



Voluntary Carbon Standard

MONITORING REPORT

Version number: 03

Date: 01/02/2011

Title of the project activity:

22.5 MW Wind Power Project by Ruchi Soya Industries Limited at Palsodi, District-Ratlam, Madhya Pradesh

Monitoring periods:

First - from 29/02/2008 to 31/12/2008;

Second - from 01/01/2009 to 31/12/2009

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

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Project activity:

The project activity is promoted by Ruchi Soya Industries Limited (RSIL). It involves supply, erection, commissioning and operation of 15 x 1.5 MW rated Wind Turbine Generators (WTGs), Make - Suzlon, Model S-82. The total installed capacity is 22.5 MW. The generated electricity from the project activity is being sold to Madhya Pradesh State Pashchim Kshetra Vidyut Vitaran Company Limited (MPPKVVCL), a company of Madhya Pradesh State Electricity Board (MPSEB). The electricity is being supplied to the NEWNE grid at 132 kVA substation at Sailana (Ratlam) for selling to MPPKVVCL. All WTGs are located on the site - "hills of Palsodi village of District Ratlam, Madhya Pradesh, India" where no renewable power plant was operated prior to the implementation of the project activity.

The following table shows the details of the installed Wind Turbine Generators (WTGs) of the project activity:

Project Participant	Make/ Model	Rated Capacity (MW)	Date of Commissioning	No. of WTGs	Total Capacity (MW)
Ruchi Soya Industries Limited	Suzlon/ S-82	1.5	29/02/2008	5	7.50
			29/03/2008	7	10.50
			30/05/2008	3	4.50
Total					22.5

Purpose of the project activity:

- To utilize renewable wind energy for generation of the electricity.
- To sell the generated electricity to Madhya Pradesh State Pashchim Kshetra Vidyut Vitaran Company Limited connected with the NEWNE grid comprising mainly fossil fuel based power plants.
- To contribute in mitigating the climate change.

The project activity involves the use of wind energy which is a renewable resource of electricity generation and would supply electricity to the NEWNE grid. The electricity generation from wind energy does not cause emissions of greenhouse gases whereas grid electricity is mostly generated from fossil fuels (i.e. coal) that are highly carbon intensive and cause GHG emissions.

Therefore, the project activity replaces anthropogenic emissions of greenhouse gases (GHGs) in to the atmosphere by supplying the equivalent amount of electricity generated through the operation of existing fuel mix in the NEWNE grid comprising mainly fossil fuel based power plants and future capacity expansion connected to the grid.

1. Brief description of the installed technology and equipments:**Technology¹:**

The use of wind as a renewable energy involves the conversion of power contained in masses of moving air into rotating shaft power. The conversion process utilises aerodynamic forces (lift and/or drag) to produce a net positive turning moment on a shaft, resulting in the production of mechanical power that can be converted to electrical power.

The energy content in wind varies with latitude, land - sea disposition, altitude and season. In India the factor that mostly governs the availability of wind energy at a particular site is its geographical location with respect to the monsoon wind. The availability of data on wind speed being a basic requirement for determining the feasibility of wind power generation at any site and due to the highly uneven distribution of wind speed over the country, an assessment of the wind resource over different regions was undertaken before any plan of harnessing the wind energy was drawn for implementation.

Equipments:

The WTGs made by Suzlon are categorized as S-82 (capacity-1500 kW). Suzlon is well-known supplier of wind turbines and so far has installed different capacities of WTGs in various countries.

2. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.):

- | | | |
|-------|--|-------------------------------------|
| i. | Date of purchase order: | 20/11/2007 |
| ii. | Commissioning of WTGs: | 29/02/2008 to 30/05/2008 |
| iii. | Project start date: | 29/02/2008 |
| | (the date of commissioning of first WTG in the project activity) | |
| iv. | Project termination date: | 28/02/2028 |
| | (as per 20 years life time of the WTGs) | |
| v. | Crediting period start date: | 29/02/2008 |
| | (the project start date on which first WTG was commissioned) | |
| vi. | Duration of crediting period: | 10 years (29/02/2008 to 28/02/2018) |
| vii. | First monitoring period: | 29/02/2008 to 31/12/2008 |
| viii. | Second monitoring period: | 01/01/2009 to 31/09/2009 |

3. Total emission reductions achieved in the monitoring period:

Monitoring period	Project Participant	Monitoring Period	Emission Reductions Achieved (tCO ₂)
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¹ http://www.ireda.in/homepage1.asp?parent_category=2&sub_category=21&category=78

		From	To	
First	Ruchi Soya Industries Limited	29/02/2008	31/12/2008	31,591
Second	Ruchi Soya Industries Limited	01/01/2009	31/12/2009	47,328

A.2. Project Participant

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Project Participant: Ruchi Soya Industries Limited

A.3. Location of the project activity:

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The project activity site is located in the hills of Sambharkho range falls in village-Palsodi, District-Ratlam. The aerial distance from midpoint of the site to the Ratlam city is about 12 km. The site is easily approachable by road vehicles up to the foot of the hill. The map of Survey of India showing the relevant portion of the site is given in Figure 1. Nearest airport is at Indore and nearest railway station is at Ratlam. Ratlam is a major railway station of Western Railways, India. Ratlam is approximate 150 km away from Indore via road.

Details of location of the WTGs installed are mentioned in Table 1 and Figure 1 below:

TABLE 1: GEOGRAPHICAL COORDINATES OF INSTALLED WTGS

S. No.	Machine No.	Latitude	Longitude
1.	P 101	23 ⁰ 20' 22.4" N	74 ⁰ 54' 55.7" E
2.	P 104	23 ⁰ 20' 33.9" N	74 ⁰ 54' 40.2" E
3.	P 107	23 ⁰ 20' 36.2" N	74 ⁰ 55' 18.4" E
4.	P 109	23 ⁰ 20' 45.1" N	74 ⁰ 54' 57.1" E
5.	P 112	23 ⁰ 20' 53.8" N	74 ⁰ 55' 23.2" E
6.	P 113	23 ⁰ 20' 54.4" N	74 ⁰ 55' 41.3" E
7.	P 114	23 ⁰ 21' 00.6" N	74 ⁰ 55' 05.6" E
8.	P 131	23 ⁰ 21' 15.5" N	74 ⁰ 55' 17.1" E
9.	P 137	23 ⁰ 21' 37.9" N	74 ⁰ 56' 02.7" E
10.	P 140	23 ⁰ 21' 49.4" N	74 ⁰ 55' 51.1" E
11.	P 143	23 ⁰ 22' 07.2" N	74 ⁰ 55' 47.0" E
12.	P 145	23 ⁰ 22' 15.7" N	74 ⁰ 55' 25.5" E
13.	P 148	23 ⁰ 22' 09.6" N	74 ⁰ 56' 06.1" E
14.	P 150	23 ⁰ 22' 22.8" N	74 ⁰ 55' 51.1" E
15.	P 154	23 ⁰ 22' 37.7" N	74 ⁰ 55' 58.3" E

