

51 MW Wind Power Project at Chitradurga

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Project Title	51 MW Wind Power Project at Chitradurga
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity titled “**51 MW Wind Power Project at Chitradurga**” is registered under Voluntary Carbon Standard (VCS) with reference number 706. The project details can be referred from the below web link: http://www.vcsprojectdatabase.org/#/project_details/706.

The project activity involves installation and operation of Wind Turbine Generators (WTGs) of total capacity 51 MW (34 Nos * 1.5 MW) at Bhimasamudra site Chikkandavadi and Kallavanagathihalli village, Chitradurga District of Karnataka in India.

The main purpose of the project activity is to generate electricity by using renewable wind resources which is an environmental friendly power generation technology. Thus, the project activity results in the reduction of greenhouse gas (GHG) emissions associated with generation of equivalent amount of power in the fossil fuel dominant regional electricity grid.

Nuziveedu Seeds Limited had made an application for conversion to private company under section 31(1) of the companies act and received approval from central government for name change as “Nuziveedu Seeds Private Limited” on 26/06/2008. In continuation to that, on 16/06/2010, the central government approved for the name change as “NSL Renewable Power Private Limited” (**hereafter referred as NSL**) in line with section 21 of the companies act. "On 10/12/2007, NSL had released purchase order to RPPL for 34 nos WTGs (1.5 MW each) for a capacity of 51 MW. RPPL had supplied 9 WTGs on time out of this 34 WTGs. From the balance 25 nos of WTGs, RPPL could supply only 19 WTGs and informed NSL on 12/09/2009 that the balance 6 WTGs could be supplied only later (after June 2010). So, considering the delay in supply of WTGs from RPPL, NSL decided to replace Regen make of 6 nos WTGs with 4 nos of WTGs of Suzlon make each having capacity of 2.1 MW. Based on this, NSL released new purchase order to Suzlon Energy Limited (SEL) for 4 no WTGs. Hence the current capacity amounts to 50.4 MW which is lower than the capacity mentioned in the title. However, the PP is also developing the project under CDM and received HCA with the same title. PP is still using the same title for consistency between their CDM and VCS project.

This monitoring report covers the monitoring period from: **01/03/2016 – 31/10/2017**. The electricity generated from the project activity in this monitoring period is reducing **150,626 tCO₂e** in this monitoring period.

1.2 Sectoral Scope and Project Type

The project activity falls under the following guidelines set in the Clean Development Mechanism under the Kyoto Protocol:

- **Sectoral Scope** : 1, Energy industries (renewable / non-renewable sources)
- **Type** : Renewable Energy Projects

The project activity is not a grouped or a bundled project..

1.3 Project Proponent

Organization name	M/s. NSL Renewable Power Private Limited
Contact person	Mr. A. Rajnikant
Title	DGM – Power Division
Address	NSL ICON, 4th Floor, Road No.12, Banjara Hills, Hyderabad - 500034, Andhra Pradesh
Telephone	+91 - 40 - 3051 4444
Email	rajnikant.a@nslpower.com

1.4 Other Entities Involved in the Project

Not Applicable – no other entities involved in the project

1.5 Project Start Date

06/06/2008 – The date of commissioning of the first WTG (HK 3).

1.6 Project Crediting Period

Crediting Period Start Date : 06/06/2008

Crediting Period End Date : 05/06/2018

Total Number of Years : 10

1.7 Project Location

The project site is located at Bhimasamudra site, Chikkandavadi and Kallavanagathihalli village, Chitradurga District of Karnataka in India. Chitradurga is approximately around 200 KM from Bangalore, capital of Karnataka state. The physical location is provided below:

WTG HT SC No	Locati on No	Village	District	State	Latitude	Longitude
1	HK 1	Chikkandavadi	Chitradurga	Karnataka	N14 11 02.7	E76 12 32.2

