Validation of 5MW biomass based cogeneration project at Sainsons

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Summary:

"PA Research & Consultants Pvt. Ltd", has commissioned the "KBS Certification Services Pvt. Ltd." (KBS) to carry out the Validation of the project - "5MW biomass based cogeneration project at Sainsons", with regard to the relevant requirements of VCS Standard Version 3.4.

The project involves implementation of 5 MW cogeneration power project based on rice husk. The power will be produced by 5MW extraction-cum-condensing steam turbine with alternator. Major equipment of the power project comprises of 50 tonne per hour (TPH) capacity AFBC type boiler. The average inflow of extraction steam is 30 tonne per hour, which is used for process steam requirement in the paper machine section. In pre project scenario the heat and power requirement was met using low-pressure boiler with 3 MW turbine, wherein the remaining power is imported from grid.

A risk based approach has been followed to perform this validation. In the course of the validation, 03 Corrective Action Requests (CAR) and 01 Clarification Requests (CL) were raised and successfully closed out.

The validation is based on the VCS PD, proof of title, proof of right, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validation team by project proponent.

As a result of the validation, the validation team confirms that:

- The project fulfils criteria of VCS Standard Version 3.4.
- The project is in line with all relevant VCS requirements.
- The project additionality is sufficiently justified in the PD.
- The monitoring plan is transparent, adequate and in line with applied baseline and monitoring methodology of ACM 0006, Version: 12.1.1.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 284,420 tCO2e is most likely to be achieved within the 10 years of first crediting period.

No restrictions or uncertainties were identified related to the validation

ABBREVIATIONS

ACM	Approved Consolidated Methodology
AFBC	Atmospheric Fluidized Bed Combustion
BE	Baseline Emissions
BM	Build Margin
BTK	Bull's Trench Kiln
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CM	Combined Margin
CER	Certified Emission Reduction
CL	Clarification request
COP	Conference of Parties
DOE	Designated Operational Entity
DNA	Designated National Authority
DPR	Detailed Project Report
DR	Document Review
EB	Executive Board
EF	Emission Factor
ERs	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
ICICI	Industrial Credit and Investment Corporation of India
KP	Kyoto Protocol
LSC	Local Stakeholder Consultation
LE	Leakage Emissions
ISO	International Organization for Standardization
MoV	Means of Verification
MP	Monitoring Plan
OM	Operating Margin
PA	Project Activity
PD	Project Design
PE	Project Emissions
PP	Project Participant
PS	Project Standard
PO	Purchase Order
PCP	Project Cycle Procedure
QA/QC	Quality Assurance/Quality Control
SD	Sustainable Development
SPIL	Sainsons Paper Industries Limited
T&C	Technical & Certification
UNFCCC	United Nations Framework Convention on Climate Change
VVB	Validation & Verification Body
VVS	Validation & Verification Standard

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1 INTRODUCTION

1.1 Objective

"PA Research & Consultants Pvt. Ltd.", has commissioned the "KBS Certification Services Pvt. Ltd." (KBS) to carry out the Validation of the project - "5MW biomass based cogeneration project at Sainsons", with regard to the relevant requirements of VCS Standard Version 3.4.

The purpose of validation is to ensure a thorough, independent assessment of the project description (PD), in particular the project's baseline, the additionality, the monitoring plan (MP) and the project's compliance with

- The requirements of VCS Program Guide Version 03.5/5/
- The requirements of VCS Standard Version 03.4/6/
- The requirements of the CDM Approved methodology, ACM0006, Version 12.1.1
- To assess the project's compliance with other relevant rules, including the project country (India) legislation and
- Other relevant rules, of VCS sustainability criteria are validated in order to confirm that the project description/1//2/ as documented is sound and reasonable and meet the stated requirements and identified criteria.

The validation is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of emission reductions over the project's crediting period without any double counting.

1.2 Scope and Criteria

The scope of the validation is defined as an independent and objective review of the Project Description (PD/1//2/, the project's baseline study, additionality, monitoring plan and other relevant documents. The information in these documents is reviewed against the requirements of VCS Standard/5//6/. KBS has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of Emission Reductions/4/.

The items covered in the validation are described below:

- VCS Criteria
- VCS Project Description
- Project Additionality
- Monitoring Plan
- Background investigation and follow up interviews
- Stakeholder Consultation
- Draft validation reporting with CARs & CLs, if any
- Final validation reporting

The validation is based on the information made available to KBS and on the contract conditions.

The validation is not meant to provide any consulting to the project proponent. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project description. The work carried out by KBS is free from any conflict of interest.

1.3 Level of Assurance

The validation report is based on VCS-PD[1//2/], Monitoring plan, supporting documents made available to the validator and information collected through performing interviews/8/ and during the on-site assessment. Based on the process and procedures conducted KBS states with a reasonable level of assurance that information in the VCS PD:

- is materially correct and is a fair representation of the actual project details, and
- is prepared in accordance with VCS requirements and the applied CDM methodology for information pertaining to additionality, GHG qualification, monitoring and reporting

The validation work is carried out as per this requirement and the validation opinion is assured provided the credibility of all above. Details are presented in the Validation statement in section 4 below.

