



# Verified Carbon Standard

A VERRA STANDARD

## 1.6 MW BUNDLED RICE HUSK BASED COGENERATION PLANT BY M/S MILK FOOD LIMITED (MFL) IN PATIALA (PUNJAB) & MORADABAD (U.P) DISTRICTS

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|                      |  |
|----------------------|--|
| <b>Project Title</b> | 1.6 MW Bundled Rice Husk Based Cogeneration Plant by M/s Milk food Limited (MFL) in Patiala (Punjab) & Moradabad (U.P) Districts |
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# 1 PROJECT DETAILS

## 1.1 Summary Description of the Project

The purpose of the project activity is to utilize rice husk available in the region for steam and electricity generation for captive consumption. The project undertaken is a bundle of two cogeneration plants of capacity 1.0 MW (with 14TPH steam generation) and 0.6 MW ((with 12 TPH steam generation) located at Bahadurgarh, Patiala in the state of Punjab and Mugalpur, Moradabad in the state of Uttar Pradesh respectively.

In the Pre - Project Scenario, the electricity demand of Milkfood Limited was met by the grid supply and the steam demand was met by low pressure coal fired boiler of 8 TPH capacity in Patiala. Coal was consumed in the pre project scenario for thermal energy generation. Whereas, the Moradabad plant is a new installation. There was no steam and power demand prior to the proposed project activity as it is a new installation.

In the project scenario, the power supply has partially been displaced and the steam generated from coal fired boiler has completely been displaced by the new rice husk-based co-generation plant. Whereas, in the project scenario in Moradabad plant, electricity and steam will be generated by the biomass-based cogeneration plant.

The proposed project activity is utilizing only biomass as fuel and steam and power is generated. The biomass is a carbon neutral fuel as it does not lead to the emission of any GHG in the atmosphere. The project will displace steam and electricity generation from Coal consumption leading to an emission reduction of 70,113 tonnes CO<sub>2</sub> equivalent every year and total emission reduction during crediting period will be 701,130 tCO<sub>2</sub>e. In the absence of the proposed project activity, the steam and electricity would have been supplied to the processing plants by the Coal based Boilers and grid respectively.

## 1.2 Sectoral Scope and Project Type

TYPE I – Renewable energy power project

Category I.C: Thermal Energy Production with or without electricity

The project activity falls under the Sectoral Scope 1: Energy industries (renewable - / non-renewable sources) as per the sectoral scopes defined by the CDM Executive Board.

This is not a grouped project as it does not involve combination of GHG projects or other project categories. It is a single project and there are no other project participants involved.

The purpose of the project activity is to utilize rice husk available in the region for Steam and electricity generation for captive consumption. The project undertaken is a bundle of two cogeneration plants of capacity 1.0 MW and 0.6 MW located at Bahadurgarh, Patiala in the state of Punjab and Mugalpur, Moradabad in the state of Uttar Pradesh respectively.

## 1.3 Project Eligibility

This project falls under the “Type I: Renewable energy projects” and “Category I C: Thermal Energy production with or without electricity”. This project meets all the applicability criteria set under the selected approved small scale CDM methodology and hence the project category is applicable to the VCS project.

As per VCS standard version 4 biomass based power generation projects are not eligible under VCS Standard version 4 but as per VCS Standard version 4 appendix 2 “Registered projects and projects that complete validation on or before 19 March 2020 remain eligible to apply the crediting period requirements under VCS Version 3.”. Therefore, current project activity is eligible for renewal of crediting period under VCS standard version 4.

## 1.4 Project Design

The two projects that form the proposed bundled VCS project activity are:

Project I- 1 MW Rice Husk Based Cogeneration Plant at Post Office (P.O.) Bahadurgarh, Distt. Patiala – 147021, Punjab, India: Boiler of this cogeneration plant generates 14 TPH of steam with the outlet parameters i.e pressure 45 kg/cm<sup>2</sup> (g), and temperature as 420 °C. The part of the steam generated in the boiler i.e. 1.2 TPH at 17kg/cm<sup>2</sup>, 275 °C is fed directly to the process and the rest 12.8 TPH is fed to a back pressure turbine-generator. The bleed steam flow from the turbine is at 17 kg/cm<sup>2</sup>, 3.1 TPH, 240°C and the exhaust steam flow from the turbine is at 4 kg/cm<sup>2</sup>, 9.7 TPH, 170°C. This steam is further sent for process requirement. The electricity generating capacity is 1 MW.

Project II- 0.6 MW Rice Husk Based Cogeneration Plant at Village: MugalpururAgwanpurMustakam, Dist.: Moradabad, Uttar Pradesh, India:Boiler involved in this cogeneration plant generates 12 TPH of steam with the outlet parameters i.e pressure 32 kg/cm<sup>2</sup>, and temperature as 400 °C. Out of 12 TPH steam generated in the boiler 2.3 TPH is fed to a Dryer at 17 Kg/ cm<sup>2</sup> , 360 °C and another 9.7 TPH of steam is fed to a Back Pressure TG set at 30 Kg/cm<sup>2</sup> , 360 °C, the exhaust steam is at 3 kg/cm<sup>2</sup> , 240°C. The electricity generating capacity is 0.6 MW.

This is not a grouped project as it does not involve combination of GHG projects or other project categories. It is a single project and there are no other project participants involved.

### Eligibility Criteria

This is not a group project. Therefore, this section is not applicable.

## 1.5 Project Proponent

|                          |   |
|--------------------------|---|
| <b>Organization name</b> | Milkfood Limited  |
| <b>Contact person</b>    | Amar Baljeet Singh  |
| <b>Title</b>             | Vice President  |
| <b>Address</b>           | 5th Floor, Bhandari House, 91 Nehru Place, New Delhi 110019 |
| <b>Telephone</b>         | +91-11-26460670, 26463773                                   |

|              |                     |
|--------------|---------------------|
| <b>Email</b> | abs@milkfoodltd.com |
|--------------|---------------------|

## 1.6 Other Entities Involved in the Project

|                            |  |
|----------------------------|--|
| <b>Organization name</b>   | Enen Green Services Private Limited      |
| <b>Role in the project</b> | Project participant                      |
| <b>Contact person</b>      | Ruchika Sharma                           |
| <b>Title</b>               | Ms.                                      |
| <b>Address</b>             | 506,T4, RPS Savana, sector 88, Faridabad |
| <b>Telephone</b>           | +91-9953935506                           |
| <b>Email</b>               | enengreen@gmail.com                      |

## 1.7 Ownership

Owner of the project activity is Milkfood Limited and documents showing proof of title and ownership of the emission reductions are as follows:

- Certificate of Incorporation.
- Purchase order of Boilers.
- Purchase orders of biomass(rice husk)

## 1.8 Project Start Date

6 May 2009; The earliest commissioning of 14 TPH, 45 kg/cm<sup>2</sup> fluidized bed Combustion boiler at Milkfood Limited, Patiala (Project activity I), among both the project activity component.

## 1.9 Project Crediting Period

First crediting period- 06/05/2009 to 05/05/2019

Second crediting period- 06/05/2019 to 05/05/2029

Duration of the project activity<sup>1</sup>- 20 years

## 1.10 Project Scale and Estimated GHG Emission Reductions or Removals

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<sup>1</sup>Chartered engineer certificate.

| Project Scale |   |
|---------------|---|
| Project       | √ |
| Large project |   |

| Year                                   | Estimated GHG emission reductions or removals (tCO <sub>2</sub> e) |
|--|--|
| 2019 - 2020                            | 70,113   |
| 2020 - 2021                            | 70,113   |
| 2021 - 2022                            | 70,113   |
| 2022 - 2023                            | 70,113   |
| 2023 - 2024                            | 70,113   |
| 2024 - 2025                            | 70,113   |
| 2025 - 2026                            | 70,113   |
| 2026 - 2027                            | 70,113   |
| 2027 - 2028                            | 70,113   |
| 2028 - 2029                            | 70,113   |
| <b>Total estimated ERs</b>             | <b>70,1130</b>   |
| <b>Total number of crediting years</b> | <b>10</b>  |
| <b>Average annual ERs</b>              | <b>70,113</b>  |

## 1.11 Description of the Project Activity

The proposed project activity is utilizing only biomass as fuel and steam and power is generated. The biomass is a carbon neutral fuel as it does not lead to the emission of any GHG in the atmosphere.

The project will displace steam and electricity generation from Coal consumption leading to an emission reduction of 70,113tonnes CO<sub>2</sub> equivalent every year.

In the absence of the proposed project activity, the steam and electricity would have been supplied to the processing plants by the Coal based Boilers and grid respectively.

The project activity entails the commissioning of a biomass residue-based Cogeneration Project.

**Project I - The key parameters of the Boiler<sup>2</sup> are given below:**

|                 |                         |
|-----------------|-------------------------|
| Make:           | M/s Cheema Boilers Ltd. |
| Design capacity | 14 TPH                  |

<sup>2</sup>Purchase order from CBL dated 20 July 2007

|                        |                             |
|------------------------|-----------------------------|
| Design pressure        | 45 Kg/cm <sup>2</sup>       |
| Steam temperature      | 420 ± 5 °C                  |
| Thermal Efficiency (%) | 78                          |
| Fuel used              | Biomass residue (Rice Husk) |

**Table 1: The key parameters of the Boiler**

The key parameters of the Turbine<sup>3</sup> are given below:

|                          |                                 |
|--------------------------|---------------------------------|
| Make:                    | M/S Pentagon Turbines Pvt. Ltd. |
| Design capacity          | 1000 KW                         |
| Inlet Steam Temperature: | 430 °C                          |
| Inlet Steam Pressure:    | 43 kg/cm <sup>2</sup>           |
| Purchase date:           | 16-August 2007                  |

**Table 2: The key parameters of the Turbine**

## **Project II**

The key parameters of the Boiler<sup>4</sup> are given below:

|                        |                              |
|------------------------|------------------------------|
| Make:                  | M/S Industrial Boiler Ltd.   |
| Design capacity        | 12 TPH                       |
| Design pressure        | 32 Kg/cm <sup>2</sup>        |
| Steam temperature      | 400 ± 5 °C                   |
| Thermal Efficiency (%) | 78+2                         |
| Fuel used              | Biomass residue (Rice Husk). |

**Table 3: The key parameters of the Boiler**

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<sup>3</sup>Purchase order from Pentagon Turbines Pvt. Ltd.

<sup>4</sup>Purchase order from Industrial Boiler Ltd.dated 25 July 2007

The key parameters of the Turbine<sup>5</sup> are given below:

|                          |                          |
|--------------------------|--------------------------|
| Make:                    | M/S I.B. Turbo Pvt. Ltd. |
| Type:                    | Back pressure turbine    |
| Design capacity:         | 600 KW                   |
| Inlet Steam Temperature: | 360 °C                   |
| Inlet Steam Pressure:    | 30 kg/cm <sup>2</sup>    |
| Purchase date:           | 25-July 2007             |

**Table 4: The key parameters of the Turbine**

To take care of the ash from the biomass fired, Milkfood Limited has installed Wet Ash & Fuel Handling System.

The supply of biomass residues is as per biomass purchase agreement from Suppliers. The Biomass laden trucks are weighed on weigh bridges (electronic) installed at the entrance gate of Milkfood Limited. The weighbridges are calibrated as per statutory requirement once in a three year.

The project does not involve any transfer of technology.

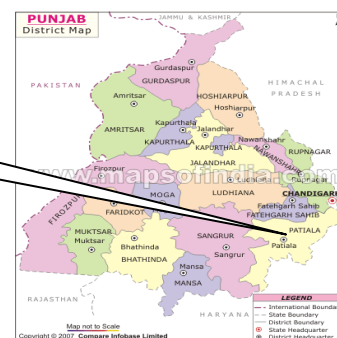
## 1.12 Project Location

Project I- The project is located at Milk food Limited at P.O. Bahadurgarh and Patiala District of Punjab. The project site is located within latitude 30 °21'55.23" N and longitude 76 °28'17.59" E respectively.

