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METHODOLOGY FOR EMISSION REDUCTION BY SHORE-SIDE OR OFF-SHORE ELECTRICITY SUPPLY SYSTEM

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SUMMARY

The methodology is applicable to projects that implement shore-side or offshore electricity supply for ships while they are docked at berths or offshore. The use of onshore or offshore sources, such as specially designed buoys to provide electricity, replace the need for ships' fossil-fuel auxiliary power generators. The methodology is an adapted version of the CDM small-scale methodology titled "AMS III.BP Emission reduction by shore-side or off-shore electricity supply system" Version 1.0. The methodology is applicable only to micro or small-scale project activities.

TABLE OF CONTENTS

INTRODUCTION

1.1.1 | The following table describes the key elements of the methodology:

Table 1. Key information

Project scale	Applicable to micro or small-scale project activities
Typical project (s)	Introduction of shore-side or offshore electricity supply to ships docked at berths, or sitting offshore, connected to specially designed systems that can provide electricity, thus displacing electricity produced from ships' fossil-fuel auxiliary or main power generator(s).
Type mitigation action	Fuel Switch: Displacement of more GHG intensive power
Emission type	Emission reduction

2| SCOPE, APPLICABILITY, AND ENTRY INTO FORCE

2.1 | Scope

2.1.1 | This methodology is applicable to project activities that involve providing electricity supply to ships docked at berths, sitting offshore, or running on hybrid propulsion systems, including cases where ships are waiting to dock, thereby replacing the electricity generated by ships' fossil-fuel auxiliary or main power generator(s). The source of electricity may include specialised buoys capable of providing electricity.

2.2 | Applicability

2.2.1 | Prior to the implementation of the project activity, electricity was supplied by the ship's fossil fuel power generation systems (e.g. internal combustion engines).

2.2.2 | Switching from fossil fuel to electricity for heat production (e.g. replacing heat generation from a fossil fuel boiler on the baseline ship with shore-side electricity in the project) is not permitted under this methodology.

2.2.3 | The shore-side/off-shore electricity supply sources in the project scenario include:

    a. A regional/national grid;

    b. A mini grid;

    c. A captive renewable energy power plant;

    d. Offshore wind power;

    e. A combination of any of the options above.

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2.3 | Safeguards

2.3.1 | The project developer shall demonstrate that double counting of emission reductions will not occur, e.g. via a contractual agreement with shipowners, unique identification of ships. The steps undertaken to avoid double counting shall be documented in the project design documents.

2.3.2 | Regarding the NDC (Nationally Determined Contribution) of the country with jurisdiction over the offshore electricity source, the project developer shall evaluate whether the shipping sector is included in the host party's NDC during a specific monitoring period. If there is a potential for double claiming between the end-user of Gold Standard Verified Emissions Reductions (GSVERs) and the NDC of the host country, the project developer shall demonstrate compliance with the requirements and procedures specified in the GHG Emissions Reductions & Sequestration Product Requirements.

2.3.3 | The methodology is only applicable if the continuation of this practice is in compliance with legal and regulatory requirements.

2.3.4 | The project developer shall include procedures in the Project Design Document to ensure the proper handling or recycling of equipment that uses battery or charging technology when it reaches the end of its life.

2.4 | Entry into force

2.4.1 | The date of entry into force of this methodology is 31 January 2024.

3| NORMATIVE REFERENCES

3.1.1 | This methodology is adapted version of CDM small-scale methodology "AMS III.BP Emission reduction by shore-side or off-shore electricity supply system" Version 1.0.

3.1.2 | This methodology refers to the latest approved versions of the following methodologies and tool(s):

    a. "AMS-I.F.: Renewable electricity generation for captive use and mini-grid";

    b. "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (hereinafter referred as CDM TOOL03);

    c. "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (hereinafter referred as CDM TOOL05);

    d. TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems (hereinafter referred as CDM TOOL09).

4| DEFINITION

4.1.1 | The definitions contained in the Glossary of GS4GG terms shall apply.

4.1.2 | For the purpose of this methodology, the following definitions apply:

a. **Shore-side electricity supply system** – is a set of facilities supplying electricity from shore side for operation of ships docked at berths.

b. **A Power Buoy** – a specialised device located off-shore or in a harbour that is connected to an electricity source (either on-shore or off-shore, such as an off-shore wind facility) which can provide electricity to ships that are anchored off-shore.

5| BASELINE METHODOLOGY

5.1 | Project Boundary

5.1.1 | project boundary is comprised of:

a. Ships docked at berths or off-shore consuming the electricity from the shore-side or off-shore electricity supply system;

b. Shore-side or off-shore electricity supply system;

c. Shore-side and off-shore electricity supply sources (e.g. a grid and/or renewable energy generation source connected by a dedicated line to the charging stations) and other ancillary facilities.

