

51 MW Wind Power Project at Chitradurga

MONITORING REPORT

Version 04, Date: 03/06/2011

First Monitoring Period

06/06/2008 to 30/06/2010

(Both days included)

Voluntary Carbon Standard 2007.1

Claimed Emission Reductions

57,893 t CO₂ e

Project Site:
Chitradurga District,
Karnataka, India

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Abbreviations

WTG : Wind Turbine Generator

MWh : Mega Watt hour

MW : Mega Watt

kWh : Kilo Watt Hour

BESCOM : Bangalore Electricity Supply Company Limited

KPTCL : Karnataka Power Transmisson Corporation Limited

PPA : Power Purchase Agreement

VCS: Voluntary Carbon Standard

NSL: Nuziveedu Seeds Limited

A. Project Reference:

Title: 51 MW Wind Power Project at Chitradurga

Date of Monitoring Report: 03/06/2011

Registration Date: 01/06/2010

Claimed Emissions Reductions: 57,893 t CO₂ e.

Version: 04

B. Location of the Project:

The project site is located at Bhimasamudra, Chitradurga District of Karnataka in India. Chitradurga is approximately around 200 KM from Bangalore, capital of Karnataka state. The approximate latitude and longitude of the project activity is 14°14' N and 76° 26' E.

C. Brief Description and Current Status of the Project:

This is the first Monitoring Report of project titled '51MW Wind Power Project at Chitradurga' under VCS 2007.1. NSL referred wind power assessment report dated 29 September 2007, prepared by Elcimech Engineers and Enterprises and submitted to ReGen Powertech Private Limited (hence onwards referred as RPPL) for Bhimasamudra village wind farm in Chitradurga district of Karnataka state. Based on above referred report, NSL had earlier proposed setting up of 51 MW wind power project with 34 number of 1.5 MW Wind Turbine Generators (WTG) of Regen make during conceptualization stage. Thus, PP released purchase order for the same to Regen make on 10 December 2007. However, on 12 September 2009, RPPL communicated to PP, that they already had supplied 09 WTGs and 25 WTGs were balance. However, RPPL could not supply balance 25 WTGs within scheduled time and could supply only 19 WTGs out of balance 25 WTGs as per scheduled time line and further balance 06 WTGs were to be supplied only after June 2010.

Thus, keeping all the above delays in mind, NSL decided to replace the ReGen make 06 WTGs (having location for low wind power potential as compared to other WTGs in wind farm) with Suzlon make 04 WTGs each of 2.1 MW capacity. Hence, on 11 December 2009, NSL released new purchase order to Suzlon Energy Limited (SEL) for 04 WTGs each of 2.1 MW capacity based on the view that this will help to achieve the expected generation without increasing the project capacity.

Thus, the current capacity though lower (i.e. 50.4 MW) than the title. However, as the PP is also developing the project under CDM and received HCA with the same title; PP is still using the title as 51 MW for consistency between their CDM and VCS project.

The project is under commissioning and the life time of the project activity is 20 years. The details are as follows:

SI 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	Yet to be commissioned
17	HK 17	1.5	Yet to be commissioned
18	HK 18	1.5	Yet to be commissioned
19	HK 19	2.1	Yet to be commissioned
20	HK 20	2.1	Yet to be commissioned
21	HK 21	2.1	Yet to be commissioned
22	HK 22	1.5	21/01/2010
23	HK 23	1.5	21/01/2010
24	HK 24	1.5	Yet to be commissioned
25	HK 25	1.5	Yet to be commissioned
26	HK 26	2.1	Yet to be commissioned
27	HK 27	1.5	Yet to be commissioned
28	HK 29	1.5	Yet to be commissioned
29	HK 30	1.5	Yet to be commissioned
30	HK 31	1.5	Yet to be commissioned
31	HK 32	1.5	Yet to be commissioned
32	HK 33	1.5	Yet to be commissioned