The map with location of the project plant is depicted below:



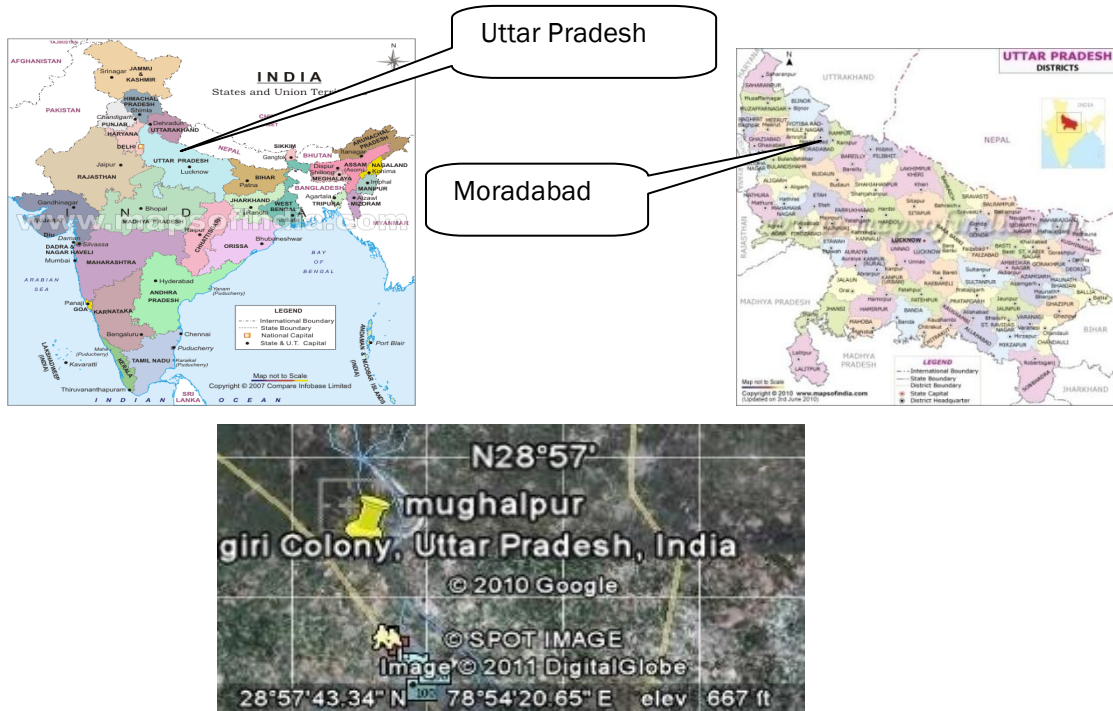
Patiala



<sup>5</sup>Purchase order from I.B. Turbo Pvt. Ltd.

## Map and Geo-Coordinates for Bahadurgarh, Patiala.

**Project II:** The proposed project activity site is located at Village: Mughalpurrf Agwanpur Mustakam, and Moradabad district of UP. The latitude and longitude for the district are 28° 57'43.34" N and 78° 54'20.65" E respectively. The map with location of the Project Plant is depicted below:



## Map and Geo-Coordinates for Mughalpur, Moradabad

### 1.13 Conditions Prior to Project Initiation

#### **Project I**

The electricity demand of Milkfood Limited was met by the grid supply and the steam demand was met by coal fired boilers. Coal was consumed in the pre project scenario for thermal energy generation.

#### **Project II**

The Moradabad plant is a new installation. There was no steam and power demand prior to the proposed project activity as it is a new installation.

### 1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project activity does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India (As per Ministry of Environment and Forests (MoEF) Notification No. - S.O. 1533, dated 14th September 2006). Also, all applicable laws and regulations in India were complied with. The required certification is obtained from the Deputy Director of Factories/ Boilers under Factories Act and Indian Boiler act.

The No Objection Certificate and consent to operate are obtained from the state Pollution Control Board under Air Act and water act.

Details of the approvals are provided below:

**Project I:**

“Consent to Operate” obtained from PPCB under section 25/26 of the Water (Prevention and Control of Pollution) Act, 1974 and its subsequent amendments dated 27-04-2008

“Consent to Operate” obtained from PPCB under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 and its subsequent amendments dated 27-04-2008.

**Project II:**

“Consent to Operate” obtained from UPPCB under section 25/26 of the Water (Prevention and Control of Pollution) Act, 1974 and its subsequent amendments dated 21-04-2008

“Consent to Operate” obtained from UPPCB under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 and its subsequent amendments dated 21-04-2008

## 1.15 Participation under Other GHG Programs

### 1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project is registered under CDM with UNFCCC Reference number 5219<sup>6</sup>.

### 1.15.2 Projects Rejected by Other GHG Programs

The project is not rejected under any other GHG programs. Milkfood Limited is applying for VCS programme to avail carbon benefits during the crediting period of the project activity.

## 1.16 Other Forms of Credit

### 1.16.1 Emissions Trading Programs and Other Binding Limits

The project is not included in any emission trading program or any other mechanism that includes GHG allowance trading and include details about any such programs or mechanisms.

### 1.16.2 Other Forms of Environmental Credit

The Project has not created another form of environment credit till date. However, project is under the validation stage in UNFCCC CDM Program. Thus, the project proponent hereby corroborate that the project has not created any other form of environmental credit till date.

## 1.17 Additional Information Relevant to the Project

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<sup>6</sup><https://cdm.unfccc.int/Projects/DB/RWTUV1316003019.23/view>

## Leakage Management

As per Para 77 of AMS I C version 21, if the energy generating equipment currently being utilized is transferred from outside the boundary to the project activity, leakage is to be considered. The equipment utilized in the project activity are not transferred from any other activity. Besides, no existing equipment has been transferred from the project site. Hence leakage for this part is zero.

As per Para 78 of AMS I C version 21, the leakage has to be considered if the biomass residue is transported over a distance of more than 200 Km due to the implementation of the project activity otherwise it can be neglected. The project activity is procuring and utilizing biomass available within the 75 Km radius from Milkfood Limited. Hence, leakage for this part is Zero<sup>7</sup>.

Hence, no leakage management plans required for this project.

## Commercially Sensitive Information

All relevant information for the purpose of Project description is included in VCS PD. None of the information disclosed to the validator was withheld from the public version of the report.

## Sustainable Development

The contributions of proposed project activity towards sustainable development are explained with indicators like social, economic, environmental and technological well-being, as follows:

- **Environmental well-being:** The project activity will conserve coal by avoiding the process steam and power generation from coal fired boiler. Also helps in Mitigating the emission of GHG (CO<sub>2</sub>) as rice husk is a carbon neutral fuel.
- **Social well-being:** The project activity will pave the way for development and increases the social status and living conditions and the prevailing living standard in the vicinity of the project activity and thus results in empowering the nearby population (supplier of the major amount of workforce for construction of the project activity).Also it will Contribute to a small increase in the local employment by employing skilled and un-skilled personnel for operation and maintenance of the equipment. This Proposed Project Activity will result in reduced migration of the local population.
- **Economic well-being:** The project has created a business opportunity during construction phase for local stakeholders such as suppliers, contractors, bankers etc. contributing to economic well-being aspects. Further, the project also influences creation of employment opportunities for local people, which would enhance their social status. Also, it Saves the coal and HSD and thus allows it to be diverted to other needy sections of the economy.
- **Technological well-being:** The project activity utilizes biomass as fuel to generate steam and electricity. It is an advanced and sustainable technology for long term benefits. The project activity is expected to increase awareness and interest among the industry players to make investments in similar areas.

## Further Information

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<sup>7</sup>Para 78 AMS I C version 21

- Legislative: The Project Proponent has obtained all the relevant approvals required for the establishment and operation of the project activity.

## 2 SAFEGUARDS

### 2.1 No Net Harm

No negative environmental and socio-economic impacts was created on the environment. Thus, no net harm caused.

### 2.2 Local Stakeholder Consultation

Project I- 1 MW captive power plant is installed within the company's premises and no additional land is procured for the project. The stakeholders involved in the project, other than the company, are:

- Punjab State Electricity Board (PSEB)
- Punjab Pollution Control Board (PPCB)
- Punjab Energy Development Agency (PEDA)
- Authorities of the local administration
- Rice husk suppliers
- Local villagers and village panchayat

Invitation for stakeholder's consultation meetings were sent out by Milkfood Limited via advertisement in the newspaper (dated 17th July, 2009) and personal letters. The village Panchayat/local villagers have been informed through munadi (announcement by a hired person in the village/localities) about the project and requested to attend the meeting communicate any suggestions / objections regarding the project activity. A public notice was affixed at main gate of Milkfood limited.

Milkfood Limited organized stakeholder consultation meetings on 27th July 2009 held at its unit at Bahadurgarh and Patiala District of Punjab. The objective of the meeting was to inform the stakeholders about the environmental and social impacts of the project activity and discuss their concerns regarding the same, if any. The comments and suggestions were invited throughout the period of Stakeholders meet.

Ongoing communication with stakeholders and interested parties is maintained through an open invitation of feedback and criticism. At the gate of Milkfood Limited, a complaint and feedback register are kept for comments of stakeholders and to inform them back for action taken on the comments. A display is maintained to inform the purpose of the register and to encourage any feedback from stakeholders that they may like to convey to Milkfood Limited. Up to the date of preparation of this report, there are no adverse comments from stakeholders regarding implementation of the project.

Project II- 0.6 MW captive power plant is installed within the company's premises and no additional land is procured for the project. The stakeholders involved in the project, other than the company, are;

- Uttar Pradesh State Electricity Board (UPSEB)
- Uttar Pradesh Pollution Control Board (UPPCB)

- Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA)
- Authorities of the local administration
- Rice husk suppliers
- Local villagers and village panchayat

Invitation for stakeholder's consultation meetings were sent out by Milkfood Limited via advertisement in the newspaper (dated 17th July, 2009) and personal letters. The village Panchayat/local villagers have been informed through munadi (announcement by a hired person in the village/localities) about the project and requested to attend the meeting communicate any suggestions / objections regarding the project activity. A public notice was affixed at main gate of Milkfood Limited.

Milkfood Limited organized stakeholder consultation meetings on 30th July 2009 held at its unit at Village Mugalpururf Agwanpur Mustakam, and Moradabad district of UP. The objective of the meeting was to inform the stakeholders about the environmental and social impacts of the project activity and discuss their concerns regarding the same, if any. The comments and suggestions were invited throughout the period of Stakeholders meet.

Ongoing communication with stakeholders and interested parties is maintained through an open invitation of feedback and criticism. At the gate of Milkfood Limited, a complaint and feedback register are kept for comments of stakeholders and to inform them back for action taken on the comments. A display is maintained to inform the purpose of the register and to encourage any feedback from stakeholders that they may like to convey to Milkfood Limited. Up to the date of preparation of this report, there are no adverse comments from stakeholders regarding implementation of the project.

## 2.3 Environmental Impact

The project activity does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India (As per Ministry of Environment and Forests (MoEF) Notification No. - S.O. 1533, dated 14th September 2006).

## 2.4 Public Comments

The village Panchayat/local villagers have been informed through munadi (announcement by a hired person in the village/localities) about the project and requested to attend the meeting communicate any suggestions / objections regarding the project activity. A public notice was affixed at main gate of Milkfood Limited.

Ongoing communication with stakeholders and interested parties is maintained through an open invitation of feedback and criticism. At the gate of Milkfood Limited, a complaint and feedback register are kept for comments of stakeholders and to inform them back for action taken on the comments. A display is maintained to inform the purpose of the register and to encourage any feedback from stakeholders that they may like to convey to Milkfood Limited. Up to the date of preparation of this report, there are no adverse comments from stakeholders regarding implementation of the project.

## 2.5 AFOLU-Specific Safeguards

This is a non-AFOLU project. Perhaps, this section is not applicable.

# 3 APPLICATION OF METHODOLOGY

## 3.1 Title and Reference of Methodology

Title of the methodology applied: Thermal energy production with or without electricity  
 TYPE I – Renewable energy project  
 Category I.C: Thermal Energy production with or without electricity  
 I.C/Version 21  
 Sectoral Scope: 1

The project activity I & II at Milkfood Limited is rice husk (biomass) based cogeneration plant and producing heat. This type of project activities is included in the methodology and therefore the methodology fulfills this requirement. The methodology chosen is appropriate for the proposed project activity.

