PROJECT DESIGN DOCUMENT

Wilmar International Ltd

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Version 1

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Annex 1:

1 Description of Project:

1.1 Project Title

Jilin Rice Husk Thermal Energy Generation Project

1.2 Type/Category of the project

The project falls into Sectoral Scope 1 - Energy Industries (renewable sources) under the Clean Development Mechanism (CDM). The project meets the applicability criteria (refer section 2.2) for thermal energy production as defined in the approved small-scale CDM baseline and monitoring methodology AMS I.C version 16 **"Thermal energy production with or without electricity"**. The project is a stand alone project and is not grouped with any other project.

1.3 Estimated amount of emission reductions over the crediting period including project size:

The estimated total emission reductions over 10 year crediting period are 595,332 tCO_{2e}. The start date of the crediting period is 10 December 2009.

Years	Emission reductions (in tCO_{2e})
2010-2011	33,074
2011-2012	33,074
2012-2013	66,148
2013-2014	66,148
2014-2015	66,148
2015-2016	66,148
2016-2017	66,148
2017-2018	66,148
2018-2019	66,148
2019-2020	66,148
Total estimated reductions (tCO_{2e})	595,332
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tCO_{2e})	59,533

Therefore, based on designed outputs/demand for maximum steam production in the two boilers, the annual average emission reductions are expected to be 59,533 tCO_{2e}. Based on the estimated annual average emission reductions, the project size lies between micro and mega projects.

1.4 A brief description of the project:

The project is a green-field rice husk based thermal energy generation system to produce steam. The project is owned and operated by Yihai Kerry (Jilin) Bio-cogeneration Co., Ltd. ("Project Proponent" or "PP"), a subsidiary of Wilmar International Ltd.

The PP will purchase rice husks from the 'Yihai Kerry (Jilin) Oils, Grains and Foodstuffs Industries Co., Ltd' also the consumer of steam ("steam customer"). No other co-firing is provided for.

The project comprises two boilers with installed capacity of 15 MT/hour each. The project commissioning is expected to be in two phases as per the following:

- Phase I (10 December 2009): 2 boilers each 15 MT/hour capacity capable of generating medium pressure (3.82 MPa) superheated steam at 450^{o}C, with either one of the two boilers likely to operate, and

- Phase II (expected to start in around 2 years from commissioning of Phase I): Operation of the both the 15 MT/hour capacity boilers.

The steam customer is understood to require steam for its operations involving rice bran oil extraction and in paddy drying tower.

The project is designed to generate 15 MT/hour steam at commissioning of Phase I and that could be increased to 30 MT/hour steam by commissioning of Phase II. For the purpose of claiming emission reductions during the crediting period, actual (monitored) steam will be used.

The project contributes to the greenhouse gas (GHG) emission reduction by avoiding potential use of a fossil fuel (in this case, coal) for thermal energy production.

The project will contribute to the sustainable development in China with respect to the following aspects.

- Advantages of utilization of rice husks as energy source has three main perspectives in China:
  - **waste management:** minimizing the environmental problems associated with the prevailing practice of its unplanned disposal including dumping and/or burning in an uncontrolled manner;
  - **energy security:** utilization of rice husks in place of other fossil fuels (in this case, coal) could reduce the rising demand for coal as energy source;
  - **environmental benefits:** avoidance of coal will reduce potential GHG emissions associated with use of coal.
- The project boiler design is a new technology developed in-house by a sister company [1] of the PP in collaboration with the Harbin Industrial University. Successful application of the new technology will promote its adaptation by other industrial plants in the neighboring cities and even all over China. This is in line with the government's initiative of encouraging renewable energy technologies to create a more sustainable supply of energy for which demand is increasing tremendously in response to the rapid increase in industrialization[2].
- Implementation of the new technology comes with the need for trained manpower to construct, operate, and maintain the system. Thus, the local citizens employed by the project will benefit from additional training and increased job opportunity.

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

The project will be located at Jilin, Jilin Province, China. The location GPS coordinates are 44° 4'1.75"N and 126°31'40.36"E. The project site is about 25 km from Jilin city to the north. Figure 1 and Figure 2 show the geographical location of Jilin Province and Jilin in Jilin Province, respectively.

[1] Yihai (Panjin) Bio-cogeneration Co., Ltd. at Panjin in Liaoning Province

[2] The Renewable Energy Law for the People's Republic of China

Figure 1: Geographical Location of Jilin Province

Figure 2: Geographical Location of Jilin in Jilin Province

1.6 Duration of the project activity/crediting period:

The PP has proceeded with this project in a phase-wise manner based on the overall plan for installation and commissioning of two boilers. The initial financial commitment to the project was made on 31 July 2008 based on the 'Authorised Financial Capital Expenditure' ("AFCE") which is a management level approval document to evaluate and authorize initial investments for any new project.

