WIND BASED POWER GENERATION BY MYTRAH ENERGY (INDIA) LIMITED (EKIESL-VCS-JANUARY-16-01)

Document Prepared By EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The purpose of the project activity is to generate electrical energy using renewable energy source (wind) for the purpose of captive utility. The project activity generates electricity using wind potential and converts it into kinetic energy using Wind turbines, which drives the alternators to generate energy. The generated electricity is exported to the regional grid system which is under the purview of the Southern grid of India.

The proposed project activity involves the installation of Wind Power Projects. The total installed capacity of the project is 233.1 MW; which involves operation of 156 Wind Turbine Generators (WTGs) with capacity of 0.85 MW each located at Karnataka (112 WTGs) and Andhra Pradesh (44 WTGs) implemented by Mytrah Vayu Krishna Private Limited and 67 Wind Turbine Generator (WTGs) of 1.5 MW implemented by Mytrah Vayu (Manjira) Private Limited Tamil Nadu state in India. These are the subsidiary companies of Mytrah Energy (India) Limited. However the project is promoted by Mytrah Energy (India) Limited, which is also the project proponent in the project activity.

The power produced displaces an equivalent amount of power from the grid, which is fed mainly by fossil fuel fired power plants. Hence, as per VCS PD, it results in reduction of GHG emissions. GHG emission reductions from the project activity will be 479,448 tons of CO_2e and total GHG emission reductions for the chosen 10 year crediting period will be 4,794,480 tons of CO_2e.

The Project activity is a new facility (Greenfield) and the purpose of the project activity is to generate electricity by the utilization of wind velocity, and selling the generated electrical energy from 132.6 MW project implemented **by Mytrah Vayu Krishna Private Limited** to respective state utitlies under the Southern Grid. Further energy generation from 100.5 MW wind mill project implemented by **Mytrah Vayu (Manjira) Private Limited** will be for captive utilization, under Tamil Nadu state. In this process there is no consumption of any fossil fuel and hence the project does not lead to any greenhouse gas emissions. Thus, electricity would be generated through sustainable means without causing any negative impact on the environment.

In the Pre- project scenario the equivalent amount of electricity delivered to the grid by the project activity, would have otherwise been generated by the operation of grid-connected fossil fuel based power plants and by the addition of new generation sources. The Pre-project scenario for the facility where the electricity is wheeled (in case of TN WEGs), the electricity was sourced from southern grid.

The total emission reductions achieved during current monitoring period is 556,341 tons of CO_2e.

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope: 01 - Energy industries (renewable / nonrenewable sources)

Project Type: I - Renewable Energy Projects

Methodology: ACM0002: Grid-connected electricity generation from renewable sources - Version 16.0[1]

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	Mytrah Energy (India) Limited (subsidiary of Mytrah Vayu Krishna Private Limited and Mytrah Vayu (Manjira) Private Limited)
Contact person	Ms. Mangal jyoti
Title	Deputy Manager
Address	1st Floor, Prestige Meridian-II, No. 30 M.G Road, Bangalore – 560 001.
Telephone	-
Email	mangaljyoti.m@mytrah.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Mr. Manish Dabkara
Title	MD & CEO
Address	Office No. 201, EnKing Embassy, Plot No. 48, Scheme No. 78, Part II, Vijay Nagar INDORE – 452010, India.
Telephone	+91-731-4289086
Email	manish@enkingint.org

1.5 Project Start Date

Project Start Date: 21-February-2014

[1] http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83

The project start date is the date on which first WTG was commissioned under the Project activity.

1.6 Project Crediting Period

Crediting Period Start date: 21-February -2014[2]

Crediting Period End date: 20-February-2024

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

1.7 Project Location

For Tamil Nadu

S.No.	Machine ID	HTSC No.	Latitude	Longitude
1	KOO - 518	DRA 001	10.695026 N	77.570779 E
2	KOO - 1359	DRA 003	10.688039 N	77.592838 E
3	APY - 241	DRA 004	10.696430 N	77.655525 E
4	APY - 416	DRA 005	10.693031 N	77.653586 E
5	PAR - 9	DRA 006	10.678811 N	77.553641 E
6	PON - 534	DRA 008	10.676050 N	77.571935 E
7	PON - 1043	DRA 009	10.729955 N	77.576547 E
8	NAL-119	DRA 012	10.652837 N	77.545505 E
9	NAL - 81	DRA 013	10.664993 N	77.528386 E
10	NAL - 57	DRA 015	10.763263 N	77.625708 E
11	MAN - 210	DRA 017	10.727352 N	77.585324 E
12	MAN - 898	DRA 018	10.713748 N	77.629144 E
13	MAN - 802	DRA 021	10.657353 N	77.553426 E
14	KON - 556	DRA 022	10.650216 N	77.649013 E
15	KON - 563	DRA 023	10.699483 N	77.688256 E
16	KON - 590	DRA 024	10.684740 N	77.608212 E
17	KON - 640	DRA 025	10.738135 N	77.688168 E
18	KON - 658	DRA 026	10.670208 N	77.629071 E
19	KON - 621	DRA 027	10.667608 N	77.611546 E
20	KON - 501	DRA 031	10.694380 N	77.634057 E
21	ALA - 1639	DRA 043	10.665640 N	77.659623 E
22	ALA - 1946	DRA 044	10.663297 N	77.566886 E
23	NAL - 434	DRA 049	10.648711 N	77.550586 E

[2] Start date of crediting period is 21/02/2014, as on this day 1st set of WTGs associated to the project activity starts its commercial operations. Accordingly end date of the crediting period is 20-February -2024

