Project design document form for small-scale CDM project activities

(Version 08.0)

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Mampuri Wind Power Project
Version number of the PDD	121
Completion date of the PDD	03/09/201618/12/2012
Project participant(s)	Senok Wind Power (Private) Limited Asian Development Bank, as trustee of the Future Carbon Fund; Swedish Energy Agency
Host Party	Sri Lanka
Applied methodology(ies) and, where applicable, applied standardized baseline(s)	AMS I.D. Version 17, " Grid Connected Renewable Electricity Generation"
Sectoral scope(s) linked to the applied methodology(ies)	01: Energy Industries
Estimated amount of annual average GHG emission reductions	18,768 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>> Mampuri Wind Power Project is located in the general area of the Mampuri village in the North Western Province of Sri Lanka. The Project was developed by Senok Wind Power (Private) Limited (SWPL), a Sri Lankan company.

The purpose of the project activity is to use the wind energy potential in the North West coastal belt of Sri Lanka to produce a total of 10 MW using eight wind turbines, each rated at 1.25 MW. The power plant is expected to generate a net energy output of 27.638 GWh per year, estimated on the basis of long-term average wind speeds at the location. Electricity produced is sold to Ceylon Electricity Board (CEB), the national electricity utility, through a dedicated transmission line. The Project has been designated by the Sri Lanka Sustainable Energy Authority (SLSEA) and Ceylon Electricity Board (CEB) as a Small Power Project (SPP), and its operations and sale of electricity are governed by the Permit issued by SLSEA, and the standardised Small Power Purchase Agreement (SPPA) signed with CEB. The Permit was issued and the SPPA was executed, before the commencement of construction activities. The SPPA is a standardised, 20-year, non-negotiable contract, and defines a standardised tariff for the sale of electricity on the basis of a generic wind power plant and other financial indices at the time of calculating the tariff by the Authority (SLSEA).

This project is the first wind power project in Sri Lanka. The energy generated by the project is to be supplied to the sole purchaser of electricity in the country, the Ceylon Electricity Board. The metering of the generation will take place at the panel room of the project, where all eight WTGs will be connected. The metering of the project is done by the CEB, and at the commissioning of the project, the officials from the CEB will connect the meters for the metering to be done as described in Section B7.2.

The project activity reduces greenhouse gas emissions in the following manner. The wind resource potential is converted to electricity using eight wind turbines and electricity is supplied to the national grid, which is fully owned and managed by CEB. Sri Lanka's electricity generating system feeding the national grid is dominated by thermal power plants, using diesel, fuel oil and naphtha, and is also using coal from year 2011. A range of diesel engines, open cycle gas turbines and combined cycle gas turbines serve the grid, while the first coal-fired power plant in Sri Lanka commenced operation in March 2011 at a site adjacent to this small scale CDM project activity. Energy share in the national grid from fossil-fuelled thermal power plants was 60% in 2007, and is expected to exceed 80% by year 2020. Electricity generated from the Mampuri Wind Power Plant displaces a corresponding portion of fossil fuels used in power plants serving the national grid and avoids the corresponding greenhouse gas emissions from the oil and coal power plants. The Mampuri Wind Power Plant is estimated to displace 18,768 tCO_2 per year at an emission factor of 0.6791 $kgCO_2$ per kWh, as calculated later in this PDD. It also avoids other emissions such as SO_x and NO_x from thermal power plants located throughout Sri Lanka. The project activity has improved the road along the coast at Mampuri, which has enhanced the mobility of villagers in Mampuri. Several community service initiatives are being implemented by the project participant.

The contribution of the project activity to sustainable development: As per the latest policy communication dated 12th January 2011 " The development Framework of the Government of Sri Lanka" requires that 20 % of electricity generation from Non conventional Renewable Energy Sources by 2020 with 10% of the target to be met by 2016. (http://www.energy.gov.lk/sub_pgs/develop_energy.html) The project activity pioneered the development of wind power using private sector financing. Therefore, the project activity contributes to sustainable development by (a) displacing fossil fuel used for electricity generation in the national grid of Sri Lanka in the long-term, (b) contributing to achieving the renewable energy targets in the National Energy Policy, and (c) pioneering the development of wind power, being the first private sector initiative to diversify the sustainable energy portfolio into wind energy, thus catalysing the growth of wind energy development in Sri Lanka.

A.2. Location of project activity

A.2.1. Host Party

>> The Host Party is Sri Lanka

A.2.2. Region/State/Province etc.

>> Province: North Western
District: Puttalam
Local Authority: Kalpitiya Pradeshiya Sabha
Village: Mampuri

A.2.3. City/Town/Community etc.

>> The Wind Power Plant is centred on the Mampuri Village, distributed along a 3.5 km coastal belt

A.2.4. Physical/Geographical location

>> The project is located on the north western coast of Sri Lanka, in the North Western Province. The site is centred on the village of Mampuri. Wind turbines are spread over a distance of 3.5 km along the coastline, and built on the coast, beyond the statutory limits from the waterfront. The site is accessed by turning from A3 Colombo-Puttalam road at the Palavi junction, to B 349 Palavi – Kalpitiya road, and then by turning left at the Mampuri junction (approx 12 km from Palavi).

Access to Site: The site is accessed by turning from A3 Colombo-Puttalam road at Palavi, to B 349 Palavi – Kalpitiya road. When travelling from Palavi towards Kalpitiya along this road, turn left at the Mampuri junction, which is approximately 12 km from Palavi. Move through the Mampuri village to reach the beach front, along which the site is located.
The coordinates of the eight wind turbine generator locations are the following:

Wind Turbine Generator (WTG)	Latitude	Longitude
WTG1	N 8° 0’ 36.7194”	E 79° 43’ 23.8794”
WTG2	N 8° 0’ 26.28”	E 79° 43’ 27.84”
WTG3	N 8° 0’ 8.6394”	E 79° 43’ 33.5994”
WTG4	N 7° 59’ 33.36”	E 79° 43’ 23.2794”
WTG5	N 7° 59’ 22.92”	E 79° 43’ 43.32”
WTG6	N 7° 59’ 12.4794”	E 79° 43’ 45.12”
WTG7	N 7° 58’ 59.52”	E 79° 43’ 48.7194”
WTG8	N 7° 58’ 47.2794”	E 79° 43’ 51.9594”

For more details of the site, please see Figure 1.

Figure 1- Wind Turbine Locations Identified for the Project

A.3. Technologies and/or measures

>> Using the categorisation stated in **Appendix B to the Simplified Modalities and Procedures for Small-scale CDM Project Activities**, the Project type and category are defined as follows:

The Project is of Type I:	Renewable Energy Projects
The Project is of Category I.D:	Grid connected renewable electricity generation

Technology/measure:

The project has developed a wind power plant to harness the wind potential along a 3.5 km coastal belt.

The project activity uses a proven wind turbine, and has selected the Suzlon S64/1250 machine. Each wind turbine is located within a block of land of approximate dimensions 150 m x 100 m. Foundation for each wind turbine is located approximately in the middle of its block of land. The turbine mast is of tubular structure, transported in sections and was assembled on site. Each turbine consists of three blades, each of length 31 m. The nacelle houses the gearbox and the electricity generator. The generator is of induction type. The complete technical specifications are given in the box. Please see the next two pages:

The project transfers wind power generation technology from India to Sri Lanka. Its operations and maintenance too is conducted by the Indian turbine supplier, for a period of seven years of operation, transferring maintenance skills to Sri Lanka during this period.

Technical specifications of WTG model S64/1250

Manufacturer: Suzlon Energy Limited, India

Operating Data	
Rated power	1250 kW
Cut-in wind speed	3 m/s
Rated wind speed	14 m/s
Cut-out wind speed	25 m/s
Survival wind speed	67 m/s
Regulation	Pitch-regulated
Rotor	
Type	3 bladed, horizontal axis
Diameter	64 m
Swept area	3217 m^2
Speed	20.7 / 13.8 rpm
Hub	
Type	SG Iron Casting
Material	GGG 40.3
Generator	
Type	Asynchronous; 4/6 pole
Rated Power	250/1250 kW
Rated voltage	690 V
Rotational speed	1006/1506 rpm
Frequency	50 Hz
Protection	IP 56
Cooling system	Air cooled
Insulation	Class H
Braking System	
Aerodynamic baking	3 independent systems with blade pitching
Mechanical braking	Hydraulic fail safe disc brake system
Gearbox	
Type	3-stage (1 planetary & 2 helical)
Ratio	74.917:1 (50Hz)
Nominal load	1390 kW
Yaw System	
Type	Active electrical
Bearings	Polyamide slide
Brake	Clutch brake on drive motor
Drive	4 electrical driven planetary gearbox
Protection	By cable twist sensor, proximity sensor

Pitch System

Type	3 independent blade pitch control
Actuation	Individual electro-mechanical drive
Bearing	Double row, ball bearings
Operating range	-5^0 to 88^0
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
Hub height	74 m
Corrosion protection	Epoxy / PU coated
Erection	With crane

Protection

Lightning protection standard IEC 1024-1, VDE 0185 part 1& 2 DIN 48801 and DIN 18014

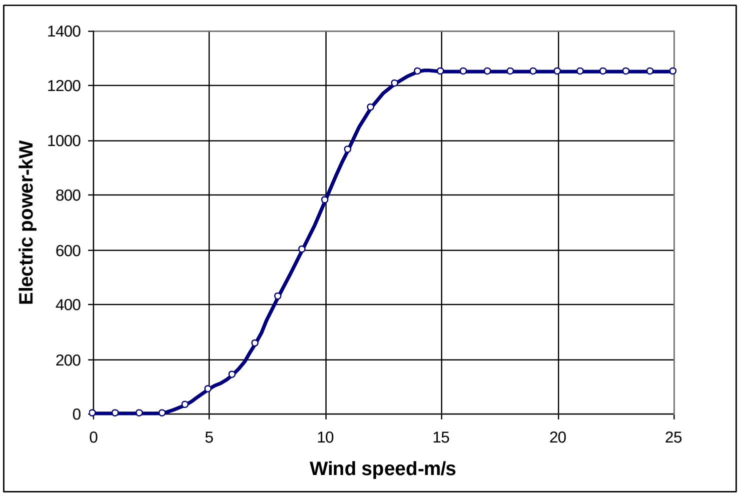
Blades Receptor in blade tips

Controller

Programmable microprocessor based
High-speed data communication
Active multilevel security
Sophisticated operating software
Advanced data collection, remote monitoring & control option
UPS back up
Real time operation indication

Power Curve

Air density: 1.225 kg/m^3



The generating voltage is 690 V. Power generated is connected to a step-up transformer located at the foot of each turbine mast, where the voltage will be raised to 33 kV to be compatible with the medium voltage transmission system of CEB. There will be a 33 kV transmission line along the entire 3.5 km length of the wind park, to which the output of each turbine is connected. At a location approximately in the middle of the park, near WTG5, there is a central switching arrangement to connect the wind power plant to the CEB network. CEB's metering point is located immediately after this interconnection point. A new 33 kV transmission line from the CEB metering point located in the middle of the wind park near WTG5 to reach the national grid was built by the project proponent.

Being the first commercial wind power plant to be built in Sri Lanka, this project introduced new but proven technology to the host country, and expects to demonstrate that wind power is a viable option for sustainable power generation in Sri Lanka in the long-term.

A.4. Parties and project participants

Party involved (host) indicates 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)
Sri Lanka (host)	Private entity Senok Wind Power (Private) Limited	No
Sweden (Other party)	Asian Development Bank, as trustee of the Future Carbon Fund ; Swedish Energy Agency	No

Contact information of the project participant is provided is Annex 1.

A.5. Public funding of project activity

>>
The project was entirely financed by Senok Wind Power (Private) Limited, through loans from commercial banks in Sri Lanka and equity provided by the holding company, Senok Trade Combine Limited. No public funds either from Annex 2 Parties, from the host party (Sri Lanka) or any other country were used for any element of this small scale CDM project activity.

A.6. Debundling for project activity

>> Guidance was sought from **EB54 Annex 13 "Guidelines on assessment of de-bundling for SSC project activities (Version 03)"** to establish the status of de-bundling.

In the context of this analysis:
- SSC PA stands for "a Small Scale CDM Project Activity"
- A "registered SSC PA" also includes a SSC PA which applied for registration

Is there a registered SSC PA with the same project participants as the proposed SSC PA?	No
Is the registered SSC PA registered within the previous 2 years?	Not applicable
Is the boundary of the registered SSC PA within 1 km of the boundary of the proposed SSC PA at the closest point?	Not applicable
Is the registered SSC PA registered within the previous 2 years?	Not applicable
Does the total size of the proposed SSC PA combined with the registered SSC PA exceed the limits for SSC PAs?	Not applicable

Therefore, based on the guidance provided by EB54 Annex 13, the proposed SSC PA is not deemed to be a debundled component of a large project activity, therefore is eligible to use the simplified modalities and procedures for SSC PAs.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

>> The Project category title is **Category I.D: Grid connected renewable electricity generation**
Reference for the approved baseline and monitoring methodology is: **AMS-I.D "Grid Connected Renewable Electricity Generation" version 17**.

B.2. Project activity eligibility

>> The Project produces electricity from the wind potential available in the coastal belt, centred on the Mampuri village. The power plant will have a total installed capacity of 10 MW, and all the output is directly supplied to the national grid of Sri Lanka, which is managed by Ceylon Electricity Board. The power plant is classified by CEB as a Small Power Project (SPP), which should by definition be less than 10 MW. The project uses renewable energy to produce electricity to supply the grid, and is less than 15 MW, and thus the category I.D is the most appropriate category for this small scale CDM project activity.

With reference to **AMS-I.D "Grid Connected Renewable Electricity Generation" version 17**, on which the choice of project category was based, the following are the specific reasons to select the project category I.D.

Technology/measure

Technology/measure	Relevance to the Project Activity
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling	The project activity comprises renewable energy generation through wind that supplies electricity to national grid i.e. Ceylon Electricity Board. Relevant and applicable (as AMS I D).
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table 2.	The project satisfies the criterion (i) in Table 2 of the methodology and qualifies for AMS-I.D. as the Project supplies electricity to the national grid (Ceylon Electricity Board in Sri Lanka)
3. 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)	The proposed project activity complies with (a) that installation of wind mills at a site where there was no renewable energy power plant prior to the implementation of the project activity (Greenfield plant)

Technology/measure	Relevance to the Project Activity
existing plant(s).	
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • 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/m2; • 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/m2.	Not relevant.
5. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel[1], the capacity of the entire unit shall not exceed the limit of 15 MW.	The project has only renewable units (wind) and the total capacity is 10 MW, and the project is a green field project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The project has no combined heat and power units. Not relevant.
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 15 MW and should be physically distinct from the existing units.	This project is not one that adds renewable energy electricity generation units at an existing renewable power generation facility, as there was no power plant at site prior to the project activity. The project activity is a new installation and is 10 MW. Not relevant.
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 15 MW.	The project activity does not seek to retrofit or modify an existing facility for renewable energy generation, as it is a new installation (green field) of 10 MW of wind turbine generators.