The trial operation of the project (Phase I: operation of one 15 MT/hour boiler) started on 26 November 2009. The crediting period is 10 years and the start date will be 10 December 2009. The project is expected to be operational for at least 15 years.

1.7 Conditions prior to project initiation:

The proposed project is a green-field project, where no prior energy generation activity similar to the project had occurred.

In the VCS project, Phase I comprises operation of a 15 MT/hour boiler and Phase II comprises additional operation of another 15MT/hour boiler. The steam customer for the project is 'Yihai Kerry (Jilin) Oils, Grains and Foodstuffs Industries Co., Ltd'.

Prior to the project, the steam requirement did not exist for the steam customer and hence the project does not displace any existing steam generation project.

The PP will purchase rice husk from a dedicated supplier located nearby to the project who operates a new rice mill. Prior to the project, there was no use of the rice husk from the rice mill.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

Emission reductions are achieved through avoidance of use of coal (the most commonly used fossil fuel in the region) by using rice husks, a carbon neutral fuel. The proposed project will use approximately 136 tonnes rice husks per day per boiler. Thus, in Phase I, the project is expected to use 136 tonnes of rice husks per day and in Phase II about 272 tonnes per day. The project will achieve GHG emission reductions by avoiding CO_2 emissions from the business-as-usual scenario (use of coal).

1.9 Project technologies, products, services and the expected level of activity:

The project involves installation and operations of two sets of boilers with a total capacity of 30 MT/hour.

Rice husks will be the only source of energy used to generate the steam. For start-up operations, fire wood is used; this will not contribute as an energy source.

The project employs a new technology based on the moving chain conveyor concept. The technology comprises a natural circulation steam boiler with 5% continuous rate

of blow-down. The treated water is heated to reach its saturated temperature of 104°C in an economizer utilizing the return condensate and hot flue gases (at about 160°C).

Inside the combustion chamber in the boiler, the rice husks are mixed with air at an inlet temperature of 170°C. The rice husks are kept in suspension using circulating fluidized bed mechanism by use of blowers at the bottom and induction fans at the top of the boiler. This feeding system increases the overall boiler efficiency compared to normal feeding system which is a fuel efficient feature in this technology. In order to control the quality of the rice husk ash, temperature inside the boiler needs to be maintained at 450-650°C. This is achieved through the design of internal inclined reciprocating grate which allows the ash to cool down prior to entering the ash collection system at the bottom of the boiler.

Figure 3 summarizes the conceptual configuration of the overall system.

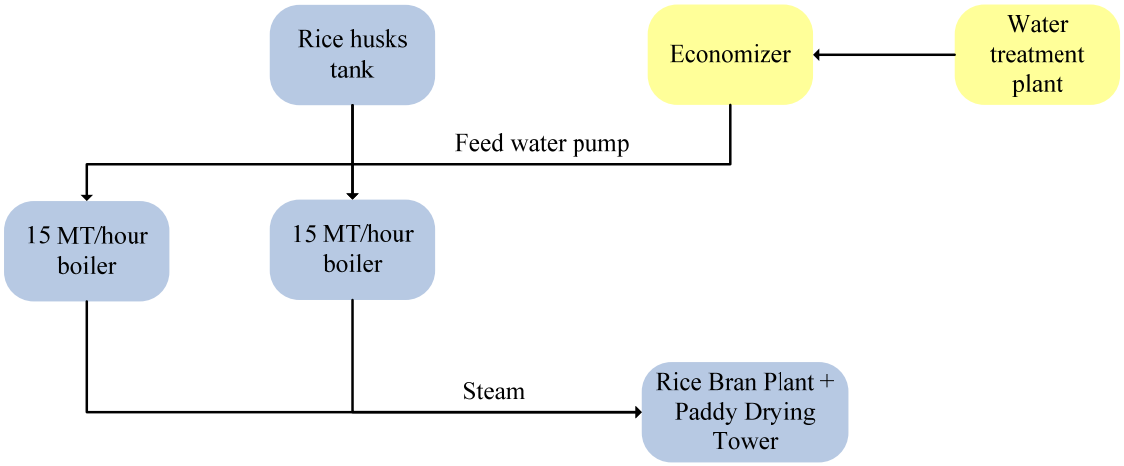

Figure 3: Flow Diagram of the Heat Generation System

The project is expected to be operated for 330 days in a year (or approximately, 8,000 hours) excluding scheduled routine operation and maintenance requirements stoppages. The boiler integrity checks are significantly important as use of rice husk (due to its high silica content) causes higher abrasion as compared with conventional fuels (like coal). As per local regulations, an external integrity check is prescribed once each year and an internal integrity check once in two years. In addition, calibration requirements are prescribed to be conducted once a year for temperature and pressure meters.

