**PROJECT DESIGN DOCUMENT FORM
FOR SMALL-SCALE CDM PROJECT ACTIVITIES (F-CDM-SSC-PDD)
Version 04.1**

**PROJECT DESIGN DOCUMENT (PDD)**

| | |
|---|---|
| **Title of the project activity** | Mampuri Wind Power Project 2 |
| **Version number of the PDD** | 05 |
| **Completion date of the PDD** | 02/11/2012 |
| **Project participant(s)** | Senok Wind Energy Pvt. Ltd. |
| **Host Party(ies)** | Democratic Socialist Republic of Sri Lanka (host country) |
| **Sectoral scope(s) and selected methodology(ies)** | **Sectoral Scope-I**: Energy industries (renewable/non-renewable sources)<br>**Methodology**: AMS.I.D./Version-17: "Grid connected renewable electricity generation" Reference: Version-17, EB-61, valid from– 17/06/2011<br>http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X |
| **Estimated amount of annual average GHG emission reductions** | The annual average emission reductions of the project activities over the crediting period of 7 years are expected to be **16,255**tonnes $CO_2e$. |

## SECTION A. Description of project activity

### A.1. Purpose and general description of project activity

The project proponent proposes to set up a 10.5MW [1] wind based power plant in the Mampuri/ Nawakkadu village area, along the coastal belt of the North Western coast of Sri Lanka.

The purpose of the project activity is to harness the kinetic energy of wind along the North Western Coastal belt of Sri Lanka and utilize this energy to generate electricity. Under the project activity, only around 25,476MWh of electricity will be generated annually due to the lower PLF of the project activity. The electricity produced will be supplied to the Ceylon Electricity Board (CEB) national grid; through a dedicated transmission line.

The project activity proposes to employ 5 numbers of 2.1MW Wind Turbine Generators (WTG's) sourced from Suzlon Energy that is considered as one of the leading manufacturers of site specific wind turbine generators. The WTG package for the project includes the latest model from Suzlon, model named S-88 / 2.1MW machines. The technological details have been provided below in Section A.4.3.

Since the project activity will generate electricity through wind energy, a clean renewable energy source it will not cause any negative impact on the environment and thereby contributes to climate change mitigation efforts.

**Pre-project Scenario/Baseline Scenario:**

The project activity is a Greenfield activity with no power generation facility existing at the project site in the pre-project scenario. In the pre-project scenario equivalent amount of electricity that would be generated by the project activity and injected into the grid electricity system would have been generated at the grid connected power plants using the existing fuel mix which is dominated by fossil fuel usage.

Baseline scenario for the project activity is same as continuation of the pre-project scenario wherein equivalent amount of electricity shall be generated by the national grid.

This electricity generated by the project activity will be from a clean energy source in form of wind energy and thereby will reduce the green house gas emissions. Thus, the project activity will result in avoidance of generation of an equivalent amount of electricity at the thermal power dominated Ceylon Electricity Board (CEB) national grid, thereby resulting in avoidance of GHG emissions (majorly $CO_2$) associated with electricity generation as per the grid mix. The project activity doesn't involve any GHG emission sources. The estimated annual average and the total $CO_2e$ emission reduction by the project activity over the renewable crediting period of 7 years are expected to be **16,255**tCO2e and **113,785**t$CO_2e$ respectively.

**Contribution to Sustainable Development:**

The project activity contributes to the sustainable development of the country by providing social well being, Economic well being, Environmental well being, and Technological well being.

The project activity contributes to the above indicators in the following manner:

**Social well being:**

[1] As per the Permit issued from Sri Lanka Sustainable Energy Authority to Senok Wind Energy Pvt. Ltd. (SWEPL) dated 29/10/2010 the installed electricity generating capacity of the project shall be 10,000 kW (10MW). However, the capacity of individual wind turbine generators available from Suzlon was 2.1MW. Therefore, the total installed capacity of the project activity with 5 wind turbines equals 10.5MW. The government of Sri Lanka was made aware of the same. Hence the title of the Standardized Power Purchase Agreement (SPPA) signed with the Ceylon Electricity Board (CEB) of Sri Lanka dated 22/11/2012 mentions 10MW on the cover page, while the technical specifications mentioned the capacity of each wind turbine as 2100kw (2.1MW) in Appendix B of the SPPA. Further, the SPPA also specifies that the range of electricity generated by the project activity should be within 24,040MWh to 30,686MWh (refer to page-22 of the SPPA). It may be noted that even for installed capacity of 10.5MW the generation from the project activity falls within the prescribed limits as specified in the SPPA. The SPPA has been enclosed for your reference

The proposed project activity will
- Harnesses a clean and free energy source to generate electricity and bridge the supply/demand gap in Sri Lanka
- Lead to alleviation of poverty by establishing direct and indirect benefits through employment generation and improved economic activities.
- Lead to the local infrastructure development – road network, communication network, electricity quality and frequency and other amenities and improve the situation of the locals in the area.

**Economic well being:**
The project activity will
- Contribute towards the economic growth of the region through in additional investment in the Mampuri/ Nawakkadu village area, along the coastal belt of the North Western coast of Sri Lanka in the field of renewable energy development and thereby promoting wind energy development in the region;
- Generate significant amount of direct and indirect employment for the skilled and semi skilled labourers - local populace for the purposes of construction, commissioning, operation and maintenance of the project activity;
- Generate new opportunities for contractors, suppliers, and erectors at different phases of its implementation.

**Environmental well being:**
The Ceylon Electricity Board (CEB) national grid mix comprises majorly of fossil fuel based power. Harnessing the wind is one of the cleanest, most sustainable ways to generate electricity. Wind farm produces none of the GHG emissions that contribute to global warming and also helps in conservation of fossil fuels. By displacing fossil fuel dominated grid power generation, the project will
- result in indirect reduction of air pollutant emissions ($NO_x$, $SO_2$, particulates, etc.) and
- result in reduction of greenhouse gas,

**Technological well being:**
- The project activity consists of the power generation through eco-friendly resource of energy i.e. Renewable Energy based power plant technology/ wind turbine generators in Sri Lanka
- The project activity employs technologically advanced WTGs of capacity 2.1MW each. This lead to the promotion of wind based energy and penetration of such technology into the country.

## A.2. Location of project activity

### A.2.1. Host Party(ies)

Democratic Socialist Republic of Sri Lanka

### A.2.2. Region/State/Province etc.

Province: North Western
District: Puttalam
Local Division: Kalpitiya

### A.2.3. City/Town/Community etc.

Village: Mampuri/ Nawakkaduwa

### A.2.4. Physical/ Geographical location

Three turbines will be erected on the coastal belt. Two of the turbines will be erected in a second row inland. The project location is accessible in the following manner:
Colombo – Puttalam A3 highway
Turn off to the B 349 Palavi – Kalpitiya road.
Turn off at the junction to the project site 11 km away from the Palavi junction

Provided below is an image of the locations of the five wind turbine generators. The latitude and longitude of the turbine locations are provided in the table below.


Figure 1: WTG sites/ Layout of the plant

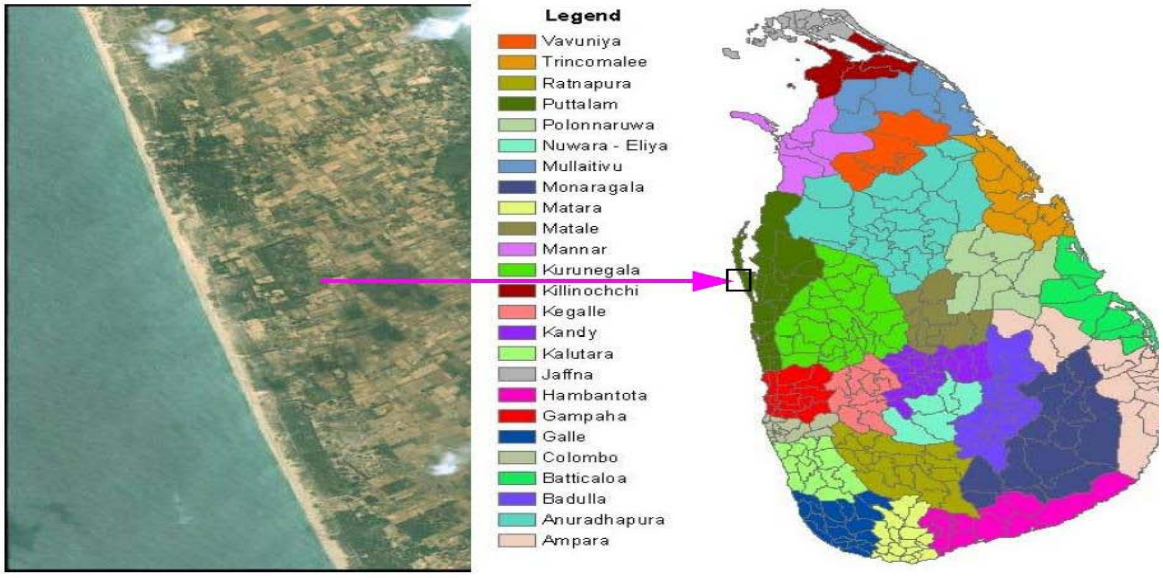



Figure 2: Location of the Wind Power Plant

Table 1: Coordinates of the WTGs

| Wind Turbine Generator (WTG) | Latitude | Longitude |
|---|---|---|
| WTG1 | N 7° 58’ 33.3” | E 79° 43’ 53.5” |
| WTG2 | N 7° 58’ 33.3” | E 79° 43’ 56.6” |
| WTG3 | N 7° 58’ 07.0” | E 79° 44’ 01.9” |
| WTG4 | N 7° 58’ 52.35” | E 79° 44’ 23.31” |
| WTG5 | N 7° 59’ 04.4” | E 79° 44’ 15.3” |

**A.3. Technologies and/or measures**

The project activity involves the installation of five wind turbine generators each of capacity 2100 kW, which will harness the kinetic energy of wind and utilize this energy to generate electricity.The three turbine blades are connected to an induction type generator generating the current at 690V. The power generated by each WTG will be stepped up to 33KV. This 33KV power will be fed through the park transmission line and be sent to the metering room of the project; which will be the metering point for CEB. There on a main transmission line will be drawn to the grid substation in the vicinity. The line up to this point will be within the purview of the project proponent. At this grid substation the electricity will be further stepped up to 220KV fed into the grid.

**Specifications of the wind turbine generator:**
The wind Turbine Generator (WTG) is being supplied by Suzlon from India. Thus, there is transfer of technology from India. The project proponent has employed technologically advanced WTGs each of capacity 2.1MW which is being used for the first time by any project proponent in Sri Lanka. Another group company of the same project proponent has earlier implemented a wind project with WTG capacity of 1.25MW each, which was first the commercial wind based power plant in Sri Lanka[2].

