CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

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Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

>>
15 MW Biomass Residue Based Power Project at Ghazipur, India
Version 05, 08/12/2009

A.2. Description of the project activity:

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The proposed CDM project activity is undertaken by Sukhbir Agro Energy Limited (SAEL) in Ghazipur district of Uttar Pradesh state, India. The project involves installation of a new 15MW capacity steam turbine to generate electricity and export surplus power to the regional grid. The project activity will use rice husk, a by-product of paddy processing, as fuel. The project activity thus proposes to reduce GHG emissions by displacing the fossil fuel dominated grid based electricity with biomass residues based renewable electricity.

Under the project activity SAEL proposes to install a new 70 tonnes per hour (TPH) capacity travelling grate boiler and a new 15 MW extraction cum condensing turbine to generate electricity, along with all accessories and equipments. The cogeneration system will be commissioned within the premises of a 40 TPH milling capacity Rice Mill for paddy processing and a 500 tonnes per day (TPD) Solvent Extraction Plant. At present a 10 TPH rice husk fired boiler meets the heat demand of facility and the electricity demand is met through supply from grid. After the implementation of the project activity the captive heat and electricity demand of the rice mill and solvent extraction plant will be met by the project activity. The surplus electricity from the project activity will be exported to the regional grid.

The project activity will operate in season as well as during off-season period of the rice mill. During season, after meeting the captive power demand of approximately 2 MW, the net surplus power will be sold to the regional grid. Similarly, during off-season the net surplus power after meeting an expected approximate 1.0 MW of captive demand will be exported to grid. A Power Purchase Agreement (PPA) has been signed between the project promoter, Sukhbir Agro Energy Limited and the state electricity utility, Purvanchal Vidyut Vitran Nigam Limited (PVVNL). The power output from the turbo generator will be at 11 kV and this will be stepped up to 132 kV at the local step-up sub-station before being connected to grid.

The project activity proposes to use rice husk for combustion and generation of steam. Rice husk is a by-product of paddy processing. The rice grain is covered with a woody husk or hull (rice husk), which is indigestible and is to be removed in the first step during processing for making the rice edible. Under the project activity scenario, part of the rice husk requirement will be met by the in-house generation of rice husk in the rice mill. The remaining quantity will be procured from surrounding areas.

Contribution towards sustainable development
SAEL management envisaged that the project activity through the production of renewable energy contributes to sustainable development through the reduction of GHG emissions in the region. The project will also provide direct and indirect employment opportunities to the local community. The sustainable development potential of the project activity is highlighted through the following broad categories:

- Contribution to environmental well-being.
- Contribution to socio-economic well-being.

- Contribution of technical well-being.

Contribution to environmental well-being

- The project activity will result in GHG emission reduction of 0.8 tCO_2e per MWh of electricity generated in the project plant by utilising biomass residues as fuel and displacing fossil fuel dominated grid electricity.
- In addition to the reduction in carbon dioxide (CO_2) emissions the project implementation will result in reduction of other harmful gases (NOx and SOx) that arise from the combustion of coal used in power generation. The project will also lead to reduced ash generation since the ash content in rice husk is lower than that of Indian coal.

Contribution to socio-economic well - being

- The project activity will result in direct and indirect employment opportunities for local persons towards installation, operation and maintenance of the proposed project activity.
- The proposed project activity will result in increased business opportunities for local contractors and suppliers during the various phases. Also, the collection and transportation of biomass residue will involve manpower requirement throughout the year, thereby creating an opportunity for employment generation. This will contribute towards improvement of the local economic structure and the social status of the people involved, clearly indicating positive socio-economic impact in the local area.

Contribution to technological well-being

- In the state of Uttar Pradesh, biomass residue based power projects are primarily been dominated by bagasse based cogeneration projects in the sugar mills. There are very few other biomass residues based grid connected power projects in the state[1] The Uttar Pradesh state is the second largest producer of rice in the country (approximately 13.38% of the India production[2]) and despite this rice husk based power generation is still not actively prevalent in the state. The installation of proposed project activity will significantly contribute towards technological well being in the region by promoting similar projects.
- The technology being used in the project activity represents the environmentally safe technology for the application of power generation. The equipments being supplied for the project activity are from well established equipment manufacturers. Installation of such plant at SAEL substantially upgrades the technological level of the industry, introducing superior skills and competencies.

The information mentioned above concludes that the subject project activity of rice husk based cogeneration project is first of its kind project of such large capacity in the state of Uttar Pradesh in spite of large capacity of rice mills available in the state. Project activity's contribution to sustainable development parameters of the host country has been described and it is evident that project activity meets all the criteria of sustainable development policy of host country.

A.3. Project participants:

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[1] Source: http://mnes.nic.in/booklets/Book2-e.pdf

[2] Source: http://planning.up.nic.in/innovations/inno3/ae/rice.htm

Name of the Party involved (*) ((host) indicates a host party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	**Private entity:** Sukhbir Agro Energy Ltd	No
India (host)	**Private entity:** Federation of Indian Chambers of Commerce and Industry	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

Sukhbir Agro Energy Limited is the project owner and Federation of Indian Chambers of Commerce and Industry is the CDM project developer. Contact information is provided in Annex I. The Host Country India has ratified the Kyoto Protocol to the United Nations Framework Convention on Climate Change on 26th August 2002.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party (ies):

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India

A.4.1.2. Region/State/Province etc.:

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Uttar Pradesh

A.4.1.3. City/Town/Community etc:

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Village: Fatehullahpur, District: Ghazipur

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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The project activity is located in the premises of a rice mill and solvent extraction plant of Sukhbir Agro Energy Limited at Village Fatehullahpur, district Ghazipur, Uttar Pradesh, India. The project is located on Varanasi-Gorakhpur highway and is about 60 Km away from Varanasi. The project is about 10 km away from Ghazipur railway station. Nearest airport is Babatpur in district Varanasi which is about 65 km away. The coordinates of Ghazipur are:
Latitude – between 25° 19' and 25° 54' North
Longitude – between 83° 4' and 83° 58' East

A.4.2. Category (ies) of project activity:

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As per the scope of the project activity, project is categorized under Scope Number 1, Sectoral Scope - Energy industries (renewable/ non-renewable sources).

A.4.3. Technology to be employed by the project activity:

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The proposed power project will consist of following main units:

- One 70 TPH capacity biomass residue fired boiler.
- One 15 MW capacity extraction cum condensing type turbo generator.

The cogeneration system will be commissioned within the premises of a 40 TPH milling capacity Rice Mill for paddy processing and a 500 TPD Solvent Extraction Plant. In the pre-project scenario a 10 TPH rice husk fired boiler met the heat demand of facility while the electricity demand is met through supply from grid. After the implementation of the project activity the captive heat and electricity demand of the rice mill and solvent extraction plant will be met by the project activity. The surplus electricity from the project activity will be exported to the regional grid.

The project activity will also include all auxiliary installations and systems, including Electrostatic precipitator (ESP), cooling water system and cooling tower, ash handling system, feed water system, raw water system and DM plant, electrical system and control and instrumentation.

The technical specifications of the key equipments are as follows

Major Technical Parameters of Boiler

Description	Parameters
No of boilers	One (1)
Makers	ISGEC John Thomson (IJT)
Type	Bi-drum, natural circulation, balanced draft, bottom supported, outdoor water tube type travelling grate
Steam flow at main steam stop valve outlet (100% BMCR)	70 TPH
Steam pressure at main steam stop valve outlet	67 kg/cm^2 (g)
Steam temperature at main steam stop valve outlet	490 +/- 5 deg C.
Feed water temperature at the economizer inlet	126 deg C
Design code for pressure parts	IBR

The boiler is designed with following design codes:

- Pressure parts: IBR 1950 with latest amendments
- Piping: ANSI 31.1 & IBR 1950
- Boiler performance: ASME PTC 4.4 – Indirect Method

The Electrostatic Precipitator procured for installation at the downstream of boiler flue gases has been designed not only to meet the regulatory norms (150 ppm) of State Pollution Control Board but significantly decrease the SPM level before exhausting to atmosphere. It is expected to control SPM below 100 ppm.

The boiler supplied by IJT has added advantage in terms of quick and easy ash removal process, high efficiency, quick response to load change, greater reliability, ease of maintenance and step less (smooth) change in grate speed.

Major Technical Parameters of Steam Turbine generator

Description	Parameters
No of Turbine	One (1)
Makers	Qingdao Jieneng Power Station Engineering Co., Ltd (QJPS)
Type	Extraction cum condensing
Rated capacity of turbine	15 MW with 10TPH extraction at 2.5 ata
Steam conditions at turbine inlet pressure (abs)	64 kg/cm^2 (g)
Temperature	485 +/- 5 deg C.
Condenser operational pressure (ata)	0.106
Recommended temperature rise in the cooling tower (deg C)	9.6
Rating at the generator terminals (MW)	15
Electrical generator	One 11kV, 50Hz, 0.8 power factor

The turbine is designed and manufactured according to following standards:

- For turbine, it is GB/T5578-1985 "Technical specifications for stationery steam turbine" which is equivalent to IEC 34:
- For Generators, it is GB/T6064-2002, "General technical specification for turbo generator", which is equivalent to IEC-34

DM Plant: This is single stream manually operated DM plant with flow rate of 6m^3/hr.

The power will be generated at 11 kV from the turbine generator. The power output from the turbine generators will be stepped up to 132 kV at SAEL plant and then connected to the regional grid line.

The technology of biomass based power generation is well established in India and the project doesn't involve any transfer of technology. The technology being used is environmentally safe and sound.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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Years	Annual estimation of emission reductions in tonnes of CO2 e
2009-10	67,259
2010-11	67,259
2011-12	67,259
2012-13	67,259
2013-14	67,259
2014-15	67,259
2015-16	67,259
2016-17	67,259

2017-18	67,259
2018-19	67,259
Total estimated reductions (tonnes of CO2 e)	**672,590**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	67,259

A.4.5. Public funding of the project activity:

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The project has received no public funding from any Annex-I country. Thus it is confirmed that there is no chance of diversion of Official Development Assistance due to this project activity.

SECTION B Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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Approved combined baseline and monitoring methodology ACM0006 (version 6.2) "***Consolidated methodology for electricity generation from biomass residues"*** is applied to the project activity

Approved combined baseline and monitoring methodology ACM0002 (version 8) "***Consolidated methodology for grid-connected electricity generation from renewable sources"*** is used to determine the baseline grid emission factor.

Baseline scenario selection and additionality determination is done by using ***"Combined tool to identify the baseline scenario and demonstrate additionality"*** version 02.2.

