

Joint Crediting Mechanism Approved Methodology MN_AM003
“Installation of Solar PV System”

A. Title of the methodology

Installation of Solar PV System, Ver. 02.0

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

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| Criterion 1 | The project newly installs solar PV system(s). |
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| Criterion 2 | The PV modules 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 used 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 the 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 Mongolian national grid which consists of Central Energy System (CES), Altai-Uliastai Energy System (AUES), Western Energy System (WES), Eastern Energy System (EES), and Southern (Gobi) Energy System (SES) and based on the most efficient heat efficiency of a diesel power generator.

In order to identify the emission factor based on the national grid simplistically and secure net emission reductions, this methodology applies the lowest emission factor of coal-fired power plant supplying electricity to the national grid, which is set to be 0.797 tCO₂/MWh. This value is lower than the grid emission factor for CES, which is 1.154 tCO₂/MWh (combined margin, 2012) published by Mongolian government, and it 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 tCO₂/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 [tCO₂/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 CO₂ emission factor for the project solar PV system i [tCO₂/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 [tCO₂/p]

H. Calculation of emissions reductions

$$\begin{aligned} ER_p &= RE_p - PE_p \\ &= RE_p \end{aligned}$$

ER_p : Emission reductions during the period p [tCO₂/p]

RE_p : Reference emissions during the period p [tCO₂/p]

PE_p : Project emissions during the period p [tCO₂/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 ($EF_{RE,grid}$) or based on | Additional information The default emission factors are derived from a study of electricity systems in |

| | | |
|--|--|---|
| | <p>captive diesel power generator ($EF_{RE, cap}$) in the following manner:</p> <p>In case the PV system in a proposed project activity is connected to the national grid (CES, WES, AUES, EES, and/or SES) including internal grid which is not connected to a captive power generator, $EF_{RE, grid}$, 0.797 tCO₂/MWh is applied.</p> <p>In case the PV system in a proposed project activity is connected to internal grid which is connected to both the national grid (CES, WES, AUES, EES, and/or SES) and a captive power generator, $EF_{RE, cap}$, 0.533 tCO₂/MWh is applied.</p> <p>In case the PV system in a proposed project activity is connected to internal grid which is not connected to the national grid, $EF_{RE, cap}$, 0.533 tCO₂/MWh is applied.</p> | <p>Mongolia and the default heat 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.</p> |
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History of the document

| Version | Date | Contents revised |
|---------|-------------------|---|
| 02.0 | 30 January 2017 | Revision to: <ul style="list-style-type: none"> ● Change the description of "Measurement methods and procedures" to clarify the requirement for calibration in the Monitoring Spreadsheet: JCM_MN_AM003. |
| 01.0 | 29 September 2016 | JC4, annex 1 Initial approval. |