2	HK 2	Chikkandavadi	Chitradurga	Karnataka	N14 10 49.7	E76 12 25.7
3	HK 3	Chikkandavadi	Chitradurga	Karnataka	N14 10 42.1	E76 12 26.8
4	HK 4	Chikkandavadi	Chitradurga	Karnataka	N14 10 33.7	E76 12 26.6
5	HK 5	Chikkandavadi	Chitradurga	Karnataka	N14 10 23.2	E76 12 26.0
6	HK 6	Chikkandavadi	Chitradurga	Karnataka	N14 10 08.8	E76 12 25.6
7	HK 7	Chikkandavadi	Chitradurga	Karnataka	N14 10 00.7	E76 12 25.0
8	HK 8	Chikkandavadi	Chitradurga	Karnataka	N14 09 53.1	E76 12 23.3
9	HK 9	Chikkandavadi	Chitradurga	Karnataka	N14 09 45.3	E76 12 22.1
10	HK 10	Kallavanagathihalli	Chitradurga	Karnataka	N14 13 10.6	E76 08 43.7
11	HK 11	Kallavanagathihalli	Chitradurga	Karnataka	N14 12 43.4	E76 08 39.2
12	HK 12	Kallavanagathihalli	Chitradurga	Karnataka	N14 12 23.7	E76 08 57.4
13	HK 13	Kallavanagathihalli	Chitradurga	Karnataka	N14 12 18.9	E76 09 02.5
14	HK 14	Kallavanagathihalli	Chitradurga	Karnataka	N14 12 12.5	E76 09 07.5
15	HK 15	Kallavanagathihalli	Chitradurga	Karnataka	N14 12 06.4	E76 09 11.9
16	HK 16	Kallavanagathihalli	Chitradurga	Karnataka	N14 11 59.5	E76 09 16.8
17	HK 17	Kallavanagathihalli	Chitradurga	Karnataka	N14 11 37.0	E76 09 38.3
18	HK 18	Kallavanagathihalli	Chitradurga	Karnataka	N14 11 30.3	E76 09 43.3
19	HK 19	Kallavanagathihalli	Chitradurga	Karnataka	N14 11 24.4	E76 09 48.0
20	HK 20	Kallavanagathihalli	Chitradurga	Karnataka	N14 11 16.6	E76 09 50.9
21	HK 21	Kallavanagathihalli	Chitradurga	Karnataka	N14 11 10.9	E76 09 56.4
22	HK 22	Kallavanagathihalli	Chitradurga	Karnataka	N14 11 04.4	E76 09 59.9
23	HK 23	Kallavanagathihalli	Chitradurga	Karnataka	N14 10 57.8	E76 10 03.4
24	HK 24	Kallavanagathihalli	Chitradurga	Karnataka	N14 10 41.1	E76 10 39.9
25	HK 25	Kallavanagathihalli	Chitradurga	Karnataka	N14 10 34.0	E76 10 44.3
26	HK 26	Kallavanagathihalli	Chitradurga	Karnataka	N14 10 26.9	E76 10 47.8
27	HK 27	Kallavanagathihalli	Chitradurga	Karnataka	N14 10 19.8	E76 10 51.3
28	HK 29	Kallavanagathihalli	Chitradurga	Karnataka	N14 10 02.1	E76 11 14.3

29	HK 30	Kallavanagathihalli	Chitradurga	Karnataka	N14 09 55.0	E76 11 18.0
30	HK 31	Kallavanagathihalli	Chitradurga	Karnataka	N14 09 48.9	E76 11 23.0
31	HK 32	Kallavanagathihalli	Chitradurga	Karnataka	N14 09 42.0	E76 11 26.8
32	HK 33	Kallavanagathihalli	Chitradurga	Karnataka	N14 09 35.0	E76 11 30.4

1.8 Title and Reference of Methodology

The baseline methodology applied for this project activity is as follows:

Type	:	I – Renewable Energy Projects
Category	:	ACM0002. Consolidated baseline methodology for grid connected electricity generation from renewable sources”.
Version	:	11, EB 62.
Reference	:	http://cdm.unfccc.int/filestorage/H/G/Y/HGY3TLRFPQVM016WA4I7XCZD92KE5S/EB52_repan07_ACM0002_ver11.pdf?t=U3B8bWVtemZjfDBx_f1H0dEfORFSDfU71vzP

Tools referred in the methodology are as follows:

- Version 05.2 of “Tool for the demonstration and assessment of additionality” .
- Version 02 of “Tool to calculate the emission factor of an electricity system

1.9 Other Programs

Emission Trading Programs and other Binding Limits:

The project participant confirmed that net GHG emission reductions or removals generated during this monitoring period have not been used for any compliance under any programs or mechanisms.

Other forms of Environmental Credit:

The Project participant confirmed that the project activity has not sought or received another form of GHG related environmental credit, including renewable energy certificates during this monitoring period.

Participation under other GHG programs:

The project participant confirmed that the project is not registered under any other programs.