1.4 Summary Description of the Project

SPIL has implemented a 5 MW cogeneration power project based on rice husk. The power will be produced by 5MW extraction-cum-condensing steam turbine with alternator. Major equipment of the power project comprises of 50 tonne per hour (TPH) capacity AFBC boiler. The average inflow of extraction steam is 30 tonne per hour, which is used for process steam requirement in the paper machine section. In pre project scenario the heat and power requirement was met using low-pressure boiler with 3 MW turbine, wherein the remaining power is imported from grid.

The fuel being used for project activity is rice husk, which is available in plenty in the nearby region. The rice husk required for project activity is being procured from the Rice Mills and other vendors available in the nearby region, which is then transported to the project site using motor vehicle (trucks). The project proponent has developed an infrastructure in terms of manpower and financial resources, in order to ensure continuous fuel availability. The project proponent also intended to use small quantity of coal during heavy rain, when moisture content of rice husk increases. The biomass assessment study[23/] is carried out by the third party was validated to confirm the surplus biomass in the area.

Before project activity the total electricity requirement was 114 MWh/day or 37,620 MWh/year (68*330) validated from the plant log books[21/]. Out of which 68 MWh/day or 22,440 MWh/year was supplied from in-house turbine generators and another 46 MWh/day or 15,180 MWh/year was supplied by grid. Before project activity, the total installed capacity of turbine was 3 MW and turbines were running at 90% load.

After project activity the total electricity requirement would be 170 MWh/day or 56,100 MWh/year. Out of which 22,440 MWh/year (2.7 MW) would be supplied from old turbines and 33,660 MWh/year (4.5 MW) would be supplied from project activity. Therefore 33,660 MWh/year represents the project activity electricity and removal of grid electricity.

The GHG emission reductions are from electricity generation. It would substitute electricity generation of NEWNE grid of India dominated by coal based power plants, and thus would reduce coal consumption. The estimated annual average GHG emission reductions from this project are **28,442 tCO_2e** and total GHG emission reductions over the ten year period are **284,420 tCO_2e**.

The proposed project activity is located in Bakhli village, Pehowa Tehshil, Kurukshetra district of Haryana state of India. The Project site is well connected by district and village roads to the nearest town. The nearest railway station is Kurukshetra Junction is 30 Km away. The geographic co-ordinate of project site is provided below.

Latitude: 30° 00' 09"

Longitude: 76° 31' 51.44"

2 VALIDATION PROCESS

2.1 Method and Criteria

The project activity applies approved CDM methodology "Consolidated baseline methodology for grid-connected electricity generation from renewable source", ACM0006 version 12.1.1[/29/], categorized under sectoral scope 1 "Energy Industries". The validation consisted of the following phases:

- Completeness check and desk review of the Project Description
- Onsite inspection, interview with project representatives and issuance of findings.
- Resolution of findings followed by preparation of the final validation report and opinion.

Timeline of Validation:

The validation of the project was carried from May 2016 till September 2016	
Date of signing contract	29/03/2016
On-site validation	18/07/2016
(Draft) Reporting	01/09/2016
(Final) Reporting	12/09/2016

2.2 Document Review

After the submission of the draft PD[/1/] and supporting background documents related to the project design and baseline from the client, the completeness of information made available as per VCS standard version 3.4[/6/] requirements is reviewed. Furthermore, the validation team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data available on public domain. A desk review is carried out to assess the following:

- the project details as per VCS PD template
- appropriateness of methodology applied
- compliance with relevant law and regulations
- correctness of application of baseline and monitoring methodology
- demonstration of additionality
- monitoring plan
- stakeholder comments
- proof of title

The documents that were considered during the validation process are given in Annex- I of this report.

2.3 Interviews

Follow-up interviews with the stakeholders were conducted at the PP's office as detailed in the table below:

Location:	Plot no. 5, Vill-Bakhli (pehowa), Kurukshetra, Haryana	
Dates:	18/07/2016	
Key points discussed:	**Name of person, interviewed**	**Designation, Organization**
Host Country rule and regulations related to project activity	Mr. Phool Chand	Consultant, PA Research & Consultants
Project description	Mr. J N Saha Mr. H K Saini Mr. P K Saini	Sainsons Paper Industries Limited
Additionality	Mr. Phool Chand	Consultant, PA Research & Consultants
Baseline and Monitoring plan	Mr. Phool Chand Mr. J N Saha	Consultant, PA Research & Consultants Sainsons Paper Industries Limited

2.4 Site Inspections

KBS conducted a site inspection[/8/] on 18/07/2016 at manufacturing unit of Sainsons Paper Industries Limited. The objective of the physical site inspection is to confirm that the VCS PD[/1//2/] reflects the proposed VCS project activity. The project technical details, calibration practice, calibration frequency, location and project boundary were examined during this visit. Interviews with the project proponent, the consultant and project stakeholders were carried out to confirm selected information and to resolve issues identified in the document review.

2.5 Resolution of Findings

KBS applies the risk based approach aimed at focusing on high risk issues to the validation results whilst not omitting any part of the mandatory processes. A few discrepancies were found during the validation and the validation report was submitted to the project proponent, indicated under the titles corrective action requests (CARs) and clarification requests (CLs). CARs and CLs require the PP to take relevant actions. Criteria for judging items as CAR or CL are as follows:

Corrective action request (CAR):

- the project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions

- the Voluntary Carbon Standard's requirements have not been met, or
- there is a risk that emission reductions cannot be monitored or calculated.