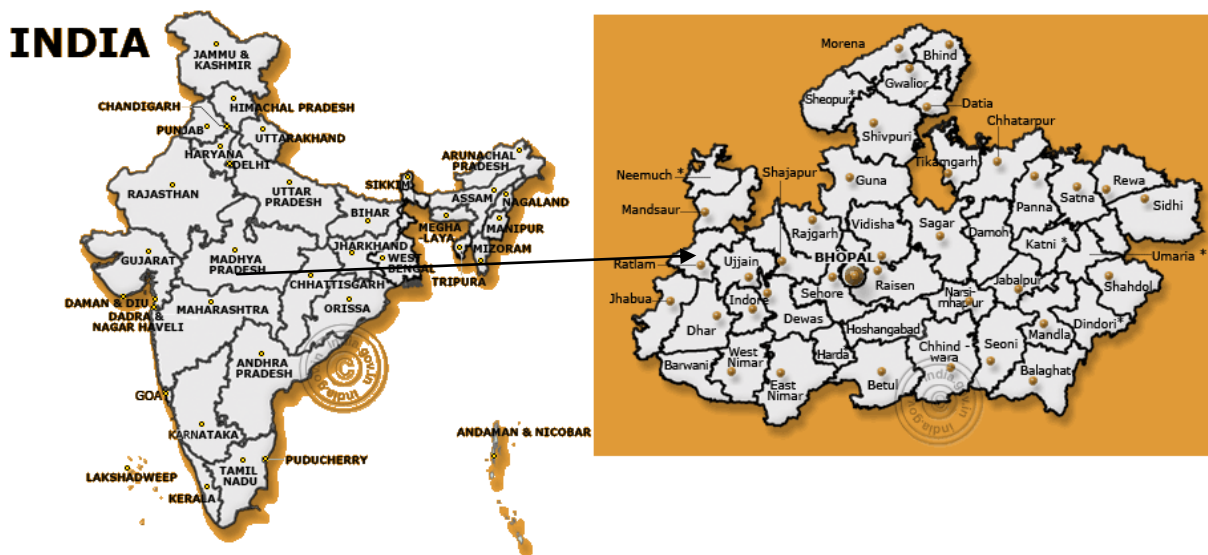


Figure 1: The location of the site of the project activity

A.4. Technical description of the project

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The WTGs made by Suzlon are categorized as S-82. Suzlon is a well-known supplier of wind turbines and so far have installed different capacities of WTGs in various countries. The equipment suppliers (herby referred as contractor) is also providing all operations and maintenance services.

TECHNOLOGY²

The use of wind as a renewable energy involves the conversion of power contained in masses of moving air into rotating shaft power. The conversion process utilises aerodynamic forces (lift and/or drag) to produce a net positive turning moment on a shaft, resulting in the production of mechanical power that can be converted to electrical power.

The energy content in wind varies with latitude, land - sea disposition, altitude and season. In India the factor that mostly governs the availability of wind energy at a particular site is its geographical location with respect to the monsoon wind. The availability of data on wind speed being a basic requirement for determining the feasibility of wind power generation at any site and due to the highly uneven distribution of wind speed over the country, an assessment of the wind resource over different regions was undertaken before any plan of harnessing the wind energy was drawn for implementation.

The technical specifications of these WTGs are listed below:

SUZLON (S-82; 1500 kW) :

S82-1.5 MW model³ is designed for generating the optimal power output even at sites with a modest wind speed regime. The wind turbine concept is based on robust design with pitch regulated blade operation, a 3-stage gearbox with 1650 kW rating and flexible coupling to the asynchronous induction generator. The Suzlon Flexi-slip System provides efficient control of the load and power control. The turbine operation is efficiently controlled by the Suzlon controller. These technologies

² http://www.ireda.in/homepage1.asp?parent_category=2&sub_category=21&category=78

³ <http://www.suzlon.com/pdf/S82%20product%20brochure.pdf>

are all well-known in the wind power industry and have proven themselves. The S82-1.5 MW is designed to withstand extreme conditions and operate effectively with low maintenance cost. The technical specifications are given below:

Operating Data	
Installed electricity output	1.5 MW
Cut-in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-out wind speed	20 m/s
Survival wind speed	52.5 m/s
Hub height	78.5 m
Variants available	STV/LTV
Generator	
Type	Asynchronous 4 poles with slip ring
Rated Power	1500 kW
Rated Voltage	690 V, 3 phase AC
Rotational speed	1511 rpm
Frequency	50 Hz
Protection	Enclosure (Generator): IP54
	Enclosure (Slip ring-unit): IP 23
Cooling system	Air cooled
Insulation	Class H
Slip control	Unique Macro Slip
	Providing slip up to 16%
Rotor	
Type	3 bladed, horizontal axis
Diameter	82 m
Swept area	5281 m ²
Braking system	
Aerodynamic braking	3 independent systems with blade pitching
Mechanical braking	hydraulic disc brake
Yaw System	
Type	Active electrical
Bearing	Polyamide slide
Gearbox	
Type	3 stage
Ratio	1:95.90
Nominal Load	1650 kW
Certifications	
Design standard	GL/IEC
Quality	ISO 9001

The power production through wind turbines depends on the speed of wind and the grid availability factor, which are external factors to the system. The project proponent hired an engineering company to estimate PLF at the site that could be achieved with the WTGs of higher capacity, 1500 kW, being installed first time in the state of Madhya Pradesh. The PLF estimated by the third party is 25.68%, which

is conservative also as PLF estimated by the supplier is 25.49% and estimated by MPERC⁴ is 22.50%.