1.10 Sustainable Development

The project contributes in achieving nationally stated sustainable development priorities by generating clean electricity. Utilizing renewable energy source helps in contributing for the national energy security and at the same time helping in reducing GHG emissions (CO₂) by replacing the equivalent quantity of grid electricity from fossil fuel dominating power plants. Project activity helped in employment generation as well during construction & operation phase.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

As given in section 1.1, the project activity has an aggregate installed capacity of 50.4 MW (28 number of 1.5 MW WTGs and 4 number of 2.1 MW WTGs). All the WTG's are located in the state of Karnataka¹. The commissioning details of the WTGs are given in the table below:

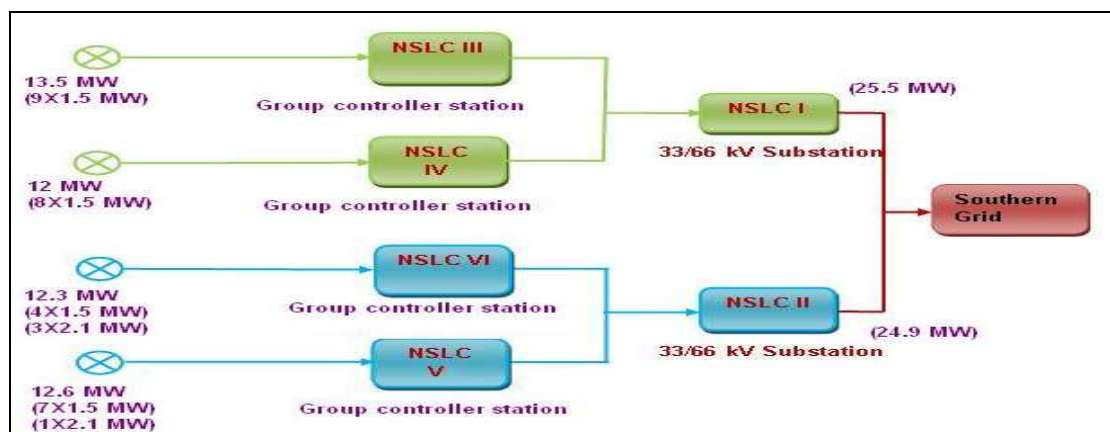
Sl. No	WTG Number	WTG Capacity (MW)	Commissioning date
1	HK 1	1.5	29/09/2008
2	HK 2	1.5	01/07/2008
3	HK 3	1.5	06/06/2008
4	HK 4	1.5	09/09/2008
5	HK 5	1.5	09/09/2008
6	HK 6	1.5	29/09/2008
7	HK 7	1.5	08/12/2009
8	HK 8	1.5	08/12/2009
9	HK 9	1.5	08/12/2009
10	HK 10	1.5	15/12/2009
11	HK 11	1.5	15/12/2009
12	HK 12	1.5	21/01/2010
13	HK 13	1.5	15/12/2009
14	HK 14	1.5	21/01/2010
15	HK 15	1.5	15/12/2009
16	HK 16	1.5	30/09/2011
17	HK 17	1.5	30/09/2011
18	HK 18	1.5	30/09/2011
19	HK 19	2.1	30/09/2011
20	HK 20	2.1	30/09/2011
21	HK 21	2.1	30/09/2011
22	HK 22	1.5	21/01/2010
23	HK 23	1.5	21/01/2010
24	HK 24	1.5	30/09/2011
25	HK 25	1.5	30/09/2011
26	HK 26	2.1	30/09/2011
27	HK 27	1.5	30/09/2011

¹The exact location details of each WTG are given in section 1.7 of the report.

28	HK 29	1.5	30/09/2011
29	HK 30	1.5	30/09/2011
30	HK 31	1.5	30/09/2011
31	HK 32	1.5	30/09/2011
32	HK 33	1.5	30/09/2011

There is no outages during the current monitoring period which have directly impacted the GHG emission reductions.

Metering arrangements of WTGs



2.2 Deviations

2.2.1 Methodology Deviations

There is no deviation in the methodology of the registered PD.

2.2.2 Project Description Deviations

There is no deviation in the project description of the registered PD.

2.3 Grouped Project

There is no grouping involved in the project activity.

2.4 Safeguards

2.4.1 No Net Harm

Not Applicable.

2.4.2 Local Stakeholder Consultation

Not Applicable.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data/ Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ / MWh
Description	Operational Margin of the Southern Grid
Source of data	CO2 Baseline Database Version 5.0 dated November 2009 published by CEA http://www.cea.nic.in/
Value applied:	0.9876
Justification of choice of data or description of measurement methods and procedures applied	The emission factors in the CO ₂ database of CEA are compiled specifically for application by grid-connected CDM projects. The emission factor is consistent with Tool to calculate emission factor for an electricity system (Version 02.)
Purpose of the data	Baseline Emission calculation.
Comments	Fixed ex-ante for entire crediting period