## 3.2 Applicability of Methodology

This project falls under the “Type I: Renewable energy projects” and “Category I C: Thermal Energy production with or without electricity”. According to the methodology:

| S. No. | Applicability condition   | Justification for project activity  |
|--------|---|---|
| 1      | This methodology comprises renewable energy technologies that supply users i.e. residential, industrial or commercial facilities with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel. | The proposed project activity (project I and II) at Milkfood Limited, is rice husk (biomass) based cogeneration plant and producing heat and electricity. This type of project activities is included in the methodology and therefore the methodology fulfills this requirement.   |
| 2      | Biomass-based cogeneration and trigeneration systems are included in this category.   | The proposed project activity (project I and II) at Milkfood Limited is rice husk (biomass) based cogeneration plant and producing heat and electricity. This type of project activities is included in the methodology and therefore the methodology fulfils this requirement.   |
| 3      | Emission reduction from a biomass cogeneration system can accrue from one of the following activities: (a) Electricity supply to a grid; (b) Electricity and/or thermal energy (steam or heat) for on-site consumption or for consumption by other facilities; (c) Combination of (a) and (b).  | As the proposed project activity (project I and II) is a biomass cogeneration system for captive utilization, Thus, Out of the listed options, option (b) is applicable for the project activity.<br><br>(b) Electricity and/or thermal energy (steam or heat) for on-site consumption or for consumption by other facilities |
| 4      | Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.  | The proposed project activity is new installation and therefore this applicability criterion is not applicable for the project  |

|   |  | activity  |
|---|--|---|
| 5 | In the case of new facilities (Greenfield projects) and project activities involving capacity additions the relevant requirements related to determination of baseline scenario provided in the "General guidelines for SSC CDM methodologies" for Type-II and Type-III Greenfield/capacity expansion project activities also apply.   | Project activity is type I activity therefore this criterion is not applicable.   |
| 6 | The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal (paragraph 9 for the applicable limits for cogeneration project activities).  | The installed thermal energy generation capacity is 22.6 MWth (refer to the excel sheet provided separately) thermal which less than 45 MW thermal. Thus fulfills the criteria.   |
| 7 | For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal (see paragraph 9 for the applicable limits for cogeneration project activities).   | No Co-firing system is being utilized in the proposed project.  |
| 8 | The following capacity limits apply for biomass cogeneration units: a) If the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3 shall be used for converting electrical energy to thermal energy (i.e., for renewable project activities, the maximal limit of 15MW(e) is equivalent to 45 MW thermal output of the equipment or the plant). b) If the emission reductions of the cogeneration project activity are solely on account of thermal energy production (i.e. no emission reductions accrue from electricity component), the total installed thermal energy production capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal. c) If the emission reductions of the cogeneration project activity are solely on account of electrical energy production (i.e. no emission reductions accrue from thermal energy component), the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not | <p>Out of the given capacity limits options (b) and (c) are not applicable, option (a) is applicable for the proposed project activity :</p> <p>a) The total installed energy generation capacity (thermal and electrical) of the proposed project is as follows: Project activity I: Thermal Generation: 9.3 MW thermal TG Installed Capacity= 1 MW (3 MWthermal) Project activity II: Thermal Generation: 8.48 MW thermal TG Installed Capacity= 0.6 MW (1.8 MWthermal)</p> <p>b) Thus the project activity as a whole qualifies this applicability criterion as it is within the limit of 45 MW thermal.</p> |

|    |  |  |
|----|--|--|
|    | exceed 15 MW.  |  |
| 9  | The capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in paragraphs 7 to 9 and should be physically distinct from the existing units.  | The proposed project activity is new installation and therefore this applicability criterion is not applicable for the project activity.                     |
| 10 | If solid biomass fuel (e.g. briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in emissions reduction calculation   | The project activity does not utilize any biomass in the form of briquette therefore this applicability criterion is not applicable to the project activity. |
| 11 | Where the project participant is not the producer of the processed solid biomass fuel, the project participant and the producer are bound by a contract that shall enable the project participant to monitor the source of the renewable biomass to account for any emissions associated with solid biomass fuel production. Such a contract shall also ensure that there is no double-counting of emission reductions.  | This case is not applicable as the electricity as well the steam is being consumed by the producer itself (for captive use).                                 |
| 12 | If electricity and/or thermal energy produced by the project activity is delivered to a third party i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into that ensures there is no double-counting of emission reductions.   | This case is not applicable as the electricity as well the steam is being consumed by the producer itself (for captive use).                                 |
| 13 | If the project activity recovers and utilizes biogas for producing electricity and/or thermal energy and applies this methodology on a standalone basis i.e. without using a Type III component of a SSC methodology, any incremental emissions occurring due to the implementation of the project activity (e.g. physical leakage of the anaerobic digester, emissions due to inefficiency of the flaring), shall be taken into account either as project or leakage emissions as per relevant procedures in the tool "Emissions from solid waste disposal sites" and/or "Project emissions from flaring". In the event that the biomass fuel (solid/liquid/gas) is sourced from an existing CDM project, then the emissions associated with the production of the fuel shall be accounted with that project. | This case is not applicable as the electricity as well the steam is being consumed by the producer itself (for captive use).                                 |
| 14 | If project equipment contains refrigerants, then the refrigerant used in the project case shall have no ozone depleting potential (ODP).   | This case is not applicable as the electricity as well the steam is being  |

|    |   |   |
|----|---|---|
|    |   | consumed by the producer itself (for captive use).  |
| 15 | Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources provided: a) Charcoal is produced in kilns equipped with methane recovery and destruction facility; or b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered. These emissions shall be calculated as per the procedures defined in the approved methodology AMS-III.K. Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity can be used, provided that it can be demonstrated that the parameters from these are comparable e.g. source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln, operating conditions such as ambient temperature. | There is no charcoal being used hence this criterion is not applicable.                                 |
| 16 | In cases where the project activity utilizes biomass, sourced from dedicated plantations, applicability conditions prescribed in the tool "Project emissions from cultivation of biomass" shall apply.  | Project activity procure rice husk from nearby local market therefore this criterion is not applicable. |

From the above discussion, it can be concluded that project meets all the applicability criteria set under the selected approved small scale CDM methodology and hence the project category is applicable to the VCS project.

The Combined Electricity as well as Thermal production for Project I (3 MW<sub>thermal</sub> (1MWe) and 9.3 MW<sub>thermal</sub>) and Project II (1.8 MW<sub>thermal</sub> (0.6 MWe) and 8.48 MW<sub>th</sub>) is 22.56 MW<sub>th</sub>, which is less than the limit 45MW<sub>th</sub>, thus determines that the proposed project activity is a small scale project activity.

As demonstrated above the project activity satisfies the qualifying criteria of Type I: Renewable Energy Projects and Category IC: "Thermal energy for the user with or without electricity". Hence the choice of project Type and category is justified.

### 3.3 Project Boundary

| Source   | Gas              | Included? | Justification/Explanation                          |
|----------|------------------|-----------|--|
| Baseline | CO <sub>2</sub>  | Included  | Main Emission source.                              |
|          | CH <sub>4</sub>  | Excluded  | Excluded for simplification. This is conservative. |
|          | N <sub>2</sub> O | Excluded  | Excluded for simplification. This is conservative. |

| Source  | Gas  | Included?        | Justification/Explanation                          |  |
|---------|--|------------------|--|--|
|         | Other  | Excluded         | -  |  |
|         | CO <sub>2</sub>  | Included         | Main Emission source.                              |  |
|         | CH <sub>4</sub>  | Excluded         | Excluded for simplification. This is conservative. |  |
|         | N <sub>2</sub> O   | Excluded         | Excluded for simplification. This is conservative. |  |
|         | Other  | Excluded         | -  |  |
| Project | On site fossil fuel and electricity consumption due to the project activity (stationary or mobile) | CO <sub>2</sub>  | Included   | The emission due to onsite fossil fuel consumption attributable to the project activity has been included in the project activity        |
|         |  | CH <sub>4</sub>  | Excluded   | Excluded for simplification. This is conservative.   |
|         |  | N <sub>2</sub> O | Excluded   | Excluded for simplification. This is conservative.   |
|         |  | Other            | Excluded   | -  |
|         | Grid electricity generation  | CO <sub>2</sub>  | Included   | Main Emission source.  |
|         |  | CH <sub>4</sub>  | Excluded   | Excluded for simplification. This is conservative.   |
|         |  | N <sub>2</sub> O | Excluded   | Excluded for simplification. This is conservative.   |
|         | Off site Transportation of biomass residues  | CO <sub>2</sub>  | Excluded   | Excluded for simplification. This is conservative.   |
|         |  | CH <sub>4</sub>  | Excluded   | Excluded for simplification. This is conservative.   |
|         |  | N <sub>2</sub> O | Excluded   | Excluded for simplification. This is conservative.   |
|         | Combustion of biomass residues for electricity and/or heat generation                              | CO <sub>2</sub>  | Excluded   | Does not apply to the project activity as there is no uncontrolled burning or decay of biomass residues that would lead to GHG emissions |
|         |  | CH <sub>4</sub>  | Excluded   |  |
|         |  | N <sub>2</sub> O | Excluded   |  |
|         |  | Other            | Excluded   |  |
|         | Storage of biomass residues  | CO <sub>2</sub>  | Excluded   | Does not apply to the project activity as the biomass residues storage period is less than one year.                                     |
|         |  | CH <sub>4</sub>  | Excluded   |  |
|         |  | N <sub>2</sub> O | Excluded   |  |

Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

Project I:

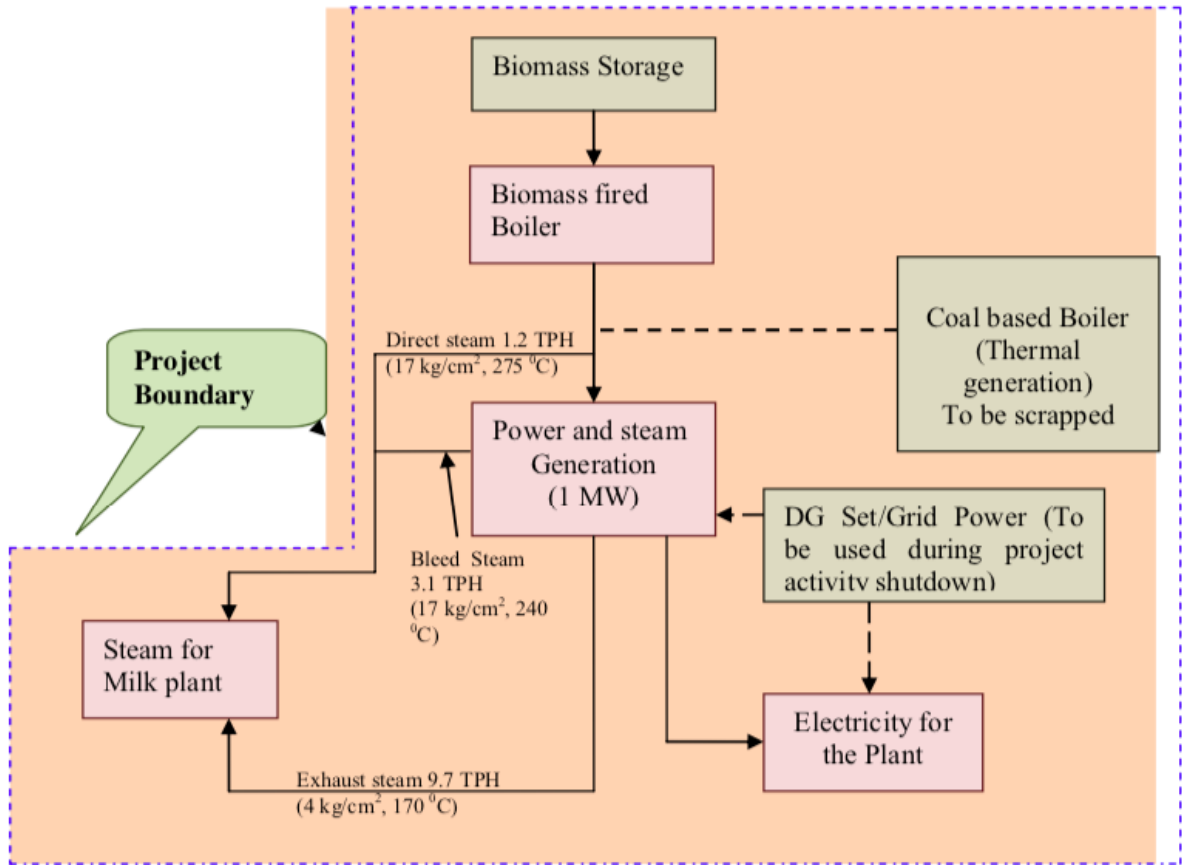


Figure 1: Sources, sink and reservoir for baseline Scenario and for the project I

Please note that the coal based boiler used in the pre-project scenario was already dismantled and it is planned to be scrapped.