The monitoring equipments and their location in the systems:

Metering equipment, which consists of two main meters, having technical standard of 0.5% accuracy class, does primary monitoring. The meters installed at metering point has four quadrants, three phase, and four wire provision for online reading. The metering is done at the 33 kV, metering yard located at site having common main meters, which are connected with WTGs of the project activity. There are two main meters at project site: one each for seven (1500 kW) and eight (1500 kW) machines.

The wind turbines have an average lifetime of 20 years as per the industry standards and MPERC recommendations⁵. The windmills constituting the project activity are newly commissioned.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Title of the approved baseline and monitoring methodology applied to the project activity:

"Consolidated baseline methodology for grid-connected electricity generation from renewable sources".

Reference of the methodology applied to the project activity: ACM0002; Version 10

Title and reference of tool, which the approved consolidated methodology ACM 0002 drawn upon:

1. "Tool for the demonstration and assessment of additionality"; Version: 05.2 (EB 39) <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>
2. "Tool to calculate the emission factor for an electricity system"; Version: 01.1 (EB 35). <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf>

A.6. Validation date of the project activity:

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Date of Final Validation Report: 23/02/2010

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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Choice of the crediting period: Fixed crediting period

Duration of the crediting period: 10 years

Crediting period start date: 29/02/2008 (date of commissioning of the first WTG)

A.8. Name of responsible person(s)/entity (ies):

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Name of responsible entity: Ruchi Soya Industries Limited

Ruchi Soya Industries Limited is the project participant.

⁴ <http://www.mperc.org/Review-order-1-3-2006-of-wind-power.pdf>

⁵ <http://www.mperc.org/windenergy.pdf> pp. 14

SECTION B. Implementation of the project activity**B.1. Implementation status of the project activity**

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The project activity has been implemented. 5 WTGs were commissioned on 29/02/2008, 7 WTGs were commissioned on 29/03/2008 and remaining 3 WTGs were commissioned on 30/05/2008.

B.2. Revision of the monitoring plan

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A revision in the monitoring plan has been proposed in section C.

B.3. Request for deviation applied to this monitoring period

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Not undertaken.

B.4. Notification or request of approval of changes

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Not undertaken.

B.5. Major Breakdown and maintenance:

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The summary of major breakdown and maintenance in the crediting year 2008:

Month	Loc No.	Breakdown Date	Total Duration (Hours)	Month	Loc No.	Breakdown Date	Total Duration (Hours)
Mar-08	P109	31/03/2008	6.1	Mar-08	P145	10/03/2008	24
Mar-08	P112	31/03/2008	13.3	Mar-08	P148	10/03/2008	24
Mar-08	P113	31/03/2008	12.9	Mar-08	P145	09/03/2008	24
Mar-08	P114	31/03/2008	13.4	Mar-08	P148	09/03/2008	24
Mar-08	P131	31/03/2008	5.4	Mar-08	P145	08/03/2008	23.7
Mar-08	P137	31/03/2008	13.5	Mar-08	P148	08/03/2008	23.7
Mar-08	P140	31/03/2008	13.2	Mar-08	P143	07/03/2008	12.3
Mar-08	P109	30/03/2008	17.2	Mar-08	P145	07/03/2008	24
Mar-08	P112	30/03/2008	22.6	Mar-08	P148	07/03/2008	24
Mar-08	P113	30/03/2008	22.8	Mar-08	P150	07/03/2008	13.8
Mar-08	P114	30/03/2008	22.3	Mar-08	P154	07/03/2008	16.4
Mar-08	P131	30/03/2008	18.9	Mar-08	P143	06/03/2008	20.9
Mar-08	P137	30/03/2008	22.5	Mar-08	P145	06/03/2008	24
Mar-08	P140	30/03/2008	22.8	Mar-08	P148	06/03/2008	24
Mar-08	P148	21/03/2008	18.6	Mar-08	P150	06/03/2008	21
Mar-08	P145	20/03/2008	14.9	Mar-08	P154	06/03/2008	20.4
Mar-08	P148	20/03/2008	23.9	Mar-08	P143	05/03/2008	18.1
Mar-08	P145	19/03/2008	23.3	Mar-08	P145	05/03/2008	24
Mar-08	P148	19/03/2008	23.3	Mar-08	P148	05/03/2008	24
Mar-08	P145	18/03/2008	23.7	Mar-08	P150	05/03/2008	20.3

