CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • 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>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

10MW Photovoltaic Plant in Dubai, UAE
Version: 02
Date: 03/08/2012

A.2. Description of the small-scale project activity:

The purpose of the project activity is to develop a 10 MW output capacity photovoltaic (PV) power plant in Dubai, United Arabic Emirates (hereinafter referred to as the "project").

The project proponent is the Dubai Electricity and Water Authority (DEWA), a Dubai Government-run company. DEWA is responsible for power generation, water production, transmission and distribution of power and water in the Emirate of Dubai. DEWA operates 8 power plants with a total installed capacity of 7,361 MW and 7 desalination plants with an installed capacity of 1.5 million cubic metres of water per day.

Based on strategies in place at the national and Emirate levels to promote sustainable, eco-friendly development, DEWA plans to develop a 10 MW solar power plant in Dubai.

The project will reduce greenhouse gas emissions by displacing fossil fuel based electricity from the grid through electricity generation from solar radiation.

As per the feasibility study performed by an independent consultant, the location of the project activity has been chosen after assessment of the climate, weather, geomorphology, topography and existing or planned use of the sites around Dubai. Evaluation of the climate and weather conditions, particularly the solar irradiation, wind and sand dust; have resulted in the recommendation for the suitable technology for solar energy generation.
The photovoltaic power plant will be composed of 13 thin film - PV modules (connected together serial) with a total output capacity of 10 MW and an installed capacity of 13 MW peaks to generate 24,778 MWh annually. It will contribute to annual greenhouse gas (GHG) emissions reductions estimated at 12,765 tCO_2.

The project lifetime is estimated at 25 years.

The project activity will contribute to sustainable development by:

- generation of sustainable electrical power,
- reduction of fossil fuel consumption,
- reduction of greenhouse gas emissions from combustion of fossil fuels.;

A.3. Project participants:

>>

Name of Party involved (host) indicates a host Party):	Private and/or public entity(ies) project participants(as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
United Arab Emirates (host)	Dubai Electricity and Water Authority (DEWA)	No
	Dubai Carbon Centre of Excellence	

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

United Arab Emirates

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

Dubai Emirate

A.4.1.3. City/Town/Community etc:

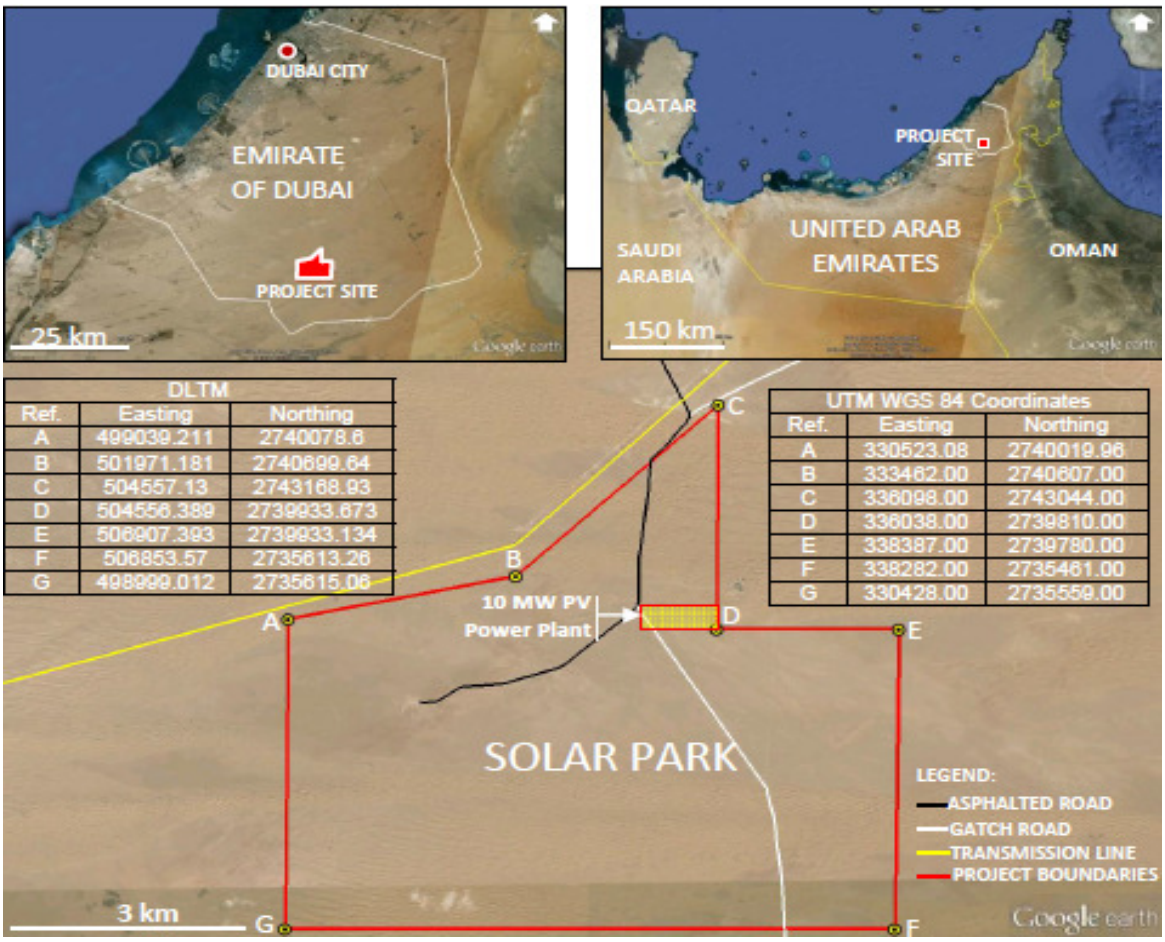
Seih Al Dahl

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity:

The power station utilizing PV technology is proposed to be developed in the Emirate of Dubai, south-east of the city of Dubai.

The 10 MW ouput PV Power Plant will be located within the designated area for the Solar Park located in Seih Al Dahl area of the Emirate of Dubai, at about 55 kilometers south of Dubai City proper. The project will cover an area of about 0.3km2 of the 48 km2 designated area for the Solar Park.

GPS coordinates of the 10 MW site: 27.4008° N / 50.4054° E (centre of the 10 MW plant) .