## Project II:

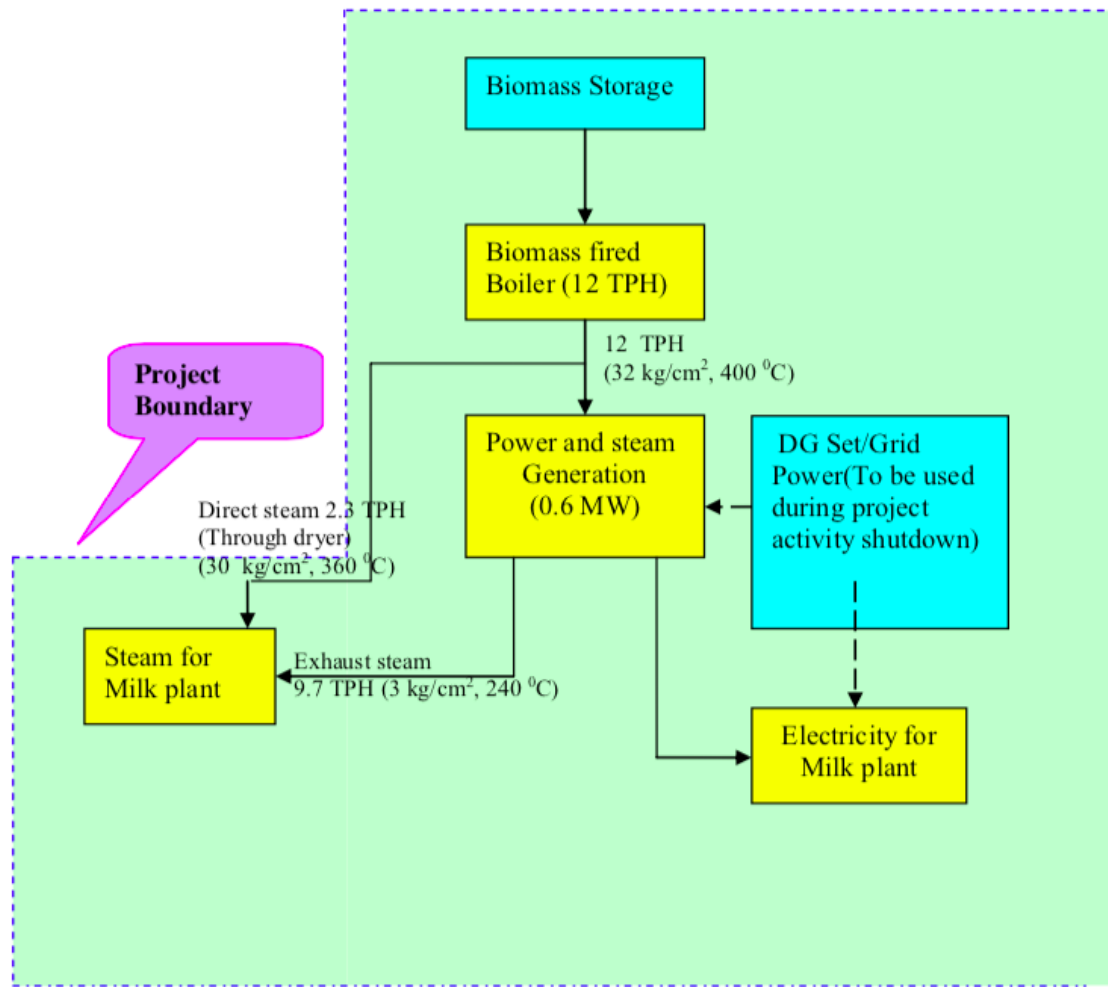


Figure 2: Sources, sink and reservoir for baseline Scenario and for the project II

### 3.4 Baseline Scenario

Baseline Scenario: As per the Para 29 of AMS.I.C Version 21

Project activities producing both heat and electricity using biomass cogeneration shall use one of the following baseline scenarios:

- Electricity is imported from the grid and thermal energy (steam/heat) is produced using fossil fuel;
- Electricity is produced in an on-site captive power plant using fossil (with a possibility of export to the grid) and thermal energy (steam/heat) is produced using fossil fuel;
- A combination of (a) and (b);
- Electricity and thermal energy (steam/heat) are produced in a cogeneration unit using fossil fuel (with a possibility of export of electricity to the grid/other facilities and/or thermal energy to other facilities);
- Electricity is imported from the grid and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export to the grid); steam/heat is produced from biomass;
- Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to the grid) and/or imported from the grid; steam/heat is produced using fossil fuel;
- Electricity and thermal energy (steam/heat) are produced in a biomass fired cogeneration unit (without a possibility of export of electricity either to the grid or to other facilities and without a possibility of export of thermal energy to other facilities);
- Electricity and/or thermal energy produced in a co-fired system.

- (i) Electricity is imported from a grid and/or produced in a biomass fired cogeneration or trigeneration unit (without a possibility of export of electricity either to the grid or to other facilities); thermal energy is produced in a biomass fired cogeneration or trigeneration unit and/or a biomass fired boiler (without a possibility of export of thermal energy to other facilities);
- (j) Electricity is imported from a grid and/or produced in an on-site captive power plant using fossil fuel and thermal energy is produced using electricity.

**Tool to assess the validity of the original/ current baseline and to update the baseline at the renewal of a crediting period, Version 3.0.1**

*This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 300 of Project Standard & 49 (a) of the modalities and procedures of the Clean Development Mechanism.*

The tool stipulates the following steps to be carried out.

**Step 1: Assess the validity of the current baseline for the next crediting period**

*Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies*

There is no legal and regulatory requirement that mandates the production of energy by the chosen technology. Investment in biomass energy projects in the State of Punjab and Uttar Pradesh are not mandatory. There are no national or local laws or regulations that require this investment to be undertaken, i.e., setting up of biomass based power projects. The setting up of biomass based energy projects is a voluntary activity.

Hence the baseline for the project activity remains unchanged in the crediting period.

*Step 1.2: Assess the impact of circumstances*

As per the methodology AMS I.C, version 21.0.0, the alternative for the project activity is generation of equivalent amount of electricity by operation of grid-connected power plants and by addition of new generation sources. The alternative scenario for the project activity remains same and the grid still supplies primarily fossil fuel based electricity as reflected in the combined margin emission factor. Hence, circumstances and the externalities for determining the baseline for the project activity are same.

*Therefore, there is no change in baseline scenario.*

***Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested***

This sub-step has to be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment. Since this is not the case with the project activity under consideration, hence this condition is not applicable.

*Step 1.4: Assessment of the validity of the data and parameters*

This step stipulates that *“Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission*

*factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the VCS project activity.”*

*In the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor.*

### **Step 2: Update the current baseline and the data and parameters**

As evident from the explanation provided above the baseline scenario remains unchanged. Only the baseline emission factor has been updated as per the latest version of CEA database 15.0 available at the time of PD submission for renewal of crediting period.

The approved consolidated baseline methodology, AMS I.C. (Version 21.0), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology “Tool to calculate the emission factor for an electricity system” (version 07.0) has been used to determine continued validity of the baseline based on combined margin (CM) calculations. The grid emission factor has been calculated as the weighted average of OM & BM; and has been fixed ex-ante for the entire crediting period.

Combined margin emission factor ( $EF_{grid,CM,y}$ ) for the project activity and it has been estimated ex-ante as 0.94193tCO<sub>2</sub>e/MWh for Indian electricity grid in India. It will remain fixed throughout the crediting period. The combined margin emission factor is obtained from the three years generation weighed average of the operating margin emission factor and the latest year build margin emission factors by applying suitable weights (i.e. 25 % to operating margin emission factor ( $EF_{grid,OM,y}$ ) and 75 % to build margin emission factor ( $EF_{grid,BM,y}$ )) as referred to the EF tool version 7.0. The simple operating margin value of 0.9622 tCO<sub>2</sub>e/MWh and build margin value of 0.8811 tCO<sub>2</sub>e/MWh for Indian electricity grid in India have been referred from CO<sub>2</sub> baseline database published by Central Electricity Authority, Govt. Of India, version 15.

As per the applied methodology, AMS.I.C, version 21, Project activities producing both heat and electricity including cogeneration use following baseline scenarios:

(a) Electricity is imported from the grid and thermal energy (steam/heat) is produced using fossil fuel;

Demonstration of the chosen baseline scenario is represented below:

Project I: The project proponent had following alternatives in order to fulfill the steam and power requirement of the milk plant processing:

1. Use of fossil fuels like coal, furnace oil and diesel as fuel source
2. Use of biomass (rice husk) as fuel source
3. Use of Natural Gas (NG) as fuel source.

As Natural Gas is not available in the region of Punjab, the alternative 3 is not possible for the project proponent. Among other options the unit cost of energy was the basis for selection as a fuel and the same is analyzed in the following table:

The unit cost of various fuels options available for steam and power generation per unit of energy generation, are shown below.

| Fuel type          | Fuel NCV                       | Fuel price                 | Cost per unit of energy(Rs/TJ) |
|--------------------|--------------------------------|----------------------------|--------------------------------|
| FO                 | 0.0000404TJ/Kg <sup>8</sup>    | 27.92 Rs./Kg <sup>9</sup>  | 691089.1089                    |
| Diesel             | 0.000043 TJ/Kg <sup>10</sup>   | 34.86 Rs./Lt <sup>11</sup> | 988655.71                      |
| Coal               | 0.000019228TJ/Kg <sup>12</sup> | 3.2 Rs./Kg <sup>13</sup>   | 166423.9651                    |
| Biomass(rice husk) | 0.00001254 TJ/Kg <sup>14</sup> | 2.5 Rs./Kg <sup>15</sup>   | 199362.0415                    |

As is evident from above, coal has the lowest unit cost amongst all the fuel options available (It is substantially low). Therefore, coal has been chosen as the possible fuel alternatives for the project activity.

Hence the most plausible baseline scenario for this project activity is “Steam generation using coal”

In the state of Punjab, interrupt and continuous supply of power from grid is a problem and since it was requirement of plant to ensure the continuous and interrupt supply of power to processing unit, Milkfood Limited had to invest for the power unit as well. Now the option for power generation were either power from coal or from rice husk based power unit. Thus, basically cost of per unit of power was compared between coal based power unit and rice husk based power unit in addition to the interrupted grid power supply as given below:

Unit cost of electricity imported from the grid: Rs 3.25

Unit cost of electricity based on coal:Rs 0.431

Unit cost of electricity based on rice husk:Rs 0.62

Thus, it clearly shows that coal based power unit would be preferable option for Patiala plant which does not faces any barriers and therefore same would have been installed for power generation in the absence of rice husk based cogeneration unit. And thus the coal based power unit is baseline scenario. But to adopt a conservative approach, grid has been considered as baseline scenario for emission reduction calculation.

Project II: Among the available options the unit cost of energy was the basis for selection of fuel for steam generation and the same is analyzed in the following table.

The unit cost of various fuels options available for steam and power generation per unit of energy generation, are shown below.

<sup>8</sup>IPCC default value([https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2\\_Volume2/V2\\_1\\_Ch1\\_Introduction.pdf](https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf))

<sup>9</sup>As per the quotation from the supplier.

<sup>10</sup>IPCC default value([https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2\\_Volume2/V2\\_1\\_Ch1\\_Introduction.pdf](https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf))

<sup>11</sup>As per the quotation from the Supplier.

<sup>12</sup>As per lab test reports.

<sup>13</sup>As per the quotation from the supplier.

<sup>14</sup>As per lab test reports.

<sup>15</sup>As per the quotation from the supplier.

| Fuel type          | Fuel NCV         | Fuel price   | Cost per unit of energy(Rs/TJ) |
|--------------------|------------------|--------------|--------------------------------|
| FO                 | 0.0000404TJ/Kg   | 27.92 Rs./Kg | 691089.1089                    |
| Diesel             | 0.000043 TJ/Kg   | 34.86 Rs./Lt | 988655.71                      |
| Coal               | 0.000019228TJ/Kg | 3.2 Rs./Kg   | 166423.9651                    |
| Biomass(rice husk) | 0.00001254 TJ/Kg | 3.0 Rs/ Kg   | 239234.44                      |

As is evident from above, coal has the lowest unit cost amongst all the fuel options available. Therefore, coal has been chosen as the possible fuel for the project activity. Hence the most plausible baseline scenario for this project activity is “Steam generation using coal”.

In the state of U.P., interrupt and continuous supply of power from grid is a problem and since it was requirement of plant to ensure the continuous and uninterrupted supply of power to processing unit, Milkfood Limited had to invest for the power unit as well. Now the option for power generation were either power from coal or from rice husk-based power unit. Thus, basically cost of per unit of power was compared between coal-based power unit and rice husk based power unit in addition to the interrupted grid power supply as given below:

Unit cost of electricity imported from the grid: Rs 3.32

Unit cost of electricity based on coal:Rs 0.51

Unit cost of electricity based on rice husk: Rs 0.74

Thus, it clearly shows that coal based power unit would be preferable option for Moradabad plant which does not faces any barriers and therefore same would have been installed for power generation in the absence of rice husk based cogeneration unit. And thus, the coal-based power unit is baseline scenario. But to adopt a conservative approach, grid has been considered as baseline scenario for emission reduction calculation.

Thus, the most plausible baseline scenario for project I and project II is in accordance to para 29 (a) of AMS.I.C version 21 i.e. “Electricity is imported from the grid and thermal energy (steam/heat) is produced using fossil fuel i.e. coal”.

