MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	MRMPL Wind Power Project
Reference number of the project activity	3839
Version number of the monitoring report	01.1
Completion date of the monitoring report	06/07/2012
Registration date of the project activity	27/11/2010
Monitoring period number and duration of this monitoring period	01 (27/11/2010 to 30/04/2012)
Project participant(s)	Modern Road Makers Pvt. Ltd.
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope 01: Energy Industries (renewable/non-renewable sources) Methodology: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", ACM0002, Version 10, EB 47,
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	46,449
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	35,443

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project is the generation of electricity from wind power by installation of 16 Wind Turbine Generators (WTG) at Jaisalmer, Rajasthan by Modern Road Makers Pvt. Ltd. (herein referred to as MRMPL). Each WTG has an installed capacity of 1.25 MW. The total installed capacity of the project is 20 MW. The purpose of the project is to produce power from clean source and to reduce the dependence on fossil fuels for energy requirements. Project proponent has signed a power purchase agreement (PPA) with "Jodhpur Vidyut Vitran Nigam Limited" (JVVNL) to export the electricity to local grid. The project displaces electricity from the grid (North East West North East (NEWNE) grid, India). This helps in significant reduction of GHG emissions as the NEWNE Grid is mostly dependent on fossil fuel generated electricity.

A.2. Location of project activity

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The site details are given below:

District: Jaisalmer
State: Rajasthan

WTG No.	Latitude (N)	Longitude (E)	Sub-station
R060	N 26^0 48' 45.8''	E 70^0 44' 16.3''	Soda Mada
R061	N 26^0 48' 36.8''	E 70^0 44' 26.1''	Soda Mada
R078	N 26^0 49' 15.4"	E 70^0 51' 35.4"	Soda Mada
R007	N 26^0 48' 58.4"	E 70^0 51' 37.2"	Soda Mada
R008	N 26^0 48' 41.7"	E 70^0 51' 39.4"	Soda Mada
R063	N 26^0 48' 54.6"	E 70^0 43' 33.2"	Soda Mada
R064	N 26^0 48' 45.1"	E 70^0 43' 43.5"	Soda Mada
R069	N 26^0 48' 36.8"	E 70^0 43' 23.5"	Soda Mada
R070	N 26^0 48' 27.3"	E 70^0 43' 33.8"	Soda Mada
R071	N 26^0 48' 17.7"	E 70^0 43' 44.2"	Soda Mada
R072	N 26^0 48' 08.2"	E 70^0 43' 54.5"	Soda Mada
R073	N 26^0 47' 58.6"	E 70^0 44' 04.9"	Soda Mada
R074	N 26^0 47' 49.1"	E 70^0 44' 15.2"	Soda Mada
R016	N 26^0 49' 21.4"	E 70^0 49' 30.9"	Soda Mada
R062	N 26^0 48' 25.3"	E 70^0 44' 37.1"	Soda Mada
R067	N 26^0 48' 00.3"	E 70^0 44' 34.7"	Soda Mada

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Modern Road Makers Pvt. Ltd.(Private entity)	No

A.4. Reference of applied methodology

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Methodology: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", ACM0002, Version 10, EB 47

A.5. Crediting period of project activity

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Fixed Crediting Period: 10 Years (27/11/2010 – 26/11/2020)

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project activity is the generation of electricity from wind power by installation of 16 Wind Turbine Generators (WTG) at Jaisalmer, Rajasthan. Each WTG has an installed capacity of 1.25 MW. The total installed capacity of the project is 20 MW. The purpose of the project is to produce power from clean source and to reduce the dependence on fossil fuels for energy requirements. Project proponent has signed a power purchase agreement (PPA) with "Jodhpur Vidyut Vitran Nigam Limited" (JVVNL) to export the electricity to local grid. The project displaces electricity from the grid (North East West North East (NEWNE) grid, India). This helps in significant reduction of GHG emissions as the NEWNE Grid is mostly dependent on fossil fuel generated electricity.