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

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The applicability of ACM0006 for the proposed project activity has been discussed in the table below:

Applicability condition	Project justification
The approved methodology ACM0006 is applicable to grid connected and biomass residue fired electricity generation project activities, including cogeneration.	The project activity is the installation of new grid connected cogeneration plant for exporting surplus electricity to grid. The plant will use rice husk, a by-product of paddy processing as fuel. *Applicability condition fulfilled.*
The project activity may include the installation of a new biomass residue fired power plant at a site where currently no power generation occurs (**greenfield power projects**);	The proposed project activity is the installation of new biomass based cogeneration system where currently no power generation occurs and hence the project is a ***Greenfield Power Project Activity***. *Applicability condition fulfilled*
No other biomass types aside from biomass residues, as defined in consolidated baseline methodology ACM0006 will be used in the project plant.	The project activity will be utilizing rice husk. No other biomass types aside from biomass residues, as defined in consolidated baseline methodology ACM0006 will be used in the project plant. *Applicability condition fulfilled.*
For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;	Implementation of the project activity will not result in an increase of the processing capacity of paddy in the rice mill. Increase in processing capacity will require addition of new equipments in the mill and solvent extraction plant. *Applicability condition fulfilled*
The biomass residues used by the project facility should not be stored for more than one year.	The project activity will be partially fired with in-house rice mill generated rice husk and partially by purchasing rice husk from outside. Considering the storage space available and the consumption pattern of rice husk, there is no provision to store

	rice husk for more than one year. *Applicability condition fulfilled*
No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils).	Rice husk is burnt in boilers as generated from the rice mill and does not require any specific technology for its preparation before combustion. Hence no electricity/energy will be consumed on account of preparation of the same. *Applicability condition fulfilled.*

The project activity meets all the applicability conditions of the methodology and hence justifies the selection of approved consolidated baseline methodology ACM0006 version 06.2 for the proposed project activity.

B.3. Description of the sources and gases included in the project boundary

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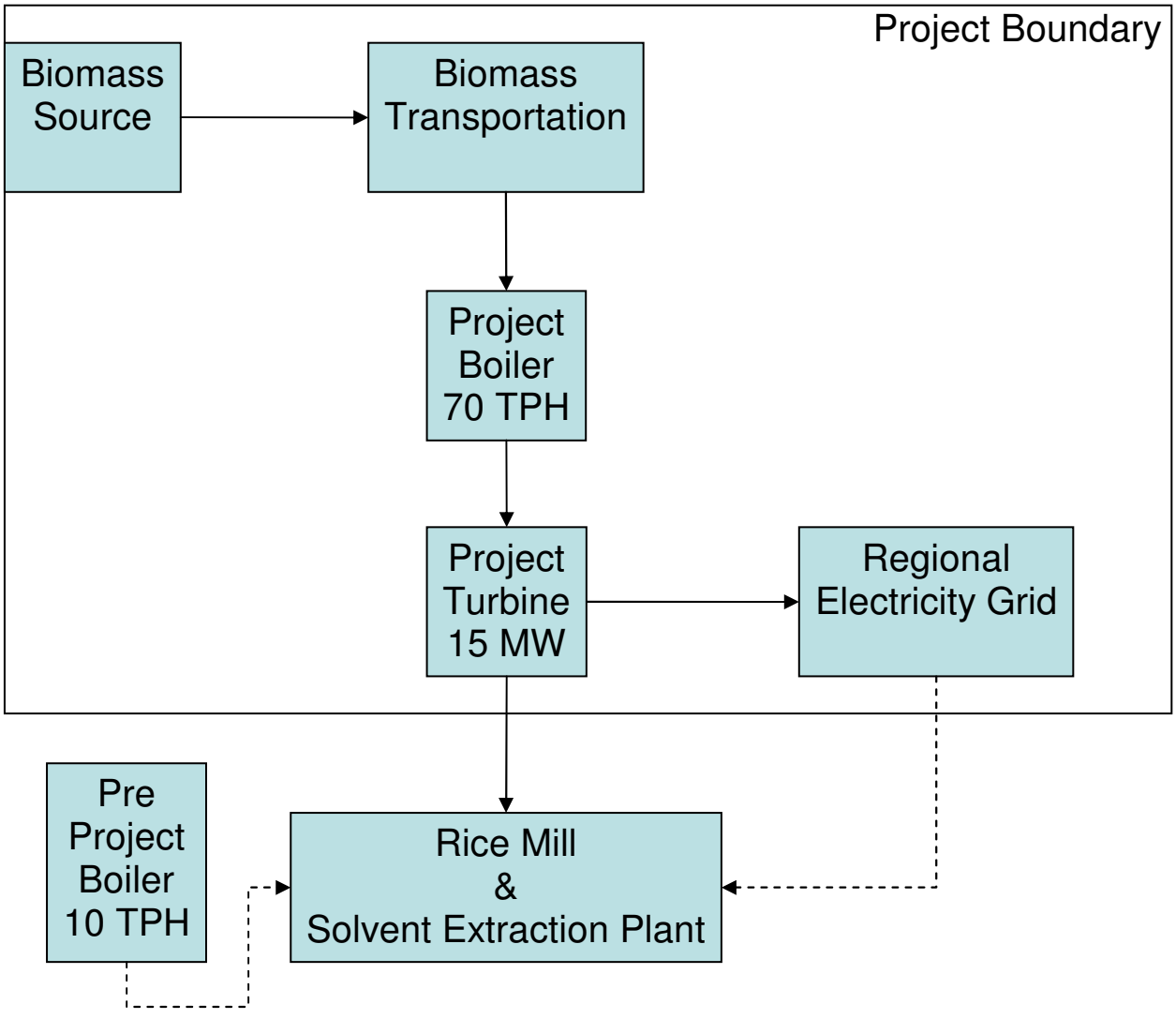
Spatial extent of the project boundary:

The spatial extent of the project boundary encompasses the plant at the project site, transportation of biomass residues to the project site (e.g. vehicles), and the electricity/grid system that the proposed project activity is connected to. The diagram below explains the project boundary explained above:



The Indian power grid system is split into five regions. The regional grids facilitate the transfer of electricity between states, which is supplied by state-owned and central sector power generating stations. Uttar Pradesh state falls within the Northern Region, hence grid based plants supplying electricity to the Northern Grid are chosen as the sample for the analysis of the grid emission coefficient.

Calculation of build margin (BM) and operating margin (OM) emission factors as given in methodology ACM0006 (version 6.2) states that "If the power generation capacity of the project plant is less or equal to 15 MW, project participants may alternatively use the average CO2 emission factor of the electricity system, as referred to in option (d) in step 1 of the baseline determination in ACM0002". The latest version (Version 8) of ACM0002 does not have step 1 and option (d) referred. It states "If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following: Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. This is referred in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" as used in ACM0002 version 8 for determination of CO2 emission factor. In the host country India, Central Electricity Authority (CEA) is responsible for technical coordination and supervision of programmes and is also entrusted with a number of statutory functions. CEA publishes the emission factor data using combined margin approach based on approved methodology ACM 0002. PDD is using the latest data of emission factor published by CEA for baseline emission calculation.

Emission sources within the project boundary:
As per ACM0006, for the purpose of determining GHG emissions of the **project activity**, project participants shall include the following emissions sources:

- *CO2 emissions from on-site fossil fuel and electricity consumption that is attributable to the project activity. This includes fossil fuels co-fired in the project plant, fossil fuels used for on-site transportation or fossil fuels/electricity used for the preparation of the biomass residues, e.g., the operation of shredders or other equipment, as well as any other sources that are attributable to the project activity; and*

  The proposed project activity will use rice husk as fuel, which does not require any preparation before being fed to the boiler. Hence, no fossil fuel or electricity consumption has been envisaged for the project activity. Fossil fuel will not be used for either start up or co-firing purpose in the project activity. Start up of boiler will be done using old jute bags available in plenty for packaging purposes. Hence, CO2 emissions from on-site fossil fuel and electricity consumption are not included in the boundary.

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- *CO2 emissions from off-site transportation of biomass residues that are combusted in the project plant:*

  CO2 emissions from off-site transportation biomass residues that may be required in addition to the rice husk (biomass residue) generated in rice mills in house are included in the project boundary and will be measured and accounted as project emission. The collection of biomass residue and survey of surplus availability of biomass residue (rice husk) is considered to be within 200 km. This is in line with the requirement mentioned in the *Leakage* section of the methodology to limit the region of biomass residue collection within 200 km. The area consists of nine districts considering 100 Kms radius and 26 districts considering 200 Kms radius in the states of Uttar Pradesh and Bihar. PP has considered this as biomass procurement region for the project activity. This is in line with the requirement mentioned in the *Leakage* section of the methodology to limit the region of biomass residue collection within 200 km. This has been indicated on page 3 of "A report on Biomass Residue Availability Survey for 15 MW Biomass

Residue Based Power Plant at District Ghazipur, Uttar Pradesh". The surplus rice husk availability while considering 100 Kms radius works out to be 78% whereas considering 200 Kms radius it works out to be 91.6% surplus. List of target districts is as below:

Uttar Pradesh:

Within 100 Kms Radius			Over 100 Kms but upto 200 Kms Radius		
S.N.	District	Average Distance(Kms)	S.N.	District	Average Distance(Kms)
1	Ghazipur	Plant Location	1	Mirzapur	160
2	Mau	59	2	Sant Ravidas Nagar	127
3	Varanasi	70	3	Deoria	128
4	Chandauli	72	4	Gorakhpur	146
5	Azamgharh	91	5	Ambedkar Nagar	150
6	Ballia	98	6	Sant Kabir Nagar	160
7	Jaunpur*	104	7	Sonbhadra	174
			8	Kushinagar (Padruna)	195
			90	Basti	195
			10	Sultanpur	198

Bihar:

Within 100 Kms Radius			Over 100 Kms but up to 200 Kms Radius		
S.N.	District	Average Distance(Kms)	S.N.	District	Average Distance(Kms)
1	Buxer	55	1	Bhojpur	115
2	Bhabua	78	2	Rohtas	118
			3	Saran	140
			4	Aurangabad	153
			5	Patna	160
			6	Gopalganj	183
			7	Siwan	195

* Has been considered within 100 Kms radius.

- *Where applicable, CH4 emissions from anaerobic treatment of wastes originating from the treatment of the biomass residues prior to their combustion.*
  In the subject project activity the biomass residues do not require any treatment before combustion in boiler. Hence, CH4 emissions from anaerobic treatment of wastes originating from the treatment of the biomass residues prior to their combustion do not exist and hence are not included in the project boundary.

For the purpose of determining **baseline emissions**, project participants shall include the following emission sources:

- *CO2 emissions from fossil fuel fired power plants at the project site and/or connected to the electricity system*
  No fossil fuel based power plants existed at the project site before the proposed project activity and hence only CO2 emissions from Northern region grid are included in the project boundary, the emission factor is available through locally published data from Central Electricity Authority (CEA) and have been taken from latest published data of emission factor by CEA.

