JCM Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Bangladesh
Name of the methodology proponents submitting this form	Institute for Global Environmental Strategies
Sectoral scope(s) to which the Proposed Methodology applies	1. Energy industries (renewable-/non-renewable sources)
Title of the proposed methodology, and version number	Installation of Solar PV System, Ver 01.0
List of documents to be attached to this form (please check):	☐The attached draft JCM-PDD: ☒Additional information
Date of completion	15/12/2016

History of the proposed methodology

Version	Date	Contents revised
01.0	15/12/2016	First edition

A. Title of the methodology

Installation of Solar PV System, Ver 01.0

B. Terms and definitions

Terms	Definitions
Solar photovoltaic (PV) system	An electricity generation system which converts sunlight into electricity by the use of photovoltaic (PV) modules. The system also includes ancillary equipment such as inverters required to change the electrical current from direct current (DC) to alternating current (AC).

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	Displacement of grid electricity and/or captive electricity by installation and operation of the solar PV system(s).
Calculation of reference emissions	Reference emissions are calculated on the basis of the AC output of the solar PV system(s) multiplied by either; 1) conservative emission factor of national grid electricity, 2) conservative emission factor of diesel power generator or 3) conservative emission factor of gas power generator.
Calculation of project emissions	Project emissions are the emissions from the solar PV system(s), which are assumed to be zero.
Monitoring parameters	The quantity of the electricity generated by the project solar PV system(s).

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	The project newly installs solar PV system(s).
Criterion 2	The PV modules have obtained a certification of design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).
Criterion 3	The equipment to monitor output power of the solar PV system(s) and irradiance is installed at the project site.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Consumption of grid electricity and/or captive electricity	CO_2
Project emissions	
Emission sources	GHG types
Generation of electricity from solar PV system(s)	N/A

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

The default emission factors are set in a conservative manner based on the Bangladesh's national grid. The emission factor is calculated based on the recent three years of electric power source mix published by Bangladesh government identifying 1) primary fuel type which has the largest volume of generated electricity among the fossil fuel types used as a source and 2) the best heat efficiencies derived from the type of power plants currently operational in Bangladesh according to the identified primary fuel type.

As a result, the emission factor of 0.376 tCO_2/MWh is applied which is calculated based on the heat efficiency of the most efficient natural gas-fired power plant supplying electricity to the national grid. The value is lower than the emission factor of the Bangladesh grid published by the government of Bangladesh, which is 0.674 tCO_2/MWh (combined margin, 2011), and ensures net emission reductions.

In addition, the conservative emission factor based on a captive diesel power generator is calculated by applying the default heat efficiency of 49%, an efficiency level which is above the value of the world's leading diesel power generator, and set to 0.533 tCO_2/MWh. The conservative emission factor based on a captive natural gas power generator is calculated by applying the most efficient heat efficiency of 52% for gas power generator, and set to 0.376 tCO_2/MWh.

F.2. Calculation of reference emissions

$$RE_p = \sum_i (EG_{i,p} \times EF_{RE,i})$$

RE_p : Reference emissions during the period *p* [tCO_2/p]
$EG_{i,p}$: Quantity of the electricity generated by the project solar PV system *i* during the period *p* [MWh/p]
$EF_{RE,i}$: Reference CO_2 emission factor for the project solar PV system *i* [tCO_2/MWh]

G. Calculation of project emissions

Project emissions are not assumed in the methodology as electricity consumption by any PV

system is negligible.

$PE_p = 0$

PE_p : Project emissions during the period *p* [tCO_2/p]

H. Calculation of emissions reductions

$ER_p = RE_p - PE_p$

$= RE_p$

ER_p : Emission reductions during the period *p* [tCO_2/p]

RE_p : Reference emissions during the period *p* [tCO_2/p]

PE_p : Project emissions during the period *p* [tCO_2/p]

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameter	Description of data	Source
$EF_{RE,i}$	Reference CO_2 emission factor for the project solar PV system *i*. The value for $EF_{RE,i}$ is selected from the emission factor based on the national grid ($EF_{RE,grid}$), based on captive diesel power generator ($EF_{RE,cap,diesel}$) or based on captive gas power generator ($EF_{RE,cap,gas}$) in the following manner: In case the PV system in a proposed project activity is connected to the Bangladesh national grid including an internal grid which is not connected to a captive power generator, $EF_{RE,grid}$, 0.376 tCO_2/MWh is applied. In case the PV system in a proposed project activity is connected to an internal grid which is connected to both the national grid and a	Additional information The default emission factors are derived from a study of electricity systems in Bangladesh, the most efficient diesel power generator (49% heat efficiency) and the most efficient gas power generator (52% heat efficiency). The default value is revised if deemed necessary by the JC.

	captive power generator, $EF_{RE,grid}$, 0.376 tCO_2/MWh is applied. In case the PV system in a proposed project activity is connected to a captive power generator but not connected to the national grid, $EF_{RE,cap,gas}$, 0.376 tCO_2/MWh is applied unless the captive power generator uses only oil fuel. In case the captive power generator uses only oil fuel, $EF_{RE,cap,diesel}$, 0.533 tCO_2/MWh is applied.	