5.2 | Demonstration of additionality

5.2.1 | The regulatory surplus shall be demonstrated by all the projects, irrespective of scale. The project shall demonstrate that proposed activity is neither directly mandated by law nor otherwise triggered by legal requirements (e.g., legally binding agreements, covenants, consent decrees, or contracts (with government agencies or private parties). If the any legal mandate comes in force during the crediting period, the project can only be credited until the date the legal requirements take effect.

5.2.2 | The compliance to any national or international regulations related to the energy source during the docking period applicable to project developer shall be taken into account.

5.2.3 | The project developer shall demonstrate additionality by conforming to additionality requirements of:

a. CDM Tool 21 – Demonstration of additionality of small-scale project activities.

If applicable, the barrier(s) shall be demonstrated for the project participant that is responsible for implementing the shore-side electricity supply system (e.g. berth owners[1])

5.3 | Baseline scenario

5.3.1 | The baseline scenario is the electricity consumption of ships docked at berths or off-shore that would otherwise have been supplied by the ships' fossil fuel power generator(s).

5.3.2 | The baseline scenario shall be in compliance with all mandatory applicable legal and regulatory requirements, even if these laws and regulations have objectives other than greenhouse gas (GHG) reductions, such as mitigating local air pollution. The assessment of the compliance does not consider national and local policies that do not have legally-binding status. To align with Article 6.4 and 6.2 principles of Paris Agreement, the project developer shall take into account applicable policies (eg: subsidies, which are different from mandatory legal requirements) when establishing the baseline scenario.

5.4 | Baseline Emissions

5.4.1 | The baseline emissions in year y (BE_y) shall be calculated as follows:

Eq. 1

$$BE_y = \sum_i \sum_m \sum_j \left(EC_{PJ,i,y} \times R_{BL,i,m,j} \times NCV_j \times EF_{CO2,j} \right)$$

Where:

BE_y	=	Baseline emissions in year y (t CO$_2$e)
$EC_{PJ,i,y}$	=	Electricity consumed by the ship i docked at the project berth or anchored off-shore during year y (MWh)
$R_{BL,i,m,j}$	=	Consumption rate of fossil fuel j of auxiliary power generator m of ship i in the baseline scenario (mass or volume units/MWh)
NCV_j	=	Net calorific value of fuel j (GJ/mass or volume unit)

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[1] Berth is the term used in ports and harbours for a designated location where a vessel may be moored, usually for the purposes of loading and unloading.

$EF_{CO2,j}$	=	CO_2 emission factor of fossil fuel j (t CO_2/GJ)
i	=	Different ships
m	=	Different auxiliary power generators
j		Different types of fossil fuels

5.5 | Project emissions

5.5.1 | The project emissions in year y (PE_y) shall be calculated as follows:

$$PE_y = \sum_i \sum_k EF_{EL,i,k,y} \times \frac{EC_{PJ,i,k,y}}{(1 - TDL_{k,y})}$$

Eq. 2

Where:

PE_y	=	Project emissions in year y (t CO_2e)
$EC_{PJ,i,k,y}$	=	The shore-side/off-shore electricity consumed by the ship i from the source k at the project berth in year y (MWh)
$EF_{EL,i,k,y}$	=	CO_2 emission factor of the shore-side electricity source k supplying electricity for the ship i in year y (t CO_2/MWh)
$TDL_{k,y}$	=	Average technical transmission and distribution losses for providing electricity from source k in year y
i	=	Different ships
k	=	Different sources of electricity

5.6 | Leakage emissions

5.6.1 | No leakage calculation is required.

5.7 | Emission reductions

5.7.1 | The emission reductions in year y (ER_y) shall be calculated as follows:

Eq. 3

$$ER_y = BE_y - PE_y$$

Where:

ER_y	=	Emission reductions in year y (t CO_2e/yr)
BE_y	=	Baseline emissions in year y (t CO_2e/yr)
PE_y	=	Project emissions in year y (t CO_2e/yr)

5.8 | Data and parameters not monitored

Parameter ID	1
Data/Parameter:	$R_{BL,i,m,j}$
Data unit:	Mass or volume unit/MWh
Description:	Consumption rate of fossil fuel j of auxiliary power generator m of ship i in the baseline scenario
Source of data:	The following data sources may be used in preference order from a to d: a. At least 3 years average fuel consumed ratio of project ships at berths b. At least three comparable ships, at least 1 year's average fuel consumed ratio c. The fuel consumed ratio provided by the generator manufacturer d. Default efficiency based on Appendix of CDM TOOL 09 that results in the most conservative baseline emissions
Measurement procedures (if any):	For options (a) and (b), the fuel consumed, and electricity generated by each auxiliary power generator of each ship shall be measured following the provisions of CDM TOOL 03 and TOOL 05, respectively. For option (c), the technical specifications shall be documented for each auxiliary power generator
Any comment:	Parameter shall be determined by each ship that docks at the berth and consumes the shore-side electricity or is located off-shore using a power buoy. To apply options (a) and (b), the project participant shall have access to the information on fuel consumed and electricity generated by each auxiliary power consumption of each ship. To apply option (c), the project participant shall have access to the technical specifications of each of the auxiliary generators of each ship