- *CO2 emissions from fossil fuel based heat generation that is displaced through the project activity*
  There was no fossil fuel based heat generation at the project site before the project activity, only biomass residue was combusted to generate heat. Proposed project activity involves displacement of fossil fuel for electricity generation only and not for heat generation because the similar baseline emissions existed for heat generation. Hence, CO2 emissions from fossil fuel based heat generation are not included in the project boundary.

- *The project activity does not include any CO_2 emissions related to the decomposition or uncontrolled burning of biomass residue.*
  The biomass residue (rice husk) is available in surplus (78% to 92% considering distance within 100 Kms radius to 200 Kms radius of project activity site) in the region and is either dumped or left to decay in fields or burnt in an uncontrolled manner without utilizing it for energy purposes in the baseline scenario. Emissions due to decay are not included in baseline and this is conservative assumption. The carbon di-oxide emissions from uncontrolled burning or decomposition of biomass residues are not included in the project boundary and this is a conservative assumption.

The following table summarizes the details of the GHG emissions included for the project activity.

	Source	Gas		Justification / Explanation
Baseline	Grid electricity generation	CO_2	**Included**	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Heat generation	CO_2	Excluded	Excluded. Baseline scenario for the project activity is generation of heat using the same type of biomass residue (rice husk) hence inspite of the project activity being co-generation, the emission reductions due to displacement of heat are not considered or claimed.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of surplus biomass residues.	CO_2	Excluded	Excluded, As per ACM006 Version 06, it is assumed that CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	Excluded. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative. As per ACM006 Version 06, emissions from natural decay of biomass are not included in GHG inventories as anthropogenic sources.
Project Activity	On-site fossil fuel and electricity consumption due to the project activity (stationary or mobile)	CO_2	Excluded	Excluded. On site fossil fuel and electricity consumption not envisaged in the project scenario. Waste jute bags are used for initial lit up of the boiler. These bags are received at site in plenty carrying Paddy from the field. No fossil fuel is used for start up of the system.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Off-site transportation of biomass residues	CO_2	**Included**	May be an important emission source
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Combustion of biomass residues for electricity and / or heat generation	CO_2	Excluded	Excluded, As per ACM006 Version 06, It is assumed that CO2 emissions from surplus biomass residues shall lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	Excluded. Not a significant source.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Storage of biomass residues	CO_2	Excluded	Excluded, As per ACM006 Version 06, It is assumed that CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small and cane be neglected.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Waste water from the treatment of biomass residues	CO_2	Excluded	Excluded. There is no treatment of biomass residue, hence no waste water generation is envisaged. There will not be any CO2 emissions from treatment of biomass residues and hence no changes of carbon pools in the LULUCF sector.
		CH_4	Excluded	Excluded, as no treatment of biomass residue is envisaged.
		N_2O	Excluded	Excluded for simplification. There is no treatment of biomass residue leading to generation of waste water, hence no N_2O emission is envisaged.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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The most plausible baseline scenario is identified using the "Combined tool to identify the baseline scenario and demonstrate additionality" version 02.1. The baseline scenario will be identified using the following steps as per the combined tool:

STEP 1. Identification of alternative scenarios

This step serves to identify all alternative scenarios to the proposed CDM project activity(s) that can be the baseline scenario through the following sub-steps:

Step 1a. Define alternative scenarios to the proposed CDM project activity

The combined baseline and monitoring methodology ACM0006 version 06.2 deals with power generation, heat generation and biomass residue scenarios in conjunction. Hence, the alternative scenarios are determined separately for the three heads, namely:

- How **power** would be generated in the absence of the CDM project activity;
- What would happen to the **biomass residues** in the absence of the project activity; and
- In case of cogeneration projects: how the **heat** would be generated in the absence of the project activity.

Identification of realistic and credible alternatives:

Power

Scenario/Alternative	Included/Excluded
P1 The proposed project activity not undertaken as a CDM project activity.	Included
P2 The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-)fired in the project activity.	Excluded. No biomass based power generation existed before the project activity at site
P3 The generation of power in an existing captive power plant, using only fossil fuels.	Excluded. No power generation existed before the project activity at site
P4 The generation of power in the grid.	Included
P5 The installation of a new biomass residue fired power plant, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case.	Excluded. This option would not optimally utilize the fuel because of lower efficiency. Hence it was dropped by the project proponent at the time of decision making as the IRR with low efficiency power generation was further

	lower making the project financially unviable. Besides this with rapid advancement in technology, low efficiency plant would become obsolete within few years.
P6 The installation of a new biomass residue fired power plant that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity. Therefore, the power output is the same as in the project case.	Excluded. This option would not optimally utilize the fuel because of lower efficiency. Hence it was dropped by the project proponent at the time of decision making. Also with the advancement in technology implementation of low efficiency plant would make it obsolete within few years.
P7 The retrofitting of an existing biomass residue fired power, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case.	Excluded. No biomass based power generation existed before the project activity at site
P8 The retrofitting of an existing biomass residue fired power that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity.	Excluded. No biomass based power generation existed before the project activity at site
P9 The installation of a new fossil fuel fired captive power plant at the project site.	Included

Heat

Scenario/Alternative	**Included/Excluded**
H1 The proposed project activity not undertaken as a CDM project activity	Included
H2 The proposed project activity (installation of a cogeneration power plant), fired with the same type of biomass residues but with a different efficiency of heat generation (e.g. an efficiency that is common practice in the relevant industry sector)	Excluded. This option was dropped considering the rapid advancement of technology, long-term operational life and optimal utilisation of fuel.
H3 The generation of heat in an existing captive cogeneration plant, using only fossil fuels	Excluded. No fossil fuel based heat generation existed

	before the project activity at site
H4 The generation of heat in boilers using the same type of biomass residues	Included
H5 The continuation of heat generation in an existing biomass residue fired cogeneration plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as in the project activity	Excluded. No biomass residue based cogeneration plant existed before the project activity at site
H6 The generation of heat in boilers using fossil fuels	Excluded. With rice husk available as an internal source of fuel, generation of heat using fossil fuels will not be a plausible alternative. Also with the small 10 TPH boiler in place, further investment will have to be done to install a similar capacity fossil fuel fired boiler would involve.
H7 The use of heat from external sources, such as district heat	Excluded. No provision of district based heating source or other such alternative is prevalent in the country.
H8 Other heat generation technologies (e.g. heat pumps or solar energy)	Excluded. This option was not considered because of in-house generation of rice-husk (biomass residue) and very high investment cost towards other heat generation technologies such as heat pump or solar energy. Besides this in absence of the project activity the biomass residue could have been wasted leading to higher GHG emission. Hence investment in the other technology as not an alternative scenario.

Biomass

Scenario/Alternative	**Included/Excluded**

B1 The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.	Included
B2 The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields.	Excluded. This activity of anaerobic decay is not into practice in the region of the project activity
B3 The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.	Included
B4 The biomass residues are used for heat and/or electricity generation at the project site	Included
B5 The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power plants	Excluded. This is the first grid-connected project activity based on rice husk in the Uttar Pradesh State. This is demonstrated from the letter received from UPPCL.
B6 The biomass residues are used for heat generation in other existing or new boilers at other sites	Included.
B7 The biomass residues are used for other energy purposes, such as the generation of biofuels	Excluded. There is no other commercial and established use of rice husk for energy purpose except for combustion to generate energy, in the region. This is also established from the biomass assessment study done.
B8 The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry)	Excluded. There is no other use of rice husk except for combustion to generate energy, in the region. This is also established from the biomass assessment study done.

The realistic and credible alternatives identified for this project activity are

For power generation, the realistic and credible alternatives are:

1. The proposed activity not undertaken as a CDM project activity, P1
2. The generation of power in grid, P4
3. The installation of new fossil fuel fired power plant of same capacity, P9

For heat generation, the realistic and credible alternatives are:

1. The proposed activity not undertaken as a CDM project activity, H1

2. The generation of heat in boilers using the same type of biomass residues, H4

For biomass residues, the realistic and credible alternatives are:
1. The biomass residues are used for heat generation at the project site, B4
2. The biomass residues are dumped or left to decay on fields, B1
3. The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes, B3
4. The biomass residues are used for heat generation in other existing or new boilers at other sites, B6

Outcome of Step 1a: List of plausible alternative scenarios to the proposed project activity that can be baseline scenario under the heads – power generation, heat generation and biomass has been listed above.

Sub-step 1b. Consistency with mandatory applicable laws and regulations:

All the alternatives identified under the three heads in step 1a are consistent with the laws and regulations prevalent in host country India. The Indian law allows power/heat generation from fossil fuels or biomass residues. The surplus biomass residues normally are left in the field for decaying or are burnt in an uncontrolled manner. It is therefore fair to say that these options are consistent with the applicable laws and regulations as under existing practices.

Outcome of Step 1b: All the plausible alternative scenarios for the proposed project activity under the heads – power generation, heat generation and biomass as listed above are in compliance with mandatory legislation and regulations under existing practices.

Based on the plausible alternatives mentioned above, in line with ACM0006 version 06.2 the credential combination(s) of baseline scenarios for power, heat and biomass is (are):

SN	Scenario	Baseline Scenario			Description of Situation
		Power	Biomass	Heat	
1	3	P4	(B1 or B2 or B3) and B4	H4	*The project activity involves the installation of a new biomass residue fired cogeneration plant at a site where no power was generated prior to the implementation of the project activity. The power generated by the project plant is fed into the grid or would in the absence of the project activity be purchased from the grid. The biomass residues would in the absence of the project activity (a) be used for heat generation in boilers at the project site and (b) be dumped or left to decay or burnt in an uncontrolled manner without utilizing it for energy purposes. This may apply, for example, where the quantity of biomass residues that was not needed for heat generation was dumped, left to decay or burnt in an uncontrolled manner prior to the project implementation. The heat generated by the new cogeneration plant would in the absence of the project activity be generated in boilers using the biomass residues that are fired in the cogeneration plant.*
2	12	P4	B4	H4	*The project activity involves the installation of a new*

					biomass residue fired cogeneration plant, which is operated next to (an) existing biomass residue fired power plant(s). The existing plant(s) are only fired with biomass residues and continue to operate after the installation of the new cogeneration plant. The power generated by the new cogeneration plant is fed into the grid or would in the absence of the project activity be purchased from the grid. The biomass residues fired in the project plant would in the absence of the project activity be used for heat generation in boilers at the project site. This may apply, for example, where the biomass residues have been used for heat generation in boilers at the project site prior to the project implementation. The heat generated by the new cogeneration plant would in the absence of the project activity mainly be generated in boilers at the project site.

