CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

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MRMPL Wind Power Project
Version: 01
Date: 04/05/2009

A.2. Description of the project activity:

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The project sponsor is Modern Road Makers Pvt. Ltd. (herein referred to as MRMPL). MRMPL is incorporated in the Companies Act, 1956. It is a subsidiary of IRB Infrastructure Developers Limited (IRBIDL). It is involved in the construction, operation and maintenance of roads through various infrastructure projects in the road sector and is one of the major road developers in India.

The project 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" to export the electricity to local grid. The project displaces electricity from the grid (North East West North East grid, India). According to the latest Central Electricity Authority[1] report the northern grid has been included in the common grid NWNE (North East West North East). This helps in significant reduction of GHG emissions as the Northern Grid is mostly dependent on fossil fuel generated electricity.

The project proponent have considered the sustainable development of the region due to the project activity. Ministry of Environment and Forests, Govt. of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects:

Social well being:

- The project activity contributes towards local socio-economic development around its area of operation through provision of employment opportunities (direct and indirect) for local population.

- It contributes towards improving the India's power deficit situation by contributing to the power grid and making power accessible to more people.

Environmental well being:

- The project activity causes sustenance and improvement in regional air quality by avoiding commonly used fossil fuels for power generation. It thereby, also, results in maintenance of the ecosystem and human health due to avoidance in the use of GHG emissive fuels such as coal.

- It also leads to conservation of natural resources such as coal, oil etc.

[1] 1. http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Economic well being:

- By providing employment opportunities, this project activity leads to development in the local economy.

- Through bringing in revenue to India through CDM process, it demonstrates how certain real and perceived financial barriers can be overcome for implementing clean energy measures.

Technological well being:

The successful implementation of the project activity will result in encouraging the use of cleaner technology. This will lead to replacement of the non eco friendly sources of power generation like thermal energy which are the major sources of power in the country.

In addition to this MRMPL will also invest 2% of the CER revenues in sustainable development including society/community development. The details of the same are provided in the Annexure 4

A.3. Project participants:

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Name of Host Party (*) (host) Indicates a Host Party)	Private and/or Public entity(ies) project participants (*) (as applicable)	Kindly indicate whether the party involved wishes to be considered as project participant (Yes/No)
India	Modern Road Makers Pvt Ltd.(Private entity)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

>>
India

A.4.1.2. Region/State/Province etc.:

>>
Rajasthan

A.4.1.3. City/Town/Community etc.:

>>
Jaisalmer

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

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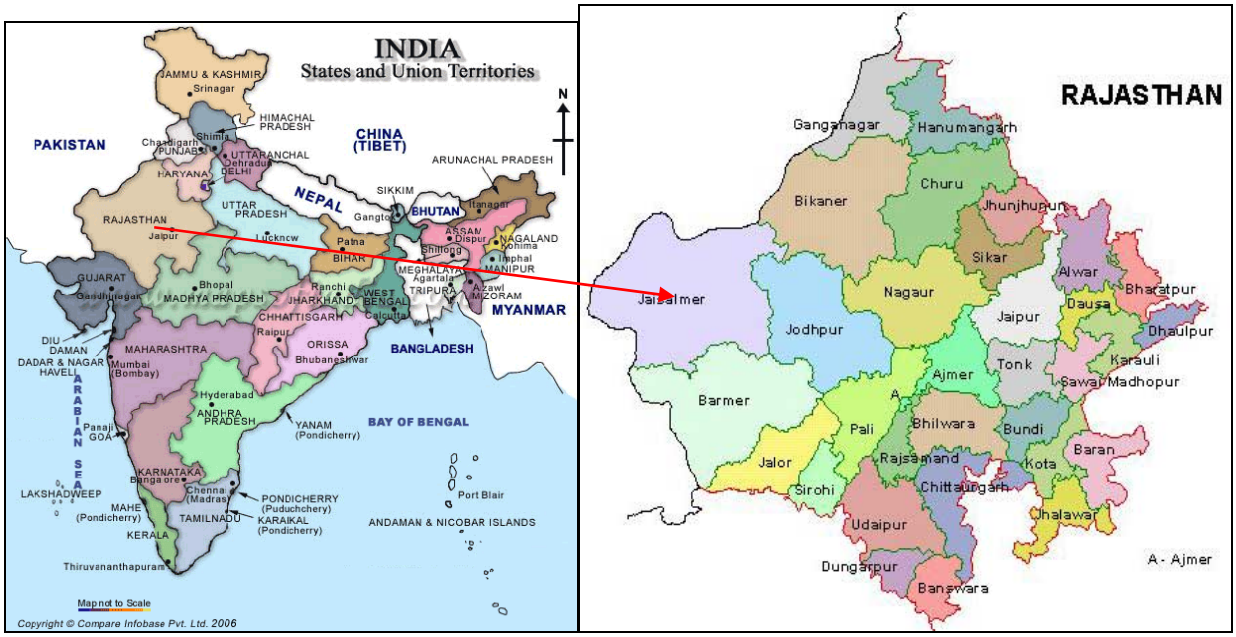
The project activity is located at villages Mudari, Ganesh ki Dhani, Dhava and Dedha in the district of Jaisalmer, Rajasthan. The nearest railway station and airport to reach the site is the town of Jaisalmer located approximately 30 kms from the project site. The coordinates of the project site are:

Latitude: 26^0 54'55'' North
Longitude: $70^0$54'46'' East

The map of the project location is shown below:



A.4.2. Category (ies) of project activity:

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The project activity is considered under "Zero emissions grid-connected electricity generation from renewable sources", the project activity has a capacity more than 15 MW. Therefore as per the scope of the project activity enlisted in the 'list of sectoral scopes and related approved baseline and monitoring methodologies', the project activity may principally be categorized in:

Scope Number 1

Sectoral Scope – Energy Industries (renewable/non-renewable sources).

A.4.3. Technology to be employed by the project activity:

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The project activity is the generation of wind power based electricity at Jaisalmer, Rajasthan. It involves the installation of 16 S-66 SUZLON 1250 KW rating Wind Turbine Generators with a total installed capacity 20 MW. The main features of the technology are given below:

ROTOR	
Diameter	66m
No. of Rotor Blade	3
Rotor Blade Material	GRP
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
PLANT LOAD FACTOR (%)	24

The electricity generated by the project activity will be supplied to the local grid which a part of the Northern/Eastern/Western/ North Eastern Grid (NEWNE) in India. The major contributor of electricity to the NEWNE Grid is thermal energy based power plants which utilise fossil fuels as raw materials. Fossil fuel based electricity generation contributes to Green house gas emissions of Carbon dioxide into the atmosphere. The project activity is a clean source of energy dependent on the renewable wind source. In addition to contributing to the electricity generation to the state of Rajasthan, the project activity also helps to displace electricity generated through fossil fuels from the grid. This helps reduce the emissions to the atmosphere. Without the project activity, the electricity will continue to be generated by the fossil fuels based power stations in the grid and these emissions will continue to cause environment pollution.

The Baseline scenario is same as the existing pre project scenario. In the baseline situation the electricity generated by the project would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.

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A.4.4. Estimated amount of emission reductions over the chosen crediting period:

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Year	Annual estimation of emissionreductions in tonnes of CO2 e
2009– 2010	35109
2010 – 2011	35109
2011 – 2012	35109
2012 – 2013	35109
2013 – 2014	35109
2014 – 2015	35109
2015 – 2016	35109
2016 – 2017	35109
2017 – 2018	35109
2018 – 2019	35109
Total estimated reductions (tonnes of CO_2e)	351090
Total no of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	35109

A.4.5. Public funding of the project activity:

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No public funding is available to the project activity from parties included in Annex I.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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Approved Consolidated Baseline and Monitoring methodology ACM0002 (Version 09 Sectoral Scope 01, EB 44)

Title: "Consolidated Baseline Methodology for grid-connected electricity generation from renewable Sources. "

Reference: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

The other references which have been taken for the preparation of the document are:

- Tools for the demonstration and assessment of additionality, Version 05.2, EB 39

Reference: http://cdm.unfccc.int/Reference/tools/ls/meth_tool01.pdf

- Tools to calculate the emission factor for an electricity system, Version 01.1, EB 35

Reference: http://cdm.unfccc.int/Reference/tools/ls/meth_tool07_v01_1.pdf

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

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The Methodology ACM0002 is applicable to the project activity. The applicability criteria are met in the following way:

Applicability Criteria	Project Scenario
The project activity is the installation or modification/retrofit of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project activity is the installation of a new wind power plant unit.
The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available	The electricity is supplied to the Northern Eastern Western North Eastern (NEWNE) Grid of India. The information on the NEWNE grid is clearly elaborated by the Central Electricity Authority of India, a Government Agency.
Applies to grid connected electricity generation from landfill gas to the extent that it is combined with the approved "Consolidated baseline methodology for landfill gas project activities" (ACM0001)	The project activity does not involve electricity generation from landfill gas.
5 years of historical data (or 3 years in the case of non hydro project activities) have to be available for those project activities where modification/retrofit measures are implemented in an existing power plant.	No modification/retrofit measures are involved in the project activity.

B.3. Description of the sources and gases included in the project boundary:

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Source		Gas	Included	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity.	CO_2	Yes	Main Emission Source
		CH_4	No	Excluded for simplification
		N_2O	No	Excluded for simplification
Project	CO_2 emissions from Wind power plant.	CO_2	No	Estimates not required
		CH_4	No	Estimates not required
		N_2O	No	Estimates not required

The spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the project power plant is connected to.