DUBAI CITY
EMIRATE OF DUBAI
PROJECT SITE
25 km
QATAR
PROJECT SITE
SAUDI ARABIA
UNITED ARAB EMIRATES
OMAN
150 km
DLTM
Ref. Easting Northing
A 499039.211 2740078.6
B 501971.181 2740699.64
C 504557.13 2743168.93
D 504556.389 2739933.673
E 506907.393 2739933.134
F 506853.57 2735613.26
G 499999.012 2735615.06
UTM WGS 84 Coordinates
Ref. Easting Northing
A 330523.08 2740019.96
B 333462.00 2740607.00
C 336098.00 2743044.00
D 336038.00 2739810.00
E 338387.00 2739780.00
F 338282.00 2735461.00
G 330428.00 2735559.00
10 MW PV Power Plant
SOLAR PARK
LEGEND:
ASPHALTED ROAD
GATCH ROAD
TRANSMISSION LINE
PROJECT BOUNDARIES
3 km
Google earth

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

>> According to **Appendix B of the simplified modalities and procedures for small-scale CDM project activities**[1], the proposed project falls under the following type and category:

Project type:	Type I - renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts (or an appropriate equivalent)
Category:	I.D - Grid connected renewable electricity generation
Reference:	AMS I.D, Version 17

The project activity is to install and operate a photovoltaic power plant with total 10 MW output capacity. The standard test conditions of modules were used to describe the photovoltaic power plant capacity. Thereby, the losses until the feed in (metering system) are not considered. For the DEWA project it has been defined that the photovoltaic plant shall be designed to ensure a specified Alternating Current (AC) ouput (after converter) instead of the typically used for the Standard Test Conditions (STC) definition. Hence, DEWA project require a higher Direct Current (DC) capacity (until inverter) to follow this requirement. A simulation has been performed for the 10 MW photovoltaic plant to get knowledge of the required capacity for fulfilling the DEWA project specification. The simulation results show that the 10 MW PV power plant requires a DC capacity of 13 MW to reach the defined 10 MW AC output.

13 PV power block will be installed at the entire PV power plant.
Each 1 MW PV power block consists of:
1 x 1,000 kVA transformer 33 kV
2 x 500 kVA inverter
11,760 x 85W CdTe modules => the resulting module area per 1 MW power block is 8,467 m^2

The connection of DC devices is as following:
14 modules (1.19 kW) will be connected together serial (called string) and 2 strings are connected together in parallel with cable clamps and one cable will ongoing to a junction box incomer.
Maximum 24 cables (48 strings) are connectable in parallel at one junction box, eight times 24 cables and one time 18 cables will be connected to a junction per 500 kVA inverter, hence 9 junction boxes will be connected to each inverter and 18 junction boxes will be installed per 1 MW PV power block.

Cadmium telluride1 (CdTe) PV modules will be used. CdTe is a semiconductor that absorbs and converts sunlight into electricity. CdTe layers are deposited onto a glass "superstrate" that allows sunlight to enter. The sunlight passes through the glass and produces electrical current and voltage in the lower layers.
The 10 MW PV power plant will include a total of 152,880 CdTe PV modules, which will be installed on 1,820 tables (i.e. 84 modules per table). The area of one module is 0.72 m^2 resulting a total of 110,073.6 m^2 module area will be installed.

The whole PV power plant area is 280,000 m^2 which is useable for the installation of modules, internal roads, buildings, etc. Additional an adequate distance between two rows will be considered by a site area of 280,000 m^2. The PV panels will mounted horizontally on the fixed tables, where the panels will be facing south with an inclination angle of 20°.

[1] http://cdm.unfccc.int/UserManagement/FileStorage/CDM_AMSH4SLBZ8FEJK4MIVW6DUVDT5YOVBTH3

The PV modules will be connected to 500 kVA inverters (in total 26 inverters) and always two inverters will be connected to a 1,000 kVA transformer with primary voltage level of 33 kV.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

>> The chosen crediting period for the project activity is 7 years, renewable twice.

Annual estimates of emission reductions by the project activity during the crediting period are:

Years	Estimate of annual emission reductions in tonnes of CO_2e
1	12,765
2	12,765
3	12,765
4	12,765
5	12,765
6	12,765
7	12,765
Total estimated reductions (tonne of CO_2e)	89,355
Total number of crediting years	**7** (the first crediting period)
Annual average of the estimated reductions over the crediting period. (tCO_2e)	12,765

A.4.4. Public funding of the small-scale project activity:

>> Public funding from Annex I Parties is not involved.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

>> Based on the information provided in **Appendix C of the simplified Modalities and Procedures for Small-Scale CDM projects**[2], *a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:*

- *With the same project participants;*
- *In the same project category and technology/measure*[3]*;*
- *Registered within the previous 2 years; and*
- *Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity.*

[2] http://cdm.unfccc.int/Projects/pac/howto/SmallScalePA/sscdebund.pdf

[3] The *CDM Glossary of Terms* (Version 05, EB 47, 19.08.2009) defines 'same technology/measure' as follows:

a. Two different project activities will be considered to be applying the same technology if they provide the same kind of output and use the same kind of equipment and conversion process.

b. Two different project activities will be considered to be using the same measure if they constitute the same course of action and result in the same kind of effect (e.g. two projects using the same management practice such as fuel switch)

The project proponent confirms that it has not registered any small scale CDM activity nor applied to register another small scale CDM project activity within 1 km of this project boundary, in the same project category and with the same technology.

Therefore the proposed project activity is not a debundled component of a larger scale project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

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Title : Type I –Renewable Energy Projects
Reference : I.D-Grid connected renewable electricity generation
Version : 17 (EB 61)[4]

B.2 Justification of the choice of the project category:

>> The approved small-scale methodology AMS-I.D., Version 17 applies to the proposed project activity, as follows:

Applicability condition	Justification
1. & 2. 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 proposed project activity will install a renewable energy generation unit – a solar photovoltaic (PV) power plant. The electricity generated by the project activity PV plant will be supplied into the electricity grid of Dubai Emirate, operated by the Dubai Electricity and Water Authority (DEWA).
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) existing plant(s).*	The project activity PV plant will be installed at a site where there was no renewable energy power plant operating: it is a Greenfield plant.
4. Hydro power plants with reservoirs that satisfy at least one of the listed conditions	Not relevant: the proposed project activity is not implementing a hydro power plant.

[4] http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X

are eligible to apply this methodology.	
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, the capacity of the entire unit shall not exceed the limit of 15 MW.	The proposed project activity has only a renewable component and it is within the 15 MW limit for a small-scale CDM project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	Not relevant: the proposed project activity is not a co-generation system.
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.	Not relevant: the proposed project activity does not involve addition of units since it is a Greenfield project.
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.	Not relevant: the proposed project activity is neither a retrofit nor a replacement project.