B.3. Project boundary

The spatial extent of 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. According to “Tool to calculate the emission factor for an electricity system (Version 02.2.1) EB 63 Report Annex 19”, the grid/project electricity system is defined by the spatial extent of the power

[1] A co-fired system uses both fossil and renewable fuels.

plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

As such the boundary is defined as the grid electricity system and other power plants connected to grid in project boundary. The project boundary is shown in Figure 2.

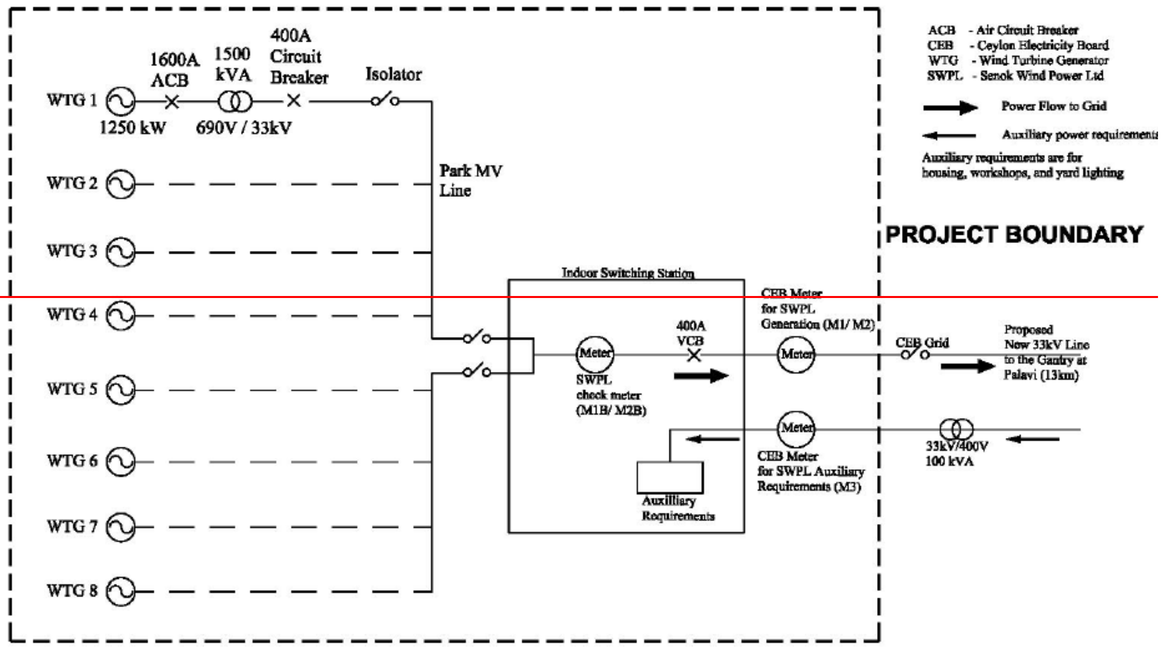
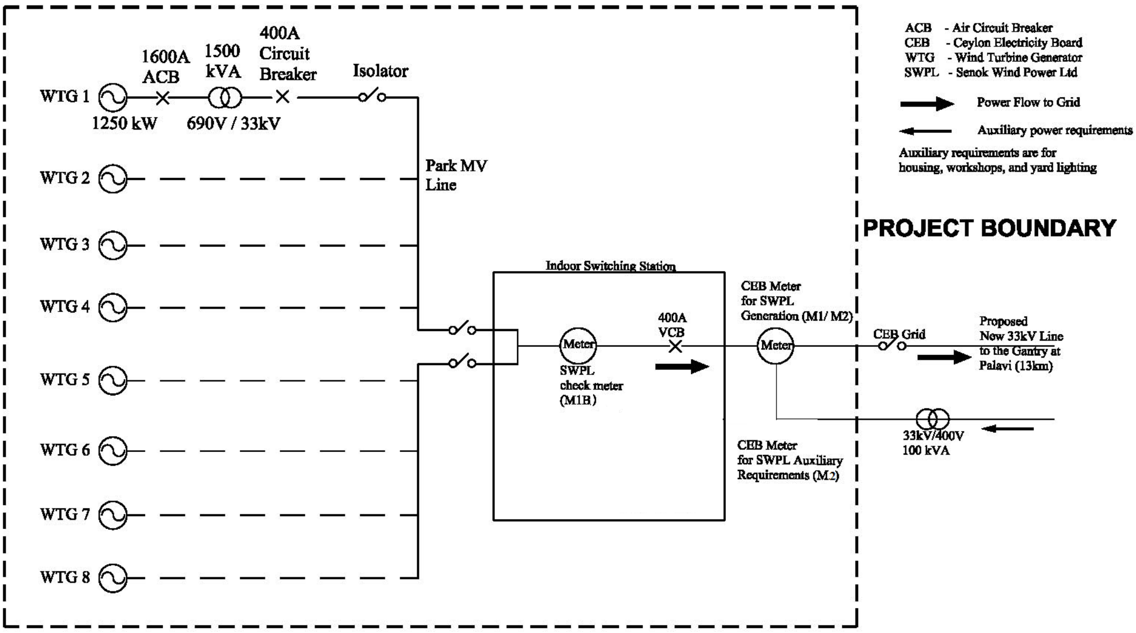


Figure 2- Schematic Layout showing the Project Boundary



Note: There is one main meter which records M1 (export) and M2 (import) readings, installed by CEB in accordance with the power purchase agreement. There is a backup meter installed by the project participant, which records M1B (export)~~ and M2B (import)~~ readings~~. To ensure reliability of auxiliary power supply to the power plant in case the new 33 kV line carrying the output of the project activity to the grid undergoes an outage, there is a separate service connection from CEB, which is metered by CEB using meter M3. The auxiliary power requirements are for yard lighting at wind turbine locations, workshops, and for the control and monitoring station.~~

B.4. Establishment and description of baseline scenario

>> The baseline for this project is the emissions from the electricity generating system in Sri Lanka supplying the national grid. The national grid is owned and managed by CEB, the state-owned electricity utility. The national grid serves about 80% of households, nearly all the commercial and industrial customers, while a further estimated 2.5% of households use off-grid electricity supply systems.

Historic development of electricity generation in Sri Lanka: Sri Lanka's electricity generation development was initially focussed on developing conventional hydropower resources. Commencing from year 1950, a total of 1205 MW of medium and large hydropower generating capacity has been built by end 2007, to supply the national grid. (See Table 1). In year 1995, Sri Lanka produced 95% of the grid electrical energy requirements from such conventional hydropower plants. However, with no major new hydroelectric projects to be developed, the dominance of hydropower changed dramatically from 1996 onwards. The growing demand for electricity had to be met with new thermal power plants. Between 1996 and 2008, Sri Lanka added 965 MW of oil-fired power plant to meet the growing demand for electricity. Over the same period, households using electricity rose from 47% to 80% and a similar increase in demand was observed from commercial and industrial customers. In

year 2007, 59.8% of energy in the national grid was sourced from oil-fired thermal power plants (see Table 2). In a year when hydropower output decreases owing to adverse weather, the share of electricity from oil-fired thermal power plant increases to about 65%.

Table 1- Types of power plants in operation in the Sri Lanka national grid as of 31st December 2007

Types of Power Plants	Installed Capacity (MW)	Share of Total Capacity	Gross Energy Dispatched to the Grid in 2007 (GWh)	Share of Total Energy
Hydro and other renewable				
CEB Hydro Power Plants	1205.0	50.1%	3,602.9	36.7%
Small Power Producers (Hydro)	117.1	4.9%	342.8	3.5%
Small Power Producers (Biomass, solar)	2.1	0.1%	1.3	0.0%
CEB Wind Power Plant	3.0	0.1%	2.3	0.0%
Total hydro and other renewables	**1327.2**	**55.2%**	**3,949.2**	**40.2%**
Thermal Power Plants using Fossil Fuel				
CEB Thermal : Petroleum	528.0	22.0%	2,335.5	23.8%
IPP Thermal : Petroleum	550.1	22.9%	3,528.5	36.0%
Total thermal power plants using fossil fuel	**1078.1**	44.8%	**5,864.1**	**59.8%**
Total Grid connected power plants	**2405.3**	**100.0%**	**9813.3**	**100.0%**

Note: Installed capacity data as of end December 2007
Sources:
1. CEB Long-term Generation Expansion Plan Dec 2005
2. Sales and Generation Data Book, CEB, 2007

Note 1: The project electricity system is the national electricity grid of Sri Lanka
Note 2: One new oil-fired power plant of 200 MW was commissioned during year 2008, but not included in the above list because the published information is available only up to December 2007 at the time of submission of the PDD to DOE. For more details of power plants, see Table A3.1 in Annex 3.

Table 2- Sri Lanka generating capacity share on the grid by source (2007)

Primary Source	Installed Capacity (MW)	Share of Total Capacity	Gross Energy Dispatched to Grid in 2007 (GWh)	Share of Total Energy
Hydro	1,322.1	55.0%	3,945.6	40.2%
Biomass, solar	2.1	0.1%	1.3	0.0%
Wind	3.0	0.1%	2.3	0.0%
Fossil Fuel (oil)	1,078.1	44.8%	5,864.1	59.8%
Total	2,405.3	100.0%	9,813.3	100.0%

The Small Power Project (SPP) Development Program: Electricity generation from large hydroelectric power plants is considered to be a conventional approach in Sri Lanka. Renewable

energy-based electricity generation from non-conventional renewable energy sources (NCRE) received a new impetus in 1996, when the Government announced a standardised power purchase agreement and a standardised tariff for private developers of NCRE-based power plants. By end 2007, a total of 68 power plants have been built by private developers under the SPP development program, including 64 small hydroelectric power plants, two biomass power plants, one waste heat power plant and one solar PV system. In spite of the SPP development program being available since 1996, and open to wind power developers as well, no wind power plants had been built as yet on this scheme. The Mampuri Wind Power Project was the first commercial wind power plant in Sri Lanka. The reasons for the non-implementation of wind power projects under the SPP program over the period 1998-2008 are (a) lack of information and analytical capability on wind resources (b) financial constraints imposed by the lower (avoided cost based) standardised tariff which was technology-neutral, compared with rising equipment costs, finance costs, and (c) moderate wind regime in Sri Lanka resulting in lower annual capacity factor.

By mid 2008, Sri Lanka had only one grid-connected wind power plant rated at 3 MW built and operated by the national electricity utility, the CEB, as a pilot/demonstration facility. This power plant is located in the Hambantota District in the southern province. That CEB power plant is not a commercial power plant and was built with concessionary finance from international lending agencies.

Future Electricity Generation in Sri Lanka: Sri Lanka hydroelectric potential, for both large and small developments for power generation, is limited. All the small hydropower development sites in the capacity range of 250 kW to 10 MW have either been developed already or in various stages of development. A few large projects beyond the 10 MW limit allowed in the SPP program, remain yet to be developed, most of which are associated with new irrigation schemes. Very small and micro-hydro power projects remain to be developed, but there too, the total potential is limited. Thus Sri Lanka's electricity generating system is presently dominated by oil-fired electricity generation, and in the future, it will be dominated by coal-fired power plants. Table 3 shows the published long-term generation expansion plan of CEB, which shows the planned dominance of coal-fired power generation in the future, while phasing out the existing oil-fired generation. The first coal-fired power plant was commissioned in year 2011 (see Table 3) is presently operational at a site adjacent to the northern boundary of this small scale CDM project activity, the Mampuri Wind Power Project.

Table 3- Sri Lanka's long-term generation expansion plan 2005 (Base Case Plan)

YEAR	HYDRO ADDITIONS	THERMAL ADDITIONS	THERMAL RETIREMENTS	LOLP** %
2006		-	-	1.081
2007	-	-	-	3.760
2008	-	200 MW GT part of Kerawalapitiya Combined Cycle Plant	-	2.792
2009	-	100 MW ST PART OF KERAWALAPITIYA COMBINED CYCLE PLANT 245 MW Gas Turbines	-	0.817
2010	-	285 MW Gas Turbines	4x17 MW Gas Turbine at Kelanitissa	0.676
2011	*150 MW Upper Kotmale*	*600 MW Coal Steam (West Coast)*		0.003
2012	-	*300 MW Coal Steam (West Coast)*	20 MW ACE Power Matara	0.002
2013	-	300 MW Coal Steam (South Coast)	22.5 MW Lakdhanavi Plant 4x18 MW Sapugaskanda Diesel 20 MW ACE Power Horana	0.007
2014	-	300 MW Coal Steam (South Coast)		0.006

2015	-	300 MW Coal Steam (South Coast)	60 MW Colombo Power Plant 100MW Heladhanavi Diesel Power Plant at Puttalam 100MW ACE Power Diesel Power Plant at Embilipitiya	0.063
2016	-	300 MW Coal Steam (South Coast)		0.077
2017	-	300 MW Coal Steam (East Coast)	-	0.109
2018	-	300 MW Coal Steam (East Coast)	115 MW Gas Turbine 7 at KPS 49 MW Asia Power Plant	0.428
2019	-	300 MW Coal Steam (East Coast)		0.675
2020	-	300 MW Coal Steam (West Coast) 105 MW Gas Turbines	-	0.696
Total PV Cost up to year 2020, **US$ 4,783.9 million** (LKR 476,679.7 million)				

Source: Long-term Generation Expansion Plan, Ceylon Electricity Board, December 2005

**LOLP = Loss of Load Probability, is a measure of generating system reliability, PV= Present Value
Power plants shown in italics are those committed for implementation as of the starting date of the small scale
CDM project activity.

The above base case plan is the least-cost plan approved by CEB for implementation. Accordingly, Sri Lanka's energy mix in the generating system, as stated in the long-term generation expansion plan, would change from the present oil-dominant status to be coal-dominant, as shown in Table 4. The share of hydropower is estimated by CEB to reduce from 40.2% in 2007 to 19.5% by 2020, while coal-fired thermal generation is estimated to reach 77.7% by 2020. Oil-fired thermal generation which accounted for 59.8% of energy input to the grid in 2007 would be phased out and will provide 9.6% of energy by 2020.

Table 4- Generation mix in the Sri Lanka grid (Base Case)

Primary Source	Gross Energy Dispatched to Grid (GWh)				Share of Total Gross Energy in the Grid			
	2007	2010	2015	2020	2007	2010	2015	2020
Hydro	3946	4,464	4,994	4,994	40.2%	36.7%	28.2%	19.5%
Biomass, solar	1	Not included in the long-term plan			Not included in the long-term plan			
Wind	2	Not included in the long-term plan			Not included in the long-term plan			
Oil-fired thermal	5864	7,705	1,009	715	59.8%	63.3%	5.7%	2.8%
Coal-fired thermal		-	11,681	19,945	0.0%	0.0%	66.1%	77.7%
Total	9813	12,169	17,684	25,654	100.0%	100.0%	100.0%	100.0%

Source: Long-term Generation Expansion Plan, CEB, December 2005

Policy Initiatives: The **"Energy Policy and Strategies of Sri Lanka",** approved by the Government (published on 10th June 2008) states that "The Government will endeavour to reach a minimum level of 10% of electrical energy supplied to the grid to be from Non-conventional Renewable Energy (NCRE) sources by a process of facilitation, including access to green funding such as CDM. The target year to reach this level of NCRE penetration is 2015." However, CEB does not include contributions from such NCRE power plants in the base case long-term plan, and consider such project activities as additional.