As shown above the plausible combined alternatives narrow down to scenario 3 and scenario 12. The scenario 12 is not applicable for the proposed project activity, since it is a Greenfield power project. Hence, in line with ACM0006 version 06.2 the only plausible alterative to the project activity is scenario 3, which also describes the actual situation of project activity.

The other alternative to the project activity is "The proposed project activity not undertaken as a CDM project activity".

Thus the plausible alternative scenarios to the project activity are:

1. Scenario 3 of "Consolidated methodology for electricity generation from biomass residues" ACM0006 version 06.2
2. The proposed project activity not undertaken as a CDM project activity.

STEP 2. Barrier analysis

Sub-step 2a. Identify barriers that would prevent the implementation of alternative scenarios:

A complete list of identified realistic and credible barriers that may prevent alternate scenarios to occur is furnished as below for point no.2 i.e. if the proposed project activity is not undertaken as a CDM project activity:

Institutional barriers

1. PPA tariff and poor implementation of policies related to biomass based power sector:

The viability of biomass based power projects exporting electricity to grid depends primarily on the power purchase tariff decided by the distribution company, in this case PVVNL. The Uttar Pradesh Electricity Regulatory Commission has announced the tariff[3] for sale of power from renewable

[3] Terms and conditions for supply of power and fixation of tariff for sale of power from captive generating plants, co-generation, renewable sources of energy and other non- conventional sources of energy based plants to a distribution licensee, 2005

sources of energy for the term 2005-06 to 2009-10. The short term PPA and indicated tariff rate applicable after 2009-10 are yet not defined. The term and condition has risk associated with the project activity considering the escalation in the price of biomass and corresponding tariff rate agreed by the distribution company. Situation may aggravate to a level leading to closure of unit if the CDM benefits are not made available as part of financial consideration. In addition to changing political situations in the state uncertainty of tariff determination post 2009-10 is also an existing risk to the project activity.

Besides this the tariff rate in the state of Uttar Pradesh is among the lowest provided by various state regulatory bodies for biomass based power[4] (This has been further substantiated with details compiled from present state electricity regulatory bodies tariff orders for biomass based electricity). Thus with the prevalent tariff level, the proposition of selling biomass based power to grid does not become a viable option.

PPA details a rebate of 1.25%[5] on the billed amount for payment made within one month (Refer PPA) and this further reduces the revenue from electricity sale, thus affecting financial viability of project activity adversely.

It is notified that the Government of host country has plans and policy to encourage biomass-based power generation and this has increased awareness related to the potential for biomass residue based power, but the steps to exploit these underutilized energy resources gets complicated by the array of policies and regulations found in the Indian power sector. Although the Indian Government has made recommendations on power sector restructuring and pricing policies; the exact details of the application of these regulations and policies are required to be implemented effectively at the state level. Because of lack of implementation capacity the renewable energy sector is witnessing comparatively very slow growth[6]. SAEL in spite of all these challenges has taken the initiative to implement the project activity considering that the additional CDM revenue will offset these risks.

Apart from this there are other noteworthy additional difficulties existing in the form of technical barriers faced by the project proponent that are not quantifiable but have posed hurdle towards the successful implementation of the project.

Technological barriers

1. Lack of availability of skilled manpower:

Availability of skilled manpower in the region to operate plant continuously and efficiently is a practical barrier envisaged by the project promoters. This eastern part of Uttar Pradesh, India region has a history of low industrial potential[7] since last many years and hence lack of technically trained local people is considered as a major constraint. In absence of technically skilled personnel required for efficient and safe operation of the plant, the project activity faces a major risk. It is the commitment and initiative of top management team of SAEL supervising the project team that has dynamic vision and plans related to this environment friendly project. The commitment to timely and qualitative completion of these jobs requiring high skill has necessitated import of the skilled persons from other states. The project thus

[4] http://www.newenergyindia.org/Policy%20Page.htm (State Specific Incentives)

[5] Power purchase agreement between SAEL & PVVNL

[6] http://www.newenergyindia.org/Policy%20Page.htm (Policy-Level Challenges)

[7] http://en.wikipedia.org/wiki/Ghazipur#Industrial_Condition

clearly has to be heavily dependent on continuous training of the manpower to ensure efficient and continuous operation. The SAEL management is also working on acquiring trained manpower from other industrially developed regions (with an impact to the increased costs associated with salary & wages) and investing on the less experienced manpower.
Besides this Power generation is not the core business of SAEL. The company is mainly engaged in operation of a rice mill and solvent extraction unit. Power generation is a diversification from the core business field and will require SAEL to meet the challenges for successful implementation and operation of the project activity.

2. Effect of Silica present in Rice husk ash: Rice husk ash has higher silica percentage than coal and hence is more abrasive than the coal ash. This was envisaged to have long term effect, causing higher adverse abrasive impacts on boiler tubes and other critical parts resulting into weakening and failure of boiler tubes, increased maintenance cost, frequent breakdowns and increased downtime.

Description of the identified technological barriers as above was a limiting factor to prohibit the scenario if the project activity was considered without CDM consideration.

Outcome of Step 2a: The barriers that may prevent alternative scenario "The proposed project activity not undertaken as a CDM project activity" to occur are described as above and are indicated as below:

1. Technological barriers
2. Institutional barriers

Sub-step 2b. Eliminate alternative scenarios which are prevented by the identified barriers:

The alternative scenario "The proposed project activity not undertaken as a CDM project activity" is prevented by the barriers listed in step 2a.

The scenario 3 of ACM0006 version 06.2 does not face any of the barriers mentioned above.

Outcome of Step 2b: The only alternative scenario that is not prevented by any of the barriers mentioned above is the scenario 3 of ACM0006 version 06.2.

As per the "combined tool to identify the baseline scenario and demonstrate additionality" version 02.1, the scenario 3 of ACM0006 version 06.2 becomes the baseline scenario for the project activity.

The barriers identified in step 2a have a financial impact on the project activity. Considering the CDM benefit only, the project activity becomes feasible and viable.

Investment analysis outcome demonstrates that registration of CDM project activity will help in alleviating the identified barriers that are preventing the proposed project activity from occurring because of prohibitive barriers described above. Project participants have also chosen to go to step 3 i.e. investment analysis to substantiate the fact that CDM incentives are essential for the project activity.

STEP 3. Investment analysis

The step 2 of "combined tool to identify the baseline scenario and demonstrate additionality" above identifies the baseline scenario of the proposed project activity. There is an option to skip step 3 and proceed directly to step 4. But, the step 3 is used to demonstrate additionality by showing that the proposed project activity is not financially attractive and it is the CDM revenue that makes it viable.

The financial indicator chosen is the internal rate of return for the project (IRR) and is most suitable for the project type and decision context. This is compared with the cost of financing which has been taken from the Prime Lending Rate (PLR) in India prevailing at the time of taking decision. PLR is conservatively estimated at ***11%***. The considered benchmark PLR rate, published by Reserve Bank of India (RBI) for five major banks, the range quoted on July 2006 was 10.75% to 11.25%. (http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/81678.pdf). Incentive from CDM will significantly reduce the risk by absorbing the expenses on training or hiring of skilled persons from other areas besides this it will reduce the losses due to technical risks, low tariff and uncertainties on account of low land holding size etc.

The CUF of project activity has been considered as 80% with 330 days of operation resulting in a PLF of 72.33% (80%*330/365). This is justified on the basis of facts prevailing such as:

1- There is only one crop of rice in a year. This is because of rain fed ecosystem existing in this part of the country. There are hardly any irrigation facilities and cultivation of paddy is entirely dependent on rain. Rainy season starts from end June and hence July to November is the season of rice cultivation. From October to February, the procurement is done by Food Corporation of India and this is indicated in Kharif Procurement Plan submitted as evidence.
2- Farmers are not able to sow rice in the non-rainy season and hence look for other crops after harvesting paddy. The region being poverty ridden area do not have mechanised practices and facilities to expedite the harvesting.
3- Besides this Boiler have to be offered annually for inspection by Boiler Inspectorate and this requires about a month's time for preparation of boiler for inspection. Preparing Boiler for inspection includes activities such as flue gas cleaning, boiler tubes cleaning, furnace cleaning, hydro testing of tubes and safety valves. In case of any tube found leaking the same has to be replaced and tested. This requires specific and authenticated competence and hence may take more than expected time occasionally.
4- Although the other activities related to maintenance of other equipments are carried out, such as critical electrical equipments, DCS, turbine etc. but downtime of 35 days in a year for maintenance reasons is practically justified practice for biomass based project activity.

Calculation and comparison of financial indicators:

The calculation of the IRR is based on the project cash inflows from sale of electricity to grid and project cash outflows related to cost of operation and maintenance of the plant, fuel cost, etc. All these costs considered are in line with industry standards.

It is indicated in PPA with State Electricity utility that electricity units after reaching 60% PLF in off season shall be paid with incentive of 3 paisa per unit. Revised IRR calculations are made considering this input parameter and this has resulted in reduced IRR of 6.75% without CDM instead of 6.78% indicated earlier.

On the basis of above assumptions, the IRR of the project computed without the inclusion of CER revenues was found to be **6.75%** and increases to **14.61%** after the inclusion of CER revenue.

IRR without CDM	Benchmark rate	IRR with CDM
6.75%	11%	14.61%

Therefore it is to be concluded that the CDM project activity has a less favourable indicator (Lower IRR, 6.78%) than the benchmark (11%). It crosses the bench mark internal rate of return (PLR) only after the inclusion of CDM revenue. This concludes that the proposed CDM project activity is not at all a financially attractive option.

Sensitivity analysis
According to the investment analysis the project proponent is required to include a sensitivity analysis that shows whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions.

The critical parameters chosen for sensitivity analysis:
1. Electricity selling price, and
2. Fuel price
3. CUF
4. Capital Investment

The Project IRR has been assessed with the reasonable variation of (+/- 5% and +/-10%) for all the above parameters. The findings of sensitivity analysis are tabulated below:

Electricity selling price		
	IRR without CDM	**IRR with CDM**
-10%	-4.74%	8.15%
-5%	2.67%	11.66%
0%	6.75%	14.61%
5%	9.98%	17.25%
10%	12.79%	19.69%

With the tariff rate falling, by 10% the returns from the project activity become negative clearly indicating non-viability, besides this 5% decrease in tariff rate reduces internal rate of return considerably. The possibility of 10% increase in tariff is very bleak considering the year to year increment of electricity sale price for a project is approximately Rs 0.04 amounting to 1.3% only.