B.3. Description of the project boundary:

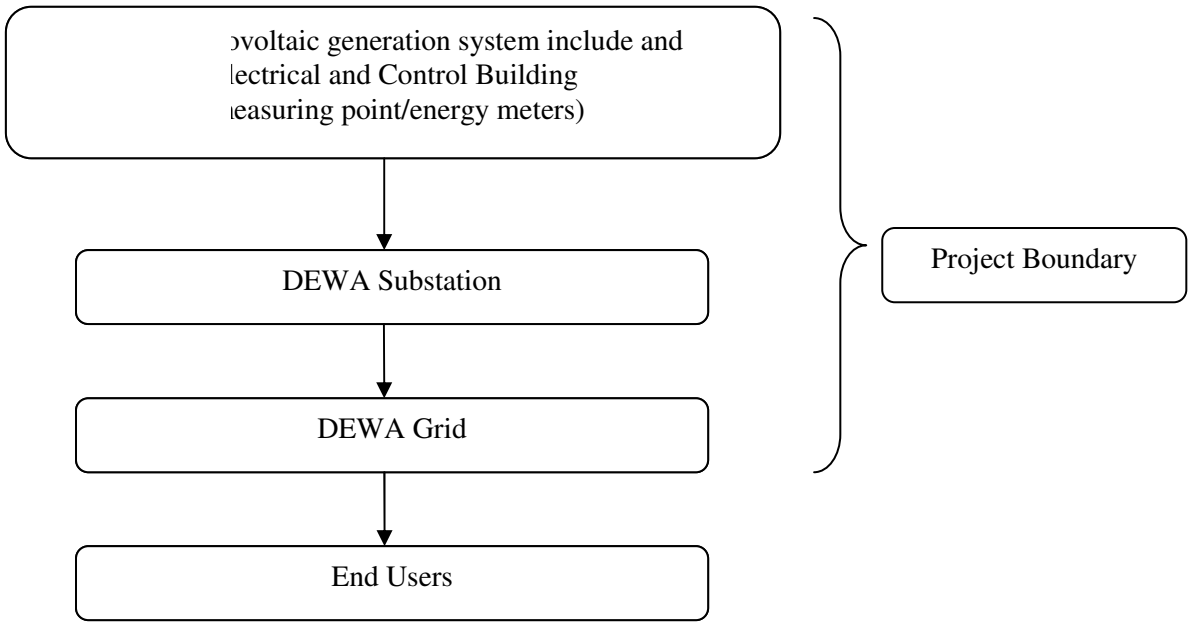
>> According to the **AMS.I.D, Version 17**, **Paragraph 9,** *the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.*

The proposed project will deliver electricity to DEWA grid, hence project boundary includes the PV power generation plant and all power plants connected physically to DEWA grid.

Table 1: Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	No	No geothermal power plant
		CH_4	No	No geothermal power plant
		N_2O	No	No geothermal power plant
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	No geothermal power plant or solar thermal power plant
		CH_4	No	No geothermal power plant or solar thermal power plant
		N_2O	No	No geothermal power plant or solar thermal power plant
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	No hydro power plant
		CH_4	No	No hydro power plant
		N_2O	No	No hydro power plant

The flow diagram describes the 10 MW PV plant project boundary:



B.4. Description of baseline and its development:

>> According to the used methodology **AMS-I.D, Version 17, paragraph 10**, *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 to the grid.*

Baseline development:

According to AMS-I.D, Version 17, paragraph 10, *the baseline emissions are the product of the electrical energy baseline* $EG_{BL,y}$ *expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor*:

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad \textbf{(1)}$$

Where:

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

According to AMS-I.D, Version 17, paragraph 12, *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";

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.

Between two choices above, (a) has been chosen. A combined margin (CM) has been calculated by referring "Tool to calculate the emission factor for an electricity system" (version 02.2.1).

For the detailed information, please refer to section B.6 and Annex 3 in this document.

Baseline emissions are calculated using the grid emission factor of the DEWA grid that reflects the existing power plants' consumption of fossil fuels and electricity generation. All the existing power plants connected to the DEWA grid are fossil fuel-fired power plants generating electricity from natural gas, diesel fuel oil and residual fuel oil.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

>> According to the "Guidelines on the demonstration of additionality of small-scale project activities"[5], version 09, EB 68, Annex 27, grid-connected solar technologies (photovoltaic and solar thermal electricity generation) of installed capacity up to 15 MW are automatically defined as additional, without further documentation of barriers.
The proposed project activity is a grid-connected photovoltaic power plant of <15 MW and is thus automatically additional.

Key milestones of the project activity:

- The notification of prior consideration was sent on 24 July 2011 to UNFCCC although the PDD has been published for Global Stakeholder Consultation prior to the project activity's start date
- Global Stakeholder Comments period 24 Sep 11 - 23 Oct 11
- Issuance of Letter of Approval by DNA on 1 November 2011
- Consultancy Services Tender Opening: November 2011
- ILF appointed as consultant on 20 Feb 2012
- Final Report by ILF: early June 2012
- Submission of Final EIA to Dubai Municipality: mid June 2012
- Tender for equipment: End of June 2012
- EIA Approval by Dubai Municipality: 02 August 2012
- Award of contract: 27 August 2012 (**start of project activity**)
- Start of construction: Mid October 2012
- Commissioning: July 2013

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Calculation of Baseline Emissions

[5] http://cdm.unfccc.int/UserManagement/FileStorage/I5FZTH0DK3O2QLA1VRWU9X7SE6MBY8

According to the selected methodology **AMS-I.D Version 17, paragraph 11**: 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.

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

(Equation 1, AMS-I.D., Version 17)

Where:

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

Calculation of the grid emission factor:

According to the methodology **AMS-I.D, Version 17, paragraph 12**, *the grid emission factor (measured in tCO_2e/MWh) 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",

OR

(b) The weighted average emissions (in tCO_2e/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

For the DEWA grid emission factor calculation, Option (a) – calculation of the combined margin has been chosen.

The combined margin (CM) has been calculated according to the **"Tool to calculate the emission factor for an electricity system", Version 02.2.1 (EB 63)**[6].

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

Details of the calculation are in the Annex 3 - BASELINE INFORMATION, Attachments 1 and 2.

STEP 1. Identify the relevant electricity systems

STEP 1. Identify the relevant electricity systems;

As per the Tool, a grid/project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

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

Similarly, connected electricity system is an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.

