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

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

>>
Title: The Converging World Renewable Energy India Wind Farm
PDD version: 1.2
Date: 28 March 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

A.2. Description of the project activity:

>>
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 Converging World Renewable Energy India Wind Farm will consist of 17 wind turbines, each of which will have a capacity of 1.5 MW, to be installed over a period of 3 years. When completed the 25.5 MW wind farm is expected to generate approximately 66 GWh/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).

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 61,469 tCO2e.

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. About 25% of the revenue from green electricity sales will

be donated to TCW's local partner, the NGO SCAD ("Social Change and Development"), to invest in community development. The remainder of the revenue will go towards financing new wind turbines. The projected emission reductions will be retired by the project sponsors up to the value of the original investment, with the revenues from any remaining reductions re-invested in further low-energy and sustainable development projects.

Table 1 Summary Gold Standard Sustainable Development Screen

Component • Indicators	**Score (-2 to 2)**
Local/regional/global environment	
• Water quality and quantity	0
• Air quality (emissions other than GHGs)	+1
• Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases)	0
• Soil condition (quality and quantity)	0
• Biodiversity (species and habitat conservation)	0
Sub total	*+1*
Social sustainability and development	
• Employment (including job quality, fulfilment of labour standards)	+1
• Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services)	+1
• Human and institutional capacity (including empowerment, education, involvement, gender)	+2
Sub total	*+4*
Economic and technological development	
• Employment (numbers)	+1
• Balance of payments (sustainability)	+1
• Technological self reliance (including project replicability, hard currency liability, skills development, institutional capacity, technology transfer)	+1
Sub total	*+3*
TOTAL	**+8**

Note: A detailed assessment of the matrix is presented in Annex 5.

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):

>>
India

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

>>
Tamil Nadu

A.4.1.3. City/Town/Community etc:

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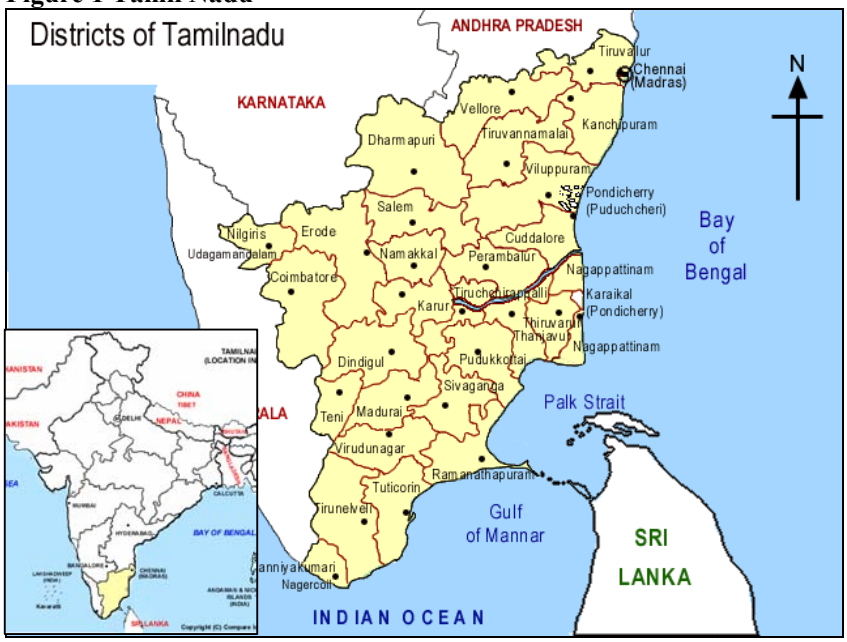
Tirunelveli district (in the south of Tamil Nadu)

Figure 1 Tamil Nadu



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

>>
Udayathur Village at Chidamparapuram Panchayat in Radhapruam Taluk
Lat: 8o 15` 36.33``N; Long: 77 o 44`59.97``E.