### 3.5 Additionality

Thus, the additionality of the project activity is explained on the basis of barrier analysis mentioned in Attachment A to Appendix B of Simplified modalities and procedures for small scale project activities as referred by applied methodology i.e. AMS.I.C, version 21. Attachment A to Appendix B mentions the barriers listed below and at least one of the listed barriers should be explained to show that the project activity could not be undertaken due to the barrier and that the VCS revenue would significantly act as an impetus for the project to survive.

1. Investment barrier
2. Technological barrier
3. Barrier due to prevailing practice
4. Other barriers

As mentioned in section 3.4, the project proponent has four alternative fuels to generate thermal energy required for the process; however it may be noted that alternative 4 i.e. Use of biomass in the boiler (rice husk) as fuel source faced following barrier which is detailed below:

Investment Barrier - The proposed project activity and the identified baseline alternative generate no financial or economic benefits other than VCS related income. Project faces capital or investment return constraints that can be overcome by the additional revenues associated with the generation of VCUs. A cost comparison is made with data of Milkfood Limited; this suggests the per unit cost in quantitative terms.

Below table provides the unit cost comparison analysis for project I:

| Parameter                   | Coal        | Rice husk   | Unit                  | Reference  |
|-----------------------------|-------------|-------------|-----------------------|--|
| Quantity of steam generated | 14          | 14          | TPH                   | Feasibility report approved by PEDDA and Purchase order  |
| Design efficiency of boiler | 0.82        | 0.78        | %                     | Feasibility report approved by PEDDA                     |
| Fuel calorific value        | 4600        | 3000        | Kcal/kg               | Feasibility report approved by PEDDA and fuel quotations |
| Running hours               | 8030        | 8030        | Hrs per annum         | Assumptions considered in Feasibility report             |
| Enthalpy of steam output    | 3254        | 3254        | KJ/kg                 | Derived at design temp. and pressure (from steam table)  |
| Enthalpy of feed water      | 440.274     | 440.274     | KJ/kg                 | Derived, Liquid properties (Steam table)                 |
| Boiler output               | 39385444    | 39385444    | KJ/hr                 | Calculated   |
| Energy input in boiler      | 48031029.27 | 50494158.97 | KJ/hr                 | Calculated   |
| Specific energy consumption | 3430787.805 | 3606725.641 | kJ/Ton of steam       | Calculated   |
| Fuel consumption rate       | 178         | 288         | Kg(coal)/Ton of steam | Calculated   |

|                                |            |        |             |                                      |
|--------------------------------|------------|--------|-------------|--------------------------------------|
| Annual fuel requirement        | 20058.7250 | 32334  | Ton/annum   | Calculated                           |
| Price                          | 3200       | 3000   | Rs./Tonne   | Feasibility report approved by PEDDA |
| Fuel Cost per year             | 642        | 808    | Rs. Lakhs   | Calculated                           |
| Total steam generated          | 112420     | 112420 | Tonnes/year | Calculated                           |
| Unit cost of energy generation | 570.97     | 862.85 | Rs./Tonne   | Calculated                           |

**Table 5: unit cost comparison analysis for project I**

\* Design efficiency of boilers is chosen in a conservative way.

Above table clearly indicates that rice husk is not preferable option as it will cost more than coal which is baseline scenario.

In the state of Punjab, continuous supply of power is a problem and since it was requirement of plant to ensure the continuous and uninterrupted supply of power to processing unit, Milkfood Limited had to invest for the power unit as well. Now the option for power generation were either power from coal or from rice husk based power unit. Thus, basically cost of per unit of power was compared between fuel as a coal and fuel as a rice husk. However, calculation concludes:

Unit cost of electricity based on coal:Rs 0.43

Unit cost of electricity based on rice husk:Rs 0.62

As demonstrated above, the use of coal is the most cost effective option. It is evident from the above table that the average cost of steam generation using biomass (rice husk) is costlier compared to coal based steam and power generation. Hence the project activity is not a business-as-usual scenario.

The above analysis clearly demonstrates that project I is additional to that would have been implemented in the absence of project.

Below table provides the unit cost comparison analysis for project II:

| Parameter                    | Coal | Rice husk | Unit    | Reference                              |
|------------------------------|------|-----------|---------|--|
| Steam quantity               | 12   | 12        | TPH     | Feasibility report and Purchase order  |
| Design efficiency of boiler* | 0.82 | 0.78      | %       | Feasibility report                     |
| Fuel calorific value         | 4600 | 3000      | kcal/kg | Feasibility report and fuel quotations |

|                                |             |             |                        |  |
|--------------------------------|-------------|-------------|------------------------|--|
| Running hours                  | 8030        | 8030        | Hrs per annum          | Assumptions considered in Feasibility report           |
| Enthalpy of steam output       | 3228        | 3228        | KJ/kg                  | Derived at design temp. and pressure(from steam table) |
| Enthalpy of feed water         | 440.274     | 440.274     | KJ/kg                  | Derived, Liquid properties (Steam table)               |
| Boiler output                  | 33456192    | 33456192    | KJ/hr                  | Calculated   |
| Energy input in boiler         | 40800234.15 | 42892553.85 | KJ/hr                  | Calculated   |
| Specific energy consumption    | 3400019.512 | 3574379.487 | kJ/Ton of steam        | Calculated   |
| Fuel consumption rate          | 177         | 285         | kg (coal)/Ton of steam | Calculated   |
| Annual fuel requirement        | 17039       | 27466       | Ton/annum              | Calculated   |
| Price                          | 3200        | 3000        | Rs./Tonne              | Feasibility report                                     |
| Fuel Cost per year             | 545         | 824         | Rs. Lakhs              | Calculated   |
| Total steam generated          | 96360       | 96360       | Tonnes/year            | Calculated   |
| Unit cost of energy generation | 565.84      | 855.11      | Rs./Tonne              | Calculated   |

**Table 6: unit cost comparison analysis for project II**

\*Design efficiency of boilers is chosen in a conservative way.

Above table clearly indicates that rice husk is not preferable option as it will cost more than coal which is an actual baseline scenario.

In the state of U.P., continuous supply of power is a problem and since it was requirement of plant to ensure the continuous and uninterrupted supply of power to processing unit, Milkfood Limited had to invest for the power unit as well. Now the option for power generation were either power from coal or from rice husk based power unit. Thus basically cost of per unit of power was compared between fuel as a coal and fuel as a rice husk. However, calculation concludes:

Unit cost of electricity based on coal: Rs 0.51

Unit cost of electricity based on rice husk: Rs0.74

The above analysis clearly demonstrates that project II is additional to that would have been implemented in the absence of project.

As demonstrated above, the use of coal is the most cost effective option. It is evident from the above table that the average cost of steam generation using biomass (rice husk) is costlier compared to coal based steam and power generation. Hence the project activity is not a business-as-usual scenario.

The tabular representation of sensitivity demonstration is as below:

**Project I:**

| Parameter   | Unit Cost of thermal energy generation on coal (Rs./ton) |         | Unit cost of electrical energy generation (Rs./kwh) |         |
|---|--|---------|---|---------|
|   | Coal   | Biomass | Coal  | Biomass |
|   | <b>Variation in Coal and Biomass price</b>               |         |   |         |
| 10% fall in Biomass Price, other parameter remains constant       | 570.97   | 776.57  | 0.4313  | 0.5166  |
| 10% fall in Coal Price, other parameter remains constant          | 513.87   | 862.85  | 0.3881  | 0.4650  |
| 10% hike in Coal Price, other parameter remains constant          | 628.06   | 862.85  | 0.4744  | 0.5166  |
| 10% hike in Biomass price other parameter remains constant        | 570.97   | 949.14  | 0.4313  | 0.5683  |
| <b>Variation in NCV of coal and biomass</b>                       |  |         |   |         |
| NCV of biomass increased by 10%, other parameter remains constant | 570.97   | 784.41  | 0.4313  | 0.5636  |
| NCV of coal increased by 10%, other parameter remains constant    | 519.06   | 862.85  | 0.392   | 0.620   |
| NCV of biomass decreased by 10%, other parameter remains constant | 570.97   | 958.73  | 0.4313  | 0.688   |
| NCV of coal decreased by 10%, other parameter remains constant    | 634.41   | 862.85  | 0.479   | 0.620   |

**Project II**

| Parameter   | Unit Cost of thermal energy generation on coal (Rs./ton) |         | Unit cost of electrical energy generation (Rs./kwh) |         |
|---|--|---------|---|---------|
|   | Coal   | Biomass | Coal  | Biomass |
| <b>Variation in Coal and Biomass price</b>                        |  |         |   |         |
| 10% fall in Biomass Price, other parameter remains constant       | 565.84   | 769.60  | 0.516   | 0.668   |
| 10% fall in Coal Price, other parameter remains constant          | 509.26   | 855.11  | 0.464   | 0.742   |
| 10% hike in Coal Price, other parameter remains constant          | 622.43   | 855.11  | 0.568   | 0.742   |
| 10% hike in Biomass price, other parameter remains constant       | 565.84   | 940.63  | 0.516   | 0.816   |
| <b>Variation in NCV of coal and biomass</b>                       |  |         |   |         |
| NCV of biomass increased by 10%, other parameter remains constant | 565.84   | 777.38  | 0.516   | 0.674   |
| NCV of coal increased by 10%, other parameter remains constant    | 514.40   | 855.11  | 0.469   | 0.7424  |
| NCV of biomass decreased by 10%, other parameter remains constant | 565.84   | 950.13  | 0.516   | 0.824   |
| NCV of coal decreased by 10%, other parameter remains constant    | 628.72   | 855.11  | 0.573   | 0.7424  |

The conclusion of the sensitivity analysis is that the unit cost of steam (thermal) and power generation is very sensitive to calorific value and cost of rice husk. For all analyzed cases, the unit cost of steam generation is well above the unit cost of steam generation in baseline scenario. Even in the case of a maximum decrease in rice husk price or increase in calorific value of rice husk, the unit cost of steam and power production in case of project activity is well above the baseline scenario.

Thus, together the project activity is faces investment barrier and thus additional.

### 3.6 Methodology Deviations

There was no deviation in methodology followed. Thus, this section is not applicable.

## 4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 4.1 Baseline Emissions

#### Project I:

Baseline emissions for supply of electricity to and / or displacement electricity from a grid shall be calculated as per the procedures detailed in AMS I. D version 18.

As per the Para 23 of the AMS.I.D version 18, the emission factor ( $EF_{grid,CM,y}$ ) is calculated in a transparent and conservative manner based on combined margin approach. The emission factor ( $EF_{grid,CM,y}$ ) is calculated from the CEA data base and user guide version 15 (A publicly available official source <http://www.cea.nic.in>), which comes to 0.94193 tCO<sub>2</sub>e/MWh .

The detailed approach for the calculation of combined margin emission factor for Indian grid is provided as Annex-1 of the PD.

Baseline emission (tCO<sub>2</sub>e) = Net Electricity generated (MWh) x 0.94193(tCO<sub>2</sub>e/MWh)

Baseline emission (tCO<sub>2</sub>e) = Net Electricity generated (MWh) x 0.94193 (tCO<sub>2</sub>e/MWh).

= 7227 MWh x 0.94193 (tCO<sub>2</sub>e/MWh). = 6807 tCO<sub>2</sub>e

2. For steam/ heat produced using fossil fuels the baseline emissions are calculated as follows:

As per the Para 34 of the AMS.I.C version 21:

The baseline emissions are calculated as follows:

$$BE_{thermal, Co2,y} = (EG_{thermal,y} / \eta_{BL,thermal}) * EF_{EF,CO2}$$

Where:

$BE_{thermal, Co2,y}$ - The baseline emission from steam/heat displaced by the steam activity during the year y in tCO<sub>2</sub>e.

$EG_{thermal,y}$ - The net quantity of heat supplied by the project activity during the year y TJ.

$EF_{EF,CO2}$ - The CO2 emission factor per unit of the energy of the fuel that would had been use in the base line plant in (tCO2/ TJ), obtained from reliable local or national data if available, otherwise, IPCC Default emission factor should be used.

$\eta_{BL, thermal}$ - The efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

$$BE_{thermal, Co2,y} = (EG_{thermal,y} / \eta_{BL,thermal}) * EF_{EF,CO2}$$

$$= (268.19 \text{ TJ / yr} / .82) \times 94.6 \text{ tCO}_2 / \text{TJ}$$

$$= 30,940.99 \text{ tCO}_2\text{e/ yr}$$

“Since the project activity displaces both grid power and steam from coal fired boiler, the baseline is summation of both 1 and 2.”

$$\text{Total Baseline Emission Reduction} = 6807 \text{ tCO}_2\text{e} + 30,940.99 \text{ tCO}_2\text{e/ yr} = 37,748 \text{ tCO}_2\text{e/ yr}$$

### **Project II:**

Baseline emissions for supply of electricity to and / or displacement electricity from a grid shall be calculated as per the procedures detailed in AMS I. D.