The proposed project would be feeding the electricity in the NEWNE grid. This grid constitutes all the states of India except those connected to Southern grid (Karnataka, Andhra Pradesh, Kerala, Pondicherry, Lakshadweep, and Tamil Nadu). The proposed project would have marginal impact on all the generation facilities in the grid. Thus all the power generation facilities connected to this grid form the project boundary for the purpose of baseline estimation. The NEWNE grid is also connected with the Southern grid, however, the net exchange of energy within the grids is comparatively small, and thus the other regional grids are not included in the boundary (however for conservative and accurate estimation, the imports of electricity from other regional grid has been included in the baseline calculation).

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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Baseline scenario:

According to the methodology ACM0002 the baseline scenario for the project is defined as "Electricity delivered to the grid with the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations as shown in the "Tools to calculate the emission factor for an electricity system, Version 05.2, EB 39."

In the absence of the project activity the energy displaced by the project would have been supplied by the existing grid connected power systems. The project provides electricity to the Northern East West North East (NEWNE) grid. Due to significant changes in the grid structure, the Indian electricity system is now

divided into two grids, the new Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid[2]. Historically, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states. Since August 2006, however, all regional grids except the Southern Grid havebeen integrated and are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids will be treated as a single grid and is being named as NEWNE grid Each grid covers several states. As the grids are interconnected, there is inter-state and inter- regional exchange. A small power exchange also takes place with the neighboring countries
Bhutan and Nepal.

Presently Southern grid is connected with Western and Eastern grid through HVDC link and HVDC back to back systems. Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state meets their demand with their own generation facilities and also with allocation from power plants owned by the central sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the central sector power plants. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. Moreover, there are also electricity transfers between regional grids, and small exchanges in the form of cross border imports and exports (e.g. from Bhutan).

Geographical Scope of two electricity grids

NEWNE				Southern
Northern	**Eastern**	**Western**	**North Eastern**	**Southern**
Delhi	Bihar	Chhattisgarh	Arunachal Pradesh	Andhra Pradesh
Haryana	Jharkhand	Gujarat	Assam	Karnataka
Himachal Pradesh	Orissa	Daman & Diu	Manipur	Kerala
Jammu & Kashmir	West Bengal	Dadar & Nagar Haveli	Meghalaya	Tamil Nadu
Punjab	Sikkim	Madhya Pradesh	Mizoram	Pondicherry
Rajasthan	Andaman-Nicobar	Maharashtra	Nagaland	Lakshadweep
Uttar Pradesh		Goa	Tripura	
Uttarakhand				
Chandigarh				

The emission factor of the NEWNE grid has been calculated using the combined margin values from the data published by the Central Electricity Authority (CEA). CEA is a legal government body given the task of making policies and advising the Indian government on the issues of electricity in the country. The Combined margin values have been calculated by a combination of the Build and the operational margin.

[2] http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

According to the "Tools to demonstrate additionality" the combined margin has to be calculated using the following weights:

Operating Margin (Weight) = 0.75
Build Margin (Weight) = 0.25

Coal is the primary fuel for power generation in India and dominates the power supply scenario overwhelmingly. About 53 percent of the country´s installed capacity is coal based[3]. In actual production terms about 70 percent of the generation comes from coal[3]. The following chart shows the share of different sources of power generation in india.[3]

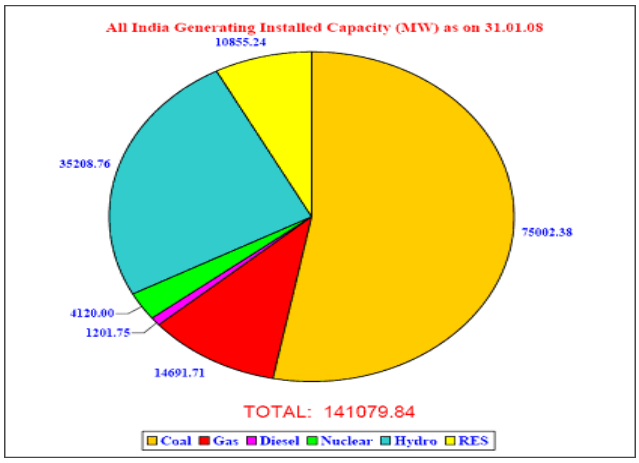

Figure: Installed generation capacity in India from different sources.

As of December 2007, the country had about 8% of the installed capacity from renewable sources, excluding large hydro (above 25 MW). Thus there is a major dependence on the Indian power on the fossil fuel based generation.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

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Step I: Identification of the alternatives to the project activities consistent with mandatory laws and regulation.

Step 1a. Define alternatives to the project activity.

