JCM Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Socialist Republic of Vietnam
Name of the methodology proponents submitting this form	Stanley Electric Co., Ltd.
Sectoral scope(s) to which the Proposed Methodology applies	3. Energy demand
Title of the proposed methodology, and version number	Installation of LED lighting equipment to fishing boats, Version 01.0
List of documents to be attached to this form (please check):	☐The attached draft JCM-PDD: ☒Additional information
Date of completion	19/05/2017

History of the proposed methodology

Version	Date	Contents revised
01.0	19/05/2017	First Edition

A. Title of the methodology

Installation of LED lighting equipment to fishing boats, Version 01.0

B. Terms and definitions

Terms	Definitions
Illuminance	Illuminance is the physical quantity used in the measurement of the incident light illumination on the surface and equals to the luminous flux per unit area. In SI derived units these are measured in lux (lx) or lumens per square meter (lm/m^2).
Luminous flux	Luminous flux is the measure of the perceived power of the total amount of light energy radiated from a light source in a certain direction. The SI unit of luminous flux is the lumen (lm).
LED light	LED light is a lighting fixture using a light-emitting diode (LED), a semiconductor device that emits visible light when an electric voltage is applied in forward direction.

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	GHG emission reduction is achieved through the reduction of electricity consumption by newly installing LED lighting equipment or replacing existing lamps with LED lighting equipment.
Calculation of reference emissions	GHG emissions associated with electricity consumption of reference lighting equipment are calculated based on the total electricity consumption by LED lighting, rated electricity consumption of reference lamp, rated electricity consumption of LED light, the ratio of the number of reference lamps to that of project LED lights, and the emission factor of captive power

	generation using diesel fuels.
Calculation of project emissions	Project emissions are calculated by multiplying total electricity consumption of project by the emission factor of captive power generation using diesel fuels.
Monitoring parameters	Total electricity consumption of project LED lights.

D. Eligibility criteria

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

Criterion 1	The project newly installs LED lights or replaces existing lamps with LED lights as fishing lights for diesel powered fishing boats whose horsepower is over 90 in Vietnam.
Criterion 2	Project LED lighting meets the following specification: - Water proof and dust proof ratings are equal to or higher than the international standard IP65.
Criterion 3	In case existing lamps are replaced, a plan for proper treatment (including re-use and recycling) and disposal of replaced existing lamps is prepared and implemented according to the relevant legislation in Vietnam to avoid the mercury release to the environment.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Electricity consumption by reference lighting equipment	CO_2
Project emissions	
Emission sources	GHG types
Electricity consumption by project LED light	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are calculated by multiplying reference total electricity consumption by the emission factor of captive power generation using diesel fuels. Reference total electricity consumption is computed by multiplying total electricity consumption by LED lighting of

fishing boat *i*, by rated electricity consumption of reference lamp and the ratio of the number of reference lamps to that of project LED lights of fishing boat *i*, divided by rated electricity consumption of LED light of fishing boat *i*.

The luminous flux of reference lamp, which is used for calculating the parameter N_{REF}, is determined conservatively in the following manner to ensure the net emission reductions.

- The luminous flux of reference lamp is set at the highest specification among the fishing boat lamps which are currently available in the Vietnamese market.

F.2. Calculation of reference emissions

Reference emissions are calculated by the following equation:

$$RE_p = \sum_i EC_{REF,i,p} \times EF_{CO2,captive} \quad (1)$$

$$EC_{REF,i,p} = EC_{PJ,i,p} \times REC_{REF} \times N_{REF} / REC_{PJ} \quad (2)$$

Where

RE_p	=	Reference emissions during the period *p* [tCO_2/p]
$EC_{REF,i,p}$	=	Reference total electricity consumption of fishing boat *i* by reference lamp during the period *p* [MWh/p]
$EF_{CO2,captive}$	=	CO_2 emission factor of the electricity consumed by the diesel-powered fishing boat [tCO_2/MWh]
REC_{REF}	=	Rated electricity consumption of reference lamp of fishing boat [W]
i	=	Index for fishing boat
N_{REF}	=	Number of reference lamps, which has the equivalence to the design illuminance into an irradiated sea surface by one project LED light of fishing boat
$EC_{PJ,i,p}$	=	Total electricity consumption by LED light of fishing boat *i* during period *p* [MWh/p]
REC_{PJ}	=	Rated electricity consumption of LED light of fishing boat [W]

G. Calculation of project emissions

$$PE_p = \sum_i EC_{PJ,i,p} \times EF_{CO2,Captive} \quad (3)$$

Where

PE_p	=	Project emissions during the period p [tCO_2/p]
$EF_{CO2,captive}$	=	CO_2 emission factor of the electricity consumed by the diesel-powered fishing boat [tCO_2/MWh]
$EC_{PJ,i,p}$	=	Total electricity consumption by LED light of fishing boat i during the period p [MWh/p]
i	=	Index for fishing boat

H. Calculation of emissions reductions

$$ER_p = RE_p - PE_p \quad (4)$$

Where

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
$EF_{CO2,captive}$	CO_2 emission factor of the electricity consumed by the diesel-powered fishing boat 0.8 [tCO_2/MWh]	"Table 2. Emission factors for diesel generator systems (in kg CO_2/kWh) for three different levels of load factors" of CDM approved small scale methodology AMS-I.F.

REC_{REF}	Rated electricity consumption of reference lamp of fishing boat 1,000 [W]	Additional information
REC_{PJ}	Rated electricity consumption of LED light of fishing boat	Nominal value derived from the manufacturer's specifications available on specification documents, the concerned product catalogs, specification documents or manufacturer's websites.
N_{REF}	Number of reference lamps, which has the equivalence to the design illuminance into an irradiated sea surface by one project LED light of fishing boat	Explanatory Note

Explanatory Note

The procedure to determine the N_{REF} value is as follows.

Step 1

Design illuminance of project fishing boat from light to sea surface is derived from the following equation.

$$E_{PJ} = F_{PJ} * M_{PJ}$$

where:

E_{PJ}	=	Design illuminance of project fishing boat [lx]
F_{PJ}	=	Luminous flux into an irradiated sea surface, of those from light sources of one LED light in fishing boat [lm]
M_{PJ}	=	Maintenance rate of LED, on the basis of international standard, national standard/guideline, or manufacture specification

Step 2

Calculate number of reference lamps, which has the equivalence to the design illuminance into an irradiated sea surface by one project LED light of fishing boat:

$$N_{REF} = \frac{E_{PJ}}{F_{REF} * M_{REF}}$$

where:

N_{REF}	=	Number of reference lamps, which has the equivalence to the design illuminance into an irradiated sea point by one project LED light of fishing boat
F_{REF}	=	Luminous flux into an irradiated sea point, of those from light sources of one High Intensity Discharge (HID) light in fishing boat [lm] *: The luminous flux of reference lump sets 97,091 [lm] as the additional information shows.
M_{REF}	=	Maintenance rate of HID lamp, on the basis of JIEG-001 of the Illuminating Engineering Institute of Japan 0.5