Figure 2 Chidamparapuram in Tirunelveli district

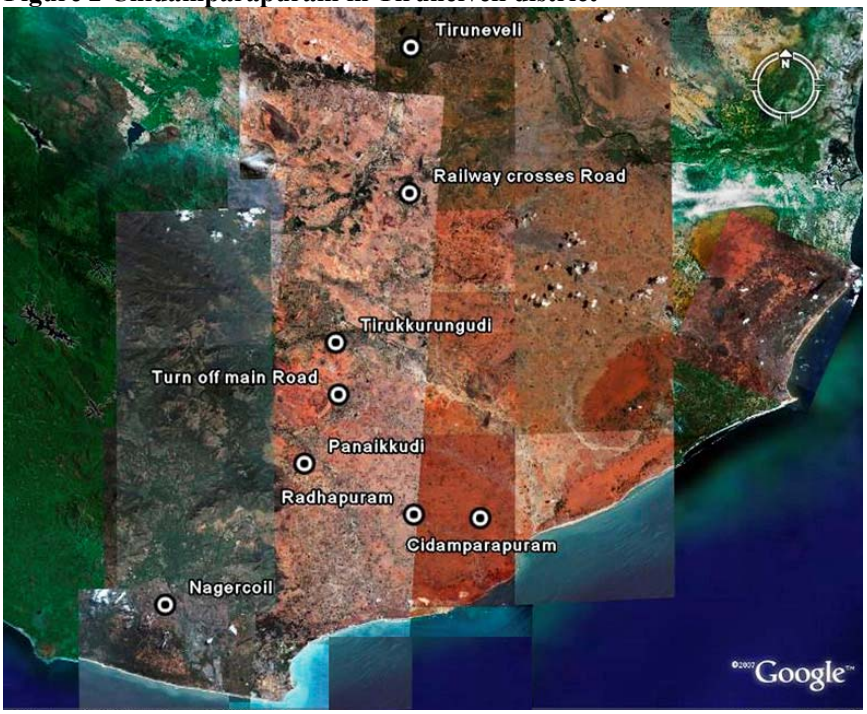
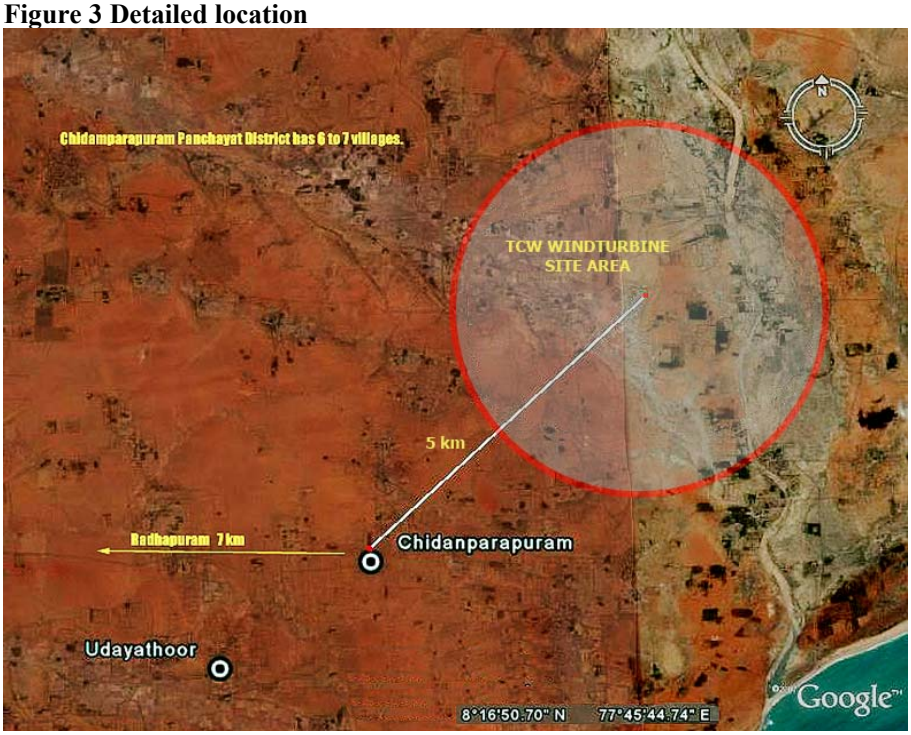


Figure 3 Detailed location



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 17 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 2.

Table 2. 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 (variable depending on site)
Capacity (kW)	1500

With the wind resource available on site, each turbine is expected the generate 4.32 million kWh per year (gross). The proposed project activity is expected to generate 66 GWh per year once fully commissioned, net of own consumption and losses. 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 4 Monthly electricity output variation