Biomass Price		
	IRR without CDM	**IRR with CDM**
-10% (1080)	10.25%	17.35%
-5% (1140)	8.60%	16.02%
0% (1200)	6.75%	14.61%
5% (1260)	4.57%	13.09%
10% (1320)	1.77%	11.41%

Rice husk prices in the region and in whole country have experience huge escalation and there are hardly any chances of these falling down. There is increasing trend of rice husk prices in the region, the possibility of a situation wherein the rate decreases more than 10% is unlikely to happen. IRR values calculated and presented in the above table clearly indicate the impact on viability.

Capacity Utilisation Factor (CUF)		
	IRR without CDM	**IRR with CDM**
-10%	4.10%	12.30%
-5%	5.45%	13.47%
0%	6.75%	14.61%
5%	8.02%	15.74%
10%	9.25%	16.85%

Capacity utilisation factor has been sensitized with variation to positive and negative variation. Table above shows that that even if the capacity utilisation factor increases by 10%, the Internal Rate of Return remains below benchmark. The spread not only shows robust financial mechanism, but indicates that project activity remains unviable even if it is subjected to near impossible increase in Capacity Utilisation factor.
This also may be noted that in case of CUF reduction by 10%, the IRR without CDM incentives reduces to 4.10% and making the project highly unattractive.

Capital Cost		
	IRR without CDM	**IRR with CDM**
-10%	9.62%	17.96%
-5%	8.14%	16.22%
0%	6.75%	14.61%
5%	5.45%	13.12%
10%	4.22%	11.74%

Capital Cost has been sensitized with +/-10% variation on both sides and as can be seen even from the table above, reduction of capital cost by 10% (which is highly unlikely), the bench mark return rate is not achieved.
Considering the current rate of escalation, the price of steel, cements are on increase and there is extremely remote possibility that project cost may come down.

Outcome of Step 3:
From the investment analysis done above it is concluded that the proposed project activity is financially not attractive since the project IRR is below the prevalent Prime Lending Rate chosen as bench mark.
The CDM benefits only make the project viable crossing the IRR above the PLR.

STEP 4. Common practice analysis
Proposed project activity has demonstrated and provided evidence of it being the first of its kind, there may not be other explainations required. However following analysis is further described to complement the credibility check of investment and barrier analysis.
Sub-step 4-a: Analyse other activities similar to the proposed project activity
(1) The biomass based power generation scenario in the state of Uttar Pradesh is primarily been dominated by bagasse based cogeneration projects in the sugar mills only and very few rice husk based heat generation projects are operational in the state (*Source: http://mnes.nic.in/booklets/Book2-e.pdf*), despite Uttar Pradesh being the second largest producer of rice (Approximately 13.38% of the India production).

This illustrates that practice of generating power from the rice husk & other biomass residues has not penetrated in the region and entrepreneurs are not willing to change the current operating practices in the region.

However, SAEL decided to go ahead with the implementation of the project activity taking CDM revenue into consideration. SAEL is the first unit in the state to implement a 15 MW rice husk based grid connected power project and this is authenticated by the letter dated 18-Nov-2008 from UPPCL that say "It is to confirm that the Power Purchase Agreement with M/s Sukhbir Agro Energy Ltd is the only agreement on biomass based Co-generation Plant in the state of U.P. at present in which the fuel is to be fired for generation will be mainly rice husk". The practice of generating power from rice husk has not penetrated in the region due to barriers discussed above.

Sub-step 4-b: Discuss any similar options that are occurring:
(2) All the bagasse based projects in the region are either registered with UNFCCC CDM EB or in different stages of CDM project registration cycle and hence after excluding proposed CDM projects, no new co-generation facilities in the state of UP are observed.

Hence, 15 MW biomass based power generation project by project owners is the biggest capacity project at present implemented in the state of UP and thereby faces major barriers as discussed above for implementation.

Based on the above analysis, it could be concluded that the establishment of biomass based power project is not a common practice in the state of UP.

This concludes that the proposed project activity is additional.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

>>
Additionality is demonstrated using "Combined tool to identify the baseline scenario and demonstrate additionality".

The same has been used and additionality has been demonstrated in section B.4.

The project proponent has seriously considered the CDM revenue in taking the decision of implementation of project activity. This has been demonstrated to the host country DNA for approval and DOE during validation.

Timeline of events taken to achieve CDM registration is mention in chronological order

Event	Date
Initial Communication to SAEL board regarding project approval	25.07.2006
Board meeting for approval of project	18.09.2006

Appointment of EPC contractor (Project Start Date)	22.12.2006
Discussion of offer received from Vitol Carbon Solutions Pvt. Ltd. And E&Y P Ltd. for CDM consultancy at Board meeting	18.01.2007
Civil work start at site	15.03.2007
Discussion of offer received from The Louis Berger Group for CDM consultancy at Board meeting	28.04.2007
Turbine contract finalization	28.05.2007
Discussion of offer received from Emergent Ventures India Pvt. Ltd. for CDM consultancy at Board meeting	18.06.2007
Discussion of offer received from FICCI Quality Forum for CDM consultancy at Board meeting	20.11.2007
Appointment of CDM Consultant – FICCI Quality Forum	26.11.2007
First communication with KfW regarding sale of CERs	19.03.2008
First communication with Non-Conventional Energy Development Agency (NEDA), Uttar Pradesh for status and details of biomass based cogeneration plant in UP	27.05.2008
Submission of project to Host Country DNA	04.06.2008
Appointment of Validator (DOE), advance payment done	18.06.2008
Offer received from GTZ regarding sale of CERs	20.06.2008
Indicative term sheet received from KfW regarding sale of CERs	25.06.2008
Communication with Global Vantage Llc regarding sale of CERs	12.07.2008
Submission of two CD-ROMs containing Project PDD & PCN to DNA	16.07.2008
Meeting with DNA	21.07.2008
Submission of relevant documents to DNA	21.07.2008
Communication with Ecolutions Carbon India Pvt Ltd regarding sale of CERs	22.07.2008
Revised offer received from KfW regarding sale of CERs	01.08.2008

Submission of biomass assessment report to DNA	13.08.2008
Validation site visit	30.08.2008
Project Approval from Host Country DNA	03.09.2008
Second communication with Non-Conventional Energy Development Agency (NEDA), Uttar Pradesh for status and details of biomass based cogeneration plant in UP	12.09.2008
Communication with Green Initiative Carbon Assets S.A. regarding sale of CERs	17.09.2008
Communication with Gujarat Fluorochemicals Limited regarding sale of CERs	24.09.2008
Third communication with Non-Conventional Energy Development Agency (NEDA), Uttar Pradesh for status and details of biomass based cogeneration plant in UP	22.10.2008
First communication with Uttar Pradesh Power Corporation Ltd. (UPPCL) for status and details of biomass based cogeneration plant in UP	24.10.2008
Second communication with Uttar Pradesh Power Corporation Ltd. (UPPCL) for status and details of biomass based cogeneration plant in UP	14.11.2008
Communication received from UPPCL for status and details of biomass based cogeneration plant in UP	14.11.2008
Communication with Kommunalkredit Public Consulting Gmbh regarding sale of CERs	17.11.2008
Communication received from UPPCL for status and details of biomass based cogeneration plant in UP confirming the project activity to be 1st rice husk based cogeneration plant with electricity export to grid in the state	18.11.2008
Communication with X-change Carbon Pvt. Ltd. regarding sale of CERs	15.12.2008

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Approved consolidated baseline and monitoring methodology ACM0006 Version 06.2, Sectoral Scope: 01 **"Consolidated methodology for generation from biomass residues"** is chosen for the proposed project activity. The justification of their applicability has already been demonstrated in section B.4.

As per the consolidated methodology ACM0006, calculation of baseline emission associated with the electricity generation, the generation of heat and the usage of biomass. Broadly the emission reductions from the project are calculated from the application of the following equation:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

Where:

ERy	Emissions reductions of the project activity during the year *y* (tCO2/yr)
$ER_{heat,y}$	Emission reductions due to displacement of heat during the year *y* (tCO2/yr)
$ER_{electricity,y}$	Emission reductions due to displacement of electricity during the year *y* (tCO2/yr)
$BE_{biomass,y}$	Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year *y* (tCO2e/yr)
PEy	Project emissions during the year *y* (tCO2/yr)
Ly	Leakage emissions during the year *y* (tCO2/yr)

Baseline Emission

$ER_{electricity,y}$, $ER_{heat,y}$ and $BE_{biomass,y}$ constitute the baseline emissions of the project activity.

Emission reductions due to heat generation

SAEL project activity is only claiming credits for GHG emission reductions from displacement of fossil fuel dominated grid electricity and no credit are claimed for baseline emission from heat generation in the project plant. Hence emissions due to the displacement of heat are assumed as zero.

$ER_{heat,y} = 0$

Emission reductions due to displacement of electricity

The baseline emissions due to displacement of electricity are determined by the following equation,

$$ER_{electricity,y} = EG_y \cdot EF_{electricity,y}$$

Where:

EG_y is the net quantity of electricity generation as a result of the project activity (incremental to baseline generation) during the year y in MWh, and

$EF_{electricity,y}$ is the CO_2 emission factor for the electricity displaced due to the project activity during the year y in tons CO_2/MWh.

1. Determination of CO_2 emission factor ($EF_{electricity,y}$)

The emission factor for the displacement of electricity corresponds to grid emission factor ($EF_{electricity,y} = EF_{grid}$). The grid emission factor (EF_{grid}) has been fixed ex-ante and has been determined as per the guidance provided in "Consolidated baseline methodology for grid connected electricity generation from renewable sources" (ACM0002), Version 08. The grid emission factor has been taken from the Central Electricity Authority, India "CO2 baseline database, version 4, October 2008. *(Source: http://www.cea.nic.in).* As per the CEA report the Northern Regional Grid was synchronised with the integrated Eastern, North Eastern and Western Grid in August,2006 and the four regional grids have since been operating in synchronous mode. Hence the grid emission for northern grid is now determined from the synchronous grid emission factor of Northern, Eastern, Western and North Eastern Grids (NEWNE). The value is determined as follows:

Simple Operating Margin (tCO2/MWh)				
Grid	2005-06	2006-07	2007-08	Average
NEWNE	1.02	1.02	1.01	**1.01**
Southern	1.01	1.00	0.99	1.00
India	1.02	1.01	1.01	1.01

Build Margin (tCO2/MWh)			
Grid	2005-06	2006-07	2007-08
NEWNE	0.67	0.63	**0.60**
Southern	0.71	0.70	0.71
India	0.68	0.65	0.63

Combined Margin = Average Simple OM x 0.50 + BM x 0.50 = 1.01 x 0.50 + 0.60 x 0.50 = 0.80

(Source: CEA, CO2 baseline database, version 4, October 2008)