The details of the WTG and their commissioning details are as follows:

Location No.	Model/Type	Capacity (MW)	Date of Commissioning
R060	S-66	1.25	12/01/2009
R061	S-66	1.25	12/01/2009
R078	S-66	1.25	28/09/2008
R007	S-66	1.25	28/09/2008
R008	S-66	1.25	28/09/2008
R063	S-66	1.25	12/01/2009
R064	S-66	1.25	12/01/2009
R069	S-66	1.25	12/01/2009
R070	S-66	1.25	12/01/2009
R071	S-66	1.25	12/01/2009
R072	S-66	1.25	12/01/2009
R073	S-66	1.25	12/01/2009
R074	S-66	1.25	12/01/2009
R016	S-66	1.25	28/09/2008
R062	S-66	1.25	12/01/2009
R067	S-66	1.25	12/01/2009

Technology Employed

The project activity is a greenfield project for generation of electrical energy using wind which is a renewable source of energy. Thus, this project actually displaces electricity from the NEWNE grid, which is essentially fossil-fuel based.

In wind energy generation, kinetic energy of the wind is converted into mechanical energy and subsequently into electrical energy. Wind turbines capture the wind's energy with three rotor blades, which are mounted on a rotor, to generate electricity. The turbines sit high atop towers, taking advantage of the stronger and less turbulent wind. As the wind blows through the blades of the windmill, a pocket of low-pressure air forms on the downwind side of the blade. The low-pressure air pocket then pulls the blade towards it, causing the rotor to spin. The rotor turns the three-stage gearbox with flexible coupling that further spins the connected asynchronous induction generator. The spinning of this generator produces the required electricity. Since power is generated from wind energy, no emissions are attributed to the project

emissions and emissions due to fossil-fuel dominated grid power has been displaced due to the project activity.
The salient features of the technology utilized are:

ROTOR	
Diameter	66 m
No. of Rotor Blade	3
Rotor Blade Material	Epoxy bonded fibre glass
Swept Area	3421 m^2
Hub Height	74.5 m
OPERATIONAL DATA	
Cut in wind speed	3.0 m/s
Rated wind speed	14 m/s
Cut off wind speed	22 m/s
GEARBOX	
Type	Integrated 3 Stage 1 planetary & 2 helical
Gear ratio	1:74:9
Nominal Load	1390 KW
Type of Cooling	Oil cooling system, Forced lubrication.
GENERATOR	
Rotation speed	1500 RPM
Rated output	1250 KW
Rated voltage	690 V – AC (phase to phase)
Frequency	50 Hz
Lifetime of the WTG	20 yrs

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B.2. Post registration changes
B.2.1. Temporary deviations from registered monitoring plan or applied methodology
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There have been no temporary deviations from the registered monitoring plan or applied methodology

B.2.2. Corrections
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There are no corrections to the registered project activity

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

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There have been no permanent changes from the registered monitoring plan or applied methodology

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

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There have been no changes to the project design of the registered project activity

B.2.5. Changes to start date of crediting period

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There are no changes in the start date of the crediting period

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

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This is not applicable since the project activity is not an afforestation or reforestation project activity

SECTION C. Description of monitoring system

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The delivered energy is metered by the authorities of JVVNL in the presence of representatives of the technology supplier at the substation at Soda Mada. Metering equipment used are electronic tri-vector meters. The metering equipment is maintained in accordance with electricity standards. The monthly meter readings at the project sites (controller reading) and the receiving station are taken simultaneously and jointly by the parties. The controller readings of the Wind mills are recorded by the technology supplier by a Central Monitoring system installed at the wind site. Daily and monthly generation reports are sent to MRMPL.

All the Main and Check meters are tested for accuracy annually with reference to a portable standard meter. As the instruments are calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times. To ensure accurate and continuous monitoring, MRMPL has a standby meter, calibrated by an authorized agency.