The two realistic and credible alternatives for the project activity are:

1. *Continuation of the project scenario without the CDM benefits.*

[3] http://www.indianelectricity.com/sectorinfo.htm

In the said alternative MRMPL would have gone ahead with the implementation of project activity, generating renewable electricity and exporting the same to the state electricity grid under a power purchase agreement thereby displacing equivalent units of power generated by fossil fuel based plants in the grid. There would be no emissions of greenhouse gases to atmosphere. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline scenario. However there exist barriers to the implementation of the proposed project activity without CDM as explained in step 2 and step 3 below.

1. *Continuation of the present scenario*

The "no project option" which is the continuance of the present scenario wherein the equivalent amount of energy would have been produced by the project grid electricity system through its currently running power plants and by new capacity additions (which are mostly thermal) is the most plausible alternative as baseline option for the project. In India, the power off-takes from the power plants is decided based on power plant and T&D availability and not on merit order.

Sub-step 1b. Enforcement of applicable laws and regulations:

All the above alternatives are in compliance with all applicable legal and regulatory requirements as follows:

The implementation of project activity is a voluntary initiative and it is not mandatory or a legal requirement. For power generation, the electricity act 2003 does not restrict or empower any authority to restrict the fuel choice, the applicable environmental regulations do not restrict the use of wind energy and there is no legal requirement on the choice of a particular technology.

Thus, considering that all the alternatives are in line with the applicable legal and regulatory requirements, the "no project option" i.e. continuation of current practice where in the equivalent amount of energy would have been produced by the project grid electricity system through its currently running power plants and by new capacity additions is the chosen baseline scenario which would have happened in the absence of the proposed project activity.

Step 2: *Investment Analysis*

Step 2a: Determine appropriate analysis method

As the project generates income other than the CDM benefits (revenues from the sale of electricity to the grid), Option I that is the Simple Cost Analysis cannot be applied in this case. Among the two options – Investment Comparison analysis (Option II) and Benchmark analysis (Option III), the benchmark analysis has been applied for investment analysis. The financial indicator chosen is the Internal rate of return of the project activity. The prime lending rate (PLR) values issued by the Reserve Bank of India has been taken as the benchmark.

Step 2b: Apply Benchmark Analysis:

The financial parameter to be considered here is the project IRR. According to the Para 3 of the "Annex: Guidance on the Assessment of Investment Analysis" in the "Tools for the demonstration and assessment of additionality (Version 05.2)", the period of assessment should not be limited to the proposed crediting period of the CDM project activity. Both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or - if a

shorter period is chosen - include the fair value of the project activity assets at the end of the assessment period. In general a minimum period of 10 years and a maximum of 20 years will be appropriate. The project lifetime, as quoted by the technology supplier is 20 years and 0 months. Hence the period chosen here is for the whole life cycle of the project which is 20 years and 0 months.

The Benchmark which has been applied is the Reserve Bank of India Prime lending rate. The Reserve Bank of India has a role to regulate and supervise the financial system of the country. It has the main function to prescribe the broad parameters of banking operations within which the country's banking and financial system function. Every year the Reserve Bank in its Annual Statement on Monitory policy, prescribes the Prime Lending rates which is a standard benchmark referred by the other financial institutions in India. The PLR is given as a range of values. The conservative value has been taken as the benchmark. As the projects financial closure has been done in 2008 so the value of PLR in the RBI's Annual Statement of 2008-09 has been taken. The following table shows the comparison of the benchmark with the project IRR with and without the benefits of CDM revenue.

Project IRR without CDM revenue (%)	7.6
Project IRR with CDM revenue (%)	11.9
Prime Lending Rate[4] (%)	12.25

Sub Step 2c: Calculation and comparison of the financial indicators:

Project IRR without CDM revenue (%)	7.6
Project IRR with CDM revenue (%)	11.9
Prime Lending Rate (%)	12.25

The calculations for the IRR values have been shown in the sheet accompanying the project design document. As is clear from the values given above the Project IRR without the CDM benefit is lower than the benchmark. Thus the project is not financially attractive. After taking into account the CDM revenues the project IRR is greater than the benchmark which makes the project financially viable.

Sub-step 2d: Sensitivity analysis:

The sensitivity of the IRR by varying the critical assumptions in the project has been shown in the table below. The critical assumptions for this project are:

1) Generation of electricity
2) O & M escalation rate
3) Escalation in Tariff rate.