As per the Para 23 of the AMS.I.D version 18, the emission factor ( $EF_{grid,CM,y}$ ) is calculated in a transparent and conservative manner based on combined margin approach. The emission factor ( $EF_{grid,CM,y}$ ) is calculated from the CEA data base and user guide version 15 (A publicly available official source <http://www.cea.nic.in>), which comes to 0.94193 tCO2e/MWh .

The detailed approach for the calculation of combined margin emission factor for Indian grid is provided as Appendix-1 of the PD.

$$\text{Baseline emission (tCO}_2\text{e)} = \text{Net Electricity generated (MWh)} \times 0.94193 \text{ (tCO}_2\text{e/MWh)}$$

$$\text{Baseline emission (tCO}_2\text{e)} = \text{Net Electricity generated (MWh)} \times 0.94193 \text{ (tCO}_2\text{e/MWh)}.$$

$$= 4336.2 \text{ MWh} \times 0.94193 \text{ (tCO}_2\text{e/MWh)}. = 4084 \text{ tCO}_2\text{e}$$

2. For steam/ heat produced using fossil fuels the baseline emissions are calculated as follows:

As per the Para 34 of the AMS.I.C version 21:

The baseline emissions are calculated as follows:

$$BE_{thermal, Co2,y} = (EG_{thermal,y} / \eta_{BL,thermal} ) * EF_{EF,CO2}$$

Where:

$BE_{thermal, Co2,y}$ - The baseline emission from steam/heat displaced by the steam activity during the year y in tCO<sub>2</sub>e.

$EG_{thermal,y}$ - The net quantity of heat supplied by the project activity during the year y TJ.

$EF_{EF,CO2}$ - The CO<sub>2</sub> emission factor per unit of the energy of the fuel that would had been use in the base line plant in (tCO<sub>2</sub>/ TJ), obtained from reliable local or national data if available, otherwise, IPCC Default emission factor should be used.

$\eta_{BL, thermal}$ - The efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

$$\begin{aligned}
 BE_{thermal, Co2,y} &= (EG_{thermal,y} / \eta_{BL, thermal}) * EF_{EF,CO2} \\
 &= (245.14 \text{ TJ} / \text{yr} / .82) \times 94.6 \text{ tCO}_2 / \text{TJ} \\
 &= 28,281.43 \text{ tCO}_2\text{e} / \text{yr}
 \end{aligned}$$

“Since the project activity displaces both grid power and steam from coal fired boiler, the baseline is summation of both 1 and 2.”

$$\text{Total Baseline Emission Reduction} = 4084 \text{ tCO}_2\text{e} + 28,281.43 \text{ tCO}_2\text{e} / \text{yr} = 32,365 \text{ tCO}_2\text{e} / \text{yr}$$

## 4.2 Project Emissions

For ex-post calculation, project emission (in case of coal used as a fuel in stand by boiler) and diesel used in DG sets, will be calculated based on para.67 of AMS.I.C, version 21 “CO<sub>2</sub> emissions from on-site combustion of fossil fuels ( $PE_{FC,y}$ ) shall be calculated using the latest version of the “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion”. As per Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion version 3 para 6 “CO<sub>2</sub> emissions from fossil fuel combustion in process j are calculated based on the

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

quantity of fuels combusted and the CO<sub>2</sub> emission coefficient of those fuels, as follows:

$PE_{FC,j,y}$ = the CO<sub>2</sub> emissions from fossil fuel (coal, diesel) combustion in process j during the year y (tCO<sub>2</sub>e/yr);

$FC_{i,j,y}$  = the quantity of fuel type (coal, diesel) i combusted in process j during the year y (mass or volume unit/yr);

$COEF_{i,y}$ = the CO<sub>2</sub> emission coefficient of fuel type (coal) i in year y (tCO<sub>2</sub>e/mass or volume unit)

i = the fuel types (coal) combusted in process j during the year y

## 4.3 Leakage

As per Para 77 of AMS I C version 21, if the energy generating equipment currently being utilized is transferred from outside the boundary to the project activity, leakage is to be considered. The equipments utilized in the project activity are not transferred from any other activity. Besides, no existing equipment has been transferred from the project site. Hence leakage for this part is zero.

As per Para 78 of AMS I C version 21, In cases where the collection, processing and transportation of biomass residues is outside the project boundary and due to the implementation of the project activity biomass residues are transported over a distance of 200 kilometers CO<sub>2</sub> emissions from the collection, processing and transportation of biomass residues to the project site shall be taken into account as leakage using with the latest version of tool “Project and leakage emissions from transportation of freight”. The project activity is procuring and utilizing biomass available within the 75 Km radius from MilkfoodLimited.Hence leakage for this part isZero.

#### 4.4 Net GHG Emission Reductions and Removals

Emission reduction:

$$ER_y = BE_y - PE_y - LE_y$$

**Where:**

ER<sub>y</sub> = Emission reductions in year y (t CO<sub>2</sub>e)

BE<sub>y</sub> = Baseline emissions in year y (t CO<sub>2</sub>e)

PE<sub>y</sub> = Project emissions in year y (t CO<sub>2</sub>)

LE<sub>y</sub> = Leakage emissions in year y (tCO<sub>2</sub>)

**Project I :**

$$ER_y = BE_y - PE_y - LE_y$$

$$= 37,748tCO_2e/ yr + 0 + 0$$

$$= 37,748 tCO_2e/ yr$$

**Project II:**

$$ER_y = BE_y - PE_y - LE_y$$

$$= 32,365 tCO_2e/ yr + 0 + 0$$

$$= 32,365 tCO_2e/ yr \text{ Total EmissionReduction:}$$

$$= \text{Project I} + \text{Project II}$$

$$= 37,748+ 32,365tCO_2e/ yr = 70,113 tCO_2e/ yr$$

The detailed calculation has been provided in the Excel Sheet.

| Year         | Estimated baseline emissions or removals (tCO <sub>2</sub> e) | Estimated project emissions or removals (tCO <sub>2</sub> e) | Estimated leakage emissions (tCO <sub>2</sub> e) | Estimated net GHG emission reductions or removals (tCO <sub>2</sub> e) |
|--------------|---|--|--|--|
| 2019 – 2020  | 70,113  | 0  | 0  | 70,113   |
| 2020 – 2021  | 70,113  | 0  | 0  | 70,113   |
| 2021 – 2022  | 70,113  | 0  | 0  | 70,113   |
| 2022 – 2023  | 70,113  | 0  | 0  | 70,113   |
| 2023 – 2024  | 70,113  | 0  | 0  | 70,113   |
| 2024 – 2025  | 70,113  | 0  | 0  | 70,113   |
| 2025 – 2026  | 70,113  | 0  | 0  | 70,113   |
| 2026 – 2027  | 70,113  | 0  | 0  | 70,113   |
| 2027 – 2028  | 70,113  | 0  | 0  | 70,113   |
| 2028 – 2029  | 70,113  | 0  | 0  | 70,113   |
| 2029 – 2030  | 70,113  | 0  | 0  | 70,113   |
| <b>Total</b> | <b>701,130</b>  | <b>0</b>   | <b>0</b>   | <b>701,130</b>   |

## 5 MONITORING

### 5.1 Data and Parameters Available at Validation

|                  |                       |
|------------------|-----------------------|
| Data / Parameter | EF <sub>EF,CO2</sub>  |
| Data unit        | tCO <sub>2</sub> / TJ |

|   |   |
|---|---|
| <b>Description</b>  | The CO2 emission factor per unit of energy of coal that would have been used in the baseline plant in absence of the project activity               |
| <b>Source of data</b>   | As per IPCC 2006 Volume 2 Energy Table 1.4  |
| <b>Value applied</b>  | 94.6  |
| <b>Justification of choice of data or description of measurement methods and procedures applied</b> | Default values, as per table 1.4 of IPCC 2006 Volume 2 Energy. Para 34 of AMS I C version 21, also suggested to adopt IPCC default emission factor. |
| <b>Purpose of Data</b>  | Baseline emission calculation   |
| <b>Comments</b>   | -   |

|   |  |
|---|--|
| <b>Data / Parameter</b>   | $\eta_{BL, thermal}$   |
| <b>Data unit</b>  | %  |
| <b>Description</b>  | The efficiency of the boiler using coal that would have been used in the absence of the project activity |
| <b>Source of data</b>   | Manufacturer specification   |
| <b>Value applied</b>  | 82   |
| <b>Justification of choice of data or description of measurement methods and procedures applied</b> | This value is provided by the boiler manufacturer.   |
| <b>Purpose of Data</b>  | Baseline emission calculation  |
| <b>Comments</b>   | -  |

|                         |  |
|-------------------------|--|
| <b>Data / Parameter</b> | $EF_{grid,CM,y}$   |
| <b>Data unit</b>        | tCO2/ MWh  |
| <b>Description</b>      | Combined margin CO2 emission factor for Indiangrid           |
| <b>Source of data</b>   | Central Electricity Authority (CEA) version 15 Value of data |

|  |  |
|--|--|
|  | applied for the purpose of   |
| Value applied  | 0.94193  |
| Justification of choice of data or description of measurement methods and procedures applied | The Combined Emission Factor for Indian grid has been calculated in accordance with Version 7 of “Tool to calculate the emission factor for an electric system”. The weightage for Operating and Build margin emission factors are taken as 0. 25 and 0. 75. The operating and build margin values (including imports) have been sourced from CEA Baseline Database, version 15. |
| Purpose of Data  | Baseline emission calculation  |
| Comments   | -  |

|  |  |
|--|--|
| Data / Parameter   | COEF <sub>i,y</sub>  |
| Data unit  | tCO <sub>2</sub> /litre  |
| Description  | <p>The CO<sub>2</sub> emission coefficient of fuel type I (Diesel) (tCO<sub>2</sub>/mass or volume unit) It is calculated based on EB 41, Annex 11;</p> $COEF_{i,y} = NCV_{i,y} \times EFCO_{2,i,y}$ <p>Where, NCV<sub>i,y</sub>= weighted average net calorific value of the fuel type i (Diesel) in year y (GJ/mass or volume unit)      EFCO<sub>2,i,y</sub> = weighted average CO<sub>2</sub> emission factor of fuel type I (Diesel) in year y (tCO<sub>2</sub>/GJ)</p> |
| Source of data   | Table 1.2 & Table 1.4 Chapter 1 Volumes 2 of IPCC, 2006.   |
| Value applied  | 0.0032   |
| Justification of choice of data or description of measurement methods and procedures applied | Default values, as per EB 41, Annex 11 (IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 & Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories if values are not provided by the fuel supplier  |
| Purpose of Data  | Baseline emission calculation  |
| Comments   | -  |

|                  |     |
|------------------|-----|
| Data / Parameter | PLF |
| Data unit        | %   |

|   |  |
|---|--|
| <b>Description</b>  | Plant load factor  |
| <b>Source of data</b>   | Third party determination  |
| <b>Value applied</b>  | 90   |
| <b>Justification of choice of data or description of measurement methods and procedures applied</b> | According to EB48 annex 11 third party determination of the PLF is required and the same value to be used. |
| <b>Purpose of Data</b>  | Baseline emission calculation  |
| <b>Comments</b>   | -  |

|   |  |
|---|--|
| <b>Data / Parameter</b>   | $\eta_{BI,biomass}$  |
| <b>Data unit</b>  | %  |
| <b>Description</b>  | The efficiency of the project activity biomass based boiler.                                       |
| <b>Source of data</b>   | Manufacturer specification   |
| <b>Value applied</b>  | 78   |
| <b>Justification of choice of data or description of measurement methods and procedures applied</b> | As per feasibility report approved by PEDDA and technical specification provide by boiler supplier |
| <b>Purpose of Data</b>  | Baseline emission calculation  |
| <b>Comments</b>   | -  |

