Joint Crediting Mechanism Approved Methodology BD_AM003
"Energy efficiency improvement through the introduction of energy efficient air jet looms in textile industry"

A. Title of the methodology

Energy efficiency improvement through the introduction of energy efficient air jet looms in textile industry, Version 01.0

B. Terms and definitions

Terms	Definitions
Air Jet Loom	A loom that uses a jet of air to propel the weft yarn through the shed.
Energy Saving Coefficient (ESC)	The energy efficiency improvement achieved by the air jet looms introduced by the project. This parameter is pre-determined based on the weaving speed and the power consumption by the loom motor of the project air jet loom and the reference rapier loom.
Shedding	The process forming "the shed" by dividing the warp ends into two sheets, providing a path for the weft. The shed is formed raising and/or lowering frames. Among the three main types of shedding mechanisms, Cam, Dobby, and Jacquard, the methodology is applicable when Cam and/or Dobby shedding is applied.

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	The methodology is applicable to the project which newly installs energy efficient air jet loom(s) or replaces existing loom(s) by energy efficient air jet loom(s) at a textile factory. GHG emission reductions will be achieved through electricity savings per unit of final product.

Calculation of reference emissions	Reference emissions are calculated by multiplying the project electricity consumption by the loom motor(s) of the project air loom(s), the default energy saving coefficient (ESC) provided by the methodology, and the CO_2 emission factor for electricity consumed.
Calculation of project emissions	Project emissions are calculated by multiplying the sum of the electricity consumption by the loom motor(s) of the project air jet loom(s) and air compressor(s), and CO_2 emission factor for electricity consumption.
Monitoring parameters	● Total amount of electricity consumed by the loom motor(s) of the project air jet loom(s). ● Total amount of electricity consumed by the air compressor(s) of the project air jet loom(s).

D. Eligibility criteria

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

Criterion 1	The air jet loom(s) are introduced at a textile factory. The air jet looms introduced as part of the project are equipped with energy saving technologies such as an optimized shape reed's tunnel of nozzles and a pressure sensor to measure air pressure of nozzles for optimization of compressed air consumption of weft insertion.
Criterion 2	Periodical checks of the project air jet loom(s) are conducted at least once every calendar year.
Criterion 3	Shedding mechanism of the project air jet loom(s) is either Cam or Dobby shedding.
Criterion 4	The effective reed width of the project air jet loom(s) is less than or equal to 190 cm.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Electricity consumption by the reference rapier loom(s)	CO_2
Project emissions	

Emission sources	GHG types
Electricity consumption by the loom motor(s) of the project air jet loom(s)	CO_2
Electricity consumption by the air compressor(s) of the project air jet loom(s)	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are calculated with the following parameters:

- Total amount of electricity consumed by the loom motor(s) of the project air jet loom(s) [MWh/p];
- Default energy saving coefficient (ESC) provided by the methodology, that is determined based on the energy savings of the project air jet loom(s) compared to the reference rapier loom(s) [fraction]; and
- CO_2 emission factor for electricity consumed [tCO_2/MWh].

Net emission reductions are achieved by adopting a conservative energy saving coefficient (ESC) as the methodology default value. ESC is determined as function of the loom motor's power consumption and the weaving speed. Among various combinations of the weaving speed and the loom motor power available for the type of fabric woven in the country, a set of the weaving speed and the loom motor power, which lead to the most conservative ESC, are selected and used to determine the default ESC in the methodology for the project in Bangladesh.

F.2. Calculation of reference emissions

$$RE_p = \sum EC_{PJLM,p} \times ESC \times EF_{elec}$$

Where:

RE_p	:	Reference emissions during the period p [tCO_2/p]
$\Sigma EC_{PJLM,p}$	:	Total electricity consumption by the motor(s) of the project air jet loom(s) during the period p [MWh/p]
ESC	:	Energy saving coefficient [fraction]
EF_{elec}	:	CO_2 emission factor for electricity consumed by the project [tCO_2/MWh]

G. Calculation of project emissions

$$PE_p = \left(\sum EC_{PJLM,p} + \sum EC_{PJAC,p}\right) \times EF_{elec}$$

Where:

PE_p	:	Project emissions during the period p [tCO_2/p]
$\Sigma EC_{PJLM,p}$	:	Total electricity consumption by the motor(s) of the project air jet loom(s) during the period p [MWh/p]
$\Sigma EC_{PJAC,p}$	:	Total electricity consumption by the air compressor(s) of the project air jet loom(s) during the period p [MWh/p]
EF_{elec}	:	CO_2 emission factor for electricity consumed by the project [tCO_2/MWh]

H. Calculation of emissions reductions

$$ER_p = RE_p - PE_p$$

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
ESC	Energy saving coefficient (dimensionless) Default value: 2.93	Methodology default
EF_{elec}	CO_2 emission factor for electricity consumed by the project When the project consumes only grid electricity or captive electricity, the project	[Grid electricity] The most recent published value by National CDM Committee or any other relevant authority such as

	participant applies either the grid emission factor [$EF_{elec,grid}$] or the captive emission factor [$EF_{elec,cap}$] respectively. When the project consumes both grid and captive electricity, the project participant applies the lower value of the grid or the captive emission factors. [$EF_{elec,grid}$]: For grid electricity, the most recent emission factor of Bangladesh grid [tCO_2/MWh] available at the time of validation. [$EF_{elec,cap}$]: For captive electricity, 0.8 [tCO_2/MWh]* may be applied when the captive generator consumes diesel fuel. In case of captive electricity with natural gas as fuel, the emission factor of 0.46 [tCO_2/MWh]** is applied. *The most recent value available from CDM approved small scale methodology AMS-I.A at the time of validation is applied. **Calculated as follows: $EF_{elec,cap} = \frac{EF_{NG}}{\eta_{cap}} \times 3.6(GJ/MWh)$ Where: EF_{NG}: 0.0543tCO_2/GJ, lower value of effective CO_2 emission factor for natural gas. η_{cap}: 42%, default efficiency for off-grid gas turbine system.	JCM secretariat at the time of validation [Captive electricity with diesel fuel] CDM approved small scale methodology: AMS-I.A. [Captive electricity with natural gas] 2006 IPCC Guidelines on National GHG Inventories for the source of EF of natural gas. CDM Methodological tool "Determining the baseline efficiency of thermal or electric energy generation systems version02.0" for the default efficiency for off-grid power plants.

History of the document

Version	Date	Contents revised
01.0	16 October 2017	Electronic decision by the Joint Committee Initial approval.