Sensitivity Analysis

S. No	Parameter	Variation	IRR without	IRR with CDM	Variation at which the	Comments

[4] *http://rbi.org.in/scripts/NotificationUser.aspx?Id=4152&Mode=0*

			CDM revenues (%)	**revenue (%)**	**IRR without CDM revenues will equal the benchmark**	
1	Project Scenario	-	10.3	12.7	-	
2	Generation of electricity	10% increase	9.3	13.9	27.8% increase in generation.	The Rajasthan Renewable Energy Corporation (RREC, a state government agency) while prescribing the tariff for NES power plants in GoR policy of April 2003, October 2004 and February 2006 considered that a PLF of 22.37% would be appropriate for wind projects in Rajasthan[5]. The generation from the project has been estimated using a higher PLF of 24%. A more than 10% increase in generation for the span of 20 years is highly improbable. On similar arguments the project activity will not be able to cross the benchmark as the increase in generation by about 27.8% is highly unlikely.
		10% decrease	5.8	9.7	-	
3	Annual escalation in O & M charges	10% decrease	7.6	11.9	-	The change in the parameter does not have a drastic effect on the IRR.
		10% increase	7.6	11.9	-	
4	Annual escalation in Tariff rate	10% decrease	7.6	11.9	-	The change in the parameter does not have any major effect on the IRR. The required annual escalation in the tarrif rate for the project IRR to cross the
		10% increase	7.6	11.9	Approx 1075%	

[5] Refer: Para 67, page 20 and 21 of RERC Wind Order

						benchmark prime lending rate is very high and practically not feasible.

Step 4: Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity:

The contribution of wind to the overall generation in India is quite less. As on 31/01/2008 the total generation in India is 141,080 MW where as the contribution of wind is 7844 MW. The percentage of the wind in generation is around 5.55%. Thus wind power has a low contribution to the total energy generation of India.

The contribution of Rajasthan to the total wind power generated is small as compared to states like Tamil Nadu, Maharashtra and Gujarat which have major share in wind projects in the country. A comparison of the share of wind power in the different states has been shown in the table below [6]:

Table 1

State	**Tamil Nadu**	**Maharashtra**	**Gujarat**	**Karnataka**	**Rajasthan**	**Andhra Pradesh**
Wind Power (%)	44.23	20.19	14.44	11.84	6.23	1.45

Rajasthan has achieved a small portion of the potential existing in the state. The installed capacity of the wind power as compared to the potential existing in India and in the state of Rajasthan has been shown in the following table[6]

.

	Wind Power potential(MW)	**Installed capacity (MW)**	**Percentage of potential utilised (%)**
India	45,195	7844	17.35
Rajasthan	5400	495.7	9.17

The percentage utilisation of the wind potential in India is less and the utilisation in Rajasthan is even lower.

In the existing wind projects in Rajasthan most of them have taken the CDM revenues into financial consideration for executing the project. As per the data up to December 2007 the number of projects which are in the process of availing the CDM benefits amount to 473.8 MW of capacity which means that 95.5% of the wind projects in Rajasthan have gone for CDM consideration[7]. The reason for such a high percentage is that it is difficult for the project proponent to independently finance the project without the help of CDM funds. Even for projects of small capacity the CDM benefits have been sought.

[6] http://mnes.nic.in/annualreport/2007_2008_English/Chapter%205/chapter%205_1.htm

[7] *CDM Pipeline from* http://www.cd4cdm.org/

Only 21.9 MW capacities of the projects have not gone for CDM consideration. This implies that most, if not all of the large scale projects in the state have applied for CDM benefits (as large scale projects have capacity > 15 MW).The current project is a large scale project involving a large investment and from the statistics in the state it is clear that such projects need to avail the CDM benefit in order to be executed.

Thus only 21.9 MW capacities of the wind projects have not availed the CDM benefits. This is around 0.3% of the total installed capacity of the state of Rajasthan which is 5881 MW[8]. The above arguments show that wind power in Rajasthan is still not a prevailing practice.

Sub-step 4b: Discuss any similar Options that are occurring

As has been demonstrated Wind power is still not a common practice in the state of Rajasthan.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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As per the methodology ACM0002 the baseline emissions include only CO_2 emissions from electricity generation in Fossil fuel fired power plants that are displaced due to project activity, calculated as follows

$BE_y = (EG_y – EG_{baseline})* EF_{Grid,CM,y}$

Where:

BEy = Baseline emissions in year y (tCO2/yr).

EGy = Electricity supplied by the project activity to the grid (MWh).

EGbaseline = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero.

EFgrid,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.

The project activity is a new installation. So for the project activity, $EG_{baseline} = 0$. The baseline emission will be calculated as

$BE_y = EG_y * EF_{Grid,CM,y}$

The combined margin has been used for calculating the emission factor of the grid. The grid to which the project activity contributes electricity is the Northern grid in India. The values of Operating margin and Build Margin has been taken from the data published by the Central Electricity Authority of India : CO_2 Baseline Database(Version 4.0)[1]. CEA undertook the study relating to the baseline data for the Power sector in the country with a view to obtaining uniformity of approach in the country towards Detailed information has been collected from all power generating stations for the aim of calculating the required parameters.. According to the latest report the Northern Regional Grid was synchronized with the integrated Eastern, North Eastern and Western Grid in August, 2006 and the four regional grids have since been operating in synchronous mode. The emission factors have been worked out based on this new grid configuration and have been calculated using the “Tools to calculate the emission factor of the grid(Version 01.1)”.According to the tool the combined margin Emission is calculated by the following formula.