This table provides the main important technical data of the SUZLON S88 – 2.1MW turbine, certified according to Germanischer Lloyd “Guideline for the Certification of Wind Turbines”.

| **Parameters:** | **Specifications:** |
|---|---|
| **Turbine Generators (Suzlon Energy Ltd, India)** | |
| Turbine Type | Horizontal axis wind turbine, with flexi-slip control |
| Model Number | S88 |
| Capacity (kW) | 2100 |
| No of Turbine Generators | 05 |
| Lifetime as per Manufacturer’s specification (Years) | 20 |
| Lifetime as per Industry Standard (Years) | 20 |
| **Operating Data** | |
| Rated power (kW) | 2100 |
| Cut-in wind speed (m/s) | 4 |
| Rated wind speed (m/s) | 14 |
| Cut-out wind speed (m/s) | 25 |

[2] http://www.ifc.org/ifcext/spiwebsite1.nsf/0/C834208AAA7BFC7D85257856005FCC5F

| | |
|---|---|
| Survival wind speed (m/s) | 59.5 |
| Tip speed (At rated power) (m/s) | 71 |
| Regulation | Pitch-regulated/ Suzlon flexi slip system |
| **Rotor:** | |
| Type | 3 bladed, horizontal axis |
| Diameter (m) | 88 |
| Swept area ($m^2$) | 6082 |
| Speed (rpm) | 15 – 17.6 |
| Rotor orientation | Upwind |
| **Hub:** | |
| Type | Cast spherical hub |
| Material | Cast Iron as per EN-G5S-400-18U-LT and DIN EN 1563 |
| **Generator:** | |
| Type | Asynchronous with slip ring |
| Rated Power (kW) | 2100 |
| Rated voltage (V) | 690/6-- |
| Full Load Current (A) | 1895 |
| Rotational speed (rpm) | 1006/1506 |
| Frequency (Hz) | 50/60 |
| Stator/Rotor winding connection | Delta/Star |
| Protection | IP 54 |
| Cooling system | Air cooled |
| Insulation | Class H |
| **Braking System:** | |
| Aerodynamic Braking | 3 independent systems with blade pitching |
| Mechanical Braking | Hydraulic fail safe disc brake system |
| **Gearbox (Cast Iron-GGG 40.3):** | |
| Type | 3-stage (1 planetary & 2 helical) |
| Ratio (Hz) | 1:98.8/1:118.1 (50Hz) |
| Nominal load (kW) | 2200 |
| **Oil Pump:** | |
| Type of cooling | Forced oil cooling lubrication system |
| Oil Pump motor voltage (V) | 3 Phase - 690 V AC |

| | |
|---|---|
| Oil Pump (Dual) Motor rating (kW) | 5 kW / 7.5 kW |
| Oil Pump flow rate (Lit/min) | 74/153 |
| **Yaw System (Active electrical):** | |
| Number of units | 3 |
| Bearings | Polyamide slide |
| Brake | Clutch brake on drive motor |
| Drive | 4 electrical driven planetary gearbox |
| Protection | By cable twist sensor, proximity sensor |
| **Main Bearing House:** | |
| Material | Cast Iron as per EN-GJS-400-18U-LT and DIN EN 1563 |
| Quantity | 1 |
| **Pitch System:** | |
| Type | Electrical |
| pitch angle full range | $-5^0$ to $+ 90^0$ |
| Resolution | $0.1^0$ |
| Back up | Battery pack |
| Drives | Planetary gearbox with AC inverter drive |
| **Certifications:** | |
| Design Standards | GL/IEC |
| Quality | ISO 9001 |
| **Tower:** | |
| Type | Tubular with welded steel plates |
| Tower height (m) | 77.5 |
| Top most diameter of shell (m) | 2.966 |
| Bottom most diameter of shell (m) | 4.004 |
| Corrosion protection | Epoxy / PU coated |
| Erection | With crane |
| **Wind Turbine main Panel/CPU Panel:** | |
| Capacitor bank voltage (V) | 3 Phase - 690V AC |
| Frequency (Hz) | 50 |
| **Electrical Grid connection:** | |
| Voltage fluctuation (%) | +/- 15 |

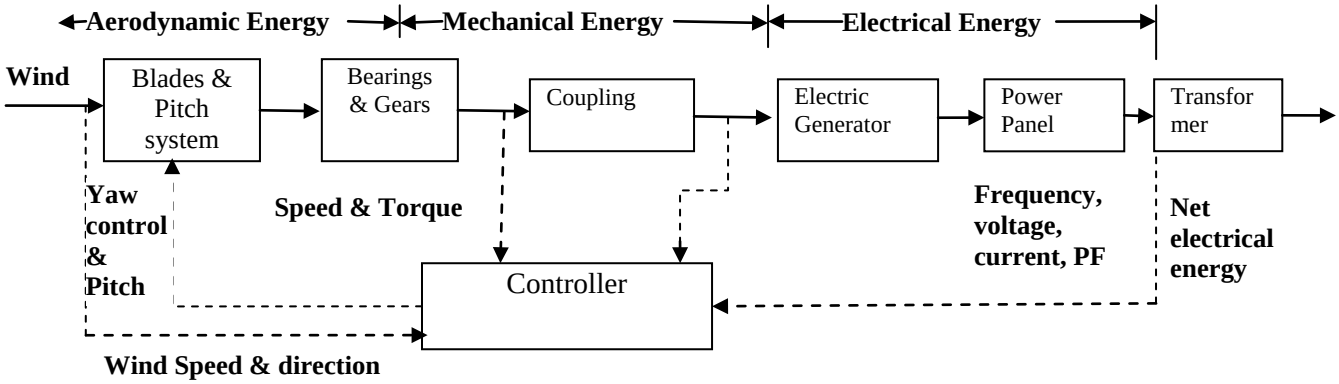
| | |
|---|---|
| Frequency Variation (%) | -5% to +4% |
| Maximum asymmetric voltage (Phase to ground) for 60 sec(%) | 2% |
| Maximum asymmetric current | 10% of full load current |
| Maximum short circuit current | 27 kA at 690V AC (phase to phase) |
| **Turbine will shut down immediately, when the set point limits / set values for the critical parameters are exceeded** | |
| **Protection:** | |
| Lightning protection standard | IEC 1024-1, VDE 0185 part 1& 2 DIN 48801 and DIN 18014 |
| Blades | Receptor in blade tips |
| **Climate & site condition:** | |
| Annual average wind speed (m/s) | 8.5 |
| Temperature Range for Operation | -10 deg C to +45 deg C |
| Temperature Range for Structure | -20 deg C to +55 deg C |
| Form factor, C | 2.0 |
| A-factor (m/s) | 9.59 |

Apart from the above technical specification of WTGs, the connectivity of all the WTGs is to a central Monitoring Station (CMS) through high speed WLAN modem or fibre optic cable which helps in providing real time status of the turbine at CMS with easy GUI (Graphical User Interface) and ability to monitor the functioning of the turbine from CMS.

A Supervisory Control & Data Acquisition System (SCADA) provides a graphical representation of data providing ease to understand the behaviour of WTG, long time data storage facility, access to daily generation report and power curve related information & helps to analyze the problem with graphical tools offline as well as online.

The other specification includes a safety system with instrumentation for tracking individual functions of the wind turbine generator.

The mass & energy flow diagram where three states of energy states are presented for the project activity is provided below:




The aerodynamic principles are used to convert the linear flow of wind into the rotary motion (torque) by the blades. The rotary motion of the blades generates a low speed, high torque mechanical energy, which is transmitted and converted into a high speed, low torque energy for making it suitable for the chosen electrical system. When the wind blades rotate, the connected generator also rotates, thereby produce electricity. The major mechanical portion of a wind turbine is provided below:

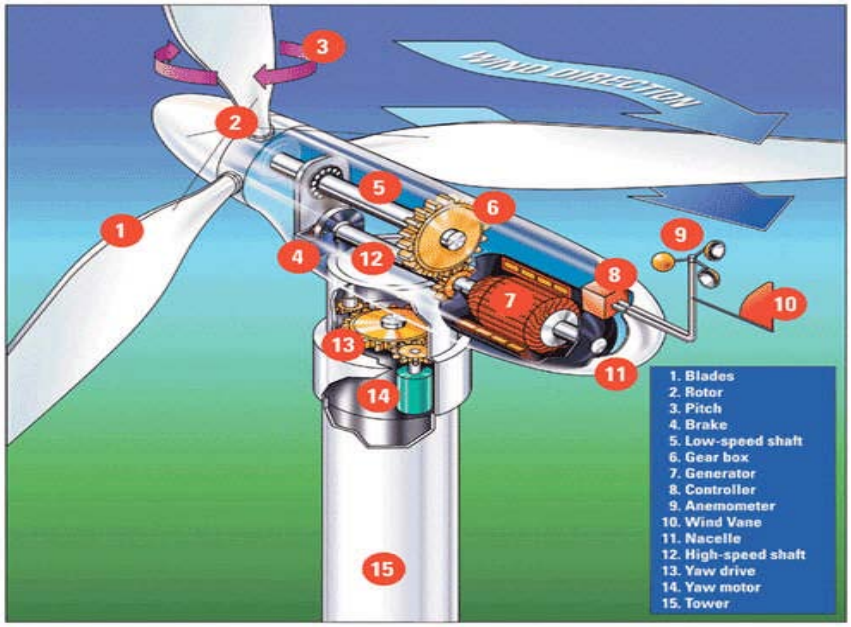



Figure 3: Major Mechanical Parts of a Wind Turbine

The project activity is safe and sound and poses no environmental hazards and the project activity will meet all national environmental standards.

This will be the first time these models of wind turbines are being used in Sri Lanka. The Suzlon S88-2100 KW machines have been GL certified. This success of this project will prove the option of wind technology in Sri Lanka and the possibility of using larger turbine to reduce the land requirement for wind farms in the country.

**A.4. Parties and project participants**

| Party involved (host) indicates a host Party | Private and/or public entity(ies) project participants (as applicable) | Indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|---|---|---|
| Democratic Socialist Republic of Sri Lanka (host country) | **Private entity**: Senok Wind Energy Pvt. Ltd. | No |

**A.5. Public funding of project activity**

No public funds either from Annex 1 Parties or any other country would be used for any element of the CDM project activity.

**A.6. Debundling for project activity**

The project activity is not a debundled component of a larger project activity as explained below.
As per clause 12(c) of the Simplified Modalities and Procedures for small scale clean development mechanism project activities (decision 4/CMP.1, Annex II), "*To use simplified modalities and procedures for small-scale CDM project activities, a proposed project activity shall: Not be a debundled component of a larger project activity, as determined through appendix C to this annex.* "

As per clause 2 of the Appendix C of the Simplified Modalities and Procedure for Small-Scale CDM project activities (consolidated in Guidelines on assessment of de-bundling for SSC project activities, Version 03.1, EB54, Annex 13), "*A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:*

*(a) With the same project participants;*

*(b) In the same project category and technology/measure; and*

*(c) Registered within the previous 2 years; and*

*(d) Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point.*"

The project activity is the first and only wind based power plant of the project participant. They neither have a registered project activity nor an application to register another project activity. Therefore, the project activity does not meet the above clause (a). Hence, the project activity is not a de-bundled component of a large scale project activity.

**SECTION B. Application of selected approved baseline and monitoring methodology**
**B.1. Reference of methodology**

Following approved baseline & monitoring methodology is applied;
**Title**: Type-I, Renewable Energy Project
**Methodology**: I.D. Grid Connected renewable electricity generation
**Version**: 17, valid from 17/06/2011. Scope: 01, EB 61
**Reference:** The approved baseline methodology has been referred from the "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories."
http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X

The tools referenced in this methodology include:

- Tool to calculate the emission factor for an electricity system Version 02.2.1, Annex 19 of EB 63 Report (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf)
- Tool for the demonstration and assessment of additionality, Version 06.1.0, Annex 20 of the EB 69 Report (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf)

**B.2. Project activity eligibility**

As per paragraph 12 of the Simplified Modalities and Procedures for small scale CDM project activities, to use simplified modalities and procedures for small scale CDM project activities, a project activity shall:
*(a) "Meet the eligibility criteria for small-scale CDM project activities set out in paragraph 28 of Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its second session, held at Nairobi from 6 to 17 November 2006 [FCCC/KP/CMP/2006/10/Add.1, English, Page 08]; Point i. [Renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts (or an appropriate equivalent)]"*

The project activity entails wind energy (renewable resource) based power generation of capacity 10.5MW (less than 15MW).As per the above category, the project falls under Type-I category; since it has the capacity limit of 10.0 MW and employs renewable energy as the primary technology.

(b) "*Conform to one of the project categories in appendix B to this annex:*
The project is a renewable energy project with a cumulative maximum capacity output of 10.5MW (≤15MW, the maximum output for small scale project). Hence this comes under the Appendix B of the simplified modalities & procedures for small-scale CDM-project activities. The power generated by the wind power project is supplied to the NEWNE Regional Grid.

*(c)Not be a debundled component of a larger project activity, as determined through appendix C to this annex.*
The project activity is not a de-bundled component of a larger project activity as determined through *"Appendix C of the simplified modalities and procedures for small-scale CDM project activities"*. The justification for the same has been provided in Section A.4.5.

