



**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: The Converging World Renewable Energy India Wind Farm Phase 1

PDD version: 3.1

Date: 15 Dec 2008

Revision history

Version 1.0 (19 December 2007) used for local stakeholder consultation

Version 1.1 (20 March 2008) including local stakeholder consultation outcome

Version 1.2 (28 March 2008) after internal QA for stakeholder comments and DNA approval

Version 2.0 (22 August 2008) after draft validation report

Version 3.0 (20 November 2008) after second stakeholder consultation meeting, new PDD template and guidance, and change in project capacity due to requirements from the DNA

Version 3.1 (15 December 2008) submission to DOE for validation

A.2. Description of the project activity:

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The Converging World is a UK-registered charity with the aim of reducing the impact of climate change as well as reducing inequality and social injustice in the world. As part of its strategy The Converging World (TCW) has decided to construct a wind farm in Tamil Nadu, India, providing non-polluting electricity in a developing country to aid their sustainable development, while helping to reduce global greenhouse gas emissions.

The first phase of The Converging World Renewable Energy India Wind Farm will consist of 2 wind turbines, each of which will have a capacity of 1.5 MW, giving a total capacity of 3 MW. The wind farm is expected to generate approximately 7,776 MWh/y net of own use and losses, which will be supplied to the Tamil Nadu Electricity Grid on the basis of a Power Purchase Agreement (PPA).

Over the next few years TCW is planning to add further capacity, reaching 25.5 MW of installed capacity and 66 GWh/y net generation, in total. The additional capacity will be proposed as a separate CDM project, in order to comply with the requirements of the DNA.

The proposed project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions from fossil fuel-fired power plant supplying the Southern Grid in India. The expected annual reductions, once fully operational, will be 7,208 tCO₂e.

The baseline scenario, therefore, is the same as the scenario existing prior to the implementation of the project activity, i.e. generation of electricity by grid connected power plants.

The proposed project activity's two main aims are sustainable development and emission reductions. The project will:

- Generate non-polluting electricity
- Aid sustainable development in Southern India



- Reduce greenhouse gas emissions compared to fossil fuel-fired power plants that supply the Southern India Grid
- Reduce other pollutants resulting from the fossil fuel-fired power plants business-as-usual scenario.
- Help the further growth of the wind power industry in Southern India
- Create local employment opportunity during assembly, installation and operation of the project
- Help stakeholder awareness in the region

The proposed project activity will be built and operated by Suzlon, an experienced wind farm project operator, who also provides the technology.

In addition, after payments to the operator, the revenues from the project will be used to further the sustainable development impact of the project. Surplus revenue from the project activity will be donated to TCW's local partner, the NGO SCAD ("Social Change and Development"), to invest in community development, and re-invested in further low-energy and sustainable development projects.

A.3. Project participants:

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Name of Party involved	Private and/or public entity(ies) project participants	Project participant
India (host)	CW Renewable Energy (India) Private Limited	No
United Kingdom of Great Britain and Northern Ireland	The Converging World	No

Note: CW Renewable Energy (India) Private Limited is the vehicle through which The Converging World invests in and operates the proposed project activity.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

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India

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

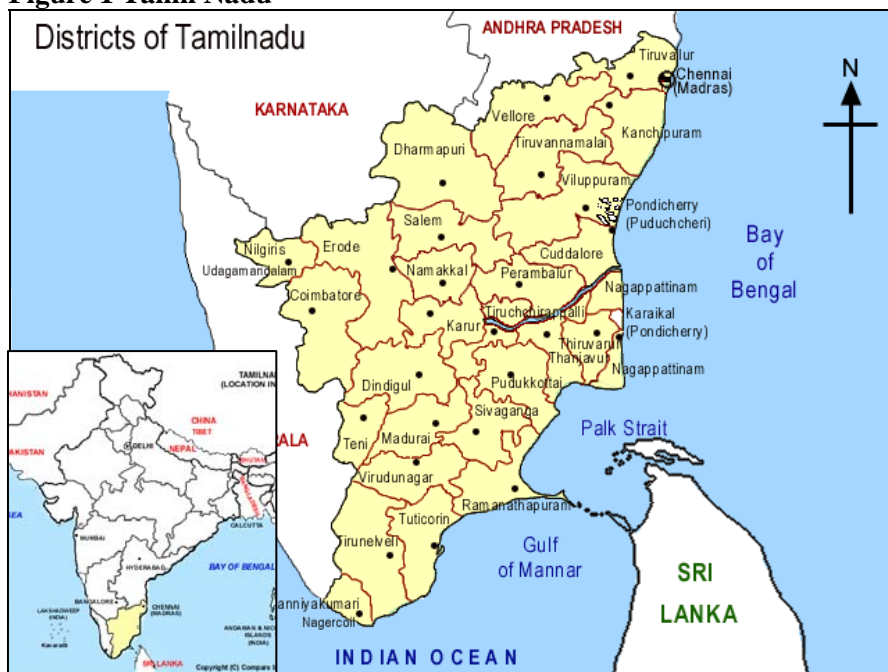
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Tamil Nadu

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

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Tirunelveli district (in the south of Tamil Nadu)

Figure 1 Tamil Nadu

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

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Turbine R.385 co-ordinates: N8 17.285 E77 46.694

Turbine R.386 co-ordinates: N8 17.735 E77 46.111

Kasthurirangapuram village, Radhapuram Taluk.

Figure 2 Radhapuram Taluk in Tirunelveli district**A.4.2. Category(ies) of project activity:**

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Using the agreed consolidated methodology ACM0002 the category of the project activity is:
Sectoral scope 1: Energy industries

Using the project types listed by Gold Standard, the project type is:
Renewable Energy: Wind

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

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The project activity involves the installation of 2 wind turbines, each with a capacity of 1.5 MW, manufactured in India by Suzlon. While Suzlon is an Indian company, its R&D facilities are based in Europe, and it has acquired other technology from the “North”.¹ The technical design of the wind turbines is highly advanced and reflects current best practice. Some key technology parameters are listed in Table 1.

Table 1. Key technology parameters of the turbine

Key Technology Parameter	Value
Manufacture	Suzlon
Model	S.82
Rotor diameter (m)	82
Swept area (m ²)	5281
Cut-in wind speed (m/s)	4
Rated wind speed (m/s)	14
Cut-out wind speed (m/s)	20
Hub height of the wind turbines (m)	78.5
Capacity (kW)	1500

With the wind resource available on site, as established by Suzlon from significant experience at both this location and with the specific technology, each turbine is expected to generate 4.32 million kWh per year (gross). The generated electricity will be supplied to the grid via the 110 kV Tamil Nadu Electricity Board (TNEB) substation.