Mar-08	P148	18/03/2008	23.7	Mar-08	P154	05/03/2008	18.7
Mar-08	P145	17/03/2008	24	Mar-08	P143	04/03/2008	18.7
Mar-08	P148	17/03/2008	24	Mar-08	P145	04/03/2008	24
Mar-08	P145	16/03/2008	23.5	Mar-08	P148	04/03/2008	24
Mar-08	P148	16/03/2008	23.5	Mar-08	P150	04/03/2008	23.8
Mar-08	P145	15/03/2008	24	Mar-08	P154	04/03/2008	23.7
Mar-08	P148	15/03/2008	24	Mar-08	P143	03/03/2008	20.9
Mar-08	P145	14/03/2008	24	Mar-08	P145	03/03/2008	23.3
Mar-08	P148	14/03/2008	24	Mar-08	P148	03/03/2008	23.3
Mar-08	P145	13/03/2008	12.6	Mar-08	P150	03/03/2008	22.9
Mar-08	P148	13/03/2008	12.6	Mar-08	P154	03/03/2008	23.2
Mar-08	P143	12/03/2008	14.5	Mar-08	P143	02/03/2008	21.1
Mar-08	P145	12/03/2008	22.5	Mar-08	P145	02/03/2008	21.1
Mar-08	P148	12/03/2008	22.5	Mar-08	P148	02/03/2008	21.1
Mar-08	P150	12/03/2008	13.4	Mar-08	P150	02/03/2008	20.2
Mar-08	P154	12/03/2008	13.2	Mar-08	P154	02/03/2008	21
Mar-08	P143	11/03/2008	15.4	Mar-08	P143	01/03/2008	24
Mar-08	P145	11/03/2008	24	Mar-08	P145	01/03/2008	24
Mar-08	P148	11/03/2008	24	Mar-08	P148	01/03/2008	24
Mar-08	P150	11/03/2008	19.2	Mar-08	P150	01/03/2008	23.8
Mar-08	P154	11/03/2008	16.8	May-08	P-101	31/05/2008	22.00
Apr-08	P113	17/4/2008	18.80	May-08	P-104	31/05/2008	21.90
Apr-08	P140	17/4/2008	19.10	May-08	P-107	31/05/2008	20.40
Apr-08	P113	16/4/2008	21.70	May-08	P-101	30/05/2008	5.40
Apr-08	P140	16/4/2008	20.20	May-08	P-104	30/05/2008	5.30
Apr-08	P140	15/4/2008	24.00	May-08	P-107	30/05/2008	4.10
Apr-08	P154	15/4/2008	20.90	May-08	P-154	05/04/2008	24.00
Apr-08	P113	15/2/2008	15.30	May-08	P-154	05/03/2008	4.50
Apr-08	P154	14/4/2008	20.10	May-08	P-109	05/02/2008	6.00
Apr-08	P113	14/2/2008	11.70	May-08	P-109	05/01/2008	24.00
Apr-08	P113	14/2/2008	4.80	May-08	P-154	05/01/2008	22.30
Apr-08	P113	13/4/2008	15.50	Jun-08	P-148	28/6/2008	3.00
Apr-08	P140	13/4/2008	16.70	Jun-08	P-148	27/6/2008	19.90
Apr-08	P154	13/4/2008	17.10	Jun-08	P-104	30/06/2008	20.60
Apr-08	P113	04/12/2008	19.50	Jun-08	P-107	30/06/2008	24.00
Apr-08	P140	04/12/2008	20.70	Jun-08	P-104	29/06/2008	24.00
Apr-08	P154	04/12/2008	17.90	Jun-08	P-107	29/06/2008	24.00
Apr-08	P113	04/11/2008	24.00	Jun-08	P-104	28/06/2008	23.70
Apr-08	P140	04/11/2008	24.00	Jun-08	P-107	28/06/2008	23.70
Apr-08	P154	04/11/2008	24.00	Jun-08	P-104	27/06/2008	24.00
Apr-08	P113	04/10/2008	24.00	Jun-08	P-107	27/06/2008	24.00
Apr-08	P140	04/10/2008	20.70	Jun-08	P-104	26/06/2008	24.00
Apr-08	P154	04/10/2008	11.90	Jun-08	P-107	26/06/2008	24.00

Apr-08	P113	04/09/2008	21.90	Jun-08	P-104	25/06/2008	22.10
Apr-08	P140	04/09/2008	24.00	Jun-08	P-107	25/06/2008	24.00
Apr-08	P154	04/09/2008	15.40	Jun-08	P-107	24/06/2008	24.00
Apr-08	P112	04/08/2008	24.00	Jun-08	P-107	23/06/2008	24.00
Apr-08	P113	04/08/2008	21.80	Jun-08	P-107	22/06/2008	24.00
Apr-08	P154	04/08/2008	24.00	Jun-08	P-104	21/06/2008	23.90
Apr-08	P112	04/07/2008	24.00	Jun-08	P-107	21/06/2008	23.90
Apr-08	P113	04/07/2008	24.00	Jun-08	P-104	20/06/2008	24.00
Apr-08	P131	04/07/2008	19.90	Jun-08	P-104	20/06/2008	24.00
Apr-08	P154	04/07/2008	24.00	Jun-08	P-107	20/06/2008	24.00
Apr-08	P112	04/06/2008	19.70	Jun-08	P-104	19/06/2008	9.80
Apr-08	P113	04/06/2008	24.00	Jun-08	P-104	19/06/2008	9.80
Apr-08	P131	04/06/2008	24.00	Jun-08	P-107	19/06/2008	9.80
Apr-08	P140	04/06/2008	24.00	Jun-08	P-104	18/06/2008	23.20
Apr-08	P154	04/06/2008	16.00	Jun-08	P-104	18/06/2008	23.20
Apr-08	P131	04/05/2008	24.00	Jun-08	P-107	18/06/2008	23.20
Apr-08	P113	04/04/2008	24.00	Jun-08	P-104	17/06/2008	18.50
Apr-08	P131	04/04/2008	15.20	Jun-08	P-107	17/06/2008	18.50
Apr-08	P113	04/02/2008	24.00	Jun-08	P-104	16/06/2008	24.00
Apr-08	P113	04/01/2008	24.00	Jun-08	P-107	16/06/2008	24.00
Jun-08	P-104	15/06/2008	22.20	Jul-08	P-104	31/07/2008	24.00
Jun-08	P-107	15/06/2008	22.20	Jul-08	P-104	30/07/2008	23.60
Jun-08	P-104	14/06/2008	20.90	Jul-08	P-104	29/07/2008	23.00
Jun-08	P-107	14/06/2008	20.90	Jul-08	P-104	28/07/2008	24.00
Jun-08	P-104	13/06/2008	24.00	Jul-08	P-104	27/07/2008	24.00
Jun-08	P-107	13/06/2008	24.00	Jul-08	P-104	26/07/2008	24.00
Jun-08	P-104	12/06/2008	20.80	Jul-08	P-104	25/07/2008	24.00
Jun-08	P-107	12/06/2008	20.80	Jul-08	P-104	24/07/2008	21.40
Jun-08	P-104	11/06/2008	23.80	Jul-08	P-104	23/07/2008	24.00
Jun-08	P-107	11/06/2008	23.80	Jul-08	P-104	22/07/2008	22.90
Jun-08	P-104	10/06/2008	24.00	Jul-08	P-104	21/07/2008	24.00
Jun-08	P-107	10/06/2008	24.00	Jul-08	P-104	20/07/2008	24.00
Jun-08	P-101	09/06/2008	24.00	Jul-08	P-104	19/07/2008	23.80
Jun-08	P-104	09/06/2008	24.00	Jul-08	P-104	18/07/2008	23.50
Jun-08	P-107	09/06/2008	24.00	Jul-08	P-104	17/07/2008	23.90
Jun-08	P-101	08/06/2008	17.70	Jul-08	P-104	16/07/2008	23.30
Jun-08	P-104	08/06/2008	24.00	Jul-08	P-107	16/07/2008	1.50
Jun-08	P-107	08/06/2008	24.00	Jul-08	P-104	15/07/2008	22.50
Jun-08	P-101	07/06/2008	21.50	Jul-08	P-107	15/07/2008	20.10
Jun-08	P-104	07/06/2008	23.00	Jul-08	P-104	14/07/2008	24.00
Jun-08	P-107	07/06/2008	23.00	Jul-08	P-107	14/07/2008	24.00
Jun-08	P-101	06/06/2008	22.80	Jul-08	P-104	13/07/2008	20.90
Jun-08	P-104	06/06/2008	24.00	Jul-08	P-107	13/07/2008	20.90
Jun-08	P-107	06/06/2008	24.00	Jul-08	P-104	12/07/2008	23.90
Jun-08	P-101	05/06/2008	24.00	Jul-08	P-107	12/07/2008	24.00

