Joint Crediting Mechanism Approved Methodology LA_AM002
"Installation of Solar PV System"

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 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 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 connected Lao Power Grid and Thailand Power Grid (hereafter referred to as "Lao-Thailand Power Grid"), which is defined as one interconnected electricity system.

Natural gas-fired power plants hold the majority (70%) in overall power supply to the Lao-Thailand Power Grid for the last five years. Emission factor of the electricity system is thus calculated in a conservative and simple manner based on the emission factor of gas power plants in order to secure net emission reductions. The calculation applied the emission factor of natural gas and the efficiency of the most efficient natural gas-fired power plant which supplies generated power to the grid (efficiency: 61.2%). As a result, the emission factor for the grid is set to be 0.319 tCO_2/MWh.

In addition, assuming captive power plants to be diesel power plants, whose emission factor 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.

The emission factors to be applied are shown in Section I. Data and parameters fixed *ex ante* of this methodology.

F.2. Calculation of reference emissions

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

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 emission factor for the project solar PV system i [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 for the project solar PV system i. The value for $EF_{RE,i}$ is selected from the list of emission factors in the following manner: PV Case1: In case the PV system(s) in a proposed project is connected to the Lao Power Grid, or connected to the grid via an internal grid not connecting to a captive power generator, $EF_{RE,i}$ 0.319 tCO_2/MWh is applied. PV Case2: In case the PV system(s) in a proposed project is connected to an internal grid connecting to both the Lao Power Grid and a captive power generator, $EF_{RE,i}$ 0.319 tCO_2/MWh is applied. PV Case3: In case the PV system(s) in a proposed project is only connected to an internal grid which is not connected to the Lao Power Grid, $EF_{RE,cap}$: 0.533 tCO_2/MWh is applied.	Additional information. The default emission factor is obtained from a study of electricity systems in Lao PDR and the default thermal efficiency of 49% which is set above the value of the most efficient diesel power generator. The default value is revised if deemed necessary by the JC.

History of the document

Version	Date	Contents revised
01.0	10 August 2018	JC4, annex 1 Initial approval.