Clarification request (CL):

- Information is insufficient or not sufficiently clear to determine whether the applicable VCS requirements have been met.

FARs is to be raised to highlight issues related to project implementation that require review during the first verification of the project activity. FARs does not relate to VCS requirements for registration.

CARs and CLs are to be resolved or closed out if the PP modifies the project description, rectifies the PD or provides adequate additional explanations or evidence that satisfies the concerns. If this is not completed, the project activity cannot be recommended for registration under VCS registry.

The project description document was revised addressing the CARs & CLs issued by KBS. After reviewing the revised and resubmitted project description/1/; resolving the CARs & CLs raised and outstanding concerns, KBS issues this final validation report and opinion.

03 CAR and 01 CL were found during Validation. The list of CARs/CLs raised and the response provided, the means of validation, reasons for their closure and references to correction in the PD are provided in respective section to this report. The revised PD/2/ with changes incorporated as per the issues raised were rechecked with the documentary evidences and found to be inline.

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2.6 Forward Action Requests

No FAR is raised during the validation.

3 VALIDATION FINDINGS

3.1 Project Details

The need of project activity was because of increased production of paper mill from 150 TPD to 225 TPD as confirmed by interviewing the top management and also by reviewing the plant logs/21/. The Boilers and TG sets before project activity were not enough to meet the demand after capacity expansion. Hence, there was a need of a new cogeneration plant to meet the process steam and electricity requirement because of expansion of project. Due to capacity expansion, the additional process heat requirement was of 1300 GJ/day and additional electricity requirement was of 56 MWh/day validated from the historical data from the plant records/21/. To meet up the complete demand after capacity expansion and to remove dependency from grid, SPIL decided to install a new co-generation unit.

The project is a cogeneration unit with one 50 TPH biomass based boiler and a 5 MW turbine generator (TG). The generated steam and electricity is used to meet the captive demand of increased capacity of paper plant.

The detailed specifications of Boiler and TG are as below were validated from the technical specification sheets[/10/12/] of boiler and turbines:

Boiler:	
Type:	Air Fluidized bed combustion (AFBC) Boiler
Pressure:	65 kg/cm^2(g)
Temperature:	490+/-5^{o}C
Capacity:	50 tonnes per hour (tph)
Fuel:	Fuel firing option: Rice Husk and Coal
Efficiency:	The efficiency for Rice husk 80%
Turbine:	
Type:	Multistage, extraction-cum-condensing, Horizontal, Impulse type
Capacity:	5 MW
Inlet steam pressure:	63 Kg./Cm^{2}g
Temperature:	485+/- 5^{o}C
Gear Box Output speed:	1500 RPM
Alternator:	
Rating:	5 MW
Speed:	1500 RPM
Frequency:	50 Hz

The plant installed one condensing cum extraction turbine along with 50 TPH high-pressure boiler with steam parameters of 63 kg/cm^2 and 485 ^{0}C. This boiler is of modern design with fluidized bed combustion suitable for indoor installation with water scrubber for dust collection. For generating maximum of 100% steaming capacity of the boiler at rated parameters, about 600 TPD of rice husk (100%rice husk firing) is required. The plant has Supervisory Control and data acquisition for operation and generates a gross output of 5000 KW at the generator terminals. The power generation in the cogeneration plant is at 440V level.

The plant is designed with all other auxiliary plant systems like:

1. Rice husk handling system.

2. Ash handling system

3. Air pollution control devices

4. Water system consists of following sub-systems:

5. Raw water system

   5.1 Condensate system

   5.2 Fire protection system

The rice husk is supplied by vendors on continuous basis hence the storage of rice husk is less than 30 days hence there is no significant GHG emission from storage of rice husk. Also the ash resulting from the firing of rice husk is dumped to a specified site. The operation of the rice husk based power plant will lead to mitigation of emission of carbon di-oxide, as husk is a carbon neutral fuel. The project apart from mitigating the emission of GHG will reduce the local emissions of sulfur and other pollutants associated with the burning of fossil fuels. Hence technology employed in project activity is environmentally safe and sound.

No technology transfer is involved in the project activity, as the technology used and know how required for the project activity is available in India.

3.2 Application of Methodology

3.2.1 *Title and Reference*

Title of the Methodology Used: "Consolidated methodology for electricity and heat generation from biomass residues", ACM 0006, Version: 12.1.1, EB 69"

The validation team has confirmed that the selected baseline methodology is the approved baseline methodology "Consolidated methodology for electricity and heat generation from biomass residues", ACM0006, Version: 12.1.1, EB 69 /29/, available on UNFCCC web site. The applied methodology latest version and is valid. The selected baseline methodology, i.e., ACM0006, Version: 12.1.1 is correctly applied to this type of co-generation projects. All the applicability criterion of applied methodology is appropriately justified in section 2.2 of the VCS PD/2/. Moreover as assessed by the VVB during site visit/8/ and by desk review of technical design of project there is a significant reduction in emissions involved with the proposed project compared to conventional activities.

3.2.2 *Applicability*

The approved small scale methodology requires the project activity to meet all the applicability criteria as specified in the methodology. The applicability has been demonstrated by the PP as per the relevant paragraphs of the methodology ACM0006, version 12.1.1 The following table

considers the methodological applicability criteria along with course of validation for each criterion of the methodology considered individually.