Rice husk is procured from a source located close to the project boundary (within 500 meters) and conveyance is by pipeline under suction to an intermediate silo for temporary storage avoiding development of any anaerobic conditions.

The project is in line with environment protection requirements (as per an environmental impact assessment study) and will not affect local environmental safety. With the project technology and associated facilities developed locally, the project involves no technology transfer from abroad. The ash generated from the project will be given away for a third party for use in silica production.

1.10 Compliance with relevant local laws and regulations related to the project:

There are no existing local laws and regulations favouring or restricting the implementation of rice husk based thermal energy production. The local environmental regulations provide requirements for pollution control from the project and an environmental impact assessment (approved by the regulators) have been completed. The PP has provided for various inspections required for the project equipment as per the local regulations (also refer section 1.9).

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

The following risks could substantially reduce the emission reductions.

- The project might be down for a longer than expected period of time due to system unfamiliarity in the new technology and other technical problems (such as higher corrosion) requiring more maintenance than expected. No prior experience of operating and maintaining this new technology is available, resulting in new challenges in case of upsets of the project plant thereby increasing the possibility of extended down time.

- The steam production is dependent upon the uptake rate of the steam consumer. If there be any disruptions/reductions in the steam demand from this consumer, the steam production from the project will be reduced resulting in lower rice husk use and hence lower emission reductions.

- Improper record keeping and/or loss of data would render difficulties in providing documentary evidence on the reductions achieved.

- Problems associated with calibration and operation of the metering instruments at the plant could also give rise to difficulty in accurate record keeping and emission reduction estimations.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The PP will be starting this green-field project using locally available rice husks. As per current practice in the region, rice husk from different rice mills are normally dumped outside rice mills and/or burnt. Some of the rice husk decays and the rest are taken away by local villagers for various domestic uses such as poultry feed, etc. The PP is an independent organization in the business of thermal energy generation for commercial sale. The project therefore does not create any GHG emissions for subsequent removal.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

The project has not created any other forms of environmental credits. In China, the other environmental credit that could have been created is Certified Emission Reductions (CER) under the CDM process. The project has not participated in the CDM process.

1.14 Project rejected under other GHG programs (if applicable)

Not applicable, since the project has not participated in any other GHG program.

1.15 Project proponents' roles and responsibilities, including contact information of the project proponent, other project participants:

Role: VCS Project Developer

Responsibility: Undertake all activities leading to registration of VCS project and monitoring, verification and issuance of VCU.

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Project Host/Project Participant (PP)

Responsibility: Undertake all activities leading to implementation and operation of the project and provision of necessary information to the project developer for registration of VCS project and monitoring, verification and issuance of VCU.

Yihai Kerry (Jilin) Bio-Cogeneration Co., Ltd.
YaFu Village, WuLajie Town, LongTan District
Jilin, Jilin Province, China 132227

Contact: Mr. Li Chao
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E-mail: lichao8@wilmar-intl.com

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.

All relevant information is captured in other sections of this PD.

1.17 List of commercially sensitive information (if applicable):

The following information is proprietary and confidential:

- Rice husk procurement agreements entered by the PP;
- Steam sale agreement between the PP and the steam customer;
- Contract between the PP and Wuxi Taihu Boiler Company (contractor for boiler installation); and
- Boiler technology concept and design.

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

An approved methodology under the CDM processes has been applied to the project activity as the applicable VCS methodology. This CDM methodology is the 'simplified baseline and monitoring methodology AMS I.C - version 16' "Thermal energy production with or without electricity".

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

Applicability of AMS I.C (version 16) for the project activity is justified below.

Applicability Requirements	Compliance with Applicability Criteria
Paragraph 1	
This category comprises renewable energy technologies that supply users (residential, industrial or commercial facilities) with thermal energy that displaces fossil fuel use.	The project activity will exclusively use rice husks (with a new renewable energy based technology) to produce thermal energy thereby avoiding the need to use coal as the most likely fossil fuel.
Paragraphs 3 and 5	
The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal.	The total energy generated shall be as per the following: • Phase I: 15 MT/hour steam (equivalent to 349.6 TJ thermal energy generated per year) at 3.82 MPa and 450^{o}C, installed thermal energy = [349.6 TJ * (1/(3.6 TJ/GWh*10^9)) * 10^12] / 8000 hours = 12.15 MW; and • Phase II: 30 MT/hour steam at 3.82 MPa and 450^{o}C, the total installed thermal energy = 2 * 12.15 MW = 24.3 MW. Thus, the combined maximum installed

Applicability Requirements	Compliance with Applicability Criteria
	energy generation capacity of the project (24.3 MW thermal) is less than 45 MW thermal (limit).
Paragraph 6	
In case electricity and/or steam/heat produced by the project activity is delivered to another facilities or facilities within the project boundary, a contract between the supplier and consumers of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displaced.	A supplement to the contract between the PP and the "steam customer" provides that only the PP will claim the emission reductions.
Paragraphs 2, 4, 7, 8 and 9	Not applicable.

