 2002-03	997.02
Simple Operating Margin - 2003-04	1,009.37
Simple Operating Margin - 2004-05	1,003.76
Average Operating Margin of last three years	1,003.38

Build Margin

	tCO₂e/GWh
Build Margin- 2004-05	717.99

Combined Margin calculations

	Weights	tCO₂e/GWh
Operating Margin	0.75	1003.38
Build Margin	0.25	717.99
Combined Margin		932.04

Detailed information on calculation of Operating Margin Emission Factor and Build Margin Emission Factor is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

³ http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Annex 2**MONITORING INFORMATION**

- **Metering:** Net electricity supplied to the grid is metered jointly by state utility and WWIL through two sets of main and check meters at 33 kV metering point connecting exclusively the machines of project activity after adjusting for transmission loss.

In addition to this there is one set of main and check meter (Bulk meter) at 220 KV metering point at WWIL substation covering machines of the project activity and machines of other project developers. The schematic diagram indicating location of meters at 33 kV and 220 kV metering points for the project activity is attached as Annex 3.

- **Metering Equipment:** Metering system for the project activity consists of two sets of main and checks meters at 33kV metering point and one set of main and check meters at 220 kV metering point. All the meters are **two-way Trivector meters capable of recording import and export of electricity**. The meters installed are capable of recording and storing half hourly readings of all electrical parameters for a minimum period of 35 days with digital output.
- **Meter Readings:** The electricity supplied to the grid is recorded by taking two joint meter readings (Form B) at 56.8 MW and 12 MW at 33kV metering point in the presence of representatives of state utility and WWIL. The joint meter readings (Form B) at 33kV metering point contains the value of energy exported, energy imported, transmission loss and net electricity supplied to the grid during the recording period. This joint meter readings (Form B) is certified by the Executive Engineer of the state utility and WWIL. These certified readings are then used to prepare the invoices to be raised on BESCOM. Thus the net electricity supplied to the grid as mentioned in the joint meter readings (Form B) can be crosschecked with the value mentioned in the invoices. Further no inconsistency was found between the values as mentioned in Form B & invoices raised on state utility during the current monitoring period.
- **Inspection of Energy Meters:** All main and check energy meters and all associated instruments, transformers installed at the Project are of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of the Parties and is not to be interfered with by either Party except in the presence of the other Party or its authorized representatives.

Meter Test Checking: All main and check meters are tested for accuracy with reference to a portable standard meter. The portable standard meter is owned by state utility. The main and check meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2 accuracy class. The consumption registered by the main meters alone will hold good for the purpose of metering electricity supplied to the grid as long as the error in the main meters is within the permissible limits. All main & check meters connected at metering points with RR. No. KBCWP 01 (220kV metering point), KBCWP 02 (33kV metering point) & KBCWP03 (33kV metering point) (please refer project layout Annex 3) will be tested for accuracy on annual basis by state utility and in case of error beyond permissible limit; meters are calibrated by either of KPTCL or BESCOM based on the availability of EB officials. Further during the annual meter testing, all the meters were found under the permissible limit of error and accordingly none of the meter was calibrated during the current monitoring period. KPTCL is a transmission utility and BESCOM is distribution licensee in the state of Karnataka.