Data / Parameter	EF _{grid,BM,y}
Data unit	tCO ₂ / MWh
Description	Build Margin of the Southern Grid
Source of data	CO2 Baseline Database Version 5.0 dated November 2009 published by CEA http://www.cea.nic.in/
Value applied:	0.8179
Justification of choice of data or description of measurement methods and procedures applied	The emission factors in the CO ₂ database of CEA are compiled specifically for application by grid-connected CDM projects. The emission factor is consistent with Tool to calculate emission factor for an electricity system (Version 02.)
Purpose of the data	Baseline Emission calculation.
Comments	Fixed ex-ante for entire crediting period

Data / Parameter	EF _{grid,CM,y}
Data unit	tCO ₂ / MWh
Description	CO2 Baseline emission factor of the grid
Source of data	CO2 Baseline Database Version 5.0 dated November 2009 published by CEA http://www.cea.nic.in/

Value applied:	0.9451
Justification of choice of data or description of measurement methods and procedures applied	The emission factors in the CO ₂ database of CEA are compiled specifically for application by grid-connected CDM projects. The emission factor is consistent with Tool to calculate emission factor for an electricity system (Version 02.)
Purpose of the data	Baseline Emission calculation.
Comments	Fixed ex-ante for entire crediting period

3.2 Data and Parameters Monitored

Data / Parameter	EG _y
Data unit	kWh
Description	Electricity supplied by the plant to the grid
Source of data	Tariff invoices submitted to KPTCL for the electricity supplied to the grid
Description of measurement methods and procedures to be applied	The metering points NSLC III, NSLC IV, NSLC V are connected to bulk metering point NSLC I and NSLC II till 30th Sep 2011. From 30th Sep 2011 onwards, the metering points NSLC III, NSLC IV are connected to bulk metering point NSLC I and metering point NSLC V, NSLC VI are connected to bulk metering point NSLC II. The WTGs of capacity load 13.5 MW (9X1.5 MW) are connected to metering point NSLC III, and WTGs of capacity load 12 MW (8X1.5 MW) are connected to metering point NSLC IV and WTGs of capacity load 12.6 MW (7X1.5 MW, 1X2.1 MW) are connected to the metering point NSLC V and WTGs of capacity load 12.3 MW (4X1.5 MW, 3X2.1 MW) are connected to metering point at NSLC VI located at group controller station, Hirekandavadi. Energy is fed to grid from NSLC III, NSLC IV, NSLC V, NSLC VI through bulk metering points NSLC I, NSLC II located at 66 KV substation, KN Halli. Actual power generated by WTGs of project activity is measured using energy meters (Main & Check) located at group controller station, Hirekandavadi. The main meter and check meter are installed at group controller station, Hirekandavai. The energy meters are 0.2s accuracy class and regularly calibrated. The details

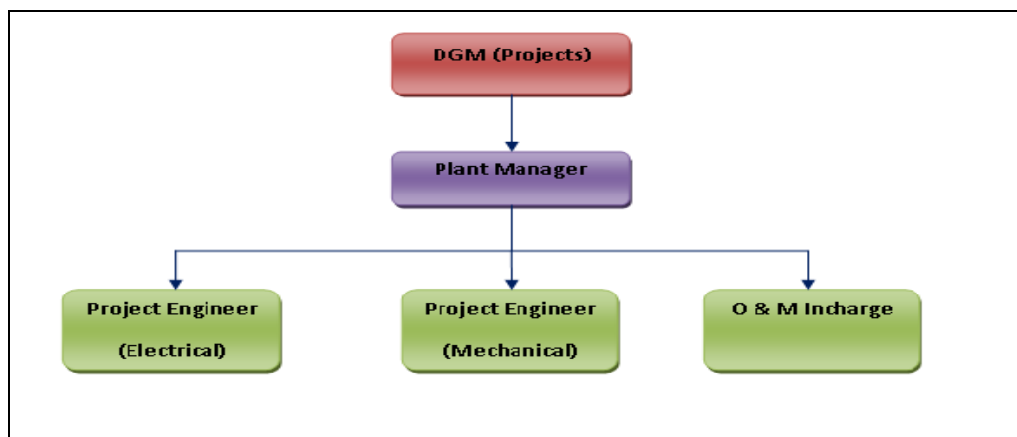
	of calibration along with respective energy meter are provided in Appendix-I of this monitoring report. Net electricity exported to grid by the wind farm is measured using KPTCL meters installed at HT end of the 33/66 KV substation at KN Hali. The main meter and check meter are installed at the substation. Both of these are joint meter readings and are taken on monthly basis in the presence of KPTCL/BESCOM and representative of the project proponent. KPTCL & BESCOM is issued a certificate for the share of electricity generated every month. Monthly share of electricity certificate is prorated by KPTCL/BESCOM based on actual generation of WTGs and the net total electricity supplied by the Wind Farm. Reading recorded in this certificate for the WTGs in the project activity is used for actual estimations.				
Frequency of monitoring/recording	Measuring frequency – Continuous Recording frequency – Monthly				
Value monitored:	83190728 – (01/03/2016 – 31/12/2016) 76185188 – (01/01/2017 – 31/10/2017) Total = 159375915 kWh				
Monitoring equipment	<table border="1"> <thead> <tr> <th>Energy Meter</th><th>Accuracy Class</th></tr> </thead> <tbody> <tr> <td>Trivectorenergy meter</td><td>0.2S</td></tr> </tbody> </table> The details of calibration along with respective energy meter are provided in Appendix-I of this monitoring report.	Energy Meter	Accuracy Class	Trivectorenergy meter	0.2S
Energy Meter	Accuracy Class				
Trivectorenergy meter	0.2S				
QA/QC procedures to be applied	The main and check energy meters are of 0.2S accuracy class. Calibration of energy meters at group controller end and substation end are carried out by BESCOM/KPTCL annually. The invoices raised to BSECOM/ KPTCL by NSL can be used for cross checking the electricity readings.				
Purpose of the data	Calculation of baseline emission				
Calculation method	Not applicable				
Comments	The data will be archived for the crediting period plus two years in electronic format.				