¹ http://www.suzlon.com/history.html?cp=1_5.

Figure 3 Monthly electricity output variation

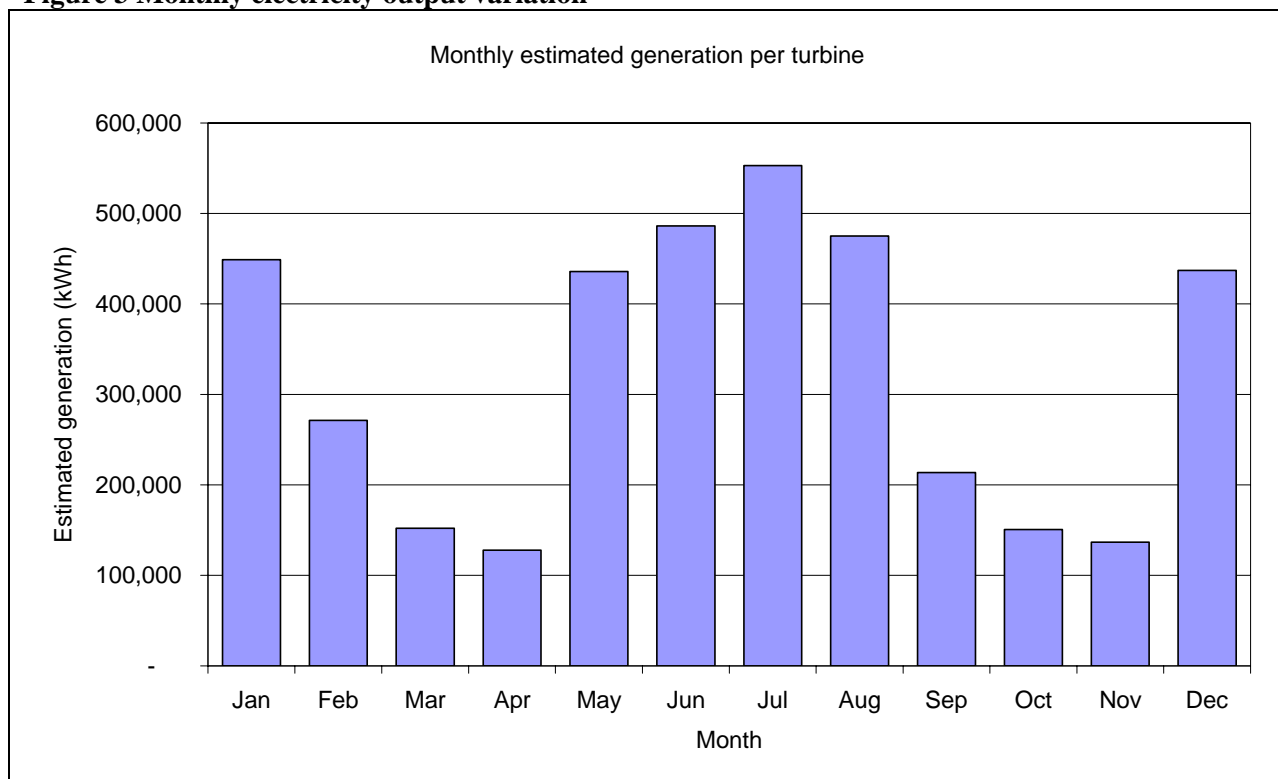


Table 2 describes the time schedule of the implementation of the project.

Table 2. Time schedule of the implementation of the project

Milestone	Date
CDM discussions with consultant	Jan 2007
CDM development agreement	Jun 2007
First stakeholder meeting	Feb 2008
Publication of PDD for global stakeholder comment	April 2008
First discussions with the DNA for the LOA	May 2008
Draft validation report from SGS	Jun 2008
Equipment contract signed	Jul 2008
Commissioning of first two turbines & second stakeholder meeting	Aug 2008
DNA approval of the project	Dec 2008

The project scenario is the installation of 2 wind turbines with an aggregate capacity of 3MW. The wind turbines are estimated to generate on average 7,776 MWh of electricity annually. The power generation is monitored by the electronic control and monitoring system in the project office.

Prior to the implementation of the project activity, the electricity was generated by grid-connected power plants. Without the implementation of the project, this scenario would have continued and is considered the baseline scenario.

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

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Applying ACM0002, the proposed project activity will achieve an ex-ante estimated average annual emission reduction of 7,208 tCO₂e/year over the first 7-year crediting period.

Table 3. Estimated emission reductions from the proposed project activity (tCO₂e)

Period	Annual estimation of emission reductions in tonnes of CO ₂ e
2009	7,208
2010	7,208
2011	7,208
2012	7,208
2013	7,208
2014	7,208
2015	7,208
Total estimated reductions (tonnes CO₂e)	
	50,456
Total number of crediting years	
	7
Annual average over the crediting period of estimated reductions (tonnes of CO₂e)	
	7,208

Note: Using 12-monthly periods from the start of the crediting period

The baseline emissions factor has been fixed for the first 7-year crediting period. In each year the amount of CERs actually generated by the project will vary depending on the metered net electricity supplied by the proposed project to the grid.

A.4.5. Public funding of the project activity:

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There is no public funding from Annex I Parties for this 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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- Approved consolidated baseline and monitoring methodology ACM0002 (version 08, EB 44, valid from 5 Dec 08 onwards) “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”
- AM_Tool_01 (version 05.2, EB 39) “Tool for the demonstration and assessment of additionality”
- AM_Tool_07 (version 01.1, EB 35) “Tool to calculate the emission factor for an electricity system”

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

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The approved methodology ACM0002 is applicable to the proposed project activity, because:



- The proposed project involves electricity capacity addition from wind sources; and
- The proposed project does not involve switching from fossil fuels to renewable energy at the site of the project activity; and
- The geographic and system boundaries 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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Emission sources:

For the baseline determination only CO₂ emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account.

Spatial boundary:

The spatial extent of the project boundary includes the proposed wind farm and all power plants connected to the project electricity system. The project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constrains.

While electricity generation and distribution remains largely in the hands of the Tamil Nadu Electricity Board (TNEB), the Indian state grids are becoming more integrated in the regional grids. The project electricity system for the determination of baseline emission factor, therefore, is selected as the Southern Region grid.

The Southern Region grid is made up from generation in the following states and the central sector generation in the grid, as reported in the relevant documents:

- Tamil Nadu
- Andra Pradesh
- Karnataka
- Kerala
- Lakshadweep
- Pondicherry

The baseline data is based on the Central Electricity Authority (CEA) published study for baseline emission factors for the Indian regional grids. CEA is a statutory body under the Ministry of Power, Government of India, which monitors and reports the electricity generation, transmission, and distribution performance of the power utilities in India. CEA has published baseline carbon dioxide emission database for all regional power grids in India, which is accepted by the Indian DNA.²

The data in the CEA baseline database indicates that there are no imports from the other regional grid to the Southern Grid.