Mampuri Wind Power Project is a pioneering effort to build the first commercial wind power plant of Sri Lanka, under the small power purchase scheme. Studies have indicated a technical potential of

over 20,000 MW of wind power generating capacity in the country, but no wind power plant had been built before the Mampuri Wind Power Project, except the CEB's 3 MW demonstration facility built in 1999 elsewhere in the country, using concessionary finance and grants.

Establishing Baseline:

In accordance with Appendix B of the simplified M&P for small-scale CDM project activities of the UNFCCC, the project activity falls under category AMS I.D – "Grid connected renewable electricity generation."

Paragraph 10, 11 and 12 of the AMS ID version 17 are relevant for baseline determination. Therefore, baseline under section B.4 was determined using para 10, 11 and 12 of the approved methodology AMS ID version 17.

In accordance with paragraph 10 of applied methodology-

The baseline scenario is that the electricity delivered to the grid by the project activity which would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

The project activity is a new grid connected power plant supplying electricity to Ceylon Electricity Board (CEB), the state-owned electricity utility, hence in accordance with the applied methodology, the baseline scenario for the project activity is the electricity delivered to the grid by the wind turbines that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.

In accordance with paragraph 11 of applied methodology-

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.*

$$BE_y = EG_{BL,y} \times EF_{CO2,grid,y}$$

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} = CO_2 emission factor of the grid in year y, (tCO_2/MWh)

The baseline emissions for the project activity are the electricity generated by the project activity multiplied by the emission factor of the concerned grid. The project activity is connected to national grid hence national grid is considered as baseline grid and emission factor of national grid was used for the calculation of baseline emissions.

In accordance with para 12 of applied methodology-

The Emission Factor can be calculated in a transparent and conservative manner as follows:

(a) 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' version 02.2.1

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.

Option (a) was used to calculate the combined margin consisting of the operating margin (OM) and the build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system", version 02.2.1, as the applicable emission factor for determining baseline emissions.

The baseline emissions and emission reductions from the project activity were estimated based on the amount of electricity exported by the project activity to the national grid, multiplied by the

emission factor of the national grid calculated as the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors.

Variable	**Data Source**
$EG_{BL,y}$ – Net electricity exported to the grid.	Records maintained by project proponent This is recorded through the monthly invoices raised to the Ceylon Electricity Board for payment for the supply of net electricity to the grid.
Parameter	**Data Source**
$EF_{OM,\ y}$ = Operating Margin Emission Factor (tCO_2/MWh)	Sales and Generation Data Books (2005, 2006, 2007), Ceylon Electricity Board (CEB)
$EF_{BM,\ y}$ = Build Margin Emission Factor (tCO_2/MWh)	Sales and Generation Data Books (2005, 2006, 2007), Ceylon Electricity Board (CEB)
$EF_{CO2,\ grid,\ y}$ = Grid Emission Factor	Calculated as the weighted average of the operating margin and build margin

Baseline Emissions: Please see B.6.1 for the methodological choices to calculate baseline emissions and the development of the baseline.

B.5. Demonstration of additionality

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The table below is only applicable if the proposed project activity is a type of project activity which is deemed automatically additional, as defined by the applied approved methodology, tool, standardized baseline or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by a DNA and approved by the Board.

Dispatch procedure:

The Mampuri Wind Power Plant described in this document, according to the Small Power Purchase Agreement signed with CEB, is a must-run power plant. This means that all the energy output of the power plant will be purchased and dispatched into the grid by CEB, at all times. CEB is the only buyer of energy, and there are no other users of the energy output of the power plant.

This procedure is already applied to the small hydro power plants operating on similar standardised power purchase agreements, which is to fully dispatch them irrespective of the short-term economics of load dispatch by CEB.

How anthropogenic emissions of GHG will be reduced:

When one unit (kilowatt-hour) of electricity is input to the project electricity system (ie the national grid of Sri Lanka) by the small scale CDM activity described in this PDD, the Mampuri Wind Power Plant, an equivalent amount of electricity is cut-back from the marginal generating plant(s) serving the CEB grid at that instant. The marginal generating plant in the CEB is always a thermal power plant using a fossil fuel. Therefore, the avoided energy output from a thermal power plant would result in a reduction of GHG emissions from fossil-fuel burning power plant(s).

With the higher growth rates recorded in the past, and the 20-year forecast published by CEB, thermal plants will continue to be the marginal power plants in the CEB system. Therefore, the Mampuri Wind Power Project will avoid anthropogenic emissions of GHG throughout its 20-year operating life.

Chronology of CDM activities:

The project participant has been actively seeking CDM status for the project from the initial stages of the project activity. The summary of key activities to seek CDM status along with the key milestones of the project activity are listed below-

Period	Activity
01/10/2006	Negotiated with Royal Haskoning of the Netherlands for providing consulting services for the CDM process
08/12/2006	Received an inquiry from Daiwa securities for CER sale. This was in response to Senok's participation at the Carbon Expo Asia in Beijing, China, 26-27 October 2006
03/09/2007	Project Participant attended a Workshop on Carbon Trade and CDM Development, organised by kfw, Germany.
24/03/2008	Received an inquiry from Lanka Carbon Assets Pvt Limited and subsequently negotiated on possible services to the project activity
12/08/2008	Board resolution to proceed to equipment contract conditional on CDM
15/08/2008	Appointed CDM consultants
23/08/2008	Signing of equipment supply contract: CDM project activity Starting Date
14/11/2008	Applied to DNA for approval to PIN
08/12/2008	Received DNA approval for PIN
07/04/2009	Applied for Host Country DNA approval for PDD
04/05/2009	Received DNA approval for PDD
15/05/2009	Submitted PDD to DOE for validation

However, for the project to materialise, SWPL, the project participant had to face a number of barriers and constraints.

Analysis of the small scale CDM project activity for additionality is based on EB 70 Report Annex 08 Methodological Tool “Tool for the demonstration and assessment of additionality” (Version 07.0.0) The additionality of the project activity is analysed below:

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

This is according to the “Guidelines on additionality of first-of-its-kind project activities” EB 69, Annex 07, Version 2.0

Identification of a first-of-its-kind project activity

A proposed project activity is the First-of-its-kind in the applicable geographical area if:

(a) The project is the first in the applicable geographical area that applies a technology that is different from any other technologies able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the project; and

(b) Project participants selected a crediting period for the project activity that is .a maximum of 10 years with no option of renewal.

The applicable geographical areas: Sri Lanka.

Guidance was taken from “Guidelines on additionality of first-of-its-kind project activites” EB 69, Annex 07, Version 2.0” point III (4), which states that in the absence of a specific definition of the applicable geographical area in the approved baseline and monitoring methodology, the host country should be used as default.

As stated previously in this PDD, the Mampuri Wind Power Project is the first commercial wind power plant to be built in Sri Lanka. This is further confirmed by the fact that the first Energy Permit issued in Sri Lanka for a wind power plant is for the Mampuri Wind Power Project (please see the list of Energy Permits http://www.energy.gov.lk/sub_pgs/develop_permits_wind.html)

This project is the first wind power project in Sri Lanka, was commissioned in 2010 (http://www.lankabusinessonline.com/fullstory.php?nid=1223352553).

However, during the course of validation, CDM EB has approved (EB69 Annex 7) a guidance on the demonstration of the first of its kind, which has been applied by the proposed CDM project activity as under;

The applicable geographical area is considered to be the host country, Sri Lanka, as default, as prescribed by the EB69 Annex 7. The proposed CDM project activity comprises installation of wind energy generators of 1.250 MW (8 units), which is the first installation of this size and capacity in the host country by any private investor at the time of investment decision and project start date.

(b) Project participants selected a crediting period for the project activity that is a maximum of 10 years with no option of renewal.;

The project participant has selected the fixed 10 year crediting period, in accordance with second condition of the first of its kind guidance, which is not renewable.

Therefore, in accordance with "Guidelines on additionality of first-of-its-kind project activities" EB 69, Annex 7, Version 2.0, paragraphs 5a and 5b, the project activity complies with the guidance and is additional.

The "Guidelines on additionality of first-of-its-kind project activities" EB 69, Annex 7, Version 2.0, further explains that there is no need for further justification if the project has completed Step 0. But further to this step, the PP has decided to provide the Investment Analysis as further cause to substantiate the project activity.

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

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

Identification of alternatives to the project participant or to similar project developers:

The small scale CDM project is a wind power plant developed under the small power development scheme of Sri Lanka, to sell electricity to the project electricity system (the national grid).

The realistic and credible analysis of alternatives in accordance with the EB 70 Report Annex 08 Methodological Tool "Tool for the demonstration and assessment of additionality" (Version 07.0.0), were selected among the following:

(1) The proposed project activity undertaken without being registered as a CDM project activity;

(2) Other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs services (e.g., cement) or services (e.g. electricity, heat) with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology;

(3) If applicable, continuation of the current situation (no project activity or other alternatives undertaken).

There is no credible alternative scenario other than Alternative 3 hence Alternative 1 and 2 are not considered for this purpose.

In accordance with para 10 of AMS 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.
Outcome of Sub-step 1a: As per Para 10 of AMS I.D. Version 17 this is the baseline scenario and same will be the alternative to project activity.

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

The mandatory laws and regulations applicable to the CDM project activity and the alternatives are the following:

(i) Sri Lanka Electricity Act No 20, 2009: Chapter 3 (all applicable clauses related to licensing)

(ii) Sri Lanka Sustainable Energy Authority Act No 35 of 2007: Part 2 (all applicable clauses related to renewable energy, along with the following regulations issued under this Act)
  a. Regulations on Renewable Energy Development Areas: Gazette notification 1538/22 dated 26/02/2008
  b. On-grid Renewable Energy Project Regulations: Gazette notification Gazette notification 1599/6 dated 27/04/2009

(iii) National Environmental Act No 47 of 1980, Amendment to Act No. 56 of 1988, Amendment to Act No. 53 of 2000,
  a. Activities for which an Environmental Protection License is Required (Gazette No 1159/22)

(iv) North-west Province Environmental Statute No 12 of 1990.

(v) Coast Conservation Act 57 of 1981.

Alternative (1), the proposed project activity undertaken without being registered as a CDM project activity, is consistent with mandatory laws and regulations, because all the laws applicable to the proposed CDM activity will also apply to this alternative.

Alternative (3), continuation of the current situation (no project activity or other alternatives undertaken) is also not hindered by any of existing laws/regulations. In the event no project activity is implemented it is quite reasonable to assume that it would have been otherwise generated in power plants that would come up in the future and emission would occur in accordance with current generation of mix of power plants. The power is being exported to grid and is not utilized by project participant renders this as a credible option, as there is no burden to invest in the project and is simply a no cost option.

The laws and regulations are mandatory, they are applicable to the alternatives, and they are being enforced. The laws and regulations have objectives other than GHG reductions. These objectives include renewable energy resource allocation, air quality management, water quality management, etc.
Outcome of Sub-step 1b: It is noted that As per the latest policy communication dated 12th January 2011 " The development Framework of the Government of Sri Lanka" requires that 20 % of electricity generation from Non conventional Renewable Energy Sources by 2020 with 10% of the target to be met by 2016. (http://www.energy.gov.lk/sub_pgs/develop_energy.html). Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with legislation in Sri Lanka, as other forms of Renwable Energy projects could be developed in the future up until 2020 in order to meet this above deadlines.
While this project has considered these Alternatives at Sub-Step 1b, the described laws and regulations are mandatory.
Alternative 1 is not feasible due to its investment barriers and first of its kind nature. Therefore a credible Alternative is Alternative 3, where the current situation will continue, as all projects are governed by the laws and regulations mentioned.

Step 2: Investment Analysis

Sub-step 2a: Determine appropriate analysis method

The CDM project activity and the alternatives identified in Step 1 generate financial or economic benefits other than CDM related income. Therefore, as guided by EB 70 Report Annex 08, "Tool for the demonstration and assessment of additionality" Version (07.0.0) the simple cost analysis (Option I) cannot be used. The analysis can then use investment comparison analysis (Option II) or benchmark analysis (Option III).

The selection between Option II and Option III was done taking guidance from EB62, Annex 5, "Guidelines on the Assessment of Investment Analysis: Version 5, Clause 16", which provides specific guidance on how to select between investment comparison analysis (Option II) and benchmark analysis (Option III). The baseline is outside the direct control of the project developer and the case is one where the choice of the developer is to invest or not to invest.

Therefore, for the investment analysis of this small scale CDM project, the benchmark analysis (Option III) was selected.

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

The financial/economic indicator, most suitable for the project type and decision context was selected to be the **project Internal Rate of Return (project IRR).** In accordance with EB62 Annex 5 clause 12, local commercial lending rates, was determined to be the appropriate benchmark for project IRR.

In accordance with EB62 Annex 5 clause 13, considering that the project, in principle, could be developed by any entity other than the project participant, the benchmark value for the project activity was based on parameters that are standard in the market.

Establishment of the Benchmark project IRR with publicly available official data sources

The small scale CDM project activity requires long-term financing. For each month, the Central Bank of Sri Lanka (CBSL) publishes long-term lending rate of four banks.

- State Mortgage and Investment Bank (SMIB, primarily a bank providing housing loans)
  - http://www.smib.lk/products/loan-schemes
- Development Finance Credit Corporation Bank (DFCC, a bank providing long term loans to development project, including renewable energy projects)
  - http://www.dfcc.lk/sme-project-finance/project-financing
- National Savings Bank (NSB, a savings bank, lending to mainly housing projects) http://www.nsb.lk/Loan_centers.php
- National Housing Development Agency (NHDA, a housing bank)
  - http://www.nhda.lk/

As referred in the web links above, the SMIB. NHDA and the NSB primarily give loans either for housing/ infrastructure projects and personal loans. Thereby it was mandatory to use the DFCC lending rates, as DFCC bank rates can be used as a benchmark for other banks in this sector too. Therefore, the rates published for DFCC bank were used to establish the benchmark. This information is published by CBSL. Interest rates for 12 months ending in June 2008, the month before the project start date, of the proposed small scale CDM project activity were the following:

Published long-term lending rates of DFCC Bank												
Month-year	Jul – 07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08
Minimum	19.5%	19.5%	23.0%	23.5%	24.0%	20.0%	24.0%	24.0%	23.5%	22.0%	22.5%	22.0%
Maximum	21%	22.0%	24.5%	25.0%	25.0%	25.0%	27.0%	24.5%	25.0%	25.0%	22.5%	24.0%
Calculated average	20.25%	20.8%	23.8%	24.3%	24.5%	22.5%	25.5%	24.3%	24.3%	23.5%	22.5%	23.0%
Average for 12 months	23.3 %											

Source: Central Bank of Sri Lanka http://www.cbsl.gov.lk/htm/english/_cei/ei/e_2.asp

The average of the maximum and minimum lending rate for each month over a period of twelve months, was determined to be the benchmark for the project activity. Therefore, the benchmark for the project activity = 23.3 %

Other financial parameters used in the investment analysis are specific to the project, and described below.