E.Γ. **Determination of net electricity generation (EG_y)**

As per the baseline scenario 3 of ACM0006 version 06.2, EGy corresponds to the net quantity of electricity generation in the project activity.

$$EG_y = EG_{project\ plant,y}$$

Baseline emission from biomass decay

The project participants have decided not to claim any credit from decomposition of biomass decay and have not included it in the project boundary. Hence,

$$BE_{Biomass,y} = 0.$$

Project Emissions

As per ACM0006 version 06.2, the project emissions (Pey) need to be include;

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \cdot (PE_{Biomass,CH4,y} + PE_{WW,CH4,y})$$

Where,

PET_y	CO2 emissions during the year y due to transport of the biomass residues to the project plant (tCO2/yr)
$PEFF_y$	CO2 emissions during the year y due to fossil fuels co-fired by the generation facility or other fossil fuel consumption at the project site that is attributable to the project activity (tCO2/yr)
$PE_{EC,y}$	CO2 emissions during the year y due to electricity consumption at the project site that is attributable to the project activity (tCO2/yr)
GWP_{CH4}	Global Warming Potential for methane valid for the relevant commitment period
$PE_{Biomass,CH4,y}$	CH4 emissions from the combustion of biomass residues during the year y (tCH4/yr)
$PE_{WW,CH4,y}$	CH4 emissions from waste water generated from the treatment of biomass residues in year y (tCH4/yr)

CO2 emissions due to transport of the biomass residues to the project plant (*PET_y*)

The biomass residues from outside are transported to the project site by trucks and the CO_2 emissions resulting from transportation of the biomass residues to the project plant is calculated as per option-1 on the basis of distance and the number of trips.

$$PET_y = N_y * AVD_y * EF_{km,CO2}$$

Where

PET_y – *CO_2 emissions during the year y due to transport of the biomass residues to the project plant (tCO_2/yr)*

N_y – *the number of truck trips during the period y.*

AVD_y – *Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year y (km)*

$Ef_{km,CO2}$ - is the average CO_2 emission factor for the trucks measured during the year y in t (CO_2/km)

CO2 emissions due to fossil fuels co-fired by the generation facility ($PEFF_y$)

No fossil fuel will be co-fired in the project activity.

$PEFF_y = 0$

CO2 emissions due to electricity consumption at the project site ($PE_{EC,y}$)

As no consumption of electricity from grid is envisaged during the operation of the project activity and hence $PE_{EC,y}$ *is assumed to be zero*

$PE_{EC,y} = 0$

CH4 emissions from the combustion of biomass residues ($PE_{Biomass,CH4,y}$)

CH4 emissions from the combustion of biomass residues is not included in the project boundary and hence $PE_{Biomass,CH4,y}$ *is assumed to be zero.*

$PE_{Biomass,CH4,y} = 0$

CH4 emissions from waste water generated from the treatment of biomass residues ($PE_{WW,CH4,y}$)

CH4 emissions from the *waste water generated from the treatment of biomass residues* is not included in the project boundary and hence $PE_{WW,CH4,y}$ *is assumed to be zero.*

$PE_{WW,CH4,y} = 0$

Leakage

A detailed assessment on the biomass availability in the region has been conducted by third party to ensure the availability of biomass during the crediting period and beyond. The survey report is titled "A Report on Biomass residue Availability Survey for 15 MW Biomass based Power plant at District Ghazipur, Uttar Pradesh – July 2008" conducted by Mr. U Bandyopadhyay, Project & Management Consultant. A copy of same has been submitted to DOE. As per the methodology, option L_2 has been selected for addressing the leakage. It is found that there is a surplus of biomass, which is much more than the 25% of the total consumption of the biomass in the region (within 200 km radius of the project site) including the requirement of the project activity. Hence leakage emissions due to competing use of biomass is insignificant and ignored. Anyway leakage in future due to competing uses of biomass will be monitored every year during the crediting period. This is to ensure that the implementation of project activity does not lead to any increase in GHG emissions from fossil fuel combustion or other sources due to diversion of biomass residues from the other uses to the project as a result of project activity. A biomass availability survey will be carried out every year of the crediting period to assess the surplus

availability of biomass in the project region. Project boundary has been defined within 200 kms of radius and the target districts in the neighbouring states of Bihar and U.P. have been indicated in section B.3 of PDD. If the project activity causes any leakage effect, the estimated emissions will be deducted as per the following equation:

$$L_y = EF_{CO2.LE} * \sum BF_{PJ,k,y} * NCV_k$$

Where:
L_y = Leakage emissions during the year y (tCO_2/yr)
$EF_{CO2,LE}$ = CO_2 emission factor of the most carbon intensive fuel used in the country (tCO_2/GJ)
$BF_{PJ,k,y}$ = Incremental quantity of biomass residue type k used as a result of the project activity in the project plant during the year y (tons of dry matter or liter)
k = Types of biomass residues for which leakage effects could not be ruled out with one of the approaches L_1, L_2 or L_3 above
NCV_k = Net calorific value of the biomass residue type k (GJ/ton of dry matter or GJ/liter)

Determination of $BF_{PJ,k,y}$:

$$BF_{PJ,k,y} = BF_{k,y} - \frac{Q_{project\ plant,y}}{\varepsilon_{boiler} \cdot NCV_k}$$

Where,

$BF_{PJ, k,y}$ = Incremental quantity of biomass residue (rice husk) used as a result of the project activity in the project plant during the year y (tons of dry matter)

$BF_{k.y}$ = Quantity of biomass residue (rice husk) combusted in the project plant during the year y (tons of dry matter)

$Q_{project\ plant, y}$ = Quantity of heat generated in the cogeneration project plant from firing biomass residues during the year y (GJ)

NCV_k = Net calorific value of the biomass residue type k (GJ/ton of dry matter or GJ/liter)

ε_{boiler} = Energy efficiency of the boiler that would be used in the absence of the project activity

Emission reductions

Now from the above discussion, for the present emission reduction calculations, emission reduction may be simplified to:

$$\mathbf{ER_y = ER_{electricity,y} - PE_y}$$

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	$Ef_{electricity,y}$
Data unit:	tCO2 / MWh
Description:	Combined margin (CM) value of CO2 baseline emission factor for the grid electricity displaced due to the project activity during the year y
Source of data used:	Central Electricity Authority, India "CO2 baseline database, version 4, Oct 2008)" (www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20we

	bsite.htm)
Value applied:	0.80 tCO2 / MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	As local data's are not available hence, Combined margin (CM) value by CEA is considered. CEA is the statutory organization constituted by Government of India to advise on matters relating to the national electricity policy, CEA also collects and record the data concerning to the generation, transmission, trading, and distribution. CEA has developed an emission baseline database for all Indian regional grids for prospective CDM projects. The database currently covers emission factors for fiscal years 2005-2008 and will be updated annually. CEA has calculated Combined margin (including inter-regional and cross-border electricity transfers) according to methodology ACM0002 for the year 2007 – 2008.
Any comment:	Baseline emission factor is held constant as ex-ante based and fixed for entire crediting period

B.6.3 Ex-ante calculation of emission reductions:

>>

For the purposes of determining the emission reductions for the project activity we apply the following equation:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

As outlined in section B6.1 this may be simplified to:

$$\mathbf{ER_y = ER_{electricity,y} - PE_y}$$

Emission reductions due to displacement of electricity ($ER_{electricity,y}$)

Installed Capacity	MW	15
Annual utilization	Hrs	7920
CUF (Capacity Utilization Factor)	%	80
Gross Power Generation	**MWh**	**95040**
Auxiliary Consumption	%	11
Net Power Generation	**MWh**	**84586**

Now, taking a grid emission factor of 0.80 (TCO2e/MWh), Emission reductions due to displacement of electricity is calculated as follows,

$\mathbf{ER_{electricity,y}}$ = EGy X $EF_{electricity,y}$ = 84,586 X 0.80 = 67,668 **tCO2e per annum**

(a)Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass residues to the project plant (PET_y)

The biomass residues are transported (within the 100 km radius) to the project site by trucks and the CO_2 emissions resulting from transportation of the biomass residues to the project plant is calculated as per option-1 on the basis of distance and the number of trips.

$$PET_y = N_y * AVD_y * EF_{km,CO2}$$

Where

Total fuel (rice husk) required	118,272	TPA
In-house rice husk	34,560	TPA
Outside fuel	83,712	TPA
Average truck load	9.00	T
Truck trips per year (Ny)	9,302.00	
Average round trip distance (AVDy)	100.00	km
Estimation of Emission factor of Diesel		
Default Value of National CO2 emission factor for diesel*	71.40	tCO2/TJ
Default Value of Net calorific value for diesel**	43.00	TJ/Gg
Density of Diesel***	860.00	kg/m3
Vehicle mileage	6.00	km/l of diesel
Emission factor of Diesel (Efkm,CO2)	0.00044	tCO2/km
PETy	409	tCO2/yr

Source: * Report of "India's Initial National Communication to UNFCCC" (Page: 41, Table: 2.6)

** 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volme-2, Page 1.18

*** http://mrpl.co.in/products_user1.php?mod=_ones_y&link_no=12&menu=Products&mn_no=3

Substituting $ER_{electricity,y}$ & PET_y in the emission reduction equation the emission reductions are estimated for the proposed project activity

Ery = 67,668 – 409 = 67,259 tCO2/yr

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project activity emission (Tones of CO2 e)	Estimation of baseline emissions (Tones of CO2 e)	Estimation of Leakages (Tones of CO2 e)	Estimation of overall emission reductions (Tones of CO2 e)
2009	409	67,668	0	67,259
2010	409	67,668	0	67,259
2011	409	67,668	0	67,259
2012	409	67,668	0	67,259
2013	409	67,668	0	67,259
2014	409	67,668	0	67,259
2015	409	67,668	0	67,259
2016	409	67,668	0	67,259
2017	409	67,668	0	67,259
2018	409	67,668	0	67,259
Total	**4,090**	**676,680**	**0**	**672,590**

B.7 Application of the monitoring methodology and description of the monitoring plan:

>>

B.7.1 Data and parameters monitored:	
Data / Parameter:	**$EG_{projectplant,y}$**
Data unit:	MWh per annum
Description:	Net electrical energy generated by the project activity
Source of data to be used:	Electricity meter at generation point.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	84,586
Description of measurement methods and procedures to be applied:	Hourly recordings of data will be taken from energy meters located at the project activity site. This data will be recorded hourly by the Switch Board attendant and entered into logbooks on site. This hourly data will be signed off at the end of every shift by an engineer in charge of the shift and again at the end of each day and signed off by the power plant manager. The meters will be calibrated annually by an independent third party.
QA/QC procedures to be applied:	The data will be archived electronically. The consistency of metered net electricity generation would be cross checked with the quantity of biomass fired. The meters would be calibrated regularly.
Any comment:	Calculated considering 15MW capacity, 330 days of operation, 80% CUF and 10% Auxilliary consumption.

