



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

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**SECTION A. General description of project activity****A.1 Title of the project activity:**

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Title: Bundled wind energy power projects (2003 policy) in Rajasthan

Version: 1.0

Date of completion of PDD: 15 November 2006

A.2. Description of the project activity:

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Objective of the Project

The objective is development, design, engineering, procurement, finance, construction, operation and maintenance of bundled wind power projects totalling 30.59 MW wind power projects (“Project”) in the Indian state of Rajasthan to provide reliable, renewable power to the Rajasthan state electricity grid which is part of the Northern regional electricity grid. The Project will lead to reduced greenhouse gas emissions because it displaces electricity from fossil fuel based electricity generation plants.

Nature of Project

The Project harnesses renewable resources in the region, and thereby displacing non-renewable natural resources thereby ultimately leading to sustainable economic and environmental development. Enercon (India) Ltd (“Enercon” or “EIL”) is the equipment supplier and the operations and maintenance contractor for the Project. The generated electricity will be supplied to Rajasthan Rajya Vidyut Prasaran Nigam Ltd (“RRPVN”)/ Jodhpur Electricity Distribution Company Ltd (“Jodhpur Discom”) under a long-term power purchase agreement (PPA). The details of the sub-projects comprising the Project are as under:

- Enercon Wind Farm Rajasthan: 24 MW
- Prerna Pharma Intermediates Pvt. Ltd.: 0.23 MW
- Modular Power: 0.23 MW
- Vijay Traders: 0.23 MW
- Vijay Developers: 0.23 MW
- Vikas Agencies: 0.23 MW
- G. C. Chemie Pharmie Ltd.: 0.23 MW
- Cooper Metals Pvt. Ltd.: 0.46 MW
- Kataria Infrastructure Corporation: 0.6 MW
- Dempo Industries Pvt. Ltd.: 0.6 MW
- D.P.Power: 0.23 MW
- Kataria Infrastructure Corporation: 0.23 MW
- Kataria Wires: 0.23 MW
- Ratlam Wires: 0.23 MW
- Kwality Tobacco Products: 0.23 MW
- D P Power: 0.6 MW
- Unique Power Corporation: 0.6 MW
- P.V.Chandran: 0.6 MW



- Srinivaas Sirigeri: 0.6 MW

Contribution to sustainable development

The Project meets several sustainable development objectives including:

- contribution towards the policy objectives of Government of India and Government of Rajasthan of incremental capacity from renewable sources;
- contribution towards meeting the electricity deficit in Rajasthan;
- CO₂ abatement and reduction of greenhouse gas emissions through development of renewable technology;
- reducing the average emission intensity (SO_x, NO_x, PM, etc.), average effluent intensity and average solid waste intensity of power generation in the system;
- conserving natural resources including land, forests, minerals, water and ecosystems; and
- developing the local economy and create jobs and employment, particularly in rural areas, which is a priority concern for the Government of India;

A.3. Project participants:

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| Name of Party involved ((host) indicates a host Party) | Private and/or public entity(ies) project participants (*) (as applicable) | Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|--|--|---|
| Government of India (Host) | Enercon (India) Ltd | No |
| Government of Japan | Japan Carbon Finance | No |

All the sub-projects have authorised Enercon (India) Ltd to take the projects forward as CDM projects.

The contact details of the entities are provided in Annex – 1.

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):

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The host party to the project activity is the Government of India.

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

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The Project is located in the State of Rajasthan that forms part of the Northern regional electricity grid of India.

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

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The sub-projects are located at the following sites in Jaisalmer District of Rajasthan state in India:

- Asloi: Enercon Wind Farm Rajasthan
- Korwa: Prerna Pharma Intermediates Pvt. Ltd., Modular Power, Vijay Traders, Vijay Developers, Vikas Agencies, G. C. Chemie Pharmie Ltd., Cooper Metals Pvt. Ltd.
- Sodabandhan: Kataria Infrastructure Corporation, Dempo Industries Pvt. Ltd.
- Temderai I: D.P.Power, Kataria Infrastructure Corporation, Kataria Wires, Ratlam Wires, Kwality Tobacco Products
- Temderai II: D P Power, Unique Power Corporation
- Temderai III: P.V.Chandran, Srinivaas Sirigeri

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

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The project area extends between

- Asloi: latitude 26° 33' & 26° 34.5' North and longitude 70° 51' & 70° 53' East.
- Korwa: latitude 26° 32' & 26° 33' North and longitude 70° 53' & 70° 54' East.
- Sodabandhan: latitude 26° 32.5' & 26° 36' North and longitude 70° 53' & 70° 55' East.
- Temderai I, II, III: latitude 26° 42.5' & 26° 46' North and longitude 70° 52.5' & 70° 54.5' East.

The Project is connected to the RRVPN 33/132/220 kV substation at Amarsagar. The sites are located at a distance of 35 km from Jaisalmer by road. The nearest railway station is at Jaisalmer. A location map is attached at Appendix – 1.

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

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The project activity is considered under CDM category zero-emissions '**grid-connected electricity generation from renewable sources**' that generates electricity in excess of 15 MW (limit for small scale project). Therefore as per the scope of the project activity enlisted in the 'list of sectoral scopes and related approved baseline and monitoring methodologies (version 02 Mar 05/07:23)', 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 involves 30 wind energy converters (WECs) of Enercon make 800 kW E-48, 6 WECs of Enercon make 600 kW E-40 and 13 WECs of Enercon make 230 kW E-30 with internal electrical lines connecting the Project with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The other salient features of the state-of-art-technology are:

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.



- Minimum drawl (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEC with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking System.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts Generation of power at wind speed of 3 m/s.

Enercon (India) Ltd has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured.

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

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Crediting Period for the Project: fixed for 10 years

| Years | Annual estimation of emission reductions in tonnes of CO₂e |
|--|--|
| 2008 | 54,529 |
| 2009 | 54,529 |
| 2010 | 54,529 |
| 2011 | 54,529 |
| 2012 | 54,529 |
| 2013 | 54,529 |
| 2014 | 54,529 |
| 2015 | 54,529 |
| 2016 | 54,529 |
| 2017 | 54,529 |
| Total estimated reductions (tonnes of CO ₂ e) | 545,290 |
| Total number of crediting years | 10 |
| Annual average over the crediting period of estimated reductions (tonnes of CO ₂ e) | 54,529 |

A.4.5. Public funding of the project activity:

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There is no ODA financing involved in the Project.

**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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The approved consolidated baseline and monitoring methodology **ACM0002 Version 6.0** (19 May 2006) has been used. The titles of these baseline and monitoring methodologies are “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” and “Consolidated monitoring methodology for grid-connected electricity generation from renewable sources.”

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

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The Project is wind based renewable energy source, zero emission power project connected to the Rajasthan state grid, which forms part of the Northern regional electricity grid. The Project will displace fossil fuel based electricity generation that would have otherwise been provided by the operation and expansion of the fossil fuel based power plants in Northern regional electricity grid.

The approved consolidated baseline and monitoring methodology ACM0002 Version 6 is the choice of the baseline and monitoring methodology and it is applicable because:

- the Project is grid connected renewable power generation project activity
- the Project represents electricity capacity additions from wind sources
- the Project does not involve switching from fossil fuel to renewable energy at the site of project activity since the Project is green-field electricity generation capacities from wind sources at sites where there was no electricity generation source prior to the Project, and
- the geographical and system boundaries of the Northern electricity grid can be clearly identified and information on the characteristics of the grid is available.

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

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The project boundary encompasses the physical, geographical site of the Project sited at the Project Location. It would include the wind turbine installations and sub-station up to the Metering Point.

According to ACM0002, for the baseline emission factor, the spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

The Indian electricity system is divided into five regional grids, viz. Northern, Eastern, Western, Southern, and North-Eastern. Each grid covers several states. As the regional grids are interconnected, there is inter-state and inter-regional exchange. A small power exchange also takes place with neighbouring countries like Bhutan and Nepal.

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 in a regional grid meets its demand with its 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. The regional grid thus represents the largest electricity grid where power plants can be dispatched without significant constraints and thus, represents the “project electricity system” for the Project. As the Project is connected to the Northern regional electricity grid, the Northern grid is the “project electricity system”.

Grid connected captive power plants have not been included because adequate detail of data (for example, fuel consumption) is not available. In addition, data on certain utility power plants was not available and these were excluded from the project electricity system. Even though data on individual renewable energy projects is not available, they have been included using appropriate assumptions.

| | Source | Gas | Included? | Justification/ Explanation |
|-------------------------|---|------------------|-----------|--|
| Baseline | Electricity generation from power plants connected to the Northern Grid | CO ₂ | Included | Main emission source |
| | | CH ₄ | Excluded | This source is not required to be estimated for wind energy projects under ACM0002 |
| | | N ₂ O | Excluded | This source is not required to be estimated for wind energy projects under ACM0002 |
| Project Activity | Electricity generation from the Project | CO ₂ | Excluded | Wind energy generation does not have any direct GHG emissions. |
| | | CH ₄ | Excluded | |
| | | N ₂ O | Excluded | |

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

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According to ACM0002, for project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following:

Electricity delivered to the grid by the project 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 described below.

As the Project does not modify or retrofit an existing generation facility, the baseline scenario is the emissions generated by the operation of grid-connected power plants and by the addition of new generation sources. This is estimated using calculation of Combined Margin multiplied by electricity delivered to the grid by the Project.

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): >>

Step 0: Preliminary screening based on the starting date of the project activity



If project participants wish to have the crediting period starting prior to the registration of their project activity, they shall:

- a) Provide evidence that the starting date of the CDM project activity falls between 1 January 2000 and the date of the registration of a first CDM project activity, bearing in mind that only CDM project activities submitted for registration before 31 December 2005 may claim for a crediting period starting before the date of registration.
- b) Provide evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. This evidence shall be based on (preferably official, legal and/or other corporate) documentation that was available at, or prior to, the start of the project activity.

The Project start date is prior to the date of validation of the PDD. The following evidence will be made available to the validator to demonstrate that CDM benefits were considered while considering investments in these projects:

- The Management Committee of Enercon set out the CDM initiative in 2000 and since then monitored the progress of the CDM initiative. Enercon management had taken a decision to go ahead with the development of the wind farm in Rajasthan in 2002, after duly considering CDM benefits under the Kyoto Protocol.
- In late 2001, Government of Netherlands came out with the CERUPT Tender. Enercon participated in CERUPT tender by offering 15 MW + 15 MW wind farm projects and was selected under the tender. Enercon was not able to conclude the contract with CERUPT and the 15 MW + 15 MW projects were subsequently cancelled. However, this provided Enercon with a considerable experience in the CDM process.
- Enercon appraised its customers in Rajasthan about the CDM benefits.
- The loan documentation of Enercon Windfarm (Rajasthan) Ltd, one of the sub-projects in this PDD, contains provision of sharing of CDM benefits.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a. Define alternatives to the project activity:

1. Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. These alternatives are to include:

- The proposed project activity not undertaken as a CDM project activity;
- All other plausible and credible alternatives to the project activity that deliver outputs and on services (e.g. electricity, heat or cement) with comparable quality, properties and application areas;
- If applicable, continuation of the current situation (no project activity or other alternatives undertaken).

Alternative(s) available to the project participants or similar project developers include:

- (a) The Project is not undertaken as a CDM project activity.
- (b) Setting up of comparable utility scale fossil fuel fired or hydro power projects that supply to the Rajasthan grid under a PPA.



- (c) Continuation of the current situation where no project activity or any of the above Alternatives are undertaken would not be applicable as Rajasthan had energy (MU) shortages of 3.5% and peak (MW) shortages of 13.7% in 2005-06 (Source: Northern Region Power Sector Profile, July 2006, Ministry of Power).

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

2. The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. This sub-step does not consider national and local policies that do not have legally-binding status.
3. If an alternative does not comply with all applicable legislation and regulations, then show that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread in the country. If this cannot be shown, then eliminate the alternative from further consideration.
4. If the proposed project activity is the only alternative amongst the ones considered by the project participants that is in compliance with all regulations with which there is general compliance, then the proposed CDM project activity is not additional.

There are no legal and regulatory requirements that prevent Alternatives (a) and (b) from occurring.

Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both steps 2 and 3.)

Step 2: Investment Analysis

Determine whether the proposed project activity is the economically or financially less attractive than other alternatives without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. - Determine appropriate analysis method

1. Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b). If the CDM project activity generates no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).

Sub-step 2b. – Option I. Apply simple cost analysis

2. Document the costs associated with the CDM project activity and demonstrate that the activity produces no economic benefits other than CDM related income.

Sub-step 2b. – Option II. Apply investment comparison analysis

3. Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in \$/kWh or levelized cost of delivered heat in \$/GJ) most suitable for the project type and decision-making context.

Sub-step 2b. – Option III. Apply benchmark analysis

4. Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in \$/kWh or levelized cost of delivered heat in \$/GJ) most suitable for the project type and decision context.