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

Figure 5 and 5 below show the delineation of the project boundary for the baseline scenario and project.

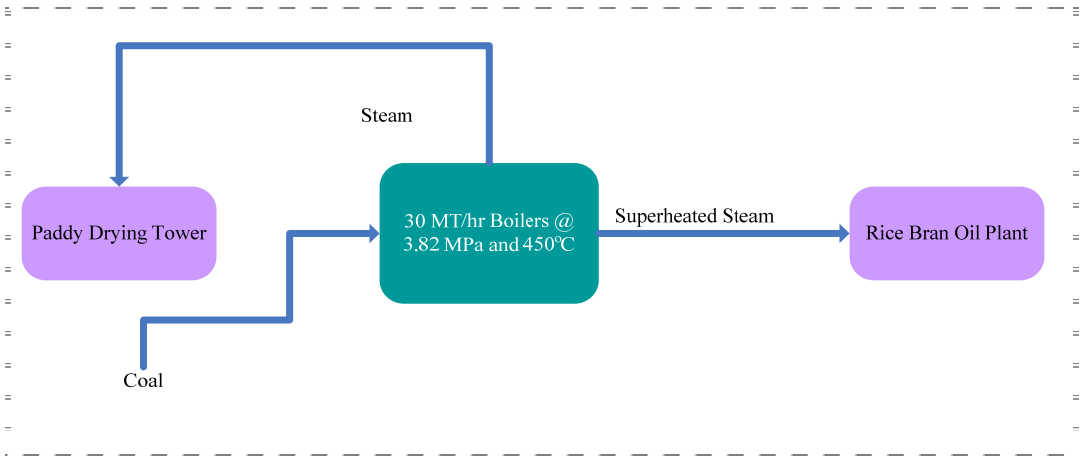

Figure 4: Delineation of Baseline Scenario

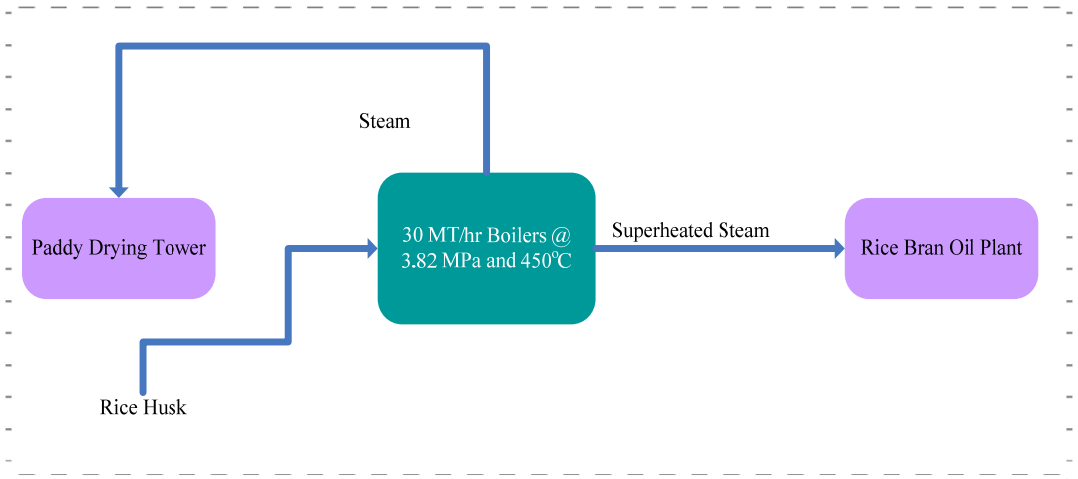

Figure 5: Delineation of Project

The following table describes the sources of emissions from the project.

	Source	Gas	Included?	Justification/ Explanation
Baseline	Fossil fuel (coal) combustion for heat generation	CO_2	Yes	Major GHG emissions in the baseline.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	Combustion of biomass residues for heat generation	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be small.
	Biomass collection, processing and	CO_2	No	The rice husks are procured from sources in proximity to the project

	Source	Gas	Included?	Justification/ Explanation
				and there are no significant collection, processing and transportation requirements. Thus, CO_2 emissions associated with collection, processing and transportation are negligible and thus excluded for simplification.
	transportation	CH_4	No	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small.
		N_2O	No	Excluded for simplification. This emissions source is assumed to be very small.