24	KON - 234	DRA 054	10.658922 N	77.561651 E
25	PAR - 50	DRA 007	10.737605 N	77.627596 E
26	MAN - 625	DRA 032	10.662515 N	77.557552 E
27	MAN - 604	DRA 033	10.644345 N	77.515043 E
28	ALA-2301/2304	DRA 046	10.720840 N	77.587169 E
29	ALA - 1569	DRA 047	10.759444 N	77.604996 E
30	ALA-2352	DRA 048	10.763189 N	77.616268 E
31	KOO - 1157	DRA 002	10.669956 N	77.554773 E
32	PON - 1081	DRA 010	10.660363 N	77.617842 E
33	MAN - 940	DRA 019	10.668934 N	77.569253 E
34	PON - 1565	DRA 037	10.673908 N	77.529976 E
35	PON - 1568	DRA 038	10.646536 N	77.555893 E
36	VEL - 1936	DRA 039	10.677837 N	77.535691 E
37	ALA - 1618	DRA 042	10.66492 N	77.547432 E
38	PON - 908	DRA 050	10.718534 N	77.615573 E
39	PON - 1203	DRA 052	10.71890 N	77.581396 E
40	MAN - 963	DRA 055	10.683484 N	77.617876 E
41	PON - 1021	DRA 011	10.773698 N	77.61412 E
42	KUL - 652	DRA 014	10.68742 N	77.616146 E
43	PON - 4	DRA 016	10.692721 N	77.615369 E
44	MAN-828	DRA 020	10.692721 N	77.615369 E
45	KON - 618	DRA 028	10.710023 N	77.646516 E
46	KON-395	DRA 029	10.77361 N	77.639413 E
47	KON-451	DRA 030	10.754682 N	77.62652 E
48	APA-84	DRA 034	10.689743 N	77.610703 E
49	PUN-270	DRA 035	10.66565 N	77.517593 E
50	PUN - 34	DRA 036	10.673745 N	77.54778 E
51	VEL-1702	DRA 040	10.681788 N	77.689854 E
52	KAL-93	DRA 041	10.649539 N	77.51747 E
53	ALA-2290	DRA 045	10.654515 N	77.559157 E
54	PON - 775	DRA 051	10.65057 N	77.580673 E
55	ALA - 2260	DRA 053	10.620784 N	77.564648 E
56	MET 1664	DRA 065	10.630660 N	77.569115 E
57	NAL - 445	DRA 061	10.684400 N	77.563052 E
58	KOO-1036	DRA 056	10.667224 N	77.539641 E
59	VEL-1540	DRA 060	10.683467 N	77.536761 E
60	KOO-1174	DRA 058	10.677765 N	77.616831 E
61	KOO-1000	DRA 057	10.714956 N	77.67510 E

62	PON-1304	DRA 059	10.659904 N	77.651955 E
63	APY-247	DRA 064	10.656300 N	77.62939 E
64	KON-411	DRA 67	10.765864 N	77.633324 E
65	KOO - 581	DRA 062	10.709670 N	77.627337 E
66	VEL - 2119	DRA 063	10.753168 N	77.683129 E
67	ALA 1385	DRA 066	10.762752 N	77.680226 E

For Andhra Pradesh

S. No.	Location No.	Latitude	Longitude
1	508	15.154461 N	77.922135 E
2	510	15.157268 N	77.921522 E
3	511	15.158979 N	77.923322 E
4	513	15.161872 N	77.923761 E
5	514	15.163549 N	77.923292 E
6	515	15.165388 N	77.922815 E
7	516	15.166574 N	77.921892 E
8	517	15.167997 N	77.920787 E
9	518	15.16929 N	77.919977 E
10	519	15.170968 N	77.918066 E
11	520	15.172449 N	77.918783 E
12	528	15.185218 N	77.923655 E
13	529	15.186921 N	77.923976 E
14	530	15.189489 N	77.925118 E
15	531	15.190881 N	77.925026 E
16	532	15.206692 N	77.937622 E
17	533	15.208101 N	77.938972 E
18	534	15.209818 N	77.940958 E
19	535	15.211871 N	77.942781 E
20	536	15.215178 N	77.947515 E
21	537	15.216917 N	77.949166 E
22	538	15.218416 N	77.950564 E
23	539	15.221591 N	77.953603 E
24	540	15.225099 N	77.957372 E
25	541	15.226569 N	77.958248 E
26	542	15.228387 N	77.959399 E
27	543	15.229998 N	77.960501 E
28	545	15.223820 N	77.956471 E
29	546	15.213598 N	77.946804 E
30	547	15.204944 N	77.93730 E
31	551	15.188055 N	77.924987 E
32	509	15.155886 N	77.920862 E

33	512	15.160386 N	77.923416 E
34	521	15.174326 N	77.91959 E
35	522	15.175897 N	77.92030 E
36	523	15.177475 N	77.921177 E
37	524	15.179081 N	77.921943 E
38	525	15.180875 N	77.922916 E
39	526	15.182457 N	77.923515 E
40	527	15.183845 N	77.923022 E
41	544	15.231485 N	77.961368 E
42	548	15.202938 N	77.936743 E
43	549	15.201556 N	77.936035 E
44	550	15.192441 N	77.927995 E

For Karnataka

S. No.	Machine ID	Latitude (N)	Longitude (E)
1	MVKPL_01-03	17° 09' 49.3"	75° 43' 2.6"
2	MVKPL_01-04	17° 09' 37.1"	75° 43' 1.5"
3	MVKPL_01-05	17° 09' 31.4"	75° 43' 1.1"
4	MVKPL_01-06	17° 9' 29.4"	75° 43' 18.8"
5	MVKPL_01-07	17° 9' 24.3"	75° 43' 21.4"
6	MVKPL_01-08	17° 9' 16.6"	75° 43' 26.9"
7	MVKPL_01-09	17° 09' 11.2"	75° 43' 28.3"
8	MVKPL_01-10	17° 9' 3.6"	75° 44' 26.9"
9	MVKPL_01-11	17° 8' 59.1"	75° 44' 31"
10	MVKPL_01-12	17° 8' 51.9"	75° 44' 34.5"
11	MVKPL_01-13	17° 8' 38.9"	75° 44' 20.9"
12	MVKPL_01-14	17° 8' 34.3"	75° 44' 26.1"
13	MVKPL_01-15	17° 8' 26.2"	75° 44' 26.7"
14	MVKPL_02-01	17° 09' 02.4"	75° 42' 49.2"
15	MVKPL_02-02	17° 08' 57.4"	75° 42' 44.3"
16	MVKPL_02-03	17° 08' 51.0"	75° 42' 39.8"
17	MVKPL_02-04	17° 08' 52.5"	75° 42' 31.9"
18	MVKPL_02-05	17° 08' 45.7"	75° 42' 41.7"
19	MVKPL_02-06	17° 08' 36.2"	75° 42' 37.6"
20	MVKPL_02-07	17° 08' 31.4"	75° 42' 31.1"
21	MVKPL_02-08	17° 08' 22.3"	75° 42' 23.2"
22	MVKPL_02-09	17° 08' 20.5"	75° 42' 46.8"
23	MVKPL_02-10	17° 08' 40.9"	75° 42' 53.7"
24	MVKPL_02-11	17° 08' 35.6"	75° 42' 59"
25	MVKPL_02-12	17° 08' 29.4"	75° 42' 59.9"