$EF_{Grid,CM,y} = EF_{Grid,OM,y} * W_{OM} + EF_{Grid,BM,y} * W_{BM}$

[8] http://www.rerc.gov.in/index1.htm

Where
$EF_{Grid,CM,y}$ = Combined Margin CO_2 emission factor. (tCO_2/MWh)
$EF_{Grid,OM,y}$ = Operating Margin CO_2 emission factor. (tCO_2/MWh)
$EF_{Grid,BM,y}$ = Build Margin CO_2 emission factor. (tCO_2/MWh)
W_{OM} = Weighting of Operating margin emission factor. (%)
W_{BM} = Weighting of Build margin emission factor. (%)

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	**$EF_{CM,Grid}$**
Data unit:	Tonnes CO_2/MWH
Description:	Combined Margin emission factor of the grid
Source of data used:	Central Electricity Authority report (Version 4.0)
Value applied:	0.9075
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value will be calculated using the Operating Margin and Build Margin values, also taken from the CEA reports.
Any comment:	

B.6.3. Ex-ante calculation of emission reductions:

>>

The emission reduction in the year y is calculated by the following formula:

$ER_y = BE_y - PE_y – LE_y$

Where

ER_y = Emission reduction in the year y
BE_y = Baseline emission in the year y
PE_y = Project emission in the year y
LE_y= Leakage emission in the year y

Baseline Emission

The Baseline emission is calculated by the following formula:

$BE_y = EG_y * EF_{Grid,CM,y}$

BEy = Baseline emissions in year y (tCO2/yr).
EGy = Electricity supplied by the project activity to the grid (MWh).
EFgrid,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.

The electricity supplied by the project activity to the grid (EGy) will be monitored each year. An initial estimation based on the available wind data of the site and the power curve of the WTG being offered has been made. The estimated generation of the project shall be approximately 41600 MWh per annum. This value has been used for ex ante calculation of emission reduction. Thus

The combined margin has been used for calculating the emission factor of the grid. According to the "Tools to calculate the emission factor of the grid (Version 01.1)" the combined margin Emission is calculated by the following formula.

$EF_{Grid,CM,y} = EF_{Grid,OM,y} * W_{OM} + EF_{Grid,BM,y} * W_{BM}$

Where
$EF_{Grid,CM,y}$ = Combined Margin CO_2 emission factor. (tCO_2/MWh)
$EF_{Grid,OM,y}$ = Operating Margin CO_2 emission factor. (tCO_2/MWh)
$EF_{Grid,BM,y}$ = Build Margin CO_2 emission factor. (tCO_2/MWh)
W_{OM} = Weighting of Operating margin emission factor. (%)
W_{BM} = Weighting of Build margin emission factor. (%)

The grid to which the project activity contributes electricity is the Northern grid. The values of Operating margin and Build Margin has been taken from the data published by the Central Electricity Authority of India: CO_2 Baseline Database (Version 4.0). According to the latest report the northern grid is a part of the North East West North East grid. (NWENE) The values for the NWENE grid considered for calculations are shown below:

Operating Margin Emission factor($EF_{Grid,OM,y}$)	**Build Margin emission factor ($EF_{Grid,BM,y}$)**
1.01	0.60

According to the tool, the values of weight for Wind project have been taken as:

$W_{OM} = 0.75$
$W_{BM} = 0.25$

Putting these values in the formula for Combined Margin Emission Factor above:

$EF_{Grid, CM,y} = 1.01 * 0.75 + 0.60 * 0.25 = 0.9075$

The value of baseline emission has been calculated as 35109 tonnes of CO_2 per annum.

Project Emission:

As the project activity involves the generation of electricity from Wind power and supply of the electricity to the grid, the project emissions are considered to be zero. Hence

$PE_y = 0$

According to the methodology, no leakage emission has taken into account by the project. Thus $LE_y = 0$

The emission reduction for the project has been estimated as 35109 tonnes of CO_2 per annum.

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project activity emissions	Estimation of Baseline emissions	Estimation of leakage	Estimation of overall emission reductions
2009-2010	0	35109	0	35109
2010-2011	0	35109	0	35109
2011-2012	0	35109	0	35109
2012-2013	0	35109	0	35109
2013-2014	0	35109	0	35109
2014-2015	0	35109	0	35109
2015-2016	0	35109	0	35109
2016-2017	0	35109	0	35109
2017-2018	0	35109	0	35109
2018-2019	0	35109	0	35109
Total (tonnes of CO_2e)		**351090**	**0**	**351090**