Option I – Simple cost analysis is not applicable as the project activity sells electricity to the grid and obtains economic benefits in the form of electricity tariffs.

Enercon proposes to use **Option II – Investment comparison analysis** and the financial indicator that is identified is the post-tax return on equity or the equity IRR.

The post tax return on equity and equity IRR is used as the appropriate financial indicator because in the Indian power sector, a 14% post tax return on equity is an established benchmark for projects in public or private sector based on cost-plus regulations (Source: Central Electricity Regulatory Commission, Terms and Conditions of Tariff, Regulations 2004 dated 26 March 2004) for utility scale power plants (similar to Alternative (b)). Incentives, foreign exchange variations and efficiency in operations are in addition to this benchmark of 14%.

For determining the tariffs for wind power projects, the electricity regulatory commissions of the state of Rajasthan and Gujarat have considered the return on equity at 14% while the electricity regulatory commissions of the state of Madhya Pradesh, Maharashtra and Karnataka have considered the return on equity at 16%. (Source: RERC Order dated 29 September 2006).

There are some essential differences between the Project (whether implemented with or without CDM revenues) and the Alternatives identified in Sub-step 1(b) (utility scale fossil fuel and hydro projects). These should be taken into account while setting the appropriate level of equity IRR.

- The project activity tariff structure is a single-part tariff structure as compared to utility scale fossil fuel and hydro projects, which have two-part tariff structure. This implies that project activity carries a higher investment risk than the utility scale fossil fuel and hydro projects (Alternative (b)) where the investment recovery is decoupled from the level of actual generation achieved by the project due to variations in offtake.

Thus, in case of the project activity, issues such as transmission unavailability, back-down of generation or part-load operations, which are beyond the control of the investors are likely to affect the project activity more severely and therefore the project activity investors would require higher rate of return to compensate them for these additional risks.

- In case of utility scale fossil fuel and hydro projects (Alternative (b)), these are by reference to cost-plus approach whereby the projects recover their full investment cost each year if they are able to reach specified level of plant availability. In case of the Project, it does not recover its full investment cost in the initial years as the tariffs are back-loaded. This increases the investment risks in the project activity compared to the alternatives.

Based on the above considerations, 16% post-tax equity IRR is considered to be the appropriate post-tax equity return. If the Project has a post-tax equity IRR of less than 16%, then it can be considered to be additional.

Sub-step 2c. Calculation and comparison of financial indicators (only applicable to options II and III):

5. Calculate the suitable financial indicator for the proposed CDM project activity and, in the case of Option II above, for the other alternatives. Include all relevant costs (including, for example, the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but including subsidies/fiscal incentives where applicable), and, as appropriate, non-market cost and benefits in the case of public investors.



6. Present the investment analysis in a transparent manner and provide all the relevant assumptions in the CDM-PDD, so that a reader can reproduce the analysis and obtain the same results. Clearly present critical techno-economic parameters and assumptions (such as capital costs, fuel prices, lifetimes, and discount rate or cost of capital). Justify and/or cite assumptions in a manner that can be validated by the DOE. In calculating the financial indicator, the project's risks can be included through the cash flow pattern, subject to project-specific expectations and assumptions (e.g. insurance premiums can be used in the calculation to reflect specific risk equivalents).
7. Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated.
8. Present in the CDM-PDD submitted for validation a clear comparison of the financial indicator for the proposed CDM activity and:
 - (a) The alternatives, if Option II (investment comparison analysis) is used. If one of the other alternatives has the best indicator (e.g. highest IRR), then the CDM project activity can not be considered as the most financially attractive;
 - (b) The financial benchmark, if Option III (benchmark analysis) is used. If the CDM project activity has a less favourable indicator (e.g. lower IRR) than the benchmark, then the CDM project activity cannot be considered as financially attractive.

The key assumptions used for calculating the benchmark (post-tax equity IRR) are set out below. These details are taken for Enercon Wind Farm (Rajasthan) Ltd.:

| | |
|---------------------------------------|----------|
| Capacity of Machines in kW | 800 |
| Number of Machines | 30 |
| Project Capacity in MW | 24.00 |
| Project Commissioning Date | 1-Apr-05 |
| Project Cost per MW (Rs. In Millions) | 48.4 |

| | |
|--|--------|
| Operations | |
| Plant Load Factor - 1st to 5th year | 22.00% |
| Plant Load Factor - 6th to 9th year | 21.73% |
| Plant Load Factor - 10th to 13th year | 21.45% |
| Plant Load Factor - 14th to 17th year | 21.18% |
| Plant Load Factor - 18th to 20th year | 20.90% |
| Insurance Charges @ % of capital cost | 0.18% |
| Operation & Maintenance Cost base year @ % of capital cost | 1.25% |
| % of escalation per annum on O & M Charges | 5.0% |

| | |
|---|------|
| Tariff | |
| Base year Tariff (2003-04) - Rs./Kwh | 3.32 |
| Annual Escalation (Rs./kWh per Year) | 0.06 |
| Tariff applicable from 2013-14 onwards (Rs/kWh) | 3.92 |



CDM – Executive Board

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| | |
|---|------------|
| Project Cost | Rs Million |
| Land and Infrastructure, Generator & Electrical Equipments, Mechanical Equipments, Civil Works, Instrumentation & Control, Other Project Cost, Pre operative Expenses, etc. | |
| Total Project Cost | 1,163 |

| | | |
|------------------|-------|------------|
| Means of Finance | | Rs Million |
| Own Source | 30% | 349 |
| Term Loan | 70% | 814 |
| Total Source | | 1,163 |
| Terms of Loan | | |
| Interest Rate | 8.50% | |
| Tenure | 10 | Years |
| Moratorium | 6 | Months |

| | |
|---|-------|
| Income Tax Depreciation Rate (Written Down Value basis) | |
| on Wind Energy Generators | 80% |
| On other Assets | 10% |
| Book Depreciation Rate (Straight Line Method basis) | |
| On all assets | 7.86% |
| Book Depreciation up to (% of asset value) | 90% |

| | |
|-----------------------|-----|
| Income Tax | |
| Income Tax rate | 30% |
| Minimum Alternate Tax | 10% |
| Surcharge | 10% |
| Cess | 2% |

| | |
|-------------------------------|-----|
| Working capital | |
| Receivables (no of days) | 45 |
| O & m expenses (no of days) | 30 |
| Working capital interest rate | 12% |

| | |
|-------------------------|-------|
| CER Revenues | |
| CER Price in US\$ | - |
| Exchange rate Rs./US\$* | 45.34 |

* RBI reference rate as of 15 November 2006

| | |
|-------------------------|----------|
| Crediting period starts | 1-Apr-07 |
|-------------------------|----------|



| | |
|----------------------------|----|
| Length of Crediting period | 10 |
|----------------------------|----|

| | |
|--|--------|
| Baseline Emission Factor for Northern Region (tCO ₂ /GWh) | 924.96 |
|--|--------|

The equity IRR for the Project without CDM revenues is 11.6% and with CDM revenues is 13.1%.

Sub-step 2d. Sensitivity analysis (only applicable to options II and III):

9. Include a sensitivity analysis that shows whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favor of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive (as per step 2c para 8a) or is unlikely to be financially attractive (as per step 2c para 8b).

Sensitivity analysis of the Equity IRR to the Plant Load Factor (the most critical assumption) has been carried out considering a plant load factor of 20% (plant load factor as observed in recent past for other Enercon projects) and 23.97% (highest plant load factor achieved according to RERC, in its Order dated 29 September 2006). Plant Load Factor is the key variable encompassing variation in wind profile, variation in off-take (including grid availability) including machine downtime. The post tax Equity IRRs at the stated PLFs are as follows:

| | PLF at 20% | PLF at 23.97% |
|--|------------|---------------|
| Post tax Equity IRR without CER revenues | 8.7% | 14.5% |
| Post tax Equity IRR with CER revenues | 10.0% | 16.1% |

As can be seen from above, the Project is not the most financially attractive (as per step 2c para 8a) we proceed to Step 4 (Common practice analysis).

Step 4. Common practice analysis

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

1. Provide an analysis of any other activities implemented previously or currently underway that are similar to the proposed project activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities are not to be included in this analysis. Provide quantitative information where relevant.

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

2. If similar activities are widely observed and commonly carried out, it calls into question the claim that the proposed project activity is financially unattractive (as contended in Step 2) or faces barriers



(as contended in Step 3). Therefore, if similar activities are identified above, then it is necessary to demonstrate why the existence of these activities does not contradict the claim that the proposed project activity is financially unattractive or subject to barriers. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them that explain why the similar activities enjoyed certain benefits that rendered it financially attractive (e.g., subsidies or other financial flows) or did not face the barriers to which the proposed project activity is subject.

- Essential distinctions may include a serious change in circumstances under which the proposed CDM project activity will be implemented when compared to circumstances under which similar projects were carried out. For example, new barriers may have arisen, or promotional policies may have ended, leading to a situation in which the proposed CDM project activity would not be implemented without the incentive provided by the CDM. The change must be fundamental and verifiable.

We analyze the extent to which wind energy projects have diffused in the electricity sector in Rajasthan. In 2005 – 06, electricity generation from wind sources was 417 GWh which is expected to increase to 512 GWh in 2006 – 07. This works out to 1.35% of total generation available to the state of Rajasthan in 2005 – 06 and 1.66% of total expected generation available to the state of Rajasthan in 2006 – 07. Clearly, electricity generation from wind is not a common practice in Rajasthan.

We analyze the wind energy projects in Rajasthan that have come under different policy regimes and in different years. Briefly, the various policies have progressively decreased the electricity tariffs payable by the offtaker (RRVPN/Discoms) and have progressively passed on burden of providing or paying for transmission facilities. Below is the electricity tariff payable under different policies:

| Electricity tariff (Rs/kWh) | 1999-00 | 2000-01 | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 2007-08 |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1999 Policy | 2.89 | 3.03 | 3.18 | 3.34 | 3.51 | 3.69 | 3.87 | 4.06 | 4.27 |
| 2000 Policy | | 3.03 | 3.18 | 3.34 | 3.51 | 3.68 | 3.87 | 4.06 | 4.26 |
| 2003 Policy | | | | | 3.32 | 3.39 | 3.45 | 3.52 | 3.59 |
| 2004 Policy (Original) | | | | | | 2.91 | 2.96 | 3.01 | 3.06 |
| 2004 Policy (Amended) | | | | | | | 3.25 | 3.31 | 3.37 |

Out of the 279 MW installed up to 31 March 2005, the wind power projects under various policies of Government of Rajasthan are set out below:

Policy 1999 (effective 11th March 1999): 4.25 MW

Policy 2000 (effective 4th Feb 2000): 82.23 MW

Policy 2003 (effective 30th April 2003): 174.29 MW

Policy 2004 (effective 25th October 2004): 18.85 MW

Based on the commissioning dates of the wind projects in the CDM pipeline (on the cdm.unfccc.int website), we estimate that the following capacities are being developed or have been developed as CDM project activities (including this Project):

- Policy 2000: 28.16 MW
- Policy 2003: 79.45 MW + 30.59 MW (this Project) = 110.04 MW
- Policy 2004: 15.75 MW



Clearly, wind power project development in Rajasthan is insignificant when compared to the power sector of Rajasthan. Further, wind power project development is substantially dependent on CDM mechanism and thus is not common practice.

Sub-steps 4a and 4b are satisfied.

Step 5. Impact of CDM registration

Explain how the approval and registration of the project activity as a CDM activity, and the attendant benefits and incentives derived from the project activity, will alleviate the economic and financial hurdles (Step 2) or other identified barriers (Step 3) and thus enable the project activity to be undertaken.

Registering the project activity as a CDM activity provides a significant amount of revenue, improving the project’s cash flow and improving the equity IRR by 1.5%. The revenues from sale of the Certified Emission Reductions would enhance the viability of the project and would partially offset the risks associated with the possible changes in policy, wind regime, project implementation risks (time and cost overruns), etc. Further, CER revenues will be high quality cash flows coming from creditworthy parties and denominated in foreign currency. The CDM revenues will attract new players to wind investments in Rajasthan, as they provide compensation for the regulatory and project risks implicit in the wind power projects.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

According to the approved baseline methodology ACM0002, the emission reductions **ER_y** by the project activity during a given year “y¹” is

$ER_y = BE_y - PE_y - Ly \dots \dots \dots (1)$

where **EG_y** is the electricity supplied to the grid, **EF_y** is the CO₂ emission factor of the grid and **L_y** is the amount of emissions leakage resulting from the project activity.

Baseline Emissions for the amount of electricity supplied by project activity, **BE_y** is calculated as

$BE_y = EG_y * EF_y \dots \dots \dots (2)$

where **EG_y** is the electricity supplied to the grid, **EF_y** is the CO₂ emission factor of the grid as calculated below.