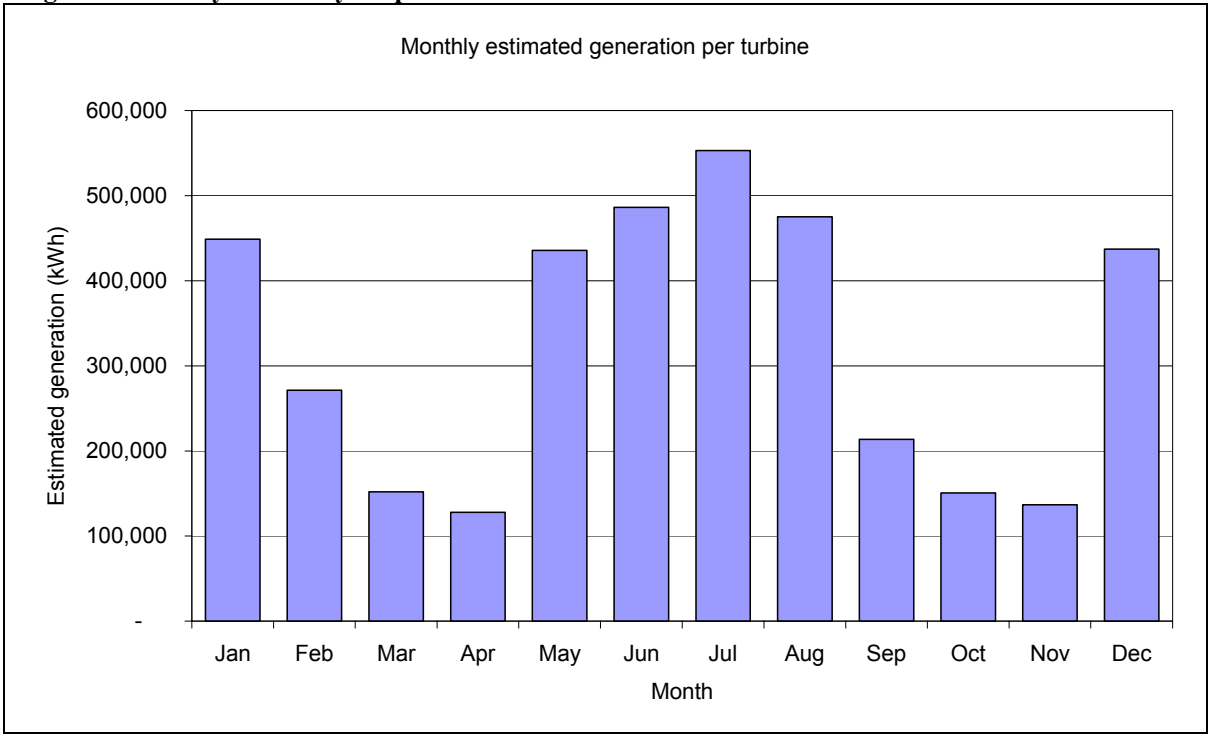

Table 3 describe the time schedule of the implementation of the project.

Table 3. Time schedule of the implementation of the project

Milestone	Date
CDM discussions with consultant	Jan 2007
CDM development agreement	Jun 2007
Stakeholder meeting	Feb 2008
Purchase order for first turbines	Mar 2008
Start construction for first turbine	Mar 2008
Commissioning of first two turbines	Jun 2008
Expected commissioning of last turbine	Sep 2010

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 52,882 tCO2e/year over the first 7-year crediting period.

Table 4. Estimated emission reductions from the proposed project activity (tCO2e)

Period*	Estimated emisison reductions
2008	21,402
2009	43,097
2010	59,800
2011	61,469
2012	61,469
2013	61,469
2014	61,469
Total	**370,177**
Crediting period	7 years
Average reductions	52,882

*Note: * 12-monthly periods from the start of the crediting period, not calendar years.*

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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- Baseline methodology: ACM0002 (version 07, EB 36) "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
- Monitoring methodology: ACM0002 (version 07, EB 36) "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources"
- Additionality tool (version 04, EB 36) "Tool for the demonstration and assessment of additionality"
- Emission factor tool (version 01, EB 35) "Tool to calculate the emission factor for an electricity system"

Each of these documents is available from http://cdm.unfccc.int/methodologies/approved.

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 4 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 fro the other regional grids to the Southern Grid.

Table 5. Sources and gases in the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Grid	CO2	Yes	Following ACM0002
		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	

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

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 project activities that do not modify or retrofit an existing electricity generation facility 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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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.

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.

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-step1a. 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 economically or financially less attractive than at least one other alternative, identified in step 1, 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):

The proposed project activity generates financial benefits by the sales of electricity, so the simple cost analysis (Option I) should not be applied. The investment comparison analysis (Option II) is suitable for an investment project which has a similar type alternative project. The alternative of the proposed project is comparable capacity or electricity generation addition provided by the Southern Grid, not a concrete project, so Option II is not suitable, either.