Details of PPAs and Metering Points

S. No	Details of PPA				Corresponding Metering Points at Project Site	Locations of WTGS attached to each Metering Point	Details of WTGs		
	Signed between	Date	No of WTGs	Capacity (MW)			No of WTGs	Capacity of each WTG (MW)	Total Capacity (MW)
1	NSL and BESCO M	02/01/2009	17 *1.5 MW	25.5	NSLC 3	HK1 to HK9	9	1.5	13.5
					NSLC 4	HK10 to HK15, HK22 , HK23	8	1.5	12
	Total Capacity as per PPAs (MW)			25.5			Total Installed		25.5

D. Monitoring Period

The Monitoring period is from 06/06/2008 to 30/06/2010 (both days included).

VCS approved CDM methodology: Version 11 of ACM0002: "Consolidated baseline methodology for grid connected electricity generation from renewable sources"

Tools referenced in this methodology:

- 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"

Duration of the project activity/crediting period

Project Start date: 06/06/2008 (WTG at HK 3 location is commissioned on June 6th 2008. Hence, this date is considered as start date of the project activity)

Crediting period start date: 06/06/2008

VCS project crediting period: 06/06/2008 to 06/06/2018 and renewable for 10 years

Monitoring period: The monitoring period from 06/06/2008 to 30/06/2010.

E. Baseline Emission Factor

The baseline emission factor (combined margin) has been calculated as per the guidance provided in ACM0002 (Version 11). The tool referenced in this methodology is titled "Tool to calculate the emission factor for an electricity system (Version 2).

- Baseline emissions are calculated as per the formula given below:

BE_y = Baseline Emissions

Baseline Emissions = $EG_y \times EF_{grid,CM,y}$

Where,

EG_y = Electricity supplied by the project activity to the grid

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor

Ex ante Grid emission factor of 0.9451 tCO₂/MWh is considered based on the data provided in the validated PD and procedures mentioned in Version 11 of ACM0002.

- Emission Reductions:

The project activity reduces carbon dioxide through displacement of grid electricity generation by renewable-wind electricity. The emission reduction (ER_y) due to NSL project activity during a given year y is calculated as the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as per the formulae given below:

$$ER_y = BE_y - PE_y - L_y$$

Where,

BE_y = Baseline emissions

As per Version 11 of ACM 0002, project emissions and leakage emissions from the project are zero. Project emissions that might arise on account of import from grid are already accounted in the calculation of net electricity exported to the grid. Same is incorporated in the revised monitoring report.

PE_y = Project emissions; $PE_y = 0$ for NSL project activity.

L_y = Emissions due to Leakage. $L_y = 0$ for NSL project activity.

F. Parameters being monitored:

For the Project, the following parameters are being monitored on continuous basis:

Data / Parameter:	EG_y
Data unit:	kWh
Description:	Electricity supplied by the plant to the grid
Source of data to be used:	Electricity generation reports based on NSLC I, NSLC II, NSLC-III and NSLC-IV are considered as metering points to KPTCL/BESCOM for the electricity supplied to the grid
Value of data applied for the purpose of calculating expected emission reductions	5.5 Million kWh for period June 2008 to Dec 2008. 28.17 Million kWh for period Jan 2009 to Dec 2009. 27.53 Million kWh for period Jan 2010 to June 2010.
Description of measurement methods and procedures to be applied:	Power supplied to the grid will be recorded at the plant using electronic tri vector meters installed at the project site. HK 1 to HK 9, are connected to NSLC-3 and HK 10 to 15, 22 and 23 are connected to NSLC-4 located at site. Energy is fed to grid from NSLC-3 and NSLC-4 metering points through bulk metering points NSLC-1 and NSLC-2. Energy exported to the Grid and imported from the grid has been recorded by representatives of KPTCL/BESCOM and NSL on 1 st day of every month.
QA/QC procedures to be applied:	All the main meter and check energy meters installed at the Project site were of 0.2% accuracy class. Each meter was jointly inspected and sealed on behalf of KPTCL and NSL. Calibration of energy

	meters is done on annual basis. However, the calibration of monitoring energy meters is carried out by BESCOM and is beyond control of NSL. Electricity sold receipts/records (i.e. invoices) was cross-verified with meter readings at bulk metering points NSLC-I and NSLC-II.
Any comment:	The data will be archived for the crediting period plus two years in electronic or in paper form