The conformance of the project activity to the applicability criteria of the methodology has been explained as follows:

| SL. No. | Applicability condition | Compliance of condition |
|---|---|---|

<table>
<tr>
<td>1.</td>
<td>This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass[3]:<br>(a)Supplying electricity to a national or a regional grid or<br>(b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</td>
<td>The project activity involves generation of power by harnessing wind potential which is a form of renewable energy and exporting this power to the national grid.The power generated by the project activity helps in displacing electricity supplied by grid.<br>Thus, the project activity meets the applicability condition (a) of the mentioned criterion.</td>
</tr>
<tr>
<td>2.</td>
<td>Illustration of respective situation under which, each of the methodology (i:e AMS-I.D, AMS-I.F and AMS-I.A[2]) applies is included in Table 2: Applicability of AMS-I.D, AMS-I.F and AMS-I.A based on the project types
<table>
<tr><th></th><th>Project type</th><th>AMS-I.A</th><th>AMS-I.D</th><th>AMS -I.F</th></tr>
<tr><td>1</td><td>Project supplies electricity to a national/regional grid</td><td></td><td>√</td><td></td></tr>
<tr><td>2</td><td>Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)</td><td></td><td></td><td>√</td></tr>
<tr><td>3</td><td>Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)</td><td></td><td>√</td><td></td></tr>
<tr><td>4</td><td>Project supplies electricity to a mini grid[4] system where in the baseline all generators use exclusively fuel oil and/or diesel fuel</td><td></td><td></td><td>√</td></tr>
<tr><td>5</td><td>Project supplies electricity to household users (included in the project boundary) located in off grid areas</td><td>√</td><td></td><td></td></tr>
</table>
</td>
<td>As per Table 2, the project activity falls under project type I.D i:e “Project supplies electricity to a national/regional grid.” Thus, the project activity meets the applicability criterion.</td>
</tr>
<tr>
<td>3.</td>
<td>This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).</td>
<td>The project activity is a ‘Greenfield project’ and involves installation of a new wind based power plant. Hence, it complies with the option (a) of the</td>
</tr>
</table>

[3] Refer to EB 23; annex 18 or the definition of renewable biomass.

[2] AMS-I.D “Grid connected renewable electricity generation”, AMS-I.F “Renewable electricity generation for captive use and mini-grid” and AMS-I.A “Electricity generation by the user”

[3] The sum of installed capacities of all generators connected to the mini-grid is equal to or less than 15 MW.

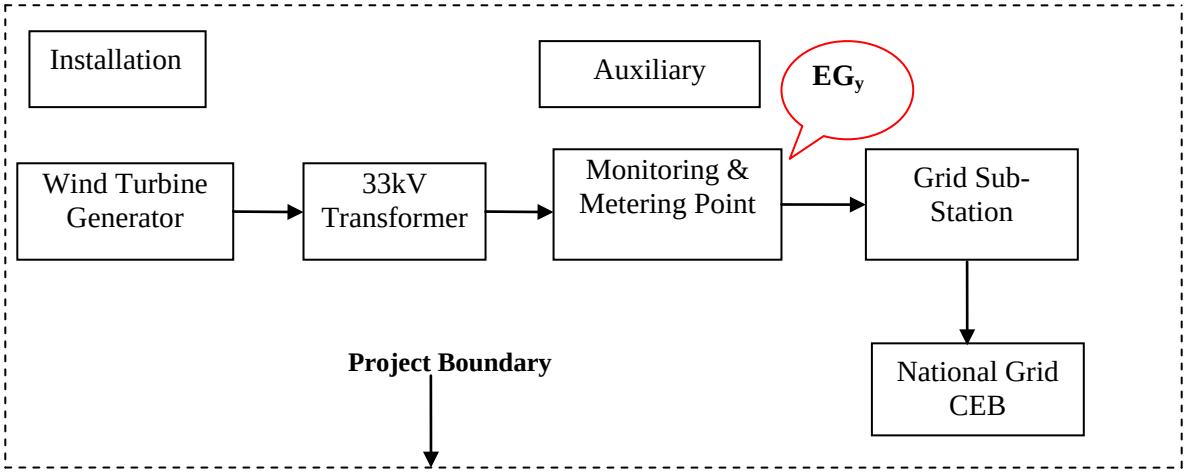
| | | |
|---|---|---|
| | | mentioned criterion. |
| *4.* | *Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:*<br>*• The project activity is implemented in an existing reservoir with no change in the volume of reservoir;*<br>*• The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m$^2$;*<br>*• The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m$^2$.* | The project activity is a wind based power project. Hence this criterion is **not applicable** for the project activity. |
| *5.* | *If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel[3], the capacity of the entire unit shall not exceed the limit of 15MW.* | The project activity does not have any non-renewable component. The project activity entails power generation through wind power project of capacity 10.5MWlower than 15MW. Hence, the project activity complies with the mentioned criterion. |
| *6.* | *Combined heat and power (co-generation) systems are not eligible under this category.* | The project activity is not a co-generation activity. Hence, this condition is **not applicable** to the given type of project activity. |
| *7.* | *In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15MW and should be physically distinct from the existing units.* | As the project activity is a Greenfield Project, so this condition is **not applicable**. |
| *8.* | *In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15MW.* | As the project activity is a Greenfield Project, so this condition is **not applicable** here. |

Hence, the project activity meets all the applicability conditions of the project methodology.

**B.3. Project boundary**

In accordance with AMS I.D, the project boundary includes *"the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to"*.Therefore, the project boundary includes the five WTGs that will be connected through a common metering point and all the connected power plants in the grid.

Project boundary is shown by the dotted line box in diagram below:




The 33 kV transmission line from the project location to the grid substation will be a dedicated line for the proposed CDM project activity. This line will be maintained by the project proponent. After the lifetime of the project activity, the transmission line will be under the purview of the CEB.

**B.4. Establishment and description of baseline scenario**

As per the Para 10 of approved methodology I.D. Version 17, "*the baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid*".

Therefore, in accordance with the above, the baseline for the project activity is continuation of the pre-project scenario wherein the equivalent amount of electricity as generated by the project activity shall be generated at the thermal dominated grid connected power plants resulting in $CO_2e$ emissions. The same is line with all national policies and there are no policies or regulations which mandates the project participant to implement the project activity.

$BE_y = EG_{BL,y} * EF_{CO2, grid, y}$
Where:

| | |
|---|---|
| $BE_y$ | Baseline Emissions in year *y* (t $CO_2$) |
| $EG_{BL,y}$ | Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh) |
| $EF_{CO2, grid, y}$ | $CO_2$ emission factor of the grid in year y (t $CO_2$/MWh) |

As per the Para 12 of approved methodology I.D. Version 17, valid from 17 June 2011, the Emission Factor can be calculated in a transparent and conservative manner as follows:

a) Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM)according to the procedures prescribed in the "*Tool to calculate the emission factor for an electricity system*".

OR

b) The weighted average emissions (in t $CO_2$/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The project proponent has opted for approach '**a**' i.e. combined margin emission factor and desires to keep the emission factor constant throughout the crediting period for the sake of adopting more simple approach for calculation of emission reductions.

Therefore the baseline estimation according to the applied methodology will consider the Sri Lanka national grid, the baseline grid and use the operational grid-connected power plants and additions of new generation sources into the grid for the baseline calculation.

| **Variable:** | **Data Source:** |
|---|---|
| $EG_{BL,y}$–Net electricity exported to the grid. | Records maintained by project proponent |
| **Parameters:** | **Data Source:** |
| $EF_{OM,y}$– Operating Margin Emission Factor ($tCO_2/MWh$) | CEB Sales and Generation Data Book (2008, 2009& 2010), Ceylon Electricity Board (CEB) |
| | Sri Lanka Energy Balance (Sri Lanka Sustainable Energy Authority) http://www.info.energy.gov.lk/ |

| | |
|---|---|
| $EF_{BM, y}$ = Build Margin Emission Factor ($tCO_2/MWh$) | CEB Sales and Generation Data Book (2008, 2009 & 2010), Ceylon Electricity Board (CEB) |
| | Sri Lanka Energy Balance (Sri Lanka Sustainable Energy Authority) http://www.info.energy.gov.lk/ |
| $EF_{CO2, grid,y}$ – Grid Emission Factor | Weighted average of the OM and BM |

The $CO_2$ emission factor is calculated in accordance with paragraph 12(a) of AMS.I.D, version-17 which states that
"*A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the Tool to calculate the Emission Factor for an electricity system*".

As per the "*Tool to calculate the emission factor for an electricity system, version 02.2.1 of EB-63, Annex 19*", the combined margin emission factor is calculated as per the following steps:

References: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

STEP 1: Identify the relevant electricity systems;
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method;
STEP 5: Calculate the build margin (BM) emission factor;
STEP 6: Calculate the combined margin (CM) emission factor.

The following section details the steps mentioned above in order to calculate the combined margin emission factor:
**Step 1: Identify the relevant electricity systems** The tool requires that for the purpose of determining the electricity emission factor, a 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 transmitted without significant transmission constraints.

DNA of the host country, Sri Lanka, has not published a delineation of the project electricity system and the connected electricity system.

All electricity is purchased by the national utilities supplier, **Ceylon Electricity Board (CEB)**. In this case there is no spot market for electricity. Since the project will sell entire energy generated to the Ceylon Electricity Board (CEB) grid, the electric power system for the purpose of calculating the CM is the CEB grid.
Reference: http://www.ceb.lk/

**Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)**

PP may choose between the following two options to calculate the operating margin and build margin emission factor:
Option 1: Only grid power plants are included in the calculation
Option 2: Both grid power plants and off grid power plants are included in the calculation.

Project proponent has chosen **Option I:** Only grid power plants are included in the calculation. In Sri Lanka off grid power plants are small and almost negligible when compared with the national grid system.

**Step 3: Select a method to determine the operating margin (OM)**

As per the tool the calculation of the operating margin emission factor ($EF_{grid, OM, y}$) is based on one of the following methods:
a) Simple OM; or
b) Simple adjusted OM; or
c) Dispatch data analysis OM; or
d) Average OM

PP has chosen simple OM for calculation based on the generation data available of Ceylon Electricity Board (CEB).

*The simple OM method (Option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.*

As per the Power Generation mix of Sri Lanka electricity Grid; PP has adopted the approach of average of the five most recent years for calculating the share of low cost must-run sources. Since, the generation data for the year 2011 is not published by Ceylon Electricity Board; so the five most recent years for calculation is considered from 2006 to 2010; which is provided by Sri Lanka Sustainable Energy Authority.

**Power generation mix of Sri Lanka Electricity Grid for the last five years (GWh) as obtained from Generation Data Book of Ceylon Electricity Board& electrical generation statistical data compiled by Sri Lanka Sustainable Energy Authority**[5]

| **Generation type** | **2006** | **2007** | **2008** | **2009** | **2010** |
|---|---|---|---|---|---|
| Total Power Generation | 9,534.6 | 9,937.9 | 9,997.6 | 9,963.9 | 10,718.3 |
| Generation from low cost/must run resources | 4,634 | 3,946.90 | 4,129.40 | 3,881.10 | 5,634.50 |
| %age of low cost/must run resources | **48.60%** | **39.72%** | **41.30%** | **38.95%** | **52.57%** |

[5] Reference: http://www.info.energy.gov.lk/

| | |
|---|---|
| **Average of the five most recent years of low cost/must run resources** | **44.23%** |

Since the low-cost/must-run resources constitute less than 50% of the total grid generation the simple OM method has been chosen.

According to the tool, for the simple OM, the simple adjusted OM and the average OM, the emission factor can be calculated using either of the two following data vintages:

- ***Ex ante option:*** *If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the five most recent calendar years prior to the time of submission of the CDM-PDD for validation., or*

- ***Ex post option:*** *If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1, or y-2) should be used throughout all crediting periods.*

*For the dispatch data analysis OM, use the year in which the project activity displaces grid electricity and update the emission factor annually during monitoring.*

**Ex-ante option**: A 3 year generation weighted average, based on the most recent data available at the time of submission of the first CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.
The detailed calculation of 3 year generation-weighted average OM is provided in section B.6.1 of the PDD.

**Step 4: Calculate the operating margin emission factor according to the selected method**
*The simple OM emission factor is calculated as the generation-weighted average $CO_2$ emissions per unit net electricity generation ($tCO_2/MWh$) of all generating power plants serving the system, not including low-cost/must-run power plants/units.*

*The simple OM may be calculated by one of the following two options:*
*Option A: Based on the net electricity generation and a $CO_2$ emission factor of each power unit; or*
*Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.*

*Option B can only be used if:*
*(a) The necessary data for Option A is not available; and*
*(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and*
*(c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).*

PP has chosen **Option A** for calculation; since the necessary data for *Option Aby using the equation 1 of the tool. As per the tool Option A has to be used if the necessary data is available. Since the data is available, we have used "Option A - Calculation based on average efficiency and electricity generation of each plant"*. The detailed calculations are provided in section B.6.1 of the PDD.