(a) Investment for the Mampuri Wind Power Project

Table 5- Calculation of project costs

Project Cost	**LKR million**	**Source**
Project development / implementation	52.53	Engineer's estimate 01st August 2008
Infrastructure development	58.62	-do-
Equipment price	1,522.10	-- Suzlon Proposal dated 15th February 2008
Project supervision	8.21	Engineers Estimate dated 12th April 2008
Clearing & transport	89.69	Engineer's estimate dated 12th April 2008
Civil works	187.44	-do-
Erection	217.16	-do-
Transmission and Interconnection	120.75	- do -
Consultancy fees	20.00	- do -
Bank charges and legal fees	115.58	-do-
Total Project Cost	2,392.08	sum of the above

(b) Base Data and Financing Terms

Table 6- Financing terms

Base Data	Value	Source
Project Cost (LKR million)	2392.08	Project cost calculation
Construction Period (Months)	12	Suzlon Proposal dated 15th February 2008
Guaranteed Plant Capacity (MW)	10	Suzlon Proposal dated 15th February 2008
Debt (%)	- 46%	Calculated
Equity (%)	54%	Calculated
Term of Agreement (years)	20	SLSEA – 05th February 2008 (http://www.energy.gov.lk/pdf/guideline/PERMIT_ENGAGING.pdf)
O&M Cost (USD)	285,000	Suzlon Proposal dated 15th February 2008
Escalation of O&M Cost	6.52%	Matches rates published by SEA

Financial Parameter	**Unit**	**Value**	**Source**
Investment	LKR million	-2392.08	Project cost calculation, see above
Exchange Rate	LKR/USD	115	1st Aug 2008 rate depreciated for 1 year - rates checked on 1st August 2008 at http://www.cbsl.gov.lk/htm/english/_cei/er/e_1.asp
Percentage Debt	%	- 46%	Calculated
AWDR	%	10.60 %	3-month avg (Mar-May 08), checked on 1st August 2008 March 2008 – 10.47% April 2008 – 10.58% May 2008 – 10.76% http://www.cbsl.gov.lk/htm/english/_cei/ir/i_4.asp?date=&Mode=2&Page=9
AWFDR	%	15.92 %	3-month avg (Mar-May 08), checked on 1st August 2008 March 2008 – 15.76% April 2008 – 15.89% May 2008 – 16.12% http://www.cbsl.gov.lk/htm/english/_cei/ir/i_4.asp?date=&Mode=2&Page=9
AWPLR	%	18.50 %	3-Q avg, CBSL website checked on 1st August 2008 2007 4Q - 18.08% 2008 1Q - 18.32% 2008 2Q - 19.07% http://www.cbsl.gov.lk/htm/english/_cei/ir/i_4.asp?date=&M

			ode=2&Page=9
Repayment Period	Years	7	Bank offer dated 28th March 2008

Note: By the date of decision made, published AWDR, AWFDR, AWPLR were available only until May 2008.

AWDR= Average Weighted Deposit Rate, AWFDR=Average Weighted Fixed Deposit Rate
AWPLR = Average Weighted Prime Lending rate

$$\text{Interest rate} = \frac{\text{AWDR} + \text{AWFDR}}{2} + 7\% \qquad \text{for 80\% of debt}$$

Interest rate = AWPLR+ 4% for 20% of debt

(c) Technical Parameters

Table 7- Technical parameters of the project activity used in the investment analysis

Technical Parameter	Unit	Value	Source
Turbine Capacity	kW	1250	Project feasibility report
No of Turbines	Nos.	8	- do -
Total Power Plant Capacity	MW	10	Limited by regulation, by SLSEA
Average net plant factor	%	31.55%	Project feasibility report submitted to SLSEA in June 2008 with the application for the Energy Permit. The feasibility study was conducted by an independent third party engineering company. (Guidance: EB48 Annex 11)

Note: Plant factor is also known as capacity factor

(d) Tariff for the sale of electricity to the project electricity system

Table 8- Tariff for the sale of electricity as stated in the Standardised Small Power Purchase Agreement

Standardised, non-negotiable Small Power Producer (SPP) Tariff (LKR/kWh)[2]	O&M Tariff (yrs 1-20)	2.14
	Annual Escalation	6.52%
	Fixed Tariff (yrs 1-8)	18.66
	Fixed Tariff (yrs 9-15)	7.03
	Escalable Tariff (yrs 16-20)	1.30

Note: Years are counted from the Commercial Operation Date

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

The inputs to investment analysis are given in Annex 5.Detailed IRR calculations and Benchmark for project activity are shown Investment Analysis spreadsheet.

Benchmark for project activity = 23.3 %

[2] Source: Small Power Purchase Tariff is publicly announced: http://www.energy.gov.lk/pdf/explanatory_note_march_2008.pdf. Out of the two tariff options offered for SPPAs signed in year 2008, the project participant has selected the three-tier tariff option.

Calculated project IRR (without CER revenues) = 18.0 %

Therefore, the small scale CDM project activity is not financially attractive without CER revenues.

When considering a 50:50, Debt Equity ratio, the Pre-tax project Project IRR remains the same, as the interest component is not taken into account when calculating the IRR. Therefore the change in the Debt Equity ratio does not affect the pre-tax project IRR as explained in the attached spreadsheet " 2 Appendix 2 Investment Analysis.

Sub-step 2d: Sensitivity analysis

Several sensitivity analyses were conducted to examine the robustness of the financial analysis, to variations of a number of critical assumptions. The results are given below in Table 9.

Table 9- Sensitivity of the Project IRR to changes in critical parameters in the investment analysis

				Benchmark to the project activity
Change in exchange rate	-10%	0%	10%	
Value (LKR/USD)	103.5	115.0	126.5	**23.3 %**
Calculated project IRR	**18.2 %**	**18.0%**	**17.9%**	
Annual O&M escalation in tariff	-10%	0%	10%	
Value	5.87%	6.52%	7.17%	**23.3 %**
Calculated project IRR	**18.0%**	**18.0%**	**18.0%**	
Annual capacity factor	-10%	0%	10%	
Value	28.40%	31.55%	34.71%	**23.3 %**
Calculated project IRR	**15.0%**	**18.0%**	**21.0%**	
Change in Project Cost	-10%	0%	10%	
Value (LKR)	2152.87	2392.08	2631.29	23.3 %
Calculated project IRR	**21.1%**	**18.0%**	**15.5%**	

Sensitivity analysis was not conducted on the total tariff because the tariff announced is fixed for the life of the project activity based on the published structure, and the only variable in tariff is the O&M escalation rate, for which a sensitivity analysis is presented above.

The investment analysis is not sensitive to changes in the annual capacity factor in the range of 28.4% to 34.71%. This is because, the power plant will receive a cushion on the capacity factor in the range 32%± 15%. This means, if the annual capacity factor (owing to wind flow variations) of any year turns out to be between 27.2% and 36.8%, this CDM project activity will get the same revenue from the power purchaser. This special cushion was offered to the first commercial wind power plants in Sri Lanka, provided the power purchase agreement is signed before 31 December 2008. Please see the announcement of this condition by the Sri Lanka Sustainable Energy Authority: http://www.energy.gov.lk/pdf/explanatory_note_march_2008.pdf

Therefore, the small scale CDM project activity "Mampuri Wind Power Project" is unlikely to be financially attractive without revenues from CER.

Step 3: Barrier analysis

Senok Wind Power (Pvt) Ltd has opted for the Investment Analysis and as per EB 70 Annex 08 Methodological tool "Tool for demonstration and assessment of additionality" (Version 7.0.0) it is

stated that therefore Step 3: Barrier Analysis is optional and hence the Barrier Analysis is not demonstrated.

Step 4: Common practice analysis

The proposed small scale CDM project activity is the first commercial wind power plant in Sri Lanka, which is selected as default applicable region, developed by the private sector. The only other wind power plant is a 3 MW plant built by the electricity utility in 1999, which used concessionary financing, and had smaller generators.

To complement the investment analysis (Step 2) or barrier analysis (Step 3), according to the additionality tool "Tool for the demonstration and assessment of additionality, Version 07.0.0", EB 70 Annex 08 , the common practice analysis is provided below:

Sub-step 4a: The proposed CDM project activity(ies) applies measure(s) that are listed in the definitions section above

The analysis is done is accordance with the EB 69 Annex 8 "Guidelines on common practice" (Version 02.0).

Step 1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity

The host country has been chosen as default applicable geographical region owing to policy reasons and tariff.

Output range of the project : 5 MW to 15 MW

Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area
(b) The projects apply the same measure as the proposed project activity
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity

As this is a first of it's kind project, there are no other similar projects in the same geographical area, which use the same energy source or are within the applicable capacity or started commercial operations before this project, both CDM and non CDM.

Step 3: Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number Nall.

As described above, as there are no similar activities, Nall = 0

Step 4: Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number Ndiff.

As described above, as there are no similar activities, Ndiff = 0

Step 5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

Therefore, F = 1 – Ndiff/Nall = 1

The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3.

Hence as Nall – Ndiff is lesser than 3 the activity is not a "common practice" within a sector in the applicable geographical area.

Analysis	Proposed project activity: 10 MW wind power plant	The only other activity: CEB's 3 MW wind power plant
Country/region	Sri Lanka/North-western Province	Sri Lanka/Southern province
Wind Regime	Coastal zone	Interior to coastal zone
Scale in terms of Sri Lanka's small power investment magnitude	Large (http://www.energy.gov.lk/sub_pgs/develop_energy.htm)	not applicable
Vintage	WTG equipment to be ordered and built in year 2009	WTG equipment ordered and built in1999
Regulatory framework	Private investor absorbing all the risks	Utility demonstration plant with no clear need or desire to be profitable
Tariff for the sale of electricity	Standardized and non-negotiable, fixed for 20 years	No tariff defined. Whatever produced is fed to the utility's own grid.
Project income	Only from tariff-based payments after meter reading	No specific requirements for project incomes
Investment rules/climate	Private equity (46% %) and commercial lenders' debt (54%)	Very low equity by Govt-owned CEB, and Global Environmental Facility (GEF) funding on concessionary terms
Access to financing	Commercial terms, no guarantee from any state or private funds	CEB investment carries a sovereign guarantee

On the basis of the above analysis, it is concluded that there are no similar activities of comparable magnitude, investment rules, and access to financing, that have already diffused in the country. There are no other wind power plants in Sri Lanka, other than (a) the 3 MW demonstration power plant owned by CEB, built in 1999 with concessionary financing/grants and (b) the proposed CDM project activity built by a private entity with commercial loans.

Sub-step 4b: the proposed CDM project activity(ies) does not apply any of the measures that are listed in the definitions section above

According to the tool, this step is not required as project activity belongs to sub-step 4a) category.

Outcome of Step 4: As the proposed project activity is not regarded as "common practice" , it is concluded that the project activity is additional.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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Reference: EB63 Annex 19- Methodological Tool (Version 02.2.1) “Tools to calculate the emission factor of an electricity system”.

<u>Justification for the use of the Methodological Tool</u>: The tool states that “This tool may be referred to in order to estimate the OM, BM and/or CM for the purpose of calculating baseline emissions for a project activity substitutes electricity from the grid, i.e. where a project activity supplies electricity to a grid”. The proposed project activity will supply electricity to the national grid of Sri Lanka, and therefore this tool is appropriate to calculate the baseline emissions.

The “Steps” referred to below relate to the steps stated in the above Methodological Tool.

<u>Step 1: Identify the relevant electricity systems;</u>

The **project electricity system** is the **national grid of Sri Lanka**. DNA of the host country, Sri Lanka, has not published a delineation of the project electricity system and the connected electricity system.

There is only one national grid of Sri Lanka, to which all the major power plants of the utility (Ceylon Electricity Board), the independent power producers and the small power producers are connected. There is a clear demarcation of the national grid, which is entirely owned and operated by Ceylon Electricity Board up to the 33 kV level.

<u>Step 2- Choose whether to include off-grid power plants in the project electricity system (optional)</u>

The tool allows to choose between the following two options to calculate the operating margin and the
build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I is selected. Option II is not selected because off-grid power plants in the project electricity system are small and negligible.

Step 3: Select a method to determine the operating margin (OM)
<u>Simple operating margin method</u>: The possibility of using this method was examined by analysing the share of low-cost, must-run resources in the total grid generation, as described below:

The methodological tool requires the last five years to be examined. The most recent five year period for which published data on generation to the national grid is available, is the period 2003-2007. Generation to the project electricity system (ie the national grid of Sri Lanka) is given Table 12 below.

Table 12- Generation to the National Grid over the most recent five-year period

		Net Generation to the National Grid (GWh)				
Type of Power Plant	**Fuel or resource**	**2003**	**2004**	**2005**	**2006**	**2007**
Hydro, CEB and SPP	Hydro, biomass, solar	3,296	2,944	3,437	5,068	3,930
Thermal, CEB, IPP and hired	Oil	3,844	4,501	5,157	4,595	5,692
Non-conventional, CEB	Wind	3	3	2	2	2

Self generation by customers	Oil	-	115	-	-	-
Total		**7,143**	**7,563**	**8,597**	**9,665**	**9,625**
Percentage of Low cost/must run plants (defined as hydro, biomass, solar, wind)	Annual	46.2%	39.0%	40.0%	52.5%	40.9%
	Simple Average	43.7%				
	Weighted average	43.9%				

Source: Adapted from the CEB Sales and Generation Data Book of each respective year
SPP Small Power Producers
IPP Independent Power Producers

As seen above, the low-cost, must-run resources constitute less than 50% of the total grid generation, when the average of the five most-recent years for which data is published, is considered. Therefore, the simple operating margin method was selected to calculate the operating margin emission factor. Other methods of calculation of the operating margin (simple adjusted, dispatch analysis, average) stated in the methodological tool, were therefore not considered further.

The methodological tool provides two options to calculate the baseline emission factor: The ex-ante option and the ex-post option. The ex-ante option, which uses the three-year generation weighted average based on the most recent data available at the time of submission of the CDM-PDD, was selected to calculate the operating margin emission factor.

Step 4: Calculate the operating margin emission factor according to the selected method

As the simple operating margin method was selected in the previous step, the methodological tool provides two options A and B to calculate the operating margin. As the required data is available for each power plant, option A was selected to calculate the operating margin. Options B was not considered.

In the national grid of Sri Lanka, all the generating units in a power plant are either must-run/low-cost units or they are not must-run/low-cost units. In the same power plant, there is no mixing of generating units of two types. Therefore, information used for the calculations are on the basis of power plants and not on the basis of individual generating units within each power plant.

The methodological tool requires the calculation of the operating margin for the most recent three years for which data is available (ex-ante option) at the time of submission of the CDM-PDD to the DOE for validation.

For all power units, data on fuel consumption and electricity generation is available, Therefore, Option A1 is applicable and the following equation will be used to calculate the simple operating margin.