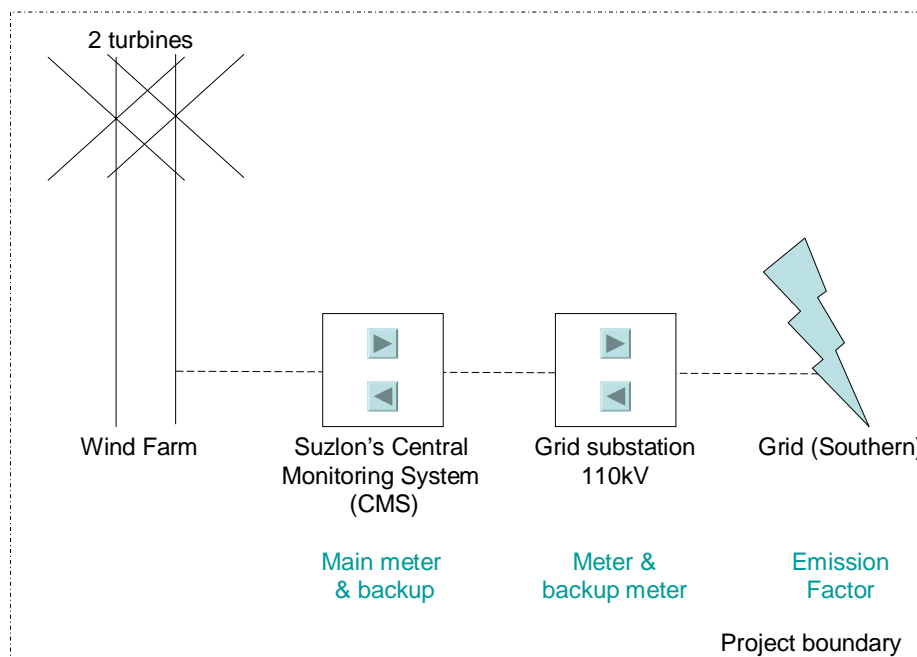
Table 4. Sources and gases in the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Grid	CO ₂	Yes	Following ACM0002

² www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm.

		CH4	No	Conservative/according to ACM0002
		N2O	No	
Project Activity	Fossil fuel use	CO2	No	According to ACM0002, the project emission of renewable energy project activity is not considered.
		CH4	No	
		N2O	No	

Figure 4 Flow diagram of the project boundary



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

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According to ACM0002, the baseline scenario for a new grid-connected renewable power plant/unit is:

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 in the “Tool to calculate the emission factor for an electricity system”.

It is shown in section B.5. that none of the alternatives to the proposed project activity is a realistic and credible baseline scenario.

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

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CDM consideration



The emission reductions are the primary aim, along with encouraging development in the area, of the proposed project activity. The CDM, therefore, had been taken into account prior to the starting date of the project activity, aiming to obtain the investment for the plant on the basis of upfront sales of the reductions.

After initial discussions with the CDM consultant since January 2007, a CDM development contract was signed in June 2007. Due to the unique nature of the project, in particular with regards to the financing of the equity, through upfront sales of the lifetime carbon reductions from the project, the preparatory phase took until the beginning of 2008.

The stakeholder consultation meeting was organised, in conjunction with the NGO SCAD, in February 2008, before the equipment contract was signed in July 2008. A second meeting was held at the time when the two turbines were commissioned in August 2008.

A detailed timeline of the implementation of the project is presented in A.4.3.

Additionality

The approved methodology ACM0002 requires the use the latest version of the “Tool for the demonstration and assessment of additionality” agreed by the Executive Board to demonstrate and assess the additionality of the proposed project.

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

Realistic and credible alternatives to the project activity that can be part of the baseline scenario are defined through the following sub-steps:

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

The demonstration about the alternative that provides outputs or services comparable with the proposed CDM project activity is as follows:

- a) *The proposed project activity undertaken without being registered as a CDM project activity.*
 - The proposed project will face many barriers, in particular the investment barrier, as demonstrated below. The proposed project activity undertaken without being registered as a CDM project activity is not a realistic alternative.
- b) *A fossil fuel-fired power plant with the comparable capacity or electricity power generation.*
 - A comparable fossil fuel-fired power station would be small, while most added and planned capacity is much larger. Therefore, this is not realistic alternative.
- c) *A power plant using other source of renewable energy with the comparable capacity or electricity generation, such as PV, biomass and hydro, etc.*
 - Besides wind energy, other kinds of energy like solar PV, geothermal, biomass and hydro are the possible grid-connected renewable energy technologies that may be used in India. However, due to the technology development status and the high cost for power generation from these sources, these



are not attractive investment in the grid in Southern India. Indeed the 11th plan includes a total added capacity of 14,518MW in the Southern Grid, with only 1217MW hydro.³ Therefore they are not realistic alternatives.

- d) *Comparable capacity or electricity generation addition provided by the Southern Grid.*
- To satisfy the increase of the electricity demand, output of generation from operating units can be increased or new power plants build, as planned for example in the 11th plan. Therefore comparable capacity or electricity generation addition provided by the grid can be taken as a realistic alternative for the project activity.

Sub-step 1b. Consistency with mandatory laws and regulations:

Each of the alternatives is consistent with laws and regulations, however, comparable capacity or electricity addition provided by the grid is the most realistic alternative.

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

The project participants chose to complete both steps 2 and 3.

Step 2. Investment analysis

The purpose of this step is to determine whether the proposed project activity is not: (a) the most economically or financially attractive; or (b) economically or financially feasible, 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

Determine whether to apply the simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b):

Following the EB guidance on the assessment of investment analysis⁴, if the alternative to the project activity is the supply of electricity from the grid, this is not considered an investment and a benchmark approach is considered appropriate. As the baseline alternative involves the continuation of current practices, supply of electricity from the grid, a benchmark analysis is used to identify whether the project is economically attractive (Option III).

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

As The Converging World is a registered charity and not a for-profit company, there is no industry standard for the investment return that can be used. Therefore the benchmark chosen is the loan rate used in the IRR calculations, i.e. 10.3%, which is also the loan rate achieved for the debt financing. This choice of benchmark is conservative, as equity returns are normally expected to be above the loan rate.

³ White Paper on Strategy for 11th Plan, Central Electricity Authority & Confederation of Indian Industry, August 2007. (The 11th plan cover 2007/08 to 2011/12.)