Therefore, the benchmark analysis (Option III) is adopted.

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[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.)

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. 12%.

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

The data for the financial estimation is presented in Table 6. This data is based on the first two wind turbines being installed by Suzlon. The same financial analysis can be made for each turbine individually in accordance with the schedule for installations of the remaining 15 turbines. All variables are taken from the Suzlon 1500 kW Feasibility Report.

Table 6. Key Data for the financial assessment

Item	Value
Electricity generated per turbine	3.32 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	12%
Loan term	12 years

Source: Suzlon Financial Analysis, September 2007.

Table 7 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 7. Investment analysis of the proposed project (IRR)

Project IRR (post tax)	
without CDM	with CDM
8.03%	13.63%

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 8 IRR sensitivity analysis for the project

Variable	-10%	+10%
Investment cost per turbine	10.49%	7.35%
Annual O&M costs	9.17%	8.35%
Tariff	6.77%	10.72%
Generation	6.77%	10.72%

The sensitivity analysis shows that without CER revenue the IRR of the project is unlikely to reach the benchmark 12%. 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. Similarly, the project would need to either obtain a much higher feed in tariff or have much greater generation then expected. However, it is not expected that the tariff will be increased. 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.

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 the proposed CDM 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), then proceed to Step 3 (Barrier analysis) or Step 4 (Common practice analysis).

The financial analysis shows that the project is not the most financially attractive alternative, and the sensitivity analysis shows that it is unlikely to be financially 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 8.03% after tax, which is significantly below the Indian Bank interest rates, which currently stand at 12.50%.[4] This means that the equity return is actually negative.[5]

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.[6]

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.

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[4] http://www.indianbank.in/interest.htm#plr

[5] Suzlon calculations provided to DOE.

[6] Each turbine is expected to generate 4.32 million kWh per year, which net of own use and losses is 77,760 MWh over a 20 year lifetime of the turbine. Lifetime emission reductions, therefore, are calculated to be 72,317 tCO2e per turbine, assuming a constant grid emissions factor of 0.93 tCO2e/MWh.

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)

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

	2002-03		2003-04		2004-05	
Fuel	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 power[7] as shown below.

Table 10. Planned additions during the 11th plan

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

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

[7] White paper on Strategy for 11th Plan, CEA & CII, August 2007.

There are significant wind power capacity additions in the Southern Grid region. However, most installations have received CDM registration, or are applying for carbon finance. Indeed, 1170 MW of capacity in the Southern Grid region, and 719 MW in Tamil Nadu alone, is listed on the UNFCCC website.[8] 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.

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.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Baseline emissions due to displacement of electricity

For the displacement of electricity, the baseline scenario is the electricity that would have been generated by the operation of grid-connected power plant and by the addition of new generation sources, in absence of the project activity.

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.[9]

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).

STEP 1. Identify the relevant electric power system

The project electricity system is defined by the special 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

[8] As of 21 November 2007.

[9] Central Electricity Authority, *CO2 Baseline Database for the Indian Power Sector*, Version 2.0, June 2007, see www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm.

Indian DNA.[10] Electricity transfers are accounted for. The baseline calculations by CEA are used in this document.

STEP 2. Select an operating margin (OM) method

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 27%. 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:

$$EF\_OM = \Sigma i,m\ (FC\_i,m,y * NCV\_i,y * EF\_CO2,i,y) / \Sigma m\ EG\_m,y \qquad (1)$$

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 net 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 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 x 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.

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

Table 11. 3-year generation weighted OM values

EF_OM	2003-04	2004-05	2005-06	3-year
Emissions (tCO2)	108,049,156	105,539,862	101,712,149	315,301,166
Included generation (GWh)	107,603	105,568	100,978	314,150
Imports (GWh)	0	0	0	-
EF_OM (tCO2/MWh)	1.00	1.00	1.01	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:

$$EF\_BM = \Sigma i,m\ (EG\_m,y * EF\_EL,my) / \Sigma m\ EG\_m,y \qquad (2)$$

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:

$$EF\_EL,m,y = \Sigma i\ (FC\_i,m,y * NCV\_i,y * EF\_CO2,i,y) / EG\_m,y \qquad (3)$$

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.

$$EF = w\_OM * EF\_OM + w\_BM * EF\_BM \qquad (4)$$

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:

$$BE\_y = EF * EG\_y \quad (5)$$

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:	tCO2/MWh
Description:	CO2 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 all Indian regional grids. The database is updated annually. The current (second) version covers emission factors for five fiscal years 2002-2006.
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:	tCO2/MWh
Description:	CO2 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	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.