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 to be used:	Plant energy meters located at NSLC-3 and NSLC-4 metering points
Value of data applied for the purpose of calculating expected emission reductions	5.5 Million kWh for period June 2008 to Dec 2008. 28.25 Million kWh for period Jan 2009 to Dec 2009 30.45 Million kWh for period Jan 2010 to June 2010
Description of measurement methods and procedures to be applied:	Electricity produced at HK-1 to HK-9 locations are recorded at NSLC-III metering point and electricity produced for HK-10 to 15, 22, 23 locations recorded at NSLC-IV metering point. Joint meter reading for the energy exported to the Grid and imported from the grid will be recorded by representatives of KPTCL/BESCOM and NSL on 1 st day of every month
QA/QC procedures to be applied:	Plant meters installed at the Project site are of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of KPTCL and NSL. However, BESCOM is responsible for calibration and testing of energy meters. Calibration of energy meters is done on annual basis. Electricity sold receipts/records (i.e. invoices) was cross-verified with meter readings at bulk metering points NSLC-I and NSLC-II
Any comment:	The data will be archived for the crediting period plus two years in electronic or in paper form

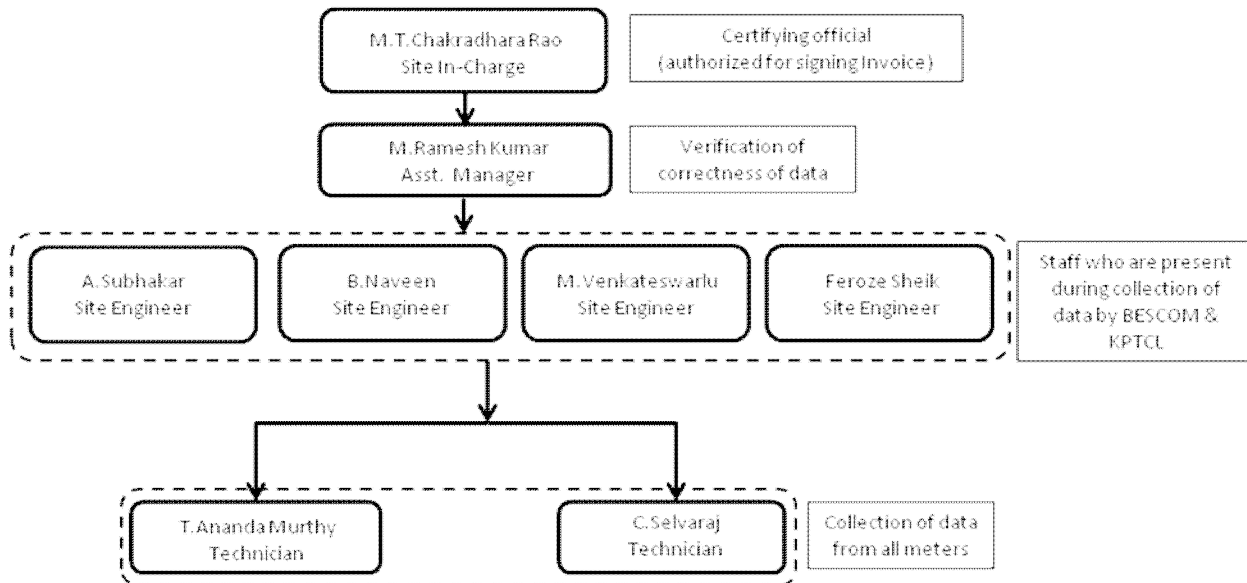
Transmission Losses:

Transmission Losses = (Sum of electricity export recorded for the metering points NSLC-III and NSLC-IV) – (Electricity export recorded at the substation)/(Sum of electricity export recorded for the metering points NSLC-III and NSLC-IV) x 100