Data / Parameter:	**BFy**
Data unit:	Tonnes of dry matter
Description:	Quantity of biomass residue (rice husk) combusted in the project activity during the year y
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not used in determination of emission reduction, data will be monitored for all the biomass residues used in the project activity scenario
Description of measurement methods and procedures to be applied:	For the biomass consumed from outside sources, weighbridge receipts will be used. These weights will be adjusted for the moisture content of the biomass residues by measuring the moisture in laboratory. The amount of biomass residue (rice husk) procured from outside will me measured by the weigh bridge installed at the factory gate. The receipts of the same will become a basis for monitoring the number of truck trips and the average distance traveled to determine the project emissions. The amount of biomass residue (rice husk) form the internal source will be measured as a percentage of paddy processed by the rice mill. The amount of paddy processed will in turn be measured by the weigh bridge installed at factory gate. The weigh bridge will also be calibrated once a year to ensure accurate readings.
QA/QC procedures to be applied:	The biomass combusted in the boilers may be cross checked through an energy balance undertaken each year for the project activity this will involve the

	calculation of the other biomass residues if used in the boilers.
Any comment:	Data will be held for a period of 2 years after the end of the crediting period.

Data / Parameter:	**Moisture content of biomass residues**
Data unit:	% Water content
Description:	Moisture content of biomass residue
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not used in determination of emission reduction, data will be monitored for all the biomass residues used in the project activity scenario
Description of measurement methods and procedures to be applied:	The moisture content of biomass residue will be determined in the in-house laboratory. Standard testing procedure will be used. The monitoring will be continuously, with mean values calculated annually
QA/QC procedures to be applied:	The value can be checked for consistency by getting one sample analysed at an authorised laboratory once in six months.
Any comment:	Data will be held for a period of 2 years after the end of the crediting period.

Data / Parameter:	**AVDy**
Data unit:	Km
Description:	Average round trip distance (from and to) between biomass fuel supply sites and the project site
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100
Description of measurement methods and procedures to be applied:	Factory records maintained at the factory gate at the time of receipt of biomass residues at factory
QA/QC procedures to be applied:	The records can be checked from the receipts of biomass residue received from the transporters
Any comment:	Data will be held for a period of 2 years after the end of the crediting period.

Data / Parameter:	**Ny**
Data unit:	-
Description:	Number of truck trips for the transportation of biomass.
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected	9,302

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Factory records maintained at the factory gate at the time of receipt of biomass residues at factory
QA/QC procedures to be applied:	The records can be checked from the receipts of biomass residue received from the transporters
Any comment:	Data will be held for a period of 2 years after the end of the crediting period.

Data / Parameter:	$EF_{km,CO2,y}$
Data unit:	tCO2/km
Description:	Average CO2 emission factor for the trucks during the year y
Source of data to be used:	Estimated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.00044
Description of measurement methods and procedures to be applied:	The emission factor will be determined using appropriate net calorific values and CO2 emission factor from national reliable default values and/or IPCC default values
QA/QC procedures to be applied:	The values will be used from reliable default values
Any comment:	Data will be archived for a period of 2 years after the end of the crediting period.

Data / Parameter:	Quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region
Data unit:	Tons
Description:	Quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region
Source of data to be used:	Survey or statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The monitoring/survey will be carried out by an authorised third party. The monitoring will be carried out once a year. One such survey had been carried out dated July 2008 and has been submitted to DOE.
QA/QC procedures to be applied:	The study will be done by an authorised third party.
Any comment:	This parameter is monitored since approach L2 is used to rule out leakage

Data / Parameter:	Quantity of available biomass residues rice husk in the region of 200 Kms. And

	as defined in B.3 and Biomass Assessment Survey report
Data unit:	Tons
Description:	Quantity of available biomass residues of type k in the region
Source of data to be used:	Survey or statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	The monitoring/survey will be carried out by an authorised third party. The monitoring will be carried out once a year.
QA/QC procedures to be applied:	The study will be done by an authorised third party.
Any comment:	This parameter is monitored since approach L2 is used to rule out leakage

Data / Parameter:	$\mathbf{EF_{co2,LE}}$
Data unit:	tCO2/GJ
Description:	CO2 emission factor of the most carbon intensive fuel used in the country
Source of data to be used:	National default values for the CO2 emission factor. Otherwise, IPCC default Values will be used
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$\mathbf{Q_{project\ plant,\ y}}$
Data unit:	GJ
Description:	Net quantity of heat generated from firing biomass in the project plant
Source of data to be used:	On site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	No value has been estimated for calculating expected emission reductions. Under the project activity the same will be measured and monitored through a calibrated steam flow meter
Description of measurement methods and procedures to be	Flow meter. Continuous measure of the quantity of steam generated.

applied:	
QA/QC procedures to be applied:	The consistency of metered net heat generation should be the quantity of biomass fired (e.g. check whether the net heat generation divided by the quantity of biomass fired results in a reasonable thermal efficiency that is comparable to previous years). Meters shall be calibrated annually in accordance with manufacturer specifications.
Any comment:	-

Data / Parameter:	**NCV_k**
Data unit:	GJ/ton of dry matter
Description:	Net Calorific value of biomass residue type k (rice husk)
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	No value has been estimated for calculating expected emission reductions. Under the project activity the same will be measured and monitored
Description of measurement methods and procedures to be applied:	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV based on dry biomass. At least every six months, taking at least three samples for each measurement.
QA/QC procedures to be applied:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, additional measurements will be done. NCV is determined on the basis of dry biomass.
Any comment:	-

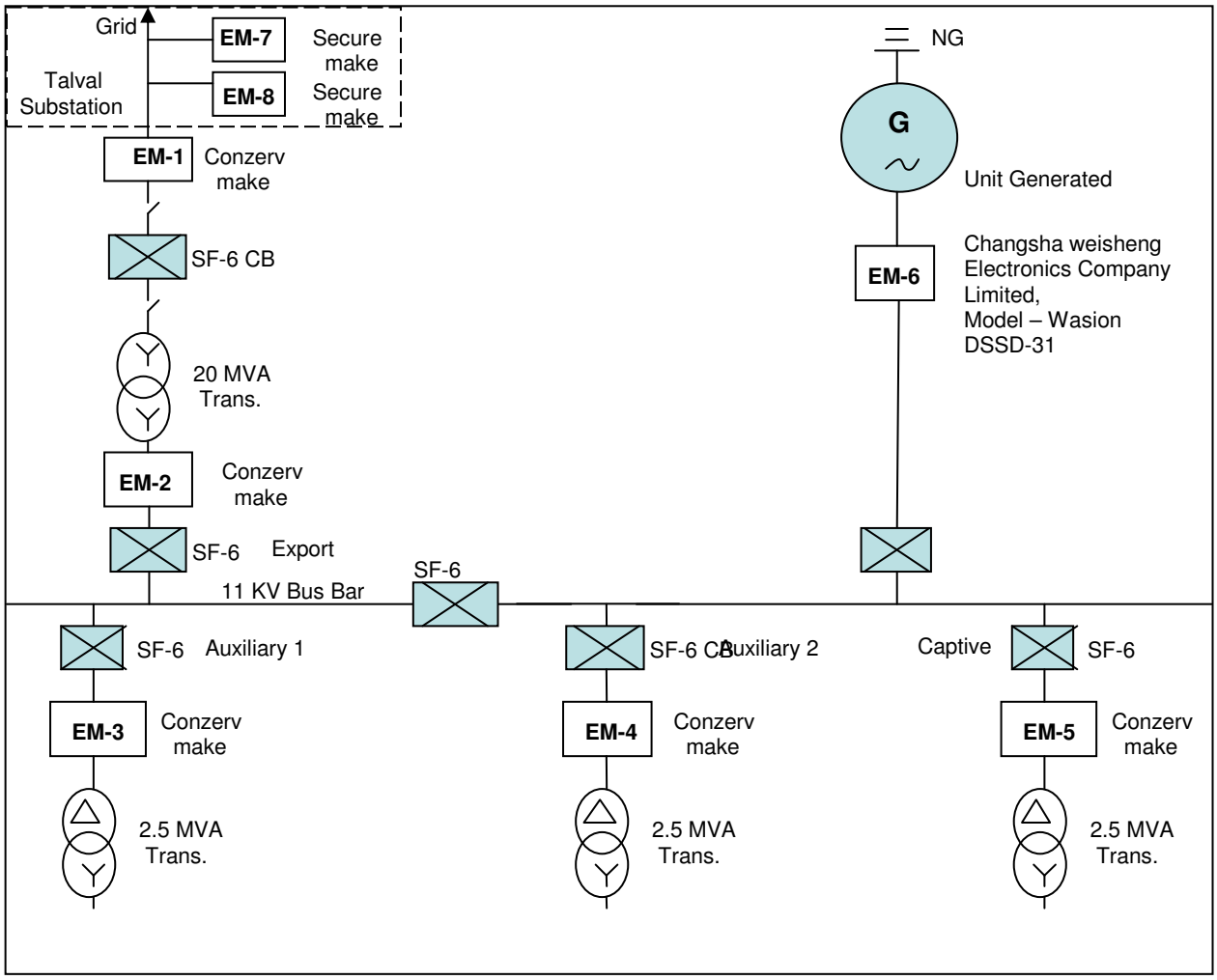
Data / Parameter:	**ε_{boiler}**
Data unit:	-
Description:	Average net energy efficiency of heat generation in the boiler that would generate heat in the absence of the project activity. Under the project activity this would be the 10 TPH boiler
Source of data to be used:	Higher value among (a) the measured efficiency and (b) manufacturer's information on the efficiency
Value of data applied for the purpose of calculating expected emission reductions in section B.5	No value has been estimated for calculating expected emission reductions. Under the project activity the same will be measured and monitored
Description of measurement methods and procedures to be applied:	Direct method (dividing the net heat generation by the energy content of the fuels fired during a representative time period) will be used. This method is better able to reflect average efficiencies during a representative time period compared to the indirect method (determination of fuel supply or heat generation and estimation of the losses). The monitoring will be done once at the project start, because the boiler will be a stand-by at the start of the project activity
QA/QC procedures to	Consistency can be checked with manufacturers' information or the efficiency.

be applied:	
Any comment:	-

B.7.2 Description of the monitoring plan:

>>

The CDM project monitoring essentially involves monitoring of electricity and fuel. The monitoring of electricity data revolves around the power generation from the turbine generators and the auxiliary consumption of the project activity. The auxiliary power consumption will be metered and there will also be main meter attached to the turbine generator to determine their total generation. All the meters installed will be calibrated each year. The diagram below details the electricity metering system for the CDM project.