If during the meter test checking,

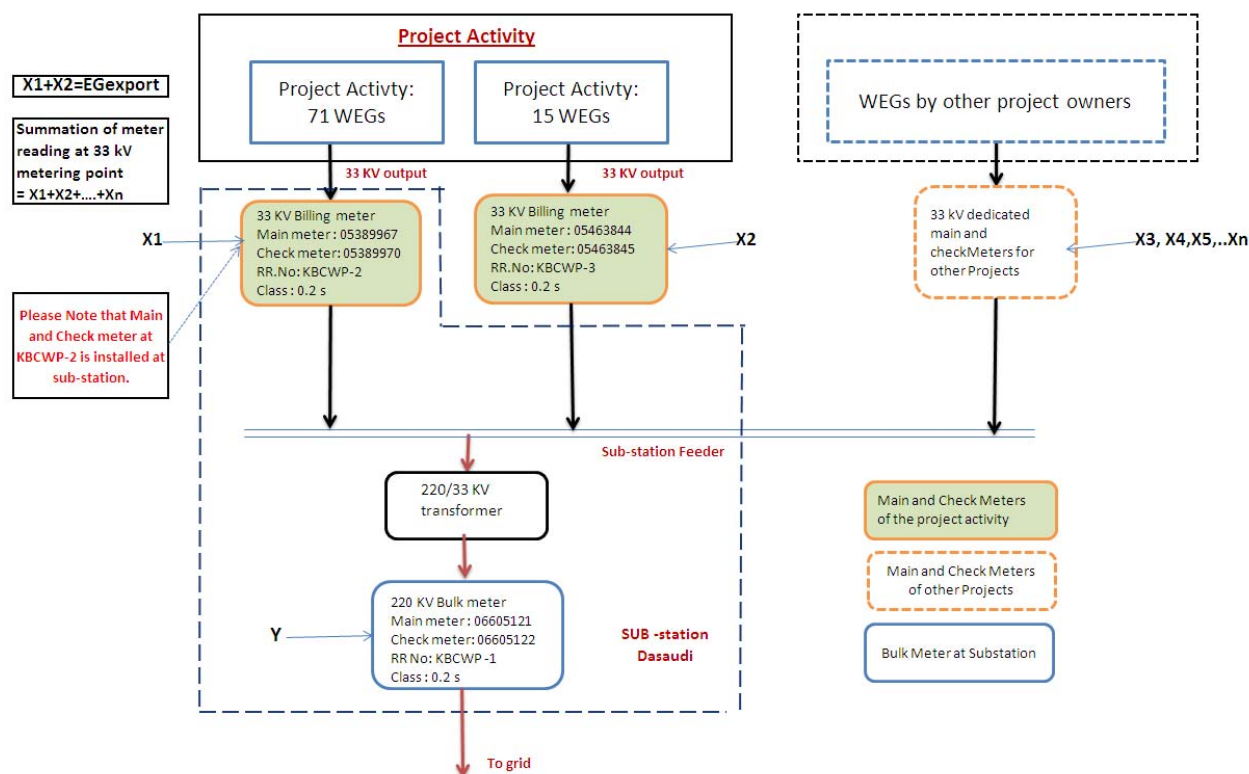
- The main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then the meter reading will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.
- The main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible of error, then the meter reading for the month up to the date and time of such test shall be as per the check meter. There will be a revision in the meter reading for the period from the previous calibration test up to the current test based on the readings of the check meter. The main meter shall be calibrated immediately and meter reading for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.
- Both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the main meters and the corresponding check meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive at the correct reading of energy supplied for metering electricity supplied to the grid for the period from the

last meter test reading up to the current test. Meter reading for the period thereafter till the next monthly reading shall be as per the calibrated main meter.

- During the monitoring period all the meter were found under the permissible limit of error and accordingly none of the meter was calibrated, and there was no occurrence of emergency events.

The schematic showing the location of meters for the project activity is given in Annex 3:

Annex 3: Line Diagram Showing Relevant Metering Points



For the current monitoring period; at 220kV sub-station only the WEGs of project activity are connected and there is no WEGs of other customers while at the time of validation WEGs of other project activity were also connected to same 220kV sub-station that's why the generic layout of monitoring system is presented in above diagram . Further it may be noted in future WEGs of other project activity might be connected to 220kV same sub-station depending on the requirements. Monitoring system shown above is given to provide the generic scenario and method of calculation to arrive the net electricity export of individual customers in case there is other project WEGs are also connected to same 220kV sub-station. This procedure of apportioning is applied by state utility only.