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

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

FUEL NET CALORIFIC VALUES (kCal/kg)			
Fuel Type	2005	2006	2007
Fuel Oil	10,104	10,104	10,104
Residual Fuel	10,052	10,052	10,052

Emission Factors IPCC lower bound of 95% confidence	
Fuel Type	(kg-CO2/GJ)
Fuel Oil	75.50
COAL	92.80

Diesel	10,556	10,556	10,556
Naphtha	11,259	11,259	11,259

Residual Fuel	75.50
Diesel	72.60
Naphtha	69.30

SPECIFIC GRAVITY (kg/litre)			
Fuel Oil	0.95	0.95	0.95
Residual Fuel	0.97	0.97	0.97
Diesel	0.85	0.85	0.85
Naphtha	0.69	0.69	0.69

1.00 kCal = 4.1868 kJ

FUEL NET CALORIFIC VALUES (kJ/litre)			
Fuel Oil	40,098	40,098	40,098
Residual Fuel	40,979	40,979	40,979
Diesel	37,391	37,391	37,391
Naphtha	32,510	32,510	32,510

Location	Plant Type	Fuel(s) used	**Fuel Consumption (million litre)**			**Fuel Consumption (GJ)**			**Emissions from Power Plants (t-CO2)**			**Net Electricity Generation (GWh)**		
			2005	**2006**	**2007**	**2005**	**2006**	**2007**	**2005**	**2006**	**2007**	**2005**	**2006**	**2007**
CEB Thermal Power Plants														
Kelanitissa	Gas turbine (Old)	Diesel	11.839	3.036	23.742	442,669	113,518	887,731	32,137.8	8,241.4	64,449.3	20.793	4.431	46.308
Kelanitissa	Gas turbine (New)	Diesel	94.249	22.897	73.268	3,524,040	856,136	2,739,545	255,845.3	62,155.5	198,891.0	275.510	65.030	218.792
Kelanitissa	Combined Cycle (Naphtha /diesel)	Diesel	74.595	88.975	126.351	2,789,163	3,326,842	4,724,358	202,493.2	241,528.7	342,988.4	333.717	369.193	550.633
		Naphtha	179.620	91.187	137.586	5,839,407	2,964,469	4,472,891	404,670.9	205,437.7	309,971.3	660.791	340.622	517.641
Sapugaskanda	Diesel	Diesel	1.638	1.855	2.033	61,246	69,360	76,015	4,446.5	5,035.5	5,518.7	3.283	5.189	4.752
		Residual Fuel	75.073	79.055	95.308	3,076,437	3,239,616	3,905,653	232,271.0	244,591.0	294,876.8	314.328	331.418	399.966
Sapugaskanda	Diesel (Extension)	Diesel	1.091	1.255	1.110	40,793	46,925	41,504	2,961.6	3,406.8	3,013.2	2.985	4.022	3.224
		Residual Fuel	113.643	110.070	117.800	4,657,008	4,510,589	4,827,358	351,604.1	340,549.4	364,465.6	505.082	491.258	526.686
IPP Thermal Power Plants: Petroleum														
Lakdanavi	Diesel	Fuel Oil	38.25	25.97	29.14	1,533,630	1,041,346	1,168,457	115,789.0	78,621.6	88,218.5	151.082	103.688	118.422
Asia Power	Diesel	Residual Fuel	81.35	76.75	83.12	3,333,623	3,145,159	3,406,197	251,688.5	237,459.5	257,167.9	353.692	334.203	361.725
Colombo Power (Barge)	Diesel	Fuel Oil	105.17	101.11	102.00	4,217,030	4,054,312	4,090,000	318,385.8	306,100.6	308,795.0	475.780	452.048	456.343
ACE Power Matara	Diesel	Fuel Oil	36.78	29.08	33.24	1,474,645	1,165,850	1,332,819	111,335.7	88,021.7	100,627.8	163.308	129.824	147.708
ACE Power Horana	Diesel	Fuel Oil	37.88	29.01	31.25	1,518,713	1,163,404	1,252,863	114,662.8	87,837.0	94,591.2	174.017	131.778	142.412
AES Kelanitissa	Combined Cycle	Diesel	96.32	163.41	209.40	3,601,402	6,110,022	7,829,622	261,461.8	443,587.6	568,430.6	475.780	619.684	786.885
Heladhanavi	Diesel	Fuel Oil	163.71	140.30	157.64	6,564,570	5,625,754	6,321,054	495,625.0	424,744.5	477,239.6	758.887	619.380	747.740
ACE Power Embilipitiya	Diesel	Fuel Oil	117.94	143.31	160.22	4,729,082	5,746,449	6,424,507	357,045.7	433,856.9	485,050.3	488.219	593.380	663.027
								Total	**3,512,424.7**	**3,211,175.5**	**3,964,294.9**	**5,157.254**	**4,595.148**	**5,692.264**

Year	2005	2006	2007
Emissions from Power Plants (t-CO2)	3,512,425	3,211,176	3,964,295
Net Electricity Generation (GWh)	5,157	4,595	5,692
Simple operating margin CO2 emission factor (t-CO2/MWh)			
Annual	0.6811	0.6988	0.6964
Three-year weighted average	**0.6921**		

Step 5: Calculate the build margin (BM) emission factor

The sample group of power units that have been built most recently can be selected in one of the two methods, as allowed in the methodological tool.

(a) the five power units that have been built most recently, or

(b) the set of power plant additions that comprise 20% of system generation (in GWh) and that have been built most recently.

The above options were examined and the five power plants built most recently have been selected
The build margin CO2 emission factor will be calculated for year 2007, the most recent year for which data is available. Emission factors used for each fuel will be the same as for the calculation of operating margin in step 3. The following equation is used.

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

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 (in this case y = 2007)

Justification of the 20% selection

Five power units most-recently added	Net Generation in 2007 GWh
Forest Hill	0.47
Batatota	8.20
Kehelgamu oya	8.19
Kotankanda	0.51
Lower Neluwa	0.00
Total generation	**17.38**
Total grid generation	**9,624.53**
Share of grid generation	0.18%

	Power Plant	Fuel Type	Fuel consumption in 2007 (TJ)	Emissions (t-CO2)	Generation
					(GWh)
1	Small Power Producers	small hydro	None	none	16.899
2	Small Power Producers	small hydro	None	none	46.396
3	ACE Power Embilipitiya	Fuel Oil	6,424,507.2	485,050.3	663.027
4	Small Power Producers	small hydro	none	none	34.412
5	Heladhanavi	Fuel Oil	6,321,054.3	477,239.6	747.740
6	Small Power Producers	small hydro	none	none	94.461
7	AES Kelanitissa	Diesel	7,829,622.0	568,430.6	786.885
	Total in power plants considered for the build margin			1,530,720.5	2389.820
	Build margin emission factor (kg-CO2/kWh)			**0.6405**	

The build margin is 0.6405 t-CO2/MWh

Step 6 : Calculate the combined margin emissions factor

The methodological tool followed in this analysis requires the combined margin to be calculated as the weighted average of the operating margin emission factor and the build margin emission factor.

The combined margin emissions factor was calculated as follows based on Weighted average CM (eq 14 -of referred Tool):

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

where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

As the Mampuri Wind Power Plant is a wind power generation project activity, in accordance with the methodological tool, the weighting factors used for operating margin and build margin requires to be w_{OM} = 0.75 and w_{BM} =0.25, respectively.

Emission Factors	Calculated Value t-CO2/MWh	Weighting Factor	Weighted Margin t-CO2/MWh
Operating margin	0.6921	0.75	0.5190
Build margin	0.6405	0.25	0.1601
Combined Margin			**0.6791**

The data and parameters available at validation are described in Section B.6.2. The detailed calculations of the operating margin, build margin and the combined margin emissions factors are given in Annex 3.

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data and parameter.)

Data / Parameter	$EF_{grid,OM,Y}$
Unit	tCO_2/MWh
Description	Simple operating margin CO_2 emission factor in year y
Source of data	Sales and Generation Data Books (2005, 2006, 2007), Ceylon Electricity Board (CEB)
Value(s) applied	0.6921
Choice of data or Measurement methods and procedures	Calculated by using 3 years vintage (2005, 2006 and 2007) data obtained from "Sales and Generation Data Books (2005, 2006, 2007), Ceylon Electricity Board (CEB) published by the Ceylon Electricity Board, Government of Sri Lanka. The calculation has been as per the tool "Tool to calculate the emission factors for an electricity system". Please refer Annex 3
Purpose of data	
Additional comment	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2/MWh
Description	Build margin CO_2 emission factor in year y
Source of data	Sales and Generation Data Books (2007), Ceylon Electricity Board (CEB)
Value(s) applied	0.6405
Choice of data or Measurement methods and procedures	Calculated by using most recent year vintage 2007 data obtained from "Sales and Generation Data Books (2007), Ceylon Electricity Board (CEB) published by the Ceylon Electricity Board, Government of Sri Lanka, The calculation has been as per the tool "Tool to calculate the emission factors for an electricity system". Please refer Annex 3
Purpose of data	
Additional comment	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined Margin Emission Factor
Source of data	Sales and Generation Data Books (2005, 2006, 2007)
Value(s) applied	**0.6791**
Choice of data or Measurement methods and procedures	The combined margin emission factor has been calculated in accordance with the tool "Tool to calculate the emission factors for an electricity system". In case of wind power projects default weights of 0.75 for EF_{OM} and 0.25 for EF_{BM}

Purpose of data	
Additional comment	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

B.6.3. Ex ante calculation of emission reductions

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Project emissions: As per AMS I.D. Version 17 EB61, Sectoral Scope 01, " Grid Connected Renewable Electricity Generation" para 20. Project emissions for the proposed project activity are zero.

Baseline emissions: The application of equations and the detailed calculations are provided in Annex 3. The results are summarized below. All results of emission factor stated in kg-CO2/kWh have been rounded downwards to four decimal places:

eg: For year 2005,

Simple operating margin = 3,512,424.7/5157.254 = 0.6811 kg-CO2/kWh

Similarly, the simple operating margin emission factor was calculated for each year.

The operating margin emission factor $EF_{grid,OM,2007}$ =(3,512,424.7+3,211,175.5+3,964,294.9)/(5,157.254+4,595.148+5,692.264) = 0.6921 kg-CO2/kWh

Operating Margin emission factor results

Year	**2005**	**2006**	**2007**
Emissions from Power Plants (t-CO2)	3,512,424.7	3,211,175.5	3,964,294.9
Net Electricity Generation (GWh)	5,157.254	4,595.148	5,692.264
Simple operating margin CO2 emission factor (kg-CO2/kWh)			
Annual (*EF*)	0.6811	0.6988	0.6964
Operating margin emission factor (three-year weighted average) t-CO2/MWh $EF_{grid,OM,2007}$		**0.6921**	

Build margin emission factor, $EF_{grid, BM, 2007}$ = 1,530,720.5/2389.920 = 0.6405 kg-CO2/kWh

Build Margin emission factor result

	t-CO2	GWh
Total in power plants considered for the build margin	1,530,720.5	2389.820
Build margin emission factor (t-CO2/MWh) $EF_{grid, BM, 2007}$	**0.6405**	

Combined margin emission factor, $EF_{grid,CM,y}$ = 0.6921 x 0.75 + 0.6405 x 0.25 = 0.6791 kg-CO2/kWh

Combined Margin Emission Factor result

Emission Factors	Calculated Value t-CO2/MWh *EF*	Weighting factor *w*	Weighted Margin t-CO2/MWh
Operating margin	0.6921	0.75	0.5190
Build margin	0.6405	0.25	0.1601
Combined Margin $EF_{grid,CM,y}$			**0.6791**

Therefore, baseline emission reductions
= Combined margin emission factor x annual net energy delivered to the project electricity system
= 0.6791 (t-CO2/MWh) x 27.638 (GWh/year) x 1000 (MWh/GWh)
= 18,768 t-CO2/year

Leakage: As per AMS I.D. Version 17 EB61, Sectoral Scope 01, "Grid Connected Renewable Electricity Generation" para 22. Leakage is to be considered if the energy generating equipment is transferred from another activity, leakage is to be considered. Since there is no such transfer in the project activity, leakage will therefore be zero.

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2013	18,768	0	0	18,768
2014	18,768	0	0	18,768
2015	18,768	0	0	18,768
2016	18,768	0	0	18,768
2017	18,768	0	0	18,768
2018	18,768	0	0	18,768
2019	18,768	0	0	18,768
2020	18,768	0	0	18,768
2021	18,768	0	0	18,768
2022	18,768	0	0	18,768
Total	187,680	0	0	187,680
Total number of crediting years	10 years			
Annual average over the crediting period	18,768	0	0	18,768

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter	**EG_y**
Unit	KWh
Description	Quantity of net electricity supplied to the grid in a year
Source of data	1. Gross energy sales to Ceylon Electricity Board and 2. Energy purchased from Ceylon Electricity Board
Value(s) applied	27683
Measurement methods and procedures	The Value will be calculated using the 1. Gross Energy Sales to Ceylon Electricity Board and 2. Energy purchased from Ceylon Electricity Board
Monitoring frequency	Monthly

QA/QC procedures	QA/QC procedures for 1. Gross Energy Sales to Ceylon Electricity Board and 2. Energy purchased from Ceylon Electricity Board, shall apply to this parameter as well. These will be cross- checked against invoices.
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter will be calculated based on the two 1. Gross Energy Sales to Ceylon Electricity Board and 2. Energy purchased from Ceylon Electricity Board. Hence as done for these two parameters, the same will apply for this parameter as well.

Data / Parameter	**$EG_{imp,y}$**
Unit	KWh
Description	Energy purchased from Ceylon Electricity Board
Source of data	(1) Import register of the energy meter installed at the Point of Suply (POS) to the national grid (~~2) monthly electricity bills based on energy meter installed at the point of purchase of electricity from a local distribution line.~~
Value(s) applied	Estimated to be 0 kWh per year each for, (1) ~~and (2)~~
Measurement methods and procedures	(1) The energy meter at the POS has been installed and maintained by Ceylon Eletricity Board in accordance with the Small Power Purchase Agreement. The import readings of the main meter (M2) will be read by CEB every month, in the presence of a SWPL representative. ~~(2) The energy meter at the point of purchase has been installed by the Ceylon Electricity Board. This meter (M3) will be read by CEB every month. The meter will continuously monitor, conduct hourly measurement and at least monthly recording, as required by the methodology.~~
Monitoring frequency	Monthly
QA/QC procedures	The meter readings are checked against the monthly invoice issued to CEB. The accuracy of the meters is declared to be 1.0%. (1) The accuracy of the meter M2 will be tested (ie the meter shall be calibrated) by an independent agency, once a year, as specified in the Small Power Purchase Agreement. If at any time there is a concern about the accuracy, SWPL or CEB can request a test. ~~(2) The accuracy of meter M3 is 1.0%. The meter has been calibrated before installation and will be tested by CEB upon request by customers or at intervals selected by CEB, in CEB's own meter testing laboratory. However, SWPL will request CEB for calibration at least once in three years. as given in the general guidance for SSC activities~~.
Purpose of data	Calculation of baseline emissions
Additional comment	~~As a backup to the energy meter M2 installed by CEB for contractual purpose, an additional meter (M2B) has been installed in the power plant at the expense of SWPL. This meter too, will be calibrated annually by SWPL using the services of an independent agency.~~

Data / Parameter	**$EG_{exp,y}$**
Unit	KWh
Description	Gross Energy Sales to Ceylon Electricity Board
Source of data	Export register of the energy meter installed at the Point of Supply (POS) to the national grid

Value(s) applied	27638
Measurement methods and procedures	The energy meter has been installed and maintained by Ceylon Electricity Board in accordance with the Small Power Purchase Agreement. The export reading of the main meter (M1) is read by CEB every month, in the presence of the SWPL representative. The meter will continuously monitor, conduct hourly measurement and at least monthly recording, as required by the methodology.
Monitoring frequency	Monthly
QA/QC procedures	The meter readings are checked against the monthly invoice issued to CEB. The accuracy of the meter installed is 1.0%. The meter accuracy will be tested (ie the meter shall be calibrated) by an independent agency, once a year, as specified in the Small Power Purchase Agreement. If at any time there is a concern about the accuracy, SWPL or CEB can request a test.
Purpose of data	Calculation of baseline emissions
Additional comment	As a backup to the energy meter installed by CEB for contractual purpose, an additional meter which records exports (M1B) has been installed in the power plant at the expense of SWPL. This meter too, will be calibrated annually by SWPL using the services of an independent agency.