**Step 5: Calculate the build margin emission factor**

*In terms of vintage of data, project participants can choose between one of the following two options:*

***Option 1:*** *For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.*

***Option 2:*** *For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.*

The project proponent has opted for **Option 1** for choosing the data vintage. The build margin emission factor so calculated will remain fixed for the entire crediting period of the project activity.

The detailed calculations of the Build Margin are provided in Section B.6.1 of the PDD.

**Step 6: Calculate the combined margin emissions factor**

*The calculation of the combined margin (CM) emission factor ($EF_{grid, CM, y}$) is based on one of the following methods:*
*(a) Weighted average CM; or*
*(b) Simplified CM.*

*The weighted average CM method (option A) should be used as the preferred option.*

*The simplified CM method (option b) can only be used if:*
*• The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered CDM projects at the starting date of validation; and*
*• The data requirements for the application of step 5 above cannot be met*

Sri Lanka does not fall under Least Developed Country (LDC) & the data requirements for the application of step 5 above are met. Hence, for the calculation of Combined Margin (CM) the **option (a)** weighted average CM has been used.

***(a) Weighted average CM***

*The combined margin emissions factor is calculated as follows:*

$$EF_{Grid, CM, y} = EF_{Grid, OM, y} \times w_{OM} + EF_{Grid, BM, y} \times w_{BM}$$

*Where:*

$EF_{grid,BM,y}$ = *Build margin $CO_2$ emission factor for the year y ($tCO_2/MWh$)*
$EF_{grid,OM,y}$ = *Operating margin $CO_2$ emission factor for the year y ($tCO_2/MWh$)*
$w_{OM}$ = *Weighting of operating margin emission factors (%)*
$w_{BM}$ = *Weighting of build margin emission factors (%)*

*The following default values should be used for $w_{OM}$ and $w_{BM}$:*

• *Wind and solar power generation project activities:* $w_{OM}$ *= 0.75 and* $w_{BM}$ *= 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;*

Since the project activity is wind power generation project, so the default value for the project activities will be: $w_{OM}$ = **0.75** and $w_{BM}$ =**0.25** (owing to their intermittent and non-dispatchable nature) for the first crediting period.

The detailed calculations for obtaining the weighted average CM are provided in section B.6.1 of the PDD.

**B.5. Demonstration of additionality**

As per the decision 17/cp.7 paragraph 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

In accordance with the "Guidelines on the demonstration of additionality of small-scale project activities", Annex 27, EB 68, *"project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:*
*(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;*

*(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;*

*(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;*

*(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher."*

The project activity faces investment barriers due to high capital investment and its impact on the returns from the project activity. The Investment barrier has been demonstrated through Step 2: Investment Analysis of the "Tool for the demonstration and assessment of additionality" Version 06.1.0 and as per "Guidelines on the Assessment of Investment Analysis" Version 05.The same has been elaborated in below.

**A. Investment Barrier:**

The tool requires project proponent 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 demonstrate the above, investment analysis has been conducted using the following sub-steps of the "Tool for the demonstration and assessment of additionality" Version 06.1.0:

**Sub-step 2a: Determine appropriate analysis method**

The proposed project activity generates financial and economic benefits (sale of electricity to the state utility), so the simple cost analysis (Option I) is not applicable.

Out of the two remaining options, investment comparison analysis (Option II) and benchmark analysis (Option III), investment comparison analysis is inapt as there are no other credible and realistic baseline scenario alternatives other than electricity supply from the grid in order to conduct an investment analysis.
For the project activity under consideration the baseline alternative is supply of electricity from a grid. Thus, the benchmark analysis (Option III) has been selected to demonstrate additionality.
References: http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

**Sub-step 2b: Option III: Apply benchmark analysis**

Benchmark analysisapproach was adopted and found to be appropriate to demonstrate the additionality of the project activity since as per para 19 of the guidelines on the assessment of investment analysis, version 5, annex 5, EB 62, *"If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate"*. SWEPL conducted an investment analysis of the wind power project activity with the Internal Rate of Return (IRR) as the financial indicator. 'Internal Rate of Return' is one of the known financial indicators used by banks, financial institutions and project developers for making investment decisions. Post tax project IRR of the project activity is calculated and compared it with the post tax WACC valid at the time of project conceptualization. The same is in line with the para 12 of *"Guidelines on the assessment of investment analysis"*, Annex 5, EB 62 – "*Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for equity IRR"*.

As per the tariff order for renewable energy projects for 2009 published by Sri Lanka Sustainable Energy Authority dated 24/04/2009, the annual return on equity (ROE) considered for renewable energy projects for calculation of tariff is 22%, while the WACC is 20.33%[6].

It may be noted that the lending rate prevailing during the time period when the notification was published was around 19.22%, while the average weighted lending rate at the time of decision making was 16.89%[7] as published by the Central Bank of Sri Lanka. The return on equity for power projects in Sri Lanka applicable at the time of Board Decision was 22% as per the most recent data published by Sri Lanka Sustainable Energy Authority dated 24/04/2009.

Sri Lanka has a stock exchange namely Colombo Stock Exchange. However, there were only two power sector companies that were listed prior to decision making namely, Hemas Power Plc and Vallibel Power Erathna Plc listed on 08/10/2009 and 16/05/2006[8] respectively. Hence, it is clear from the above that apart from Vallibel Power there are no other listed companies for which data is available for atleast 3-5 years for calculation of ROE. ROE shall not be calculated with only one or two companies as the same shall not represent risk profile of the power sector in Sri Lanka. Therefore, WACC for project activity calculated using lending rate as 16.89% and ROE as 22% is **15.387%**.

The project participant has further calculated WACC using the default values published by CDM EB as per the "*Guidelines on Investment Analysis*", version 5, Annex 5, EB 62. As per Appendix of the above guidelines, *"in situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used."*

As per the above guidelines, the sectoral for the project activity is 1 – Energy Industries and hence falls under Group 1. The WACC has been further derived based on the default value for the expected return on equity for Group 1 type of projects for Sri Lanka and the lending rate valid at the time of decision making. Moreover, since the default value for ROE mention in the above guidelines is in real terms,

[6] http://www.energy.gov.lk/pdf/explanatory_note_april_2009.pdf
[7] Average weighted lending rate (AWLR) represents the commercial lending rate available to project developers from commercial banks. Hence, AWLR has been selected. This data is published quarterly by Central Bank of Sri Lanka. At the time of decision making the latest data was available for the quarter ending March 2010 which is applicable at time of decision making i.e. June 11, 2010. The data for quarter April 2010 to June 2010 was not available. http://www.cbsl.gov.lk/htm/english/_cei/ir/i_4.asp?date=&Mode=2&Page=6
[8] http://www.cse.lk/list_by_sector.do?sector=13

hence the same is converted to nominal terms by adding the forecasted inflation rate for the next five years published by the *IMF (International Monetary Fund World Economic Outlook*) in accordance with teh above mentioned guidelines. WACC calculation post tax is provided in the table below:

| Default Value of expected return of equity as per the Guidelines on the Assessment of Investment Analysis/Version 05 | Average Target Inflation Rate for 5 years from 2011 to 2015)[9] | Return on Equity on real terms (RoE) | Lending Rate | Debt: Equity | Tax Rate | WACC |
|---|---|---|---|---|---|---|
| **13.0%**(Group-I: Energy Industries) | **7.34%** | **21.29%** | **16.89%** | **60:40** | **35%** | **15.10%** |

The cost of equity in nominal terms has been calculated using equation below;

Cost of equity (nominal) = (1+cost of equity in real terms) * (1+ inflation rate) -1

Clearly, as can be evidenced from the above the WACC calculated based on the default values published by CDM EB is conservative and hence same has been adopted for the project activity as the benchmark.

**The financial details used to arrive at the Project IRR have been provided below:**

| **Parameters:** | **Unit:** | **Values:** | **Source/References:** |
|---|---|---|---|
| Capacity Utilization Factor | Percent | 29.75% | Feasibility Study Report |
| Total hours of operation | Hours | 8760 | Feasibility Study Report |
| Transmission & Transformation Losses | Percent | 2% | Feasibility Study Report |
| Machine and grid availability | Percent | 95% | Feasibility Study Report |
| Net power exported | MWh | 25475.93 | The net power exported to the grid is the net power available after taking into account auxiliary consumption, transmission and transformation loss and the Grid and machine availability factor. The figures to calculate the net power generated from the project activity has been sourced from the Feasibility Study Report. |
| Sale Tariff (LKR/kWh) | LKR/kWh | 23.07 | Tariff order 2009 http://www.energy.gov.lk/sub_pgs/develop_tariffs.html |
| IDC | Million LKR | 204.30 | Feasibility Study Report. IDC shall be paid up from equity portion as per the Feasibility Study Report. Hence the same shall be considered as part of equity. |

9 http://www.imf.org/external/pubs/ft/weo/2010/01/weodata/weorept.aspx?pr.x=63&pr.y=9&sy=2008&ey=2015&scsm=1&ssd=1&sort=country&ds=.&br=1&c=524&s=PCPI%2CPCPIPCH%2CPCPIEPCH&grp=0&a

| | | | |
|---|---|---|---|
| Total Project cost without preliminary expenses and working capital margin with IDC | Million LKR | 2892.30 | Feasibility Study Report |
| Debt | Million LKR | 1612.80 | Feasibility Study Report |
| Equity | Million LKR | 1279.50 | Feasibility Study Report. IDC shall be paid up from equity portion as per the Feasibility Study Report. Hence the same has been considered as part of equity. |
| Debt : Equity ratio | - | 60:40 | Feasibility Study Report. Debt equity is calculated on project cost without IDC and then IDC is added to equity since IDC shall be incurred from equity. |
| Annual Operation & Maintenance Costs (O&M) for WTG only* | USD | 250000 | Feasibility Study Report |
| | Million LKR | 28.74 | Calculated as per Historical Exchange Rate prevailing at time of project conceptualization. Please refer IRR computation sheet. |
| Escalation on O&M costs for WTG only | % | 6.0 | Feasibility Study Report |
| Annual Other Maintenance cost (including transmission line) | USD | 275500 | Feasibility Study Report |
| | Million LKR | 31.67 | Calculated as per Historical Exchange Rate prevailing at time of project conceptualization. Please refer IRR computation sheet. |
| Escalation of other O&M costs(including Maintenance of line) | % | 6.0 | Feasibility Study Report |
| Administrative expenses | Million LKR | 30 | Feasibility Study Report |
| Escalation on Administrative costs | % | 8.0 | Feasibility Study Report |
| Insurance Charges | Million LKR | 5.63 | Feasibility Study Report |
| Annual Maintenance spare cost | Million LKR | 3.0 | Feasibility Study Report |
| Escalation in annual spare cost | % | 6.0 | Feasibility Study Report |
| Interest Rate | % | 16.89 | Feasibility Study Report<br>Average weighted lending rate (AWLR) represents the commercial lending rate available to project developers from commercial banks. Hence, AWLR has been selected. This data is published quarterly by Central Bank of Sri Lanka. At the time of decision making the latest data was available for the quarter ending March 2010 which is applicable at time of decision making i.e. June 11, 2010. The data for quarter April 2010 to June |

| | | | |
|---|---|---|---|
| | | | 2010 was not available. http://www.cbsl.gov.lk/htm/english/_cei/ir/i_4.asp?date=&Mode=2&Page=6 |
| Depreciation Rate-Civil | % | 6.67 | Feasibility Study Report; http://www.inlandrevenue.gov.lk/publications/Acts/IR/IRActNo.10%28E%292006.pdf |
| Depreciation Rate-P&M | % | 12.50 | Feasibility Study Report; http://www.inlandrevenue.gov.lk/publications/Acts/IR/IRActNo.10%28E%292006.pdf |
| Income Tax Rate | % | 35.0 | Feasibility Study Report; cross check with section-35 & section-40 (page-323) provided in Inland Revenue Act, No 10 of 2006 |
| Tax Holiday | Years | 2.0 | Based on previous experience of SWEPL from the wind project implemented by one of the group companies |
| *Note: As per the Feasibility Study Report, the O&M cost for WTGs will be free for the first 3 years of operation and will be incurred from the 4th year of operation. | | | |

The Board of Investments (BOI), Sri Lanka, offers income tax incentives to new projects in various sectors. However, the number of years for the tax incentive is not fixed and varies with the type of project, amount of capital investment and the time period for application of tax incentive or time of investment.