26	MVKPL_02-13	17° 08' 22.0"	75° 43' 00.1"
27	MVKPL_02-14	17° 08' 12.4"	75° 43' 03.0"
28	MVKPL_02-15	17° 08' 06.8"	75° 43' 04.7"
29	MVKPL_02-16	17° 08' 17.9"	75° 44' 29.8"
30	MVKPL_02-17	17° 07' 59.4"	75° 43' 53.5"
31	MVKPL_02-18	17° 07' 53.6"	75° 43' 50.9"
32	MVKPL_02-19	17° 07' 49.5"	75° 43' 36.0"
33	MVKPL_02-20	17° 07' 24.0"	75° 44' 02.4"
34	MVKPL_03-01	17° 07' 03.4"	75° 41' 51.5"
35	MVKPL_03-02	17° 07' 10.6"	75° 42' 08.1"
36	MVKPL_03-03	17° 07' 52.0"	75° 42' 09.8"
37	MVKPL_03-04	17° 07' 03.2"	75° 42' 21.6"
38	MVKPL_03-05	17° 07' 29.2"	75° 42' 37.1"
39	MVKPL_03-06	17° 07' 44.7"	75° 43' 03.3"
40	MVKPL_03-07	17° 07' 48.5"	75° 42' 58.7"
41	MVKPL_03-08	17° 07' 18.6"	75° 43' 03.0"
42	MVKPL_03-09	17° 07' 11.3"	75° 43' 01.4"
43	MVKPL_03-10	17° 07' 04.4"	75° 42' 57.3"
44	MVKPL_03-11	17° 06' 58.5"	75° 42' 58.1"
45	MVKPL_03-12	17° 07' 34.2"	75° 43' 37.7"
46	MVKPL_03-13	17° 07' 18.1"	75° 43' 24.2"
47	MVKPL_03-14	17° 07' 12.3"	75° 43' 25.2"
48	MVKPL_03-15	17° 07' 06.2"	75° 43' 36.3"
49	MVKPL_03-16	17° 06' 51.9"	75° 42' 0.1"
50	MVKPL_03-17	17° 6' 46.2"	75° 43' 59.9"
51	MVKPL_03-18	17° 06' 37.9"	75° 43' 55.5"
52	MVKPL_03-19	17° 06' 31.1"	75° 43' 49.7"
53	MVKPL_04-01	17° 06' 35.1"	75° 42' 52.8"
54	MVKPL_04-02	17° 06' 01.9"	75° 42' 29.4"
55	MVKPL_04-03	17° 05' 54.7"	75° 42' 21.6"
56	MVKPL_04-04	17° 05' 51.3"	75° 42' 46.6"
57	MVKPL_04-05	17° 05' 46.4"	75° 42' 41.3"
58	MVKPL_04-06	17° 05'39.9"	75° 42' 41.6"
59	MVKPL_04-07	17° 06' 35.9"	75° 43' 23.6"
60	MVKPL_04-08	17° 06' 28.8"	75° 43' 24.4"
61	MVKPL_04-09	17° 06' 23.9"	75° 43' 47.1"
62	MVKPL_04-10	17° 06' 15.6"	75° 43' 39.4"
63	MVKPL_04-11	17° 05' 59.5"	75° 43' 31.8"

64	MVKPL_04-12	17° 05' 27.3"	75° 43' 30.0"
65	MVKPL_04-13	17° 06' 04.5"	75° 43' 55.5"
66	MVKPL_04-14	17° 05' 59.0"	75° 43' 54.1"
67	MVKPL_04-15	17° 05' 51.0"	75° 43' 53.2"
68	MVKPL_04-16	17° 05' 38.9"	75° 43' 45.7"
69	MVKPL_04-17	17°05' 30.6"	75° 43' 49.0"
70	MVKPL_04-18	17° 06' 02.7"	75° 44' 32.2"
71	MVKPL_04-19	17° 05' 53.1"	75° 44' 20.5"
72	MVKPL_04-20	17° 05' 48.0"	75° 44' 11.2"
73	MVKPL_04-21	17° 05' 42.7"	75° 44' 20.2"
74	MVKPL_05-01	17° 05' 54.8"	75° 40' 38.6"E
75	MVKPL_05-02	17° 05' 49.1"	75° 40' 40.6"
76	MVKPL_05-03	17° 05' 43.2"	75° 40' 40"
77	MVKPL_05-04	17° 05' 37.5"	75° 40' 39.2"
78	MVKPL_05-05	17° 05' 31.7"	75° 40' 38.1"
79	MVKPL_05-06	17° 5' 26.1"	75° 40' 34"
80	MVKPL_05-07	17° 05' 20.1"	75° 40' 30.9"
81	MVKPL_05-08	17° 05' 13.9"	75° 40' 32.7"
82	MVKPL_05-09	17° 05' 44.4"	75° 41' 52.6"
83	MVKPL_05-10	17° 05' 29.6"	75° 41' 42.6"
84	MVKPL_05-11	17° 05' 25.2"	75° 41' 26.4"
85	MVKPL_05-12	17° 05' 23.1"	75° 41' 49"
86	MVKPL_05-13	17° 05' 16.5"	75° 41' 48"
87	MVKPL_05-14	17° 05' 12.5"	75° 41' 59.3"
88	MVKPL_05-15	17° 05' 3.4"	75° 41' 57.6"
89	MVKPL_05-16	17° 05' 52.3"	75° 41' 36.9"
90	MVKPL_05-17	17° 05' 45.3"	75° 41' 33"
91	MVKPL_05-18	17° 05' 34.7"	75° 41' 32.7"
92	MVKPL_06-01	17° 04' 51.4"	75° 42' 53.2"
93	MVKPL_06-02	17° 04' 43.4"	75° 42' 58.2"
94	MVKPL_06-03	17° 04' 31.8"	75° 43' 01.3"
95	MVKPL_06-04	17° 04' 25.3"	75° 43' 0.4"
96	MVKPL_06-05	17° 05' 9.3"	75° 43' 42.7"
97	MVKPL_06-06	17° 05' 5.6"	75° 43' 49.8"
98	MVKPL_06-07	17° 04' 53"	75° 43' 54.7"
99	MVKPL_06-08	17° 04' 45.3"	75° 44' 0.8"
100	MVKPL_06-09	17° 04' 28"	75° 44' 9.1"
101	MVKPL_06-10	17° 04' 20.3"	75°44'12.4"

102	MVKPL_06-11	17° 04' 12.7"	75° 44' 13.8"
103	MVKPL_06-12	17° 03' 48.9"	75° 44' 23.9"
104	MVKPL_06-13	17° 03' 55.5"	75° 44' 22.7"
105	MVKPL_06-14	17° 04' 57.8"	75° 42' 49.1"
106	MVKPL_06-15	17° 04' 9.1"	75° 44' 22.6"
107	MVKPL_06-16	17° 04' 5.2"	75° 43' 45.8"
108	MVKPL_06-17	17° 04' 1.3"	75° 45' 0"
109	MVKPL_06-18	17° 03' 41.6"	75° 44' 49.5"
110	MVKPL_06-19	17° 03' 55"	75° 43' 44.1"
111	MVKPL_06-20	17° 03' 44.1"	75° 44' 49"
112	MVKPL_06-21	17° 03' 50.6"	75° 44' 48.9"

1.8 Title and Reference of Methodology

Methodology: ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0, Sectoral Scope: 01, EB 81, Annex 9
https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83