Organization structure of the project activity:

The operational and management structure implemented by NSL at the project site is as follows:

Organizational chart for data collection of Bhimasamudra Wind farm



1. Plant Manager : Certifying official (authorized for signing the Invoices & Form-B) and Staff who shall be present during collection of data by BESCOM & KPTCL
2. Project Engineer : Verification of data (daily & monthly)

Emergency Preparedness Plan:

At emergency situations, wind turbine gets automatically shut down and avoids subsequent damages to grid connectivity and project activity. However, during current monitoring period no such emergency events have occurred.

Monitoring Procedure:

Metering Equipment: Metering equipment are electronic trivector meters of accuracy class 0.2% required for the Project (both main and check meters). NSL provides such metering results to the KPTCL/BESCOM.

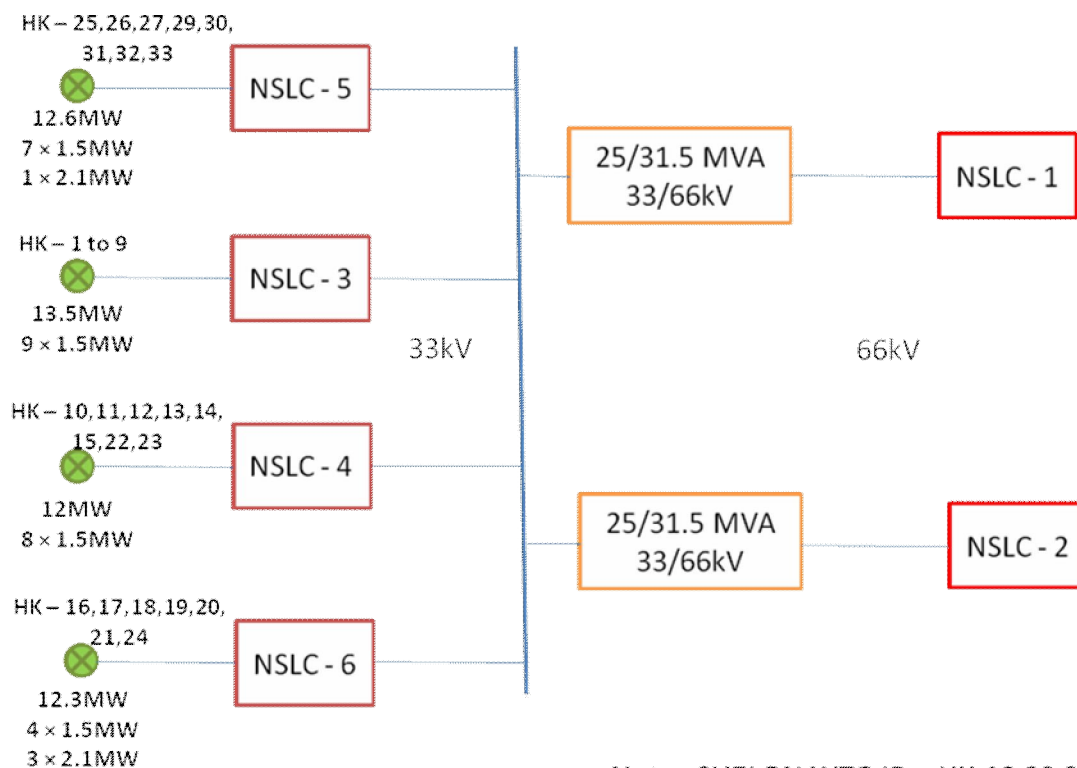
Monthly Meter Readings: An export and import meter installed at each of these metering points monitors the quantity of electricity exported and imported continuously and a joint meter reading for the energy exported to the Grid and imported from the grid will be recorded by representatives of KPTCL/BESCOM and NSL on 1st day of every month in Joint Meter Reading Statement also called Form-B for all the metering points at site and substation and the readings will be jointly signed by both the parties as a proof of export of Power to the grid from project activity and import of Power from grid by project activity.