The information regarding exact number of years of tax holiday was not available for the project activity at the time of decision making. Therefore, the tax holiday of 2 years has been considered for the project activity on the basis of the information available at the time of decision making from another wind project implemented by one of the group companies of the project proponent.

However, on actual the tax holiday granted by the BOI is 5 years. Thus, even if we calculate the project IRR considering 5 years as the tax holiday, the IRR changes from 11.78% to 11.97% which shall be below the benchmark.

An investment analysis of the project activity was conducted based on the above mentioned assumptions considering the project IRR as the financial indicator. The Project IRR has been computed over a period of 20 years by taking into account the cash outflows (capital investment in the project) and cash inflows comprising profit after tax, depreciation, interest on term loan and salvage value (in the terminal year).

The project IRR computed for the above project activity works out to be **11.78%.**The project IRR is compared with the WACC of 15.10% derived as above and found to be lower which emphasises that the project activity is unlikely to be financially attractive without CER revenue.

**Sensitivity analysis:**

In accordance with the guidance on the assessment of investment analysis, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation.
Gross electricity generated by the project activity is the major contributor for the above and Project IRR with 10% increase and decrease in tariff has been calculated to see the sensitivity analysis. Also the Project Cost has been varied along with O&M and CUF to see the IRR and the result is tabulated below:

| Sensitivity Analysis | | | | | | |
|---|---|---|---|---|---|---|
| **Sl. No.** | **Parameters** | **+10%** | **Base Case** | **-10%** | **Breaching Value** | **Remarks on Likelihood of parameter crossing the breaching value** |
| 1. | Capacity Utilization Factor (CUF) | 14.03% | 11.78% | 9.37% | 16% | It is highly unlikely that the PLF increases by 16% percent continuously through the year. |
| 2. | O&M | 11.39% | | 12.16% | -98% | It is not possible that total O&M cost will reduce by 98%. The O&M contract for the project activity has been signed with Suzlon and the same similar the value assumed. |
| 3. | Tariff Rate | 14.03% | | 9.37% | 16% | It is not possible that the tariff rate will increase by 16% percent. The standard power purchase agreement has been signed for the project activity at a fixed rate of 19.43LKR/kWh which is about 16% lower than the assumed value. |
| **Sl. No.** | **Parameter** | **+12%** | **Base Case** | **-12%** | **Breaching Value** | **Remarks on Likelihood of parameter crossing the breaching value** |
| 4. | Project Cost | 9.78% | 11.78% | 14.23% | -16% | It is not possible that the project cost reduces by 16%. The purchase order has already given by the PP and the same is within the sensitivity range. |

As per the tariff notification dated 2009 published by Sustainable Energy Authority of Sri Lanka, the project cost per MW is 230 Million LKR per MW. Considering the same, results in total cost of 2415Million LKR for a 10.5MW wind based project which is lower than the project cost assumed for the project activity by 11.3% (rounded up to zero decimal digit -12%). Hence, for project cost sensitivity analysis has been performed by taking range of +/-12%.

From the above table, it can be seen that even after 12% increase and decrease in Project cost and 10% increase and decrease of Capacity Utilization Factor (CUF), tariff rate and O&M the project IRR is below the benchmark. Further it may be noted that the generation from the project activity depends upon the wind availability to the project activity which is not in the project proponent's control. The figures required to calculate the net power generated from the project activity has been sourced from the Feasibility Study Report.

So, it is clear from the above that the project activity is financially not viable, and the CDM revenue that would be obtained through sale of the emission reductions is rather crucial to sustain the operations of the project activity.

**CDM Consideration:**

In line with *"Guidance on the Demonstration and Assessment of Prior Consideration of the CDM"*, version 4,Annex 4, EB62, since the start date of the project activity is after 2nd August 2008, the project proponent has notified the Designated National Authority (DNA) of – Sri Lankaand the UNFCCC about

their intention to seek CDM status on 04/05/2011. Supporting email communications/letters will be provided to the DoE for validation.

The chronologies of events for the project activity are as follows:

| CDM CHRONOLOGY: | |
|---|---|
| Date: | Particulars: |
| 11/06/2010 | Board Resolution for Mampuri Wind Power Project 2 |
| 05/10/2010 | Letter of Intent (LOI) to purchase electrical energy by Ceylon electricity Board |
| 07/10/2010 | Certificate for Site Clearance from Provincial Environmental Authority, North Western Province, Sri Lanka |
| 29/10/2010 | Permit for Signing the Standardized Power Purchase Agreement with Ceylon Electricity Board from Sri Lanka Sustainable Energy Authority |
| 25/11/2010 | Application for License to Generate Electricity under Sri Lanka Electricity Act |
| 04/05/2011 | Date of Prior Consideration of the CDM as shown in UNFCCC website (PP has intimated UNFCCC about the project on this date) |
| 21/06/2011 | Stakeholder presentation & comments received |
| 19/08/2011 | Project Start Date - Signing of the wind Turbine Supply and Commissioning agreement with the WTG manufacturer Suzlon |
| 09/11/2011 | Host Country Approval received for the project |
| 01/02/2013 | Expected Commissioning date for the project activity |

From the above mentioned chronology of events it is evidenced that the PP has been putting continued efforts to obtain the status of Registration.

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

The methodology & Tools which are applicable for explanation of methodological choices in this section includes:

- Methodology-AMS.I.D/version-17; valid from 17/06/2011; http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X
- Tool to calculate the emission factor for an electricity system Version 02.2.1, Annex 19 of EB 63 Report, valid from 29/09/2011 (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf)

The project activity is generation of electricity using wind potential and exporting the same to the grid system, which is also fed by other fuel sources such as fossil and non-fossil types. Emission reductions due to the project activity are considered to be equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity. Emission reductions are related to the electricity exported by the project and the actual generation mix in the national grid system.
As per paragraph 11 to the approved methodology AMS.I.D (version 17), the baseline for the proposed project activity is the grid and the baseline emission are *the product of electrical energy baseline* $EG_{BL,y}$ *expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.*

**Baseline Emissions:**

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$ Equation 1

Where:

| | |
|---|---|
| $BE_y$ | Baseline Emissions in year y ($tCO_2$) |
| $EG_{BL,y}$ | Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh) |
| $EF_{CO2,grid,y}$ | $CO_2$ emission factor of the grid in year y ($tCO_2$/MWh) |

$EF_{CO2,grid,y}$ is calculated using the data from the CEB Sales and Generation Data Book (2008, 2009, 2010), Ceylon Electricity Board (CEB) published by National Energy Balance 2010 (SEA), Democratic Socialist Republic of Sri Lanka.
The $CO_2$ emission factor is calculated in accordance with paragraph 12(a) of AMS.I.D, version-17 which states that
"*A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the Tool to calculate the Emission Factor for an electricity system*".

As per the "*Tool to calculate the emission factor for an electricity system, version 02.2.1 of EB-63, Annex 19*", the combined margin emission factor is calculated as per the following steps:

STEP 1: Identify the relevant electricity systems;
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method;
STEP 5: Calculate the build margin (BM) emission factor;
STEP 6: Calculate the combined margin (CM) emission factor.

**STEP 1: Identify the relevant electricity systems**
As mentioned in Section B.4 the relevant electricity system is the Ceylon Electricity Board (CEB).
Reference: http://www.ceb.lk/

**Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)**
As mentioned in section B.4 of the PDD, Option-1 i:e**Only grid power plants are included in the calculation.**

**Step 3: Select a method to determine the operating margin (OM)**
As shown in section B.4 of the PDD; since the low-cost/must-run resources constitute less than 50% of the total grid generation the **simple OM** method has been chosen. The Simple OM will be fixed for the entire crediting period of the project activity.
**Ex-ante option**: A 3 year generation weighted average, based on the most recent data available from 2008 to 2010 from Generation Sales Data Book of Ceylon Electricity Board (CEB). The generation data for year 2011-12 is not available at the time of webhosting of the PDD for global stake holder consultation, from the Sri Lanka Energy Balance data published by Ceylon Electricity Board (CEB) hence, the recent 3 years considered are from 2008 to 2010. This is as per the published overview details provided by Sri Lanka Energy Balance till 2010, compiled by Sri Lanka Sustainable Energy Authority[10].

**Step 4: Calculate the operating margin emission factor according to the selected method**
PP has chosen **Option A** for calculation of Operating Margin.

[10] http://www.info.energy.gov.lk/

*The OM has been calculated as per Option A by using the equation 1 of the tool. As per the tool Option A has to be used if the necessary data is available. Since the data is available, we have used "Option A - Calculation based on average efficiency and electricity generation of each plant" as below:*

$$EF_{Grid, OMsimple, y} = \frac{\sum EG_{m. y} \times EF_{EL, m, y}}{\sum EG_{m, y}}$$

Where:
$EF_{grid,OM\ simple,y}$ = Simple operating margin $CO_2$ emission factor in year *y* ($tCO_2$/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$ = $CO_2$ emission factor of power unit *m* in year *y* ($tCO_2$/MWh)
m = All power units serving the grid in year y except low-cost / must-run power units
y = The relevant year as per the data vintage chosen in Step 3

**Determination of $EF_{EL,m,y}$**

The emission factor of each power unit *m* has been determined by Option A1, equation 2 of the tool as follows:

If for a power unit *m* data on fuel consumption and electricity generation is available,the emission factor ($EF_{EL,m,y}$) should be determined as follows:

$$EF_{EL, m, y} = \frac{\sum FC_{i, m, y} \times NCV_{i, y} \times EF_{CO2, i, y}}{EG_{m, y}}$$

Where:
$EF_{EL,m,y}$ = $CO_2$ emission factor of power unit *m* in year *y* (tCO2/MWh)
$FC_{i,m,y}$ = Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,m,y}$ = $CO_2$ emission factor of fossil fuel type *i* in year *y* (tCO2/GJ)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m = All power units serving the grid in year *y* except low-cost/must-run power units
i = All fossil fuel types combusted in power unit *m* in year *y*
y = The relevant year as per the data vintage chosen in Step 3

In the project activity, the generation weighted average for the most recent 3 years (2008-2010) for which data is available has been considered for arriving at the Simple OM.
The basic data available from the Sales & Generation Data Book (2008-2010) includes:

| Fuel Type | Specific Gravity(Kg/Lt) | Net Calorific Value(GJ/tonne) |
|---|---|---|
| Furnace Oil | 0.95 | 10104 |
| Residual Fuel oil | 0.97 | 10052 |
| Lanka Auto Diesel (LAD) | 0.85 | 10556 |
| Lanka Heavy Fuel (LHF) | 0.85 | 10556 |
| Naphtha | 0.69 | 11259 |

As per Table 1.4- "**Default $CO_2$ Emission Factors for Combustion**" of IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories[11] includes:

| **Fuel Type** | **$CO_2$ emission factor (Kg/TJ) (Default value)** | **$CO_2$ emission factor ($tCO_2/GJ$)** |
|---|---|---|
| Diesel Oil | 72600 | 0.0726 |
| Naptha | 69300 | 0.0693 |
| Residual fuel oil | 75500 | 0.0755 |

The Weighted Average Operating Margin obtained for the 3 years (2008-2010) generation data is provided in the table below:

| **Weighted Average Operating Margin(OM) Emission Factor ($tCO_2/MWh$)** | | | | |
|---|---|---|---|---|
| | | Years | | |
| Particulars | Unit | 2008 | 2009 | 2010 |
| Weighted Average OM | $tCO_2/GWh$ | 737.8744 | 628.9563 | 613.5028 |
| Average OM for the project activity | $tCO_2/MWh$ | =(737.8744+628.9563+613.5028)/3/1000 = 0.66011 | | |

Thus the final EFOM,y based on three years weighted average is estimated to be **0.66011** tCO2/MWh

**Step 5: Calculate the build margin emission factor**

As mentioned in section B.4 of the PDD, PP has chosen **Option 1** as per the Tool. The build margin emission factor so calculated will remain fixed for the entire crediting period of the project activity.