Data / Parameter	TEG _y
Data unit:	kWh
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y
Source of data:	Form B certificate issued by KPTCL/BESCOM.
Description of measurement methods and procedures to be applied:	The metering points NSLC III, NSLC IV, NSLC V are connected to bulk metering point NSLC I and NSLC II till 30th Sep 2011. From 30th Sep 2011 onwards, the metering points NSLC III, NSLC IV are connected to bulk metering point NSLC I and metering point NSLC V, NSLC VI are connected to bulk metering point NSLC II. The WTGs of capacity load 13.5 MW (9X1.5 MW) are connected to metering point NSLC III, and WTGs of capacity load 12 MW (8X1.5 MW) are connected to metering point NSLC IV and WTGs of capacity load 12.6 MW (7X1.5 MW, 1X2.1 MW) are connected to the metering point NSLC V and WTGs of capacity load 12.3 MW (4X1.5 MW, 3X2.1 MW) are connected to metering point at NSLC VI located at group controller station, Hirekandavadi. Energy is fed to grid from NSLC III, NSLC IV, NSLC V, NSLC VI through bulk metering points NSLC I, NSLC II located at 66 KV substation, KN Halli. Actual power generated by WTGs of project activity is measured using energy meters (Main & Check) located at group controller station, Hirekandavadi. The main meter and check meter are installed at group controller station, Hirekandavai. Net electricity exported to grid by the wind farm is measured using KPTCL meters installed at HT end of the 33/66 KV substation at KN Hali. The main meter and check meter are installed at the substation. Both of these are joint meter readings and are taken on monthly basis in the presence of KPTCL/BESCOM and representative of the project proponent. KPTCL & BESCOM is issued a certificate for the share of electricity

	generated every month. Monthly share of electricity certificate is prorated by KPTCL/BESCOM based on actual generation of WTGs and the net total electricity supplied by the Wind Farm. Reading recorded in this certificate for the WTGs in the project activity is used for actual estimations.				
Frequency of monitoring/recording:	Measuring frequency – Continuous Recording frequency – Monthly				
Value monitored:	83197800 – (01/03/2016 – 31/12/2016) 76194000 – (01/01/2017 – 31/10/2017) Total = 159391800 kWh				
Monitoring equipment:	<table border="1"> <thead> <tr> <th>Energy Meter</th><th>Accuracy Class</th></tr> </thead> <tbody> <tr> <td>Trivector meter</td><td>0.2S</td></tr> </tbody> </table> The details of calibration along with respective energy meter are provided in Appendix-I of this monitoring report.	Energy Meter	Accuracy Class	Trivector meter	0.2S
Energy Meter	Accuracy Class				
Trivector meter	0.2S				
QA/QC procedures to be applied:	The main and check energy meters are of 0.2S accuracy class. Calibration of energy meters at group controller end and substation end are carried out by BESCOM/KPTCL annually. The invoices raised to BSECOM/ KPTCL by NSL can be used for cross checking the electricity readings.				
Purpose of the data	Calculation of baseline emission				
Calculation method:	Not applicable				
Any comment:	The data will be archived for the crediting period plus two years in electronic format.				