The project activity also takes reference from following Tools from the tools prescribed by applied methodology:
1. Tool for the demonstration and assessment of additionality --- Version 07.0.0, EB 70, Annex 8
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

2. Tool to calculate the emission factor for an electricity system --- Version 05.0, EB 87, Annex 09
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

1.9 Other Programs

- Emission Trading Programs and Other Binding Limits: The PP has not applied this project in any Emission Trading Programs and other Binding Limits.
- Other Forms of Environmental Credit: The PP has not applied this project in any other form of environmental credits other than Tamil Nadu 45 MW WTGs. The electricity generated from 45 MW REC component of Tamil Nadu are not included for VCU calculations to avoid any double accounting. The HTSC numbers DRA-01, 03,04,05,06,07,08,09,12,13,15,17,18,21,22,23,24,25,26,27,31,32,33,43,44,46,47,48,49, 54 (TOTAL 30 WTGs of 1.5 MW from Tamil nadu site) are availing REC. Thus electricity generated form these WTGs having REC component are not considered for VCU calculations for current complete monitoring period.
- Participation under Other GHG Programs: The PP has not participated under any other GHG program with this project activity.

1.10 Sustainable Development

Contribution to sustainable development:

Ministry of Environment and Forests, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

- **Social well-being:** The project would help in generating employment opportunities during the construction and operation phases. The project activity will lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.

- **Economic well-being:** The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity will also help to reduce the demand supply gap in the state.

  The project activity will generate power using zero emissions solar based power generation which helps to reduce GHG emissions and specific pollutants like SOx, NOx, and SPM associated with the conventional thermal power generation facilities.

- **Technological well-being:** The successful operation of project activity would lead to promotion of solar based power generation and would encourage other entrepreneurs to participate in similar projects

- **Environmental well-being**: The project activity being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the project activity also helps in avoiding significant amount of GHG emissions.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The Project Activity envisages implementation of a 233.1 MW wind power project consisting of 156 Wind Electric Generators (WEGs) of individual capacity 0.85 MW in Andhra Pradesh and Karnataka state of India by Mytrah Vayu Krishna Private Limited. And another 67 Wind Electric Generators of individual capacity 1.5 MW in Tamil Nadu state of India by Mytrah Vayu (Majira) Private Limited. All the 223 Wind Electric Generators (WEGs) which are part of the project activity are commissioned.

The project has been under operation since commissioning without any major breakdowns. Though normal breakdowns due to O&M measures are continuously being worked upon by the dedicated O&M contractor for the projects WEGs. There has been no event that may have an impact on the GHG emissions or removals during the current monitoring period.

Further, there are no changes to the project participant for the project activity during the monitoring period.

2.2 Deviations

2.2.1 Methodology Deviations

There has not been any methodology deviation during the aforesaid monitoring period (21-Feb-2014 to 1-April-2016)

2.2.2 Project Description Deviations

Since metering arrangement, monitoring practice, accuracy class, calibration interval is under control of state electricity board, the PP do not have all calibration certificates available with them.

Being Green field project activity and commissioned and end date of current monitoring period is within 2.5 years commissioning, all meters are used for monitoring purpose are pre calibrated before installation as per state electricity board regulations, thus installed pre calibrated meters have validity of calibration till 5 years of commissioning date. The all meters installed at the time of commissioning are calibrated by state electricity board, thus these meters calibrations is valid for 5 years since commissioning date.

The current monitoring period is well within the validity period of initial calibrated meters.

Thus deviation is requested for Tamilnadu site WTGs for not having all calibration certificates with PP, and applied error factor for complete monitoring period as a conservative approach.

2.3 Grouped Project

The project is not a grouped project.

2.4 Safeguards

2.4.1 No Net Harm

As per VCS guidelines, the contract for validation is prior to the 19th April 2017, hence No Net Harm is not mandatory.

2.4.2 Local Stakeholder Consultation

As per VCS guideline, the contract for validation is prior to the 19th April 2017, hence the local stake holder consultation is not mandatory.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$

Data unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied	0.9887 (Southern Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0" as 3-year generation weighted average using data for the years 2011-2012, 2012-2013 & 2013-2014. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of the data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied	0.9609 (Southern Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0" for the year 2013-2014. The data is obtained from "CO_2 Baseline Database for Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of the data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combines Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied	0.9817 (Southern Grid)
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/MWh) $EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year *y* (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%

Purpose of the data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

3.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project (Wind) plant/unit to the grid in year y
Source of data	Credit note/ JMR/Form B reports from respective state electricity board
Description of measurement methods and procedures to be applied	Quantity of net electricity generation supplied by the project (Wind) plant/unit to the grid in year y $EG_{PJ,y} = EG_{BLKNy} + EG_{BLTNy} + EG_{BLAPy}$ Where, $EG_{BLKNy} = EG_{Export,KN} – 115\%*EG_{Import} –$ Transmission Loss ($T_{E,KN}$) EG_{BLTNy} = EG Export – EG Import EG_{BLAPy} = EG Export – EG Import The value of net electricity generation supplied to the grid as per Monthly electricity form B /Credit Note or Joint Meter Reading Report forms the basis for calculation of the emission reductions; which can be cross checked from the invoice raised to DISCOM & Adjustment reports (in case of captive utility). Net electricity supplied to grid will be calculated as the difference of the measured values of “export” and “import” of electricity through the dedicated SEB energy meter installed at the delivery point. Monthly meter readings are taken from the main and check meter installed at metering point and certified by the representatives of SEB Officials and the representatives of the project proponent for apportioning procedure refer section 3.3
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and at least monthly recording
Value monitored	566,713
Monitoring equipment	Monitoring: Tri vector meter will be used Data type: Measured Type of meter: Static type meter (Main & Check). Both are Bidirectional meters. Class of meter: 0.2s.
QA/QC procedures to be applied	The calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2.

	The meter accuracy class and calibration interval is under purview of state electricity board and PP do not have any control on it. It is also noted that apportioning procedure is under control of state electricity board and PP do not have any control on it. The available parameter to PP is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter The Net electricity exported to the grid will be cross checked against the invoice raised by the PP towards the DISCOM and Adjustment Reports in case of captive consumption.
Purpose of the data	Calculation of Baseline emissions
Calculation method	-
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.

3.3 Monitoring Plan

Aim of monitoring:

The monitoring procedure will set guidelines for the project investor to monitor the parameters regularly and to ensure quality and accuracy in monitoring. It elaborates on the functions of the monitoring team and procedures to be followed in monitoring of the CDM parameters.

The monitoring shall include all the equipment's that contribute towards reduction in GHG emissions. Since the project activity focuses mainly on the generation of renewable power from the WTGs, it is important to monitor all the equipment's involved in the metering of all the necessary instruments.