As per the "**Tool to calculate the emission factor for an electricity system"**
*The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:*

*(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently (SET5-units) and determine their annual electricity generation ($AEG_{SET}$-5-units, in MWh);*

*(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities ($AEG_{total}$, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of $AEG_{total}$ (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET≥20%) and determine their annual electricity generation ($AEG_{SET}$-≥20%, in MWh);*

*(c) From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation ($SET_{sample}$);*
*Identify the date when the power units in $SET_{sample}$ started to supply electricity to the grid.*
*If none of the power units in $SET_{sample}$ started to supply electricity to the grid more than 10 years ago, then use $SET_{sample}$ to calculate the build margin.*
**Option (a): Set of 5 recent power units not registered as CDM project activities:**

[11] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

| Power Plant not registered under CDM | Commissioning Dates | | Annual Electricity Generation |
|---|---|---|---|
| | **Month** | **Year** | **GWh** |
| **PPP THERMAL**-West Coast-Kerapitiya**(LFO)** | May | 2010 | 547.10 |
| **PPP HYDRO**-Watakella | January | 2010 | 4.23 |
| **PPP HYDRO**-Ganthuna Udagama | March | 2010 | 3.52 |
| **PPP HYDRO**-Aggra Oya | June | 2010 | 3.84 |
| **WIND**-Mampuri | May | 2010 | 17.85 |
| **TOTAL:** | | | **576.56** |

**Option (b):** ***20% of $AEG_{total}$ (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation)***

| | |
|---|---|
| **Total grid generation for 2010** | **10,540.10** |
| **20% of Total Grid Generation** | **2108.02** |
| **Total Grid Generation (20% selection connected to grid most recently):** | **2169.53** |

Source: Sales & Generation Data Book, Ceylon Electricity Board [12](2010)

Hence, as per option c; the *SET≥20% of power units that comprises the larger annual electricity generation ($SET_{sample}$) is chosen for calculation. The above data shows that none of the power units in $SET_{sample}$ started to supply electricity to the grid more than 10 years ago,*

As per the Tool "*The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units m during the most recent year y for which electricity generation data is available, calculated as follows*:

$$EF_{Grid,\,BM,\,y} = \frac{\sum EG_{m,\,y} \times EF_{EL,\,m,\,y}}{\sum EG_{m,\,y}}$$

Where:

$EF_{grid,BM,y}$ = Build margin $CO_2$ emission factor in year *y* ($tCO_2/MWh$)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$ = $CO_2$ emission factor of power unit *m* in year *y* ($tCO_2/MWh$)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available"

[12] http://powermin.gov.lk/?page_id=121

**Build Margin Calculation for 2010 as per the Sales & Generation Data Book:**

$CO_2$ Emission Factor ($tCO_2$/MWh) for BM = $\frac{CO_2 \text{ Emission from Power Plants } (tCO_2)}{\text{Net Electricity Generation (MWh)}}$

$CO_2$ Emission Factor ($tCO_2$/MWh) for BM = $\frac{1240786.46 \times 1000}{2169.53 \times 1000000}$

= 0.57191

| Build Margin ($tCO_2$/MWh) for National Grid | |
|---|---|
| **Year- 2010** | |
| National Grid (CEB) | **0.57191** |

**Step 6: Calculate the combined margin emissions factor**

***(a) Weighted average CM***

*The combined margin emissions factor is calculated as follows:*

$EF_{Grid,CM,y} = EF_{Grid,OM,y} \times w_{OM} + EF_{Grid,BM,y} \times w_{BM}$

*Where:*

$EF_{grid,BM,y}$ = *Build margin $CO_2$ emission factor for the year y ($tCO_2$/MWh)*
$EF_{grid,OM,y}$ = *Operating margin $CO_2$ emission factor for the year y ($tCO_2$/MWh)*
$w_{OM}$ = *Weighting of operating margin emission factors (%)*
$w_{BM}$ = *Weighting of build margin emission factors (%)*

For wind power generation project, so the default value for the project activities will be: $w_{OM}$ = 0.75 and $w_{BM}$ =0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period. Therefore, we can calculate the combined margin emission factor as shown in the following table:

| Emission Factor for National Grid: | | | | |
|---|---|---|---|---|
| **Weighted average Operating Margin ($tCO_2$/MWh)** | **$w_{OM}$** | **Build Margin($tCO_2$/MWh)** | **$w_{BM}$** | **Emission factor ($EF_{grid,CM,y}$)($tCO_2$/MWh)** |
| 2008-10 | | 2010 | | |
| **0.66011** | **0.7500** | **0.57191** | **0.2500** | **0.63806** |

Since the grid carbon dioxide emission factor determined in section B4 will be fixed for the entire crediting period, this equation may be adopted for the ex-ante calculations in the PDD and ex-post calculations

$BE_y = EG_{BL,y} * 0.63806$
Where,
$EG_{BL,y}$= Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EG_{BL,y}$ = (Plant Capacity× Yearly operating hours× Plant Utilization Factor (PLF)×Grid and Machine Availability factor×(1-(Transmission and transformation Losses))

$EG_{BL,y}$ = (10.5×8760×29.75%×95%×(1-2%)) MWh/yr
$EG_{BL,y}$ = 25475.93 MWh/yr

**Project Emissions:**
No project emissions are applicable to the wind based power project, since the electricity generation is based on wind resources, which does not involve in combustion or generation of emissions from fossil fuels.
Hence, $PE_y = 0$

**Leakage:**
As stated in paragraph 22 of Type I category D of indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities (version-17 EB 61)*," if the energy generating equipment is transferred from another activity, leakage is to be considered.*"

No leakage emissions are considered for the project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity.
Hence, $LE_y = 0$

**Emission Reductions:**
As per paragraph 23 of the methodology, *the emission reductions are calculated as follows:*
*ERy= BEy-PEy- LEy*
*Where:*
*ERy = Emission reduction in the year y (t CO2 / year)*
*BEy = Baseline emissions in the year y (t CO2 / year)*
*PEy = Project emissions in the year y (t CO2 / year)*
*LEy = Leakage emissions in the year y (t CO2 / year)*

Since the project emissions as well as the leakage are zero, the emission reductions are equal to the baseline emissions. These are calculated based on the monitored net amount of electricity supplied to the grid and the baseline emission factor.

**B.6.2. Data and parameters fixed ex ante**
*(Copy this table for each piece of data and parameter.)*

| **Data/Parameter** | **$EF_{OM, y}$** |
|---|---|
| **Unit** | $tCO_2$/MWh |
| **Description** | Simple Operating Margin Emission Factor |
| **Source of data** | Sales and Generation Data Book (2008, 2009, 2010), Ceylon Electricity Board (CEB) |
| **Value(s) applied** | 0.66011 |
| **Choice of data or Measurement methods and procedures** | The data has been published by Sri Lanka Sustainable Energy Authority and Ceylon Electricity Board (CEB), which is the nodal agency for all power related activities in the country. http://www.info.energy.gov.lk/ The value applied is the weighted average of the last three recent years (2008, 2009 and 2010); Measurement procedures is as per paragraph 12 of the methodology AMS I.D / Version 17 |
| **Purpose of data** | Calculation of baseline emissions |
| **Additional comment** | - |

| Data / Parameter | $EF_{BM, y}$ |
|---|---|
| Unit | $tCO_2$/MWh |
| Description | Build Margin Emission Factor |
| Source of data | Sales and Generation Data Book (2010), Ceylon Electricity Board (CEB) |
| Value(s) applied | 0.57191 |
| Choice of data or Measurement methods and procedures | The data has been published by Sri Lanka Sustainable Energy Authority and Ceylon Electricity Board (CEB), which is the nodal agency for all power related activities in the country. http://www.info.energy.gov.lk/ The value applied is for year 2010; Measurement procedures is as per paragraph 12 of the methodology AMS I.D / Version 17 |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | - |

| Data / Parameter | $EF_{CO2,y}$ |
|---|---|
| Unit | $tCO_2$/MWh |
| Description | CO2 emission factor of the grid electricity in year y (Combined Margin Grid Emission Factor) |
| Source of data | Sales and Generation Data Book (2008, 2009, 2010), Ceylon Electricity Board (CEB) |
| Value(s) applied | 0.63806 |
| Choice of data or Measurement methods and procedures | The value is calculated as the weighted average of the Simple Operating Margin emission factor ($EF_{M, y}$) and the Build Margin emission factor ($EF_{BM, y}$) and giving 75% and 25% weightage respectively by default. |
| Purpose of data | Calculation of baseline emissions |
| Additional comment | - |

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

As per AMS I.D, the baseline emissions are calculated as the net electricity generated by the project activity, multiplied with the baseline emission factor for the project grid.

**Baseline emissions:**
The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.
As per paragraph 11 of the methodology:
$BE_y = EG_{BL,y} * EF_{CO2,grid, y}$
Where:
*BEy* Baseline Emissions in year *y*(t CO2)
*EGBL, y* Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y(MWh)
$EF_{CO2,grid, y}$ CO2 emission factor of the grid in year *y*(t CO2/MWh)

Baseline emissions calculated as explained in section B.6.1 above are summarised as below.

| Data inputs:- | Values | Unit | References: |
|---|---|---|---|
| WTG individual capacity | 2.1 | MW | Feasibility study report |

| | | | |
|---|---|---|---|
| No. of WTGs | 5 | Nos | Feasibility study report |
| Total Plant Capacity | 10.5 | MW | Feasibility study report |
| Days of operation | 365 | days | Feasibility study report |
| No. of hours | 24 | hours | Feasibility study report |
| Grid and Machine Availability Factor | 95% | percent | Feasibility study report |
| Site Capacity Utilization Factor(CUF) | 29.75% | Percent | Feasibility study report |
| Gross Generation | 27364.05 | MWh/Year | Calculated |
| Transmission and transformation Losses | 2% | percent | Feasibility study report |
| Estimated net generation for project | 25475.93 | MWh/Year | Calculated |
| Grid Emission Factor | 0.63806 | $tCO_2$/MWh | Calculated |
| **Baseline Emissions(BE)** | **16255** | **$tCO_2$/Annum** | **Calculated** |

**Project emissions:**

As per para 20 of the methodology for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002.

1. Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption)
2. Emissions from water reservoirs of hydro power plants

The project activity is neither involve any geothermal application and nor any reservoirs.

Project activity is wind based power project therefore no project emissions are applicable to the project activity.
The project activity also does not involve any use of Diesel Generator (DG) set during the operation. Hence, there is no project emissions involved due to DG Set.

Therefore,
$PE_y$ = **0** $tCO_2$/annum

**Leakage:**
The leakage of the proposed CDM project activity will be zero, since there are no measurable and attributable anthropogenic emissions as a result of the project activity.
Hence, $LE_y$ = **0** $tCO_2$

**Emission reductions:**

$ER_y = BE_y - PE_y - LE_y$
Where,
$ER_y$ = Emission reduction in the year y (t $CO_2$ / year)
$BE_y$ = Baseline emissions in the year y (t $CO_2$ / year)
$PE_y$ = Project emissions in the year y (t $CO_2$ / year)
$LE_y$ = Leakage emissions in the year y (t $CO_2$ / year)

$PE_y$ = 0 $tCO_2$/year
$LE_y$ = 0 $tCO_2$/year

$ER_y$ = 16255 - 0 - 0
$ER_y$ = 16255 $tCO_2$

**B.6.4. Summary of ex-ante estimates of emission reductions**

| Year | Baseline emissions ($tCO_2$ e) | Project emissions ($tCO_2$ e) | Leakage ($tCO_2$ e) | Emission reductions ($tCO_2$ e) |
|---|---|---|---|---|
| 2013-2014 | 16255 | 0 | 0 | 16255 |
| 2014-2015 | 16255 | 0 | 0 | 16255 |
| 2015-2016 | 16255 | 0 | 0 | 16255 |
| 2016-2017 | 16255 | 0 | 0 | 16255 |
| 2017-2018 | 16255 | 0 | 0 | 16255 |
| 2018-2019 | 16255 | 0 | 0 | 16255 |
| 2019-2020 | 16255 | 0 | 0 | 16255 |
| **Total** | **113785** | **0** | **0** | **113785** |
| **Total number of crediting years** | **7** | | | |
| **Annual average over the crediting period** | **16255** | **0** | **0** | **16255** |