⁴ Paragraph 15, 'Guidance on the Assessment of Investment Analysis' (version 02), EB 41 Annex 45.

**Sub-step 2c. Calculation and comparison of financial indicators:**

The data for the financial estimation is presented in Table 5. All variables are taken from the Suzlon 1500 kW Feasibility Report, which was the offer from the equipment supplier, and which formed the basis for the decision by TCW to go ahead with the project. The IRR calculations are based on the two wind turbines installed by Suzlon.

Table 5. Key Data for the financial assessment

Item	Value
Electricity generated per turbine (gross)	4.32 million kWh
Losses	10%
Price per turbine	1.1563 million GBP
O&M	1.75% of turbine cost
Tariff	2.90 INR/kWh
Interest rate	10.3%
Loan term	12 years

Source: Suzlon Financial Analysis, September 2007.

Table 6 shows the result of the IRR calculations of the proposed project activity without and with CER revenue from CDM registration. It can be seen that the IRR without CER revenue is below the benchmark / loan rate and that revenue from the CDM makes the proposed project more financially attractive.

Table 6. Investment analysis of the proposed project (IRR, post tax)

	Without CDM	With CDM
IRR (post tax)	7.67%	13.77%

Sub-step 2d. Sensitivity analysis

A sensitivity analysis is used for assessing the perceived uncertainties by identifying the key variables such as capital investments, costs, prices, etc., and assessing potential impacts of their variation on the economic performance of the proposed project.

With regard to a financial analysis of a wind farm project, the main variables that influence the IRR include:

- 1) Cost per turbine;
- 2) O&M cost;
- 3) On-grid tariff
- 4) Generation

By changing these parameters within the range between -10% and +10% from the default value, the IRR sensitivity can be analysed.

Table 7 IRR sensitivity analysis for the project



Variation	-10%	0%	+10%
Investment	9.79%	7.67%	6.08%
O&M	8.06%	7.67%	7.26%
Generation	5.99%	7.67%	9.57%
Tariff	5.99%	7.67%	9.57%

The sensitivity analysis shows that without CER revenue the IRR of the project is unlikely to reach the benchmark 10.3%.

- Investment: Investment per turbine would need to be dramatically reduced, by more than 10% for the project to reach the benchmark. It is highly unlikely that investment would be reduced by such a large margin as the basis of the analysis is the actual contract offer for the equipment.
- Tariff: Similarly, the project would need to either obtain a much higher feed in tariff than expected. However, it is not expected that the tariff, which is centrally regulated, will be increased.
- Generation: It is also not expected that generation will be much greater than expected, as the estimate is based on long term wind data and actual previous operation by Suzlon in the same area.
- O&M: As the impact of variations in the O&M costs have a limited impact on the project IRR, in order to achieve the benchmark O&M expenditure would need to be dramatically reduced. It is highly unlikely that O&M would be reduced by a large margin as the basis of the analysis is the actual contract offer from the operator.

However, the revenue from the CERs will greatly improve the financial feasibility of the proposed project. Indeed, in the case of this project, the CER revenue is the means for obtaining the equity, with no other source for equity, and without CERs the project would not be possible.

→ If after the sensitivity analysis it is concluded that: (1) the proposed CDM project activity is unlikely to be the most financially/economically attractive (as per step 2c para 11a) or is unlikely to be financially/economically attractive (as per step 2c para 11b), then proceed to Step 4 (Common practice analysis). If the project participants so wish, they may apply the Step 3 (Barrier analysis) as well.

The financial analysis shows that the project is not the most financially/economically attractive alternative, and the sensitivity analysis shows that it is unlikely to be financially/economically attractive under reasonable variations in the assumptions. However, the project participants chose to apply Step 3 (Barrier analysis) as well.

Step 3. Barrier analysis

This analysis shows that the project activity faces barriers that (a) prevent the implementation of this type of proposed project activity; and (b) do not prevent the implementation of the alternatives.

Sub-step 3a. Identify barriers that would prevent the implementation of the proposed CDM project activity:

There are many barriers facing wind power projects. As a relatively new technology, technological barriers and barriers due to prevailing practice as well as other barriers exist. However, the crucial barrier faced by the project developer is the investment barrier.

Investment barriers



As shown in step 2 above, the economic returns of the project are calculated by the turbine manufacturer and developer to be 7.67% after tax, which is significantly below the loan rate.

However, as a UK-registered charity, The Converging World (TCW) is not a normal investor in wind power generation in Tamil Nadu, as its purpose is not to generate profits. But the charitable status limits TCW's ability to raise debt and equity as it does not have equity itself.

From the start of the project, TCW has been raising awareness of the project, and has obtained interest from sponsors to purchase the emission reductions. Sponsors provide the equity for the purchase of the wind turbines, on the basis of the projected emission reductions achieved over the lifetime of the turbines and the market price of the reductions.⁵

With this equity, based in full on the value of the emission reductions, TCW has been able to raise debt financing (50%) for the project, effectively leveraging each sponsored turbine with an extra turbine. This way the benefits of the project are doubled, and the purpose as a charity better served: emission reductions *and* development in the region.

In addition, the proposed project activity is set up to donate part of the revenue to SCAD, the local NGO, with the remaining revenues (after operating costs) invested in replacement turbines at the end of the project life. The emission reductions are delivered to the project sponsors, up to the value they invested, with the remaining reductions sold and revenues re-invested in emission reduction projects.

Therefore, all equity provided to the project activity is upfront payment for the emission reductions achieved over the lifetime of the wind turbines. As a charity this is the only way in which it was possible to raise the required equity to invest in the project activity.

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

While the barrier above would prevent the proposed project activity to be implemented without CDM financing, the alternative d) of comparable capacity or electricity generation addition provided by the grid (see sub-step 1a) is very common and is not impacted by any of these barriers. It is normal in the power grid to increase the electricity generation of existing generating units to satisfy the load demand. The electricity demand in the Southern Grid has been increasing in the past several years, and generation and capacity has increased to meet demand. That is to say, either to increase the operating time of the existing generating units or to build new power plants when needed is the option of choice. Therefore there are no barriers that would prevent the implementation of this alternative.

The registration of the proposed project as a CDM project activity has enabled The Converging World to raise the capital required for investment on the basis of upfront sales of the CERs generated over the lifetime of the wind turbines.

→ ***If both Sub-steps 3a – 3b are satisfied, proceed to Step 4 (Common practice analysis)***

⁵ Each turbine is expected to generate 4.32 million kWh gross per year, which is 77,760 MWh net of own use and losses over a 20 year lifetime of the turbine. Lifetime emission reductions, therefore, are calculated to be 72,080 tCO₂e per turbine, assuming a constant grid emissions factor of 0.93 tCO₂e/MWh.



