Joint Crediting Mechanism Approved Methodology PH_AM003
"Installation of biomass power plant"

A. Title of the methodology

Installation of biomass power plant, version 01.0

B. Terms and definitions

Terms	Definitions
Biomass power plant	A biomass power plant which consists of a biomass boiler, a generator set (genset) and auxiliary equipment. The biomass boiler generates heat by combusting biomass resources as its fuel, and the genset uses the heat to generate electricity.
Biomass resources	Biomass resources refer to non-fossilized, biodegradable organic material originating from naturally occurring or cultured plants, animals and micro-organisms, including agricultural products, by-products and residues such as, but not limited to, biofuels except corn, soya beans and rice but including sugarcane and coconut, rice hulls, rice straws, coconut husks and shells, corn cobs, corn stovers, bagasse, biodegradable organic fractions of industrial and municipal wastes that can be used in bioconversion process and other processes, as well as gases and liquids recovered from the decomposition and/or extraction of non-fossilized and biodegradable organic materials. (Definition in Republic Act No.9513, 2008)

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	GHG emission reductions can be achieved through the displacement of national grid and/or regional electric cooperatives by installation and operation of a biomass power plant.
Calculation of reference	Reference emissions are calculated from net electricity

emissions	generated by the project which replaces electricity from national grid and/or regional electric cooperatives, CO_2 emission factor for the national grid. CO_2 emission factor for the national grid is conservatively selected.
Calculation of project emissions	Project emissions are calculated from emissions from onsite fossil fuel consumption for processing biomass resources and assisting combustion of biomass resources, and emissions from fossil fuel consumption for transportation of biomass resources. In case there is the evidence that demonstrate transportation distance of biomass resources does not exceed 200km, emissions from transportation can be neglected.
Monitoring parameters	- Net amount of electricity generated by a biomass power plant - The amount of onsite fuel consumption for processing biomass resources and assisting combustion of biomass resources - The amount of fuel consumption for transportation of biomass resources

D. Eligibility criteria

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

Criterion 1	A biomass power plant is installed and supplies electricity to the national grid and/or regional electric cooperatives.
Criterion 2	In case a biomass power plant provides generated electricity to regional electric cooperatives only, or to both national grid and regional electric cooperatives, CO_2 emission factor for the national grid is more conservative than that of regional electric cooperatives, through comparing those energy mixes.
Criterion 3	Biomass resources from dedicated plantation are not used in the project.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Electricity generation of national grid and/or regional electric cooperatives.	CO_2

Project emissions	
Emission sources	GHG types
Onsite fossil fuel consumption for processing biomass resources and assisting combustion of biomass resources	CO_2
Fossil fuel consumption for transportation of biomass resources	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are calculated based on the net amount of electricity generated by a biomass power plant and CO_2 emission factor for the national grid.

In general, auxiliary equipment of a biomass power plant, when in operation, consumes electricity generated by the power plant itself, however, all the auxiliary equipment is not always in operation, nor do they operate at maximum load. To ensure conservativeness in this methodology, it is assumed that all the auxiliary equipment operates all the time at theoretically maximum load during a given monitoring period. Hence, the net amount of electricity generated by the biomass power plant can be calculated lower than that of the actual case, which leads to net emission reductions.

F.2. Calculation of reference emissions

$$RE_p = NEG_p \times EF_{RE,elec}$$

Where

RE_p : Reference emissions during the period p [tCO_2/p]

NEG_p : Net amount of electricity generated by the biomass power plant during the period p [MWh/p]

$EF_{RE,elec}$: CO_2 emission factor for the national grid [tCO_2/MWh]

Determination of NEG_p

$$NEG_p = EG_p - EC_{aux,p}$$

Where

EG_p :   Amount of electricity generated by the biomass power plant during the period p [MWh/p]

$EC_{aux,p}$:   Amount of electricity consumed by the auxiliary equipment of the biomass power plant during the period p [MWh/p]

Determination of $EC_{aux,p}$

$$EC_{aux,p} = RPC_{aux} \times 24(hours/day) \times D_p$$

Where

RPC_{aux} :   Total rated power consumption of the auxiliary equipment of the biomass power plant [MW]

D_p :   Number of operating days during the period p [day/p]

G. Calculation of project emissions

$$PE_p = \sum_i \left((FC_{PJ\_onsite,i,p} + FC_{PJ\_t,i,p}) \times NCV_{PJ,i} \times EF_{PJ,i} \right)$$

Where

PE_p : Project emissions during the period p [tCO$_2$/p]

$FC_{PJ\_onsite,i,p}$: The amount of the fuel type i used onsite for processing biomass resources and assisting combustion of biomass resources during the period p [mass or volume unit/p]

$FC_{PJ\_t,i,p}$: The amount of the fuel type i used for transportation of biomass resources during the period p [mass or volume unit/p]

$NCV_{PJ,i}$: Net calorific value for the fuel type i [GJ/mass or volume unit]

$EF_{PJ,i}$: CO$_2$ emission factor for the fuel type i [tCO$_2$/GJ]

In case there is the evidence that demonstrate maximum output capacity* is equal to or less than 15 MW and the round trip distance between biomass resources and a biomass power plant is unlikely to exceed 200km, emissions from transportation can be neglected. As for

project emissions resulted from the transportation of biomass resources to a utilization facility, CDM Methodological tool "Project and leakage emissions from biomass" stipulates that the emissions can be neglected if the transportation distance is less than 200 km.[1]

In case there is no evidence that demonstrate maximum output capacity is equal to or less than 15 MW and the round trip distance between biomass resources and a biomass power plant is unlikely to exceed 200km, entire emissions from transportation are calculated using the equation above.

* Maximum output capacity is maximum amount of power generation that the power plant can generate.

H. Calculation of emissions reductions

$$ER_p \quad = \quad RE_p - PE_p$$

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
$EF_{RE,elec}$	CO$_2$ emission factor for the national grid [tCO$_2$/MWh]	The most recently value of combined margin (CM) emission factor provided by Department of Energy in Republic of the Philippines or the calculated value using the latest version of the "Tool to calculate the emission

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[1] "Project and leakage emissions from biomass"
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-16-v4.pdf

		factor for an electricity system" under the CDM at the time of validation.
RPC_{aux}	Total rated power consumption of the auxiliary equipment of the biomass power plant [MW]	Specification of all the auxiliary equipment included in the biomass power plant, provided by the manufacturer.
$NCV_{PJ,i}$	Net calorific value for the fuel type i [GJ/mass or volume unit]	In the order of preference: a) values provided by fuel supplier/collector; b) measurement by the project participants; c) regional or national default values; or d) IPCC default values provided in table 1.2 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Upper value is applied.
$EF_{PJ,i}$	CO_2 emission factor for the fuel type i [tCO_2/GJ]	In the order of preference: a) values provided by fuel supplier/collector; b) measurement by the project participants; c) regional or national default values; or d) IPCC default values provided in table 1.4 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Upper value is applied.

History of the document

Version	Date	Contents revised
01.0	9 April 2023	Electronic decision by the Joint Committee Initial approval.