The energy meters used for monitoring purpose are TOD (Time of Day) meters which continuously monitor demand, time, and energy usage of electricity. Thus, continuous monitoring of electricity has been ensured inline with applied baseline and monitoring methodology.

Following details are recorded in Form-B (Joint Meter Reading Statement):

1. Name of the generating company/metering point
2. Previous and present meter readings at the metering point
3. Difference of previous and present metering readings
4. Multiplying constant of the metering point
5. Energy Exported/imported
6. Transmission losses %
7. Net energy exported to the grid (difference of energy exported and imported)

NSL will pay to the KPTCL/BESCOM charges, as notified by the KPTCL/BESCOM from time to time, to read, record and calibrate each additional energy meter installed by NSL other than the bulk energy meter, for the purpose of determination of the losses in the transmission lines constructed and maintained by NSL for the purpose of interconnection with the Grid System and for the facilitation of settlement of the Monthly Invoices.



Note: SUZLON WTG IDs: HK-19,20,21,26

Fig: Line Diagram of Metering Points

Energy exported and imported from NSLC-III and NSLC-IV metering points to NSLC-II and NSLC-I bulk metering points.

The entire main and check meters will be calibrated and tested for accuracy based on the requirement of BESCOM. The calibration of monitoring equipment is being maintained as per the requirement of BESCOM. Details of calibration of energy meters as follows.

SI No	Feeder	Make	Serial Number of the meter		Accuracy Level	Date of calibration
1	NSLC1	L&T	Main Meter	05437937	Within limits of $\pm 0.2\%$	14/05/2009
						17/08/2009
						21/11/2009
						11/02/2010
	NSLC1	L&T	Check Meter	05437950	Within limits of $\pm 0.2\%$	14/05/2009
						17/08/2009
						21/11/2009
						11/02/2010
2	NSLC2	L&T	Main Meter	05462969	Within limits of $\pm 0.2\%$	08/06/2009
						17/08/2009
						21/11/2009
						11/02/2010
	NSLC2	L&T	Check Meter	05462975	Within limits of $\pm 0.2\%$	08/06/2009
						17/08/2009
						21/11/2009
						11/02/2010
3	NSLC3	L&T	Main meter	07022896	Within limits of $\pm 0.2\%$	26/03/2008
						08/04/2009
						25/09/2009
						08/12/2009
						20/03/2010
	NSLC3	L&T	Check meter	07022921	Within limits of $\pm 0.2\%$	26/03/2008
						08/04/2009
						25/09/2009
						08/12/2009
						20/03/2010
4	NSLC4	L&T	Main meter	07022985	Within limits of $\pm 0.2\%$	15/12/2009
						20/03/2010
	NSLC4	L&T	Check meter	07022896	Within limits of $\pm 0.2\%$	15/12/2009
						20/03/2010

QA/QC procedures:

Inspection of Energy Meters: The main and check energy meters (export and import) and all associated instruments, transformers installed at the Project shall be of 0.2% accuracy class. Each meter shall be jointly inspected and sealed on behalf of the KPTCL/BESCOM and NSL and shall not be interfered with by either KPTCL/BESCOM or NSL except in the presence of the other Party or its accredited representatives. Electricity sold receipts/records (i.e. invoices) was cross-verified with meter readings at bulk metering points NSLC-I and NSLC-II

Meter Test Checking: All the main and check meters shall be tested for accuracy every calendar year with reference to a portable standard meter which shall be of an accuracy class of 0.1%. The 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 billing as long as the error in the main meter is within the permissible limits.

Plant energy meters located at NSLC-III and NSLC-IV as metering points .Each metering point contains main meter and check meter. The consumption registered by the main meters alone will hold good as per Article 7 of PPA for the purpose of billing as long as the error in the main meter is within the permissible limit. However, main meter is cross checked with the check meter for any deviation.