B.7.2. Sampling plan

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The monitoring shall consist of metering the electricity exported and imported by the power plant to/from the project electricity system, the national grid of Sri Lanka. More details are given below.

(1) Boundaries for the implementation of the monitoring plan

The monitoring plan will be implemented across the project boundary. The project boundary is described in section B3 of this PDD.

(2) Data collection and recording

Electricity Exports and Imports: An electricity meter is fixed at the metering point located at the interconnection point to the CEB grid. This is a requirement specified in the Small Power Purchase Agreement (SPPA) already executed between SWPL and CEB. The meter measures electricity dispatched to the grid at the project boundary. This meter is of the type and accuracy approved by CEB, and the SPPA states that it will be read by CEB once a month. This is an established practice for CEB to read the meters of all the small power producers in the country once a month. This meter reading is in two parts:

M1: Electricity exports to the project electricity system from the small scale CDM project activity
M2: Electricity imports from the project electricity system for requirements of the project activity, when the wind power plant is not in operation

Reading M1 is also be used by SWPL to prepare the monthly invoice to the purchaser, CEB for the sale of electricity.
Reading M2 is also be used by CEB to issue an invoice for the electricity purchased by the project activity, when the wind power plant is not in operation

M1 and M2 are incorporated in the same meter housing. ~~There is a second meter located elsewhere, as described below.~~

~~M3: This meter fixed by CEB will record the electricity purchased by this small scale project activity from the local distribution line. This electricity supply is a backup to serve the project, when there is a breakdown or servicing of the equipment at the point of supply at which M1 and M2 are located.~~

The following Table 13 describes the basic format for data collection.

Table 13- Basic Format for Data Collection

Project name: **Mampuri Wind Power Plant, Sri Lanka** Project Company: **Senok Wind Power (Private) Limited (SWPL)**

Period	Monitored performance	Monitoring devise or method	Back-up meters	Unit of measure-ment	Monitoring /recording frequency*	All information to be monitored	Method to archive data	Period of retention of archived data	Comments
MM-YYYY	Gross Energy Sales to Ceylon Electricity Board	Electricity meter readings Gross export = M1	1) Additional meter fixed at the metering point (M1B0 (2) Hourly energy (kWh) output readings for each wind turbine (T1 to T8) recorded at the power plant Central Monitoring Station	kilowatt-hour (kWh)	CEB-owned meters: monthly SWPL-owned meters: daily See note 1	Yes	Electronically and manually	Two years after the last CERs issued	CEB publishes the monthly and annual gross energy of each power producer in its annual publication “Sales and Generation Data Book”, against which the invoices and meter readings can be cross-checked.
MM-YYYY	Energy purchased from Ceylon Electricity Board	Electricity meter readings Imports = M2 ~~+ M3~~	~~Additional meter fixed at the metering point (M2B)~~	kilowatt-hour (kWh)	CEB-owned meters: monthly SWPL-owned meters: daily See note 1	Yes	Electronically and manually	Two years after the last CERs issued	None
MM-YYYY	Net Energy Sales to Ceylon Electricity Board	Calculated using electricity meter readings: Net Export = Gross generation – import from CEB	(1) Calculated from monthly meter readings (2) Hourly enrgy (kWh) output readings for each wind turbine (T1 to T8) recorded at the	kilowatt-hour (kWh)	This is a monthly calculated parameter.	Yes	Electronically and manually	Two years after the last CERs issued	CEB publishes the monthly and annual total energy of each power producer in its annual publication “Sales and

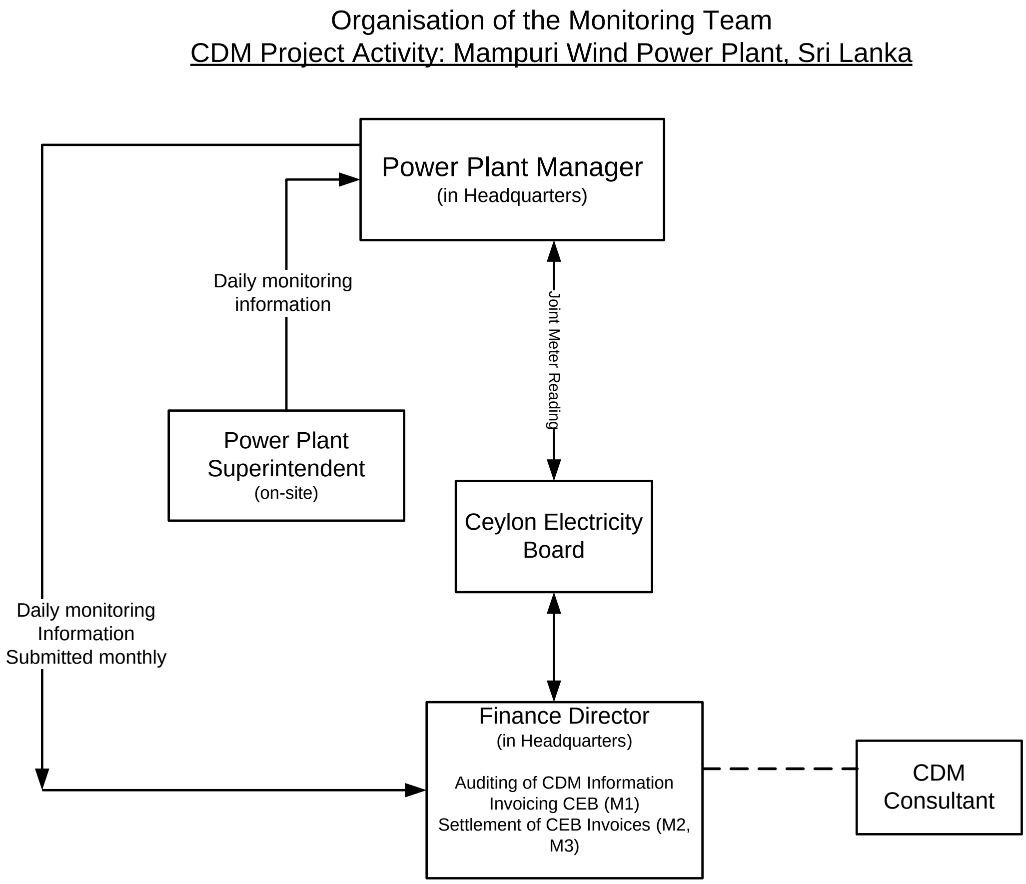
		)	power plant Central Monitoring Station						Generation Data Book", against which the invoices and meter readings can eb cross-checked.

Note 1: The primary data source M1 (export) and, M2 (import) and M3 (import for auxiliary consumption) owned by CEB will be recorded monthly
The first backup data source M1B (export), M2B (import) owned by SWPL will be recorded daily
The second backup data source Turbine 1 through Turbine 8 will be recorded by SWPL hourly

Note 2: If there is an error in M1 (export), M2 (import) or M3 , SWPL will request CEB to recalibrate the meter, for which a procedure is stated in the power purchase agreement.

*These are measured through Continuous monitoring, hourly measurement and at least monthly recording, in line with the methodology.

Organisation of the monitoring team and issues related to monitoring:



1. The Power Plant Superintendent will ensure that all the data monitoring forms are filled-up and submitted to the Power Plant Manager. If there are any abnormal variations of data or metering systems, immediate action will be taken to remedy the situation.
2. For CDM purposes, the monitoring system provides for a primary monitoring system (using CEB's meters, calibrated), a 1^{st} backup using the SWPL's meters (which too, are calibrated), and a 2^{nd} backup using the meters on each WTG. In case there is a meter failure in the primary monitoring system, there will be access to the 1^{st} and 2^{nd} backups, which are continuously maintained.
3. The information will be subject to internal auditing by the Finance Director who will
   i. examine the primary, 1^{st} backup and 2^{nd} backup monitoring documentation for completeness (and file the hardcopies, and archive the soft copies)
   ii. prepare the invoice to CEB based on the primary monitoring system meter readings
   iii. examine and file any response from CEB to the invoice and the confirmation of acceptance of the readings of M1 and M2.
   iv. ~~Examine and file the CEB invoice based on meter M3.~~
4. Any discrepancy will be corrected, with clear records maintained by the Finance Director.
5. If there is a meter failure,
   i. the provisions in the Power Purchase Agreement will be followed, for the purpose of invoicing CEB. The relevant clause is the following in clause 5.2:

c) In the event that any data required for the purpose of determining payment hereunder are unavailable when required, such unavailable data may be estimated by CEB, subject to any required adjustment based upon actual data in the next subsequent payment month. d) 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); 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) for the period of issue.
ii. The 1st and 2nd backup will be used for CDM monitoring purposes. A loss of data record will be raised by the Plant Manager, and clear entries will be made within one week of the loss of data event.

B.7.3. Other elements of monitoring plan

>>

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>> Date of completion of the application of baseline and monitoring methodologies: 15/04/2009

Name of responsible person and entity:
Dr Tilak Siyambalapitiya
Director
RMA (Private) Limited
3, Charles Terrace
Colombo 3
Sri Lanka.

RMA (Private) Limited is a Sri Lankan consulting company, and not a party connected to Senok Wind Power (Private) Limited., the project participant.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>> 23/08/2008

Guidance was taken from EB41 para 67. This is the date on which the project participant committed to the expenses of the project activity by signing the “Wind turbine supply, commissioning and warranty agreement”.

C.1.2. Expected operational lifetime of project activity

>> 20 years

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>> Fixed crediting period

C.2.2. Start date of crediting period

>> 01/01/2013

C.2.3. Length of crediting period

>> 10 years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>> As required by Sri Lanka's environmental regulations, an application was made to the Provincial Environmental Authority of the North-Western Province (PEA-NWP) where the Mampuri Wind Power Project is located. As the project lies within the coastal zone as defined by Coast Conservation Act No 57 of 1981, the evaluation of the project for its environmental impacts was conducted by the Coast Conservation Department (CCD) acting as the Project Approving Agency, with the participation of all stakeholder institutions. As required by the CCD, an Initial Environmental Examination (IEE) study was conducted (September 2008) and submitted.

Overall impacts on the environment: Impacts on the physical environment was evaluated to be minimal as the land ear marked to locate turbines are barren with no significant vegetation. No impacts on ground water or surface water bodies were identified. There would be no impacts on the climate and the air quality. Noise during construction would be managed within allowable limits, and during operations of the wind turbines, noise standards stipulated would be maintained at the boundary of each turbine. No impacts on the ecology were identified. The impacts on the socio-cultural environment would be minimal as no person or dwelling has to be re-located in this project activity.

The approval of both the CCD and the PEA-NWP were issued for the project to proceed to construction activities.

Project participant, Senok Wind Power (Private) Limited, does not consider the environmental impacts to be significant. The host party, represented by the PEA-NWP and CCD has not indicated that the project environmental impacts would be significant, in which case, a full Environmental Impacts Assessment (EIA) would have been required to be conducted in accordance with the laws. The approval for the project was granted based on the IEE.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>> During the initial stages of project development, several informal meetings with small groups of about five local stakeholders were held, and their views were sought about the planned project. Stakeholders of the project in the local area include land owners in the vicinity of the project, fishermen and others using the beach adjoining the plant, villagers in Mampuri and other villages to north and south of the power

plant site, community and religious leaders and government officials. Information was provided about the benefits and the probable constraints caused by the project at a very early stage of project development, to allow the local stakeholders time to think about the issues, consider implications, and formulate their views.

A formal public consultation meeting by the three wind project developers who have been allocated blocks at Mampuri (Senok Wind Power Pvt Limited), Narakkalli (Lanka Transformers Limited) and Nirmalapuru (Hayleys Limited) was held at 10.00am on 15th December 2007, at the Mampuri Church with the coordination of SEDEC and Mampuri Catholic Priest Reverend Father Viamon. SEDEC is a community service organisation, affiliated to the Catholic Church of Sri Lanka. The meeting was organized by SEDEC and Father Viamon based on the request jointly made by the three developers. One week's notice was given to all the stakeholders. Invitations were sent by the Catholic Church to Buddhist Priests, Muslim Priests, Hindu Priests of the area, the Kalpitiya Divisional Secretary, Pradesiya Sabha Chairman, Govi Kamitu (Agrarian Community), Dheewara Kamitu (Fisheries Community) and the villagers of Mampuri, Daluwa. The meeting was attended by 30 persons. The attendance was on a voluntary basis, at the participants' choice.

Information was sufficiently provided in accessible and culturally appropriate ways. Written information was distributed in all the three languages, Sinhala, Tamil and English. A formal presentation covering specific locations of wind turbines, equipment sizes, foundation details, turbine height, blade sizes, noise that it can generate, power it generates, installation procedure of turbines and our path forward in the project development and subsequent operation and maintenance was made to the audience. Each issue in the presentation and was discussed in detail, including questions raised by the stakeholders throughout the presentation. Please see photographs of the stakeholder consultation.

A second informal stakeholder meeting was held on 25th February 2009, to discuss the launch of the road works and to clarify the project activities to the residents of the area.

Photograph 1- Participants at the First Stakeholder Meeting

Photograph 2- Catholic Priests Chairing the First Stakeholder Meeting

Photograph 3- Presentation by Senok Wind Power about the Mampuri Wind Power Plant at the First Stakeholder Meeting

E.2. Summary of comments received

>> The following questions were raised during the meeting:

Questions directly related to the project (*text in italics are clarifying notes*)

(a) What are the possible effects on beach seine (*Sinhala: Ma-del*) operation?
(b) What will be the operation during off wind season? What is the gain by installing wind farms for only wind seasons?
(c) Will there be a huge noise due to many turbines in the area?
(d) Will it be similar to the power station (*oil-fired)* located in Puttalam suburbs?
(e) What is the land utilization pattern and extent of lands to be used by the wind farm(s)?
(f) Will there be forceful acquisition of lands as what the government does with the coal power project (*planned to be located in Narakkalli, to the north of Mampuri)*?
(g) What improvement will be done for the roads in the project areas?
(h) Will there be additional transmission lines constructed in the area?
(i) Why does the project use 1.25 turbines? Why not 5MW *(to reduce the land area used*)?
(j) What is the effect to ground water once the turbine foundations are constructed? Will there be water depletion in the area?
(k) The water table is found 6-7m below the ground level. When the foundations are constructed, will it stop the ground water movement in the area?

