

JCM proposed methodology and its attached sheet are preliminary drafts and have neither been officially approved under the JCM, nor are guaranteed to be officially approved under the JCM.

**Joint Crediting Mechanism Proposed Methodology Form**

**Cover sheet of the Proposed Methodology Form**

Form for submitting the proposed methodology

Host Country	Sri Lanka
Name of the methodology proponents submitting this form	EX Research Institute Limited
Sectoral scope(s) to which the Proposed Methodology applies	1. Energy Industries (Renewable - / non-renewable resources)
Title of the proposed methodology, and version number	Replacing Grid Electricity with Sustainable Biomass Based Power Generation
List of documents to be attached to this form (please check):	<input type="checkbox"/> The attached draft JCM-PDD: <input checked="" type="checkbox"/> Additional information
Date of completion	24/02/2015

History of the proposed methodology

Version	Date	Contents revised
01.0	24/02/2015	First edition

## A. Title of the methodology

Replacing Grid Electricity with Sustainable Biomass Based Power Generation Version 1

## B. Terms and definitions

Terms	Definitions
Sustainable Wood Biomass Resources	<p>Sustainable Wood Biomass Resources:</p> <ul style="list-style-type: none"> <li>• are mentioned in the national guideline set by the Government of Sri Lanka “Guideline for Biomass Assessment in Sri Lanka” or specifically approved by the Sri Lankan Government as energy source materials,</li> <li>• are not utilized before the commencement of the project,</li> <li>• are produced where sustainable management practices are undertaken on land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting) and the usage of resources will not decrease the carbon stock,</li> <li>• will not cause resettlement of people from the land areas where biomass resources are produced, and</li> <li>• will not result in social and environmental negative impacts on the local communities.</li> </ul>
Guideline for Biomass Assessment in Sri Lanka	<ul style="list-style-type: none"> <li>• “Guideline for Biomass Assessment in Sri Lanka” is the national guideline prepared and edited by the Sri Lanka Carbon Fund (Private) Limited, an agency under the Ministry of Environment and Renewable Energy. It covers all the biomass resources available in Sri Lanka including agricultural residue, wood biomass, organic waste etc. and specifies the type of biomass resources that should or should not be used for energy purpose. It also specifies the assessment method to determine whether a particular usage can lead to a competition with other type of usages. The guideline was produced with support by leading experts in their respective areas.</li> </ul>
Processed Biomass Resources	Processed biomass resources are biomass resources that are

	commercially processed to biomass fuel such as pellets, briquettes and bio-cokes. Wood chips are not regarded as processed biomass resources.
Periodical check	Periodical check is a periodical maintenance operation done by the manufacturer or an agent who is authorized by the manufacturer to maintain performance of power generation facilities (not including part replacement or overhaul).

### C. Summary of the methodology

Items	Summary
<i>GHG emission reduction measures</i>	This methodology applies to projects that aim to reduce fossil fuel combustion at the power plants that supply electricity to the national grid by introducing high efficiency power generation facility to the biomass based power plants that supply electricity to the national grid in Sri Lanka.
<i>Calculation of reference emissions</i>	Reference emissions are GHG emissions calculated by multiplying the grid emission factor by the amount of monitored net electricity generated and supplied to the national grid by the project.
<i>Calculation of project emissions</i>	<p>Project emissions is the total of the following emissions:</p> <p>1) Emissions associated with production, transportation and pretreatment of biomass resources:  Figure obtained by multiplying the sum of a),b) and c) below with biomass fuel consumption amount obtained through monitoring.</p> <p>a) CO<sub>2</sub> emission per ton from biomass cultivation per ton of biomass combusted in the project  b) CO<sub>2</sub> emission per ton from transportation of biomass resources  c) CO<sub>2</sub> emission per ton from fossil fuel and electricity consumption at the pretreatment facility</p> <p>2) Project consumption of electricity used onsite:  Calculated on the basis of monitored amount of electricity</p>

	consumption on project site multiplied by CO2 emission factor of the electricity used. Electricity is classified as grid electricity and captive electricity.
<i>Monitoring parameters</i>	<ul style="list-style-type: none"> <li>• Amount of biomass resources used for power generation (ton)</li> <li>• Amount of electricity sold to the national grid (MWh)</li> <li>• Grid electricity consumption of the project (MWh)</li> <li>• Captive electricity consumption of the project (MWh)</li> </ul>