The identified barriers prevent the implementation of the project activity without CDM registration, but they do not prevent the occurrence of the alternative.

Step 4. Common practice analysis

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

The prevailing practice in TNSEB is carbon intensive power generation, as shown in the table below, which shows that the share of the thermal based power generation is of 78%. While the generation from wind is growing, it is only 2.23% of total generation.

Table 8. Net power generation by fuel type in the last three years (Southern Grid)

Fuel	2002-03		2003-04		2004-05	
	GWh	%	GWh	%	GWh	%
Coal	70,706	54.84	71,761	55.19	73,448	53.83
Lignite	14,932	11.58	16,399	12.61	16,415	12.03
Gas	15,000	11.63	15,714	12.09	11,925	8.74
Diesel	4,183	3.24	3,096	2.38	2,270	1.66
Hydro	18,373	14.25	16,587	12.76	25,153	18.44
Nuclear	4,171	3.23	4,465	3.43	4,186	3.07
Wind	1,576	1.22	1,992	1.53	3,042	2.23
Total	128,941	100	130,014	100	136,439	100

Source: www.cea.nic.in.

This is unlikely to change, as the planned capacity expansion during the 11th plan will be majority thermal power⁶ as shown below.

Table 9. Planned additions during the 11th plan

Type	Additions (MW)	Share
Hydro	1217	8%
Thermal	10,361	72%
Nuclear	2940	20%
Total	14518	

According to the Ministry of Non-Conventional Energy Sources (MNES) the gross potential for wind generation in Tamil Nadu is 3050MW and technical potential 2150MW⁷, while a study prepared by Centre for Wind Energy Technology, Chennai, gives the Gross potential as 3809MW⁸. However, current installed capacity in Tamil Nadu does already exceed the former level, while nearly reaching the second

⁶ White paper on Strategy for 11th Plan, CEA & CII, August 2007.

⁷ “Wind energy” (Renewable Energy Booklet 6), Ministry of Non-Conventional Energy Sources, Government of India, Table 1, see <http://www.mnes.nic.in/booklets/Book6-e.pdf>.

⁸ “Wind energy” (Renewable Energy Booklet 6), Ministry of Non-Conventional Energy Sources, Government of India, Figure on page 9, see <http://www.mnes.nic.in/booklets/Book6-e.pdf>.



estimate. The latest annual report of MNES shows that the additions of wind capacity in Tamil Nadu is slowing rapidly, and has now reached 3711MW in 2007-2008 (see Table 10 below).⁹

Table 10 State-wise & Year-wise wind power installed capacity (MW)

	Up to 31.03.2002	2002- 03	2003- 04	2004- 05	2005- 06	2006- 07	2007- 08*	Total
Tamil Nadu	877.0	133.6	371.2	675.5	857.6	577.9	218.8	3711.6
India	1666.8	242.0	615.2	1111.7	1716.2	1742.1	750.6	7844.5

Note: * up to 31.12.2007.

Source: Annual Report 2007-2008, Ministry of Non-Conventional Energy Sources, Government of India, Chapter 5, Grid-interactive and off-grid renewable power.

Therefore, while prevailing practise is thermal generation, there are too many new wind power projects to list here, with a total added capacity in 2007-2008 of 218.8MW.

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

There are significant wind power capacity additions in the Southern Grid region. However, many installations have received CDM registration, or are applying for carbon finance. Indeed, 1473 MW of capacity in Tamil Nadu is listed in the UNEP Risoe CDM Pipeline.¹⁰ In the 11th plan, the Indian government has set a target for continuing rapid expansion of wind power capacity, which will be assisted by the CDM.

Most similar projects in Tamil Nadu are being implemented by domestic corporations, which can rely on a package of incentives including fiscal incentives such as 80% accelerated depreciation, custom duty concessions, sales tax exemption on profits for power generation, etc.¹¹ These incentives, taking into account in the analysis in Step 2 above, do not necessarily make the wind power project attractive on their own. However, the incentives such as accelerated depreciation can be used to effectively offset tax liabilities from other business activities within the same corporation. Therefore, similar projects that may occur are likely to be economically attractive only as part of a larger business, offsetting costs in the company but outside the wind power project.

Very few similar projects, therefore, are being implemented in the region without also applying for CDM registration.

→ ***If Sub-steps 4a and 4b are satisfied, i.e. similar activities cannot be observed or similar activities are observed, but essential distinctions between the project activity and similar activities can reasonably be explained, then the proposed project activity is additional.***

In conclusion, all the steps above are satisfied, the proposed CDM project activity is not the baseline scenario and is additional.

⁹ Annual Report 2007-2008, Ministry of Non-Conventional Energy Sources, Government of India, Chapter 5, Grid-interactive and off-grid renewable power, see

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

¹⁰ UNEP Risoe CDM/JI Pipeline Analysis and Database, 1 December 2008 (<http://www.cdmpipeline.org/>).

¹¹ Annual Report 2007-2008, MNES (as above).

**B.6. Emission reductions:****B.6.1. Explanation of methodological choices:**

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Baseline Emission Calculation

According to ACM0002, the baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$$BE_y = (EG_y - EG_{baseline})EF_{grid,CM,y}$$

Where:

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

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

$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh).

For new power plants this value is taken as zero. The proposed project is a new power plant, so this value is 0.

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”.

The baseline emission factor (EF_y) is calculated as a combined margin ($EF_{grid,CM,y}$), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BMy}$) factors according to the following six steps defined in the “Tool to calculate the emission factor for an electricity system”.

The baseline data is based on the Central Electricity Authority (CEA) published study for baseline emission factors for the Indian regional grids. CEA is a statutory body under the Ministry of Power, Government of India, which monitors and reports the electricity generation, transmission, and distribution performance of the power utilities in India. CEA has published baseline carbon dioxide emission database for all regional power grids in India, which is accepted by the Indian DNA.¹²

The calculation of the emission factor of the South India regional grid below, follows the 6-step approach of the “Tool to calculate the emission factor for an electricity system” (version 01.1).

STEP 1. Identify the relevant electric power system

The project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. As described in Section B.3. the regional grid delineation in India has been determined and has been used by the Central Electricity Authority and is accepted by the Indian DNA.¹³ Electricity transfers are accounted for. The baseline calculations by CEA are used in this document.

STEP 2. Select an operating margin (OM) method

¹² Central Electricity Authority, *CO₂ Baseline Database for the Indian Power Sector*, Version 4.0, September 2008, see www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm.

¹³ www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm.