applied :	CEA has developed carbon dioxide emission baseline database for all Indian regional grids. The database is updated annually. The current (second) version covers emission factors for five fiscal years 2002-2006.
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:	tCO2/MWh
Description:	CO2 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 all Indian regional grids. The database is updated annually. The current (second) version covers emission factors for six fiscal years 2000/2001 – 2005/2006.
Any comment:	EFBM 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%20we

	bsite.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 :	Used in the calculation of Simple OM/BM
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:	tCO2/GJ
Description:	CO2 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 CO_2), for each year y, are calculated by multiplying the baseline emissions factor (EF, in tCO_2/MWh) by the net supplied power of the project (EG_y, in MWh), as above:

$$BE\_y = EF * EG\_y \qquad (5)$$

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 66,096 MWh per year. Thus, baseline emissions are:

BE = EG • EF = 66,096 MWh × 0.93 tCO_2/MWh = 61,469 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 61,469 tCO_2 and the total emission reduction in the first 7-year crediting period is 370,177 tCO_2.

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*	Project	Baseline	Leakage	Emission reductions
2008	0	21,402	0	21,402
2009	0	43,097	0	43,097
2010	0	59,800	0	59,800
2011	0	61,469	0	61,469
2012	0	61,469	0	61,469
2013	0	61,469	0	61,469
2014	0	61,469	0	61,469
Total	**0**	**370,177**	**0**	**370,177**

*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:

Following approved methodology ACM0002, the data that is required to be monitored to establish the emission reductions, is the net supplied power (EG_y).

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 66,096 MWh/y (once fully operational)
Description of measurement methods	All turbines are connected to the CMS through fibre optic cables/radio modems, allowing continuous monitoring.

and procedures to be applied:	Meter readings are provided by the utility (TNEB) every month, providing a statement for the previous 30 days period.
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.

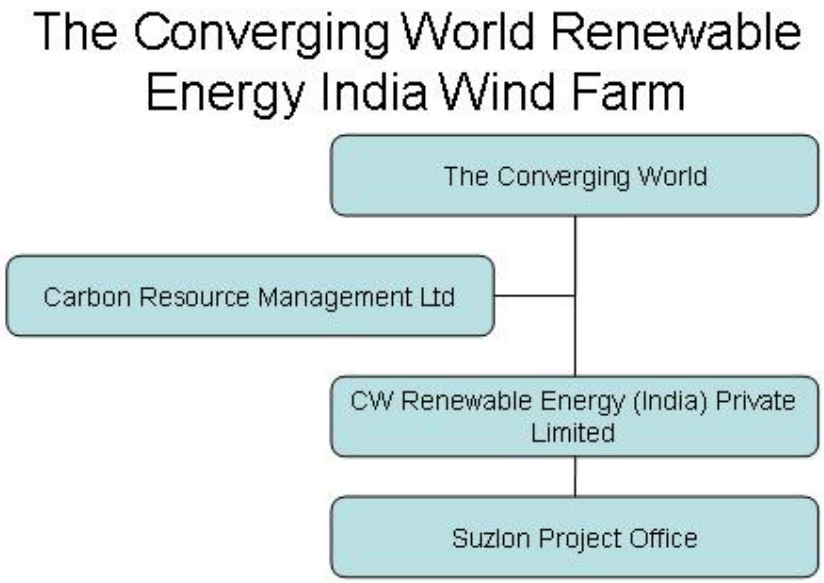
B.7.2. Description of the monitoring plan:

>>

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 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: 20 December 2007.

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 +44 117 980 9442	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:

>>
01/03/2008 (purchase order of 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:

>>
01/07/2008 (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:

>>

A detailed description of the stakeholder consultation is given in the annex.

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
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	The Converging World
Street/P.O.Box:	No 70 Prince Street
Building:	
City:	Bristol
State/Region:	
Postfix/ZIP:	BS1 4HU
Country:	UK
Telephone:	+44 117 917 7200
FAX:	+44 117 917 7201
E-Mail:	
URL:	www.theconvergingworld.org
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	

Direct FAX:	
Direct tel:	
Personal E-Mail:	

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 2.0 of Central Electricity Authority, India.

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

Relevant grid

The relevant grid for the determination of baseline emission factor is selected as the Southern Region grid. This is because although 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 4 regional grids.