The emission factor **EF_y** of the grid is represented as a combination of the Operating Margin (OM) and the Build Margin (BM). Considering the emission factors for these two margins as **EF_{OM,y}** and **EF_{BM,y}**, then the **EF_y** is given by:

¹ Throughout the document, the suffix *y* denotes that such parameter is a function of the year *y*, thus to be monitored at least annually.



$$EF_y = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y} \dots \dots \dots (2)$$

with respective weight factors w_{OM} and w_{BM} (where $w_{OM} + w_{BM} = 1$).

The Operating Margin emission factor

As per ACM0002, dispatch data analysis should be the first methodological choice. However, this option is not selected because the information required to calculate OM based on dispatch data is not available in the public domain for the Northern electricity regional grid.

The Simple Operating Margin approach has been used to calculate the Operating Margin emission factor applicable in this case. As per ACM 0002 the Simple OM method can only be used where low cost must run resources constitute less than 50% of grid generation based on average of the five most recent years. The generation profile of the Northern grid in the last five years is as follows:

| Generation in GWh | 2004-05 | 2003-04 | 2002-03 | 2001-02 | 2000-01 |
|----------------------------------|----------------|----------------|----------------|----------------|----------------|
| Low cost/must run sources | | | | | |
| Hydro | 36,128 | 38,279 | 30,335 | 29,129 | 29,020 |
| Wind | 332 | 15 | 25 | 19 | 6 |
| Nuclear | 7,503 | 7,380 | 8,800 | 8,158 | 6,669 |
| Other sources | | | | | |
| Coal | 106,156 | 103,232 | 100,362 | 96,882 | 92,417 |
| Diesel | - | - | - | 24 | - |
| Gas | 19,991 | 18,758 | 17,262 | 17,634 | 16,863 |
| Total Generation | 170,109 | 167,663 | 156,785 | 151,845 | 144,975 |
| Low cost/must run sources | 43,962 | 45,674 | 39,160 | 37,305 | 35,695 |
| Low cost/must run sources | 26% | 27% | 25% | 25% | 25% |

Source: Table 3.4 of CEA General Review 2004-05, 2003-04, 2002-03, 2001-02, 2000-01

From the available information it is clear that low cost/must run sources account for less than 50% of the total generation in the Northern grid in the last five years. Hence the Simple OM method has been used to calculate the Operating Margin Emission factor applicable.

Simple OM Method: The Simple OM emission factor $EF_{OM,y}$ is calculated as the generation-weighted average emissions per electricity unit generated (tCO₂/MWh) for all sources serving the Northern regional grid, excluding zero- or low-operating cost power plants (hydro, wind and nuclear), using the following equation:

$$EF_{OM,y} = [\sum_{i,j} Fi,j,y * COEFi,j] / [\sum_j GENj,y] \dots \dots \dots (3)$$

where Fi,j,y and $COEFi,j$ are the fuel consumption and associated carbon coefficient of the fossil fuel i consumed by power plant j in the grid in year(s) y . $GENj,y$ is the electricity generation by power plant j connected to the grid excluding zero- or low-operating cost sources in year(s) y .



As per ACM0002, the OM emission factor can be calculated using *ex ante* generation-weighted average of the most recent 3 years for which data is available or using *ex post* generation data in the year in which the project generation occurs. The OM emission factor is calculated using *ex ante* generation-weighted average of the most recent 3 years and hence does not require yearly monitoring of the OM emission factor.

For the purpose of determining the emission factor(s) for net electricity imports from a connected electricity system within India, the following option has been used “(c) the average emission rate of the exporting grid, if and only if net imports do not exceed 20% of total generation in the project electricity system”. This has been done because the net imports to the Northern Grid from the connected electricity system (Western, Eastern, North - Eastern and Southern regional electricity grids) do not exceed 20% and it is not appropriate to use emissions of specific plants as it is not possible to identify specific plants from which these imports take place.

The CO₂ emission coefficient $COEF_{ij}$ is obtained as:

$$COEF_{ij} = NCV_{ij} * EFCO_{2,i} * OXID_i \dots \dots \dots (4)$$

where:

NCV_{ij} is the net calorific value (energy content) per mass or volume unit of a fuel i ,

$OXID_i$ is the oxidation factor of the fuel,

$EFCO_{2,i}$ is the CO₂ emission factor per unit of energy of the fuel i .

Build Margin Emission Factor

The Build Margin emission factor $EF_{BM,y}$ (tCO₂/GWh) is given as the generation-weighted average emission factor of the selected representative set of recent power plants represented by the 5 most recent plants or the most recent 20% of the generating units built (summation is over such plants specified by k):

$$EF_{BM,y} = [\sum_i F_{i,m,y} * COEF_i] / [\sum_k GEN_{k,m,y}] \dots \dots \dots (5)$$

The summation over i and k is for the fuels and electricity generation of the plants in sample m mentioned above.

The choice of method for the sample plant is the most recent 20% of the generating units built as this represents a significantly larger set of plants for a large regional electricity grid have a large number of power plants connected to it and is therefore appropriate. The calculation of the net generation for 5 most recent built and for the most recent 20% of the generation units built is shown in the calculation of Build Margin in Annex – 3.

The Build Margin is calculated on *ex ante* based on the most recent information available on power plants already built for sample group m at the time of the PDD preparation.

Combined Margin Emission Factor



As already mentioned, baseline emission factor (EF_y) of the grid is calculated as a combined margin (CM), calculated as the weighted average of the operating margin (OM) and build margin (BM) factor. In case of wind power projects default weights of 0.75 for EF_{OM} and 0.25 for EF_{BM} are applicable as per ACM0002. No alternate weights are proposed.

Using the above mentioned formulas for calculation of operating margin and build margin emission factors and their respective weights for calculation of combined margin emission factor, the baseline carbon emission factor (CM) is 924.96 tCO₂e/GWh or 0.92496 tCO₂e/MWh.

Project Emissions:

The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.

$$PE_y = 0$$

Leakage:

Emissions Leakage on account of the project activity is ignored in accordance with ACM0002.

$$L_y = 0$$

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

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| | | | | |
|---|--|---------|---------|---------|
| Data / Parameter: | Net Calorific Value of Coal, Furnace Oil, HSD, Light Oil, LSHS, Lignite | | | |
| Data unit: | Terra Joules per 10 ³ tons | | | |
| Description: | The Net Calorific Value has been used for calculating the emission coefficients of fuels. | | | |
| Source of data used: | Data published in Table 1.3 of Central Electricity Authority (CEA) General Review of Power Sector for 2004-05, 2003-04 and 2002-03 has been used for all fuels except for HSD. Calorific value of HSD is taken from data published by CEA on petroleum fuels used by GT and Diesel power plants in India in 2003-04. | | | |
| Value applied: | | 2002-03 | 2003-04 | 2004-05 |
| | Coal | 17.46 | 15.99 | 15.72 |
| | Furnace oil | 44.91 | 43.40 | 43.68 |
| | Light oil | 40.86 | 42.65 | 43.00 |
| | LSHS/HHS/HS D | 44.06 | 43.13 | 43.64 |
| | Lignite | 11.25 | 11.46 | 11.40 |
| | HSD | 42.71 | 42.71 | 42.71 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | As per ACM0002, wherever available, country specific Net Calorific Values should be used for calculation. Accordingly the Net Calorific Value data published by the Central Electricity Authority, Ministry of Power, Govt. of India has been used. HSD Calorific values are not published in the CEA General Review, hence the value as per CEA data on petroleum fuels used by GT and Diesel power plants in India in 2003-04 was used. This publication is only available for 2003-04 hence the 2003-04 Calorific value has been used for all three years i.e. 2002-03, 2003-04 and 2004-05. | | | |
| Any comment: | | | | |



| | | | | |
|---|---|---------|---------|---------|
| Data / Parameter: | Net Calorific Value of Naphtha, Natural Gas | | | |
| Data unit: | Terra Joules per M.cum | | | |
| Description: | The Net Calorific Value has been used for calculating the emission coefficients of Naphtha and Natural Gas. | | | |
| Source of data used: | Data published by CEA on petroleum fuels used by GT and Diesel power plants in India in 2003-04. | | | |
| Value applied: | | 2002-03 | 2003-04 | 2004-05 |
| | Natural Gas | 34.12 | 34.12 | 34.12 |
| | Naphtha | 46.89 | 46.89 | 46.89 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | HSD Calorific values are not published in the CEA General Review, hence the value as per CEA data on petroleum fuels used by GT and Diesel power plants in India in 2003-04 was used. This publication is only available for 2003-04 hence the 2003-04 Calorific value has been used for all three years i.e. 2002-03, 2003-04 and 2004-05. | | | |
| Any comment: | | | | |

| | | |
|---|--|-------|
| Data / Parameter: | Carbon Emission Factor | |
| Data unit: | Tonnes Carbon per Terra Joule | |
| Description: | Carbon Emission Factor has been used for calculating the emission coefficients of different fuel types | |
| Source of data used: | In case of Coal and Lignite, Carbon Emission Factor as per India's first National Communication to the UNFCCC has been used. For all other fuels, default values as per table 1-4 of Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook has been used. | |
| Value applied: | | |
| | Coal | 26.13 |
| | Furnace oil | 21.10 |
| | Light oil | 20.00 |
| | LSHS/HHS/HSD | 20.20 |
| | Lignite | 28.95 |
| | Natural Gas | 15.30 |
| | Naphtha | 20.00 |
| | HSD | 20.20 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | As per ACM0002, wherever available, country specific values of Carbon Emission Factors should be used for calculation. Accordingly the Emission Factors data as per India's first National Communication to UNFCCC has been used in case of Coal and Lignite. Country specific Emission Factors for other fuel types are not available. Hence default values as per the IPCC Guidelines have been used. | |
| Any comment: | | |

| | |
|--------------------------|---|
| Data / Parameter: | Oxidation Factor |
| Data unit: | Fraction of Carbon oxidised |
| Description: | Oxidation Factor has been used for calculating the emission coefficients of different |



| | | | | | | | | | | | | | | | | | | |
|---|---|--|------|------|-------------|------|-----------|------|----------|------|---------|------|-------------|------|---------|------|-----|------|
| | fuel types | | | | | | | | | | | | | | | | | |
| Source of data used: | Default values obtained from Table 1-6 of Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook | | | | | | | | | | | | | | | | | |
| Value applied: | <table border="1"> <tr> <td>Coal</td> <td>0.98</td> </tr> <tr> <td>Furnace oil</td> <td>0.99</td> </tr> <tr> <td>Light oil</td> <td>0.99</td> </tr> <tr> <td>LSHS/HHS</td> <td>0.99</td> </tr> <tr> <td>Lignite</td> <td>0.98</td> </tr> <tr> <td>Natural Gas</td> <td>1.00</td> </tr> <tr> <td>Naphtha</td> <td>0.99</td> </tr> <tr> <td>HSD</td> <td>0.99</td> </tr> </table> | | Coal | 0.98 | Furnace oil | 0.99 | Light oil | 0.99 | LSHS/HHS | 0.99 | Lignite | 0.98 | Natural Gas | 1.00 | Naphtha | 0.99 | HSD | 0.99 |
| Coal | 0.98 | | | | | | | | | | | | | | | | | |
| Furnace oil | 0.99 | | | | | | | | | | | | | | | | | |
| Light oil | 0.99 | | | | | | | | | | | | | | | | | |
| LSHS/HHS | 0.99 | | | | | | | | | | | | | | | | | |
| Lignite | 0.98 | | | | | | | | | | | | | | | | | |
| Natural Gas | 1.00 | | | | | | | | | | | | | | | | | |
| Naphtha | 0.99 | | | | | | | | | | | | | | | | | |
| HSD | 0.99 | | | | | | | | | | | | | | | | | |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Only IPCC default values are available. | | | | | | | | | | | | | | | | | |
| Any comment: | | | | | | | | | | | | | | | | | | |