Criteria	Validation Remarks
This methodology is applicable to project activities that operate biomass-residue (co-) fired power-and-heat plants.	The project activity will utilise 100% rice husk for the generation of steam and electricity except some urgencies where coal may be used. In the absence of the project activity, the steam would be generated from biomass based boilers and electricity would be purchased from grid. The site visited is conducted by the validation team to confirm the statement provided by PP. The plant log books were verified to validate the historical consumption of biomass.
The project activity may include the following activities or, where applicable, combinations of these activities: • The installation of new plants at a site where currently no power and heat generation occurs (Greenfield projects); • The installation of new plants at a site where currently power or heat generation occurs. The new plant replaces or is operated next to existing plants (capacity expansion projects); • The improvement of energy efficiency of existing plants (energy efficiency improvement projects), which can also lead to a capacity expansion, e.g. by retrofitting the existing plant; • The total or partial replacement of fossil fuels by biomass residues in existing plants or in new plants that would have been built in the absence of the project (fuel switch projects), e.g. by increasing the share of biomass residues use as compared to the baseline, by retrofitting an existing plant to use biomass residues, etc.	The project activity involves the installation of a new plant at a site where power or heat generation was occurring. The new plant is operated next to existing plants (capacity expansion project). The plant was under construction during the site visit and plant personnel were interviewed by the team leader and also the purchase orders were validated to confirm the criteria. The expansion from 150 TPD to 225 TPD of paper production was planned by SPIL to meet the growing demand of product in the market.
No biomass types other than biomass residues are used in the project activity	The project will only use rice husk as the fuel for power and heat generation. No other biomass types than biomass residues are used in the project plant. The biomass assessment report validated to confirm the same also the top management were

	interviewed to reconfirm.
Fossil fuels may be co-fired in the project plant. However, the amount of fossil fuels co-fired does not exceed 80% of the total fuel fired on an energy basis.	There is no fossil fuel co-fired in the project as validated above.
For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project does 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;	Hence criterion in not applicable. The validation team confirms based on its local and sectoral expertise.
The biomass residues used in the project facility are not stored for more than one year.	The project activity would require 108,000 tonnes of rice husk per year. The storage capacity designed for the project can only hold 60 days quantity of rice husk supply. The same was physically verified during site visit.
The biomass residues used by the project facility are not obtained from chemically processed biomass (e.g. through esterification, fermentation, hydrolysis, pyrolysis, bio- or chemical –degradation, etc.) prior to combustion. Moreover, the preparation of biomass-derived fuel does not involve significant energy quantities, except from transportation or mechanical treatment so as not to cause significant GHG emissions.	The biomass residues used by the project proponent is rice husk, which does not require any chemical pre-processing before combustion as fuel. The above statement provided by the PP is confirmed based on the sectoral expertise of validation team.
In the case of fuel switch project activities, the use of biomass residues or the increase in the use of biomass residues as compared to the baseline scenario is technically not possible at the project site without a capital investment in: • The retrofit or replacement of existing heat generators/boilers; or	This project is not a fuel switch project activity as validated above. Hence criterion in not applicable.

• The installation of new heat generators/boilers; or • A new dedicated biomass residues supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes); or • Equipment for preparation and feeding of biomass residues	
In the case that biogas is used in power and/or heat generation, this methodology is applicable under the following conditions: • The biogas is generated by anaerobic digestion of wastewater (to be) registered as a VCS project activity and the details of the registered VCS project activity must be included in the PDD. Any CERs from biogas energy generation should be claimed under the proposed project activity registered under this methodology; • The biogas is generated by anaerobic digestion of wastewater that is not (and will not) be registered as a VCS project activity. The amount of biogas does not exceed 50% of the total fuel fired on an energy basis.	No biogas is used in power and/or heat generation. The project activity is based on the rice husk based co-generation. Hence criterion in not applicable.
In the case the project from dedicated plantations: (a) The cultivated land can be clearly identified and used only for dedicated energy biomass plantations; (b) The VCS project activity does not lead to a shift of pre-project activities outside the project boundary, i.e. the land under the proposed project activity can continue to provide at least the same amount of goods and services as in the absence of	The rice husk is agrowaste and procured from vendors. Hence criterion in not applicable.

the project; (c) The plantations are established: (i) On land which was, at the start of the project implementation, classified as degraded or degrading; or (ii) On a land area that is included in the project boundary of one or several registered A/R VCS project activities; (d) The plantations are not established on organic soil (notably peatlands); (e) The land area of the dedicated plantations will be planted by direct planting and/or seeding; (f) After harvest, regeneration will occur either by direct planting, seeding or natural sprouting; (g) Grazing will not occur within the plantation; (h) No irrigation is undertaken for the biomass plantations; (i) The land area where the dedicated plantation will be established is, prior to project implementation, severely degraded and in absence of the VCS project activity would have not been used for any other agricultural or forestry activity; (j) Only perennial plantations are eligible.	
Finally, the methodology is only applicable if the most plausible baseline scenario, as identified per the "Selection of the baseline scenario and demonstration of additionality" section hereunder, is: • For power generation: Scenarios	The baseline scenario identified for the project is Power: P7 (validated in further sections of report) Heat: H5 (validated in further sections of report) Mechanical Power - The heat generated by the