**B.7. Monitoring plans**

**B.7.1. Data and parameters to be monitored**

*(Copy this table for each data and parameter.)*

| **Data/ Parameter** | **$EG_y$** |
|---|---|
| **Unit** | MWh/y |
| **Description** | Quantity of net electricity supplied to the grid in year y |
| **Source of data** | Records of Joint meter reading taken monthly by the project participant and the CEB personnel jointly. The same may be cross checked with the monthly invoice. |
| **Value(s)applied** | 25475.93 |
| **Measurement methods and procedures** | The net electricity export/supplied to the grid shall be calculated as a difference of measured parameters, electricity exported ($EG_{exp,y}$) and imported ($EG_{imp,y}$) which are monitored using the main meter and recorded in the form of Joint Meter Reading taken monthly by CEB every month, in the presence of the SWEPL representative.<br><br>Each of the WTG is connected to a common energy meter (main meter) which is used to measure the amount electricity evacuated to the grid by the project activity.<br><br>For measuring, the electricity exported ($EG_{exp,y}$) and imported ($EG_{imp,y}$) by the project activity at the interconnection point (*i.e.* point of supply of electricity to the grid from the project facility), one set of Main meter is provided. This main meter is a bi-directional and measures export as well as import of electricity.<br>The main meter shall be maintained by CEB in accordance with the Standard Power Purchase Agreement (SPPA). The Joint Meter readings recorded every month would be considered for $EG_y$ computation. |
| **Monitoring frequency** | Monthly |
| **QA/QC procedures** | The accuracy of the meter is declared to be 0.1S. The meter accuracy will be tested (*i.e.* the meter shall be calibrated) by an independent agency annually as specified in the Standard Power Purchase Agreement (SPPA)<br>As a backup to the main meter installed above for contractual purpose, an additional meter will be installed in the Central Monitoring System (CMS) of the project facility at the expense of the project proponent. In case of any malfunction of the main meter, CMS meter reading shall be considered for billing purpose by CEB. This meter will also be calibrated annually by the project proponent using the services of an independent agency. |
| **Purpose of data** | Calculation of baseline emissions |
| **Additional comment** | Data will be archived on paper and electronically. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later. |

| | |
|---|---|
| **Data/ Parameter** | **$EG_{imp,y}$** |
| **Unit** | MWh/y |
| **Description** | Electricity imported from the Grid |
| **Source of data** | Records of Joint meter reading taken monthly by the project participant and the CEB personnel jointly. The same may be cross checked with the monthly invoice. |
| **Value(s) applied** | 0 |
| **Measurement methods and procedures** | The amount of electricity imported from the grid shall be monitored continuously using the main meter and recorded in the form of Joint Meter Reading taken monthly by CEB every month, in the presence of the SWEPL representative.<br><br>Each of the WTG is connected to a common energy meter (main meter) which is used to measure the amount electricity evacuated to the grid by the project activity.<br><br>For measuring, the electricity imported ($EG_{imp,y}$) by the project activity at the interconnection point (*i.e.* point of supply of electricity to the grid from the project facility), one set of Main meter is provided. This main meter is a bi-directional and measures export as well as import of electricity.<br><br>The main meter shall be maintained by CEB in accordance with the Standard Power Purchase Agreement. The Joint Meter readings recorded every month would be considered for $EG_{imp,y}$ computation. |
| **Monitoring frequency** | Monthly |
| **QA/QC procedures** | The accuracy of the meter is declared to be 0.1S. The meter accuracy will be tested (*i.e.* the meter shall be calibrated) by an independent agency annually as specified in the Standard Power Purchase Agreement.<br>As a backup to the main meter installed above for contractual purpose, an additional meter will be installed in the Central Monitoring System (CMS) of the project facility at the expense of the project proponent. In case of any malfunction of the main meter, CMS meter reading shall be considered for billing purpose by CEB. This meter will also be calibrated annually by the project proponent using the services of an independent agency. |
| **Purpose of data** | Calculation of baseline emissions |
| **Additional comment** | Data will be archived on paper and electronically. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later. |

| | |
|---|---|
| **Data/ Parameter** | **$EG_{exp,y}$** |
| **Unit** | MWh/y |
| **Description** | Electricity exported to Grid |
| **Source of data** | Records of Joint meter reading taken monthly by the project participant and the CEB personnel jointly. The same may be cross checked with the monthly invoice. |
| **Value(s) applied** | 25475.93 |
| **Measurement methods and procedures** | The amount of electricity exported to the grid shall be monitored continuously using the main meter and recorded in the form of Joint Meter Reading taken monthly by CEB every month, in the presence of the SWEPL representative.<br><br>Each of the WTG is connected to a common energy meter (main meter) which is used to measure the amount electricity evacuated to the grid by the project activity.<br><br>For measuring, the electricity imported ($EG_{imp,y}$) by the project activity at the interconnection point (*i.e.* point of supply of electricity to the grid from the project facility), one set of Main meter is provided. This main meter is a bi-directional and measures export as well as import of electricity.<br><br>The main meter shall be maintained by CEB in accordance with the Standard Power Purchase Agreement. The Joint Meter readings recorded every month would be considered for $EG_{exp,y}$ computation. |
| **Monitoring frequency** | Monthly |
| **QA/QC procedures** | The accuracy of the meter is declared to be 0.1S. The meter accuracy will be tested (*i.e.* the meter shall be calibrated) by an independent agency annually as specified in the Standard Power Purchase Agreement.<br>As a backup to the main meter installed above for contractual purpose, an additional meter will be installed in the Central Monitoring System (CMS) of the project facility at the expense of the project proponent. In case of any malfunction of the main meter, CMS meter reading shall be considered for billing purpose by CEB. This meter will also be calibrated annually by the project proponent using the services of an independent agency. |
| **Purpose of data** | Calculation of baseline emissions |
| **Additional comment** | Data will be archived on paper and electronically. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later. |

### B.7.2. Sampling plan

There are no parameters in the project activity which requires sampling.

### B.7.3. Other elements of monitoring plan

The monitoring plan which will be implemented by the project proponent describes about the monitoring organization, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

| Parameters | Frequency | Monitoring Procedure | Responsibility | QA/QC/data achieving |
|---|---|---|---|---|
| $EG_y$ | Monthly | $EG_y$ is calculated based on the difference between the measured quantities of the electricity exported and imported from the grid. | Plant superintendent and the CEB Engineer | The main meter accuracy will be tested (*i.e.* the meter shall be calibrated) by an independent agency annually as specified in the Standard Power Purchase Agreement. |
| $EG_{imp,y}$ | Monthly | $EG_{imp,y}$ shall be monitored continuously using the bi-directional energy meter of 0.1S accuracy class. The parameter shall be recorded in the form of Joint Meter Reading taken by the CEB in presence of SWEPL. | Plant superintendent and the CEB Engineer | The meter accuracy will be tested (*i.e.* the meter shall be calibrated) by an independent agency annually as specified in the Standard Power Purchase Agreement. As a backup to the main meter installed above for contractual purpose, an additional meter will be installed in the Central Monitoring System (CMS) of the project facility at the expense of the project proponent. In case of any malfunction of the main meter, CMS meter reading shall be considered for billing purpose by CEB. This meter will also be calibrated annually by the project proponent using the services of an independent agency. |
| $EG_{exp,y}$ | Monthly | $EG_{exp,y}$ shall be monitored continuously using the bi-directional energy meter of 0.1S accuracy class. The parameter shall be recorded in the form of Joint Meter Reading taken by the CEB in presence of SWEPL. | Plant superintendent and the CEB Engineer | |

The monitoring shall consist of metering the electricity exported and imported by the power plant to and from the national grid of Sri Lanka.

**1. Data collection and recording**

As per the monitoring plan for small scale project activities, the only set of data to be monitored is the electricity export and imports. The net electricity generated to the grid can be calculated from the above parameters.

A state of the art monitoring system will be in place in the monitoring room at the project site. This system will be accessible to the plant superintendent, the manufacturer's O&M team, the head office in Colombo, Sri Lanka and the manufacturers head office in India.

The meter readings will be taken on a monthly basis in the presence of the project proponent's representative and the officials of the CEB. This reading will be used for the generating invoices which will be used for settlement of payment.

The accuracy of the meters is ensured by adhering to the calibration and testing procedure as set in the SPPA signed between the CEB and the project proponent. The main electricity meters will be calibrated annually by CEB.

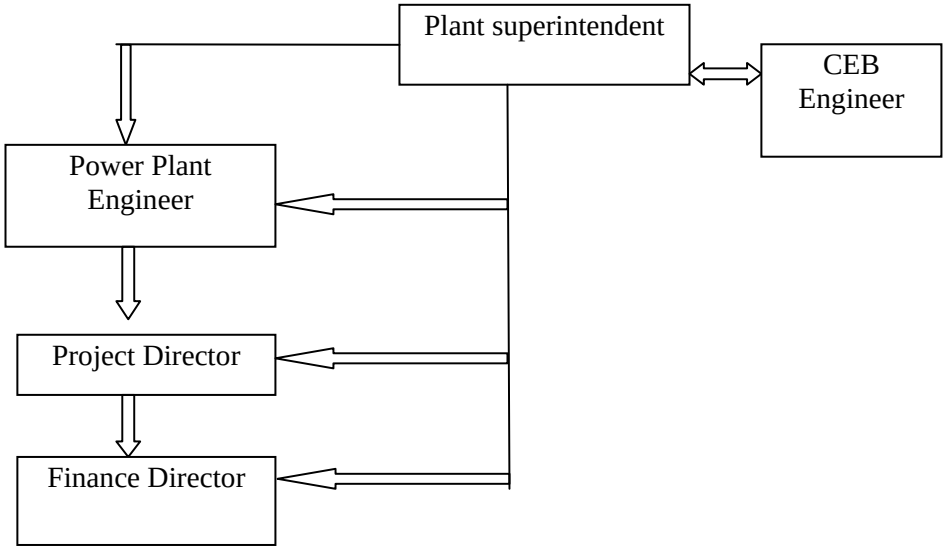
As per Article 5.2, paragraph d) of the SPPA, *"to determine the amount of electrical energy delivered and accepted, billing and payment will be based on the first available of the following metering or estimation options in order of preference:*

*i) The primary CEB meter measurement(s) when that CEB meter satisfies for the period at issue the accuracy standard in Article 4(c)* (of the SPPA)*; or*

*ii) The Seller's secondary or other meter or check meter measurement when that secondary meter is positioned to record the Energy Output, and when that meter(s) satisfies the accuracy standard in Article 4(c)* (of the SPPA) *for the period of issue*

*iii) Where all meters and sub meters fail to accurately register electrical energy delivered and accepted, the average monthly electrical energy delivered and accepted during the previous six (6) billing periods prior to meter failure (or fewer months if the facility is less than six months from the commercial operation date), as adjusted or normalized for outages or operating variations, shall be used to estimate electrical energy delivered and accepted by the facility for the period of issue".*

The Responsibility chart is provided here under:




- The Plant superintendent and the CEB Engineer will jointly take the monthly CEB meter reading
- The daily readings which are monitored by the project proponent will be monitored by the Plant superintendent and informed to the Power plant Engineer/ Project Director and the Finance Director.
- All parties concerned have access to the backup system of the SC commander monitoring system of each WTG.
    - The information will be subject to internal auditing by the Finance Director who willExamine the primary, 1st backup and 2nd backup monitoring documentation for completeness (and file the hardcopies, and archive the soft copies)
    - Prepare the invoice to CEB based on the primary monitoring system meter readingsexamine and file any response from CEB to the invoice and the confirmation of acceptance of the readings of meter.
    - Examine and file the CEB invoice based on meter.
- Any discrepancy will be corrected, with clear records maintained by the Finance Director.

**SECTION C. Duration and crediting period**
**C.1. Duration of project activity**
**C.1.1. Start date of project activity**

19/08/2011 – Signing of the wind Turbine Supply and Commissioning agreement with the WTG manufacturer Suzlon

**C.1.2. Expected operational lifetime of project activity**

20 Years 00 Months

**C.2. Crediting period of project activity**
**C.2.1. Type of crediting period**

Renewable crediting period of 3 x 7 Years 00 Months
Since the lifetime of the project activity is 20 years hence, the crediting period shall be limited to the operational lifetime of the project activity.
.

**C.2.2. Start date of crediting period**

01/02/2013 or date of registration whichever is later

**C.2.3. Length of crediting period**

There will be 3 crediting period, each of 7 Years 00 Months

**SECTION D. Environmental impacts**
**D.1. Analysis of environmental impacts**

The National Environmental (Amendment) Act No. 56 of 1988 introduced EIA, as a part of the strategy to achieve sustainable development for the entire country and the Central Environmental Authority was assigned regulatory functions.