## 5.2 Data and Parameters Monitored

|   |   |
|---|---|
| <b>Data / Parameter</b>                         | Net Electricity ( $EG_{PJ,y}$ )                 |
| <b>Data unit</b>                                | MWh/yr  |
| <b>Description</b>                              | Net electricity generated by project activity I |
| <b>Source of data</b>                           | On site instruments.                            |
| <b>Value of data applied for the purpose of</b> | Project-I: 7227 MWh                             |

|  |   |
|--|---|
| <b>calculating expected emission reductions</b>                        |   |
| <b>Description of measurement methods and procedures to be applied</b> | <p>Monitoring: electronic energy meters at the sent out point of the project activity plant will measure the data of net electricity generated.</p> <p>If, in case the net electricity is not monitored directly, the net electricity will be calculated by subtracting the electricity used by the project activity auxiliaries from gross electricity generated. Data type: Measured (as well calculated in case net is not monitored). Accuracy : 0.5s Archiving policy: Paper. Recording Frequency: hourly Responsibility: Manager (power plant) would be responsible for regular calibration of the meter Calibration Frequency: once in a three year.</p> |
| <b>QA/QC procedures to be applied</b>                                  | <p>Energy meters will be duly calibrated by accredited agency and Yes, Quality Management System will be used and the same procedurally records of net electricity generation will be checked by Plant in charge and a consolidated monthly monitoring report will be submitted to top management for internal review</p>   |
| <b>Comments</b>  | Data will be kept for crediting period + 2 years.   |

|  |   |
|--|---|
| <b>Data / Parameter</b>  | Net Electricity ( $EG_{PJ,y}$ )   |
| <b>Data unit</b>   | MWh/yr  |
| <b>Description</b>   | Net electricity generated by project activity II  |
| <b>Source of data</b>  | On site instruments.  |
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | Project-II: 4336.2 MWh  |
| <b>Description of measurement methods and procedures to be applied</b>                   | <p>Monitoring: electronic energy meters at the sent out point of the project activity plant will measure the data of net electricity generated. If, in case the net electricity is not monitored directly, the net electricity will be calculated by subtracting the electricity used by the project activity auxiliaries from gross electricity generated. Data type: Measured or (as well calculated in case net is not monitored). Accuracy : 0.5s Archiving policy: Paper. Recording Frequency: hourly Responsibility: Manager (power plant) would be responsible for regular calibration of the meter Calibration Frequency: once in a three year.</p> |

|                                       |   |
|---------------------------------------|---|
| <b>QA/QC procedures to be applied</b> | Energy meters will be duly calibrated by accredited agency and Yes, Quality Management System will be used and the same procedurally records of net electricity generation will be checked by Plant in charge and a consolidated monthly monitoring report will be submitted to top management for internal review. |
| <b>Comments</b>                       | Data will be kept for crediting period + 2 years.   |

|  |  |
|--|--|
| <b>Data / Parameter</b>  | $Q_{\text{fossil}, i, y}$  |
| <b>Data unit</b>   | Tonnes   |
| <b>Description</b>   | Quantity of fossil fuel (coal) of type i combusted in boiler in year y   |
| <b>Source of data</b>  | On site measurement; plant log sheet/records.  |
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | 0  |
| <b>Description of measurement methods and procedures to be applied</b>                   | <p>Quantity of fossil fuel type i-(coal) used in project activity would be measured using weigh scales and recorded in Log books.</p> <p>Monitoring: Weigh bridge will monitor the data. Data type: Measured. Archiving policy: Paper. Recording Frequency: Daily Responsibility: Manager (power plant) would be responsible for regular calibration of the Weigh bridge.</p> <p>Accuracy of weigh bridge is 0.5 %. Calibration Frequency: once in a three year.</p> |
| <b>QA/QC procedures to be applied</b>  | The data will be cross checked with the fossil fuel of type i procurement data (Invoices). Weigh scale will be calibrated annually by external accredited agencies.  |
| <b>Comments</b>  | Data will be kept for crediting period + 2 years.  |

|   |  |
|---|--|
| <b>Data / Parameter</b>                         | $FC_{i, j, y}$   |
| <b>Data unit</b>                                | litre  |
| <b>Description</b>                              | Quantity of fossil fuel (Diesel) of type i combusted in DG set in year y |
| <b>Source of data</b>                           | On site measurement; plant log sheet/records.                            |
| <b>Value of data applied for the purpose of</b> | 0  |

|   |  |
|---|--|
| calculating expected emission reductions                        |  |
| Description of measurement methods and procedures to be applied | Quantity of fossil fuel type i-(Diesel) used in project activity I & II (DG sets) would be measured through procurement data.<br>Monitoring: measurement through invoices. Data type: Measured. Archiving policy: Paper. Recording Frequency: Daily<br>Responsibility: Manager (power plant) would be responsible for regular achieving of quantity of diesel used. QA |
| QA/QC procedures to be applied                                  | -  |
| Comments  | Data will be kept for crediting period + 2 years.  |

|   |  |
|---|--|
| Data / Parameter  | $Q_{\text{steam}}$   |
| Data unit   | tonne  |
| Description   | Quantity of steam generated form project activity biomass boiler   |
| Source of data  | Onsite measurement taken from steam flow meter   |
| Value of data applied for the purpose of calculating expected emission reductions | Project I: 112420 Tonner per annum<br>Project II: 96360 Tonner per annum   |
| Description of measurement methods and procedures to be applied                   | Reading will be directly taken from steam flow meter by boiler attendant supervisor on hourly basis.<br>Monitoring: steam flow meter at plant.<br>Data type: Measured.<br>Accuracy: 0.5s Archiving policy: Paper.<br>Recording Frequency: hourly<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: Once in three year. |
| QA/QC procedures to be applied  | Steam flow meter will be calibrated once in a three year by external accredited agencies.  |
| Comments  | Data will be kept for crediting period + 2 years.  |

|                  |                    |
|------------------|--------------------|
| Data / Parameter | $T_{\text{steam}}$ |
|------------------|--------------------|

|  |  |
|--|--|
| <b>Data unit</b>   | Degree Celsius   |
| <b>Description</b>   | Temperature of the steam generated   |
| <b>Source of data</b>  | On-site measurement from temperature gauge installed at steam outlet from boiler   |
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | Project I: 420 °C<br>Project II: 400 °C  |
| <b>Description of measurement methods and procedures to be applied</b>                   | Monitoring: temperature gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly Responsibility: Manager (power plant) wouldbe responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| <b>QA/QC procedures to be applied</b>  | Temperature gauge will be calibrated once in a three year by external accredited agencies.   |
| <b>Comments</b>  | Data will be kept for crediting period + 2 years.  |

|  |   |
|--|---|
| <b>Data / Parameter</b>  | $P_{\text{steam}}$  |
| <b>Data unit</b>   | Kg/cm <sup>2</sup>  |
| <b>Description</b>   | Pressure of the steam generated   |
| <b>Source of data</b>  | On site measurement from pressure gauge   |
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | Project I: 45 Kg/cm <sup>2</sup><br>Project II: 32 Kg/cm <sup>2</sup>   |
| <b>Description of measurement methods and procedures to be applied</b>                   | Monitoring: pressure gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly Responsibility:<br>Manager (power plant) wouldbe responsible for regular calibration of the meter. |

|                                |   |
|--------------------------------|---|
|                                | Calibration Frequency: once in a three year   |
| QA/QC procedures to be applied | Pressure gauge will be calibrated once in a three year by external accredited agencies. |
| Comments                       | Data will be kept for crediting period + 2 years.                                       |

|   |  |
|---|--|
| Data / Parameter  | $Q_{\text{steam,HP,I}}$  |
| Data unit   | tonne  |
| Description   | Quantity of steam used in the process at high pressure(after conjunction point of direct and bleed steam)(at high pressure side) Source  |
| Source of data  | Onsite measurement taken from steam flow meter   |
| Value of data applied for the purpose of calculating expected emission reductions | Project I: 34529 Tonner per annum  |
| Description of measurement methods and procedures to be applied                   | <p>Reading will be directly taken from steam flow meter by boiler supervisor on hourly basis.</p> <p>Monitoring: steam flow meter at plant</p> <p>Data type: Measured</p> <p>Accuracy: 0.5s</p> <p>Archiving policy: Paper.</p> <p>Recording Frequency: hourly</p> <p>Responsibility: Manager (power plant) wouldbe responsible for regular calibration of the meter.</p> <p>Calibration Frequency: once in a three year</p> |
| QA/QC procedures to be applied  | Steam flow meter will be calibrated once in a three year by external accredited agencies.  |
| Comments  | Data will be kept for crediting period + 2 years.  |

|                  |   |
|------------------|---|
| Data / Parameter | $T_{\text{steamHP,I}}$  |
| Data unit        | Degree Celsius  |
| Description      | Temperature of the steam used in the process at high pressure(after conjunction point of direct and bleed steam)(at |

|   |   |
|---|---|
|   | high pressure side)   |
| Source of data  | On-site measurement from temperature gauge installed at steam outlet from boiler  |
| Value of data applied for the purpose of calculating expected emission reductions | Project I: 240 °C   |
| Description of measurement methods and procedures to be applied                   | Monitoring: temperature gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| QA/QC procedures to be applied  | Temperature gauge will be calibrated once in a three year by external accredited agencies.  |
| Comments  | Data will be kept for crediting period + 2 years.   |

|   |  |
|---|--|
| Data / Parameter  | $P_{\text{steamHP,I}}$   |
| Data unit   | Kg/cm <sup>2</sup>   |
| Description   | Pressure of the steam used in the process at high pressure(after conjunction point of direct and bleed steam)(at high pressure side)   |
| Source of data  | On site measurement from pressure gauge.   |
| Value of data applied for the purpose of calculating expected emission reductions | Project I: 17 Kg/cm <sup>2</sup>   |
| Description of measurement methods and procedures to be applied                   | Monitoring: Pressure gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter. |

|                                |  |
|--------------------------------|--|
|                                | Calibration Frequency: once in a three year  |
| QA/QC procedures to be applied | Pressuregauge will be calibrated once in a three year by external accredited agencies. |
| Comments                       | Data will be kept for crediting period + 2 years.                                      |

|   |   |
|---|---|
| Data / Parameter  | $Q_{\text{steamHP,II}}$   |
| Data unit   | tonne   |
| Description   | Quantity of steam used in the process at high pressure side.<br>Source  |
| Source of data  | Onsite measurement taken from steam flow meter  |
| Value of data applied for the purpose of calculating expected emission reductions | Project II: 18469 Tonner per annum  |
| Description of measurement methods and procedures to be applied                   | <p>Reading will be directly taken from steam flow meter by boiler supervisor on hourly basis.</p> <p>Monitoring: steam flow meter at plant.</p> <p>Data type: Measured</p> <p>Accuracy: 0.5s</p> <p>Archiving policy: Paper.</p> <p>Recording Frequency: hourly</p> <p>Responsibility: Manager (power plant) wouldbe responsible for regular calibration of the meter.</p> <p>Calibration Frequency: once in a three year</p> |
| QA/QC procedures to be applied  | Steam flow metergauge will be calibrated once in a three year by external accredited agencies.  |
| Comments  | Data will be kept for crediting period + 2 years.   |

|                  |  |
|------------------|--|
| Data / Parameter | $T_{\text{steamHP,II}}$  |
| Data unit        | Degree Celsius   |
| Description      | Temperature of the steam used in the process at high pressure(at high pressure side) |
| Source of data   | On-site measurement from temperature gauge installed at steam                        |

|   |  |
|---|--|
|   | outlet from boiler   |
| Value of data applied for the purpose of calculating expected emission reductions | Project II: 360°C  |
| Description of measurement methods and procedures to be applied                   | Monitoring: Temperature gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| QA/QC procedures to be applied  | Temperature gauge will be calibrated once in a three year by external accredited agencies.   |
| Comments  | Data will be kept for crediting period + 2 years.  |

|   |   |
|---|---|
| Data / Parameter  | $P_{\text{steam,HP,II}}$  |
| Data unit   | Kg/cm <sup>2</sup>  |
| Description   | Pressure of the steam used in the process at high pressure (at high pressure side)  |
| Source of data  | On site measurement from pressure gauge.  |
| Value of data applied for the purpose of calculating expected emission reductions | Project II: 30 Kg/cm <sup>2</sup>   |
| Description of measurement methods and procedures to be applied                   | Monitoring: Pressure gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| QA/QC procedures to be applied  | Pressure gauge will be calibrated once in a three year by external accredited agencies.   |

|  |  |
|--|--|
| <b>Comments</b>  | Data will be kept for crediting period + 2 years.  |
| <b>Data / Parameter</b>  | $Q_{\text{steam,LP}}$  |
| <b>Data unit</b>   | Tonne  |
| <b>Description</b>   | Quantity of steam extracted from the turbine that is used in the process at low pressure (Exhaust Steam at the outlet of the turbine) (at Low pressure side)   |
| <b>Source of data</b>  | Onsite measurement taken from steam flow meter   |
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | Project I: 77891 Tonner per annum<br>Project II: 77891 Tonner per annum  |
| <b>Description of measurement methods and procedures to be applied</b>                   | Reading will be directly taken from steam flow meter by boiler supervisor on hourly basis.<br>Monitoring: steam flow meter at plant.<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| <b>QA/QC procedures to be applied</b>  | Steam flow meter will be calibrated once in a three year by external accredited agencies.  |
| <b>Comments</b>  | Data will be kept for crediting period + 2 years.  |