P2 to P7, or a combination of any of those scenarios; • For heat generation: Scenarios H2: to H7:, or a combination of any of those scenarios; • If some of the heat generated by the CDM project activity is converted to mechanical power through steam turbines, for mechanical power generation: Scenarios M2 to M5: o In the case of M2 and M3, if the steam turbine(s) are used for mechanical power in the project, the turbine(s) used in the baseline shall be at least as efficient as the steam turbine(s) used for mechanical power in the project; o In the case of M4 and M5, steam turbine(s) for mechanical power are not allowed for the same purpose in the project. • For biomass residue use: Scenarios B1: to B8:, or any combination of those scenarios. For scenarios B5: to B8:, leakage emissions should be accounted for as per the procedures of the methodology. • For the land use of the plantation area: Scenario L1 is the baseline.	project activity is not converted into mechanical power. Hence not applicable. Biomass: B1 and B4. The project does not involve biomass sourced from dedicated plantation hence not applicable. Biomass is not used from dedicated plantation area. Hence L1 is not required As the identified baseline scenarios for Power, Heat and Biomass is permitted, the application of the methodology is justified.

3.2.3 *Project Boundary*

Discussion:

The project boundary was checked with regard to the requirement stipulated in the methodology[/37/] which says that the project boundary is the physical, geographical site where the spatial extent of the project boundary encompasses:

- All plants generating power and/or heat located at the project site, whether fired with biomass fossil fuels or a combination of both;
- All power plants connected physically to the electricity system (grid) that the project plant is connected to;
- Where possible, all off-site heat sources that supply heat to the site where the CDM project activity is located (either directly or via a district heating system);
- The means of transportation of biomass to the project site;
- If the feedstock is biomass residues, the site where the biomass residues would have been left for decay or dumped;
- If the feedstock is biomass produced in dedicated plantations: the geographic boundaries of the dedicated plantations;

- The wastewater treatment facilities used to treat the wastewater produced from the treatment of biomass;
- In case biogas is included, the site of the anaerobic digester.

These components were found to be consistent with the components in the PDD and the project boundary was found to be justified as per the requirements of the methodology and hence accepted.

Opinion:

Based on the above discussion, the validation team confirms the following:

a) During the site visit[/8/] and documents review the validation of the project boundary has been performed. It has been cross checked by the purchase order of the equipments and NOC from state government.

b) It has been checked there is no other GHG emission other than CO2 from the electricity consumption and this has been accounted in the project emission. No other GHG emission contributing more than 1% of overall expected average was found to be occurring within the project boundary.

c) The project boundary encompasses the physical, geographical site of the manufacturing visit. The same was checked and verified during the validation site visit[/8/] and was found to be consistent.

3.2.4 *Baseline Scenario*

Discussion:

In accordance with applied methodology ACM 0006 version 12.1.1, project participant has determined the baseline scenario and demonstrated additionality using the "Tool for demonstration and assessment of additionality" (version 7.0)

The project activity is cogeneration plant of 5 MW capacity and supplies electricity to SPIL. The project will also generate 30 TPH steam at 4kg/cm2 and supply it to SPIL for process use as validated from the technical specifications of the boilers and turbines and also from the requirements of process (paper).

According to the applied methodology ACM0006/Version 12.1.1 and the steps in the latest version (i.e. version 7) of the "Tool for the demonstration and assessment of additionality", the discussion on alternative identification is included in the PDD.

The validation team carried out the following assessment of alternatives for the use of biomass, as well as alternatives for cogeneration of power and heat, in the absence of the project activity.

No.	Description	Assessment by Validation Team
Alternatives for Power Generation		
P1	The proposed project activity not undertaken as a VCS project activity.	The validation team confirms that it is in compliance with all mandatory applicable legal and regulatory requirements in India.
P2	If applicable, the continuation of power generation in the existing power plants at the project site. The existing plants would operate at the same conditions (e.g. installed capacities, average load factors, or average energy efficiencies, fuel mixes, and equipment configuration) as those observed in the most recent three years prior to the starting date of the project activity.	As mentioned above in VCS PD, SPIL had decided to increase the production capacity from 150 TPD to 225 TPD to meet the demand. The existing plant at the same conditions was generating only 2.7 MW. After increase in production the total electricity requirement would be 7.1 MW. Hence it is not possible the continuation of power generation

		in the existing power plants at project site at same conditions. Validation team validated the historical production through the plant logs and the expansion capacity by interviewing the top management of the organization.
P3	If applicable, the continuation of power generation in existing power plants at the project site. The existing plants would operate with different conditions from those observed in the most recent three years prior to the starting date of the project activity.	As mentioned above in section 1.10 of VCS PD, SPIL had decided to expand the production capacity from 150 TPD to 225 TPD to meet the demand. The retrofitting of the existing power plants at the project site is not possible as it was a major expansion and retrofitting would result in the complete shutdown of the plant as it would need retrofitting of boilers also; which would result in heavy financial losses. Also the retrofitting is not possible due to design constraints. The assessment team confirms the statement provided by the PP based on its sectoral expertise.
P4	If applicable, the retrofitting of existing power plants at the project site. The retrofitting may or may not include a change in fuel mix.	The existing plant at the same conditions was generating only 2.7 MW. After increase in production the total electricity requirement would be 7.1 MW. The total Turbine Generator capacity at full load was 2.7 MW in the existing plant. For project case the total electricity requirement would be 7.1 MW. So even if power generation from existing plant has been done at full load (which is conservative), it would not be sufficient for power requirement after capacity expansion. Hence it is not possible. The last three year data has also been checked during site visit and it is confirmed that load factors of these plants are not sufficient to meet the entire demand. Hence this is not considered as a plausible scenario.
P5	The installation of new power plants at the project site different from those installed under the project activity.	This has been considered as a plausible alternative. PP has considered installation of new coal based cogeneration system to meet the increased power demand as heat is also required in the production units. It has been confirmed by the local and technical expert that a coal based plant is most feasible and economical in the region as compare to other fossil fuels such as Natural gas, diesel and naphtha.
P6	The generation of power in specific off-site plants, excluding the power grid.	As per on-site inspection of the project site and interview with the representatives from the local communities, there was no off-site power plant near the project site. Thus P6 is not considered as a creditable scenario and