| Data / Parameter: | Fuel Density | | | | | | | | | | | | | | | | | | | |
|---|---|--|------|-----------------|------|------|-------------|------|-----------|------|------|------|---------|------|-------------|------|-----|------|---------|------|
| Data unit: | Kgs per Ltr or Kgs per Cu.m | | | | | | | | | | | | | | | | | | | |
| Description: | Fuel density of various fuels has been used for calculating the emissions of the respective fuel types | | | | | | | | | | | | | | | | | | | |
| Source of data used: | | | | | | | | | | | | | | | | | | | | |
| Value applied: | <table border="1"> <thead> <tr> <th>Fuel</th> <th>Density (kg/Lt)</th> </tr> </thead> <tbody> <tr> <td>Coal</td> <td>1.00</td> </tr> <tr> <td>Furnace oil</td> <td>0.93</td> </tr> <tr> <td>Light oil</td> <td>0.83</td> </tr> <tr> <td>LSHS</td> <td>0.83</td> </tr> <tr> <td>Lignite</td> <td>1.00</td> </tr> <tr> <td>Natural Gas</td> <td>1.00</td> </tr> <tr> <td>HSD</td> <td>0.83</td> </tr> <tr> <td>Naphtha</td> <td>0.76</td> </tr> </tbody> </table> | | Fuel | Density (kg/Lt) | Coal | 1.00 | Furnace oil | 0.93 | Light oil | 0.83 | LSHS | 0.83 | Lignite | 1.00 | Natural Gas | 1.00 | HSD | 0.83 | Naphtha | 0.76 |
| Fuel | Density (kg/Lt) | | | | | | | | | | | | | | | | | | | |
| Coal | 1.00 | | | | | | | | | | | | | | | | | | | |
| Furnace oil | 0.93 | | | | | | | | | | | | | | | | | | | |
| Light oil | 0.83 | | | | | | | | | | | | | | | | | | | |
| LSHS | 0.83 | | | | | | | | | | | | | | | | | | | |
| Lignite | 1.00 | | | | | | | | | | | | | | | | | | | |
| Natural Gas | 1.00 | | | | | | | | | | | | | | | | | | | |
| HSD | 0.83 | | | | | | | | | | | | | | | | | | | |
| Naphtha | 0.76 | | | | | | | | | | | | | | | | | | | |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Only IPCC default values are available | | | | | | | | | | | | | | | | | | | |
| Any comment: | | | | | | | | | | | | | | | | | | | | |

| | |
|--------------------------|---|
| Data / Parameter: | Fuel consumption by Northern grid generating sources in 2004-05, 2003-04 and 2002-03 |
| Data unit: | '000' MT, KL, M Cu M |
| Description: | Fuel consumption by generating sources have been used to calculate the total emissions from electricity generation in the Northern grid during 2004-05, 2003-04 and 2002-03 |
| Source of data used: | Table 6.1 CEA General Review of Power Sector 2004-05, 2003-04 and 2002-03 |



| | | | | | |
|----------------|---|---|----------------|----------------|----------------|
| Value applied: | Fuel | Units | 2002-03 | 2003-04 | 2004-05 |
| | Steam stations | | | | |
| | Coal | '000' MT | 68,594 | 70,085 | 72,943 |
| | Furnace oil | KL | 57,666 | 43,377 | 26,071 |
| | Light oil | KL | 60,211 | 254,855 | 94,208 |
| | LSHS/HHS | KL | 32,761 | 2,377 | 3,126 |
| | Lignite | '000' MT | - | - | - |
| | Gas Stations | | | | |
| | Natural Gas | M Cu M | 3,953 | 3,808 | 4,058 |
| | HSD | KL | 401,257 | 240,593 | 275,047 |
| | Naphtha | KL | - | 188,981 | 243,961 |
| | Justification of the choice of data or description of measurement methods and procedures actually applied : | The data source, i.e. Central Electricity Authority is a Government of India organisation, which is mandated to publish such information under section 73 (i) and 73(j) of the Indian Electricity Act 2003. | | | |
| Any comment: | | | | | |

| | | | | |
|---|---|---------|---------|---------|
| Data / Parameter: | Imports from other regional grids into the Northern grid in 2002-03, 2003-04 and 2004-05 | | | |
| Data unit: | GWh | | | |
| Description: | Electricity imports from other regional grids are used as an input into the calculation of operating margin. | | | |
| Source of data used: | Table 5.8 of CEA General Review of Power Sector for 2002-03, 2003-04 and 2004-05 | | | |
| Value applied: | Net generation in GWh | 2004-05 | 2003-04 | 2002-03 |
| | Western Region | 374 | 175 | 43 |
| | Eastern Region | 3,043 | 125 | 827 |
| | Southern Region | 120 | | |
| | North-eastern Region | 172 | | |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The data source, i.e. Central Electricity Authority is a Government of India organisation, which is mandated to publish such information under section 73 (i) and 73(j) of the Indian Electricity Act 2003. | | | |
| Any comment: | | | | |

| | | | |
|--------------------------|---|--|--|
| Data / Parameter: | Average emission rate of regional grids in 2002-03, 2003-04 and 2004-05 | | |
| Data unit: | tCO ₂ e/GWh | | |
| Description: | Average emission rate of regional grids is used for calculating the emissions related to import of electricity from other regional grids into the Northern grid, which is used as an input for calculation of operating margin. | | |



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| | |
|---|--|
| Source of data used: | Fuel Consumption: Table 6.1, CEA General Review for 2004-05, 2003-04 and 2002-03 Gross Electricity Generation: Table 3.4, CEA General Review for 2004-05, 2003-04 and 2002-03 Net Electricity Generation: Table 5.5, CEA General Review for 2004-05, 2003-04 and 2002-03 |
| Value applied: | Refer Annex – 3 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The data source, i.e. Central Electricity Authority is a Government of India organisation, which is mandated to publish such information under section 73 (i) and 73(j) of the Indian Electricity Act 2003. |
| Any comment: | |

| Data / Parameter: | Net electricity generation by fossil fuel fired power plants in the Northern grid in 2002-03, 2003-04 and 2004-05 | | | | | | | | | | | | |
|---|---|-----------------------|-------|-----|---------|--------|--------|---------|--------|--------|---------|--------|--------|
| Data unit: | GWh | | | | | | | | | | | | |
| Description: | Net electricity generation by fossil fuel fired power plants in the Northern grid has been used to calculate the average emission intensity of electricity generated in the Northern grid. This data is used as an input in the Operating margin emission factor calculation. | | | | | | | | | | | | |
| Source of data used: | Table 3.4 of CEA General Review of Power Sector for 2002-03, 2003-04 and 2004-05 | | | | | | | | | | | | |
| Value applied: | <table border="1"> <thead> <tr> <th>Net generation in GWh</th> <th>Steam</th> <th>Gas</th> </tr> </thead> <tbody> <tr> <td>2004-05</td> <td>96,404</td> <td>19,516</td> </tr> <tr> <td>2003-04</td> <td>94,041</td> <td>18,328</td> </tr> <tr> <td>2002-03</td> <td>91,523</td> <td>16,852</td> </tr> </tbody> </table> | Net generation in GWh | Steam | Gas | 2004-05 | 96,404 | 19,516 | 2003-04 | 94,041 | 18,328 | 2002-03 | 91,523 | 16,852 |
| Net generation in GWh | Steam | Gas | | | | | | | | | | | |
| 2004-05 | 96,404 | 19,516 | | | | | | | | | | | |
| 2003-04 | 94,041 | 18,328 | | | | | | | | | | | |
| 2002-03 | 91,523 | 16,852 | | | | | | | | | | | |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The data source, i.e. Central Electricity Authority is a Government of India organisation, which is mandated to publish such information under section 73 (i) and 73(j) of the Indian Electricity Act 2003. | | | | | | | | | | | | |
| Any comment: | | | | | | | | | | | | | |

| | |
|---|---|
| Data / Parameter: | Sample group of power plants added to the Northern grid in recent times, |
| Data unit: | MW, GWh |
| Description: | The sample group of new additions to the Northern grid comprising 20% of the grid's net generation during 2004-05 have been used for calculating the build margin emission factor |
| Source of data used: | Table 2.8 of CEA General Review of Power Sector for 2004-05, 2003-04, 2002-03, 2001-02, 2000-01, 1999-00, 1998-99, 1997-98, 1996-97 and 1995-96 |
| Value applied: | Refer Annex – 3 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The data source, i.e. Central Electricity Authority is a Government of India organisation, which is mandated to publish such information under section 73 (i) and 73(j) of the Indian Electricity Act 2003. |
| Any comment: | |



| | |
|---|--|
| Data / Parameter: | Gross electricity generation during 2004-05 by power plants considered for Build margin calculations. |
| Data unit: | GWh |
| Description: | Gross generation by the sample group of power plants has been used to arrive at the net electricity supply by these power plants to the Northern grid. |
| Source of data used: | <ul style="list-style-type: none"> – Hydro Generation data obtained from CEA Performance Review of Hydro Power Stations 2004-05 – Steam Generation data obtained from Section 2, CEA Thermal Performance Review 2004-05 – Gas Generation data obtained from Section 10, CEA Thermal Performance Review 2004-05 – Nuclear Generation data obtained from Nuclear Power Corporation of India's website http://www.npcil.nic.in/raps.asp – Wind generation data is obtained from Table 3.4, CEA General Review 2004-05 |
| Value applied: | Refer Annex – 3 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | <p>The data source, i.e. Central Electricity Authority is a Government of India organisation, which is mandated to publish such information under section 73 (i) and 73(j) of the Indian Electricity Act 2003.</p> <p>Many power generating stations in India house multiple generating units (both in case of Hydro and Thermal) and in many cases unit wise generation data is not published. Therefore some times it is not possible to determine the actual amount of electricity generated by a new unit that was added in recent times. In such cases pro-rata generation, depending on capacity, has been used.</p> <p>Plant wise generation for Nuclear power units is not available in the CEA publication. Generation data reported for the Rajasthan Atomic Power station for 2004-05 on the website of Nuclear Power Corporation of India Limited, http://www.npcil.nic.in/raps.asp, has been used.</p> <p>Similarly unit wise generation data of wind installations is also not available in the public domain. In case of the northern region build margin sample plants, the earliest plant i.e. GHTP Bhatinda-2 was commissioned on 18 October 1998, whereas the earliest wind installation of northern region was commissioned in 1999-00 in Rajasthan. Rajasthan is the only state in the northern region that has wind power installations. Therefore electricity generation for all wind power projects in Rajasthan for 2004-05 has been considered for build margin calculations.</p> |
| Any comment: | |

| | |
|--------------------------|---|
| Data / Parameter: | Auxiliary consumption during 2004-05 by power plants considered for Build margin calculations. |
| Data unit: | GWh |
| Description: | Auxiliary consumption by the sample group of power plants has been used to arrive at the net electricity supply by these power plants to the Northern grid. |
| Source of data used: | <ul style="list-style-type: none"> – Auxiliary consumption for Hydro units is considered at 0.5% as per CERC norms applicable to Surface hydro electric power generating stations with static excitation system. – Auxiliary consumption for Steam units taken from Section 11, CEA Thermal Performance Review 2004-05 – For Gas plants, the state average auxiliary consumption of Gas Power plants as per Table 5.5 CEA General Review 2004-05 has been used in the absence of plant |



| | |
|---|--|
| | <p>specific auxiliary consumption data.</p> <p>– Auxiliary Consumption for Nuclear Power Plants taken as the: State average for the respective generation type from Table 5.5 CEA General Review 2004-05</p> |
| Value applied: | Refer Annex – 3 |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | <p>The data source, i.e. Central Electricity Authority is a Government of India organisation, which is mandated to publish such information under section 73 (i) and 73(j) of the Indian Electricity Act 2003.</p> <p>Actual auxiliary consumption of Hydro power units is not available in the CEA publications. Hence the auxiliary consumption norms set by Central Electricity Regulatory Commission for determination of tariff for Hydro units has been used.</p> <p>Nuclear power in India is generated by the Government owned Nuclear Power Corporation of India Limited. Therefore the entire nuclear power generation pertains to NPCL alone. Hence the state average auxiliary consumption for Nuclear power actually refers to the auxiliary consumption rate achieved by the NPCL plant.</p> <p>In case of Gas plants, plant wise data is not available. Hence the state averages (for the respective fuel type) of auxiliary consumption have been applied.</p> <p>Auxiliary consumption of wind considered as “Nil” as wind power generation does not involve any auxiliary consumption. This is conservative.</p> |
| Any comment: | |