The DNA of the UAE has not published any delineation of project electricity systems and connected electricity systems. If this information is not available, the project participants should define the project electricity system and any connected electricity systems using the following criteria to determine the existence of significant transmission constraints:

- In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year;

1. The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

Application of the first criterion does not result in a clear determination of the grid boundary. There are four different entities responsible for different regional grids within the UAE:

1. Abu Dhabi Water and Electricity Authority (ADWEA),
2. Dubai Water and Electricity Authority (DEWA),
3. Sharjah Water and Electricity Authority (SEWA), and
4. Federal Water and Electricity Authority (FEWA).

These regional grids are not operated with spot markets for electricity, and dispatch decisions are being made centrally within each regional grid[7]. The regional grids have been connected through high voltage transmission lines but prices still defer between regions and are affected by political considerations. As end-user prices are kept relatively constant, one can conclude that price differences of more than 5% exist for more than 60% of the year. As can be seen from the table below, the prices of all 4 electricity systems are constant throughout the year and the difference is more than 5%.

Customer Category	ADWEA[8]	DEWA[9]	SEWA	FEWA[10]
Residential	3-15 fils/kWh	23-38 fils/kWh	30 fils/kWh	20-33 fils/kWh
Commercial	15 fils/kWh	23-38 fils/kWh	30 fils/kWh	20-33 fils/kWh
Industrial	15 fils/kWh	23-38 fils/kWh	40 fils/kWh	20-33 fils/kWh

The second criterion does not provide a clear boundary either. Regional transmission lines are available and have spare capacity but the current utilization level cannot be explained by differences in real transmission costs alone. As there is no liberalized market for electricity between regional grids, utilization of transmission capacity is mainly a result of long term commercial negotiations between the four authorities.

[7] http://www.adwec.ae/documents/ppt/prospects_for_electricity_trade_between_gcc_countries.pdf
[8] http://www.rsb.gov.ae/en/PrimaryMenu/index.aspx?LeftType=1&SubCatLeftMenu_Name=Customer%20Tariffs%20&%20Charges&SubCatLeftMenu_ID=152&SubCatMenu_Name=Tariffs%20&%20Charges&SubCatMenu_ID=151&CatMenu_ID=67&PriMenu_ID=177&CatMenu_Name=Tariffs&PriMenu_Name=
[9] http://www.dewa.gov.ae/tariff/tariffdetails.aspx
[10] http://fewa.gov.ae/_arabic/Slab.html

As the two criteria above do not result in a clear identification of a grid boundary, the project electricity system is defined as the Dubai Emirate regional grid operated by DEWA, defined by the following power plants/units which are all connected through transmission and distribution lines to the project activity and can be dispatched without significant transmission losses:

Name of power plant/unit	Installed capacity in 2010[11] (MW)
Jebel Ali Power and Desalination Station "D"	1,027
Jebel Ali Power and Desalination Station "E"	605
Jebel Ali Power and Desalination Station "G"	798
Aweer Power Station "H" - Ph l	607
Aweer Power Station "H" - Ph ll	421
Aweer Power Station "H" - Ph lll	818
Jebel Ali Power and Desalination Station "K"	831
Jebel Ali Power and Desalination Station "L" - Ph I	861
Jebel Ali Power and Desalination Station "L" - Ph ll	1,393

The relevant electricity system is located in United Arab Emirates only, which is not an Annex-I country. Therefore the Tool is applicable to the proposed project activity.

The connected power grids are:

- In non-Annex I countries:
    - Abu Dhabi Water and Electricity Authority (ADWEA), in UAE;
    - Sharjah Electricity and Water Authority (SEWA), in UAE; and
    - Federal Electricity and Water Authority (FEWA), in UAE.

  No electricity imports to the DEWA grid have been used from the above identified connected electricity systems.

- In Annex I countries: none

STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional);
For the DEWA grid emission factor calculation, Option I has been used: Only grid power plants are included in the calculation.

STEP 3. Select a method to determine the operating margin (OM);
The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or
(d) *Average OM.*

For the DEWA grid emission factor calculation, the Average OM method has been chosen

[11] http://www.dewa.gov.ae/aboutus/electStats2010.aspx

The average OM emission factor ($EF_{grid,OM\text{-}ave,y}$)is calculated as the average emission rate of all power plants serving the grid.

For the average OM the emissions factor can be calculated using either of the two following data vintages:

- *Ex ante option.*
- *Ex post option.*

For the DEWA grid emission factor calculation, the ex ante data vintage option has been chosen. The emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation has been used.

STEP 4. Calculate the operating margin emission factor according to the selected method
The average OM emission factor is calculated as (EFgrid,OM-ave,y) is calculated as the average emission rate of all power using the methodological guidance as described for the simple OM, but also including the low-cost/must-run power plants in all equations.

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

Option B should only be used if the necessary data for Option A is not available.

For the DEWA grid emission factor calculation, Option A has been chosen for the calculation of the Average OM. *Under this option, the Average OM emission factor is calculated based on the net electricity of each power unit and an emission factor for each power unit, as follows:*

$$EF_{grid,OM-ave,y} = \frac{\Sigma_m EG_{m,y} * EF_{EL,m,y}}{\Sigma_m EG_{m,y}}$$

Equation (1) of the Tool to calculate the emission factor for an electricity system, (Version 02.2.1)

Where:

$EF_{grid,OM\text{-}ave,y}$	*Average operating margin CO_2 emission factor in year y (tCO_2/MWh)*
$EG_{m,y}$	*Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)*
$EF_{EL,m,y}$	*CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
m	*All power units serving the grid in year y*
y	*The relevant year as per the data vintage chosen in Step 3 - the ex ante option.*

Source of the data:

$EF_{grid,OM\text{-}ave,y}$	Calculation is provided in the Excel file "GEF DEWA Calculation- V3"
$EG_{m,y}$	The data on net electricity generated and delivered to the grid by the power units have been provided by DEWA.
$EF_{EL,y}$	Calculated according to the Tool to calculate the emission factor for an electricity system, (Version 02.2.1); see the details on the determination method below
m	For the proposed project activity, m = power plants operated by DEWA, as listed in Excel file "GEF DEWA calculation-V3"
y	y = 2008, 2009, 2010

Determination of $EF_{EL,m,y}$:
The emission factor of each power unit m should be determined as follows:

- ***Option A1****. If for a power unit m data on fuel consumption and electricity generation is available;*
- ***Option A2****. If for a power unit m only data on electricity generation and the fuel types used is available, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit;*
- ***Option A3.*** *If for a power unit m only data on electricity generation is available, an emission factor of 0 tCO_2/MWh can be assumed as a simple and conservative approach.*

For the DEWA grid emission factor calculation, Option A1 has been chosen for the calculation of $EF_{EL,m,y}$
Justification of the chosen option: this option should be used if for a power unit *m* the data on fuel consumption and electricity generation is available. The data on fuel consumption and electricity generation over the 3 most recent years have been provided by DEWA.