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

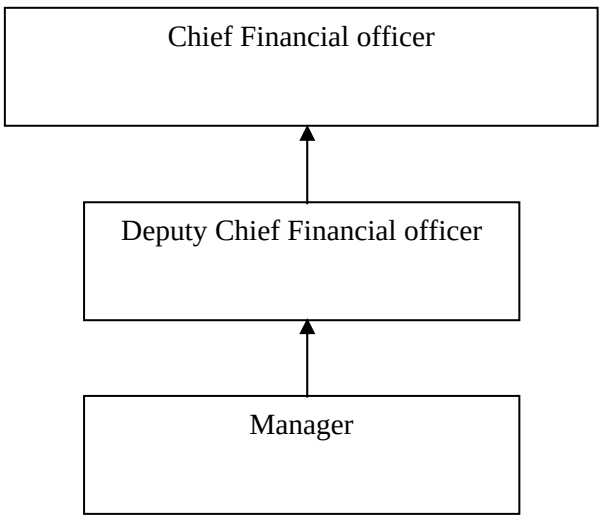
Data / Parameter:	EG_y
Data unit:	MWh (Mega-Watt-Hour)
Description:	Electricity supplied by the project activity to the grid
Source of data to be used:	Net electricity exported as recorded in the Joint meter readings.
Value of data applied for the purpose of calculating expected emission reductions	The value for the generation has been estimated by the technology supplier to be 41600 MWh per year.
Description of measurement methods and procedures to be applied.	Net electricity generated will be measured at the main meter. The procedures of metering will be as per the power purchase agreement.
QA/QC procedures to be applied:	Electricity supplied by project activity to the grid. Double check by receipt of sales.
Any comment:	Hourly and daily values can be obtained at the meters installed at the Wind mill site. The net electricity exported from a WTG will be evaluated by applying apportioning methods using the values from the meters installed at the Wind mill site.

B.7.2. Description of the monitoring plan:

>>

Project participants will be implemented 20 MW Wind energy power generation project. Power generation using renewable energy like wind power is eligible for CDM benefits under Kyoto protocol. Following is a monitoring plan for CDM activity.

Organizational Structure:



***Responsibility*:**

Analysis of power generation reports, performance report and monthly meter reading is handled by project proponents on regular basis. The data collection on daily basis is done by O&M team contracted by project proponent. An automated generation report is sent to the manager. The manager maintains the generation reports.

The Deputy chief Financial officer is assisted by the manager on the project. He is responsible to plan and allocate the annual budget for operation, estimation of the likely operating cost, electricity dispatch, organizing third party contractors, revenue collection etc. The deputy CFO reports to the chief financial officer who is responsible for the overall project management.

O&M team is responsible for preventive maintenance, handling emergency situations and improvement measures. O&M team ensures that joint monthly reading, issuance of credit notes and meter testing on regular basis.

Data Monitoring:

The methodology requires monitoring of the following:

Actual Electricity generation from the project activity;

For Electricity generation data: The project activity will install the latest state of art monitoring and control equipment that measure, record, report, monitor and control various key parameters. There are tower wise meters which are used to monitor tower wise power generation data. These meters are maintained by O&M team contracted by project proponents. A daily generation report is prepared which is sent to project proponent every day. Overall plant electricity generation is monitored using state electricity board meter. State Board personnel take reading of power generation every month; this data is used for billing purposes. This meter is maintained by state electricity board. The reading is taken in presence of O&M personnel and counter signed. This cumulative reading of wind farm as well meter readings supplied from individual WTGs are used to prepare credit notes for individual WTG owners.
A daily log is maintained by O&M team about issues related to power generation (tower shutdown, grid failure etc).

Calibration of Meters-
Calibration of meters is done by state electricity boards against a standard laboratory meters. The calibration will be done annually.

Frequency-
Electricity generation data is collected monthlyby O&M team.

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

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

>>
Date of completion of baseline study and monitoring methodology----01/12/2008

Person Responsible: Mr M H Kale
Modern Road Makers Pvt Ltd.
91-22-6640-4220
mhk@irb.co.in

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
19.08.2008 (Date of the Purchase Order)

C.1.2. Expected operational lifetime of the project activity:

>>
20 years

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/06/2009 or date of registration

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

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D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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Also, in the redefined EIA notification i.e. S.O. 1533 (http://envfor.nic.in/legis/eia/so1533.pdf), dated 14th September 2006, Ministry of Environment & Forests (MoEF), Govt. of India, the wind projects are not included in the list of projects that has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted. But some of the impacts of the project have been analyzed as mentioned below.

Impact on air

Wind project has a minimal impact on the air as it does not produce any degradable emissions. Some of the pollution is caused because of the transportation of the construction material but as the transportation is a one time affair and not continuous, the effects are considered negligible.

Impact on water

No significant impact on the water takes place because of the project activity.

Impact on ecology

The wind mills are erected in the barren lands near the desert of Rajasthan. The vegetation of the area is scanty and hence the erection of the windmill does not have a significant impact on the ecology of the area.