Meter readings at bulk metering points NSLC-I and NSLC-II are used for cross verification

As per article 7 of PPA, if it is found during calibration tests that error in main meter is within the permissible limit of error and the corresponding check meter is beyond the permissible limit, then the billing will be as per the main meter as usual.

During the calibration test, if main meter is found to be beyond permissible limit of error, but the corresponding check meter is found to be within permissible limit of error, then the billing for the month up to the date and time of such test shall be as per the check meter.

During the calibration test, if main meter and check meter are found to be beyond permissible limit of error, both meters will be immediately calibrated and the correction is applied to the reading registered by the main meter to arrive at the correct reading of the energy supplied for billing purpose.

Training: The site team is provided training periodically for understanding and complying with monitoring procedures. The team is also updated about precautionary measure and safety measures to be taken at the project site.

G. Calculation of Emission Reductions

Baseline and project emissions are calculated as per the formulas mentioned in Section B of the validated PD of the project activity.

1. Baseline emissions

Baseline Emissions are calculated as per the formula given below:

Baseline emissions = Net Electricity exported to the grid (MWh) x Grid emission factor (tCO₂/MWh)

Grid emission factor of 0.9451 tCO₂/MWh is considered based on the data provided in the validated PD and procedures mentioned in methodology version 11 of ACM0002.

Net Electricity Exported to the grid is calculated as follows:

Net Electricity Supplied by the plant = Electricity exported to the grid by the project activity – Electricity imported from the grid by the project activity- Transmission Line losses

Export:

- a. Electricity exported to the grid is considered based on Form B
- b. Electricity export is calculated based on invoice every month

Import:

- a. Electricity imported from the grid is recorded in **From-B** every month at each of metering points of the grid.
- b. As per the PPAs signed with KPTCL, NSL is billed for 115% of the electricity imported by the project activity from the grid. Considering the same, NSL submits invoices (corresponding to PPA) to BESCO.

Gap in calibration of energy meters for which correction was applied

Metering	Gap in successive calibrations	Correction Applied for
NSLC-III	26/03/2009 to 08/04/2009	01/03/2009 to 31/04/2009

In accordance with 4(a) of Section B of “**Guidelines for assessing compliance with calibration frequency requirement**” a maximum permissible error of 0.2% is applied, since error of calibration is within the permissible limit. Correction factor is applied for period March 2009 to April 2009 for the metering points NSLC-III.

Transmission Losses:

Transmission losses for transmitting electricity from two metering points at the site to the bulk metering point are recorded in Form B and Invoices to BESCO. As per annex 2 of the validated PD export meters are to be calibrated on annual basis. However the same was not complied during the period of March 2009 to April 2009 for the metering points NSLC-III.

Conservative value of the net electricity exported to the grid (EG_y) (from the following two values) is considered for calculation of emission reductions and monthly recordings of export, import, and transmission losses used to arrive at the conservative value.

- Net Electricity Exported based on generation = Electricity produced by the project activity (As per form-B) – Electricity imported from the grid by the project activity (As per form-B) - Transmission Line losses based on Form-B

- Net Electricity Exported based on Invoice = Electricity produced by the project activity (As per Invoices) –Electricity imported from the grid by the project activity (As per Invoices) - Transmission Line losses based on Invoices*

Note: * Transmission losses are applied wherever NSLC3 generation is accounted.

2. Project Emissions:

$PE_y = 0$ for NSL project activity.

3. Leakage Emissions:

$L_y = 0$ for NSL project activity.

4. Emission Reductions:

The NSL project activity reduces carbon dioxide through displacement of grid electricity generation with fossil fuel based power plants by renewable-wind electricity. The emission reduction ER_y due to NSL project activity during a given year y is calculated as the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as per the formulae given below:

$$ER_y = BE_y - PE_y - L_y$$

H. Emission Reductions

The emission reductions per year during the chosen monitoring period are as given below. Emission reductions are calculated based on the power exported to the grid [**start date 06.06.2008**] to [**end of monitoring period date 30.06.2010**].