The allocation of electricity is executed as per the following procedure:

1. Enter the value of electricity received from meter at the controller (kWh).
2. Enter the value of electricity supplied to meter at the controller (kWh).
3. Take the difference of electricity received and supplied to meter at the controller (kWh)
4. Take the difference of electricity as per the above steps 1 to 3 for each of the WTGs (of owner i) connected to the feeder of the MRMPL WTG. [$EG_{meter,i}$]
5. Take the sum of all the controller readings as calculated in Step 4. [$\Sigma EG_{meter,i}$]
6. Divide individual difference by total calculated as per step 5 and multiply by 100 to find % allocation for each of the WTG of MRMPL.
   [$EG_{meter\ MRMPL}$ / $\Sigma EG_{meter,i}$) x 100]
7. Enter the value of electricity received from the feeder at the substation (kWh).
8. Enter the value of electricity supplied to the feeder at the substation (kWh).
9. Take the difference of electricity received and supply to meter at the substation. (kWh) [$EG_{meter,T}$]
10. Multiply the value calculated as per step 9 by % allocation calculated as per step 6 to calculate the net electricity export allocated to the WTGs of MRMPL connected to the feeder. [$EG_{net,MRMPL}$, i.e., EGy and ECy]
11. The steps 1-10 are repeated for the other feeders connecting the WTGs of MRMPL to the substation to calculate the allocation of net electricity.

The sum of net electricity allocated in all the relevant feeder units gives the total net electricity exported by the WTGs of Modern Road Makers Private Limited.

The project owner uses the credit notes sent by state electricity board for respective the WTGs at different locations. The cumulative power supplied to grids is tabulated and multiplied by respective Grid Emission Factor to calculate number of CERs.

The summary of the shut down times during the current monitoring period for the project activity are provided as Appendix-1.

The meter detail of individual towers has been given below in the table. Meters have an accuracy of 0.2s.

Location No.	Meter No.	Substation	Feeder Name/No.	Date of Commissioning
R061	RJB01144	Soda Mada	Feeder 17	12/01/2009
R070		Soda Mada		
R060		Soda Mada		
R062		Soda Mada		
R063		Soda Mada		
R064		Soda Mada		
R067		Soda Mada		
R069		Soda Mada		
R071		Soda Mada		
R072		Soda Mada		
R073		Soda Mada		
R074		Soda Mada		
R007	RJB00337	Soda Mada	Feeder 15	28/09/2008
R008		Soda Mada		
R016		Soda Mada		
R078		Soda Mada		

Meter Details for the Sub-stations

Meter	Meter Number	Sub-station	Last Calibratio	Calibratio n Due date	Calibration conducted	Test Result

			n			
Main meter	RJB00316	Soda Mada	11/03/2011	11/03/2012	14/03/2012	Normal
Check meter	RJB00317	Soda Mada	11/03/2011	11/03/2012	14/03/2012	Normal

SECTION D. Data and parameters

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

Data/Parameter	$EF_{Grid,OM,y}$
Unit	tCO2/MWh
Description	Weighted Average Simple Operating margin of the grid
Source of data	Central Electricity Authority database (Version 4.0)
Value(s) applied	1.0086
Purpose of data	The value has been used form the Central Electricity Authority (CEA) database (Version 4.0, dated 1st September 2008) for the calculation of the Baseline emissions
Additional comment	-

Data/Parameter	$EF_{Grid,BM,y}$
Unit	tCO2/MWh
Description	Build Margin of the grid
Source of data	Central Electricity Authority database (Version 4.0)
Value(s) applied	0.5977
Purpose of data	The value has been used form the Central Electricity Authority (CEA) database (Version 4.0, dated 1st September 2008) for the calculation of the Baseline emissions
Additional comment	-