| Data / Parameter: | Average Emission Factor for Gas plants | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--|--|---|----------------------------|-------|-----------------------|------|----------------------|--------------|--|-------|---|-------|-------------------------------------|------|------------------------|-------|------------------|-------|------------------------------|-------|--|---------------|
| Data unit: | tCO ₂ /GWh | | | | | | | | | | | | | | | | | | | | | | | |
| Description: | The Average emission factor for Gas plants is used as in input for calculation of build margin emission factor | | | | | | | | | | | | | | | | | | | | | | | |
| Source of data used: | CERC for tariff Regulations dated 24 March 2004 | | | | | | | | | | | | | | | | | | | | | | | |
| Value applied: | <table border="1"> <thead> <tr> <th></th> <th>Gas Combined Cycle (Advanced class machines)</th> </tr> </thead> <tbody> <tr> <td>Gross Heat Rate (Kcal/KWh)</td> <td>1,850</td> </tr> <tr> <td>Auxiliary Consumption</td> <td>3.0%</td> </tr> <tr> <td>Net Heat Rate</td> <td>1,907</td> </tr> <tr> <td>Net Calorific value of fuel (Kcal/SCM)</td> <td>8,150</td> </tr> <tr> <td>Net Calorific value of fuel (TJ/'000' Tons)</td> <td>34.12</td> </tr> <tr> <td>Specific Fuel Consumption (SCM/KWh)</td> <td>0.23</td> </tr> <tr> <td>Carbon emission factor</td> <td>15.30</td> </tr> <tr> <td>Oxidation factor</td> <td>0.995</td> </tr> <tr> <td>tCO₂/'000' tons</td> <td>1,905</td> </tr> <tr> <td>Emission Coefficient (tCO₂e/GWh)</td> <td>445.73</td> </tr> </tbody> </table> | | | Gas Combined Cycle (Advanced class machines) | Gross Heat Rate (Kcal/KWh) | 1,850 | Auxiliary Consumption | 3.0% | Net Heat Rate | 1,907 | Net Calorific value of fuel (Kcal/SCM) | 8,150 | Net Calorific value of fuel (TJ/'000' Tons) | 34.12 | Specific Fuel Consumption (SCM/KWh) | 0.23 | Carbon emission factor | 15.30 | Oxidation factor | 0.995 | tCO ₂ /'000' tons | 1,905 | Emission Coefficient (tCO₂e/GWh) | 445.73 |
| | Gas Combined Cycle (Advanced class machines) | | | | | | | | | | | | | | | | | | | | | | | |
| Gross Heat Rate (Kcal/KWh) | 1,850 | | | | | | | | | | | | | | | | | | | | | | | |
| Auxiliary Consumption | 3.0% | | | | | | | | | | | | | | | | | | | | | | | |
| Net Heat Rate | 1,907 | | | | | | | | | | | | | | | | | | | | | | | |
| Net Calorific value of fuel (Kcal/SCM) | 8,150 | | | | | | | | | | | | | | | | | | | | | | | |
| Net Calorific value of fuel (TJ/'000' Tons) | 34.12 | | | | | | | | | | | | | | | | | | | | | | | |
| Specific Fuel Consumption (SCM/KWh) | 0.23 | | | | | | | | | | | | | | | | | | | | | | | |
| Carbon emission factor | 15.30 | | | | | | | | | | | | | | | | | | | | | | | |
| Oxidation factor | 0.995 | | | | | | | | | | | | | | | | | | | | | | | |
| tCO ₂ /'000' tons | 1,905 | | | | | | | | | | | | | | | | | | | | | | | |
| Emission Coefficient (tCO₂e/GWh) | 445.73 | | | | | | | | | | | | | | | | | | | | | | | |
| Justification of the choice of data or description of measurement methods and procedures actually | In the absence of any plant specific gas consumption information, the operating norms set by CERC, for tariff determination of Gas power plants, has been considered for arriving at the applicable emission rates for gas plants included in the build margin calculations. | | | | | | | | | | | | | | | | | | | | | | | |



| | |
|--------------|--|
| applied : | |
| Any comment: | |

| Data / Parameter: | Average Emission Factor for Coal plants | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--------------------------|-------------------------|----------------------------|-----------------------|---|--|--|-----------------------------|------------------------------------|--------------------------|-------------------------|----------------------------|-----------------------|---|--|------------------------|--|--|--|--|--|--|--|--------|-------|-------|-------|-------|-------|-------|-----|-----------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-----|-------|-------|-------|-------|-------|----------|-------|-----|-------|-------|-------|-------|-----|---------|-------|-----|-------|--------|-------|-------|-------|
| Data unit: | tCO ₂ /GWh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description: | The Average emission factor for Coal plants is used as in input for calculation of build margin emission factor. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source of data used: | CEA Thermal Performance Review 2004-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Value applied: | <table border="1"> <thead> <tr> <th>Coal/lignite fired stations</th> <th>Coal consumption Million Tonnes</th> <th>Installed Capacity MW</th> <th>Gross generation GWh</th> <th>Auxiliary consumption %</th> <th>Net Generation GWh</th> <th>Emission Coefficient (tCO₂/1000 tonnes of fuel)</th> <th>Specific emissions (tCO₂e/MWh)</th> </tr> </thead> <tbody> <tr> <td colspan="8">Northern Region</td> </tr> <tr> <td>Rihand</td> <td>4,768</td> <td>1,000</td> <td>7,988</td> <td>7.93%</td> <td>7,355</td> <td>1,476</td> <td>957</td> </tr> <tr> <td>Suratgarh</td> <td>5,920</td> <td>1,250</td> <td>9,362</td> <td>9.22%</td> <td>8,499</td> <td>1,476</td> <td>1,028</td> </tr> <tr> <td>Kota</td> <td>5,213</td> <td>1,045</td> <td>7,749</td> <td>9.62%</td> <td>7,004</td> <td>1,476</td> <td>1,099</td> </tr> <tr> <td>Unchahar</td> <td>4,604</td> <td>840</td> <td>6,781</td> <td>8.57%</td> <td>6,200</td> <td>1,476</td> <td>1,096</td> </tr> <tr> <td>Bhatinda</td> <td>1,995</td> <td>420</td> <td>3,309</td> <td>9.23%</td> <td>3,004</td> <td>1,476</td> <td>980</td> </tr> <tr> <td>Panipat</td> <td>4,447</td> <td>860</td> <td>5,326</td> <td>10.34%</td> <td>4,775</td> <td>1,476</td> <td>1,375</td> </tr> </tbody> </table> | | | | | | | | Coal/lignite fired stations | Coal consumption Million Tonnes | Installed Capacity MW | Gross generation GWh | Auxiliary consumption % | Net Generation GWh | Emission Coefficient (tCO ₂ /1000 tonnes of fuel) | Specific emissions (tCO ₂ e/MWh) | Northern Region | | | | | | | | Rihand | 4,768 | 1,000 | 7,988 | 7.93% | 7,355 | 1,476 | 957 | Suratgarh | 5,920 | 1,250 | 9,362 | 9.22% | 8,499 | 1,476 | 1,028 | Kota | 5,213 | 1,045 | 7,749 | 9.62% | 7,004 | 1,476 | 1,099 | Unchahar | 4,604 | 840 | 6,781 | 8.57% | 6,200 | 1,476 | 1,096 | Bhatinda | 1,995 | 420 | 3,309 | 9.23% | 3,004 | 1,476 | 980 | Panipat | 4,447 | 860 | 5,326 | 10.34% | 4,775 | 1,476 | 1,375 |
| Coal/lignite fired stations | Coal consumption Million Tonnes | Installed Capacity MW | Gross generation GWh | Auxiliary consumption % | Net Generation GWh | Emission Coefficient (tCO ₂ /1000 tonnes of fuel) | Specific emissions (tCO ₂ e/MWh) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Northern Region | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rihand | 4,768 | 1,000 | 7,988 | 7.93% | 7,355 | 1,476 | 957 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Suratgarh | 5,920 | 1,250 | 9,362 | 9.22% | 8,499 | 1,476 | 1,028 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kota | 5,213 | 1,045 | 7,749 | 9.62% | 7,004 | 1,476 | 1,099 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Unchahar | 4,604 | 840 | 6,781 | 8.57% | 6,200 | 1,476 | 1,096 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bhatinda | 1,995 | 420 | 3,309 | 9.23% | 3,004 | 1,476 | 980 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Panipat | 4,447 | 860 | 5,326 | 10.34% | 4,775 | 1,476 | 1,375 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The data source, i.e. Central Electricity Authority is a Government of India organisation, which is mandated to publish such information under section 73 (i) and 73(j) of the Indian Electricity Act 2003. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Any comment: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

B.6.3 Ex-ante calculation of emission reductions:

>>

Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions as project emissions and leakage are nil.

Baseline emission factor (combined margin)

= 924.96 tCO₂e/GWh

Annual electricity supplied to the grid by the Project

= 30.59 MW (Capacity) x 22% (PLF) x 8760 (hours) / 1000 GWh

= 58.953 GWh

Annual baseline emissions

= 924.96 tCO₂e/GWh x 58.953 GWh

= 54,529 tCO₂e

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



>>

| Year | Estimation of project activity emissions (tonnes of CO2e) | Estimation of baseline emissions (tonnes of CO2e) | Estimation of leakage (tonnes of CO2e) | Estimation of overall emission reductions (tonnes of CO2e) |
|-------------------------------|---|---|--|--|
| 2008 | 0 | 54,529 | 0 | 54,529 |
| 2009 | 0 | 54,529 | 0 | 54,529 |
| 2010 | 0 | 54,529 | 0 | 54,529 |
| 2011 | 0 | 54,529 | 0 | 54,529 |
| 2012 | 0 | 54,529 | 0 | 54,529 |
| 2013 | 0 | 54,529 | 0 | 54,529 |
| 2014 | 0 | 54,529 | 0 | 54,529 |
| 2015 | 0 | 54,529 | 0 | 54,529 |
| 2016 | 0 | 54,529 | 0 | 54,529 |
| 2017 | 0 | 54,529 | 0 | 54,529 |
| Total (tonnes of CO2e) | 0 | 545,290 | 0 | 545,290 |

| | |
|--|--|
| B.7 Application of the monitoring methodology and description of the monitoring plan: | |
| B.7.1 Data and parameters monitored: | |
| Data / Parameter: | EGy |
| Data unit: | MWh (Mega-watt hour) |
| Description: | Net electricity supplied to the grid by the Project |
| Source of data to be used: | Electricity supplied to the grid as per the tariff invoices raised on RRVPNL/Jodhpur Discom. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | Annual electricity supplied to the grid by the Project = 30.59 MW (Capacity) x 22% (PLF) x 8760 (hours) GWh = 58,953 MWh |
| Description of measurement methods and procedures to be applied: | Net electricity supplied to grid will be measured by main meters (export and import). The procedures for metering and meter reading will be as per the provisions of the power purchase agreement and the Metering Code of Rajasthan. Refer Annex – 4 for an illustration of the provisions for measurement methods. |
| QA/QC procedures to be applied: | QA/QC procedures will be as implemented by RRVPN/Jodhpur Discom pursuant to the provisions of the power purchase agreement and the Metering Code of Rajasthan and there will be no additional QA/QC procedures. Refer Annex – 4 for an illustration of the provisions for QA/QC procedures. |
| Any comment: | |

B.7.2 Description of the monitoring plan:



>>

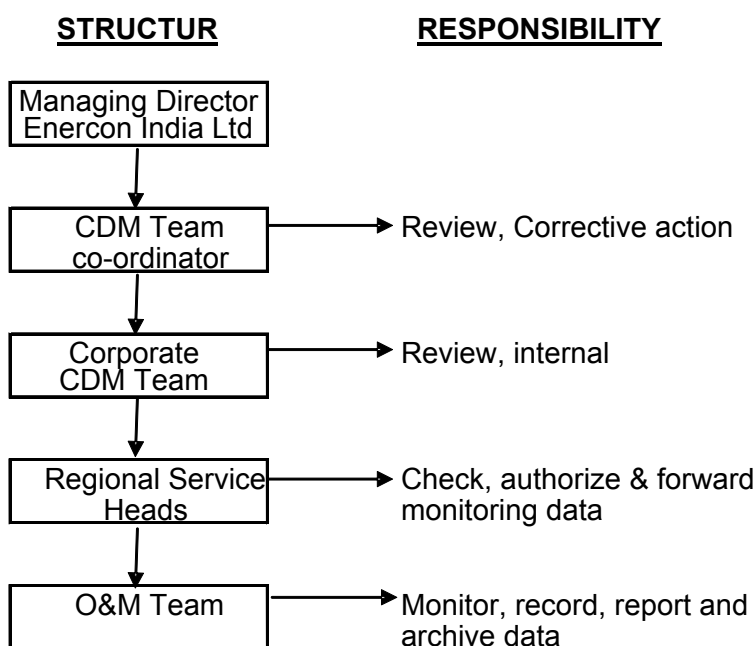
Approved monitoring methodology ACM0002 / Version 06 Sectoral Scope: 1, “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”, by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

This approved monitoring methodology requires monitoring of the following:

- Electricity generation from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where *ex post* determination of grid emission factor has been chosen

Since the baseline methodology is based on *ex ante* determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required.

The sole parameter for monitoring is the electricity supplied to the grid. The Project is operated and managed by Enercon (India) Ltd. The operational and management structure implemented by Enercon is as follows:



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: 15/11/2006

Name of responsible person/entity:

PricewaterhouseCoopers (not a Project Participant)

**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:**

>>

30/04/2003 being the date of placement of purchase order for the first project in the bundle.

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:**

>>

01/04/2007, being the expected date of registration of Project.

C.2.2.2. Length:

>>

10 years

SECTION D. Environmental impacts

>>

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

>>

Enercon appointed Aditya Environmental Services Private Limited to conduct rapid environmental impact assessment study to assess the impact of the project on the local environment.

Environmental Impact Assessment (EIA) of this project is not an essential regulatory requirement, as it is not covered under the categories as described in EIA Notification of 1994 or the Amended Notification of 2006. However, Enercon conducted the EIA to study impacts on the environment resulting from the project activity.