$EF_{EL,m,y}$ is calculated as follows:

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

Equation (2) of the Tool to calculate the emission factor for an electricity system, (Version 02.2.1)

Where:

$EF_{EL,m,y}$	*CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
$FC_{i,y}$	*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)*
$EF_{CO2,i,y}$	*CO_2 emission factor of fossil fuel type i in year y (tCO_2/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*
i	*All fossil fuel types combusted in power unit m in year y*

y	*Most recent historical year for which power generation data is available*

Sources of data:

$EF_{EL,m,y}$	Calculation is provided in the Excel file "GEF DEWA calculation-V3"
$FC_{i,y}$	The data on amounts of the fossil fuel types combusted in the power units have been provided by DEWA.
$NCV_{i,y}$	The net calorific values of the fossil fuel types combusted in the power units have been provided by DEWA.
$EF_{CO2,i,y}$	Source: 1. For the natural gas and distillate fuel oil (DFO), $EF_{CO2,i,y}$ is based on the laboratory analysis of the fuel. 2. For the medium fuel oil, the IPCC default value at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories[12] has been used.
$EG_{m,y}$	The data on net electricity generated and delivered to the grid by the power units have been provided by DEWA.
m	m = power plants operated by DEWA, as listed in the Excel file "GEF DEWA calculation-V3"
i	Natural gas (NG) medium fuel oil (MFO) diesel fuel oil (DFO)
y	y = 2008, 2009, 2010

Calculation of the generation-weighted average CO_2 emissions factor (2008-2010) - $EF_{grid, OM-ave,2008-2010}$:

	NET ELECTRICITY GENERATION		**OPERATING MARGIN EMISSIONS FACTOR**
	MWh	**Weight**	**tCO_2/MWh**
2008	28,613,451	0.31	0.5579
2009	30,499,280	0.33	0.5417
2010	33,207,824	0.36	0.5064
TOTAL	**92,320,555**	**1**	
$EF_{grid, OM-ave,2008-2010}$ =		**$(EF_{grid,OM-ave,2008}*weight_{2008}) + (EF_{grid,OM-ave,2009}*weight_{2009}) + (EF_{grid,OM-ave,2010}*weight_{2010})$**	
		0.5340	**tCO_2/MWh**

STEP 5 – Calculate the build margin (BM) emission factor

[12] *http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html*

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

Option 1: *ex ante*

Option 2: *ex post*

For the DEWA grid emission factor calculation, Option 1: ex ante has been chosen.

As per the **Tool, STEP 5, Option 1**, *for the first crediting period, the build margin emission factor is calculated ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation.*

For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE.

For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

The sample group of power units *m* used to calculate the build margin is determined according to the Tool, as per the following procedure, consistent with the chosen ex-ante data vintage:

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

For the DEWA grid emission factor calculation: $AEG_{SET\text{-}5\text{-}units}$ = 640,190 MWh

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

For the DEWA grid emission factor calculation: $AEG_{\geq 20\%}$ =8,385,027 MWh[13]

Note: The 20% of AEG_{total} falls on part of the generation of the unit L 22 GT therefore the unit is fully included.

[13] *Note: $AEG_{\geq 20\%}$ comprises more than 20% of AEG_{total} because there are two steam gas turbine units in one of the power plants running dependently on the gas turbine units of the power plant. Therefore, all these units have to be reckoned together, and this power plant must be considered as a whole.*

Moreover, the unit L 21 GT is included in the sample group although it is already higher than the 20% threshold. It is because that the steam turbine units L 25 CEST and L 26 CEST included in the sample group are not independent units; they are interconnected with all the gas turbine units L 21 GT, L 22 GT, L 23 GT and L 24 GT. Therefore all these units have to be reckoned together, and the plant L Ph-2 must be considered as whole.

(c) *From $SET_{5\text{-}units}$ and $SET_{\geq 20\%}$, select the set of power units that comprises the larger annual electricity generation (SET_{sample}).*
Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

For the DEWA grid emission factor calculation: $AEG_{SET\text{-}5\text{-}units} < AEG_{\geq 20\%}$

$$SET_{\geq 20\%} = SET_{sample}$$

$$SET_{sample} \approx AEG_{\geq 20\%} = 8{,}385{,}027 \text{ MWh}$$

None of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago. Therefore, the selected SET_{sample} can be used for calculation of the build margin. Steps (d), (e) and (f) of the procedure are ignored.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\Sigma_m EG_{m,y} * EF_{EL,m,y}}{\Sigma_m EG_{m,y}}$$

Equation (13) of the Tool to calculate the emission factor for an electricity system, (Version 02.2.1)

Where:

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

Sources:

$\boldsymbol{EF_{grid,BM,y}}$	Calculation is provided in the Excel file "GEF DEWA calculation-V3"
$\boldsymbol{EG_{m,y}}$	The data on net electricity generated and delivered to the grid by the power units have been provided by DEWA.

$EF_{EL,m,y}$	The CO_2 emission factor of each power unit m has been determined according to the "Tool": as per the guidance in Step 4 (a) for the simple OM, using year 2010 for the most recent historical year y for which power generation data is available, and using for m the power units included in the build margin.
m	Power units as listed in the Excel file "GEF DEWA calculation-V3"
y	y = 2010

As the result of the calculation, $EF_{grid,BM,y} = 0.4588$ tCO_2/MWh.

STEP 6 - Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or

(b) Simplified CM.