The Operating Margin can be based on one of four methods. According to ACM0002, the Simple OM method is applicable if the low-cost/must run resources constitute less than 50% of total grid generation in average of the five most recent years. According to CEA, the maximum share of low-cost/must-run generation in the last five years in the Southern Region grid was 28.3% (see Annex 3). The Simple OM method therefore is applicable to the proposed project.

The Simple OM is calculated ex-ante using a 3-year generation-weighted average. This allows the Simple OM to be fixed for the first crediting period.

STEP 3. Calculate the operating margin emission factor according to the selected method

The Central Electricity Authority (CEA) CO₂ Baseline Database for the Indian Power Sector, following ACM0002, calculates the Simple OM as the generation-weighted average emissions per electricity unit (tCO₂/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants.

The Simple OM is calculated as:

$$EF_{OM} = \frac{\sum_{i,m} (FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y})}{\sum_m EG_{m,y}} \quad (1)$$

where:

- $FC_{i,m,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *m* in year(s) *y*;
- m* refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including import to the grid;
- NCV_i is the calorific value (energy content) per mass or volume unit of a fuel *i*;
- $EF_{CO2,i}$ is the CO₂ emission factor per unit of energy of the fuel *i*.
- EG_m is the electricity (MWh) delivered to the grid by source *m*.

Where available, local values of NCV_i and $EF_{CO2,i}$ should be used. If no such values are available, country-specific values (see e.g. IPCC Good Practice Guidance) are preferable to IPCC world-wide default values. According to the CEA, the emission factors and gross/net caloric values were based on the values provided in India's National Communication under the UNFCCC, and that the low end values of the 95% confidence intervals indicated by IPCC were used, in line with the Grid Tool.¹⁴

According to ACM0002, if net imports do not exceed 20% of total generation in the project electricity system, the average emission rate of the exporting grid is adopted. Therefore, the import-adjusted data from CEA is used. However, imports to the project electricity system have been 0% during the last three years.

The Simple OM is calculated ex-ante using a 3-year generation-weighted average. This allows the Simple OM to be fixed for the first crediting period. Table 11 presents CEA's calculated OM values for the last three years available, as well as the generation and the weighted average for the last three years.

Table 11. 3-year generation weighted OM values

¹⁴ See CEA CO₂ Baseline Database for the Indian Power Sector, User Guide, Version v4.0, October 2008, see www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm.



Year	2005-06	2006-07	2007-08	Total
Absolute emissions OM (tCO ₂ e)	101,551,293	109,020,456	113,626,240	324,197,989
Net generation in Operating Margin (GWh)	100,978	109,116	114,702	324,796
Emission factor (tCO ₂ e/MWh)	1.01	1.00	0.99	
EF_OM				1.00

STEP 4. Identify the cohort of power units to be included in the build margin

The Build Margin emissions factor is the generation-weighted average emissions factor (tCO₂/MWh) of the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently, as this set of power units comprise the larger annual generation. The build margin emission factor is also taken from the CEA CO₂ Baseline Database.

STEP 5. Calculate the build margin emissions factor

The Build Margin emissions factor is the generation-weighted average emissions factor (tCO₂/MWh) of all power units *m* during the most recent year *y*, calculated as follows:

$$EF_{BM} = \sum_{i,m} (EG_{m,y} * EF_{EL,my}) / \sum_m EG_{m,y} \quad (2)$$

where:

- $EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y*;
- $EF_{EL,m,y}$ is the CO₂ emission factor of power unit *m* in year *y*;
- m* Power units included in the build margin;
- y* Most recent historical year for which power generation data is available.

The CO₂ emission factor of each power unit *m* ($EF_{EL,m,y}$) is determined as follows:

$$EF_{EL,m,y} = \sum_i (FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y}) / EG_{m,y} \quad (3)$$

Where FC, NCV, EF_{CO2} and EG are analogous to the variables in Step 3.

According to the CEA CO₂ Baseline Database EF_{BM} is 0.71 tCO₂/MWh.

Calculation of baseline emission factor (EF)

The combined margin emissions factor for wind farms is calculated as the weighted average of the simple OM and BM.

$$EF = w_{OM} * EF_{OM} + w_{BM} * EF_{BM} \quad (4)$$

Where the weights w_{OM} and w_{BM} , are 75% and 25% respectively.

This means that EF is calculated as 0.93 tCO₂/MWh

Calculation of baseline emissions due to displacement of electricity

The baseline emissions from the displacement of electricity from the grid can now be calculated from the



baseline emissions factor and the electricity generated, net of losses and own consumption, and exported to the grid. With no electricity generation on-site in the baseline, the baseline emissions can be calculated as follows:

$$BE_y = EF * EG_y$$

Where:

BE_y are baseline emissions due to displacement of electricity during the year y in tonnes of CO₂;
 EG_y is the net quantity of electricity generated in the project activity during year y;
 EF is the CO₂ baseline emission factor for the electricity displaced due to the project activity as calculated above.

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

Data / Parameter:	EF
Data unit:	tCO ₂ /MWh
Description:	CO ₂ emission factor of the grid
Source of data used:	Calculated from the CEA published study for baseline emission factors for Indian regional grids. (www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)
Value applied:	0.93
Justification of the choice of data or description of measurement methods and procedures actually applied :	CEA is a statutory organisation constituted by the Government of India to advise on the matters relating to the national electricity policy, CEA also collects and record the data concerning to the generation, transmission, trading, and distribution. CEA has developed carbon dioxide emission baseline database for the Indian regional grids.
Any comment:	The emissions factor has been calculated ex-ante, and is fixed for the duration of the crediting period.

Data / Parameter:	EF _{OM}
Data unit:	tCO ₂ /MWh
Description:	CO ₂ operating margin emission factor of the grid
Source of data used:	Calculated from the CEA published study for baseline emission factors for Indian regional grids. (www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)
Value applied:	1.00
Justification of the choice of data or description of measurement methods and procedures actually applied :	CEA is a statutory organisation constituted by the Government of India to advise on the matters relating to the national electricity policy, CEA also collects and record the data concerning to the generation, transmission, trading, and distribution. CEA has developed carbon dioxide emission baseline database for the Indian regional grids.
Any comment:	EF _{OM} has been calculated ex-ante, and is fixed for the duration of the