The monitoring plan has been prepared in accordance with the applied methodology, ACM002 Version 16.0. The project investor has a well-defined management structure for monitoring the project activity.

Monitoring Plan at Karnataka

The main parameter to be monitored for a wind project is the Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y. The parameter is measured as electricity export, import and transmission loss, which was issued by BESCOM officials and recorded in the B-Form and issued monthly to the project proponent. These monthly reports for the entire monitoring period form the basis to report the emission reductions achieved due to the project activity. The project proponent in turn raises the invoices to the BESCOM for the electricity supplied to the grid. The electricity is measured by two way energy meters of an accuracy class of 0.2 which are calibrated periodically by officials from the BESCOM/KPTCL

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

Z = ((X1+X2+X3…+Xn)-Y)/((X1+X2+X3…+Xn)) x 100
Z = Percentage transmission loss for export incurred in transmission line between the meter located at 33 kV metering point and the meters located at bulk 220 metering point (bulk meter: main and check) high voltage side of receiving sub-station.

Xi = Energy Export Reading of energy meter installed at 33 kV metering point
Y = Energy Export Reading at bulk meter installed at high voltage side of transformer of the receiving station220kV.
X1, X2, X3,…Xn are the meters that are installed at 33kV metering point and are connected to the receiving substation by internally connected lines to the receiving station.

The Export Reading Xi is adjusted for transmission loss that is determined by the state utility and is applied directly to the JMR (Form B) taken at 33 kV metering point. This can be checked from the JMR signed jointly by the representatives of PP and the state utility.

Transmission Loss in Export (TE) = Percentage Transmission Loss (Z) * Energy Export at 33kV metering point (EGExport,KN)
Empirical Formula for Energy Export after adjustment of transmission loss (Equation 1)

Net Energy Export after adjustment of transmission loss = EGExport, – TE

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 (TI) = 15% * Energy Import at 33kV metering point ($EG_{Import,KN}$)

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

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

Therefore Energy Supplied to Grid after adjustment of transmission loss is difference of equation 1 and 2 as given in the Form B signed jointly by representatives of PP and the state utility.

$EG_{BL,KN,y}$ = EG – 115%*EG – Transmission Loss ($T_{E,KN}$)

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

1. Electricity Export (EGExport,KN)
2. Electricity Import (EGImport,KN)
3. Transmission Loss (TE,KN) between 33 kV metering point and 220 kV metering point
4. Net Electricity supplied to the Grid [EGBL,KN,y = EGExport,KN -115%* EGImport,KN – TE,KN]

Form B is signed by the representatives of PP 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.

Monitoring Plan at Tamil Nadu

Reading of net electricity imports & export is taken at the metering point of TNEB, located at yard approximately 5 to 7 meters from the WTG. Each WTG has its individual EB meter, installed by the SEB. Hence, T & D losses are considered between WTG and TNEB meter.

The import & export figure at WTG controller will be recorded in the logbooks (manual / electronic) of the O&M contractor / Investors representative on a daily basis. This data will be preserved both in paper & electronic form. The summary of the generation will be submitted by the O&M contractor / Investors representative to the investor on the monthly basis.

The TNEB meter will be the main source for monitoring net export to the grid. On mutually decided / SEB official availability date of each month, the reading from the TNEB meter will be recorded by the engineers of the SEB in presence of the O & M contractor/ Investors representative. Subsequently the Tamil Nadu Electricity Board statements will be prepared.

A monthly statement is issued by the State Utility every month to the Project investor against sale of power. Based on the monthly sale of power, invoice is raised to TNEB.

QA/QC procedures:
Energy meters will be calibrated once in a five year16 and faulty meters will be duly replaced immediately. The entire responsibility of this task lies with the state utility. The meters have an accuracy class of at least 0.5s. TNEB has an on-site testing & calibration arrangement; hence there is no need to dismantle the meter for calibration. In case the meters are found faulty and hard to calibrate against the prescribed accuracy class the meter will be replaced by the state utility.

If during any of monthly measurement, main meter is found to be beyond permissible limit of error, then meter shall be calibrated immediately & the correction factor applicable for the main meter shall be used for energy computation at time of such test checks. For the period thereafter the measurement shall be continued in accordance with the calibrated main meter.

Data Management and Data Archiving:
Copies of the break-up sheet, invoices raised on Discom and sales receipts will be retained and archived for the entire crediting period plus two years by the project investor.

Procedures for Data Adjustments / Uncertainties:
Data uncertainties are likely under following conditions:

- In case of error in TNEB meter
- When records are lost

If during any of monthly measurement, main meter is found to be beyond permissible limit of error, then meter shall be calibrated immediately & the correction factor applicable for the main meter shall be used for energy computation at time of such test checks. For the period thereafter the measurement shall be continued in accordance with the calibrated main meter. When records are lost, the Tamil Nadu Electricity Board Statements will be used as reference.

When records are lost, the Tamil Nadu Electricity Board Statements will be used as reference.

Meter calibration: The meters are tested for accuracy and calibration of the meters is taken care of, following the applicable guidance. As per the national guidelines given by CEA, electricity meters have to be calibrated once in every 5 years,

Hence the meters are scheduled to be calibrated at least once in every five years.[3]

Calculation method

The generated electricity is exported to TNEB grid and the exported electricity is measured by the TNEB energy meter. Representative Officer from Tamil Nadu Electricity Board (TNEB) prepares and provides the TNEB Statement. Once in a month, the designated person takes the TNEB energy meter readings and records the initial and final readings for Export and Import. The difference between the initial and final readings will give net export and net import. The difference between the net export and net import is recorded as Net Generation.

Net exports for Tamil Nadu $EG_{BL, TN,y} = EG_{Export} – EG_{Import}$

Monitoring Plan at Andhra Pradesh

Metering system and monitoring plan:

- The reading will be taken at the individual WEG end by the technology operator on site.
- A Joint Meter Reading shall be taken by the representatives of PP and APTRANSCO at the high voltage side of the step up transformer installed at the substation at a particular date.
- In case the main metering system is not in service, then the check metering system shall be used until the main system is back to service.
- Meter reading would be jointly signed by both the representatives.
- The main and the check metering systems shall be sealed in presence of representatives of Power producers, and APTRANSCO.
- When any of these metering systems is found to be outside acceptable limits of accuracy or otherwise not functioning properly, it shall be repaired, recalibrated or replaced.
- PP will raise a monthly energy bill/statement based on the JMR at the end of each calendar month and the payment by State Electricity Board is done on this basis. The billing and payment records will be maintained by the PP.
- Calibration and Testing of Meters will be done once in 5 years.

Calculation of data:

Net exports for Andhra Pradesh EGBL, AP,y = EG Export – EG Import

QA and QC Procedures

[3] http://www.cea.nic.in/reports/regulation/meter_reg.pdf

The electricity meter with accuracy class 0.2s at substation end (i.e. one main and one check meter) will be installed.