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

For the DEWA grid emission factor calculation, the CM has been calculated according to option A – weighted average CM method, as follows:

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

Equation (1) of the Tool to calculate the emission factor for an electricity system, (Version 02.2.1)

Where:

$EF_{grid,CM,y}$	*Combined margin CO_2 emission factor in year y (tCO_2/MWh)*
	Calculation is provided in the Excel file "GEF DEWA calculation-V3"
$EF_{grid,OM,y}$	*Operating margin emission factor in year y (tCO_2/MWh)*
$EF_{grid,BM,y}$	*Build 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*

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

- *Wind and solar power generation project activities: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;*
- *All other projects: $w_{OM} = 0.5$ and $w_{OB} = 0.5$ for the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.*

Result of the calculation of the combined margin emission factor for the DEWA electricity system:

	Wind and solar power generation project activities

w_{OM}	0.75
w_{BM}	0.25
$EF_{grid,CM,2010}$ =	$EF_{grid,OM\text{-}ave,2008\text{-}2010}$ * 0.75 + $EF_{grid,BM,2010}$*0.25
$EF_{grid,CM,2010}$ =	0.5340 * 0.75 + 0.4588 * 0.25
$EF_{grid,CM,2010}$ =	**0.5152 tCO_2/MWh**

	All other project activities for the first crediting period
w_{OM}	0.5
w_{BM}	0.5
$EF_{grid,CM,2010}$ =	$EF_{grid,OM\text{-}ave,2008\text{-}2010}$ * 0.5 + $EF_{grid,BM,2010}$*0.5
$EF_{grid,CM,2010}$ =	0.5340 * 0.5 + 0.4588 * 0.5
$EF_{grid,CM,2010}$ =	**0.4964 tCO_2/MWh**

For the proposed project activity, **$EF_{grid,CM,2010}$ = 0.5152 tCO_2/MWh**

For the calculation please refer to the Excel Attachment 1 – "GEF DEWA Calculation-V3"

Calculation of Project Emissions

According to **AMS-I.D Version 17, paragraph 20**: *For most renewable energy the project activities, PEy = 0.*
However, for the categories of project activities geothermal power plants and water reservoirs of the hydro power plants, project emissions have to be considered following the procedure described in the most recent version of ACM0002.

According to **AMS-I.D Version 17, paragraph 21:** *CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".*

The proposed project activity is neither of the exceptional project activities for which the project emissions must be calculated (geothermal plant or hydro power plant with water storage) and there will be no additional fossil fuel consumption due to the project activity.
Therefore $PE_y = 0$.

Calculation of Leakage Emissions

According to **AMS-I.D Version 17, paragraph 22**: *if the energy generating equipment is transferred from another activity, leakage is to be considered.*

In case of the proposed project activity, there will be no generating equipment transferred from another activity and therefore no leakage is to be considered: $LE_y = 0$.

Calculation of Emission Reductions

Emission Reductions are calculated according to **AMS-I.D Version 17, paragraph 23**, as follows:

$$ER_y = BE_y - PE_y - LE_y$$

(Equation 10, AMS-I.D, Version 17)

Where:

ER_y = Emission reductions in year y (tCO_2/y)
BE_y = Baseline emissions in year y (tCO_2/y)
PE_y = Project emissions in year y (tCO_2/y)
LE_y = Leakage emissions in year $_y$ (tCO_2/y)

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

(Copy this table for each data and parameter)

Data / Parameter:	$FC_{i,m,y}$, $FC_{i,y}$
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type i consumed by power plant/unit m (or in the project electricity system in case of $FC_{i,y}$) in year y
Source of data used:	Provided by DEWA
Value applied:	See Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V3"
Justification of the choice of data or description of measurement methods and procedures actually applied :	DEWA is the operator of the power plants.
Any comment:	-

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type i in year y
Source of data used:	Provided by DEWA
Value applied:	See Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V3"
Justification of the choice of data or description of measurement methods and procedures actually applied :	DEWA is the operator of the power plants and has the fuel parameters data from its fuel supplier(s).
Any comment:	-

Data / Parameter:	$EF_{CO2,i,y}$, $EF_{CO2,m,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type i used in power unit m in year y
Source of data used:	For natural gas and distillate fuel oil: as per composition and carbon content analysis, provided by DEWA. For medium fuel oil: IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Volume 2 (Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[14]

[14] http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html

Value applied:	See Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V3"
Justification of the choice of data or description of measurement methods and procedures actually applied :	DEWA is the operator of the power plants and has the fuel parameters data from its fuel supplier(s).
Any comment:	-

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO_2/MWh
Description:	Operating Margin emission factor
Source of data used:	Calculated
Value applied:	0.5340
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V3"
Any comment:	DEWA is the operator of the power plants and has the fuel parameter data from its fuel supplier(s).

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO_2/MWh
Description:	Build Margin emission factor
Source of data used:	Calculated
Value applied:	0.4588
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V3"
Any comment:	DEWA is the operator of the power plants and has the fuel parameter data from its fuel supplier(s).

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined Margin CO_2 emission factor
Source of data used:	Calculated
Value applied:	0.5152
Justification of the choice of data or description of measurement methods and procedures actually applied :	See Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V3"
Any comment:	DEWA is the operator of the power plants and has the fuel parameter data from its fuel supplier(s).

Data / Parameter:	$EG_{m,y}$, EG_y
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m* in year *y*
Source of data used:	Provided by DEWA.
Value applied:	See Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V3"
Justification of the choice of data or description of measurement methods	DEWA is the operator of the power plants.

and procedures actually applied :	
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

>>

Calculation of Baseline emissions

According to the selected methodology **AMS-I.D Version 17, paragraph 11**, as described in Section B.4. above, the baseline emissions of the proposed project activity are calculated as follows:

$$BE_y = \boldsymbol{EGfacility,y} * EF_{CO2,grid,y}$$

(Equation 1, AMS-I.D., Version 17)

$\boldsymbol{EG_{facility,y}}$ = 24,778 MWh per annum, estimated ex ante.

The net electricity supplied by the project activity to the grid has been estimated by an independent external consultant in a project report conducted in April-June 2012.

$EF_{CO2,grid,y}$ = 0.5152 tCO_2/MWh

The grid emission factor has been calculated as a combined margin emission factor according to the **"Tool to calculate the emission factor for an electricity system", Version 02.2.1 (EB 63)**; the simple operating margin method (ex-ante option) has been used.

The parameters applied in the $EF_{grid,CM,y}$ calculation and the Excel calculation sheet are presented in Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V2"".

BE_y = 24,778 MWh * 0.5152 tCO_2/MWh = 12,765 tCO_2

Calculation of Project Emissions

In accordance with **AMS-I.D Version 17, paragraph 20 and 21:**

$\boldsymbol{PE_y}$ **= 0**

Calculation of Leakage Emissions

In accordance with **AMS-I.D Version 17, paragraph 22:**

$\boldsymbol{LE_y}$ **= 0**

Calculation of Emission Reductions

Emission reductions of the proposed project activity are calculated according to **AMS-I.D Version 17, paragraph 23,** as follows:

$$ER_y = BE_y - PE_y - LE_y$$

(Equation 10, AMS-I.D, Version 17)

ER_y = 24,778 MWh * 0.5152 tCO_2/MWh = 12,765 tCO_2

The parameters applied in the ER_y calculation and the Excel calculation sheet are presented in Annex 3 BASELINE INFORMATION, Annex 3 BASELINE INFORMATION, Attachment 1 – "GEF DEWA Calculation-V2"" which is submitted to the DOE together with this PDD.