Jun-08	P-104	05/06/2008	24.00	Jul-08	P-104	11/07/2008	14.30
Jun-08	P-107	05/06/2008	23.10	Jul-08	P-107	11/07/2008	14.30
Jun-08	P-101	04/06/2008	24.00	Jul-08	P-104	10/07/2008	23.60
Jun-08	P-104	04/06/2008	24.00	Jul-08	P-107	10/07/2008	23.60
Jun-08	P-107	04/06/2008	22.80	Jul-08	P-104	09/07/2008	22.90
Jun-08	P-101	03/06/2008	24.00	Jul-08	P-107	09/07/2008	22.90
Jun-08	P-104	03/06/2008	24.00	Jul-08	P-104	08/07/2008	24.00
Jun-08	P-107	03/06/2008	24.00	Jul-08	P-107	08/07/2008	24.00
Jun-08	P-101	02/06/2008	23.10	Jul-08	P-104	07/07/2008	21.40
Jun-08	P-104	02/06/2008	23.10	Jul-08	P-107	07/07/2008	21.40
Jun-08	P-107	02/06/2008	23.10	Jul-08	P-104	06/07/2008	22.90
Jun-08	P-101	01/06/2008	15.20	Jul-08	P-107	06/07/2008	20.50
Jun-08	P-104	01/06/2008	15.20	Jul-08	P-104	05/07/2008	4.20
Jun-08	P-107	01/06/2008	14.50	Jul-08	P-145	07/03/2008	2.00
Aug-08	P104	31/08/2008	24.00	Jul-08	P-145	07/02/2008	21.50
Aug-08	P104	30/08/2008	24.00	Sep-08	P104	22/09/2008	9.6
Aug-08	P104	29/08/2008	24.00	Sep-08	P104	22/09/2008	2.3
Aug-08	P104	28/08/2008	24.00	Sep-08	P104	22/09/2008	8.1
Aug-08	P104	27/08/2008	10.00	Sep-08	P101	21/09/2008	17
Aug-08	P104	27/08/2008	13.50	Sep-08	P101	21/09/2008	4.9
Aug-08	P104	26/08/2008	24.00	Sep-08	P104	21/09/2008	17
Aug-08	P104	25/08/2008	17.50	Sep-08	P104	21/09/2008	4.9
Aug-08	P104	25/08/2008	6.40	Sep-08	P101	20/09/2008	24
Aug-08	P104	24/08/2008	24.00	Sep-08	P104	20/09/2008	24
Aug-08	P104	23/08/2008	24.00	Sep-08	P101	19/09/2008	24
Aug-08	P104	22/08/2008	11.40	Sep-08	P104	19/09/2008	24
Aug-08	P104	22/08/2008	7.50	Sep-08	P101	18/09/2008	24
Aug-08	P104	21/08/2008	24.00	Sep-08	P104	18/09/2008	24
Aug-08	P104	20/08/2008	24.00	Sep-08	P101	17/09/2008	24
Aug-08	P104	19/08/2008	20.70	Sep-08	P104	17/09/2008	24
Aug-08	P104	18/08/2008	24.00	Sep-08	P101	16/09/2008	24
Aug-08	P104	17/08/2008	24.00	Sep-08	P104	16/09/2008	24
Aug-08	P104	16/08/2008	24.00	Sep-08	P101	15/09/2008	24
Aug-08	P104	15/08/2008	24.00	Sep-08	P104	15/09/2008	24
Aug-08	P104	14/08/2008	8.10	Sep-08	P101	14/09/2008	24
Aug-08	P104	14/08/2008	15.80	Sep-08	P104	14/09/2008	24
Aug-08	P104	13/08/2008	7.50	Sep-08	P101	13/09/2008	24
Aug-08	P104	13/08/2008	10.90	Sep-08	P104	13/09/2008	24
Aug-08	P104	12/08/2008	24.00	Sep-08	P101	12/09/2008	24
Aug-08	P104	11/08/2008	24.00	Sep-08	P104	12/09/2008	24
Aug-08	P104	10/08/2008	24.00	Sep-08	P101	11/09/2008	24
Aug-08	P104	09/08/2008	24.00	Sep-08	P104	11/09/2008	24
Aug-08	P104	08/08/2008	24.00	Sep-08	P101	10/09/2008	24
Aug-08	P104	07/08/2008	24.00	Sep-08	P104	10/09/2008	24
Aug-08	P104	06/08/2008	24.00	Sep-08	P101	09/09/2008	0.1
Aug-08	P104	05/08/2008	24.00	Sep-08	P101	09/09/2008	6.8
Aug-08	P104	04/08/2008	24.00	Sep-08	P104	09/09/2008	15
Aug-08	P104	03/08/2008	24.00	Sep-08	P104	09/09/2008	6.8

Aug-08	P104	02/08/2008	17.40	Sep-08	P104	08/09/2008	24
Aug-08	P104	02/08/2008	6.00	Sep-08	P104	07/09/2008	24
Aug-08	P104	01/08/2008	24.00	Sep-08	P104	06/09/2008	24
Aug-08	P113	08/07/2008	12.9	Sep-08	P104	05/09/2008	24
Aug-08	P113	08/06/2008	9.0	Sep-08	P104	04/09/2008	24
Sep-08	P104	27/09/2008	19.5	Sep-08	P104	03/09/2008	24
Sep-08	P104	26/09/2008	24	Sep-08	P104	02/09/2008	24
Sep-08	P104	25/09/2008	24	Sep-08	P104	01/09/2008	15
Sep-08	P104	24/09/2008	24	Sep-08	P104	01/09/2008	6.2
Sep-08	P104	23/09/2008	10.7	Oct-08	P107	29/10/2008	12.9
Sep-08	P104	23/09/2008	13.1	Oct-08	P107	28/10/2008	13.7
Total			3375.9				3397.1

The summary of major breakdown and maintenance in the crediting year 2009:

Month	Loc No.	Breakdown Date	Total Duration (Hours)	Month	Loc No.	Breakdown Date	Total Duration (Hours)
May-09	P148	09/05/2009	18.10	Sep-09	P145	22/09/2009	3.40
May-09	P148	08/05/2009	24.00	Sep-09	P145	21/09/2009	16.90
May-09	P148	07/05/2009	24.00	Sep-09	P145	21/09/2009	7.00
May-09	P148	06/05/2009	24.00	Sep-09	P145	20/09/2009	24.00
May-09	P148	05/05/2009	24.00	Sep-09	P112	19/09/2009	14.20
May-09	P148	04/05/2009	24.00	Sep-09	P145	19/09/2009	24.00
May-09	P148	03/05/2009	24.00	Sep-09	P112	18/09/2009	11.10
May-09	P148	02/05/2009	2.70	Sep-09	P145	18/09/2009	24.00
May-09	P148	02/05/2009	21.10	Sep-09	P145	17/09/2009	24.00
Jul-09	P113	30/07/2009	24.00	Sep-09	P145	16/09/2009	24.00
Jul-09	P113	29/07/2009	20.10	Sep-09	P145	15/09/2009	24.00
Aug-09	P101	28/08/2009	2.10	Sep-09	P145	14/09/2009	24.00
Aug-09	P101	27/08/2009	24.00	Sep-09	P145	13/09/2009	13.00
Aug-09	P101	26/08/2009	3.60				
Aug-09	P101	26/08/2009	20.10				
Total			279.80				233.60

SECTION C. Description of the monitoring system

>>

A. Purpose of monitoring

- To ensure efficient day to day operations.
- For proper maintenance and calibration of the equipments.
- Lead to successful implementation of the project and maximization of the benefits.
- To record the electricity generation in a proper and systematic way this is very important for emission reduction calculations.

B. Types of data and information to be reported, including units of measurement

Data to be monitored:

- $EG_{TOTAL, y}$: Total electricity generation by the wind mills during the year y
MWh: Unit of measurement
- EG_{export} : Electricity exported to the grid by the project activity in year y
MWh: Unit of measurement
- EG_{import} : Electricity imported (consumed) by the project activity in year y.
MWh: Unit of measurement

Data to be calculated:

- EG_y : Net Electricity exported to the grid by the project activity in year y
MWh: Unit of measurement

C. Origin of the data

EG_{export} / EG_{import} will be measured by the main meters (MPSEB meters) installed at common metering points.

Net electricity exported (EG_y) to grid is calculated from EG_{export} and EG_{import} as $(EG_{export} - EG_{import})$.

D. Monitoring Information

The Project participant has undertaken maintenance and services agreement with Suzlon Infrastructure Services Limited (SISL), the contractor. The performance of the WTGs, safety in operation and scheduled / breakdown maintenances are organized and monitored by the contractor. So the authority and responsibility of project management lies with the contractor.

Metering:

The metering arrangement is done at site as per the provisions of the Government of M.P. policy notified on 17.10.06. Billing of the metered energy is being carried out on the monthly basis. The meter reading shall be carried out by the Parties MPPKVVCL and Contractor (SISL).

Metering Equipment and Calibration:

Controller:

The controller installed on the WTG records total generation and import of the electricity by the WTG. Its primary use is to gather data from the anemometer (weather station) located on the top of the wind turbine. With the collected data the controller points the turbine in the most desired direction with respect to wind direction. It controls the operations of the WTG to optimize working of the WTG through Central Monitoring System (CMS). The controller does not require calibration as it operates with the software.

Main meters:

-Two main meters are installed-one for seven WTGs and second for eight WTGs. These meters record export, import and reactive electrical energy. The main meters are installed and owned by MPPKVVCL. Main meters shall be tested, checked for accuracy once in a year in the presence of the parties and also be calibrated and adjusted once in a year.

-The meters shall be deemed to have been working satisfactorily if the errors as determined in the tests are within the permissible limit as allowed in the relevant IS specification applicable to high precision energy meters.

-All the tests on main meters shall be conducted by the meter relay testing staff of the MPPKVVCL jointly with the staff of the company and results and corrections so arrived at mutually shall be applicable and binding on both the parties.

Meter Readings:

A monthly reading of power supplied to the grid at the common metering point shall be jointly undertaken by the representatives of MPPKVVCL and the authorized representative of the contractor (SISL). As per the applicable provisions mentioned in the power purchase agreement the main meters' readings will be taken in the middle of each calendar month for previous one month as far as possible. Both representatives of MPPKVVCL and authorized representative of the contractor (SISL) will jointly certify the meter readings.

At controller entire day generation is recorded by the end of day (00:00). This generation is then uploaded on customer's (project participant's) portal for three years. All WTGs are connected to a Central Monitoring System (CMS) located at project site, from where any connected WTG is accessible from single point.

Secondary Monitoring Plan:

The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WTGs. Each WTG is equipped with an integrated electronic controller. The generation data of individual machine can be monitored as a real-time entity at the controller installed at individual WTG. The generation data is also available online through facility provided by the contractor. This generation will be kept as a record in electronic form.

Troubleshooting Contingency Plan:

-If the electricity recorded at the main meter in any month differs from the reading at the CMS beyond the permissible limit the main meter shall be tested as per provisions of power purchase agreement. If on such testing the main meter error is found to exceed the permissible limit then it will immediately be repaired and recalibrated and correction will be applied, as agreed between the parties, to the monthly main meter readings to arrive at the correct energy for billing purpose for the period of the month up to the time of such test repair and recalibration. The tests on main meter shall be conducted by the meter relay testing staff of the MPPKVVCL jointly with the staff of the contractor SISL and results and corrections so arrived at mutually shall be applicable and binding on both the parties. The correction factor means the percentage of error between standard test meter and main meter. The main meter will be used only after calibration.