Questions related to the coal-fired power plant proposed to be built by Ceylon Electricity Board, to the north of Mampuri.

(l) Is this a part of coal power station expansion? Are these fans constructed to pull down the coal power emission to the ground once again to prevent them dispersing in the area?
(m) Why the Kandikudi area is not been utilized for wind farms? You out do the coal power station and bring wind farms if not go and install wind turbines in Kandikudi area (*to the north of Mampuri*).
(n) Can the coal power capacity be matched with wind farms?

E.3. Report on consideration of comments received

(a) >> Impacts on beach seine (*Sinhala: Ma-del*) operation

A group of fishermen use a long seine (net, made of locally available material) on the beach, and pull it about 50 m inland from the beach over a period of several hours, and catch fish. The group moves along the beach parallel to the waterline as well and perpendicular, moving about 50 m in land as required.

The project will ensure the no wind turbine locations or any material and equipment during construction and operation will be located within 50 m from the waterline on the beach.

(b) Operation in the off-wind season: The measured wind patterns were explained to the stakeholders, and clarified that in the low wind season too, there will be generation of electricity.

(c) Will there be a huge noise due to many turbines in the area?

The expectation of noise and type of noise was explained to the stakeholders. The power plant will abide by the noise regulations stipulated by the Central Environmental Authority and the Provincial Environmental Authority.

(d) Will it be similar to the power station (*oil-fired)* located in Puttalam suburbs? The differences in technological and social/environmental impacts between an oil-fried power plant and a wind power plant were explained.
(e) What is the land utilization pattern and extent of lands to be used by the wind farm(s)? The land requirements, and the fact that only the turbine footings will be allocated to SWPL. and that the area between the turbines will be freely accessible to the people, were clarified.
(f) Will there be forceful acquisition of lands as what the government does with the coal power project (*planned to be located in Narakkalli, to the north of Mampuri)*? It was clarified that there will be no relocation of people or forceful acquisition of government land to the project. The land will be allocated through the proper procedure (for government land) and by direct negotiation with owners (for private land). *Note: By the time of submission of this PDD all land requirements to the project have been allocated.*
(g) What improvement will be done for the roads in the project areas?
The project, at its cost, will improve the coastal road running through or adjacent to the project site, with compaction and increase of the width. It is presently not compacted and difficult to use. The road will be freely accessible and useable by the public during the project construction and operation, and will be developed in accordance with the guidelines given by the Kalpitiya Pradeshiya Sabha (the local authority that is responsible for the road).
(h) Will there be additional transmission lines constructed in the area? It was clarified that there will be new 33 kV line along the land-side of the wind turbines, and a new 1.5 km transmission from the point of supply along a local road to the main road. The line will enable CEB to use the structure to provide any distribution services to households/business premises, which may have been deprived of electricity supply owing to the absence of a line.
(i) Why does the project use 1.25 turbines? Why not 5MW *(to reduce the land area used*)? The principles in which a wind turbine is selected to match a wind regime was explained.
(j) What is the effect to ground water once the turbine foundations are constructed? Will there be water depletion in the area? AND

(k) The water table is found 6-7m below the ground level. When the foundations are constructed, will it stop the ground water movement in the area?

The levels at which groundwater is available at the power plant site were explained. With the large (approximately 500 m) gap between turbine foundations, impacts on groundwater flow are not expected. The project will monitor the groundwater levels during construction and periodically thereafter, to examine that the levels and quantity of groundwater are not affected by the turbine foundations.

Questions not directly related to the project: The technical issues were explained, and it was explained that the project is comparatively small (10 MW) compared with the 900 MW coal-fired power plant being built to the north of Mampuri, and that the two projects are not comparable in terms of providing the electricity needs of Sri Lanka.

SECTION F. Approval and authorization

>>

Letter of approval is submitted to DOE.

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Senok Wind Power (Pvt) Ltd
Street/P.O. Box	No. 3, R A De Mel Mawatha
Building	
City	Colombo 05
State/region	Colombo
Postcode	005
Country	Sri Lanka
Telephone	+94 2359200
Fax	+94 112 580022
E-mail	noel@senoksl.com
Website	www.senoksl.com
Contact person	
Title	Project Manager
Salutation	Ms.
Last name	Moraes
Middle name	-
First name	Rozanne
Department	Wind Power
Mobile	+94 7722 428 23
Direct fax	+94 112584791
Direct tel.	+94 112 580017
Personal e-mail	rozanne@senoksl.com

Project participant and/or responsible person/ entity	☒ Project participant Person/entity responsible for completing the CDM-MR-FORM
Organization name	Asian Development Bank, as trustee of the Future Carbon Fund
Street/P.O. Box	6 ADB Avenue, Mandaluyong City
Building	
City	Metro Manila
State/region	
Postcode	1550
Country	Manila
Telephone	
Fax	
E-mail	

Website	
Contact person	
Title	
Salutation	Ms.
Last name	Locsin
Middle name	
First name	Ma. Carmela
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Project participant and/or responsible person/ entity	☒ Project participant Person/entity responsible for completing the CDM-MR-FORM
Organization name	Swedish Energy Agency
Street/P.O. Box	P O Box 310
Building	
City	Eskilstuna
State/region	
Postcode	SE-631 04
Country	Sweden
Telephone	
Fax	
E-mail	
Website	
Contact person	
Title	
Salutation	Mr.
Last name	Hansen
Middle name	
First name	Ola
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Appendix 2. Affirmation regarding public funding

The Mampuri Wind Power Project will not use any public funding.

Appendix 3. Applicability of methodology and standardized baseline

This annex describes the information used in the calculation of baseline emission factor. Detailed calculations are notes are provided under each step.

Generating plants serving the national grid of Sri Lanka (the project electricity system of the small scale project activity described in this PDD) as of end December 2007 are listed in Table A3.1.

Table A3.1- Generating plants serving the national grid of Sri Lanka, as of December 2007

(a) Hydroelectric power plants

Plant Name	Units x Capacity (MW)	Capacity (MW)	Annual Avg. Energy under average hydrological conditions (GWh)
Laxapana Complex			
Canyon	2 x 30	60	160
Wimalasurendra	2 x 25	50	112
Old Laxapana	3 x 8.33+2 x 12.5	50	286
New Laxapana	2 x 50	100	552
Polpitiya	2 x 37.5	75	453
Laxapana Total		**335**	**1563**
Mahaweli Complex			
Victoria	3 x 70	210	865
Kotmale	3 x 67	201	498
Randenigala	2 x 61	122	454
Ukuwela	2 x 20	38	154
Bowatenna	1 x 40	40	48
Rantambe	2 x 24.5	49	239
Mahaweli Total		**660**	**2258**
Other Power Plants			
Samanalawewa	2 x 60	120	344
Kukule	2x35	70	300
Small hydro (Inginiyagala, Uda walawe, Nilambe)		20	

Total other power plants		**210**	
Total in operation		**1205**	**4465**
Under construction			
Upper Kotmale (due for commissioning in 2010)	2 x 75	**150**	409

(b) Thermal power plants owned by CEB

Plant Name	Units x Name Plate Capacity	Capacity (MW)	Annual Max. Energy (GWh)
Kelanitissa Power Station			
Gas turbine (Old)	4 x 20	80	417
Gas turbine (New)	1 x 115	115	707
Combined Cycle (Naphtha/diesel)	1 x 165	165	1290
Kelanitissa Total		**360**	**2414**
Sapugaskanda Power Station			
Diesel	4 x 20	80	472
Diesel (Ext.)	8 x 10	80	504
Sapugaskanda Total		**160**	**976**
Small Thermal Plants			
Chunnakam	1 x 8	8	-
Small Thermal Total		**8**	**-**
Existing Total Thermal		**528**	**3390**

(c) Thermal power plants owned by independent power producers

Plant Name	Capacity (MW)	Minimum Guaranteed Energy (GWh)
Lakdanavi	22.5	156
Asia Power	51	330
Colombo Power (Barge)	64	420
ACE Power Matara	24.8	167
ACE Power Horana	24.8	167
AES Kelanitissa	163	1314
Heladhanavi	100	698
ACE Power Embilipitiya	100	697
Total IPP	**550.1**	**3949**

(d) Small Power Plants (SPPs) using renewable energy

	Name of Power Plant	Contracted Capacity	Year of Commercial Operation	Installed Capacity (MW)												Generaion in 2007 (GWh)		
				1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Non-CDM projects	CDM projects	CDM Ref number
1	Dick Oya	0.96	1996	1.40	1.50	2.40	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	3.638		
2	Seetha Eliya	0.11	1996				0.11	0.11	0.11	0.11	0.11	0.07	0.07	0.07	0.07	0.033		
3	Ritigaha Oya	0.11	1997				0.11	0.11	0.11	0.11	0.80	0.80	0.80	0.80	0.80	2.481		
4	Talawakelle	0.11	1997				0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.000		
5	Rakwana Ganga	0.76	1999				0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	1.242		
6	Kolonna	0.78	1999				0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	1.805		
7	Ellapita Ella	0.56	1999				0.56	0.56	0.56	0.56	0.56	0.55	0.55	0.55	0.55	2.101		
8	Carolina	2.02	1999				2.02	2.02	2.02	2.02	2.02	2.50	2.50	2.50	2.50	11.686		
9	Weddamulla	0.20	1999				0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.111		
10	Madampe(Waste heat)	0.39	1999				0.39	0.39	0.39	0.39	0.39	0.39	0.10	0.10	0.10	0.000		
11	Delgoda	2.91	2000					2.91	2.91	2.91	2.91	2.65	2.65	2.65	2.65	9.947		
12	Mandagal Oya	1.28	2000					1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	4.066		
13	Glassaugh	2.56	2000					2.56	2.56	2.56	2.56	2.53	2.53	2.53	2.53	9.367		
14	Minuwnella	0.64	2001						0.64	0.64	0.64	0.64	0.64	0.64	0.64	1.801		
15	Kabaragala	1.50	2001						1.50	1.50	1.50	1.50	1.50	1.50	1.50	3.833		
16	Bambarabatu Oya	3.20	2001						3.20	3.20	3.20	3.20	3.20	3.20	3.20	10.219		
17	Galatha Oya	1.20	2001						1.20	1.20	1.20	1.20	1.20	1.20	1.20	3.070		
18	Hapugastenna I	4.80	2001						4.80	4.80	4.80	4.89	4.60	4.60	4.60	16.088		
19	Belihuloya	2.50	2002							2.50	2.50	2.50	2.50	2.50	2.50	7.679		
20	Watawala	1.30	2002							1.32	1.32	1.30	1.30	1.30	1.30	4.765		
21	Niriella	3.00	2002							3.00	3.00	3.00	3.00	3.00	3.00	5.394		
22	Hapugastenna II	2.40	2002							2.40	2.40	2.40	2.30	2.30	2.30		15.696	85
23	Deyianwala	1.50	2002							1.50	1.50	1.50	1.50	1.50	1.50	2.712		
24	Hulu Ganga 1	2.88	2003								2.88	3.00	3.00	3.00	3.00	0.000		
25	Sanquhar	1.60	2003								1.60	1.60	1.60	1.60	1.60		3.083	751
26	Karawila Ganga	0.75	2004									0.75	0.75	0.75	0.75	2.366		
27	Brunswic	0.60	2004									0.60	0.60	0.60	0.60	0.347		
28	Sithagala	0.80	2004									0.80	0.80	0.80	0.80	2.130		
29	Way Ganga	8.93	2004									8.93	8.93	8.93	8.93	16.301		
30	Alupola	2.52	2004									2.52	2.52	2.52	2.52		8.962	100
31	Rathganga	2.00	2004									2.00	2.00	2.00	2.00	9.613		
32	Waranagala	9.90	2004									9.90	9.90	9.90	9.90	40.160		
33	Nakkawita	1.01	2004									1.01	1.01	1.01	1.01	0.027		
34	Walakada	4.21	2004									4.21	4.21	4.21	4.21	13.999		
35	Nianwita Oya	0.60	2004									0.60	0.60	0.60	0.60	2.048		
36	Atabage Oya	2.21	2004									2.21	2.35	2.35	2.35	7.222		
37	Batalagala	0.10	2004										0.10	0.10	0.10	0.109		
38	Battaramulla(Solar Power)	0.02	2004					0.10	0.10	0.10	0.10	0.02	0.02	0.02	0.02	0.000		
39	Walapane(Dendro)	1.00	2004									1.00	1.00	1.00	1.00	0.139		
40	Hemingford	0.18	2005										0.18	0.18	0.18	0.436		
41	Kotapola	0.60	2005										0.60	0.60	0.60	1.436		
42	Wee Oya	3.00	2005										3.00	3.00	3.00	14.137		
43	Radella	0.20	2005										0.20	0.20	0.20	0.500		
44	Kumburuteniwela	2.80	2005										2.80	2.80	2.80	4.187		
45	Asupini Ella	1.30	2005										1.30	1.30	1.30	7.013		
46	Kalupahana	0.80	2005										0.80	0.80	0.80	1.871		
47	Upper Korawaka	1.50	2005										1.50	1.50	1.50	4.832		
48	Badalgama (Biomass)	1.00	2005										1.00	1.00	1.00		1.119	2364
49	Delta Estate	1.20	2006											1.20	1.20		3.031	751
50	Hulu Ganga 2	1.60	2006											2.95	2.95		18.899	85
51	Gomala Oya	1.00	2006											0.80	0.80	3.058		
52	Gurugoda Oya	4.50	2006											4.50	4.50	5.091		
53	Coolbawan	0.75	2006											0.75	0.75	2.733		
54	Henfold	2.60	2006											2.60	2.60	7.180		
55	Dunsinane	2.70	2006											2.70	2.70	8.768		
56	Nilambe oya	0.75	2006											0.75	0.75	0.911		
57	Kolapathana	1.10	2006											1.10	1.10	2.126		
58	Guruluwana	2.00	2006											2.00	2.00	6.743		
59	Kuda Oya	1.00	2006											1.00	1.00	4.114		
60	Labuwewa	2.00	2006											2.00	2.00	5.203		
61	Forest Hill	0.30	2006											0.30	0.30	0.469		
63	Batatota	2.00	2007												2.00	8.204		
65	Kehelgamu oya	3.00	2007												3.00	8.193		
67	Kotankanda	0.15	2007												0.15	0.500		
68	Lower Neluwa	1.45	2007												1.45	0.002		

Source: Adapted from Sales and Generation Data Book , 2007, Ceylon Electricity Board and Energy Data 2007, Sri Lanka Sustainable Energy Authority, and ranked by the year of Commercial Operation

The steps 1-6 for the calculation of baseline emissions follow **EB63 Annex 19- Methodological Tool (Version 02.2.1) "Tools to calculate the emission factor of an electricity system"** identified in Section B.6.1.

Step 1: Identify the relevant electricity systems;

This was explained in Section B.6.1

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

This was explained in Section B.6.1

Step 3- Selection of a method to determine the Operating Margin (OM)

This was explained in Section B.6.1 and the simple Operating Margin method was selected.