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

>>The summary of the *ex-ante* estimate of emission reductions of the project activity for the first crediting period are shown below:

Year	Estimated baseline emissions (tCO_2e)	Estimated project activity emissions (tCO_2e)	Estimated project leakage (tCO_2e)	Estimated overall emission reductions (tCO_2e)
1	12,765	0	0	12,765
2	12,765	0	0	12,765
3	12,765	0	0	12,765
4	12,765	0	0	12,765
5	12,765	0	0	12,765
6	12,765	0	0	12,765
7	12,765	0	0	12,765
TOTAL	89,355	**0**	**0**	89,355

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{facility,,y}$
Data unit:	MWh/y
Description:	Quantity of the net electricity supplied by the project activity to the grid by the PV plant in the year *y*
Source of data:	On-site measurements by electricity meter
Value of data	24,778 MWh (this is the estimated value for the purpose of ex-ante emission reductions calculation)
Description of measurement methods and procedures to be applied:	Continuous measurements, and at least monthly recording. The data will be archived electronically and as paper prints for 2 years following the end of the last crediting period. Net electricity supplied to the grid will be measured by a bi-directional meter and check meter in the incomers of 33 kV main switchgear at PV side in the electrical and control building. The data will be put into a central database.
QA/QC procedures to be applied:	The metering equipment (main meter and check meter) will be properly calibrated every 2 years with an accuracy class of 0.2 in accordance with the instructions (schedules, procedures) for quality assurance from the technology provider and according to DEWA requirements. DEWA will cross check measurement results with records for sold electricity.
Any comment:	Main meter and check meter have back-up summation when main meters fail due to any reason.

B.7.2 Description of the monitoring plan:

The monitoring plan has been developed based on the approved methodology **AMS-I.D, Version 17**. Monitoring will take place from the start of the first crediting period up to the end of the last crediting period.

Management structure and responsibility
As the project proponent, DEWA will undertake the overall responsibility for daily operating and reporting.
Staff to carry out the monitoring work (data recording and archiving, quality assurance and quality control of the data, equipment´s calibration, scheduled and unscheduled maintenance and adoption of corrective actions, if needed) will be identified within the company.

- Management structure

The manager of the proposed project activity will hold the overall responsibility for the monitoring process, including the follow up of daily operations, revision of the monitored results/data, and quality assurance of measurements and the process of training new staff.

- Responsibility of the personnel directly involved

The personnel involved with monitoring will be responsible for carrying out the following tasks:

- Supervise and verify metering and recording
- Collection of additional relevant data (e.g. sales/invoices)
- Ensure regular calibration and maintenance
- Data archives: retain all monitoring data and make it available to the DOE for the verification of emission reductions

Monitoring equipment and installation
The quantity of annual electricity delivered to the grid by the proposed project activity will be monitored by a main meter and check meter in the incomers of 33 kV main switchgear at PV side. All equipment will be in state of the art technology and in full compliance with international and national standards

Data monitoring and management
All monitoring data and records will be archived in electronic form and as paper prints. Electronic documents will be backed up on compact disc or hard disc. The data will be put into a central database and recorded in the plant control and monitoring system and the respective associated archive servers
Main meter and check meter have back-up summation when main meters fail due to any reason.

The project proponent will also keep copies of additional relevant documents and prepare a periodic monitoring report, which includes the net electricity generation, the monitoring data summary, the calibration records and the emission reductions calculation.

Quality control
Calibration will be performed initially before the energization with DEWA tariff metering department and and properly calibrated every 2 years in accordance with the instructions (schedules, procedures) for quality assurance from the technology provider and according to DEWA requirements

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

Date of completion: 22/09/2011

Name of person/entity determining the baseline:

Energy Changes Projektentwicklung GmbH has prepared the PDD.
Mr. Clemens Plöchl clemens.ploechl@energy-changes.com
Ms. Laura Martonová laura.martonova@energy-changes.com

Energy Changes Projektentwicklung GmbH is not a project participant in this project activity.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>> 27/08/2012

As per the **Glossary of CDM terms, Version 05**[15], *the starting date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a project activity begins.*
... In light of the above definition, the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity:

This will be the date of the signature of the contract with the equipment supplier, which is expected at the end of August 2012.

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

>> 25 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

01/07/2013
Starting date of the first crediting period shall be the later of the starting date of the proposed project activity and the registration date.

C.2.1.2. Length of the first crediting period:

>> 7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>Not Applicable

[15] *http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf*

C.2.2.2. Length:

>> Not Applicable

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

For the 10 MW solar plant an EIA has been conducted by the independent, international consultancy Dome International LLC and approved by Dubai Municipality on 02 August 2012.

Change in land use and loss and disturbance of terrestrial habitat are the key environmental impacts associated with the proposed project. These impacts are particularly related to the fauna species that are present in the general area of the project site. The 10 MW PV plant has no point source of emission or discharge during operation.

During construction work environmental impacts are:

- Dust emission from open areas and unpaved roads,
- Emission from combustion gases from construction equipment and vehicles,
- Noise from construction machineries,
- Fuel leakage and accidental spillage from temporary fuel storage tank, sewage generation and discharge, wastewater discharge from washings of vehicles and equipment,
- Domestic wastes and equipment maintenance waste, including hazardous wastes, i.e. batteries, use oil, etc.,
- Habitat loss and disturbance of terrestrial fauna,
- Increased traffic flow and land uptake and land use alteration;

During the operation of the 10 MW PV plant, the following environmental impacts are expected:

- Noise from plant operation,
- Waste water discharge and sewage discharge, fuel leakage and accidental spillage,
- Domestic wastes and equipment maintenance wastes, including hazardous wastes,
- Disturbance to terrestrial fauna,
- Impact of the development of air traffic;

In order to control all environmental impacts and risks during the construction phase, a specific Construction Environmental Management Plan will be developed to minimize waste, control discharges and protect the environment.
To minimize impacts during the operational phase, a project specific operational environmental management plan will be developed together with an organizational framework (Environmental Management Group) to ensure that the environmental management procedures are implemented and regular monitoring of the environmental performance is conducted.
Additionally, environmental trainings will be provided to ensure that all personnel involved in the implementation of the project is aware of their responsibilities.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Based on the EIA conducted, the implementation of the proposed project is not expected to result in any significant environmental impacts. This conclusion was arrived at after careful consideration of available project information and of the specific conditions under which the proposed project will be implemented and on the basis that all outlined mitigation measures will be implemented.