The EIA study included identification, prediction and evaluation of potential impacts of the CDM activities on air, water, noise, land, biological and socioeconomic environment within the study area. The ambient air concentrations of Suspended Particulate Matter, Respirable Particulate Matter, Oxides of Nitrogen, Sulphur dioxide and Carbon Monoxide were monitored and were found under limits as specified by CPCB. The noise levels were observed through out the study period and were found to be in the permissible range. Water quality monitoring studies were carried out for determination of physico-chemical characteristics of bore wells. The ph level of water was found to be under the specified limits.

The study area represents part of Jaisalmer district, which is part of the Thar desert. The terrain is rough comprising sandy or stony wasteland & is very sparsely populated. The windfarm is located in the mist of the Indian ‘Thar’ Desert and does not come in the path of the migratory birds. There is no wild life or forestland near the project sites.

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:

>>

EIA demonstrated that there is no major impact on the environment due to the installation and operation of the windmills. The desert ecology is not likely to get impacted by this type of project activity. The local population confirmed that there is no noise or dust nuisance due to windmills. The EIA also ruled out any adverse impacts due to the project activity.

SECTION E. Stakeholders’ comments

>>

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

>>

The comments from local stakeholders were invited through a local stakeholder meeting conducted at Gorbandh Palace, Jaisalmer on 18 September 2006. A local newspaper advertisement was placed in *Rajasthan Patrica* on 5th September 2006 inviting the local stakeholders for the meeting.

The local stakeholder consultation meeting had representatives from the nearby villages, representatives of Enercon and representative of Aditya Environmental Services (consultant to Enercon). The minutes of the meeting are set out in Appendix 2.

E.2. Summary of the comments received:

>>

The comments from local villagers included:

- The nature of benefits that local stakeholders will get
- Impact on the grazing of local cattle
- Impact on any migratory patterns of birds or fauna
- Impact on water availability; distance of the tube wells from the Project site
- Addressing safety issues by Enercon, incidence of accidents
- Noise disturbance
- Provision of a school for education of children
- Provision of opportunities for women

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

>>

Enercon provided the following responses in relation to the comments received from the local stakeholders:

- The benefits to the local stakeholders will be through employment opportunities provided by the project in terms of small shops and construction workers. It will also lead to better connectivity to nearby towns.
- The project does not affect the grazing by the cattle. Enercon does not use any kind for boundary wall to protect their machines and hence the accessibility of cattle to areas for grazing and drinking water is not affected.
- The Project does not fall under migratory patterns of the birds.
- Project has improved the availability of water, which can also be accessed from project site. The tube wells are located at a distance of 3 Km from project site which the people daily access.
- Enercon has appropriate protocols are in place to take care of all the safety issues. No incidence of accident has occurred.
- No noise disturbances have been observed so far and local inhabitation is far away from the project site.
- A school was reconstructed by Enercon India Limited in police lane in Jaisalmer, Rajasthan in 2004 – 05. Enercon will bear in mind the requirement of school in the village and opportunities for women in the village when it undertakes further developmental work.

The local stakeholders were satisfied with the explanations provided during the meeting.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

| | |
|------------------|--|
| Organization: | Enercon (India) Limited |
| Street/P.O.Box: | Kolsite House, Plot No. 31, Shah Industrial Estate, Veera Desai Road, Andheri (West) |
| Building: | |
| City: | Mumbai |
| State/Region: | Maharashtra |
| Postfix/ZIP: | 400 053 |
| Country: | India |
| Telephone: | +91-22-5522 7794 |
| FAX: | +91-22-5692 1175 |
| E-Mail: | a.raghavan@enerconindia.net |
| URL: | |
| Represented by: | |
| Title: | Associate Vice President |
| Salutation: | Mr. |
| Last Name: | Raghavan |
| Middle Name: | |
| First Name: | A |
| Department: | Corporate |
| Mobile: | +91-98200 45724 |
| Direct FAX: | +91-22-5692 1175 |
| Direct tel: | +91-22-5522 7794 |
| Personal E-Mail: | a.raghavan@enerconindia.net |

| | |
|-----------------|---|
| Organization: | Japan Carbon Finance, Ltd. |
| Street/P.O.Box: | 6 th Floor, 1-3 Kundankita, 4-chrome |
| Building: | Chiyoda-ku |
| City: | Tokyo |
| State/Region: | |
| Postfix/ZIP: | 102-0073 |
| Country: | Japan |
| Telephone: | +81 3 5212 8870 |
| FAX: | +81 3 5212 8886 |
| E-Mail: | jcf@jcarbon.co.jp |
| URL: | http://www.japancarbon.co.jp/ |
| Represented by: | |
| Title: | Director General |
| Salutation: | Mr. |
| Last Name: | Ari |
| Middle Name: | |
| First Name: | Masato |



CDM – Executive Board

| | |
|------------------|--|
| Department: | Carbon Finance Department |
| Mobile: | |
| Direct FAX: | +81 3 5212 8886 |
| Direct tel: | +81 3 5212 8878 |
| Personal E-Mail: | m-ari@jcarbon.co.jp |



Annex 2

INFORMATION REGARDING PUBLIC FUNDING

**Annex 3****BASELINE INFORMATION****Emission Coefficients****2004-2005**

| Type of FUEL | Net Calorific Value (TJ/ 10 ³ tonnes or TJ/Mcum) | Carbon Emission Factor (t C/ TJ) | Fraction of Carbon Oxidised Oxidation Factor | Emission Coefficient (tCO ₂ / 10 ³ tonnes or tCO ₂ /Mcum) |
|------------------------|---|-----------------------------------|--|--|
| Steam stations | | | | |
| Coal | 15.72 | 26.13 | 0.98 | 1,476 |
| Furnace oil | 43.68 | 21.10 | 0.99 | 3,346 |
| Light oil | 43.00 | 20.00 | 0.99 | 3,122 |
| LSHS/HHS/HSD | 43.64 | 20.20 | 0.99 | 3,200 |
| GAS | 34.12 | 15.30 | 1.00 | 1,905 |
| Lignite | 11.40 | 28.95 | 0.98 | 1,186 |
| Gas Stations | | | | |
| Natural Gas | 34.12 | 15.30 | 1.00 | 1,905 |
| HSD | 42.71 | 20.20 | 0.99 | 3,131 |
| Naphtha | 46.89 | 20.00 | 0.99 | 3,404 |
| Diesel Stations | | | | |
| LSHS | 43.64 | 20.20 | 0.99 | 3,200 |
| Diesel | 43.00 | 20.20 | 0.99 | 3,153 |

2003-2004

| Type of FUEL | Net Calorific Value (TJ/ 10 ³ tonnes or TJ/Mcum) | Carbon Emission Factor (t C/ TJ) | Fraction of Carbon Oxidised Oxidation Factor | Emission Coefficient (tCO ₂ / 10 ³ tonnes or tCO ₂ /Mcum) |
|------------------------|---|-----------------------------------|--|--|
| Steam stations | | | | |
| Coal | 15.99 | 26.13 | 0.98 | 1,502 |
| Furnace oil | 43.40 | 21.10 | 0.99 | 3,324 |
| Light oil | 42.65 | 20.00 | 0.99 | 3,096 |
| LSHS/HHS/HSD | 43.13 | 20.20 | 0.99 | 3,163 |
| GAS | 34.12 | 15.30 | 1.00 | 1,905 |
| Lignite | 11.46 | 28.95 | 0.98 | 1,192 |
| Gas Stations | | | | |
| Natural Gas | 34.12 | 15.30 | 1.00 | 1,905 |
| HSD | 42.71 | 20.20 | 0.99 | 3,131 |
| Naphtha | 46.89 | 20.00 | 0.99 | 3,404 |
| Diesel Stations | | | | |
| LSHS | 43.13 | 20.20 | 0.99 | 3,163 |
| Diesel | 42.65 | 20.20 | 0.99 | 3,127 |



2002-2003

| Type of FUEL | Net Calorific Value (TJ/ 10 ³ tonnes or TJ/Mcum) | Carbon Emission Factor (t C/ TJ) | Fraction of Carbon Oxidised Oxidation Factor | Emission Coefficient (tCO ₂ / 10 ³ tonnes or tCO ₂ /Mcum) |
|------------------------|---|-----------------------------------|--|--|
| Steam stations | | | | |
| Coal | 17.46 | 26.13 | 0.98 | 1,640 |
| Furnace oil | 44.91 | 21.10 | 0.99 | 3,440 |
| Light oil | 40.86 | 20.00 | 0.99 | 2,967 |
| LSHS/HHS/HSD | 44.06 | 20.20 | 0.99 | 3,231 |
| GAS | 34.12 | 15.30 | 1.00 | 1,905 |
| Lignite | 11.25 | 28.95 | 0.98 | 1,170 |
| Gas Stations | | | | |
| Natural Gas | 34.12 | 15.30 | 1.00 | 1,905 |
| HSD | 42.71 | 20.20 | 0.99 | 3,131 |
| Naphtha | 46.89 | 20.00 | 0.99 | 3,404 |
| Diesel Stations | | | | |
| LSHS | 44.06 | 20.20 | 0.99 | 3,231 |
| Diesel | 40.86 | 20.20 | 0.99 | 2,996 |



Operating Margin for Northern Region

| Fuel | Units | 2004-05 | | 2003-04 | | 2002-03 | |
|------------------------|--------------|---------------------------|------------------------------------|---------------------------|------------------------------------|---------------------------|------------------------------------|
| | | Fuel consumption | Emissions (tCO ₂) | Fuel consumption | Emissions (tCO ₂) | Fuel consumption | Emissions (tCO ₂) |
| Steam stations | | | | | | | |
| Coal | '000' MT | 72,943 | 107,674,458 | 70,085 | 105,246,478 | 68,594 | 112,472,267 |
| Furnace oil | KL | 26,071 | 81,119 | 43,377 | 134,086 | 57,666 | 184,464 |
| Light oil | KL | 94,208 | 243,211 | 254,855 | 652,561 | 60,211 | 147,724 |
| LSHS/HHS/HSD | KL | 3,126 | 8,272 | 2,377 | 6,217 | 32,761 | 87,535 |
| GAS | MT | - | - | - | - | - | - |
| Lignite | '000' MT | - | - | - | - | - | - |
| Gas Stations | | | | | | | |
| Natural Gas | M Cu M | 4,058 | 7,729,258 | 3,808 | 7,253,084 | 3,953 | 7,529,265 |
| HSD | KL | 275,047 | 712,283 | 240,593 | 623,059 | 401,257 | 1,039,127 |
| Naphtha | KL | 243,961 | 631,206 | 188,981 | 488,955 | - | - |
| Diesel Stations | | | | | | | |
| LSHS | KL | - | - | - | - | - | - |
| Diesel | KL | - | - | - | - | - | - |
| Grid imports | Units | Electricity import | Emissions (tCO₂) | Electricity import | Emissions (tCO₂) | Electricity import | Emissions (tCO₂) |
| From region | | | | | | | |
| Western Region | GWh | 374 | 345,000 | 175 | 164,242 | 43 | 51,472 |
| Eastern Region | GWh | 3,043 | 3,375,957 | 125 | 144,143 | 827 | 1,050,177 |
| Southern Region | GWh | 120 | 97,941 | | | | |
| North-eastern Region | GWh | 172 | 55,058 | | | | |
| Total emissions | | 3,709 | 120,953,763 | | 114,712,824 | | 122,562,031 |

| Net electricity generation | Units | 2004-05 | 2003-04 | 2002-03 |
|----------------------------|-------|---------|---------|---------|
| Steam stations | GWh | 96,404 | 94,041 | 91,523 |
| Gas stations | GWh | 19,516 | 18,328 | 16,852 |
| Diesel stations | GWh | | | |
| Grid imports | GWh | 3,709 | 301 | 870 |
| Total | GWh | 119,630 | 112,669 | 109,245 |

| | Units | 2004-05 | 2003-04 | 2002-03 |
|------------------|-----------------------|----------|----------|----------|
| Operating Margin | tCO ₂ /GWh | 1,011.07 | 1,018.14 | 1,121.90 |



Average Emission Rate of Western Grid

| Fuel | Units | 2004-05 | | 2003-04 | | 2002-03 | |
|------------------------|----------|-----------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|
| | | Cons | Emissions (tCO ₂) | Cons | Emissions (tCO ₂) | Cons | Emissions (tCO ₂) |
| Steam stations | | | | | | | |
| Coal | '000' MT | 94,123 | 138,939,213 | 89,075 | 133,763,716 | 91,350 | 149,784,844 |
| Furnace oil | KL | 1,066,231 | 3,317,529 | 1,187,213 | 3,669,883 | 135,786 | 434,357 |
| Light oil | KL | 10,028 | 25,889 | 10,685 | 27,359 | 46,383 | 113,798 |
| LSHS/HHS/HSD | KL | 574,238 | 1,519,604 | 423,797 | 1,108,473 | 2,006,346 | 5,360,834 |
| GAS | MT | 39,012 | 74,306 | 33,884 | 64,539 | 204,166 | 388,874 |
| Lignite | '000' MT | 2,609 | 3,095,348 | 2,560 | 3,051,709 | 19,311 | 22,591,188 |
| Gas Stations | | | | | | | |
| Natural Gas | M Cu M | 4,667 | 8,889,218 | 3,721 | 7,087,375 | 3,505 | 6,675,961 |
| HSD | KL | 1,625 | 4,208 | 2,767 | 7,166 | 697,009 | 1,805,029 |
| Naphtha | KL | 776,908 | 2,010,111 | 1,082,436 | 2,800,610 | 426,280 | 1,102,924 |
| Diesel Stations | | | | | | | |
| LSHS | KL | - | - | - | - | - | - |
| Diesel | KL | - | - | - | - | - | - |
| Total | | | 157,875,426 | | 151,580,830 | | 188,257,809 |