Data Storage and Archiving All the data items monitored under the monitoring plan will be kept for 2 years after the end of crediting period or till the last issuance of CERs for this project activity, whichever occurs later. The data will be archived both electronically and manually, and kept in safe storage by PP.

In the event when the individual verification period dates and billing cycle dates of the various WTGs in the project activity do not coincide, then the monitoring procedure will be as-

X	Sum of generation during partial days of the month recorded at controller meter (kwh) source – Electronic / Manual Log Book
Y	Total generation during the month recorded at controller meter (kwh/month)
Z = X/ Y	Ratio
B	Net Energy export by the WTG as per Monthly Report on Generation and Consumption
Z*B	Generation of partial days for calculating emission reduction (kwh)

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

As per para 46 of ACM0002 version 16.0, Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$BEy = EG_{PJ,y} * EF_{grid,CM,y}$

Where:

BEy = Baseline emissions in year y (tCO2)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

Baseline Emissions

As per the equation 7 of the methodology ACM 0002 (Version 16.0),

$$BE_y = EG_{PJ,\,y} * EF_{grid,\,CM,\,y} \quad (1)$$

Where:

BE_y: Baseline emissions in year y (tCO_2e/yr)

$EG_{PJ,\,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,\,CM,\,y}$: Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2e/MWh)

Thus, $BE_y = EG_{PJ,\,y} * EF_{grid,\,CM,\,y}$

$EG_{PJ,\,y}$	=	**566,713 MWh**
$EF_{grid,\,CM,\,y}$	=	**0.9817 tCO_{2e}**
BE_y	=	**566,713 * 0.9817**
	=	**556,341 tCO_{2e}**

4.2 Project Emissions

The project activity involves in harnessing wind power. So the emissions from the project are zero.

4.3 Leakage

No leakage emissions have been considered and hence the leakage emission is zero.

4.4 Net GHG Emission Reductions and Removals

As per equation number (13) of the applied methodology, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (7)$$

Where:

ER_y Emission reductions in year y (tCO_2e/yr)

BE_y Baseline emissions in year y (tCO_2e/yr)

PE_y Project emissions in year y (tCO_2e/yr)

Year	Baseline emissions or removals	Project emissions or removals	Leakage emissions	Net GHG emission reductions or

	(tCO_2e)	(tCO_2e)	(tCO_2e)	removals (tCO_2e)
2014	208,183	0	0	208,183
2015	313,505	0	0	313,505
2016	34,653	0	0	34,653
Total	**556,341**	**0**	**0**	**556,341**

APPENDIX 1: DATE OF COMMISSIONING

Date of Commissioning of WTGs for Tamil Nadu

Vagarai @ Tamil Nadu - 100.5 MW(1.5 * 67)			
ReGen make Vensys - 87 1.5 MW WTG of model			
S. No.	**Machine ID**	**HTSC No.**	**DOC[4]**
1	KOO - 518	DRA 001	1-Jun-14
2	KOO - 1359	DRA 003	1-Jun-14
3	APY - 241	DRA 004	1-Jun-14
4	APY - 416	DRA 005	1-Jun-14
5	PAR - 9	DRA 006	1-Jun-14
6	PON - 534	DRA 008	1-Jun-14
7	PON - 1043	DRA 009	1-Jun-14
8	NAL-119	DRA 012	1-Jun-14
9	NAL - 81	DRA 013	1-Jun-14
10	NAL - 57	DRA 015	1-Jun-14
11	MAN - 210	DRA 017	1-Jun-14
12	MAN - 898	DRA 018	1-Jun-14
13	MAN - 802	DRA 021	1-Jun-14
14	KON - 556	DRA 022	1-Jun-14
15	KON - 563	DRA 023	1-Jun-14
16	KON - 590	DRA 024	1-Jun-14
17	KON - 640	DRA 025	1-Jun-14
18	KON - 658	DRA 026	1-Jun-14
19	KON - 621	DRA 027	1-Jun-14
20	KON - 501	DRA 031	1-Jun-14
21	ALA - 1639	DRA 043	23-Jun-14
22	ALA - 1946	DRA 044	23-Jun-14
23	NAL - 434	DRA 049	23-Jun-14
24	KON - 234	DRA 054	14-Jul-14
25	PAR - 50	DRA 007	1-Jun-14
26	MAN - 625	DRA 032	1-Jun-14
27	MAN - 604	DRA 033	1-Jun-14
28	ALA-2301/2304	DRA 046	23-Jun-14
29	ALA - 1569	DRA 047	23-Jun-14
30	ALA-2352	DRA 048	23-Jun-14
31	KOO - 1157	DRA 002	1-Jun-14
32	PON - 1081	DRA 010	1-Jun-14
33	MAN - 940	DRA 019	1-Jun-14
34	PON - 1565	DRA 037	23-Jun-14

[4] Date Of commissioning

35	PON - 1568	DRA 038	23-Jun-14
36	VEL - 1936	DRA 039	23-Jun-14
37	ALA - 1618	DRA 042	23-Jun-14
38	PON - 908	DRA 050	23-Jun-14
39	PON - 1203	DRA 052	23-Jun-14
40	MAN - 963	DRA 055	16-Jul-14
41	PON - 1021	DRA 011	1-Jun-14
42	KUL - 652	DRA 014	1-Jun-14
43	PON - 4	DRA 016	1-Jun-14
44	MAN-828	DRA 020	1-Jun-14
45	KON - 618	DRA 028	1-Jun-14
46	KON-395	DRA 029	1-Jun-14
47	KON-451	DRA 030	1-Jun-14
48	APA-84	DRA 034	1-Jun-14
49	PUN-270	DRA 035	1-Jun-14
50	PUN - 34	DRA 036	4-Jun-14
51	VEL-1702	DRA 040	23-Jun-14
52	KAL-93	DRA 041	23-Jun-14
53	ALA-2290	DRA 045	23-Jun-14
54	PON - 775	DRA 051	23-Jun-14
55	ALA - 2260	DRA 053	23-Jun-14
56	MET 1664	DRA 065	09-Jan-15
57	NAL - 445	DRA 061	03-Dec-14
58	KOO-1036	DRA 056	31-Oct-14
59	VEL-1540	DRA 060	03-Dec-14
60	KOO-1174	DRA 058	31-Oct-14
61	KOO-1000	DRA 057	31-Oct-14
62	PON-1304	DRA 059	31-Oct-14
63	APY-247	DRA 064	06-Jan-15
64	KON-411	DRA 67	26-Feb-15
65	KOO - 581	DRA 062	18-Dec-14
66	VEL - 2119	DRA 063	24-Dec-14
67	ALA 1385	DRA 066	04-Feb-15

