Joint Crediting Mechanism Approved Methodology MX_AM001
"Installation of Solar PV System"

A. Title of the methodology

Installation of Solar PV System, Version 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 using fossil fuel as power source 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 the grid, or 2) conservative emission factor of the captive diesel 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 are certified for design qualifications (IEC 61215,IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2). |
| Criterion 3 | The equipment used for monitoring 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 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 factor is set in a conservative manner for the Mexican grid. The emission factor is calculated based on the latest electricity mix in Mexico and refers to the conservative emission factor of each fossil fuel power plant in order to secure net emission reductions. The conservative emission factor of each plant is calculated to be 0.742 tCO_2/MWh for coal-fired power plant and 0.343 tCO_2/MWh for gas-fired power plant based on the survey on heat efficiency of power plant in Mexico. The emission factor for diesel power plant is calculated to be 0.533 tCO_2/MWh based on a default heat efficiency of 49%, an efficiency level which is above the value of the world's leading diesel power generators.

In case the PV system(s) in a proposed project activity is directly connected or connected via an internal grid, not connecting to a captive power generator, to a grid (PV Case 1), the value of operating margin without low cost/must run (LCMR) resources, using the best heat efficiency among currently operational plants in Mexico in calculating emission factors of fossil fuel power plants, are applied.

In the case the PV system(s) in a proposed project activity is connected to an internal grid connecting to both a grid and a captive power generator (PV Case 2), the lower value between the emission factor for PV Case 1 (tCO_2/MWh) shown in Section I. and the conservative

emission factor of diesel-fired power plant of 0.533 tCO$_2$/MWh is applied. The emission factors to be applied for PV Case 2 (tCO$_2$/MWh) are shown in Section I.

In the case that the PV system(s) in a proposed project activity is only connected to an internal grid connecting to a captive power generator (PV Case 3), the emission factor of a diesel generator calculated by applying the most efficient heat efficiency of 49%, an efficiency level which has not been achieved yet by the world's leading diesel generator is applied: 0.533 tCO$_2$/MWh.

The reference emission factors for each case is shown in Section I.

F.2. Calculation of reference emissions

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

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} : Reference CO$_2$ emission factor of grid and/or captive electricity [tCO$_2$/MWh]

G. Calculation of project emissions

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 emission factor of the project solar PV system *i*. The value for $EF_{RE,i}$ is selected from the reference emission factor based on a grid ($EF_{RE,grid}$) or based on a captive diesel power generator ($EF_{RE,cap}$) in the following manner: In case the PV system(s) in a proposed project activity, which is directly connected or connected via an internal grid not connecting to a captive power generator (PV Case 1), to a grid, $EF_{RE,grid}$ is set as 0.434 tCO_2/MWh. In case the PV system(s) in a proposed project activity, which is connected to an internal grid connecting to both a grid and a captive power generator (PV Case 2), $EF_{RE,grid}$ is set as 0.434 tCO_2/MWh. In case the PV system(s) in a proposed project activity is connected to an internal grid which is not connected to a grid (PV Case 3), $EF_{RE,cap}$ is set as 0.533 tCO_2/MWh.	<u>Additional information</u> The default emission factor is obtained from a study of electricity systems in Mexico and the most efficient diesel power generator (49% heat efficiency). The default value is revised if deemed necessary by the JC.

History of the document

Version	Date	Contents revised
01.0	29 December 2017	Electronic decision by the Joint Committee Initial approval.