		excluded
P7	The generation of power in the power grid.	The validation team confirms that it is in compliance with all mandatory applicable legal and regulatory requirements in India. Thus it is a realistic and credible alternative of baseline scenario.
Alternatives for Heat Generation		
H1	The proposed project activity not undertaken as a VCS project activity.	The validation team confirms that it is in compliance with all mandatory applicable legal and regulatory requirements in India. However, as per discussion in PD, this is considered as a plausible alternative but financially unattractive.
H2	If applicable, the continuation of heat generation in the existing plants at the project site. The existing plants would operate at the same conditions (e.g. installed capacities, average load factors, or average energy efficiencies, fuel mixes, and equipment configuration) as those observed in the most recent three years prior to the starting date of the project activity.	No, As mentioned above in section 1.10, SPIL had decided to increase the production capacity from 150 TPD to 225 TPD to meet the demand. The heat generation capacity of the existing plant was 45 TPH. After expansion, the additional heat requirement would be 15 TPH. Hence it is not possible the continuation of heat generation in the existing plants at project site where existing plants would operated at same conditions. The statement provided by PP deemed appropriate in view of validation team. The past 3 year data was verified during site visit by reviewing the plant logs to validate the authenticity.
H3	If applicable, the continuation of heat generation in existing plants at the project site. The existing plants would operate with different conditions from those observed in the most recent three years prior to the starting date of the project activity.	The last three year data has also been checked during site visit and it is confirmed 100% load factors on existing plants are not sufficient to meet the entire demand. Hence this is not considered as a plausible scenario.
H4	If applicable, the retrofitting of existing plants at the project site. The retrofitting may or may not include a change in fuel mix.	The last three year data has also been checked during site visit and it is confirmed 100% load factors on existing plants are not sufficient to meet the entire demand. Hence this is not considered as a plausible scenario.
H5	The installation of new plants at the project site different from those installed under the project activity.	The project activity is an increase in production cpapcity project which includes installation of a rice husk based cogeneration plant. A similar output in terms of heat energy (process steam) could have been produced using new heat only or co-generation plant at the project site different from those installed under the project activity. These would largely include Fossil Fuel based or biomass based heat only plants. Hence, In the absence of the project activity,

		the demand for steam at the paper plant would most likely be met via a new standalone boiler (Capacity of 50 TPH steam) based on: H5.1 Coal and H5.2 Biomass. The same is considered as the plausible alternative by the project participant.
H6	The generation of heat in specific off-site plants	As per on-site inspection of the project site and interview with the representatives from the local administration, there was no off-site plant near the project site. Thus H6 is not considered as a creditable scenario and excluded
H7	The generation of heat from district heating	As per the on-site interview with the representatives from local administration, there are no district heat heating available in the region, and also there is no such plan for the construction of heating network in the near future. Thus the H7 is not considered as a credible scenario.

According to the applied methodology ACM0006, Version 12.1.1 "*the baseline scenario for the use of biomass should be separately identified for different categories of biomass, covering the whole amount of biomass supposed to be used in the project activity during the crediting period*". The discussions of alternatives is provided in the PDD and assessed below in accordance with the guidance provided in the applied methodology ACM0006.

Alternative for use Biomass Residue		
B1	The biomass residues are dumped or left decay mainly under aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.	The validation team confirms that it is in compliance with all mandatory applicable legal and regulatory requirements in India. According to the Biomass Assessment report/[29]/, the biomass is dumped or left to decay besides the agricultural lands, or are just burnt in an uncontrolled manner. This is also confirmed during the on-site interview with the representatives from local communities that the surplus biomass is not utilized as energy resources. Since a cost is associated with purchase of biomass it is confirmed that cost is primarily for collection, loading and transportation of biomass.
B2	The biomass residues are dumped or left to decay under clearly anaerobic conditions	According to the Biomass assessment report , the biomass are dumped idle or left to decay besides the agricultural lands, but would not be delivered to any treatment areas such as landfill sites since this would incur extra waste management expenses. According to the onsite interview with the local villager [17], there is no such practice to dump the biomass