Parameter ID	2
Data/Parameter:	NCV_j

Data unit:	GJ/mass or volume unit
Description:	Net calorific value of fuel j
Source of data:	As per the provions from CDM TOOL03
Measurement procedures (if any):	As per the provions from CDM TOOL03
Any comment:	For baseline emissions calculation

Parameter ID	3
Data/Parameter:	$EF_{CO2,j}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel j
Source of data:	As per the CDM TOOL03
Measurement procedures (if any):	As per the provions from the CDM TOOL03
Any comment:	For baseline emissions calculation

6| MONITORING METHODOLOGY

6.1 | Data and parameters monitored

Parameter ID	4
Data/Parameter:	$EC_{PJ,i,y} \ and \ EC_{PJ,i,k,y}$
Data unit:	MWh
Description:	$EC_{PJ,i,y}$: Electricity consumed by the ship i docked at the project berth or power buoy during year y. $EC_{PJ,i,k,y}$: The shore-side or power buoy electricity consumed by the ship i from the source k at the project berth in year y
Source of data:	As per the provisions of the latest version of CDM TOOL05. When applying the tool, requirements for $EC_{PJ,j,y}$ specified in the tool shall apply to both parameters
Measurement procedures (if any):	As per the provisions of the latest version of TOOL05
Monitoring frequency:	As per the provisions of the latest version of TOOL05
QA/QC procedures:	As per the provisions of the latest version of TOOL05

Any comment:	If the electricity is consumed from a single source, $EC_{PJ,i,y} = EC_{PJ,i,k,y}$.
	If the electricity is consumed from more than one source, $EC_{PJ,i,y}$ is determined as the sum of the electricity consumed from the different sources:
	$$EC_{PJ,i,y} = \sum_k EC_{PJ,i,k,y}$$

Parameter ID	5
Data/Parameter:	$EF_{EL,i,k,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the shore-side/off-shore electricity source k supplying electricity for the ship i in year y
Source of data:	If the shore-side/off-shore electricity supply source k is a regional/national electric grid, apply the provisions of the latest version of TOOL05.
	If the shore-side/off-shore electricity supply source k is a mini-grid, apply the provisions of the latest version of "AMS-I.F.: Renewable electricity generation for captive use and mini-grid".
	If the shore-side/off-shore electricity supply source k is a renewable energy captive power plant, a value of 0 tCO_2/MWh shall be applied
Measurement procedures (if any):	If the shore-side/off-shore electricity supply source k is a regional/national electric grid , apply the provisions of the latest version of CDM TOOL05.
	If the shore-side/off-shore electricity supply source k is a mini-grid, apply the provisions of the latest version of "AMS-I.F.: Renewable electricity generation for captive use and mini-grid".
	If the shore-side/off-shore electricity supply source k is a renewable energy captive power plant, a value of 0 tCO_2/MWh shall be applied
Monitoring frequency:	If the shore-side/off-shore electricity supply source k is a regional/national electric grid, apply the provisions of the latest version of TOOL05.
	If the shore-side/off-shore electricity supply source k is a mini-grid, apply the provisions of the latest version of "AMS-I.F.: Renewable electricity generation for captive use and mini-grid".

	If the shore-side/off-shore electricity supply source k is a renewable energy captive power plant, a value of 0 tCO$_2$/MWh shall be applied
QA/QC procedures:	-
Any comment:	If the shore-side/off-shore electricity supply source k is a regional/national electric grid and the combined margin emission factor is determined based on option A1 of TOOL05, $EF_{EL,i,k,y}$ shall be monitored based on the approach selected to update the operating margin, i.e. yearly for ex post, or at the renewal of the crediting period for ex ante

Parameter ID	6
Data/Parameter:	$TDL_{k,y}$
Data unit:	%
Description:	Average technical transmission and distribution losses for providing electricity to source k in year y
Source of data:	As per TOOL05
Measurement procedures (if any):	As per TOOL05
Monitoring frequency:	As per TOOL05
QA/QC procedures:	As per TOOL05
Any comment:	As per TOOL05

DOCUMENT HISTORY

Version	Date	Description
1.0	31/01/2024	Initial adoption