	crediting period.
Data / Parameter:	EF _{BM}
Data unit:	tCO ₂ /MWh
Description:	CO ₂ build margin emission factor of the grid
Source of data used:	The data is based on the CEA published study for baseline emission factors for Indian regional grids. (www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)
Value applied:	0.71
Justification of the choice of data or description of measurement methods and procedures actually applied :	CEA is a statutory organisation constituted by the Government of India to advise on the matters relating to the national electricity policy, CEA also collects and record the data concerning to the generation, transmission, trading, and distribution. CEA has developed carbon dioxide emission baseline database for the Indian regional grids.
Any comment:	EF _{BM} has been calculated ex-ante, and is fixed for the duration of the crediting period.
Data / Parameter:	FC _i
Data unit:	mass or volume
Description:	Amount of fossil fuel consumed by each power plant
Source of data used:	The data is based on the CEA published study for baseline emission factors for Indian regional grids. (www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)
Value applied:	As per the CEA Study indicated above
Justification of the choice of data or description of measurement methods and procedures actually applied :	Obtained from power producers, dispatch centres or latest local statistics
Any comment:	Historic data is used to calculate the emissions factor ex-ante.
Data / Parameter:	EG _m
Data unit:	MWh/y
Description:	Electricity generation of each power plant m
Source of data used:	The data is based on the CEA published study for baseline emission factors for Indian regional grids. (www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)
Value applied:	As per the CEA Study indicated above
Justification of the choice of data or description of	Used in the calculation of Simple OM/BM



measurement methods and procedures actually applied :	
Any comment:	Historic data is used to calculate the emissions factor ex-ante.

Data / Parameter:	NCV _i
Data unit:	GJ / mass or volume unit
Description:	Net caloric value (energy content) of fossil fuel type i
Source of data used:	The CEA published study for baseline emission factors for Indian regional grids uses IPCC 2006 and National statistics.
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Using the latest IPCC data and the national data (Annual Statistics of Central Electricity Authority) for NCV of coal.
Any comment:	

Data / Parameter:	EF _{CO₂,i}
Data unit:	tCO ₂ /GJ
Description:	CO ₂ emission factor of fossil fuel type i
Source of data used:	The CEA published study for baseline emission factors for Indian regional grids uses IPCC 2006 and National statistics.
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Using the latest IPCC data and the national data (Annual Statistics of Central Electricity Authority) for NCV of coal.
Any comment:	

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

>>

The Baseline Emissions (BE_y, in t CO₂), for each year y, are calculated by multiplying the baseline emissions factor (EF, in tCO₂/MWh) by the net supplied power of the project (EG_y, in MWh), as above:

$$BE_y = EF * EG_y \quad (5)$$

With the baseline emissions factor (EF) calculated using operating and build margins as described in detail in sector B.6.1.

It is projected that the net power generation from proposed project, once fully operational, will be 7,776 MWh per year. Thus, baseline emissions are:

$$BE = EG \cdot EF = 7,776 \text{ MWh} \times 0.93 \text{ tCO}_2/\text{MWh} = 7,208 \text{ tCO}_2.$$



Both project emissions (PE_y) and leakage emissions (L_y) are zero, therefore total emissions from the project activity are zero.

The emission reduction ER_y by the project activity during a giving year y (once fully operational) is 7,208 tCO₂ and the total emission reduction in the first 7-year crediting period is 50,456 tCO₂.

The values obtained are presented in the table in section B.6.4.

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

>>

Table 12. Values obtained when applying formulae above (tCO₂e)

Period	Estimation of the project activity emissions (tCO ₂ e)	Estimation of the baseline emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Estimation of overall emission reductions (tCO ₂ e)
2009	0	7,208	0	7,208
2010	0	7,208	0	7,208
2011	0	7,208	0	7,208
2012	0	7,208	0	7,208
2013	0	7,208	0	7,208
2014	0	7,208	0	7,208
2015	0	7,208	0	7,208
Total (tCO₂e)	0	50,456	0	50,456

Note: Using 12-monthly periods from the start of the crediting period

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

>>

All data collected as part of the monitoring are archived electronically and kept at least for 2 years after the end of the last crediting period. 100% of the data are monitored if not indicated otherwise in the tables below. All measurements are conducted with calibrated measurement equipment according to relevant industry standards.

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity supplied to the grid by the project in period y
Source of data to be used:	Suzlon's Central Monitoring System (CMS)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Net supplied power is expected to be 7,776 MWh/y
Description of measurement methods and procedures to be	All turbines are connected to the CMS through fibre optic cables/radio modems, allowing continuous monitoring. Meter readings are provided by the utility (TNEB) every month, providing a



applied:	statement for the previous 30 days period. Net generation is calculated from exports (generation) minus imports (consumption).
QA/QC procedures to be applied:	Cross-check by receipt of sales
Any comment:	Generation details are provided on a daily basis by the operator to the project participant. Data is also uploaded on a web site.

B.7.2. Description of the monitoring plan:

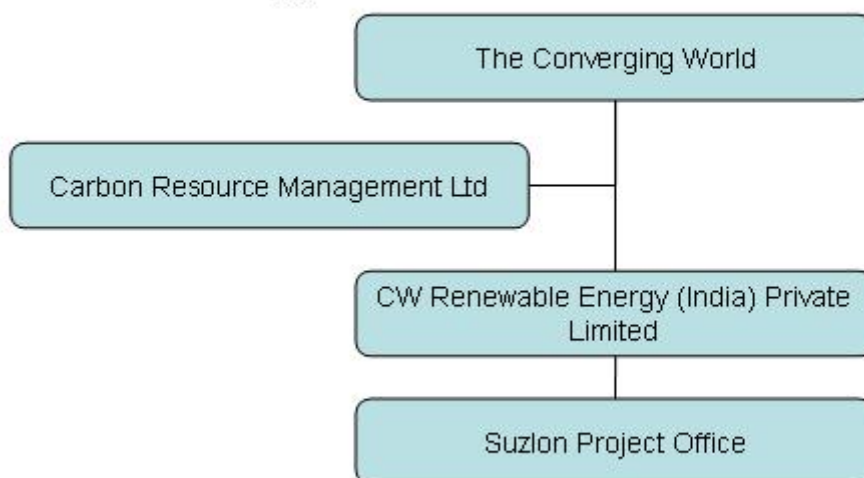
>>

The operation and maintenance of the proposed project activity is contracted out to Suzlon, who are an experienced operator and developer of wind farms in India.

Suzlon's onsite project office will be responsible for operation and maintenance of the wind farm, as well as the monitoring and reporting requirements of the CDM project.

The operating and management structure is illustrated as follows:

The Converging World Renewable Energy India Wind Farm



The detailed monitoring plan is presented in Annex 4.

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

>>

Date of completion of the baseline study and monitoring methodology: 18 November 2008.