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

Clause 11 best describes the most likely baseline alternative in the absence of the project (renewable energy technology). In the case of north-eastern part of China in Jilin, the baseline alternative is potential use of coal (fossil fuel technology) as per the easy availability of coal and coal based steam generation technology.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

The project activity's compliance with applicability requirements of AMS I.C (version 16) is described in section 2.2. The assessment and demonstration of additionality is described below using the prescribed 'Project Test' approach provided under clause 5.8 of the Voluntary Carbon Standard 2007.1 (18 November 2008).

Step 1: Regulatory Surplus

The project is not be mandated by any systematically enforced law, statute or other regulatory framework in China.

Step 2: Implementation Barriers

The project faces the following two distinct barriers that are not faced by the alternative project (which is implementation use of coal based boilers).

Investment/Institutional barrier

According to an economic report from Hexun News[3], biomass energy generation companies are making loss in China due to high capital investment, lower technological efficiency (as compared to fossil fuel based technologies) and the lack of substantial benefits from implementing such projects. Through the market analysis done in such economic reports, investors have become very unwilling to provide funding to such project (i.e. biomass energy generation industry) due to the high financial risks.

In addition, the PP as a Foreign Invested Enterprise (FIE) faces difficulty in securing bank loans. Such difficulty in securing external loans is demonstrated in a journal written by US International Trade Commission[4] which highlights the challenges due to limited capital access and restrictive foreign exchange control system in China. The journal is also supported by a survey study by PricewaterhouseCooper where FIEs confirm the difficulties posed by the foreign exchange control system and limited access to local capital. FIEs have also identified financial and tax issues, and particularly the regulation of capital and earnings, as one of the greatest challenge of investing in China. In addition, the report also cited difficulties in obtaining loans and banking services that are inadequate to meet demand.

Due to the aforesaid financial barriers, the PP sought financial assistance from another independent group company to invest in the project. The investing company provided funding in view of the VCU revenue expected to be generated through VCS registration of the project, as the VCU revenue mitigates some of the project investment risks. Therefore, the VCU revenue helped in overcoming the investment/institutional barrier.

In comparison, a more common alternate for thermal energy generation using coal with conventional technology is expected to be financially more attractive and less risk exposed for commercial lending/external project financing. However, implementation of this type of alternative will result in GHG emissions.

In comparison, a more common alternate for thermal energy generation using coal with conventional technology is expected to be financially more attractive and less

[3] http://news.hexun.com/2010-07-11/124210745.html

[4] http://www.usitc.gov/publications/332/journals/access_to_capital_china.pdf

risk exposed for commercial lending/external project financing. However, implementation of this type of alternative will result in GHG emissions.

Technological barriers

The rice husk based system is a new technology developed in-house based on commercialization of a new concept established by Harbin Industrial University. The technology development phase required significant engineering efforts that went into the design of the rice husk feeding system, combustion system and temperature control system. The new technology entails the need for developing in-house technical expertise which would not be required if a coal-fired system was implemented.

In addition, there are significant risks associated with commissioning, and operation and maintenance of the newly developed technology on a green-field project site:

- no prior experience to rely upon in case of upsets in operation;

- rice husk feeding system needs to be closely controlled to ensure that the feed is in fluidized bed system at all times maintaining efficient combustion in the combustion chamber;

- should the rice husk feeding system be disturbed, the temperature inside the boiler will drop and it would need up to 4 hours to start up the boiler to meet the steam generation demand and up to 12 hours to reach the optimum temperature of 450 – 650^{o}C; this may lead to loss of revenue as a result of reduced thermal energy production;

- rice husk boilers require more frequent maintenance than coal boilers due to the presence of silica in rice husks that causes faster damage the economizers; this reduces productive hours and causes loss of revenue.

On the manpower side, there is a need to train the local manpower to install, operate, and maintain the project. Due to the new technology, the local availability of skilled manpower was a major challenge and the PP needed to train the local manpower and/or recruit new manpower possessing the necessary skills and knowledge. Therefore, the project faces technology related barriers to its implementation.

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

The monitoring methodology follows CDM baseline and monitoring methodology AMS I.C version 16 "**Thermal energy production with or without electricity**".

3.2 Monitoring, including estimation, modeling, measurement or calculation approaches:

The purpose of monitoring is to ensure the project activity accomplishes the estimated GHG emissions reduction and these are creditable as required in the Voluntary Carbon Standards.

The emissions reduction is calculated as the difference between the baseline emissions and project emissions. The relevant GHG emissions are identified earlier in section 2.3. The PP will form a monitoring team responsible for carrying out the monitoring and maintaining records of all the monitored data. The team will also be responsible to carry out monitoring equipments calibration and maintenance.