|                         |   |
|-------------------------|---|
| <b>Data / Parameter</b> | $T_{\text{steam,LP}}$   |
| <b>Data unit</b>        | Degree Celsius  |
| <b>Description</b>      | Temperature of the steam extracted from the turbine that is used in the process(at low pressure side) |
| <b>Source of data</b>   | On-site measurement from temperature gauge installed at steam outlet from boiler                      |

|  |  |
|--|--|
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | Project I: 170°C<br>Project II: 240°C  |
| <b>Description of measurement methods and procedures to be applied</b>                   | Monitoring: Temperature gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| <b>QA/QC procedures to be applied</b>  | Temperature gauge will be calibrated once in a three year by external accredited agencies.   |
| <b>Comments</b>  | Data will be kept for crediting period + 2 years.  |

|  |   |
|--|---|
| <b>Data / Parameter</b>  | $P_{\text{steam,LP}}$   |
| <b>Data unit</b>   | Kg/cm <sup>2</sup>  |
| <b>Description</b>   | Pressure of the steam used in the process at high pressure(at low pressure side)  |
| <b>Source of data</b>  | On site measurement from pressure gauge.  |
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | Project I: 4 Kg/cm <sup>2</sup><br>Project II: 3 Kg/cm <sup>2</sup>   |
| <b>Description of measurement methods and procedures to be applied</b>                   | Monitoring: Pressure gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| <b>QA/QC procedures to be applied</b>  | Pressure gauge will be calibrated once in a three year by external accredited agencies.   |

|  |  |
|--|--|
| <b>Comments</b>  | Data will be kept for crediting period + 2 years.  |
| <b>Data / Parameter</b>  | $T_{FW}$   |
| <b>Data unit</b>   | Degree Celsius   |
| <b>Description</b>   | Temperature of the feed water in the boiler  |
| <b>Source of data</b>  | On-site measurement from temperature gauge installed at feed water inlet.  |
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | calculating expected emission reductions<br>105°C  |
| <b>Description of measurement methods and procedures to be applied</b>                   | Monitoring: Temperature gauge<br>Data type: Measured<br>Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: hourly<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| <b>QA/QC procedures to be applied</b>  | Temperature gauge will be calibrated once in a three year by external accredited agencies.   |
| <b>Comments</b>  | Data will be kept for crediting period + 2 years.  |

|  |   |
|--|---|
| <b>Data / Parameter</b>  | $Q_{\text{biomass, i,y}}$                       |
| <b>Data unit</b>   | Tonnes  |
| <b>Description</b>   | Quantity of rice husk consumed annually         |
| <b>Source of data</b>  | On site measurement                             |
| <b>Value of data applied for the purpose of calculating expected emission reductions</b> | -   |
| <b>Description of measurement methods and procedures to be applied</b>                   | Monitoring: weigh bridge<br>Data type: Measured |

|                                |   |
|--------------------------------|---|
| applied                        | Accuracy: 0.5s<br>Archiving policy: Paper.<br>Recording Frequency: daily<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter.<br>Calibration Frequency: once in a three year |
| QA/QC procedures to be applied | The data will be cross checked with the biomass (rice husk) procurement data (Invoices). Weigh scale will be calibrated once in three year by external accredited agencies  |
| Comments                       | Data will be kept for crediting period + 2 years.   |

|   |  |
|---|--|
| Data / Parameter  | NCV <sub>biomass</sub>   |
| Data unit   | kcal/kg  |
| Description   | Net calorific Value of biomass residues  |
| Source of data  | Third party (lab test of biomass)  |
| Value of data applied for the purpose of calculating expected emission reductions | 3000   |
| Description of measurement methods and procedures to be applied                   | Monitoring: Net calorific value of biomass will be checked through Govt. approved independent laboratory.<br>Data type: Estimated/measured<br>Archiving policy: Paper.<br>Recording Frequency: Once in a year.<br>Responsibility: Manager (power plant) would be responsible for regular calibration of the meter. |
| QA/QC procedures to be applied  | Not applicable   |
| Comments  | Data will be kept for crediting period + 2 years.  |

### 5.3 Monitoring Plan

For above stated parameters for which monitoring and measurements apply, Supervisors take measurements and records are made.

Management of Milkfood Limited ensures that appropriate equipments required for the measurement are provided.

These measuring instruments viz., Weigh Bridge, thermo guages, Pressure gauges and energy meters are calibrated from third party instrumentation labs once in a three years, and records of it are maintained.

All the monitoring equipments required for the calculation of emission reductions have been installed after procedural check; therefore there is less possibility of defects. However, all these equipments are daily inspected by the concerned operator while taking the reading. In case of any irregular reading or unexpected reading the shift in charge is informed for further check and calibration of the equipments. More over all the equipment are calibrated once in a three year to ensure proper data value.

Internal audit will be carried out by the upper management once in three months. In case of having corrective action or preventive action it will be checked in next internal audit.

Responsibility and competence of persons taking measurement, when the measurement should take place and controls of records are established.

Data, which are collected, are safely stored. Records such as log books, purchase receipts, calibration records of measuring devices, and public data such as IPCC and CEA are maintained for the retention period specified.

Data of inputs and outputs are summarized on monthly basis and calculation of emission reduction is updated.

Emergency preparedness: The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

# APPENDIX 1.

## BASELINE INFORMATION

The grid emission factor has been calculated ex-ante using 'Tool to calculate the emission factor for an electricity system', Version 07, EB 100

The step-by-step calculation of base line emission factor is as follows:

### STEP 1. Identification of relevant electric system

The relevant electricity system applicable to the project activity is the Indian grid electricity system according to the CEA database version 15.

STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional)  
The values of operating margin as well as build up margin are taken from the latest version of CEA database and thus only the grid power plants are included for calculation of the Operating margin and Build up margin as per option-I.

### STEP 3, Select a method to determine operating margin (OM)

The calculation of the operating margin emission factor ( $EF_{grid,OM,y}$ ) is based on one of the following methods:

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch data analysis OM, or (d) Average OM.

As per the tool, simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. The low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation.

**Table: Share of Low Cost / Must-Run (% of Net Generation)**

|   |           |           |           |           |           |           |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| Share of Must-Run (Hydro/Nuclear) (% of Net Generation) | 18.6<br>% | 16.8<br>% | 15.1<br>% | 14.6<br>% | 14.3<br>% | 14.5<br>% |
|---|-----------|-----------|-----------|-----------|-----------|-----------|

Percentage of total grid electricity generation by low cost/ must run plants in the Indian Grid (on the basis of average of five most recent years): 15.1%

The calculation above shows that the generation from low-cost/must-run resources constitutes less than 50% of total grid generation, hence usage of the Simple OM method in the project case is justified.

Further, the ex-ante approach has been used for determination of Simple of OM based on a 3-year generation-weighted average.

Step 4. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor has been calculated as the generation-weighted average CO<sub>2</sub> emissions per unit net electricity generation (tCO<sub>2</sub>e/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. As per the option A of the Tool to calculate the emission factor for an electricity system the determination of simple OM is based on the total net electricity generation of all power plants serving the system and the type of fuels and total fuel consumption of the project electricity system as per option B. The simple OM emission factor is calculated as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_{m,y}}$$

Where:

|                 |   |
|-----------------|---|
| $EF_{EL,m,y}$   | CO <sub>2</sub> emission factor of power unit $m$ in year $y$ (tCO <sub>2</sub> e/ MWh)           |
| $FC_{m,i,y}$    | Amount of fossil fuel type $i$ consumed by power unit $m$ in year $y$ (mass or unit volume unit)  |
| $NCV_{i,y}$     | Net calorific value (energy content) of fossil fuel type $i$ in year $y$ (GJ/mass or volume unit) |
| $EF_{CO_2,i,y}$ | CO <sub>2</sub> emission factor of fossil fuel type $i$ in the year $y$ (tCO <sub>2</sub> /GJ)    |
| $EG_{m,y}$      | Net electricity generated and delivered to the grid by power unit $m$ in year $y$ (MWh)           |
| $m$             | All power units serving the grid in year $y$ except low-cost/must-run power units                 |
| $i$             | All fossil fuel types combusted in power plant/ unit $m$ in year $y$                              |
| $y$             | The relevant year as per the data vintage chosen in Step 3  |

Step 5. Identify the group of power units to be included in the build margin

The sample group of power units  $m$  used to calculate the build margin consists of either:

- (a) The set of five power units that have been built most recently, or
- (b) The set of power capacity additions in the electricity system that comprise 20%

of the system generation (in MWh) and that have been built most recently<sup>16</sup>

In terms of vintage of data, the following option has been used:

For the entire crediting period, the build margin emission factor ex-ante based on the most recent information available on units already built for sample group  $m$  at the time of CDM-PDD submission to the DOE for validation has been used

Step 6. Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO<sub>2</sub>/MWh) of all power units  $m$  during the most recent year  $y$  for which power generation data is available, calculated as follows:

$$EF_{\text{grid,BM},y} = \frac{\sum_m EG_{m,y} \times EF_{\text{EL},m,y}}{\sum_m EG_{m,y}}$$

Where:

|                         |   |
|-------------------------|---|
| $EF_{\text{grid,BM},y}$ | Build margin CO <sub>2</sub> emission factor in year $y$ (tCO <sub>2</sub> e/MWh)                   |
| $EG_{m,y}$              | Net quantity of electricity generated and delivered to the grid by power unit $m$ in year $y$ (MWh) |
| $EF_{\text{EL},m,y}$    | CO <sub>2</sub> emission factor of power unit $m$ in year $y$ (tCO <sub>2</sub> e/MWh)              |
| $m$                     | Power units included in the build margin  |
| $y$                     | Most recent historical year for which power generation data is available                            |

Step 7. Calculate the combined margin emissions factor

It is calculated as the generation-weighted average emission factor (t CO<sub>2</sub>e/GWh) of a sample of power plants  $m$  of grid, as follows:

$$EF_{\text{grid,CM},y} = EF_{\text{grid,OM},y} \times w_{\text{OM}} + EF_{\text{grid,BM},y} \times w_{\text{BM}} \quad (21)$$

Where:

$EF_{\text{grid,BM},y}$  = Build margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>e/MWh)

---

<sup>16</sup>If 20% falls on part capacity of a unit, that unit is fully included in the calculation. Power plant registered as CDM project activities should be excluded from the sample group  $m$ .

$EF_{grid,OM,y}$  = Operating margin CO<sub>2</sub> emission factor in year y (tCO<sub>2e</sub>/MWh)

$w_{OM}$  = Weighting of operating margin emissions factor (%)

$w_{BM}$  = Weighting of build margin emissions factor (%)

where the weights  $w_{OM} = 0.25$  and  $w_{BM} = 0.75$  for other energy systems (including biomass).

$$BE_y = EF_y \times EG_y$$

Where

$BE_y$ : Baseline emissions due to displacement of electricity during the year y (tCO<sub>2e</sub>)

$EG_y$ : Net quantity of electricity generated by the project activity during the year y (GWh)

$EF_y$ : CO<sub>2</sub> baseline emission factor for the electricity displaced due to the project activity (tCO<sub>2e</sub>/GWh) =

$EF_{grid,CM,y}$

The estimation of ex-ante emission factor has been done as per the methodology describe above. As per the Carbon Dioxide Emission Factor database, version 15.0, given by CEA, a statutory body under the Ministry of Power, the ex – ante emission factor for the Grid is the following.

The emission factor for the project activity has been arrived at by calculating the weighted average of Simple Operating margin ( $w = 0.25$ ), Build Margin ( $w = 0.75$ ) as specified for other energy generating systems (Including biomass).

| Net Generation in Operating Margin (GWH) (incl. Imports)                    |                  |                  |                  |
|---|------------------|------------------|------------------|
|   | 2016-17          | 2017-18          | 2018-19          |
| Indian Grid   | 9,16,277.83<br>4 | 9,60,692.88<br>2 | 9,95,956.51<br>5 |
| Simple Operating Margin (tCO <sub>2e</sub> /MWh) (incl. Imports) (1)<br>(2) |                  |                  |                  |
|   | 2016-17          | 2017-18          | 2018-19          |
| Indian Grid   | 0.96             | 0.95             | 0.97             |
| Build Margin (tCO <sub>2e</sub> /MWh) (not adjusted for imports)            |                  |                  |                  |
|   | 2016-17          | 2017-18          | 2018-19          |
| Indian Grid   | 0.8723           | 0.8661           | 0.8811           |
| Weighted Generation Operating Margin (tCO <sub>2e</sub> /MWh)               |                  |                  |                  |
| Indian Grid   | 0.9622           |                  |                  |
| Combined Margin Emission Factor   |                  |                  |                  |
| Indian Grid (tCO <sub>2e</sub> /MWh)  | 0.94193          |                  |                  |