Months	Net Electricity exported to the grid (after correcting for calibration delay)		Net Electricity exported to the grid (Conservative values)	Baseline Emission factor	Project Emissions	Leakage Emissions	Emission Reductions
	As per B-From	As per Invoice					
	kWh	kWh					
Jun-08	335,700	335,565	335,565	0.9451	0	0	317
Jul-08	506,400	506,220	506,220	0.9451	0	0	478
Aug-08	924,300	924,165	924,165	0.9451	0	0	873
Sep-08	1,152,000	1,151,730	1,151,730	0.9451	0	0	1,088
Oct-08	738,900	738,765	738,765	0.9451	0	0	698
Nov-08	803,700	803,565	803,565	0.9451	0	0	759
Dec-08	1,098,000	1,098,000	1,098,000	0.9451	0	0	1,037
June 2008- Dec 2008	5,559,000	5,558,010	5,558,010				5,250
Jan-09	1,233,000	1,233,000	1,233,000	0.9451	0	0	1,165
Feb-09	736,200	735,930	735,930	0.9451	0	0	695
Mar-09	517,324	512,937	512,937	0.9451	0	0	484
April-09	897,251	896,126	896,126	0.9451	0	0	846
May-09	1,304,100	1,302,930	1,302,930	0.9451	0	0	1,231
June-09	2,295,000	2,295,000	2,295,000	0.9451			2,169
July-09	5,601,600	5,601,600	5,601,600	0.9451	0	0	5,294
Aug-09	3,816,900	3,747,697	3,747,697	0.9451	0	0	3,541
Sep-09	2,824,200	2,823,930	2,823,930	0.9451	0	0	2,668
Oct-09	2,564,981	2,564,846	2,564,846	0.9451	0	0	2,424
Nov-09	2,549,093	2,548,958	2,548,958	0.9451	0	0	2,409
Dec-09	3,912,300	3,911,895	3,911,895	0.9451	0	0	3,697
Jan 09 –Dec 09	28,251,950	28,174,850	28,174,849				26,623
Jan-10*	5,210,100	2,298,407	2,298,407	0.9451	0	0	2,172
Feb-10	3,091,500	3,091,590	3,091,500	0.9451	0	0	2,921
Mar-10	3,519,900	3,518,190	3,518,190	0.9451	0	0	3,325
April-10	3,030,300	3,030,390	3,030,300	0.9451	0	0	2,863
May-10	6,279,300	6,277,860	6,277,860	0.9451	0	0	5,933
June-10	9,319,500	9,318,330	9,318,330	0.9451	0	0	8,806
Jan 10 – June 10	30,450,600	27,534,767	27,53,4587				26,020
June 2008 – June 2010	64,261,550	61,267,627	61,267,447				57,893

Note: * For month January 2010, NSLC IV invoice is not available and NSLCIII generation is considered for conservative purpose and the same is used for cross verification

I. comparison of the monitored emission reductions with the emission reductions based on ex-ante calculations in validated -PD

Period	Ex-ante PLF	Emission Reduction based on ex-ante calculations in registered-PD	Actual PLF	Actual Achieved emission reductions	Explanation for difference in emission reductions
	%	t CO ₂	%	t CO ₂	
Jan 2009 – Dec 2009	32.48	100407	33.44	26,623	At the time of conceptualization of the project activity estimated emission reductions arrived keeping in view that all WTGS are commissioned. However, in actual scenario for the period January 2009 to December 2009 only 7 WTGs got commissioned. However for overall period from June 2008 to December 2009 only 13 WTGs got commissioned. The PLF during monitoring period is 33.44% which is slightly higher than the ex-ante estimation due to good wind season and WTG commissioned in year 2009 has generation only for few days in the month of December 2009. However, the scenario is not continued throughout lifetime of project activity. As the PLF achieved during monitoring period is 19.06% and 27.94% for year 2008 and 2009 respectively.

Note: Calendar year 2009 is considered for the comparison of monitored emission reductions with emission reductions based on ex-ante calculations.