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

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

Operating Margin

The Simple OM emissions factor is calculated from Central Electricity Authority (CEA), India published Baseline Carbon dioxide emission database version 2.0. Central Electricity Authority is a statutory body under 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. The data for the operating margin emission factor calculations for the southern grid are available at http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Summary of OM data and calculation

EF_OM	2003-04	2004-05	2005-06	3-year
Emissions (tCO2)	108,049,156	105,539,862	101,712,149	315,301,166
Included generation (GWh)	107,603	105,568	100,978	314,150
Imports (GWh)	0	0	0	-
EF_OM (tCO2/MWh)	1.00	1.00	1.01	1.00

Build Margin

Build margin emission factor is also taken from the CEA published Baseline Carbon dioxide emission database version 2.0.

Summary of BM data and calculation

EF_BM	2005-06
Emissions (tCO2)	20,029,713
Included generation (GWh)	28,158
EF_BM (tCO2/MWh)	0.71

Combined Margin

The weight for operating and build margin emission factors (w) is 0.75 and 0.25 by default for wind projects. Based on this, the combined margin for the southern grid is 0.86 tCO_2e/MWh.

Summary of CM data and calculation

EF_OM (3-year)	1.00
w_OM	0.75
EF_BM	0.71
w_BM	0.25
EF	0.93

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 07, EB 36) 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.

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.

Additional Gold Standard monitoring

Annex 5 of the PDD is updated annually in the monitoring report, including where applicable referring to SCAD projects supported through the project.

Annex 5

ADDITIONAL INFORMATION REQUIRED FOR GOLD STANDARD

Ad A.2 List of sustainable development indicators

A Local/global environmental sustainability	**+1**
A.1 Water	
Dependent on the result of the EIA, both quantity and quality assessment should discuss seasonal variation of availability and quality in addition to mean annual data due to the fact that mean annual data might not be sufficient to provide full understanding of impacts of the project activity against the baseline.	
A.1.1 Water quantity	0
This indicator is used to evaluate the project's contribution to water availability and access	

locally and regionally. Number of people with access to water supply in comparison with the baseline.	
The project does not require water other than for office use. Compared to the baseline scenario where large quantities of cooling water are required in conventional power plants currently on the grid, and with suitable water in relatively short supply in Tamil Nadu, the project may have a beneficial impact on water quantity.	*0*
A.1.2 Water quality	
This indicator is used to evaluate the contribution of the project to water quality locally and regionally in the project's area in comparison with the baseline. Water quality will be measured using concentration of main pollutants (including BOD and others) in any effluents generated by the project activity and their contribution, if any, to local water quality.	
The project does not require cooling water as conventional plant in the baseline scenario do. This means that the project reduces thermal pollution of the scarce water resource in Tamil Nadu compared with the baseline. Thus the project may have a beneficial impact on water quality.	*0*
A.2 Air quality	
This indicator is used to evaluate the contribution of the project to local air quality. Air quality will be measured by comparing the concentration of most relevant air pollutants (e.g.: SOx, NOx, particulate matters etc.) generated by the project activity with the baseline.	
The project does not generate air pollution. Compared with the baseline scenario, of fossil fuel-fired power plants, the air quality will be greatly improved. The current air quality is affected by the mostly coal-fired power plants. The coal and lignite used for power generation is locally mined, and causes significant pollution.	+1
A.3 Other pollutants	
This indicator is used to evaluate the contribution of the project activity to reducing the flow of pollutants not already considered to the environment, including solid, liquid and gaseous wastes.	
The project does not generate other pollutants, other than direct waste from the site office, which will be minimal and collected properly. The other pollutants in the baseline scenario are also not significant, other than the thermal load on the water used as cooling water. The impact therefore is considered zero.	0
A.3 Soil condition	
This indicator is used to evaluate the contribution of the project activity to local soil condition. Soil condition will be measured by comparing the concentration of most relevant soil pollutants, erosion and the extent of land use changes due to the project with the baseline.	
The soil condition is only affected during the construction of the proposed project activity, with potential for dust forming. However, the area is currently primarily barren land, and the impact is considered small. The infrastructure is in place, so that transport to the project site during construction does not cause additional dust, or significant disruption. The impact therefore is considered very low.	0
A.4 Contribution to biodiversity	
This indicator is used to evaluate the contribution of the project to local biodiversity. The change in biodiversity is estimated on a qualitative basis considering any destruction or alteration of natural habitat compared to the without projects scenario. A positive change will be given by previously disappeared species re-colonising the area, a negative change will be given by species disappearing or by introduction of foreign species. In judging this, inputs from local communities should be considered a key resource.	
The project will neither contribute to nor reduce biodiversity directly. If sited away from high-	0