Date of commissioning of WTG at Karnataka

Savalsang @ Karnataka - 95.20 MW (0.85*112)		
Gamesa Make WTG model G53/850 kW		
S. No.	**Machine ID**	**DOC[5]**
1	MVKPL-1-03	29-Apr-14
2	MVKPL-1-04	2-Jun-14
3	MVKPL-1-05	2-Jun-14
4	MVKPL-1-06	29-Apr-14
5	MVKPL-1-07	29-Apr-14
6	MVKPL-1-08	29-Apr-14
7	MVKPL-1-09	29-Apr-14
8	MVKPL-1-10	29-Apr-14
9	MVKPL-1-11	29-Apr-14
10	MVKPL-1-12	29-Apr-14
11	MVKPL-1-13	29-Apr-14
12	MVKPL-1-14	29-Apr-14
13	MVKPL-1-15	29-Apr-14
14	MVKPL-2-01	29-Apr-14
15	MVKPL-2-02	29-Apr-14
16	MVKPL-2-03	29-Apr-14
17	MVKPL-2-04	29-Apr-14
18	MVKPL-2-05	29-Apr-14
19	MVKPL-2-06	29-Apr-14
20	MVKPL-2-07	29-Apr-14
21	MVKPL-2-08	26-Jul-14
22	MVKPL-2-09	29-Apr-14
23	MVKPL-2-10	29-Apr-14
24	MVKPL-2-11	29-Apr-14
25	MVKPL-2-12	29-Apr-14
26	MVKPL-2-13	29-Apr-14
27	MVKPL-2-14	23-Jan-15
28	MVKPL-2-15	29-Apr-14
29	MVKPL-2-16	23-Jan-15
30	MVKPL-2-17	29-Apr-14
31	MVKPL-2-18	29-Apr-14
32	MVKPL-2-19	29-Apr-14
33	MVKPL-2-20	29-Apr-14
34	MVKPL-3-01	2-Jun-14
35	MVKPL-3-02	29-Apr-14
36	MVKPL-3-03	29-Apr-14
37	MVKPL-3-04	29-Apr-14

[5] Date Of commissioning

38	MVKPL-3-05	26-Jul-14
39	MVKPL-3-06	23-Jan-15
40	MVKPL-3-07	23-Jan-15
41	MVKPL-3-08	02-Jun-14
42	MVKPL-3-09	02-Jun-14
43	MVKPL-3-10	29-Apr-14
44	MVKPL-3-11	23-Jan-15
45	MVKPL-3-12	23-Jan-15
46	MVKPL-3-13	29-Apr-14
47	MVKPL-3-14	29-Apr-14
48	MVKPL-3-15	29-Apr-14
49	MVKPL-3-16	29-Apr-14
50	MVKPL-3-17	29-Apr-14
51	MVKPL-3-18	2-Jun-14
52	MVKPL-3-19	29-Apr-14
53	MVKPL-4-01	2-Jun-14
54	MVKPL-4-02	29-Apr-14
55	MVKPL-4-03	29-Apr-14
56	MVKPL-4-04	29-Apr-14
57	MVKPL-4-05	29-Apr-14
58	MVKPL-4-06	02-Jun-14
59	MVKPL-4-07	29-Apr-14
60	MVKPL-4-08	29-Apr-14
61	MVKPL-4-09	2-Jun-14
62	MVKPL-4-10	29-Apr-14
63	MVKPL-4-11	29-Apr-14
64	MVKPL-4-12	29-Apr-14
65	MVKPL-4-13	29-Apr-14
66	MVKPL-4-14	29-Apr-14
67	MVKPL-4-15	29-Apr-14
68	MVKPL-4-16	02-Jun-14
69	MVKPL-4-17	02-Jun-14
70	MVKPL-4-18	29-Apr-14
71	MVKPL-4-19	29-Apr-14
72	MVKPL-4-20	29-Apr-14
73	MVKPL-4-21	29-Apr-14
74	MVKPL-5-01	29-Apr-14
75	MVKPL-5-02	29-Apr-14
76	MVKPL-5-03	29-Apr-14
77	MVKPL-5-04	29-Apr-14
78	MVKPL-5-05	29-Apr-14
79	MVKPL-5-06	29-Apr-14
80	MVKPL-5-07	29-Apr-14

81	MVKPL-5-08	29-Apr-14
82	MVKPL-5-09	29-Apr-14
83	MVKPL-5-10	29-Apr-14
84	MVKPL-5-11	29-Apr-14
85	MVKPL-5-12	29-Apr-14
86	MVKPL-5-13	29-Apr-14
87	MVKPL-5-14	02-Jun-14
88	MVKPL-5-15	02-Jun-14
89	MVKPL-5-16	02-Jun-14
90	MVKPL-5-17	02-Jun-14
91	MVKPL-5-18	02-Jun-14
92	MVKPL-6-01	26-Jul-14
93	MVKPL-6-02	26-Jul-14
94	MVKPL-6-03	26-Jul-14
95	MVKPL-6-04	26-Jul-14
96	MVKPL-6-05	26-Jul-14
97	MVKPL-6-06	26-Jul-14
98	MVKPL-6-07	26-Jul-14
99	MVKPL-6-08	26-Jul-14
100	MVKPL-6-09	26-Jul-14
101	MVKPL-6-10	26-Jul-14
102	MVKPL-6-11	23-Jan-15
103	MVKPL-6-12	26-Jul-14
104	MVKPL-6-13	26-Jul-14
105	MVKPL-6-14	26-Jul-14
106	MVKPL-6-15	26-Jul-14
107	MVKPL-6-16	23-Jan-15
108	MVKPL-6-17	26-Jul-14
109	MVKPL-6-18	26-Jul-14
110	MVKPL-6-19	26-Jul-14
111	MVKPL-6-20	23-Jan-15
112	MVKPL-6-21	23-Jan-15

Date of Commissioning at Andhra Pradesh

Burugula @ Andhra Pradesh - 37.40MW (0.85* 44)		
Gamesa Make WTG model G53/850 kW		
S. No.	**Machine ID**	**DOC[6]**
1	Location No. 508	21-Feb-14
2	Location No. 509	21-Feb-14
3	Location No. 510	21-Feb-14
4	Location No. 511	21-Feb-14
5	Location No. 512	21-Feb-14
6	Location No. 513	21-Feb-14
7	Location No. 514	21-Feb-14
8	Location No. 515	21-Feb-14
9	Location No. 516	21-Feb-14
10	Location No. 517	21-Feb-14
11	Location No. 518	21-Feb-14
12	Location No. 519	21-Feb-14
13	Location No. 520	21-Feb-14
14	Location No. 521	21-Feb-14
15	Location No. 522	21-Feb-14
16	Location No. 523	21-Feb-14
17	Location No. 524	21-Feb-14
18	Location No. 525	21-Feb-14
19	Location No. 526	21-Feb-14
20	Location No. 527	21-Feb-14
21	Location No. 528	21-Feb-14
22	Location No. 529	21-Feb-14
23	Location No. 530	21-Feb-14
24	Location No. 531	21-Feb-14
25	Location No. 550	21-Feb-14
26	Location No. 551	21-Feb-14
27	Location No. 532	15-Mar-14
28	Location No. 533	15-Mar-14
29	Location No. 534	15-Mar-14
30	Location No. 535	15-Mar-14
31	Location No. 536	15-Mar-14
32	Location No. 537	15-Mar-14
33	Location No. 538	15-Mar-14
34	Location No. 539	15-Mar-14
35	Location No. 540	15-Mar-14
36	Location No. 541	15-Mar-14