3.3 Monitoring Plan

The operational and management structure implemented by NSL at the project site is as follows:
Organisational chart for data collection of Bhimasamudra Wind farm:



Roles and Responsibilities:

Designation	Responsibilities
DGM (Projects)	Certifying official (Authorized for signing invoice)
Plant Manager	Verification of correctness of data
Project Engineer / O & M In-charge	Staff who present during collection of data by BESCOM/KPTCL

Metering arrangements:

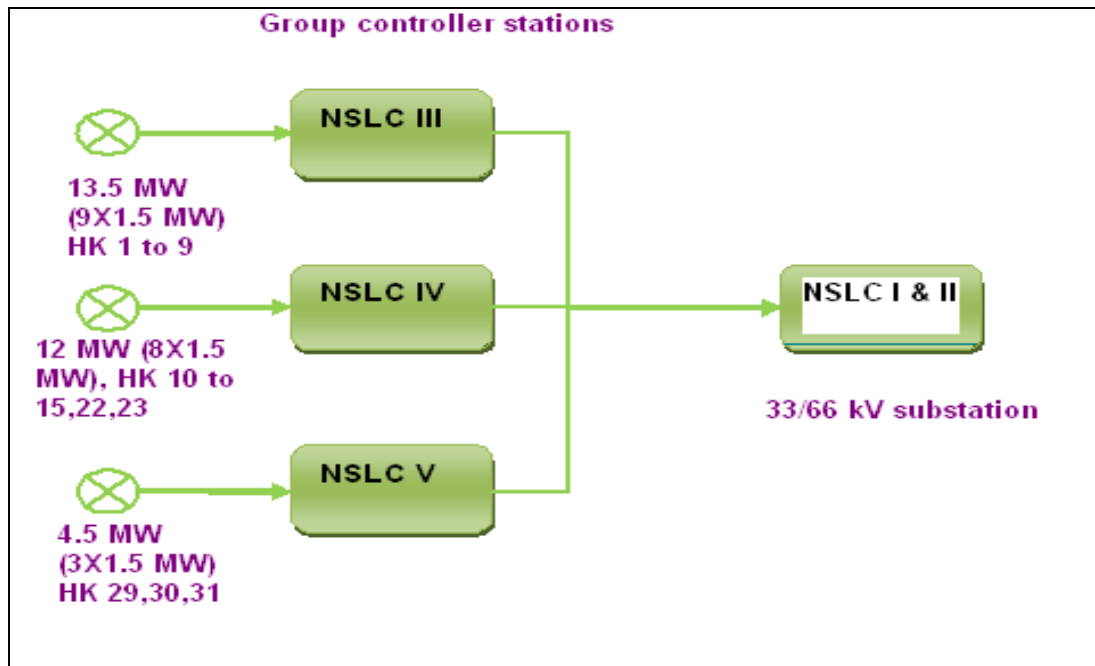
The metering points NSLC III, NSLC IV, NSLC V are connected to bulk metering point NSLC I and NSLC II till 30th Sep 2011. From 30th Sep 2011 onwards, the metering points NSLC III, NSLC IV are connected to bulk metering point NSLC I and metering point NSLC V, NSLC VI are connected to bulk metering point NSLC II.

The WTGs of capacity load 13.5 MW (9X1.5 MW) are connected to metering point NSLC III, and WTGs of capacity load 12 MW (8X1.5 MW) are connected to metering point NSLC IV and WTGs of capacity load 12.6 MW (7X1.5 MW, 1X2.1 MW) are connected to the metering point NSLC V and WTGs of capacity load 12.3 MW (4X1.5 MW, 3X2.1 MW) are connected to metering point at NSLC VI located at Group Control Station, Hirekandavadi. Energy is fed to grid from NSLC III, NSLC IV, NSLC V, NSLC VI through bulk metering points NSLC I, NSLC II located at 66 KV substation, KN Halli.

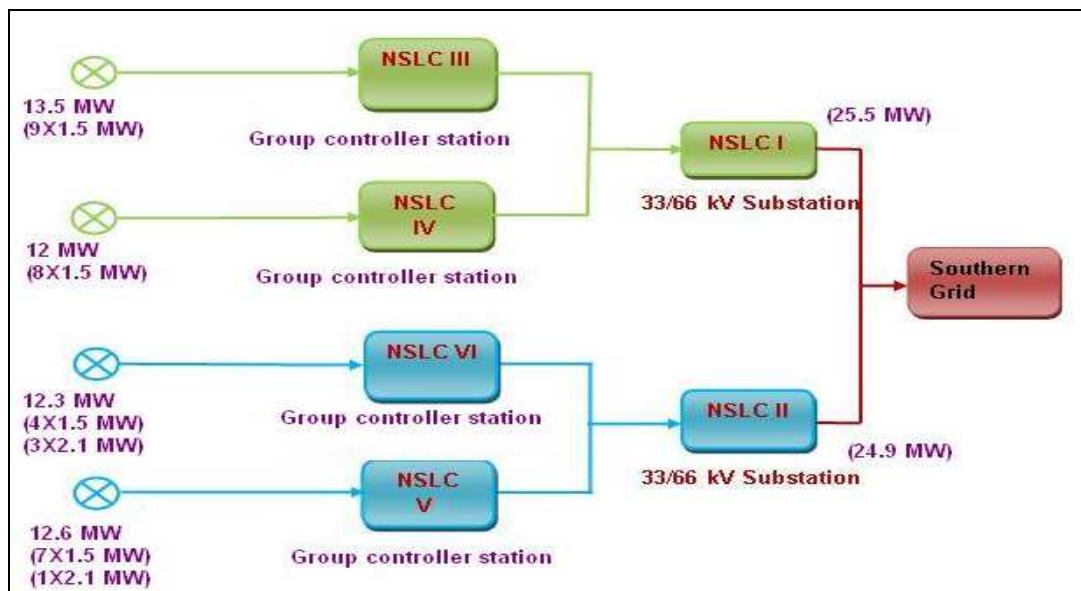
Metering points	WTGs No	Capacity of WTGs (MW)	Commissioning date