SECTION E. Stakeholders' comments

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

>> On May 17th 2011, a stakeholder event was organized in Amwaj Rotana Hotel, Jumeirah Beach Residence, Dubai, UAE.

The local stakeholders had been invited to the event through a public announcement in the Newspaper *Gulf News* on May 3rd 2011.

The project proponents presented the proposed project activity and an introduction to the Clean Development Mechanism to local stakeholders.

Stakeholders had the opportunity to make oral comments during the event and additionally by sending an email to the Dubai Carbon Centre of Excellence at cdm@dcce.com until 30th May 2011.

E.2. Summary of the comments received:

>>

The meeting commenced with an introduction by Mr. Waleed Salman, the Chairman of the Board of Dubai Carbon Centre of Excellence (DCCE), in which he talked about the partnership of DCCE with UNDP and the Dubai Supreme Energy Council in the project titled "Promoting Low-Carbon Development in Dubai", which aims to assist and build the capacity of DCCE to undertake CDM projects in order to ensure sustainable development in Dubai is improved through integrating climate change into development planning and implementation processes.

This Introduction was followed a presentation by Mr. Ivano Iannelli, the COO and interim CEO of DCCE, who presented the global actions being taken to mitigate climate change, the Kyoto Protocol and its outcomes, the GHG gases covered by the Protocol and the CDM. He thoroughly explained to the stakeholders, the milestones, different players and timelines associated with the CDM 10MW Photo Voltaic Project. He also urged all attending stakeholders to ask questions and express their concerns whether in the meeting or via email: cdm@dcce.ae

Mr. Iannelli also introduced DCCE, its role, structure, and its partnership with the UNDP. He explained the role of UNDP in the project and its outputs to the audience.

The introductions were followed by questions concerning the CDM process, CERs to be generated, what is meant by a cap-and-trade system and what is a CDM methodology.

Stakeholders' questions were answered by Mr. Ianelli and resources such as the UNFCCC website were referenced for more information.

After the introduction, the project was presented by Albertus Kleinveld, Director – Special Projects, DEWA. He introduced DEWA and the background of the project. He explained that a German firm, Lahmeyer International, was hired by DEWA in 2010 to undertake a study on solar energy in Dubai, and he presented the results of this study and the locations and environmental assessment done by the study. He further elaborated on the relatively high price of solar-generated electricity and the different technologies that should be looked at to cover utility-scale solar farms.

Questions were then raised by the stakeholders. Mr. Mohamed Almarsonzi, Dubai Aluminium, asked about the dimensions of the farm so that it can generate 10MW, and he asked Mr. Kleinveld about the cost.

Prof. Bassam Abdel Karim, British University in Dubai, asked if DEWA is using the experience of MASDAR, which already installed a PV farm in Abu Dhabi, or working together in this field with MASDAR.

Prof. Bassam Abdel Karim also asked if DEWA had made any meteorological measurements from those locations? (Answer: yes)
Attendees:

No	Company Name	Name of Representative	Title / Department
1	Crystal Sphere	Natalya Rybachok	
2	DCCE	Ivano Iannelli	CEO
3	DCCE	Walid Salman	Chairman of the Board
4	DCCE	Saoud Abdel Aziz	Manager, Technical Coordination
5	DEWA	Neno Simic	DSM Commissioning
6	DEWA	Khalil Sabt	UP-PP
7	DEWA	Bert	Director
8	Dubal	Ismat Murshed	Manager
9	Dubal	Dr. R. Opte	Manager - EHST
10	Dubal	Tay Boon Song	Manager
11	Dubal	Sanjeev	NOD
12	Dubal	Mohamed Almarsonzi	Manager Environment
13	Dubal	Milton Khan	Environmental Officer
14	Dubal	Fadi Ahmad	Senior Operations
15	Dubal	Ahmad Al Hashimi	
16	Dubal	Mohamed Zainal	Project Manager
17	Dubal	Jergey Akhmeba	Senior Manager
18	Dubal	Ebrahim Baggasi	Senior Manager
19	Dubal	Mahmoud Abdulmahif	Project Manager
20	Dubal	Moona Al Amoodi	Senior Environment Officer
21	Dubal	P. Smith	Engineering Manager

22	Dubal	Satish Nair	Area Engineer
23	Dubal	Sami Bustami	Senior Manager
24	Ecobility	Karim Aly	Director
25	Emirates Aluminium (EMAL)	Nandhakumar Bala	EHS Representative & Technician
26	Energy Changes	Clemens Plochl	Managing Partner
27	Energy Changes	Wolfgang Wetzer	Managing Partner
28	ENOC/DCCE	W. Ghamen	GasQ Director/DD
29	ETS	S.A.Kazi	BDH
30	ExxonMobil	Aude Charrote	Communications Manager
31	Freelance	Maria Luise Pansica	Consultant
32	Group Five	Muhammad Latif	Regional Manager
33	IRENA	Kim D	Strategy
34	ISTIDAMA	Joel Ante	-
35	KEMA	Manfred Fussi	Senior Consultant
36	Ozone Energy	Santosh	Managing Director
37	Ozone Energy	Vinoj	Manager
38	Roads and Traffic Authority (RTA)	Abdel Karim Meftah	Chief Engineer
39	Roads and Traffic Authority (RTA)	Waleed Al Almiri	Senior Engineer
40	Roads and Traffic Authority (RTA)	Bayan Khader Abushaban	Senior Environment Specialist
41	Roads and Traffic Authority (RTA)	Anas Fadel Dolan	Senior HSE Specialist
42	Roads and Traffic Authority (RTA)	Ebrahim	Manager
43	Sharjah Municipality	Sarah Hantoush	Engineer
44	The British University in Dubai	Prof. Bassam Abdel Karim	Professor
45	UNDP	Manar Yazbek	Programme Associate
46	World Bank	Aysha Ferozie	GGFR Coordinator

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

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No negative impacts were identified during the public consultation process.
The majority of the respondents expressed strong support for the implementation of the project.
Therefore, measures to address adverse impacts are not necessary.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2
INFORMATION REGARDING PUBLIC FUNDING

No public funding received for the proposed project activity.

Annex 3
BASELINE INFORMATION

"GEF DEWA Calculation-V2" (in a separate MS Excel file)

Annex 4
MONITORING INFORMATION

The monitoring details for the project activity are listed in Section B.7 of this PDD.