risk areas, with high avian population or on migratory routes, the impact of a modern wind farm is small. New larger-size and slower-rotating turbines are less likely to cause bird kill. The impact of the proposed project activity on bird life is expected to be minimal as the site is not in a high-risk area. However, any impact will be monitored. Monitoring of biodiversity impacts at previous wind farms in Tamil Nadu has shown very small impacts. In the baseline scenario continued emissions from the fossil fuel-fired power plants may negatively affect biodiversity in Tamil Nadu, however, this is not measurable by the project and therefore not further considered. The impact of the project, therefore, is conservatively considered zero.	
B Social sustainability and development	**+4**
B.1 Employment (quality)	
This indicator is used to evaluate the qualitative value of employment, such as whether the jobs resulting from the project activity are highly or poorly qualified, temporary or permanent in comparison with BAU. Take temporary and permanent as well as job-related Health and Safety (H&S) impacts as qualifications for job quality.	
The project will have a positive impact on overall employment quality. The construction and operation of the proposed windfarm will generate new jobs in a high-tech environment. Training will be required for the staff needed during operation of the windfarm. In addition, the project revenue donation to SCAD will provide ample employment opportunities, both at SCAD as well as through the community-building projects it invests in.	+1
B.2 Livelihoods of the poor	+1
This indicator comprises a number of sub-indicators. Where a sub-indicator is not relevant to the project, it should be ignored. After all the relevant variables have been considered, the total score should be non-negative.	
B.2.1 Poverty alleviation	
This sub-indicator is used to evaluate the project contribution to poverty alleviation. Poverty alleviation will be evaluated by calculating the change in number of people living above income poverty line compared to baseline.	
The work of SCAD, supported by the proposed project activity, will directly contribute to poverty alleviation, including through opportunities for work as well as through their community building initiatives.	*+1*
B.2.2 Livelihoods of the poor: Contribution to equitable distribution and additional opportunity for disadvantaged sectors	
This sub-indicator is used to evaluate contribution of the project to equitable distribution of wealth and opportunity, in particular gender and marginal or excluded social groups. The indicator combines quantitative - changes in estimated earned income (normalised to the project's starting year) compared with the baseline – and qualitative assessment - improved opportunities.	
One of the principle aims of The Converging World is the reduction of inequality and social injustice. The work of SCAD, supported by the proposed project activity, will directly contribute to equality and increased opportunities.	*+1*
B.2.3 Access to essential services (water, health, education, access to facilities, etc.)	
Access to essential services will be taken as an indicator of social sustainability, measured by the number of additional people gaining access in comparison with the baseline. Access must be directly related to the service and not an unintended impact.	
The work of SCAD, supported by the proposed project activity, will directly contribute to contribute to essential services where needed.	*+1*

B.2.4 Access to affordable clean energy services	
The CDM and JI provide an important opportunity to improve the coverage of reliable and affordable clean energy services, especially to the poor and in rural areas. Where of a relevant scale, security of energy supply (an indicator of a country's ability to generate the power that is needed for services and the economy in comparison with the baseline), should be taken into account.	
The work of SCAD, supported by the proposed project activity, will directly contribute to essential services where needed, though these may not necessarily include energy services.	*0*
B.3 Human Capacity	+2
This indicator is used to assess the project's contribution to raising the capacity of local people and/or communities to participate actively in social and economic development. It comprises three indicative sub-indicators:	
B.3.1 Empowerment	
The sub-indicator is used to evaluate the project's contribution to improving the access of local people to and their participation in community institutions and decision-making processes.	
The stakeholder process, organised by the local NGO SCAD, is allowing people to contribute.	*+2*
B.3.2 Education/skills	
The sub-indicator is used to assess how the project activity enhances and/or requires improved and more widespread education and skills in the community.	
The work of SCAD, supported by the proposed project activity, will directly contribute to educational needs through the community building initiatives.	*+2*
B.3.3 Gender equality	
The sub-indicator is used to assess how the project activity requires or enhances improvement of the empowerment, education/skills and livelihoods of women in the community.	
The work of SCAD, supported by the proposed project activity, will directly contribute to gender equality.	*+2*
C Economic and technological development	**+3**
C.1 Employment (numbers)	
Net employment generation will be taken as an indicator of economic sustainability, measured by the number of additional jobs directly created by the CDM project in comparison with the baseline.	
The number of jobs will be greater for the project activity as compared to the baseline scenario, both in the project itself and with SCAD and through their initiatives.	+1
C.2 Sustainability of the balance of payments	
Net foreign currency savings may result through a reduction of, for example, fossil fuel imports as a result of CDM projects. Any impact this has on the balance of payments of the recipient country may be compared with the baseline.	
The project activity will require significant investment. This investment is based on the emission reduction revenues generated by the project and will come from developed countries. Revenues from the sale of electricity will remain in the country, to cover operation and maintenance, investment in further (or replacement) capacity and the development work by SCAD. The developer is a major Indian developer, using domestic technology. The implementation of the project leads to a reduction in fossil fuel consumption in the electricity sector, which may impact positively on the balance of payments.	+1
C.3 Hard currency expenditures on technology, replicability and contribution to technological self-reliance	
As the amount of expenditure on technology changes between the host and foreign investors, a	