NSLC III	HK 1	1.5	29/09/2008
	HK 2	1.5	01/07/2008
	HK 3	1.5	06/06/2008
	HK 4	1.5	09/09/2008
	HK 5	1.5	09/09/2008
	HK 6	1.5	29/09/2008
	HK 7	1.5	08/12/2009
	HK 8	1.5	08/12/2009
	HK 9	1.5	08/12/2009
NSLC IV	HK 10	1.5	15/12/2009
	HK 11	1.5	15/12/2009
	HK 12	1.5	21/01/2010
	HK 13	1.5	15/12/2009
	HK 14	1.5	21/01/2010
	HK 15	1.5	15/12/2009
	HK 22	1.5	21/01/2010
	HK 23	1.5	21/01/2010
NSLC V	HK 25	1.5	30/09/2011
	HK 27	1.5	30/09/2011
	HK 29	1.5	30/09/2011
	HK 30	1.5	30/09/2011
	HK 31	1.5	30/09/2011
	HK 32	1.5	30/09/2011
	HK 33	1.5	30/09/2011
	HK 26	2.1	30/09/2011
NSLC VI	HK 16	1.5	30/09/2011
	HK 17	1.5	30/09/2011
	HK 18	1.5	30/09/2011
	HK 24	1.5	30/09/2011
	HK 19	2.1	30/09/2011
	HK 20	2.1	30/09/2011
	HK 21	2.1	30/09/2011

Metering arrangements before 30th Sep 2011



Metering arrangements after 30th Sep 2011



Actual power generated by WTGs of project activity is measured using energy meters located at Group Control Station, Hirekandavadi. The main and check meter of the WTGs are installed at Group Control Station, Hirekandavadi.

Net electricity exported to grid by the wind farm is measured using KPTCL meters installed at HT end of the 33/66 KV substation at KN Halli. The main meter and check meter of the net electricity exported to the grid is installed at the substation. Both of these are joint meter readings and are taken on monthly basis in the presence of KPTCL/BESCOM and representative of the project proponent.

KPTCL & BESCOM is issued a certificate for the share of electricity generated every month. Monthly share of electricity certificate is prorated by KPTCL/BESCOM based on actual generation of WTGs and the net total electricity supplied by the Wind Farm. Reading recorded in this certificate for the WTGs in the project activity is used for actual estimations. The calibration details of the energy meter are given in the Appendix-I of the report

QA/QC procedures & Data collection and archiving:

The reading can be cross verified with the actual invoices presented to BESCOM/KTPCL by NSL. The daily data at the site is collected in electronic form. Monthly data is also collected and maintained in plant log books. The project proponent shall keep complete and accurate records of all the data as a part of monitoring for at least a period of 2 years after the end of the crediting period or the last issuance of CERs for the project activity, whichever occurs later.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

As per ACM0002, baseline emissions include only CO₂ 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:

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

Where:

BE_y	= Baseline emissions in year y (tCO ₂ /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 ₂ /MWh)

Calculation of $EG_{PJ,y}$:

The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions.

Since the project activity is a Greenfield project activity, option (a) is applicable to the project activity:

(a) Greenfield renewable energy power plants

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$	= 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)
$EG_{facility,y}$	= Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

$EG_{PJ,y}$ is considered as EG_y in the registered VCS PD.

Combined margin CO_2 emission factor $EF_{grid,CM,y}$ is 0.9451 t CO_2 /MWh considered based on the data provided in the registered PD.

Net Energy Generated (EG_y):

The net electricity supplied is calculated as the follows.