The data to be monitored comprise of the following:

(a) Temperature of the feed water to the boilers
(b) Temperature of the steam delivered to the steam customer
(c) Pressure of the steam delivered to the steam customer
(d) Amount of steam delivered to the steam customer
(e) Quantity of rice husks used in the two boilers installed in the project
(f) Quantity of rice husk purchased from a nearby rice mill

Detailed list of the parameters that need to be recorded and/or monitored for the purpose of determining the amount of emissions reduction achieved is provided in section 3.3 below.

3.3 Data and parameters monitored/ selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Data / Parameter:	$\eta_{BL,thermal}$
Data unit:	-
Description:	Average net efficiency of a similar thermal heat generation system in the baseline using coal
Source of data to be used:	An efficiency of 100% as a conservative default value (refer: clause 18(c) in AMS I.C – version 16
Value of data applied for the purpose of calculating expected emission reductions:	100%
Description of measurement methods and procedures to be applied:	Not relevant
QA/QC procedures to be applied:	Not relevant
Any comment:	-

Data / Parameter:	$EF_{FF,CO2,y}$
Data unit:	tCO_{2e}/TJ
Description:	the CO_2 emission factor of the fossil fuel (in this case, coal) that would have been used in the baseline plant
Source of data to be used:	Since no accurate and reliable local or national data is available, IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances has been used
Value of data applied for the purpose of calculating expected emission reductions:	94.6
Description of measurement methods and	Not relevant

procedures to be applied:	
QA/QC procedures to be applied:	Not relevant
Any comment:	-

Data / Parameter:	$Temp_{Steam}$
Data unit:	^{o}C
Description:	Temperature of MP steam delivered to the "steam customer"
Source of data to be used:	On-line data records obtained from PLC readings using temperature sensors on MP steam delivery line attached to the boiler performance monitoring system
Value of data applied for the purpose of calculating expected emission reductions:	$450^{o}C$
Description of measurement methods and procedures to be applied:	Hourly records maintained at the project site
QA/QC procedures to be applied:	Periodic verification by site/shift supervisor
Any comment:	-

Data / Parameter:	P_{Steam}
Data unit:	MPa
Description:	Pressure of MP steam delivered to the "steam customer"
Source of data to be used:	On-line data records obtained from PLC readings using pressure sensors on MP steam delivery line attached to the boiler performance monitoring system
Value of data applied for the purpose of calculating expected emission reductions:	3.82 MPa

Description of measurement methods and procedures to be applied:	Hourly records maintained at the project site
QA/QC procedures to be applied:	Periodic verification by site/shift supervisor
Any comment:	-

Data / Parameter:	$Temp_{FeedWater}$
Data unit:	^{o}C
Description:	Temperature of feed water (at atmospheric pressure) entering each of the 15 MT/hour boiler
Source of data to be used:	On-line data records obtained from PLC readings using temperature sensors on feed water delivery line attached to the boiler performance monitoring system
Value of data applied for the purpose of calculating expected emission reductions:	$104^{o}C$
Description of measurement methods and procedures to be applied:	Hourly records maintained at the project site
QA/QC procedures to be applied:	Periodic verification by site/shift supervisor
Any comment:	-

Data / Parameter:	FL_{steam}
Data unit:	MT/hour
Description:	Flow rate of MP steam delivered by the 15 MT/hour boiler
Source of data to be used:	On-line data records obtained from PLC readings using flow rate sensors on MP steam delivery line attached to the boiler performance monitoring system
Value of data applied for the purpose of calculating expected emission	15 MT/hour (for each boiler)

reductions:	
Description of measurement methods and procedures to be applied:	Hourly records maintained at the project site
QA/QC procedures to be applied:	Periodic verification by site/shift supervisor
Any comment:	-

Data / Parameter:	HR
Data unit:	Hours
Description:	Daily operational hours for each of the boilers (2 * 15MT/hour boilers)
Source of data to be used:	Plant operation records
Value of data applied for the purpose of calculating expected emission reductions:	8,000
Description of measurement methods and procedures to be applied:	Plant daily operation records maintained at the project site
QA/QC procedures to be applied:	Periodic verification by site/shift supervisor
Any comment:	-

Data / Parameter:	$RH_{consumed}$
Data unit:	MT
Description:	Annual quantity of rice husk used in the each of the 15 MT/hour boiler
Source of data to be used:	As per PLC reading for the feeding chambers located before the respective boilers and recorded in the daily production report
Value of data applied for the purpose of calculating expected emission	Estimated annual value is 44,880 tonnes of rice husk per boiler in Phase I and 89,760 tonnes in Phase II

reductions:	
Description of measurement methods and procedures to be applied:	On-line air-lock system based flow meter (continuous basis) using equipment provider's empirical formula using input data on mass flow.
QA/QC procedures to be applied:	Periodic verification by site/shift supervisor
Any comment:	-