#### D. Eligibility criteria

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

Criterion 1	The project only uses wood biomass fuel and exports electricity to the national grid and replaces the grid electricity as a feed-in-tariff project.
Criterion 2	The facilities in the project are newly installed.
Criterion 3	<p>The biomass resources used in the project satisfies all the following conditions:</p> <p>a) The biomass resources that the Sri Lanka Central Environmental Authority has approved to use for the project in accordance with the national guideline “Guideline for Biomass Assessment in Sri Lanka” set by the Sri Lanka Sustainable Energy Authority.</p> <p>b) In the case where the project plans to have biomass resources procurement from newly established dedicated plantations, it is necessary to demonstrate that the biomass resources used in the project are only from scrub lands and/or unutilized land areas,</p> <p>c) The land for the plantation is not categorized as forest, nature reserve or peat land (organic soil). However, if special permission is given by the relevant authorities in charge of forest and nature reserves to collect and move the biomass, then the biomass from these land categories can be used as biomass fuel in the project as a special case. (e.g., biomass generated during the removal of invasive exotic species from nature reserves)</p> <p>d) Processed biomass resources such as pellets, briquettes and bio-cokes are not used in the project.</p>
Criterion 4	Power generation efficiency in the specification of the power generation facility is 25% or more. The power generation efficiency can be defined as the amount of electricity generated by the facility divided by the input energy to the turbine.
Criterion 5	Periodical check at least once a year is planned.

## E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Thermal power plants generating and supplying electricity to the National Grid.	CO2
Project emissions	
Emission sources	GHG types
Biomass cultivation site and biomass production process.	CO2, N2O
Pretreatment process of biomass resources.	CO2
Transportation process of biomass resources.	CO2
Thermal power plants generating and supplying electricity to the National Grid.	CO2

## F. Establishment and calculation of reference emissions

### F.1. Establishment of reference emissions

Reference emission is calculated on the basis of the official grid emission factor that is published by the Sri Lankan Government multiplied by the amount of electricity to be generated and exported to the national grid by the project. In the methodology, the latest grid emission factor published by the Sri Lankan Government will be applied.

### F.2. Calculation of reference emissions

$$RE_p = EG_{PJ,p} \times EF_{grid}$$

$RE_p$  :Reference emission [tCO<sub>2</sub>/p]

$EG_{PJ,p}$  :Project quantity of electricity generation and supply to the grid in the project in period p [MWh/p]

$EF_{grid}$  :Emission factor for grid electricity [tCO<sub>2</sub>/MWh]

## G. Calculation of project emissions

$$PE_p = \{APE_{cul} + APE_{pret} + APE_{trans}\} \times Q_{bio,p} + EC_{PJ,grid,p} \times EF_{PJ,grid} + EC_{PJ,cap,p} \times EF_{PJ,cap}$$

$PE_p$	:Project Emission in period p [tCO <sub>2</sub> /p]
$APE_{cul}$	:Unit project CO <sub>2</sub> emissions from biomass procurement in period p [tCO <sub>2</sub> /t]
$APE_{pret}$	:Unit project CO <sub>2</sub> emissions from fossil fuel and electricity consumption at the pretreatment facility [tCO <sub>2</sub> /t]
$APE_{trans}$	:Unit project CO <sub>2</sub> emissions from transportation of biomass resources [tCO <sub>2</sub> /t]
$Q_{bio,p}$	:Quantity of biomass fuel procured after the project starts (wet base)[t/p]
$EC_{PJ,grid,p}$	:Amount of electricity imported from grid and consumed in the project in period p [MWh/p]
$EF_{PJ,grid}$	:Emission factor for grid connected electricity [tCO <sub>2</sub> /MWh]
$EC_{PJ,cap,p}$	:Amount of captive electricity generated in the project in period p [MWh/p]
$EF_{PJ,cap}$	:Emission factor for captive electricity [tCO <sub>2</sub> /MWh]

## H. Calculation of emissions reductions

Emission reduction is calculated as the difference between the reference emission and the project emission, as follows;

$$ER_p = RE_p - PE_p$$

$ER_p$  :Emission Reduction [tCO<sub>2</sub>/p]

$RE_p$  :Reference Emission [tCO<sub>2</sub>/p]

$PE_p$  :Project Emission [tCO<sub>2</sub>/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
$APE_{cul}$	Unit project CO <sub>2</sub> emission from Biomass Procurement in period p. (tCO <sub>2</sub> /t)	Calculated based on CDM methodological tool 16.
$APE_{pret}$	Unit project CO <sub>2</sub> emissions from fossil fuel and electricity consumption at the pretreatment facility(tCO <sub>2</sub> /t)	Market survey targeting five manufacturers eight products.
$APE_{trans}$	Unit project CO <sub>2</sub> emissions from transportation	Calculated based on

	of biomass resources(tCO <sub>2</sub> /t)	UNFCCC Methodological Tool 12 and result of the interviews with the specialists in the host country.
EF <sub>PJ,grid</sub>	Emission factor for grid connected electricity (tCO <sub>2</sub> /MWh)	Official figure of the host country.
EF <sub>PJ,cap</sub>	Emission factor for captive electricity (tCO <sub>2</sub> /MWh)	Default value specified in the CDM approved small scale methodology: AMS-I.A.