Net electricity supplied to the grid by the plant = Electricity exported to the grid by the project activity – Electricity imported from the grid by the project activity – Transmission losses

Electricity export to the grid is considered based on Form B certificate issued by BESCOM/KTPCL.

Electricity import from the grid is considered based on Form B certificate issued by BESCOM/KTPCL².

Transmission losses³ are considered based on Form B certificate issued by BESCOM/KTPCL

Grid Emission Factor:

The GEF is fixed ex-ante as given below:

Parameter	Value
EF_{OM}	0.9876
EF_{BM}	0.8179

²As per PPA, NSL is billed for 115% of the electricity imported by the project activity from grid.

³ Transmission losses:

Transmission losses = (Sum of electricity export recorded for the metering points NSLC III, NSLC IV, NSLC V, NSLC VI) – (Electricity export recorded at the substation) / (Sum of electricity export recorded for the metering points NSLC III, NSLC IV, NSLC V, NSLC VI) * 100

EF _{CM}	0.9451
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Therefore, EF_{grid,CM,y} = **0.9451tCO₂/MWh**

Baseline Emissions:

The formula for Baseline emissions as discussed is provided above.

$$\begin{aligned}
 BE_y &= EG_{PJ,y} \cdot EF_{grid,CM,y} \\
 &= 159376 \cdot 0.9451 \\
 &= 150,626 \text{ tCO}_2\text{e (round down value).}
 \end{aligned}$$

4.2 Project Emissions

As per approved methodology ACM0002, for most renewable energy project activities,

$$PE_y = 0.$$

Since the project activity is a wind power project, the project emission is zero.

4.3 Leakage

No leakage emissions are considered for this Project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity.

4.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER _y	=	Emission reductions in year y (tCO ₂ e/yr)
BE _y	=	Baseline emissions in year y (tCO ₂ /yr)
PE _y	=	Project emissions in year y (tCO ₂ e/yr)

The details of emission reduction achieved by the project activity are as follows:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2016	78,624	0	0	78,624
2017	72,003	0	0	72,003
Total	150,626	0	0	150,626

APPENDIX I: CALIBRATION DETAILS

As per registered PD, all the energy meters including pooling station meters should be calibrated once in a year i.e. calibration frequency is "Annual". However, it is identified that calibration has been performed quarterly and the results are found to be satisfactory. Hence, there is no delay in calibration of energy meter during this monitoring period.

Metering Points	Meter Details					Test Result
	Serial no	Make	Type	Accuracy class	Date of Calibration	
NSLC I	Main meter – 11071857 Check meter – 15195281	L & T	3P4W	0.2S	02/01/2016	Satisfactory
					25/04/2016	Satisfactory
					19/07/2016	Satisfactory
					06/12/2016	Satisfactory
					14/03/2017	Satisfactory
					11/07/2017	Satisfactory
					27/10/2017	Satisfactory
NSLC II	Main meter – 11071861 Check meter – 11071863	L & T	3P4W	0.2S	02/01/2016	Satisfactory
					25/04/2016	Satisfactory
					19/07/2016	Satisfactory
					06/12/2016	Satisfactory
					14/03/2017	Satisfactory
					11/07/2017	Satisfactory
					27/10/2017	Satisfactory
NSLC III	Main meter – 07022896 Check meter – 07022921	L & T	3P4W	0.2S	02/01/2016	Satisfactory
					25/04/2016	Satisfactory
					19/07/2016	Satisfactory
					25/10/2016	Satisfactory
					26/04/2017	Satisfactory
					24/07/2017	Satisfactory
					27/10/2017	Satisfactory
NSLC IV	Main meter – 07022985 Check meter – 07022986	L & T	3P4W	0.2S	02/01/2016	Satisfactory
					25/04/2016	Satisfactory
					19/07/2016	Satisfactory
					25/10/2016	Satisfactory
					26/04/2017	Satisfactory
					24/07/2017	Satisfactory
					27/10/2017	Satisfactory

NSLC V	Main meter – 09142342 Check meter - 13191365	L & T	3P4W	0.2S	02/01/2016	Satisfactory
					25/04/2016	Satisfactory
					19/07/2016	Satisfactory
					25/10/2016	Satisfactory
					26/04/2017	Satisfactory
					24/07/2017	Satisfactory
					27/10/2017	Satisfactory
NSLC VI	Main meter – 11071865 Check meter - 13191363	L & T	3P4W	0.2 S	02/01/2016	Satisfactory
					25/04/2016	Satisfactory
					19/07/2016	Satisfactory
					25/10/2016	Satisfactory
					26/04/2017	Satisfactory
					24/07/2017	Satisfactory
					27/10/2017	Satisfactory