The CDM Project monitoring will be based on electricity meters 3, 4 & 6. The gross electricity will be measured by EM-6 and the auxiliary consumption will be measured by Ems-3 & 4 respectively. The difference between gross power generation and auxiliary consumption qualifies as net electricity for determining the baseline emissions for the CDM project. All electricity meters (EM 1 to 6) measuring power generation and consumption will be calibrated once a year to ensure the accuracy of the readings. The calibration frequency too is a part of the monitoring system. As a backup the baseline electricity reading can also be determined by adding the captive consumption and export. This might only be used in case of emergency.

The amount of biomass residue (rice husk) procured from outside will me measured by the weigh bridge installed at the factory gate. The receipts of the same will become a basis for monitoring the number of truck trips and the average distance traveled to determine the project emissions.

The amount of biomass residue (rice husk) form the internal source will be measured as a percentage of paddy processed by the rice mill. The amount of paddy processed will in turn be measured by the weigh bridge installed at factory gate. The weigh bridge will also be calibrated once a year to ensure accurate readings.

Operational and Management structure:

The management of the plant has designated Mr. Alok Agrawal, manager MIS to be responsible for the collation of data as per the monitoring methodology. The manager MIS will collect all data to be monitored as mentioned in this project design document (PDD) and will report to the Mr. M. L. Arora, General Manager (GM) of the plant. The overall CDM project management responsibility will remain with the GM. The GM will be responsible for entire CDM related activities and ensure quality assurance on the final data and facts recorded. The GM will have the authority to revise the monitoring plan in line with the methodology and other futuristic requirements and would be accessing the viability of the data at regular interval. The GM in turn will report to Director on monthly basis on the operational details of the project activity.

Mr. Alok Agrawal, Manager MIS of the plant will be maintaining all records pertaining to electricity generation and rice husk procurement. The hourly recording of data will be done by shift operators that will be checked and verified by the shift in-charge at the end of each shift. This data will be compiled as a daily report in the formats developed at the site by the Manager MIS. This daily report will be sent to GM for verification. The daily reports will be used collectively to prepare a monthly report. The monthly report will be prepared by Manager MIS and send to plant GM for verification. The monthly reports will become a part of the Management Information System (MIS) and will be reviewed by the management during the review meeting. The monthly reports will be sent to FICCI for estimation of monthly emission reductions, which will also be included in the MIS. The Manager MIS will also be responsible for archiving the data.

SAEL would engage its existing resources to manage, monitor and ensure quality control on the monitoring and recording of the desired data for the project activity. The monitoring personnel currently maintain and review the factory records pertaining to the rice manufacturing and they are familiar with the process of monitoring and documentation.

Uncertainties and adjustment: procedure for identifying and dealing with them
If errors have been detected, error detection and disposal reports will be submitted to the General Manager. If these errors occur as a result of inadequacy of QA and QC procedure, GM after making necessary adjustments as per assessment of historic data will recommend to Manager MIS to conduct the implementation. However, any such observations will be documented as history in the daily report maintained by GM along with its time of occurrence, duration and possible reasons behind such operational discrepancies.

Emergency preparedness plan
The project activity does not result in any unidentified activity that can result in unpredicted and significant emissions from the project activity. Hence no need is envisaged for emergency preparedness

in data monitoring. Storage of biomass will be monitored to ensure in order to prevent decay of biomass residue that has potential of increasing GHG emission. The prevention to have low moisture biomass residue and regular checking up of biomass residue during storage has been envisaged and controlled.

Training

Indure (P) Limited has been engaged by project promoters for commissioning of the project activity. Individual suppliers of the equipments and technical team from the Indure (P) Ltd will train the staff on operation and maintenance aspects of the cogeneration plant. The training and maintenance will ensure preventive maintenance and better operational control for the plant.

FICCI Quality Forum (FQF) has been engaged by the project promoters for CDM project development. The consultant will help in periodical review and GHG audit of the CDM project. FQF will also train the Project Proponent's staff responsible for monitoring as per the requirement of approved methodology and details indicated in the monitoring plan of CDM project activity.

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

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Date baseline study completed:	25/11/2008
Persons completing baseline study:	Mr. M.L. Arora, contact details as per Annex 1.
	Mr. Karun Sharma, contact details as per Annex 1.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
22/12/2006 (Date of letter of intent to EPC contractor)

C.1.2. Expected operational lifetime of the project activity:

>>
20 years 00 months

C.2 Choice of the crediting period and related information:

>>
A fixed crediting period of 10 years has been chosen

C.2.1. Renewable crediting period

>>
Not applicable

C.2.1.1. Starting date of the first crediting period:

>>
Not applicable

C.2.1.2. Length of the first crediting period:

>>
Not applicable

C.2.2. Fixed crediting period:

>>
Chosen crediting period

C.2.2.1. Starting date:

>>
14/08/2009 or the project registration date whichever is later

C.2.2.2. Length:

>>
10 years 00 months

SECTION D Environmental impacts

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D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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The positive environmental impacts arising from the project activity are:

- Reduction in carbon dioxide (GHG) emissions that would take place for the same quantity of generation of electricity available from fossil fuel dominated regional electricity grid. The electricity supply from grid is considered as baseline scenario.
- Biomass residue in the absence of project activity would have been either left to decay or would have been burned through uncontrolled combustion.
- Project activity will help in improving the socio–economic status of the nearby area and will help towards better adaptation of Climate Change effects. Implementation of project activity will also create improved awareness about environmental upkeep and improve the general housekeeping and hygienic conditions.
- Considering human as one of the environmental element, the project activity will generate employment of nearby local persons and help in alleviation of property which is existing in this poverty driven low literacy region of host country.

There are no negative environmental impacts that will arise as a result of the project activity. However, the following factors were analyzed for potential impacts and these shall be handled as per applicable statutory guidelines and are mentioned as follows:

1. Impact on Land. The ash generated from the project activity will be disposed as per the state Pollution Control Board guidelines.
2. Impact on Water. UP Pollution Control Board (UPPCB) has identified the norms of water consent and SAEL will ensure that waste water generated from the project activity will be treated to meet required limits before disposal.
3. Impact on Air. As stated above, the project activity will lead to reduction of GHG emission and also the particulate emission will be reduced to permissible limits by use of an ESP. Vent through stacks will also be controlled as per State Pollution Board Guidelines and consent conditions.
4. Impact on Ecology. The project activity shall not have any harmful impact on the ecology. There are no nearby forests, or zones high on biodiversity, or other sensitive locations around the factory that may be affected negatively due to the project. Further, no harmful impact shall be caused on the aquatic ecology as well as on the local vegetation. Individuals working in high noise zones will be provided adequate gadgets for protection.

The project activity has received the consent to establish from Uttar Pradesh Pollution Control Board. During the operation of the project activity a yearly consent to operate will be obtained from the UPPCB for air and water pollution. The project will operate within the stipulated limits set by the UPPCB and the same will be monitored as part of the overall GHG emission reduction project compliance.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Environmental impacts are considered positive towards the sustainable development criteria by the project participants. Project activity has no adverse impacts on environment that can be considered

significant. Treatment of waste generated shall be carried out to meet the statutory and regulatory norms established and controlled by host party.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

The local stakeholders were identified and informed about the proposed project activity by circulating pamphlets in nearby local villages and by sending individual letters briefing the scope, nature and description of the project. PP has considered that since newspaper may not reach all concerned stakeholders (villagers) and has adopted an approach of contacting the persons personally through personalized invitations. The local stakeholders were invited them to submit their opinion and comments.

A local stakeholder meeting was also organized by SAEL management, inviting representatives from local community. The minutes of meeting were made and sent to the participants. The same has been made available to DOE during the validation process.

The project activity has received the "consent to establish" form the Uttar Pradesh Pollution Control Board.

The other stakeholders notified for the project activity are:

- Uttar Pradesh Power Corporation Limited,
- State Boiler Inspectorate, and
- State Electrical Inspectorate.

There are no pending issues related to these stakeholders and project owners have received relevant formal consents.

E.2. Summary of the comments received:

>>

There were no adverse comments received during stakeholders meeting and subsequently. Persons attending stakeholder meeting have expressed happiness as this may lead to employment generation and improvement in environment.

E.3. Report on how due account was taken of any comments received:

>>

Since no adverse comments have been received, no action is required to be taken.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Sukhbir Agro Energy Ltd.
Street/P.O.Box:	Village: Fatehullahpur, Varanasi Gorakhpur Highway
Building:	-
City:	Ghazipur,
State/Region:	UP
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Country:	India
Telephone:	0542-3206987
FAX:	-
E-Mail:	ghazipur@sukhbiragroenergy.com, biomass@sukhbiragroenergy.com
URL:	-
Represented by:	
Title:	General Manager
Salutation:	Mr.
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Middle Name:	L
First Name:	M
Department:	-
Mobile:	+91 9936411882
Direct FAX:	+91 1685 232282
Direct tel:	+91 9453002501
Personal E-Mail:	gm@sukhbiragroenergy.com

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State/Region:	Delhi
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FAX:	91-11-23721504, 23320714
E-Mail:	fqf@ficci.com
URL:	http://www.ficci.com, www.ficci-cdm.biz
Represented by:	
Title:	Head-CDM
Salutation:	Mr
Last Name:	Sharma
Middle Name:	Hriday
First Name:	Karun
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Direct tel:	+91 11 23359735, 23739947
Personal E-Mail:	karunsharma@ficci.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding will be used for the proposed project activity.

Annex 3

BASELINE INFORMATION

Determination of CO_2 emission factor ($Ef_{electricity,y}$)

For the purpose of baseline emission factor, the combined margin (CM) value determined by Central Electricity Authority (CEA) under the Ministry of Power, India has been used. The value is calculated in accordance of the guidance of the "Consolidated baseline methodology for grid connected electricity generation from renewable sources" (ACM0002), Version 08.

Simple Operating Margin (tCO2/MWh)

Grid	2005-06	2006-07	2007-08	Average
NEWNE	1.02	1.02	1.01	**1.01**
Southern	1.01	1.00	0.99	1.00
India	1.02	1.01	1.01	1.01

Build Margin (tCO2/MWh)

Grid	2005-06	2006-07	2007-08
NEWNE	0.67	0.63	**0.60**
Southern	0.71	0.70	0.71
India	0.68	0.65	0.63

Combined Margin = Average Simple OM x 0.50 + BM x 0.50 = 1.01 x 0.50 + 0.60 x 0.50 = 0.80

(Source: CEA, CO2 baseline database, version 4, October 2008)

Annex 4

MONITORING INFORMATION

This annex has been left blank on purpose. The details have been provided in section B.7.2.