		for anaerobic treatment. This is also confirmed during the on-site interview with the representatives from local administration that the biomass would not be treated or dumped to decay under clearly anaerobic conditions such as landfill or anaerobic digester. Thus the B2 is not considered as a credible scenario.
B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.	The validation team confirms that it is in compliance with all mandatory applicable legal and regulatory requirements in India. According to the Biomass Assessment report[/29/], the biomass is dumped or left to decay besides the agricultural lands, or are just burnt in an uncontrolled manner. This is also confirmed during the on-site interview with the representatives from local communities that the surplus biomass is not utilized as energy resources.
B4	The biomass are used for power or heat generation at the project site in new and/or existing plants;	There are existing power plants at project site which are using the biomass residue; however there consumption of biomass is included in the biomass assessment report. The total biomass quantity available in the region (0-100KM) is still surplus even after accounting consumption of project activity. This surplus biomass will be dumped or left to decay under aerobic conditions (in open fields) in the absence of the project activity and thus not a credible baseline scenario.
B5	The biomass residues are used for power or heat generation at other sites in new and/or existing plants;	As per the biomass assessment study[/29/], the biomass used in the project activity will be sourced from the nearby area and there is surplus biomass available in region (0-100KM) therefore, without the proposed project, the biomass will not be transported and collected. Thus the B5 is considered not a realistic scenario and excluded.
B6	The biomass residues are used for other energy purposes, such as the generation of bio fuels	This has been confirmed from the biomass assessment study[/29/] that there is surplus biomass available in the region which has been calculated after considering consumption by households and industries. Hence use of biomass residues for other energy purposes, such as the generation of bio fuels is not a realistic baseline alternative.
B7	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);	This has been confirmed from the biomass assessment study[/23/] that there is surplus biomass available in the region which has been calculated after considering the consumption for non-energy purposes e.g. as feedstock in processes (e.g. in the pulp and paper industry). Hence this is not a realistic

		baseline alternative.
B8	Biomass residues are purchased from market, or biomass residues retailers, or the primary source of the biomass residues and/or their fate in the absence of the project activity.	In the absence of the proposed project, the biomass are dumped or left to decay besides the agricultural lands, or are just burnt in an uncontrolled manner, which is clearly identified. Thus the B8 is considered not as creditable scenario and excluded

As per Biomass assessment study[/23/], the surplus Paddy Husk estimated as surplus within 100 K.M. radius in the study area. The percentage of surplus quantity (including the usage by the proposed project) works out to be 35% within 100 K.M. radius of study area. Therefore, it is demonstrated that there is abundant surplus of biomass in the region of the project activity which is not utilized

Since the proposed project activity does not include the use of biogas, thus the discussion of baseline alternatives for the biogas is not needed.

The realistic and credible combinations of the alternatives for power, heat and biomass residues identified above are considered as plausible alternatives to the project activity and are listed below. These alternatives are in line with the combinations (scenarios) listed in ACM0006 version 12.1.1.

Alternatives	Remarks
Alternative 1	The project activity with change in existing conditions not undertaken as a VCS activity.
Alternative 2	The electricity demand and entire steam demand of the paper manufacturing facility is met by installation of new coal based cogeneration system (H5+P5).
Alternative 3	A New biomass based heat only generation plant at the project site and electricity would be sourced from grid.
Alternative 4	A New coal based heat only generation plant at the project site and electricity would be sourced from grid.

Findings: CAR#01 was raised and closed satisfactorily; please refer Annex-2 of validation report, where same is discussed completely.

Opinion:

The assessment team confirms:

(a) All the assumptions and data used by the project participants are listed in the PD, including their references and sources;
(b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PD;
(c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;
(d) Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD;
(e) The approved baseline methodology has been correctly applied to identify the most plausible baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed project activity.

(f) The assessment team shall describe other steps taken and sources of information used to cross-check the information contained in the PD.

3.2.5 Additionality

In accordance with the applied methodology ACM0006 version 12.1.1[/29/], PP has applied latest version of 'Tool for the demonstration and assessment of additionality'[/13/] version 7.0.0 to demonstrate additionality. The steps defined by the tool have been correctly applied by the PP in the PD[/2/] and the same has been reviewed by the validation team and discussed in further chapters of this report.

Identification of alternatives
Discussion:
The baseline scenario has been identified in accordance with the approved methodology ACM0006/Version 12.1.1. The steps of baseline determination are described in the PDD[/2/] and 3 alternatives which are consistent with mandatory applicable laws and regulations are identified. Please refer to the discussion of alternatives in above sections.

Investment analysis

Discussion:

As per "Tool for the demonstration and assessment of additionality" Version 07.0.0." Sub-step 2a: Determination appropriate analysis method:

As per the additionality tool, "If the project activity and the alternatives identified in Step 1 generate no financial or economic benefits other than carbon benefits related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III)."

In case of project activity, it would generate economic benefits through the heat and electricity generation, i.e. other than carbon benefits related income. Hence simple cost analysis (Option I) had been ruled out.

Further, in line with Tool "Investment analysis", "If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used."

As identified above, the project proponent viz. SPIL had other choices available to fulfil the need of additional demand of the heat and electricity; hence investment comparison analysis (option II) had been appropriately chosen.

a) **Suitability of investment analysis, financial indicator and benchmark:**

Sub-step 2b: Option II. Investment comparison analysis Identification of suitable financial indicator:

The suitable financial indicator needs to be selected considering the project type and decision-making context. For this project activity, the PP had two more other options available for the heat and electricity. So unit cost of service i.e. Levelized cost of energy (LCOE) delivered had been selected as the appropriate indicator.

The investment decision as validated from the copy of board resolution is 25/09/2012. All the input values used for the investment comparison are available at the time of decision making.