Net Grid Generations

GWh

171,027

161,528

158,333

Average Emission Rate

tCO₂e/GWh

923.10

938.42

1,189.00



Average Emission Rate of Eastern Grid

| Fuel | Units | 2004-05 | | 2003-04 | | 2002-03 | |
|------------------------|----------|---------|-------------------------------|---------|-------------------------------|---------|-------------------------------|
| | | Cons | Emissions (tCO ₂) | Cons | Emissions (tCO ₂) | Cons | Emissions (tCO ₂) |
| Steam stations | | | | | | | |
| Coal | '000' MT | 58,372 | 86,165,546 | 53,212 | 79,908,334 | 45,146 | 74,025,031 |
| Furnace oil | KL | 54,976 | 171,055 | 78,230 | 241,823 | 52,510 | 167,971 |
| Light oil | KL | 121,186 | 312,858 | 170,917 | 437,636 | 98,608 | 241,928 |
| LSHS/HHS/HSD | KL | - | - | - | - | - | - |
| GAS | MT | - | - | - | - | - | - |
| Lignite | '000' MT | - | - | - | - | - | - |
| Gas Stations | | | | | | | |
| Natural Gas | M Cu M | - | - | - | - | - | - |
| HSD | KL | - | - | 2,596 | 6,723 | 3,423 | 8,864 |
| Naphtha | KL | - | - | - | - | - | - |
| Diesel Stations | | | | | | | |
| LSHS | KL | 219 | 580 | - | - | - | - |
| Diesel | KL | 29,880 | 77,911 | 38,881 | 100,551 | 14,847 | 36,790 |
| Total | | | 86,727,950 | | 80,695,067 | | 74,480,585 |

| | | | | |
|------------------------------|------------------------|-----------------|-----------------|-----------------|
| Net Grid Generations | GWh | 78,164 | 70,253 | 58,652 |
| Average Emission Rate | tCO ₂ e/GWh | 1,109.57 | 1,148.64 | 1,269.86 |



Average Emission Rate of North – Eastern Grid

| Fuel | Units | 2004-05 | | 2003-04 | | 2002-03 | |
|------------------------|----------|---------|-------------------------------|---------|-------------------------------|---------|-------------------------------|
| | | Cons | Emissions (tCO ₂) | Cons | Emissions (tCO ₂) | Cons | Emissions (tCO ₂) |
| Steam stations | | | | | | | |
| Coal | '000' MT | | | | | | |
| Furnace oil | KL | | | | | | |
| Light oil | KL | | | | | | |
| LSHS/HHS/HSD | KL | | | | | | |
| GAS | MT | | | | | | |
| Lignite | '000' MT | | | | | | |
| Gas Stations | | | | | | | |
| Natural Gas | M Cu M | 1,309 | 2,493,248 | 1,246 | 2,373,252 | 930 | 1,771,368 |
| HSD | KL | | | | | | |
| Naphtha | KL | | | | | | |
| Diesel Stations | | | | | | | |
| LSHS | KL | | | | | | |
| Diesel | KL | 353 | 920 | 3,431 | 8,873 | 4,948 | 12,261 |
| Total | | | 2,494,168 | | 2,382,125 | | 1,783,629 |

Net Grid Generations

GWh

7,814

6,569

5,308

Average Emission Rate

tCO₂e/GWh

319.20

362.63

336.05



Average Emission Rate of Southern Grid

| Fuel | Units | 2004-05 | | 2003-04 | | 2002-03 | |
|------------------------------|--------|------------------------|-------------------------------|---------|-------------------------------|---------|-------------------------------|
| | | Cons | Emissions (tCO ₂) | Cons | Emissions (tCO ₂) | Cons | Emissions (tCO ₂) |
| Steam stations | | | | | | | |
| Coal | 000MT | 53,144 | 78,448,259 | 52,985 | 79,567,449 | 65,997 | 108,214,016 |
| Furnace oil | KL | 45,848 | 142,654 | 56,498 | 174,645 | 115,914 | 370,790 |
| Light oil | KL | 24,330 | 62,811 | 33,031 | 84,577 | 8,407 | 20,626 |
| LSSH/HHS/HSD | KL | 2,612 | 6,912 | 5,310 | 13,889 | 6,093 | 16,280 |
| GAS | KL | | - | | | | |
| Lignite | 000MT | 22,121 | 26,244,612 | 20,755 | 24,741,489 | 17,738 | 20,750,996 |
| Gas Stations | | | | | | | |
| Natural Gas | M Cu M | 2,203 | 4,196,046 | 2,010 | 3,828,440 | 3,130 | 5,961,700 |
| HSD | KL | 81,254 | 210,422 | 226,981 | 587,808 | 275,122 | 712,478 |
| Naphtha | KL | 289,451 | 748,903 | 719,694 | 1,862,080 | 485,496 | 1,256,134 |
| Diesel Stations | | | | | | | |
| LSSH | KL | 465,220 | 1,231,110 | 647,451 | 1,693,457 | - | - |
| Diesel | KL | 63,039 | 164,371 | 14,903 | 38,541 | 865,938 | 2,145,766 |
| Total | | | 111,456,100 | | 112,592,373 | | 139,448,786 |
| Net Grid Generations | | GWh | 137,025 | | 129,865 | | 125,830 |
| Average Emission Rate | | tCO ₂ e/GWh | 813.40 | | 867.00 | | 1,108.23 |



Build Margin Emission Factor for Northern Grid

| Name of the plant | State | Date of addition | Gross Gen | Aux Cons | Net supply to grid | Emission factor (tCO ₂ /GWh) | Total tCO ₂ |
|-----------------------|-----------|------------------|-----------|----------|--------------------|---|------------------------|
| | | | GWh | % | GWh | (for 2004-05) | |
| Hydro | | | | | | | |
| Nathpa Jhakri HEP - 1 | Himachal | 31-Mar-04 | 852 | 0.50% | 847 | | |
| Nathpa Jhakri HEP - 2 | Himachal | 9-Mar-04 | 852 | 0.50% | 847 | | |
| Chamera HEP II - 3 | Himachal | 26-Feb-04 | 449 | 0.50% | 447 | | |
| Nathpa Jhakri HEP - 3 | Himachal | 13-Feb-04 | 852 | 0.50% | 847 | | |
| Nathpa Jhakri HEP - 4 | Himachal | 22-Jan-04 | 852 | 0.50% | 847 | | |
| Chamera HEP II - 2 | Himachal | 5-Dec-03 | 449 | 0.50% | 447 | | |
| Nathpa Jhakri HEP - 5 | Himachal | 23-Nov-03 | 852 | 0.50% | 847 | | |
| Chamera HEP II - 1 | Himachal | 4-Nov-03 | 449 | 0.50% | 447 | | |
| Nathpa Jhakri HEP - 6 | Himachal | 20-Sep-03 | 852 | 0.50% | 847 | | |
| Baspa -II - 3 | Himachal | 27-May-03 | 398 | 0.50% | 396 | | |
| Baspa -II - 2 | Himachal | 8-Feb-03 | 398 | 0.50% | 396 | | |
| Baspa -II - 1 | Himachal | 24-Jan-03 | 398 | 0.50% | 396 | | |
| Upper Sindh II - 2 | JK | 29-Mar-02 | 49 | 0.50% | 49 | | |
| Sewa III - 3 | JK | 19-Mar-02 | 3 | 0.50% | 3 | | |
| Sewa III - 1 | JK | 18-Mar-02 | 3 | 0.50% | 3 | | |
| Sewa III - 2 | JK | 18-Mar-02 | 3 | 0.50% | 3 | | |
| Upper Sindh II - 1 | JK | 11-Sep-01 | 49 | 0.50% | 49 | | |
| Malana - 2 | Himachal | 9-Jul-01 | 134 | 0.50% | 133 | | |
| Malana - 1 | Himachal | 5-Jul-01 | 134 | 0.50% | 133 | | |
| Ghanvi - 1 | Himachal | 7-Dec-00 | 37 | 0.50% | 37 | | |
| Ranjait Sagar - 3 | Punjab | 11-Oct-00 | 286 | 0.50% | 285 | | |
| Ranjait Sagar - 4 | Punjab | 16-Sep-00 | 286 | 0.50% | 285 | | |
| Ranjait Sagar - 2 | Punjab | 20-Aug-00 | 286 | 0.50% | 285 | | |
| Ranjait Sagar - 1 | Punjab | 12-Aug-00 | 286 | 0.50% | 285 | | |
| Chenani III - 1 | JK | 31-Jul-00 | 6 | 0.50% | 6 | | |
| Chenani III - 2 | JK | 31-Jul-00 | 6 | 0.50% | 6 | | |
| Chenani III - 3 | JK | 31-Jul-00 | 6 | 0.50% | 6 | | |
| Ghanvi - 2 | Himachal | 30-Jul-00 | 37 | 0.50% | 37 | | |
| Upper Sind II - 3 | JK | 5-Jan-00 | 49 | 0.50% | 49 | | |
| Steam | | | | | | | |
| Kota TPS IV - 6 | Rajasthan | 30-Jul-03 | 1,470 | 9.62% | 1,329 | 1,099 | 1,459,784 |
| Suratgarh III - 5 | Rajasthan | 30-Jun-03 | 1,955 | 9.22% | 1,775 | 1,028 | 1,824,857 |
| Suratgarh TPS - 4 | Rajasthan | 25-Mar-02 | 1,951 | 9.22% | 1,771 | 1,028 | 1,821,124 |
| Suratgarh TPS - 3 | Rajasthan | 29-Oct-01 | 1,876 | 9.22% | 1,703 | 1,028 | 1,751,116 |
| Panipat TPS St IV - 6 | Haryana | 31-Mar-01 | 1,482 | 10.34% | 1,329 | 1,375 | 1,826,599 |
| Suratgarh - 2 | Rajsthan | 28-Mar-00 | 1,704 | 9.22% | 1,547 | 1,028 | 1,590,566 |
| Unchahar TPP - 4 | UP | 22-Oct-99 | 1,748 | 8.57% | 1,598 | 1,096 | 1,751,911 |
| Unchahar TPP - 3 | UP | 27-Jan-99 | 1,690 | 8.57% | 1,545 | 1,096 | 1,693,781 |



| Name of the plant | State | Date of addition | Gross Gen | Aux Cons | Net supply to grid | Emission factor (tCO ₂ /GWh) | Total tCO ₂ |
|--|-----------|------------------|---------------|----------|--------------------|---|------------------------|
| | | | GWh | % | GWh | (for 2004-05) | |
| GHTP Bhatinda - 2 | Punjab | 16-Oct-98 | 1,536 | 11.24% | 1,363 | 980 | 1,336,723 |
| Wind All wind power projects in the region | Rajasthan | 31-Mar-05 | 332 | 0.00% | 332 | | |
| Gas | | | | | | | |
| Pragati CCGT - 3 | Delhi | 31-Jan-03 | 936 | 2.34% | 914 | 446 | 407,293 |
| Pragati CCGT - 2 | Delhi | 9-Nov-02 | 808 | 2.34% | 789 | 446 | 351,509 |
| Ramgarh CCGT Stg II - 2 | Rajasthan | 24-Aug-02 | 120 | 7.21% | 111 | 446 | 49,447 |
| Ramgarh CCGT Stg II - 1 | Rajasthan | 7-Aug-02 | 119 | 7.21% | 110 | 446 | 49,054 |
| Pragati CCGT - 1 | Delhi | 15-Mar-02 | 808 | 2.34% | 789 | 446 | 351,509 |
| Faridabad CCGT | Haryana | 31-Jul-00 | 1,059 | 2.28% | 1,035 | 446 | 461,205 |
| Faridabad CCGT - 2 | Haryana | 18-Oct-99 | 1,052 | 2.28% | 1,028 | 446 | 458,002 |
| Faridabad CCGT - 1 | Haryana | 28-Jun-99 | 1,052 | 2.28% | 1,028 | 446 | 458,002 |
| Nuclear | | | | | | | |
| Rajasthan Atomic PP - 4 | Rajasthan | 23-Dec-00 | 1,649 | 10.50% | 1,476 | | |
| Rajasthan APS - 3 | Rajasthan | 10-Mar-00 | 1,470 | 10.50% | 1,316 | | |
| Total | | | 34,125 | | 32,150 | | 17,642,481 |