-If the main meter fails to record energy due to any reason whatsoever, the net supplied electricity to the grid during the period of outage will be calculated by apportioning the net supply of the electricity recorded at the energy meter, owned by MPPKVVCL and located at the sub-station, as follows:

*Net supply of the electricity by i^{th} WTG = (Total net supply of the electricity by entire wind farm as recorded at energy meter installed at the sub-station) * (Net generation of the electricity by i^{th} WTG as recorded on its controller / Sum of net generation by all WTGs of the wind farm as recorded on their controllers).*

Procedure for apportioning of electricity supplied to the grid where dates of monitoring period are not matching with dates of credit reports:

There are instances when the claim of emission reduction starts or ends in middle of a monitoring period and apportioning will have to be done to arrive at electricity supplied for that certain period. The following apportioning procedure will be followed, if the crediting period start or end dates falls in between the main meter reading cycles:

The apportioning will be done as per the net electricity generated at controllers of the WTGs of the project activity. The daily generation data on controllers will be used for deriving a ratio for apportioning.

Procedure for apportioning:

Let us assume,

X = Sum of the net electricity generation at controller of each WTG of the project activity during the partial period of the corresponding period of main meter reading (kWh)

Y = Sum of the net electricity generation at controller of each WTG of the project activity during the corresponding full period of main meter reading (kWh)

Therefore, ratio of the net electricity generation during the partial period (Z) = X/Y

If G = Net electricity supplied by the WTGs of the project activity to the grid during the corresponding full period of main meter reading as per credit notes (kWh)

Then net electricity supplied by the WTGs of the project activity to the grid during the partial period (for calculating emission reduction for partial period) = $G*Z$

Example:

Let us consider a case of the WTGs of the project activity where the project participant starts / ends claim of emission reduction in middle of a monitoring period of main meter reading / credit report, for example crediting period ends on 31st December and starts from 1st of January and the corresponding full main meter reading / credit report period is from 22nd December to 21st January. Let us assume in this case,

X_1 = Sum of the net electricity generation at the controller of each WTG of the project activity during 22nd December to 31st December (kWh)

X_2 = Sum of the net electricity generation at the controller of each WTG of the project activity during 1st January to 21st January (kWh)

Y = Sum of the net electricity generation at controller of each WTG of the project activity during the corresponding full period of main meter reading i.e. 22nd December to 21st January (kWh)

Ratio of the net electricity generation during the first partial period (22nd December to 31st December), $Z_1 = X_1/Y$

Ratio of the net electricity generation during the second partial period (1st January to 21st January), $Z_2 = X_2/Y$

If net electricity supplied by the WTGs of the project activity to the grid as per credit report during the corresponding full month of main meter reading (22nd December to 21st January): G

Then net electricity supplied by the WTGs of the project activity to the grid during the first partial period, 22nd December to 31st December, (for calculating emission reduction for partial period) = $G*Z_1$

And net electricity supplied by the WTGs of the project activity to the grid during the second partial period, 1st January to 21st January, (for calculating emission reduction for partial period) = $G*Z_2$

Operational and organizational structure for monitoring

Monitoring responsibility - contractor (SISL):

-Daily meter readings of controller on the WTGs and main meters are maintained on the proper log books by site operator.

-Compilation of daily reports for monthly monitoring will be done by site in-charge.

-Site in-charge/site engineer will do necessary documentation and will present at the time of monthly main meter reading by the representative of the MPPKVCL also they will be authorized representative to jointly certify the meter reading.

-Site in-charge will communicate all meter readings to the project participant.

-O&M team at site will be responsible for preventive maintenance and trouble free operation of WTGs under the overall responsibility of site in-charge. He/she will insure preventive maintenance of the WTGs and all meters.

Monitoring responsibility - Project Participant:

Overall project management responsibility, which includes responsibility for VCS implementation, lies with Vice President (VP). Under his guidance, officer account will arrange for:

- Daily monitoring the project and record keeping- i.e., checking generation on customer portal provided by the contractor (SISL), any deviation from terms of PO and /or O&M agreement is reported to VP and actions are taken accordingly.
- Collect credit reports issued by MPPKVCL with the help of O&M developer. This job is done and updated on monthly basis.
- Raising invoices, sending copy of this invoice to accounts department and making sure that payment is as per invoice, any deviation reported to VP and actions are taken accordingly.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors:

Data / Parameter:	EF_{grid,y}; grid=NEWNE
Data unit:	tCO ₂ /MWh
Description:	Combined margin CO ₂ emission factor for NEWNE grid connected power generation in year y calculated using the "Tool to calculate the emission factor for an electricity system", version 01.1, EB 35.
Source of data used:	Estimated figure based on 75% of OM and 25% of BM values calculated using data obtained from "CO ₂ Baseline Database for Indian Power Sector" version 5.0, published by the Central Electricity Authority, Ministry of Power, Government of India, which is based on new tool "Tool to calculate the emission factors for an electricity system" published by CDM Executive Board . http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value(s) :	0.92248 tCO ₂ /MWh (for NEWNE grid);
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data are used for baseline emission calculations.
Additional comment:	It is calculated on ex ante basis and will remain same throughout the crediting period.

D.2. Data and parameters monitored:

Data / Parameter:	EG_{export}
Data unit:	MWh (Mega-watt hour)
Description:	Electricity exported to the grid by the project activity in year y
Measured /Calculated /Default:	Measured
Source of data:	Two Main meters (MPSEB Meters) located at common metering points (one for 7 WTGs and second for 8 WTGs) and owned by MPPKV CO. LTD.

Value(s) of monitored parameter:	Year 2008: 34,340.25 MWh Year 2009: 51,455.48 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data are used for calculating baseline emissions.
Monitoring equipment	Monitoring Equipment: Main meters Type: two-way tri-vector energy meter Accuracy class:0.5% Calibration Frequency: Yearly
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	<i>Calibration:</i> with actual load comparing to standard reference meter which itself will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of M.P. as per terms and conditions of supply. Two dedicated new main meters (Sr. No. MPE 15233 for 8 WTGs and MPE 33415 for 7 WTGs) were installed by MPPKVVCL at the time of commissioning in the year 2008 after testing. Both main meters were calibrated in the year 2009 as detailed below: Date of calibration: 23/03/2009 Calibrating agency: MPPKVV Co. Ltd., Ratlam Result of calibration: No defect Next calibration due date: 23/03/2010 As per calibration report (2010) of main meter installed at feeder III for 7 WTGs correction factor in export @ 5.88% has been applied for the duration from October 2009 to December 2009.