Data/Parameter	$EF_{Grid,CM,y}$
Unit	tCO2/MWh
Description	Combined Margin emission factor of the grid
Source of data	Central Electricity Authority database (Version 4.0)
Value(s) applied	0.9058
Purpose of data	This value is used for the calculation of the Baseline emissions
Additional comment	-

D.2. Data and parameters monitored

Data/Parameter	EG_y
Unit	MWh
Description	Total Electricity Exported to the grid
Measured/Calculated /Default	Measured and calculated
Source of data	Credit Notes from the state electricity utility
Value(s) of monitored parameter	39,296.706
Monitoring equipment	Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2 (Main & Check meters)
Measuring/Reading/ Recording frequency	Archiving: Paper & Electronic Recording Frequency: Daily Responsibility: The O&M site-in-charge is responsible for the regular recording of data. Calibration Frequency: The meters are calibrated annually Date of last Calibration: 20/04/2010, 11/03/2011, 14/03/2012 Calibration Due Date: 14/03/2013
Calculation method (if applicable)	-
QA/QC procedures	Meter calibration is conducted annually
Purpose of data	This data is used for the calculation of Baseline Emissions
Additional comment	-

Data/Parameter	EC_y
Unit	MWh
Description	Total Electricity Import from the grid
Measured/Calculated /Default	Measured and calculated
Source of data	Credit Notes from the state electricity utility
Value(s) of monitored parameter	167.312
Monitoring equipment	Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2 (Main & Check meters)
Measuring/Reading/ Recording frequency	Archiving: Paper & Electronic Recording Frequency: Daily Responsibility: The O&M site-in-charge is responsible for the regular recording of data. Calibration Frequency: The meters are calibrated annually Date of last Calibration: 20/04/2010, 11/03/2011, 14/03/2012 Calibration Due Date: 14/03/2013
Calculation method (if applicable)	-
QA/QC procedures	Meter calibration is conducted annually

Purpose of data	This data is used for the calculation of Baseline Emissions
Additional comment	-

D.3. Implementation of sampling plan
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No sampling is required for this project activity

SECTION E. Calculation of emission reductions or GHG removals by sinks
E.1. Calculation of baseline emissions or baseline net GHG removals by sinks
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Baseline emissions are calculated by multiplying the Net electricity exported to the grid with net baseline emission factor, as per the CDM approved methodology.

BE_y = Baseline Emission Factor ($EF_{grid, CM, y}$) x Net electricity supplied to Regional Grid ($EG_{facility,y}$)

Where,
BE_y = Baseline Emissions (tons/year)
$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)
$EF_{grid, CM, y}$ = Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO2/MWh)

The Baseline emission factor is calculated in the registered CDM PDD as per "Tool to calculate the emission factor for an electricity system", Version 02, EB 50.

Thus, as per the CDM PDD, the calculated Baseline emission factor is $EF_{grid, CM, y}$ = 0.9058 tCO2/MWh
The Baseline Emission Factor is fixed.

The net export from the project activity is 39,129 MWh. Hence the baseline emissions are calculated as below:
Baseline Emissions (BEy) = 0.9058 * 39,129
= 35,443 tCO2

E.2. Calculation of project emissions or actual net GHG removals by sinks
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The project uses wind energy only for power generation which leads to zero net GHG on-site emissions. Hence there is no net emission within the project boundary.

Hence, PE_y= 0.

E.3. Calculation of leakage
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The project proponents have identified no anthropogenic greenhouse gases by sources outside the project boundary that are significant, measurable and attributable to the project activity. Hence, no leakage is considered from the project activity.

LE_y = 0

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

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
Total	35,443	0	0	35,443

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

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	46,449	35,443

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

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As per the registered PDD, the emission reductions estimated were 32,788 tCO2e/ annum. During the current monitoring period (27/11/2010 to 30/04/2012) of 17 months, the emission reduction as per the ex-ante calculations is 46,449 tCO2e. Whereas, the actual emissions reduction achieved in this period is 35,443 tCO2e, which is lesser than the expected emission reductions.

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History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Issuance		