Data / Parameter:	$RH_{supplied}$ or $RH_{regional}$
Data unit:	MT
Description:	Annual quantity of rice husk purchased from a rice mill located nearby the project as per dedicated supply contract, which is accounted for as the rice husk procured from the region from a source not affected by any other 'competing demand for the same quantity of rice husk'
Source of data to be used:	As per the invoice for rice husk purchase from the rice mill
Value of data applied for the purpose of calculating expected emission reductions:	Estimated annual value is 44,880 tonnes of rice husk in Phase I and 89,760 tonnes in Phase II
Description of measurement methods and procedures to be applied:	Not required
QA/QC procedures to be applied:	Check of the invoice by the site accounts department prior to payments made
Any comment:	The source of the rice husk is new rice mill that did not provide rice husk to other consumers. Hence, there was no competing demand for the rice husk consumed by the project.

3.4 Description of the monitoring plan:

In relation to information included in sections 3.2 and 3.3, the monitoring plan includes suggested procedures for the estimation of the following using monitored operational data from project records identified in section 3.3.

Step 1: Using "Steam Table" and monitored values of steam temperature ($Temp_{Steam}$ in '^{o}C'), pressure (P_{Steam} in 'MPa') and temperature of feedwater ($Temp_{feedwater}$ in '^{o}C'), the enthalpy (in 'kJ/kg') of delivered steam will be determined on an hourly basis for the monitoring period for which emission reductions will be monitored.

Step 2: The hourly steam flow (FL_{Steam} in 'MT/hour' converted to 'kg/hour') delivered to the "steam customer" will be multiplied by the enthalpy of steam delivered (in 'kJ/kg') to obtain the hourly value of thermal energy delivered to the steam consumer ($EG_{thermal}$ in 'kJ/hour').

Step 3: The total thermal energy ($EG_{thermal,y}$ in 'TJ') delivered to the 'steam consumer' will be calculated as the summation of each hourly value of thermal energy delivered to the steam consumer ($EG_{thermal}$ in 'kJ/hour' converted to 'TJ/hour') over the corresponding monitoring period (HR in 'hour').

Step 4: Baseline emissions ($BE_{thermal,CO2,y}$ in 'tCO_{2e}') avoided during the monitoring period 'HR' (or 'y') by virtue of steam delivered to the "steam customer" will be calculated as per the following formula as per clause 15 in AMS I.C (version 16):

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

where,

$\eta_{BL,thermal}$	the efficiency of the coal based baseline plant that would have been used in the absence of the project
$EF_{FF,CO2}$	the CO_2 emission factor of the fossil fuel (in this case, coal) that would have been used in the baseline plant; in tCO_2/TJ; this is taken from IPCC.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

CDM baseline and monitoring methodology AMS I.C version 16 **"Thermal energy production with or without electricity"** is applied for GHG emission reductions estimation of the project activity. The relevant equations are reproduced in this PD from this methodology and appropriate values are used for the estimations.

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

Phase I: Operation of one 15 MT/hour rice husk based boiler

In Phase I, at a minimum, either of the two boilers is expected to be operated with rice husk. The project alternative will be to generate same quantum of thermal energy using coal as the baseline fuel. Thus, the baseline emissions for Phase 1 implementation of the project with 330 days (approximately, 8000 hours) operation per year are calculated using clause 15 in AMS I.C (version 16).

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

where,

$BE_{thermal,CO2,y}$	the baseline emissions from steam/heat displaced by the project during the year 'y'; in tCO_2
$EG_{thermal,y}$	the net quantity of steam/heat supplied by the project during the year 'y'; in TJ
$\eta_{BL,thermal}$	the efficiency of the coal based baseline plant that would have been used in the absence of the project
$EF_{FF,CO2}$	the CO_2 emission factor of the fossil fuel (in this case, coal) that would have been used in the baseline plant; in tCO_2/TJ; this is taken from IPCC

$EG_{thermal,y}$ is calculated based on the difference in total steam enthalpy and total feed water enthalpy times multiplied by annual steam quantity.