Data / Parameter:	EG _{import}
Data unit:	MWh (Mega-watt hour)
Description:	Electricity imported (consumed) by the project activity in year y.
Measured /Calculated /Default:	Measured
Source of data:	Two Main meters (MPSEB Meters) located at common metering points (one for 7 WTGs and second for 8 WTGs) and owned by MPPKVV CO. LTD.
Value(s) of monitored parameter:	Year 2008: 94.32 MWh Year 2009: 149.31 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data are used for calculating baseline emissions.
Monitoring equipment	Monitoring Equipment: Main meters Type: two-way tri-vector energy meter Accuracy class:0.5% Calibration Frequency: Yearly
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Not Applicable
QA/QC procedures	<i>Calibration:</i> with actual load comparing to standard

applied:	reference meter which itself will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of M.P. as per terms and conditions of supply. Two dedicated new main meters (Sr. No. MPE 15233 for 8 WTGs and MPE 33415 for 7 WTGs) were installed by MPPKVVCL at the time of commissioning in the year 2008 after testing. Both main meters were calibrated in the year 2009 as detailed below: Date of calibration: 23/03/2009 Calibrating agency: MPPKVV Co. Ltd., Ratlam Result of calibration: No defect Next calibration due date: 23/03/2010 As per calibration report (2010) of main meter installed at feeder III for 7 WTGs correction factor in import @ 6.29% has been applied for the duration from October 2009 to December 2009.
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Data / Parameter:	EG_y
Data unit:	MWh (Mega-watt hour)
Description:	Net Electricity exported to the grid by the project activity in year y
Measured /Calculated /Default:	Calculated as $EG_{\text{export}} - EG_{\text{import}}$
Source of data:	EG _y is calculated as $EG_{\text{export}} - EG_{\text{import}}$. EG _{export} and EG _{import} are measured through billing meter located at common metering point and owned by MPPKVVCL.
Value(s) of monitored parameter:	Year 2008: 34,245.93 MWh Year 2009: 51,306.17 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data are used for calculating baseline emissions.
Monitoring equipment	Monitoring Equipment: Main meter Type: two-way tri-vector energy meter Accuracy class:0.5% Calibration Frequency: Yearly
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Calculated as $EG_{\text{export}} - EG_{\text{import}}$
QA/QC procedures applied:	The data can be cross-checked with the credit reports and invoices generated.

Data / Parameter:	EG_{TOTAL,y}
Data unit:	MWh (Mega-watt hour)
Description:	Total electricity generated by the wind mills in the year y
Measured /Calculated /Default:	Measured
Source of data:	CMS
Value(s) of monitored parameter:	Period (16/12/2008 to 15/01/2009): 4,420.12 MWh Period (10/12/2009 to 09/01/2010): 3,242.70 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data are used for apportioning to calculate the baseline emissions.
Monitoring equipment	Controller installed at each WTG

Measuring/ Reading/ Recording frequency:	Daily
Calculation method (if applicable):	Not Applicable
QA/QC procedures applied:	-

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

Baseline emissions in the year y (in tCO_2), BE_y , due to electricity supplied to the grid are the product of the baseline grid emission factor, $EF_{\text{grid},y}$ (in tCO_2/MWh) and the electricity supplied to the grid in the year y , EG_y , (in MWh), over the crediting period as given below:

$$BE_y = EG_y * EF_{\text{grid},y}$$

Where:

BE_y = Baseline emissions of the project activity in the year y (tCO_2)

EG_y = Net electricity supplied to grid in year y (MWh)

$EF_{\text{grid},y}$ = Baseline emission factor of the grid in the year y (tCO_2/MWh)

Emission Factor for NEWNE grid, $EF_{\text{grid},y}$, = $0.92248 \text{ tCO}_2/\text{MWh}$

Year	2008	2009
Electricity Supplied to the NEWNE Grid, EG_y , (MWh)	34,245.93	51,306.17
Baseline Emission, BE_y , (tCO_2)	31,591	47,328

Detailed calculations are provided in the attached excel sheet.

E.2. Project emissions calculation

>>

The project activity is based on renewable wind energy, therefore, project emissions should not be considered as per methodology ACM0002, $PE_y = 0$.

E.3. Leakage calculation

>>

According to the applied methodology, ACM0002, no leakage is considered for the project activity. Therefore, $LE_y = 0$

E.4. Emission reductions calculation / table

>>

The emission reduction ER_y due to project activity during a given year y is estimated as the difference between baseline emissions (BE_y), and project emissions (PE_y) & emissions due to leakage (L_y), as per the formula given below:

$$ER_y = BE_y - PE_y - L_y$$

Where,

BE_y = Baseline emissions in the year y in tCO_2

PE_y = Project emissions in the year y in tCO_2

L_y = Emissions due to leakage in the year y in tCO_2

In case of the project activity,

$PE_y = 0$ for the project activity as per the methodology.

$L_y = 0$ for the project activity.

Therefore, $ER_y = BE_y$

The emission reduction calculations are shown below:

Year	2008	2009
Total Baseline Emissions in NEWNE grid, BE_y , (tCO ₂)	31,591	47,328
Total Emission Reductions in NEWNE grid, ER_y , (tCO ₂)	31,591	47,328

E.5. Comparison of actual emission reductions with estimates in the VCS-PD

>>

Crediting Year	Crediting Period	Actual Emission Reductions (tCO ₂)	Estimated Emission Reductions as per VCS-PD (tCO ₂)
2008	29/02/2008 to 31/12/2008	31,591	35,212
2009	01/01/2009 to 31/12/2009	47,328	46,691

Justification:

There is some difference in actual emission reductions and estimated emission reductions as shown in the table. This difference is due to difference in actual PLF obtained and estimated PLF used in ex-ante calculations. However, the actual PLF obtained in both the crediting years is well within the range of PLF varied in the sensitivity analysis (25.68%±10% i.e. 23.11% to 28.25%) for which the project activity remains additional.

E.6. Remarks on difference from estimated value in the VCS-PD

>>

PLF used in ex-ante calculation of the Emission Reduction = 25.68%

Actual PLF obtained during the first monitoring period (2008): 23.04%

Actual PLF obtained during the second monitoring period (2009): 26.03%

The actual PLF obtained in both the crediting years is much below than the upper range of PLF considered in the sensitivity analysis (25.68±10% i.e. 23.11% to 28.25%) for which the project activity remains additional. Hence, due to small variations in the actual PLF obtained the project activity will remain additional.

The PLF taken in the ex-ante calculation and obtained PLF are different. Therefore, there is difference in the ex-ante calculated value of Emission Reductions and Actual obtained in each monitoring period.