[6] Date Of commissioning

37	Location No. 542	15-Mar-14
38	Location No. 543	15-Mar-14
39	Location No. 544	15-Mar-14
40	Location No. 545	15-Mar-14
41	Location No. 546	15-Mar-14
42	Location No. 547	15-Mar-14
43	Location No. 548	15-Mar-14
44	Location No. 549	15-Mar-14

APPENDIX 2: CALIBRATION DETAILS

Since metering arrangement, monitoring practice, accuracy class, calibration interval is under control of state electricity board, the PP do not have all calibration certificates available with them.

Being Green field project activity and commissioned within 2 years current monitoring period end date, all meters are used for monitoring purpose are pre calibrated before installation as per state electricity board regulations, thus installed pre calibrated meters have validity of calibration till 5 years of commissioning date. The all meters installed at the time of commissioning are calibrated by state electricity board, thus these meters calibrations is valid for 5 years since commissioning date.

The current monitoring period is well within the validity period of initial calibrated meters.

The details of calibration available with PP are as below.

For Tamilnadu site WTGs, deviation is applied for not having all calibration certificates with PP, hence error factor is applied for complete monitoring period for Tamil nadu site WTGs.

Vagarai Tamilnadu state 100.5 MW (67*1.5 MW WTGs)

Meter Serial Number	Make	Accuracy Class	Calibration Date
14190323	L & T	0.2s	08/02/2014
14190336	L & T	0.2s	07/02/2014
14190338	L & T	0.2s	08/02/2014
14190269	L & T	0.2s	07/02/2014
14190276	L & T	0.2s	07/02/2014
14190279	L & T	0.2s	08/02/2014
14190268	L & T	0.2s	07/02/2014
13197046	L & T	0.2s	04/01/2014
14190320	L & T	0.2s	07/02/2014
14190332	L & T	0.2s	01/02/2014
14190311	L & T	0.2s	31/01/2014
14190287	L & T	0.2s	31/01/2014
14190325	L & T	0.2s	31/01/2014
14190290	L & T	0.2s	30/01/2014

14190306	L & T	0.2s	30/01/2014
14190292	L & T	0.2s	31/01/2014
14190319	L & T	0.2s	31/01/2014
14190257	L & T	0.2s	07/02/2014
14190267	L & T	0.2s	07/02/2014
12091451	L & T	0.2s	16/05/2012
12091458	L & T	0.2s	16/05/2012
12092317	L & T	0.2s	06/07/2012
12091997	L & T	0.2s	10/07/2012
12092309	L & T	0.2s	10/07/2012
12092342	L & T	0.2s	11/07/2012
12092323	L & T	0.2s	06/07/2012
12092345	L & T	0.2s	05/07/2012
12092322	L & T	0.2s	11/07/2012
13197048	L & T	0.2s	04/01/2014
14190312	L & T	0.2s	30/01/2014
14190316	L & T	0.2s	31/01/2014
14190341	L & T	0.2s	11/02/2014
14190273	L & T	0.2s	07/02/2014
14190263	L & T	0.2s	06/02/2014
14190315	L & T	0.2s	08/02/2014
14190278	L & T	0.2s	08/02/2014
14190280	L & T	0.2s	08/02/2014
14190283	L & T	0.2s	30/01/2014
14190249	L & T	0.2s	30/01/2014
14190301	L & T	0.2s	31/01/2014
14190337	L & T	0.2s	30/01/2014

14190313	L & T	0.2s	31/01/2014
14190281	L & T	0.2s	31/01/2014
12092267	L & T	0.2s	11/07/2012
12092331	L & T	0.2s	05/07/2012
12092346	L & T	0.2s	06/07/2012
12092313	L & T	0.2s	11/07/2012
12092314	L & T	0.2s	05/07/2012
12092297	L & T	0.2s	11/07/2012
14190294	L & T	0.2s	31/01/2014
14190299	L & T	0.2s	31/01/2014
14190331	L & T	0.2s	31/01/2014
14190333	L & T	0.2s	31/01/2014

Calibration details for Karnataka site WTGs 95.2 MW (112*0.85 MW WTGs)

PP have details of calibration dated in Dec 2014, hence error factor is applied from April 2014 till Dec 2014 due to delay in calibration for Karnataka site WTGs as a conservative approach. 13,20,19,21,18,21 WTGs are connected to Feeder 1,2,3,4,5,6 respectively.

	Meter Type	**Meter Serial Number**	**Make**	**Accuracy Class**	**Calibration Date**
Feeder 1	Main Meter	13191120	L & T	0.2s	19/12/2014
	Check Meter	13191121	L & T	0.2s	19/12/2014
Feeder 2	Main Meter	13191094	L & T	0.2s	19/12/2014
	Check Meter	13191095	L & T	0.2s	19/12/2014
Feeder 3	Main Meter	13191100	L & T	0.2s	19/12/2014
	Check Meter	13191104	L & T	0.2s	19/12/2014
Feeder 4	Main Meter	13191096	L & T	0.2s	19/12/2014
	Check Meter	13191097	L & T	0.2s	19/12/2014
Feeder 5	Main Meter	13191114	L & T	0.2s	19/12/2014

	Check Meter	13191122	L & T	0.2s	19/12/2014
Feeder 6	Main Meter	13191159	L & T	0.2s	19/12/2014
	Check Meter	13191380	L & T	0.2s	19/12/2014
Sub Station	Main Meter	13194679	L & T	0.2s	24/12/2014
	Check Meter	13194671	L & T	0.2s	24/12/2014

Calibration details for Andhra Pradesh site WTGs 37.4 MW (44*0.85 MW WTGs)

PP have details of calibration dated in March 2015, hence error factor is applied from Feb 2014 till March 2015 for Andhra Pradesh site WTGs as a conservative approach.

Meter Type	**Meter Serial Number**	**Make**	**Accuracy Class**	**Calibration Date**
Main Meter	16538864	Elster	0.2s	02/03/2015
Check Meter	16538867	Elster	0.2s	02/03/2015
Standby Meter	16538885	Elster	0.2s	02/03/2015