Contact information of the person(s)/entity(ies) responsible:

Entity(ies)	Contact details	Project participant
Carbon Resource Management Ltd.	Mr Christiaan Vrolijk cv@carbonresource.com +44 20 7016 1426	No

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:

>>

01/07/2008 (contract for first turbine)

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

>>

20y-0m

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:

>>

01/01/2009 (or date of registration, whichever is later)

C.2.1.2. Length of the first crediting period:

>>

7y-0m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

N/A

C.2.2.2. Length:

>>

N/A

SECTION D. Environmental impacts

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

>>



Wind power is one of the cleanest sources of renewable energy, with no associated emissions and waste products. In India, wind power projects do not require an Environmental Impact Assessment. As per the Schedule 1 of Ministry of Environment and Forests (MoEF – Government of India) notification dated 14 September 2006. For details see <http://envfor.nic.in/legis/eia/so1533.pdf>.

The proposed project does not fall under the list of activities requiring EIA as it will not involve any negative environmental impacts. Also in regard to the Gold Standard requirements, no issues are identified which scored -1 in the Sustainable Development Matrix, therefore not necessitating an EIA. Additionally, the wind turbines of the proposed project activity are added to an already-existing wind farm site, thus avoiding any impacts on “unspoiled” areas. Therefore no EIA study was conducted. However certain significant impacts are discussed below:

Noise pollution

The wind farm is located in a designated wind zone, and hence do not cause residents of the area any concern.

Flora and fauna

Prior to the establishment of the wind farm, the area was mostly barren land. The impact of the wind farm construction on flora and fauna, therefore, is minimal.

Bird kill in these areas is not a common phenomenon. The wind farm is not in the path of migratory birds. There have been no serious incidents involving birds and wind turbines in the area to the best of our knowledge.

Visual impact

As gathered in the stakeholder analysis, the presence of the wind mills does not have a negative impact on the surrounding villagers in terms of visual impact. The majority of the persons spoken to, were not concerned about the wind mills in the area.

Social Impacts

The social impact of the project is positive. The Project does not displace people nor interfere in their daily life. It provides employment during construction and operation. The Project has also had positive impacts since the infrastructure like roads and communication was developed in the area.

Hence it can be concluded that there are no negative impacts associated with this project.

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:

>>

The environmental impacts are not considered significant.

SECTION E. Stakeholders' comments

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

>>

A stakeholder meeting was held in the village near the proposed site of the wind farm on 17 February 2008. Local, national and international stakeholders were invited. The local people were invited by making an earlier site visit on 24 January 2008. In total about 50 people attended.

At the meeting, an introduction to the proposed project and the objective of the stakeholder meeting was given by a representative of The Converging World. A representative of the turbine supplier and operator, Suzlon, answered any technical questions. Questionnaires for the local stakeholders were distributed at the meeting. Questionnaires had also been sent to national and international NGOs.

E.2. Summary of the comments received:

>>



All of the returned questionnaires (49) agreed with the construction of the project. 48 stakeholders thinking the overall impact of the project would be positive, and 1 negative. 47 stakeholders assumed there would be economic benefits, mostly jobs, for the local area. However, 27 people responded that the project would have some negative impact on the environment, mentioning mostly noise (22), impact of wildlife (14), and sight spoiling (7).

At the meeting it was mentioned that this was the first opportunity that stakeholders have had to seriously comment on the development of wind farms despite several projects in the area. The stakeholders indicated that they were very happy with this opportunity. Many of the more detailed comments (see



annex) therefore relate as much if not more to these other existing projects rather than the proposed TCW wind farm.

Further comments related to land use, availability of labour, noise, damage to roads, waste from construction and the damage to irrigation canals resulting from the construction and construction traffic.

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

>>

A detailed response by TCW to the issues raised is given in the annex, with TCW aiming to minimise any negative impact and maximise any positive impact on the local area. In particular TCW commits to follow up the stakeholder process with an ongoing opportunity for the villagers to give feedback, through the local liaison team of SCAD.

As a result of the stakeholder consultation TCW commits to the following:

- TCW will liaise with the local community to determine the best use of the land on which the wind farm is constructed.
- TCW will investigate the impact of the proposed project on the availability of agricultural labourers.
- None of the turbines will be constructed within 500m of the nearest residence.
- Through SCAD continue to give stakeholders an opportunity for feedback on any issues related to the proposed wind farm, including through further stakeholder meetings.
- Repair irrigation canals damaged by the construction of the proposed project.
- Restore habitat around the turbines.
- Appropriate collection and disposal of all construction waste from the project.

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

Organization:	CW Renewable Energy (India) Private Limited
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No ODA or Annex I Government funding received. The project does not benefit from any public funding.

**Annex 3****BASELINE INFORMATION**

The electricity baseline emission factor for southern grid is taken from Baseline Carbon dioxide emission database Version 4.0 of Central Electricity Authority, India.

See <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm> for details.

Share of must-run generation in the Southern grid (hydro/nuclear) (% of net generation)

Year	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Share	28.1	25.5	18.3	16.2	21.6	27.0	28.3	27.1

Source: CEA database.



Annex 4

MONITORING INFORMATION

1. Introduction

The Converging World Renewable Energy India Wind Farm adopts the approved consolidated monitoring methodology ACM0002 “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources” (version 08, EB 44) to determine the emission reductions from the net electricity supplied by the Wind Farm.

2. Responsibility

The Converging World has outsourced the operation and maintenance, including the monitoring and reporting following this monitoring plan, to Suzlon an experienced turbine manufacturer, developer and operator.

3. Installation of meters

The output from each of the turbines will be metered at the on-site project office. Each of the wind turbines is individually connected by fibre optic cable/radio modem to the Central Monitoring System (CMS), allowing continuous monitoring.

The utility (TNEB) records the main meter reading every month during the 10th to 15th day of the month and provides a statement for the previous 30 day period. This main meter is a Trivector Meter, recording imports and exports.

The meters are of the 0.5 accuracy class, i.e. having a variation of less than 0.5%.

4. Calibration

The main meter is first calibrated on commissioning, and then calibrated again once every two years by TNEB, as per industry practice, or during any maintenance.

The operator, Suzlon, is responsible for the calibration and maintenance of the CMS, which will be calibrated as per industry practice, or during any maintenance.

5. Monitored data

During the first seven operating years, the net electricity supplied to the grid (EG_y) will be monitored and recorded following the procedures above.

All data is continuously recorded in the Central Monitoring System, and is uploaded daily to a secure web site and emailed to the project participants.

6. Quality control

Net electricity supplied to the grid will be double checked with receipt of sales.



This audit will check compliance with operational procedures in this monitoring plan.

This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years.

7. Data management system

Physical document such as paper-based maps, diagrams and environmental assessments will be collated in a central place, together with this monitoring plan. In order to facilitate auditors' reference of relevant literature relating to the project, the project material and monitoring results will be indexed.

And all data including calibration records are archived electronically and be kept until 2 years after the end of the total crediting period of the CDM project.