Steam enthalpy (superheated at 3.82 MPa and 450^{o}C) = 3,332.52 kJ/kg

Feed water enthalpy (saturated at 0.103 MPa and 104^{o}C) = 419 kJ/kg

Annual steam quantity = 15 MT/hour * 8,000 hours = 120,000 MT

$EG_{thermal,y}$
= (120,000 MT) * (3,332.52 kJ/kg – 419 kJ/kg) * (10^3 kg/MT) * (TJ/10^9 kJ)
= 349.62 TJ

$EF_{FF,CO2}$ = 94.6 tCO_2/TJ, as per IPCC

$\eta_{BL,thermal}$ = 100%, as per Clause 18(c) of AMS I.C (version 16)

$BE_{thermal,CO2,y}$ = (349.62 TJ/100%) * (94.6 tCO_2/TJ) = 33,074 tCO_2.

Phase II: Operation of two 15 MT/hour rice husk based boilers

When the project will operate two boilers (i.e., 30 MT/hour), the baseline emissions will be twice that of Phase I, i.e., 66,148 tCO_2.

4.3 Quantifying GHG emissions and/or removals for the project:

As described in section 2.3, no GHG emissions or removals are applicable in relation to the operation of the project.

4.4 Quantifying GHG emissions reductions and removal enhancements for the GHG project:

As explained in section 4.2, the annual baseline emissions are 33,074 tCO_{2e} in Phase I and 66,148 tCO_{2e} in Phase II.

As discussed under section 2.3, there are no project emissions from use of rice husk, and its collection, processing and transportation.

The procurement of rice husk will be from a rice mill located nearby the project and hence within 200km radius from the project. There was no competing use of these rice husk prior to the project. Hence, there will be no leakage emissions as a result of the project.

Therefore, the annual emission reductions (ER_y) are equal to baseline emissions, and will be 33,074 tCO_{2e} in Phase I and 66,148 tCO_{2e} in Phase II.

5 Environmental Impacts:

The Environmental Impact Assessment report for the project has been prepared and has been approved by the Environmental Protection Bureau (dated 5 August 2010). The overall social and environmental impacts of the project activity were deemed to be positive towards the livelihood of the local community. The project proponent included assessment of the environmental impacts in air quality, water quality, noise, and solid waste pollution.

Air Quality

During the operation period, particulates are expected to be generated from burning of rice husks. All process design and concentration of emissions will be consistent with national environment standard.

Water Quality

The major source of waste water will be the chemical water station acid-alkali waste water, boiler-wash water, recycled water station waste water and sanitary waste. The waste water will be treated by local sewage treatment plants and the treated water will be discharged into Laozhang river. The main substances contained in the water are COD, BOD_5 and suspended solids, the concentrations of which meet National Standards DB21-60-89 II.

Noise

During the operational period, the noise will be generated from the vibration of machinery equipments such as turbine, and motors. The low noise equipments have been selected during the plant design, and the necessary noise-reducing measurements are going to be implemented as well. The noise level inside and outside the plant boundary is expected to meet the National Standards GB 12348-90III.

Solid Waste

The ash from boiler will be the main source of solid in the plant. The ash will be given away to a third party for use silica processing.

6 Stakeholders comments:

The stakeholder consultation process was part of the environmental impact assessment study before the start of the project . This was done through a questionnaire survey; 35 questionnaires were distributed to the interested survey participants and the following is a summary of the key findings:

- 91.5% of the respondents supported the construction of the project, 5.8% of the respondents were not aware about the project, and 2.8% of the respondents did not indicate any preference.

- 94.3% of the respondents believed the project would bring improvement to the local economy and living standard, 5.7% of the respondents did not provide any answer.

The stakeholder survey showed that most respondents supported the project. There were some concerns on the environmental impacts during construction and operation phase; the PP will comply with the regulations from the government authorities on monitoring any environmental impacts.

7 Schedule:

- Budget (AFCE) approval: 31 July 2008

- Date of award of EPC contract: 10 May 2009

- Completion of construction of 1st boiler: 18 October 2009

- Start of operations (Phase I): 10 December 2009

- Start of operations (Phase II): Expected start in around 2 years from commissioning of Phase I

- Date of terminating the project: The project is expected to operate for at least 15 years from the date of start of steam delivery in Phase I.

- The monitoring and reporting of parameters for the purpose of emission reduction calculations during the crediting period, including the frequency of monitoring will be as detailed under sections 3.2, 3.3 and 3.4.

8 Ownership:

8.1 Proof of Title:

In respect of the GHG emissions that will be reduced by operation of the project described in this PD, the following information is available in the name of the PP which demonstrate that the PP has right to use:

- 'in-principal approval to operate the project'
- equipment contracts for major equipment such as the boilers
- 'steam sale contract by the PP with the steam customer'.

8.2 Projects that reduce GHG emissions form activities that participate in an emissions trading program (if applicable)

Not applicable. The project activity's emissions reduction is not included in an emissions trading program and do not take place in a jurisdiction with binding limits on GHG emissions.