Step 4- Calculation of the operating margin emission factor according to the selected method

The simple operating margin is the weighted average CO_2 emissions per unit of net electricity generation (tCO2/MWh) of all generating power plants serving the system, excluding the low-cost/must-run units. For this calculation, all the hydroelectric power plants (CEB and Small Power Producers), biomass/wind/solar-based electricity generation (CEB and Small Power Producers) were defined to be low-cost/must-run units, and excluded from the calculation. All the power plants in the grid are listed in Table A3.1, from which, the following two groups of power plants were selected to calculate the simple operating margin emission factor. (a) thermal power plants owned by CEB (b) thermal power plants owned by Independent Power Producers. The data sources used to calculate the operating margin are summarized in Table A3.2.

Note: As the Chunnakam power plant (8 MW) serves the mini-grid in the northern Jaffna peninsula and therefore not serving the project electricity system, this power plant was not included in the calculations.

Table A3.2- Data sources used for the calculation of the operating margin

Data input	Symbol	Data source	Units in which data is published
Amount of fossil fuel consumed by each power plant in each year	FC	Sales and Generation Data Book, Ceylon Electricity Board (2005,2006,2007) and Energy Data 2007, published by Sri Lanka Sustainable Energy Authority	Litre
Net calorific value of each fossil fuel type	NCV	Sri Lanka Energy Balance 2007- An Analysis of Energy Sector Performance, Sri Lanka Sustainable Energy Authority (page 63)	kilocalorie/ kilogram
Specific gravity of each fossil fuel type	sg	Sri Lanka Energy Balance 2007- An Analysis of Energy Sector Performance, Sri Lanka Sustainable Energy Authority (page 63)	kilogram/litre

Mechanical equivalent of heat	-	standard conversion tables widely available	kilo Joule/ kilocalorie
CO_2 emission factor of each fossil fuel	EF_{CO2}	IPCC Guidelines on National GHG Inventories (2006), Chapter 1 of Volume 2 (Energy)	tonne CO_2/ MJ
Net electricity generated and delivered to the grid by each power plant	EG	Sales and Generation Data Book, Ceylon Electricity Board (2005,2006,2007)	Giga watthour

NCV for each fuel was first converted from kcal/kg to kJ/litre as follows. The converted values are shown in Table A3.3.

NCV (kJ/litre) = NCV (kcal/kg) x sg (kg/litre) x mechanical equivalent of heat (4.1868 kJ/kcal)

Table A3.3- Conversion of fuel calorific values

Fuel Type *I*	Net Calorific value (kcal/kg)	Specific Gravity (kg/litre)	Net Calorific Value (kJ/litre) NCV_i
Fuel Oil	10,104	0.95	40,098
Residual Fuel	10,052	0.97	40,979
Diesel	10,556	0.85	37,391
Naphtha	11,259	0.69	32,510

Note: The published net calorific values are the same for every year over 2005, 2006 and 2007

Source: Sri Lanka Energy Balance 2007- An Analysis of Energy Sector Performance, Sri Lanka Sustainable Energy Authority

The following equation was used to calculate the simple operating margin.

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

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

The three most-recent years for which data is available, are 2005, 2006 and 2007. The IPCC default CO_2 emission factors used to calculate the power plant emissions are shown in Table A3.4. Published fuel consumption for each power plant and the emission estimates are given in

Table A3.5. The published generation from each power plant is shown in Table A3.6. The operating margin calculations for each year are given in Table A3.7.

Table A3.4 - IPCC default CO2 emission factors for combustion, used to calculate power plant emissions

Fuel Type *i*	**Emission Factor (kg-CO2/GJ)** $EF_{CO2,i}$
Fuel Oil	75.50
Residual Fuel	75.50
Diesel	72.60
Naphtha	69.30

Source: IPCC Guidelines on National GHG Inventories (2006), Chapter 1 of Volume 2 (Energy)

Table A3.5- Power plant fuel consumption and calculated emissions in the project electricity system

Location	Plant Type	Fuel(s) used	Fuel Consumption (million litre) *FC*			Fuel Consumption (GJ) *FC × NCV*			Emissions from Power Plants (t-CO_2) *FC × NCV × EF*		
			2005	**2006**	**2007**	**2005**	**2006**	**2007**	**2005**	**2006**	**2007**
CEB Thermal Power Plants											
Kelanitissa	Gas turbine (Old)	Diesel	11.839	3.036	23.742	442,669	113,518	887,731	32,137.8	8,241.4	64,449.3
Kelanitissa	Gas turbine (New)	Diesel	94.249	22.897	73.268	3,524,040	856,136	2,739,545	255,845.3	62,155.5	198,891.0
Kelanitissa	Combined Cycle (Naphtha/diesel)	Diesel	74.595	88.975	126.351	2,789,163	3,326,842	4,724,358	202,493.2	241,528.7	342,988.4
		Naphtha	179.620	91.187	137.586	5,839,407	2,964,469	4,472,891	404,670.9	205,437.7	309,971.3
Sapugaskanda	Diesel	Diesel	1.638	1.855	2.033	61,246	69,360	76,015	4,446.5	5,035.5	5,518.7
		Residual Fuel	75.073	79.055	95.308	3,076,437	3,239,616	3,905,653	232,271.0	244,591.0	294,876.8
Sapugaskanda	Diesel (Extension)	Diesel	1.091	1.255	1.110	40,793	46,925	41,504	2,961.6	3,406.8	3,013.2
		Residual Fuel	113.643	110.070	117.800	4,657,008	4,510,589	4,827,358	351,604.1	340,549.4	364,465.6
IPP Thermal Power Plants:		**Petroleum**									
Lakdanavi	Diesel	Fuel Oil	38.25	25.97	29.14	1,533,630	1,041,346	1,168,457	115,789.0	78,621.6	88,218.5
Asia Power	Diesel	Residual Fuel	81.35	76.75	83.12	3,333,623	3,145,159	3,406,197	251,688.5	237,459.5	257,167.9
Colombo Power (Barge)	Diesel	Fuel Oil	105.17	101.11	102.00	4,217,030	4,054,312	4,090,000	318,385.8	306,100.6	308,795.0
ACE Power Matara	Diesel	Fuel Oil	36.78	29.08	33.24	1,474,645	1,165,850	1,332,819	111,335.7	88,021.7	100,627.8
ACE Power Horana	Diesel	Fuel Oil	37.88	29.01	31.25	1,518,713	1,163,404	1,252,863	114,662.8	87,837.0	94,591.2
AES Kelanitissa	Combined Cycle	Diesel	96.32	163.41	209.40	3,601,402	6,110,022	7,829,622	261,461.8	443,587.6	568,430.6
Heladhanavi	Diesel	Fuel Oil	163.71	140.30	157.64	6,564,570	5,625,754	6,321,054	495,625.0	424,744.5	477,239.6
ACE Power Embilipitiya	Diesel	Fuel Oil	117.94	143.31	160.22	4,729,082	5,746,449	6,424,507	357,045.7	433,856.9	485,050.3
								Total	**3,512,424.7**	**3,211,175.5**	**3,964,294.9**

Table A3.6- Generation from each power plant in the project electricity system

Location	Plant Type (additional identification)	Fuel(s) used	**Net Electricity Generation (GWh)** *EG*		
			2005	**2006**	**2007**
CEB Thermal Power Plants					
Kelanitissa	Gas turbine (Old)	Diesel	20.793	4.431	46.308
Kelanitissa	Gas turbine (New)	Diesel	275.510	65.030	218.792
Kelanitissa	Combined Cycle (Naphtha/diesel)	Diesel	333.717	369.193	550.633
		Naphtha	660.791	340.622	517.641
Sapugaskanda	Diesel	Diesel	3.283	5.189	4.752
		Residual Fuel	314.328	331.418	399.966
Sapugaskanda	Diesel (Extension)	Diesel	2.985	4.022	3.224
		Residual Fuel	505.082	491.258	526.686
IPP Thermal Power Plants: Petroleum					
Lakdanavi	Diesel	Fuel Oil	151.082	103.688	118.422
Asia Power	Diesel	Residual Fuel	353.692	334.203	361.725
Colombo Power (Barge)	Diesel	Fuel Oil	475.780	452.048	456.343
ACE Power Matara	Diesel	Fuel Oil	163.308	129.824	147.708
ACE Power Horana	Diesel	Fuel Oil	174.017	131.778	142.412
AES Kelanitissa	Combined Cycle	Diesel	475.780	619.684	786.885
Heladhanavi	Diesel	Fuel Oil	758.887	619.380	747.740
ACE Power Embilipitiya	Diesel	Fuel Oil	488.219	593.380	663.027
		Total	**5,157.254**	**4,595.148**	**5,692.264**

Table A3.7- Operating margin emission factor calculations

Year	**2005**	**2006**	**2007**
Emissions from Power Plants (t-CO2)	3,512,424.7	3,211,175.5	3,964,294.9
Net Electricity Generation (GWh)	5,157.254	4,595.148	5,692.264
Simple operating margin CO2 emission factor (t-CO2/MWh)			
Annual (*EF*)	0.6811	0.6988	0.6964
Operating margin emission factor (three-year weighted average) t- $EF_{grid,OM,2007}$	**0.6921**		

CO2/MWh	

Step 5- Calculation of the build margin emission factor

The sample group of power units that have been built most recently can be selected in one of the two methods, as provided in the methodological tool.

(a) the five power units that have been built most recently: the five power units built most-recently by end-2007 had a total capacity of 6.9 MW and 17.378 GWh of generation to the connected system. These five power units contributed 0.18% of generation in 2007, as shown in Table A3.8.

Table A3.8- Contribution of the five mostly-recently built power units

Five power units most-recently added	Net Generation in 2007 (GWh)
Forest Hill	0.47
Batatota	8.20
Kehelgamu oya	8.19
Kotankanda	0.51
Lower Neluwa	0.00
Total generation	**17.38**
Total grid generation	**9,624.53**
Share of grid generation	0.18%

Source: CEB sales and generation data book, 2007

(b) the set of power plant additions that comprise 20% of system generation (in GWh) and that have been built most recently, was therefore selected to calculate the build margin emission factor. The list of power plants is given in Table A3.9. Power plants were ranked from the most recent, and their electricity generation in 2007 was calculated cumulatively. It was observed that with the inclusion of AES Kelanitissa power plant, the share of generation covered exceeded 20%. All the power plants selected are less than ten years old, and satisfy the condition stated in the methodological tool.

Table A3.9- Selection of the set of power plant additions that comprise 20% of generation

			Generation in 2007 (GWh)	Cumulative % of total generation covered
	Total generation in the project electricity system		**9,624.527**	**100.0%**
	Power Plant	**Year of addition (most-recent plant first)**		
1	Small Power Producers	Jan-Dec 2007	16.899	0.2%
2	Small Power Producers	Jan-Dec 2006	46.396	0.7%
3	ACE Power Embilipitiya	Mar 2005	663.027	7.5%
4	Small Power Producers	Jan-Dec 2005	34.412	7.9%
5	Heladhanavi	Oct 2004	747.740	15.7%
6	Small Power Producers	Jan-Dec 2004	94.461	16.7%
7	AES Kelanitissa	Oct 2003	786.885	24.8%
	Power Plants excluded from build margin estimates because 20% level has been exceeded are,			
	Kukule	Jul 2003	267.256	27.6%
	other power plants ……..	before July 2003		

Data sources:

1. Small Power Producer commissioning dates from “Sales and Generation Data Book 2007”
2. Other power plant commissioning dates from “CEB Long-term Generation expansion Plan 2005”.
3. Generation in 2007 from each power plant from “Sales and Generation Data Book 2007”.

Note: The following Small Power Plants that have been registered as CDM project activities were excluded from the list of power plants selected in Table A3.9 to calculate the build margin.

Name of Power Plant	Commissioning Year	CDM Registration Reference Number
Hulu Ganga 2	2006	0085
Delta Estate	2006	0751

Badalgama	2005	2364
Alupola	2004	0100

There are four other registered CDM project activities in the host country serving the project electricity system (Sri Lanka national grid), but they do not belong to the group of power plants added to the project electricity system between years 2004 and 2007, and hence not relevant to this calculation.

The build margin CO2 emission factor was calculated for year 2007, the most recent year for which data is available. Emission factors used for each fuel were the same as for the calculation of operating margin in step 3. The following equation was used. Results of the calculation are shown in Table A3.10.

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

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 (in this case y = 2007)

Table A3.10- Calculation of the build margin emission factor

	Power Plant	Fuel Type	Fuel consumption in 2007 (TJ)	Emissions (t-CO2) *EG ×EF*	Generation (GWh) *EG*
1	Small Power Producers	small hydro	none	None	16.899
2	Small Power Producers	small hydro	none	None	46.396
3	ACE Power Embilipitiya	Fuel Oil	6,424,507.2	485,050.3	663.027
4	Small Power Producers	small hydro	none	None	34.412
5	Heladhanavi	Fuel Oil	6,321,054.3	477,239.6	747.740
6	Small Power Producers	small hydro	none	None	94.461
7	AES Kelanitissa	Diesel	7,829,622.0	568,430.6	786.885
	Total in power plants considered for the build margin			1,530,720.5	2389.820
	Build margin emission factor (t-CO2/MWh) $EF_{grid, BM, 2007}$			**0.6405**	

Note: Numbers in the “fuel consumption” column refer to the numbers in Table A3.4.

Step6 - Calculate the combined margin emissions factor

The methodological tool used in this analysis requires the combined margin to be calculated as the weighted average of the operating margin emission factor and the build margin emission factor.

The combined margin emissions factor was 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 in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} Weighting of operating margin emissions factor (%)
w_{BM} Weighting of build margin emissions factor (%)

As the Mampuri Wind Power Plant is a wind power generation project activity, in accordance with the methodological tool, the weighting factors used for operating margin and build margin requires to be w_{OM} = 0.75 and w_{BM} =0.25, respectively, and the results are shown in Table 3.11.

Table A3.11- Calculation of the combined margin emission factor

Emission Factors	Calculated Value t-CO_2/MWh *EF*	Weighting factor *w*	Weighted Margin t-CO_2/MWh
Operating margin	0.6921	0.75	0.5190
Build margin	0.6405	0.25	0.1601
Combined Margin $EF_{grid,CM,y}$			**0.6791**

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

Appendix 5. Further background information on monitoring plan

Appendix 6. Summary of post registration changes

A change to the Monitoring plan was done, when in December 2014 the only change has been the removal of the M3 meter, which was used by CEB for auxiliary supply. The total supply from CEB to the project (import) is now metered through the M2 meter.

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Document information

Version	*Date*	*Description*
08.0	22 July 2016	EB 90, Annex 2 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.

Version	*Date*	*Description*
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for small-scale CDM project activities (these instructions supersede the "Guidelines for completing the project design document form for small-scale CDM project activities" (Version 01.1)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-SSC-PDD* to *CDM-SSC-PDD-FORM*; • Editorial improvement.
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	13 March 2012	EB 66, Annex 9 Revision required to ensure consistency with the “Guidelines for completing the project design document form for small-scale CDM project activities”
03.0	15 December 2006	EB 28, Annex 34 • 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.
02.0	08 July 2005	EB 20, Annex 14 • The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • 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>.
01.0	21 January 2003	EB 07, Annex 05 Initial adoption.

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