Test of Build Margin Sampling

| | | |
|--|---------------|-----|
| Net Generation from five most recent plants | 3,836 | GWh |
| | <u>Net</u> | |
| Total Net Electricity Generation for NR grid (2004-05) | 158,836 | GWh |
| Total Net Electricity Generation from power plants added to the system | <u>32,150</u> | GWh |
| of the total grid generation | <u>20.24%</u> | |

Therefore the power plants as per table above have been considered in Build Margin calculations

| | | |
|---------------------|---------------|----------------------------|
| Build Margin | 548.76 | tCO₂/GWh |
|---------------------|---------------|----------------------------|

**Combined Margin for Northern Grid**

| | | Northern Grid (tCO₂e/GWh) |
|--|--|---|
| Simple Operating Margin - 2002-03 | | 1,122 |
| Simple Operating Margin - 2003-04 | | 1,018 |
| Simple Operating Margin - 2004-05 | | 1,011 |
| Average Operating Margin of last three years | | 1,050 |

| | | Northern Grid (tCO₂e/GWh) |
|--------------|--|---|
| Build Margin | | 549 |

| Combined Margin for Wind Power Plants | | Northern Grid (tCO₂e/GWh) |
|--|---------|---|
| | Weights | |
| Operating Margin | 0.75 | 1,050 |
| Build Margin | 0.25 | 549 |
| Combined Margin | | 924.96 |



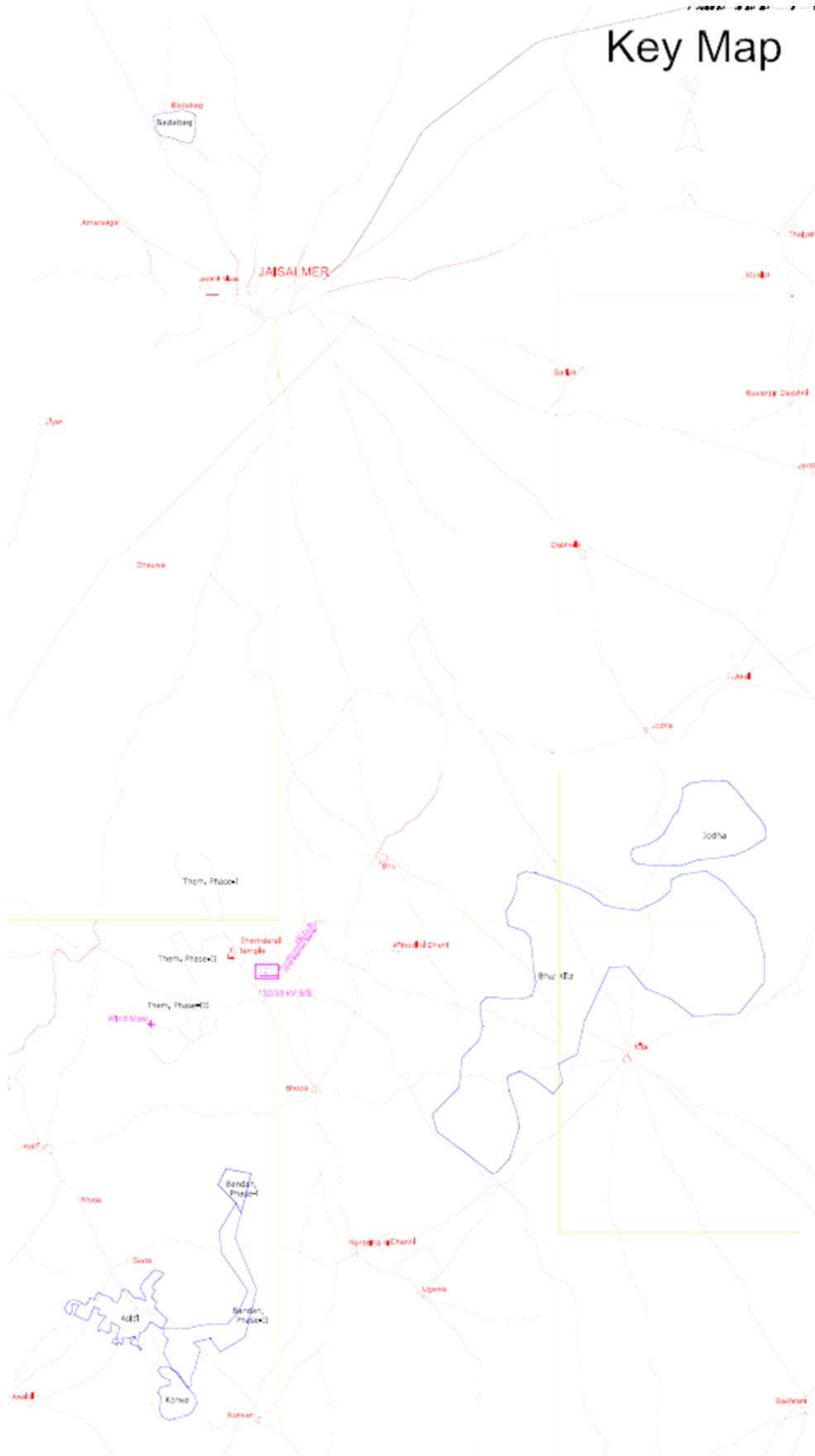
Annex 4

MONITORING INFORMATION

- The electricity supplied to the grid will be metered at the 33/132/220 kV level at the RRVPN substation at Amarsagar. Representatives of RRVPN/Jodhpur Discom and Enercon will jointly take the main reading and sign the meter reading on the first day of every month. Simultaneously, the joint meter reading at the 33/132/220 kV level of the backup metering system at Temderai substation will also be taken by representatives of RRVPN/Jodhpur Discom and Enercon.
- The meters will jointly inspected/tested once in a year as per the terms of the PPA. Joint inspection and testing will also be carried out as and when difference in monthly meter readings exceeds the sum of maximum error as per accuracy class of main and back up meters.
- In case the meters are found to operate outside the permissible limits, the meters will be either replaced immediately or calibrated. Error correction will be applied to the meter reading. Whenever a main meter goes defective, the consumption recorded by the backup meter will be referred. The details of the malfunctioning along with date and time and snaps shot parameters along with load survey will be retrieved from the main meter. The exact nature of the malfunctioning will be determined after analyzing the data so retrieved and the consumption recorded by the main meter will be assessed accordingly. Further, correction for the transmission loss between Temdarai and Amarsagar will be carried by reference to the transmission loss calculated using the data of the main meter and backup meter on the other double circuit line. This transmission loss will be applied to the backup meter reading to arrive at the electricity supplied to the grid where the main meter has been found to be defective.
- If main as well as back up metering system becomes defective, the assessment of energy consumption for the outage period will be done from the backup meters by the concerned parties as mutually agreed or at the level of Metering Committee set up under the Metering Code.
- The main and the backup metering systems will be sealed in presence of representatives of Enercon and RRVPN/Jodhpur Discom.



Appendix 1 – Location Map



**Appendix 2 – Minutes of stakeholder consultation meeting**

| | |
|--|-------------------|
| <p><i>Public Consultation Meeting for Wind Energy Projects at Clean Development Mechanism Project of Enercon (India) Limited. situated at Kita. Bhu, Sodabhandhan ,Temderai(Phase I, PhaseII and PhaseIII), Asloi, Jodha, Korwa and Badabagh in Jaisalmer,Rajasthan</i></p> <p style="text-align: center;">Jaisalmer, District Rajasthan, India MINUTES OF THE MEETING</p> | |
| Venue: Gorbandh Palace, Jaisalmer | Date: 18 Sep 2006 |
| The people participated are the following: | |
| Representatives: | |
| <p>Representatives from the Village: Shri. Rahim Singh Shri. Punam Singh Shri Kishan Singh The list of all other people from the villages is annexed.</p> <p>Enercon (India) Limited: Mr. Anupam Mathur Mr. Rajendra Vyas Mr. Rakesh Chhangani Mr. Dilip Sharma Mr. Neeraj Gupta Aditya Environmental Services Pvt. Ltd. Mr. Gurmeet Singh</p> | |
| <p>Mr. Anupam Mathur invited Mr. Punam Singh, Ex- Sarpanch to chair the meeting.</p> <p>The agenda of the meeting is fixed as follows: Welcome Description of the project details Queries and responses from the proponent and the stakeholders Vote of thanks</p> <p style="text-align: center;">WELCOME ADDRESS</p> <p>Mr. Dilip Sharma, Security and Liasoning person from Enercon India Limited welcomed all the people who came to take part in the meeting. There were more than 20 people from all the villages that fall in the vicinity of the project sites.</p> <p>Description of the Project Details. The present stakeholder consultation is for 60 MW of Enercon Wind Farm Hindustan Limited and for 82.74 MW of the customer projects out of which 47.01 MW has been finalized and the rest 35.73 MW is in the process to be considered. Some the projects will also come up in addition to the finalised projects for CDM. The Knowledge of the wind farm was communicated to the local people in the local language. The wind farm projects falls in the category of the renewable energy. The meaning of the renewable energy was explained. The sites where the projects are located have no commercial activity and is a waste land. The best use of land is made through the project which otherwise was barren. Improved supply of electricity to the grid, and employment opportunities to local people. He explained function advantages of the windmill to the people. Self reliance on using renewable energy sources is</p> | |



| | |
|--|--|
| | <p>observed in Jaisalmer.</p> <p>The comparison between the wind farm projects and other alternatives is drawn in order to convey the advantages that wind power possess over other alternatives. The sites are located near Badabagh, Sodabandhan, Korwa, Asloi, Bhu, Temderai (Phase I, Phase II and Phase III) and Kita.</p> <p>In addition several other support services augmented by Enercon to local people in terms of transportation, mid –day meals to school children, renovation of Temedarai temple etc. as its social community initiatives.</p> <p style="text-align: center;">SPEECH BY MR. PUNAM SINGH</p> <p>The chairperson of the meeting briefed the advantages of the wind farm. The project has provided the employment opportunities to the local people as the result of which the income of the people have increased. He also praised Enercon India Limited for investing in district of Jaisalmer.</p> <p>Mr. Rahim Singh (BHU Sarpanch)</p> <p>The villagers in this part of the state are very backward but the times are changing with coming up of the wind farm projects of the Enercon India Limited. The project has provided the employment opportunities to the people. Security, drivers and labour people are selected among the local villagers.</p> |
| | <p>Mr. Gurmeet Singh, Aditya Environmental Services briefed the environmental benefits of wind power generation as compared to that of thermal power generation based on coal. Similarly, a briefing on GHG and its role in global warming / increasing temperatures on the earth was given. The benefits in terms of pollution free environment and safeguard to human health were also communicated to the stakeholders while comparing coal-based generation to wind based generation. The Government of Rajasthan is also encouraging the development of renewable energy. Summary on Kyoto Protocol and CDM were made available.</p> |

| | | |
|----|---|--|
| | The concerns, suggestions, opinions of the stakeholders have been specially invited. The participants expressed the queries as given below. The representatives from ENERCON clarified them as given below. | |
| | Queries | Responses |
| 1. | What are the benefits of the wind power projects the stakeholders have observed? | The project has provided the people with the employment opportunities. The project has given jobs and economic opportunities in terms of small shops and construction workers. The transportation facilities has improved and has increased their accessibility to the near by town. |
| 2. | Has the project affected the grazing of local cattle? | No, the project does not affect the grazing by the cattle. Enercon India Limited does not use any kind for boundary wall to protect their machines and hence the accessibility of cattle to areas for grazing and drinking water is not affected. |
| 3. | Has the project affected any migratory patterns of birds or fauna? | The project does not fall under migratory patterns of the birds. The major birds migrating in the region, but away from project site are “ <i>Gatta</i> ”, <i>Tilor</i> , and <i>Solan</i> , which usually take their path |



| | | |
|----|--|---|
| | | away from the project site. |
| 4. | Has the project affected the water availability? How far are the tube wells located from the site? | The project has improved the availability of water, which can also be accessed from project site. The tube wells are located at a distance of 3 Km from project site which the people daily access. |
| 5. | During construction and erection has any incident of accident or damage occurred? | As to date no incidence of accident has occurred. |
| 6. | Do Enercon take care of safety issues? | The Enercon India Limited takes care about the safety issues. Appropriate protocols are in place to take care of all the safety issues. |
| 7. | Have you observed any noise disturbances from the project during construction and operation of the project has occurred by the local people? | No noise disturbances have been so far. Local inhabitation is far away from the project site. |

Women Representative

The women representative asked if school could be provided for the education of the children. The school can provide the much need education to the children. Also, women should be provided with the good opportunities.

Vote of thanks

Mr. Dilip Sharma thanked all the people for sparing their time for this meeting and requested them to continue their support towards the projects of Enercon India Limited. The representatives of the villages and also the local population represented their happiness towards Enercon India Limited.