Part IV C of the amendment act mandated that all "prescribed" development projects are required to be subjected to Environmental Impact Assessment. Only large scale development projects that are likely to have significant impacts on environment are listed as prescribed projects.

As per the Gazettes No. 722/22 dated 24/06/1993, No. 859/14 dated 13/02/1995, No. 978/13 dated 04/06/1997, No. 1104/22 dated 06/11/1999, No. 1108/1 dated 29/11/1999 and No. 1159/22 dated 22/11/2000 of the Democratic Socialist Republic of Sri Lanka, *"All renewable energy based electricity generating stations exceeding 50Megawatts"* requires to conduct an EIA[13].

Since the project activity has a capacity of less than 50MW hence, EIA is not required to be conducted for the project activity.

According to the requirements of the host party the following approvals and studies have been obtained and conducted by the project proponent.
i. Environmental Approval from the Central Environment Authority
ii. Renewable Energy Permit from Sri Lanka Sustainable Energy Authority
iii. Electricity Generating License from the Public Utilities Commission of Sri Lanka

Various aspects of Environmental impacts:
1. Land Use and Planning
The site is currently used for agricultural purposes and there is a loss of land where turbines will be located. This will be limited to only the minimum requirement as specified by the Manufacturer.

2. Air Quality
Wind generation produces zero emissions levels during the generation phase.

3. Hydrology
The site will not be affected in terms of contamination of surface or ground water or soils. Proper operating procedures will ensure proper disposal of waste water and other containments if any used during the operation and maintenance of the plant.

4. Ecology – Avian
A bird study was conducted by an Ornithologist and the report was submitted to the relevant environmental authorities. This project is not in line with any bird migratory paths. Due diligence is taken to monitor any bird strikes on the WTGs and will be reported accordingly.

5. Noise
The manufacturer has given a guarantee that the noise levels of the WTG will be within the permissible levels of the areas, at each WTG location boundary.

[13] http://www.cea.lk/pdf/EIA%20GUIDE%202.pdf. Please refer page - 28.

**SECTION E. Local stakeholder consultation**
**E.1. Solicitation of comments from local stakeholders**

Since the commencement of obtaining the approvals for the project, the project proponents have been in close contact with the local land owners, cultivators, fishermen and the local town councillors and the local religious heads.

On the 21/06/11 a formal meeting was held under the auspices of the Divisional Secretary - Kalpitiya, representatives from the CEB, Coast Conservation Department and the Central Environmental Authority. The local village heads and clergy were also attended the meeting. There were around one hundred villagers present at the meeting.

The meeting was held at the village of Mampuri and the villagers from the neighbouring villages were also invited to be present at the meeting.

The Stakeholders were invited by giving a written invitation to all in their local language dated 15/06/2011, mentioning the date, time and venue of the CDM Stakeholders meeting. The local village heads took the responsibility for distribution of the written invitation around the villages.

Given below are a few photographs at the stakeholder consultation meeting.

Pic 1 – The Divisional Secretary addressing the gathering

Pic 2 – A section of the villagers at the gathering

Pic 3 – Questions being raised by the villagers

Pic 4- Presentation to introduce the villagers to the project

**E.2. Summary of comments received**

The Local Stakeholders showed their interest about knowing the CDM mechanism and the process of electricity generation. They were pleased by the idea of project activity. According to them such a project would help in meeting the electricity demand of the village, improve local infrastructure and provide employment opportunities. The major Questions raised at the meeting:

1. What are the noise levels of this machine? Will there be a huge noise during the high wind season?
2. Will building walls around each turbine location affect the crops which get covered by these walls?
3. Are we more lightening prone, with these towers close by?
4. Is there any effect on TV reception caused by the power plant?
5. Where will this project be connected to?
6. Why have the turbines been located in such a manner, with such distances between them?

**E.3. Report on consideration of comments received**

Replies to the queries raised by the locals

| | Questions | Reply |
|---|---|---|
| 1 | What are the noise levels of this machine? Will there be a huge noise during the high wind season? | It has been guaranteed the noise levels at each location boundary will be 70 dBA and 60 dBA during the day and night.<br>The noise levels are high during high wind season, but will still be within this limit. |
| 2 | Will building walls around each turbine location affect the crops which get covered by these walls? | There will be no boundary walls built, the project proponent will use chain link fences for security purposes. |
| 3 | Are we more lightening prone, with these | No. |

| | | |
|---|---|---|
| | towers close by? | The turbines are having lightening conductors at the tip of the blades and nacelle and thereby will attract the lightening and reduce the changes of its hitting the houses and trees in the vicinity. |
| 4 | Is there any effect on TV reception caused by the power plant? | No.<br>It has not been reported for these models of turbines. |
| 5 | Where will this project be connected to? | The project will be connected to the grid substation close to the project site. The transmission line will be as much as possible drawn along existing pathways. |
| 6 | Why have the turbines been located in such a manner, with such distances between them? | There is a minimum distance between turbines and between turbine rows, which has been specified by the manufacturer and has to be adhered to. |

**SECTION F. Approval and authorization**

The letter of approval from each Party to be involved in the project activity will be provided to the validating DoE at the time of submission of PDD

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## Appendix 1: Contact information of project participants

| | |
|---|---|
| **Organization** | Senok Wind Energy Pvt. Ltd. |
| **Street/P.O. Box** | No 3, R A De Mel Mawatha |
| **Building** | - |
| **City** | Colombo 05 |
| **State/Region** | - |
| **Postcode** | 05 |
| **Country** | Sri Lanka |
| **Telephone** | 0094-112-580017 |
| **Fax** | 0094-112-580022 |
| **E-mail** | info@senoksl.com |
| **Website** | www.senoksl.com |
| **Contact person** | - |
| **Title** | Director Finance |
| **Salutation** | Mrs. |
| **Last name** | Dias |
| **Middle name** | - |
| **First name** | Pancherine |
| **Department** | Finance |
| **Mobile** | 0094-772 799003 |
| **Direct fax** | 0094-112-584791 |
| **Direct tel.** | 0094-112-580017 |
| **Personal e-mail** | dias@senoksl.com |

## Appendix 2: Affirmation regarding public funding

No Public funding is involved in the project activity.

## Appendix 3: Applicability of selected methodology

Refer to section B.2 of PDD.

**Appendix 4: Further background information on ex ante calculation of emission reductions**

The Power Plants registered under CDM is provided below; which are not considered for calculation of OM & BM:

| **The Power Plants Registered under CDM is Provided Below:** | |
|---|---|
| Project & Plant Details | CDM Reference |
| Magal Ganga Small Hydropower Project | 0084 |
| Small Hydropower Projects at Alupola and Badulu Oya. | 0100 |
| Hapugastenne and Hulu Ganga Small Hydropower Projects | 0085 |
| Sanquhar and Delta Small Hydro Power Projects | 0751 |
| "Coconut shell charcoaling and power generation at Badalgama, Sri Lanka" | 2364 |
| 10 MW Biomass Power Generation Project - Tokyo Cement, Trincomalee | 2772 |
| Adavikanda, Kuruwita Division Mini Hydro Power Project | 3531 |

The Power Plants considered under BM with details of their respective Commissioning years with generation in GWh are provided below:

| Plant Name not registered under CDM | Commissioning Month | Commissioning Year | Capacity(MW) | Net Generation(GWh) |
|---|---|---|---|---|
| | | | | **2010** |
| **PPP THERMAL**-West Coast-Kerapitiya**(LFO)** | May | 2010 | 270 | 547.10 |
| **PPP HYDRO**-Watakella | January | 2010 | 1.00 | 4.24 |
| **PPP HYDRO**-Ganthuna Udagama | March | 2010 | 1.20 | 3.53 |
| **PPP HYDRO**-Aggra Oya | June | 2010 | 1.50 | 3.84 |
| **WIND**-Mampuri | May | 2010 | 10.00 | 17.86 |
| **WIND**-Seguwantivu | May | 2010 | 10.00 | 17.65 |
| **WIND**-Vidatamunai | July | 2010 | 10.00 | 14.62 |
| **WIND**-Willipita | October | 2010 | 0.24 | 0.04 |
| **PPP THERMAL**-Northern Power**(LFO)** | April | 2009 | 20 | 55.74 |
| **PPP HYDRO**-Lower Atabage | January | 2009 | 0.45 | 1.13 |
| **PPP HYDRO**-Halathura Ganga | March | 2009 | 1.30 | 5.92 |
| **PPP HYDRO**-Nugedola | April | 2009 | 0.50 | 1.62 |
| **PPP HYDRO**-Pathaha Oya | July | 2009 | 1.50 | 3.89 |
| **PPP HYDRO**-Amanawala | August | 2009 | 1.00 | 4.92 |
| **PPP HYDRO**-Bogandana | October | 2009 | 3.60 | 12.93 |
| **PPP HYDRO**-Gangaweraliya | December | 2009 | 0.30 | 1.30 |
| **PPP HYDRO**-Weddemulla | June | 2009 | 0.20 | 0.42 |
| **PPP HYDRO**-Barcaple | February | 2008 | 2.00 | 7.74 |
| **PPP HYDRO**-Kadawala 1 | March | 2008 | 4.85 | 14.41 |
| **PPP HYDRO**-Blackwater | April | 2008 | 1.65 | 5.84 |
| **PPP HYDRO**-Koswatta ganga | April | 2008 | 2.00 | 5.65 |
| **PPP HYDRO**-Kadawala ii | May | 2008 | 1.32 | 5.19 |

| | | | | |
|---|---|---|---|---|
| **PPP HYDRO**-Loggal oya | May | 2008 | 4.00 | 9.28 |
| **PPP HYDRO**-Manelwala | June | 2008 | 2.40 | 8.22 |
| **PPP HYDRO**-Somerset | September | 2008 | 0.80 | 5.13 |
| **PPP HYDRO**-Sheen | October | 2008 | 0.56 | 2.80 |
| **PPP HYDRO**-Palmerston | October | 2008 | 0.60 | 3.87 |
| **PPP HYDRO**-Giddawa | October | 2008 | 2.00 | 8.74 |
| **PPP HYDRO**-Soranathota | December | 2008 | 1.40 | 3.14 |
| **PPP HYDRO**-Batatota | February | 2007 | 2.00 | 11.17 |
| **PPP HYDRO**-Kehelgamu oya | March | 2007 | 3.00 | 10.17 |
| **PPP HYDRO**-Kotankanda | March | 2007 | 0.15 | 0.83 |
| **PPP HYDRO**-Lower Neluwa | May | 2007 | 1.45 | 6.46 |
| **PPP HYDRO**-Coolbawan | February | 2006 | 0.75 | 2.38 |
| **PPP HYDRO**-Henfold | February | 2006 | 2.60 | 10.17 |
| **PPP HYDRO**-Dunsinane | March | 2006 | 2.70 | 12.88 |
| **PPP HYDRO**-Nilambe oya | September | 2006 | 0.75 | 1.86 |
| **PPP HYDRO**-Gomala Oya | June | 2006 | 0.80 | 3.74 |
| **PPP HYDRO**-Kolapathana | October | 2006 | 1.10 | 2.49 |
| **PPP HYDRO**-Guruluwana | November | 2006 | 2.00 | 7.72 |
| **PPP HYDRO**-Kuda Oya | June | 2006 | 1.00 | 7.76 |
| **PPP HYDRO**-Labuwewa | June | 2006 | 2.00 | 6.83 |
| **PPP HYDRO**-Forest Hill | December | 2006 | 0.30 | 0.70 |
| **PPP THERMAL**-Ace Power Embilipitiya**(LFO)** | April | 2005 | 100 | 611.76 |

## Appendix 5: Further background information on monitoring plan

No further information is mentioned

## Appendix 6: Summary of post registration changes

No changes to be incurred yet.

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## History of the document

| Version | Date | Nature of revision |
|---|---|---|
| 04.0 | EB 66<br>13 March 2012 | Revision requiredto ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities" (EB 66, Annex 9). |
| 03 | 22 December 2006 | • The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM. |
| 02 | 8 July 2005 | • The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document.<br>• As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>. |
| 01 | 21 January 2003 | Initial adoption. |
| **Decision Class:** Regulatory<br>**Document Type:** Form<br>**Business Function:** Registration | | |