Impact of the Noise

The noise from the rotors is not significant enough and are well below the regulatory norms. The population of the adjoining areas near the windmill is quite less and hence no major impact of the noise will be seen.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

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As has been explained in the previous section no significant environmental impacts have been considered for the project activity

SECTION E. Stakeholders' comments

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E.1. Brief description how comments by local stakeholders have been invited and compiled:

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The project proponents have taken the local concerns into consideration while implementing the wind power project. A local stakeholders meeting was conducted on 22/ 12/2008 to discuss the various issues related to the project with the stakeholders of the project. The agenda of the meeting was:

- Introduction of Members present in the stakeholders meeting.
- Introduction and presentation of the details of the project activities
- Brief introduction to the concept of CDM
- Expression of opinions and comments by the members.
- Vote of thanks.

Handouts of a detailed presentation on the CDM mechanism and the project were given to the stakeholders in the meeting.

The stakeholders identified for the project were:

- Village Panchayat
- Local people
- District Authorities
- Suzlon

The local stakeholders were invited in the following way:

- A newspaper advertisement was done about the project in the local newspaper. This advertisement notified the readers about the Wind Power project of MRML and invited them to participate in the stakeholders meeting. It was also mentioned that the project has being under the clean development mechanism of the Kyoto Protocol. The comments by the local people were compiled during the meeting and will be provided at the time of validation.
- A letter was sent to village Sarpanch by of the project participants, informing about the nature of project, various benefits of wind project and request to call meeting of local people. The purpose of meeting was to take consent and know the views of local people. The meeting was attended by members of village panchayat, the compiled minutes of meeting shall be made available to DOE at the time of validation. No negative comments were received from villagers and other parties

E.2. Summary of the comments received:

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The stakeholders were overall satisfied with the feedback given to them about the impact of the project activity on the environment. Some of the important points discussed in the meeting were.

- The stakeholders appreciated the fact that the project produces electricity from a clean source as opposed to the electricity generation from the fossil fuels.

- The villagers were inquisitive to know whether the wind project will have any effect on the soil and water of their region.

- The local people expressed their happiness about the project in their area which has provided employment opportunity to the local people.

- The person from the board expressed his appreciation for the fact that the project adds to the overall capacity of the state of Rajasthan and that it was a clean source of energy.

E.3. Report on how due account was taken of any comments received:

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The project proponent explained to the villagers that the project will have no drastic effect on the soil and water of the region. They said that wind power does not need any water or raw materials from the soil for its operation. They also said that it produces no waste material from its operation. The wind mills have been installed in the unused lands of the area and hence they also do not effect vegetation by any means. The villagers were satisfied with the reasoning and there were no further questions raised. Thus the stakeholders were satisfied with the positive sustainable impacts of the wind project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Modern Road Makers Pvt. Ltd.
Street/P.O.Box:	IRB Complex, Chandivali Farm, Chandivali Village
Building:	Andheri (East)
City:	Mumbai
State/Region:	Maharashtra
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Represented by:	
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Salutation:	Mr
Last name:	Kale
Middle name:	H
First name:	M
Department:	
Mobile:	
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Direct tel:	022-66404222
Personal e-mail:	mhk@irb.co.in

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NO PUBLIC FUNDING IS INVOLVED IN THE PROJECT ACTIVITY

Annex 3

BASELINE INFORMATION

Link: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

ANNEX 4

MONITORING INFORMATION

APPENDIX 1

CONTRIBUTION OF CER REVENUES TO SUSTAINABLE DEVELOPEMENT

MRMPL will contribute 2% of its CER revenues in sustainable development of the area. The following table lists the sustainable development scope and the monitoring action plan of the scope.

Sustainable Development	Monitoring Action Plan
Educational empowerment: MRMPL is dedicated towards empowering the unpriviledged in the local community with education. A number of initiatives will be taken to provide non formal education in the community. The initiatives such as developing a strong educational foundation, deep sense of self-esteem and fun activities for underprivileged children has been identified to facilitate education and awareness. For example nearby schools will be been given computers to promote IT education in the neighboring areas.	Receipts from the dealers will be documented. The acknowledgements from the concerned authorities like the school will also be provided. Regular visits will be made to monitor the smooth running of the initiatives.
Road development: MRMPL being in the road development sector has been involved in development of good quality pucca roads in the local community as a part of its Social Corporate responsibility. The revenue from the Carbon credits will be used in doing further work in this sector. Such initiatives facilitate transportation facilities in the local community as well as help in the overall development of the area.	All the necessary clearances and purchase orders will be provided. The company will oversee the work of construction. In addition a letter of appreciation from the local community will be provided.
Health facilities for the slum dwellers: Health has been identified as one of the primary objective in the community development process. As a part of the healthcare initiatives weekly clinics, counseling sessions, health camps will be held to promote general health and well-being in the community. MRMPL is in touch with some NGO's and doctors who provide these services in the local community. Funding will be provided to these initiatives in partnership with these authorities.	The company will ensure that health initiatives will be taken regularly. All the necessary papers and receipts will be documented.