JCM Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Republic of Maldives
Name of the methodology proponents submitting this form	Pacific Consultants Co., Ltd.
Sectoral scope(s) to which the Proposed Methodology applies	1. Energy industries (renewable-/non-renewable sources)
Title of the proposed methodology, and version number	Displacement of Grid and Captive Genset Electricity by 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	06/03/2015

History of the proposed methodology

Version	Date	Contents revised
01.0	06/03/2015	First Edition

A. Title of the methodology

Displacement of Grid and Captive Genset Electricity by 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 diesel fuel as a 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 the conservative emission factor of the grid and captive electricity.
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

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 solar PV system is connected to the internal power grid of the project site and/or to the grid for displacing grid electricity and/or captive electricity at the

	project site.
Criterion 3	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), and have fulfilled the requirements of IEC 61701.
Criterion 4	The equipment to monitor output power of the solar PV system 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

Almost all electricity in the Maldives is generated by diesel. Being an island country, almost all the islands generated its own electricity and all grids in the Maldives are isolated. Considering that power from other sources such as solar PV is very limited and is negligible, net emission reductions are ensured as follows.

It is assumed that solar PV systems installed in the Maldives will replace grid electricity and/or captive electricity generated by the existing diesel generators whose power generation efficiency is estimated to be around 35.4% in Male, which leads to the CO_2 emission factor of 0.739 tCO_2/MWh.

However, applying such emission factor derived from the existing diesel generators does not achieve net emission reductions. Therefore, the power generation efficiency of 49%, which has not been achieved yet by the world's leading diesel generators, is employed in this methodology to ensure net emission reductions. The emission factor of grid and captive electricity is set to 0.533 tCO_2/MWh based on the power generation efficiency of 49%.

F.2. Calculation of reference emissions

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

RE_p : Reference emissions during the period *p* [tCO_2/p]
$EG_{i,p}$: The quantity of the electricity generated by the project solar PV system *i* during the period *p* [MWh/p]
EF_{RE} : The reference CO_2 emission factor of grid and 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}	The reference CO_2 emission factor of grid and captive electricity, calculated based on the power generation efficiency of 49% using	Additional information The default emission factor is derived from the result of the

	diesel fuel as the power source. The default value for EF_{RE} is set to be 0.533 tCO_2/MWh. *The efficiency of the most efficient diesel engine is close to but below 49%.	survey on the new high-efficient engines using diesel fuel as a power source. The default value should be revised if necessary from the survey result which is conducted by the JC or project participants every three years.