decrease of foreign currency investment may indicate an increase of technological sustainability. When CDM projects lead to a reduction of foreign expenditure via a greater contribution of domestically produced equipment, royalty payments and license fees, imported technical assistance should decrease in comparison with the baseline. Similarly a reduced need for subsidies and external technical support indicates increased self-reliance and technology transfer.	
The developer is a major Indian developer, using domestic wind power technology, and assisting the continued strong development of the wind power sector in India.	+1

Annex 6

GOLD STANDARD ENVIRONMENTAL AND SOCIAL IMPACTS CHECKLIST

Environmental Impacts	**Result**
1. Will construction, operation or decommissioning of the Project use or affect natural resources or ecosystems, such as land, water, forests, habitats, materials or, especially any resources which are non-renewable or in short supply?	The project will use only a marginal amount of land while land use will not be changed – the area is currently barren land. There are existing roads leading to the project site which can be used. The most significant impact of resources is a reduction of water use in the electricity sector, with water a scares resource.
2. Will the Project involve use, storage, transport, handling, production or release of substances or materials (including solid waste) which could be harmful to the environment?	No, other than office waste from the project site office.
3. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?	No.
4. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	Yes. However, with no habitation nearby the impact of the noise is considered insignificant.
5. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal wasters or the sea?	No.
6. Are there any areas on or around the location which are protected under international or national or local legislation for their ecological value, which could be affected by the project?	No. The project is not located near any sensitive areas.
7. Are there any other areas on or around the location, which are important or sensitive for reasons of their ecology, e.g. wetlands, watercourses or other water bodies, the coastal zone, mountains, forests or woodlands, which could be affected by the project?	No.
8. Are there any areas on or around the location	No. No rare or protected species use the area.

which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?	The site is not near to migratory routes of birds.
9. Are there any inland, coastal, marine or underground waters on or around the location which could be affected by the project?	No.
10. Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?	No.

Socioeconomic and Health Impacts	**Results**
11. Will the Project involve use, storage, transport, handling, production or release of substances or materials (including solid waste) which could be harmful to human health or raise concerns about actual or perceived risks to human health?	No.
12. Will the Project release pollutants or any hazardous, toxic or noxious substances to air that could adversely affect human health?	No.
13. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation that could adversely affect human health?	Yes. However, with no habitation nearby the impact of the noise is considered insignificant.
14. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal wasters or the sea that could adversely affect human health?	No.
15. Will there be any risk of accidents during construction or operation of the Project which could affect human health?	The construction is likely to be carried out by experienced builders under contract with the turbine manufacturing. Accidents therefore are considered unlikely during construction. The turbine supplier will provide on the job training for operations during the first years of operation, reducing any potential for accidents.
16. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?	The project will not cause adverse social changes. However, it is likely to generate employment. In addition, through the project's contribution to SCAD, many positive impacts are expected.
17. Are there any areas on or around the	No.

location, protected or not under international or national or local legislation, which are important for their landscape, historic, cultural or other value, which could be affected by the project?	
18. Are there any transport routes or facilities on or around the location which are used by the public for access to recreation or other facilities and/or are susceptible to congestion, which could be affected by the project?	No.
19. Is the project in a location where it is likely to be highly visible to many people?	No. The population density near the project site is very low, due to the unfavourable soil for sustenance farming.
20. Are there existing or planned land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?	No. The project site is currently barren land.
21. Are there any areas on or around the location which are densely populated or built-up, or occupied by sensitive uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project?	No.
22. Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism and minerals, which could be affected by the project?	No.
23. Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present socioeconomic problems?	No.