Sub-step 2c: Calculation and comparison of financial indicators:

The main key assumptions used for calculation are presented as below:

Parameter	***Unit***	***Alter-1***	***Alter-2***	***Alter-3***	***Alter-4***	***Validation Remark***
Installed capacity TG	MW	5	5	--	--	Plant requirement. The heat to power ratio is considered appropriate by the validation team based on its local and sectoral expertise since the industry is paper production unit.
Net Electricity Production capacity	*MW*	*4.5*	*4.5*	*--*	*--*	*Design basis, this is technical parameters based on the plant load factor and the number of operating days. The calculation is validated by the assessment team as demonstrated in the*

						"Investment Analysis' spread-sheet.
Operational days/year	*Days*	*330*	*330*	*330*	*330*	*Industry standard. This is accepted based on the no of days prescribed in the various regulatory documents in India i.e CERC Tariff order[28].*
PLF	*%*	*100%*	*100%*	*100%*	*100%*	*Conservative therefore accepted.*
Electricity generated and used in project activity	*MWh*	*32340*	*32340*	*--*	*--*	*Calculated based on the PLF and annual operating days. The calculation is validated adequate by the validation team.*
Electricity imported from grid	*MWh*	*--*	*--*	*32340*	*32340*	*Calculated based on the plant requirement. The back-up calculation*

						is demonstrated in the Investment Analysis' spread-sheet
Boiler capacity	*TPH*	*50*	*50*	*30*	*30*	*Plant requirement*
Fuel	*--*	*Rice husk*	*Coal*	*Rice husk*	*Coal*	*Design basis, validated from the technical specifications.*
Feed water	*^{0}C*	*130*	*130*	*105*	*105*	*Design basis validated from the technical specifications.*
Efficiency	*%*	*80*	*82*	*78*	*82*	*Design basis validated from the technical specifications.*
NCV	*Kcal/Kg*	*3200*	*4600*	*3200*	*4600*	*Lab test report[25]*
Fuel Price	*INR/MT*	*3300*	*3250*	*3300*	*3250*	*Quotation from supplier[25]*
Escalation in biomass price	*%*	*10*	*--*	*10*	*--*	*Historical data analysis*
Electricity tariff	*INR/kWh*	*5*	*5*	*5*	*5*	*Tariff applicable at time of decision. Validated from the*

						copy of electricity bills prevailing at the time of decision making.
Escalation on ET	*%*	*1.7*	*1.7*	*1.7*	*1.7*	*Historical analysis of electricity bill paid. The escalation is appropriate in context of project activity.*
Boiler cost	*INR million*	*70*	*70*	*30*	*30*	*Supplier quotation validated.*
Turbine cost	*INR million*	*60*	*60*	*--*	*--*	*Supplier quotation validated.*
Interest rate	*%*	*13*	*13*	*13*	*13*	*As per existing rate by five major banks. The interest rate was validated from the publicly available information and validated team concluded that it is prevailing during the decision making.*
O&M Cost	*%*	*3*	*3*	*3*	*3*	*Industry specific, this is validated from the*

						CERC tariff order.
Escalation on O&M	*%*	*5*	*5*	*5*	*5*	*Industry specific this is validated from the CERC tariff order.*

Parameter	***Unit***	***Value***	***Alternative***
Levelised cost of energy generation	***INR/MJ***	*0.293*	*1*
		0.131	*2*
		0.283	*3*
		0.155	*4*

The above analysis demonstrates that Alternative 1 (Project Activity) has the highest levelised cost of energy generation. Alternative-2 and alternative-4 are more attractive than alternative-3 but alternative-2 and alternative-4 are based on coal. PP was already using biomass based cogeneration plant; hence this has been ruled out. However it is consistent with the baseline scenario of chosen with least emission among alternatives. This is conservative.

Therefore best suitable alternative for project activity is Alternative-3.

Sensitivity analysis:

To show the robustness of the financial analysis, a sensitivity analysis is carried out on key factors that may impact the performance of the project activity. As required by Tool "Investment analysis" only those parameters that constitute more than 20% of either total project costs or total project revenues are subjected to reasonable variation. The critical parameters thus identified for determination of financial viability of a project are as follows:

1. Price of Biomass

2. Rate of Electricity

3. Investment Cost

4. Operation and Maintenance cost (O&M)

5. Biomass NCV

According to para 21 of Annex 05 EB 62, 'As a general point of departure variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances".

It can be seen that even in the best scenarios through decreasing the price of biomass the project is not able to overcome the investment barrier and would require carbon benefits for its successful operations.

Outcome of Step 3:

From the sensitivity, it is clear that in the LCOE of project activity without being considering carbon benefits is more than options available. Therefore, it can be concluded that the project activity without getting additional revenue from carbon benefits is financially not a viable activity.

Step 4: Common Practice Analysis

Identified and discussed the common practice through the following Sub-steps:

Since the project activity is a measure that involves use of renewable energy in the applicable geographical area, as per paragraph 57 of the methodological tool "Demonstration and assessment of additionality" version 07.0.0, we proceed to sub-step 4a.

Sub-step 4a: The proposed project activity(ies) applies measure(s) that are listed in the definitions section above.

As per paragraph 58 of the tool, the "Guidelines on common practice" Version 02.0 has been applied. According to the Guidelines, it requires the following definitions as follows:

1) **Applicable geographical area**: Hariyana State. It is chosen because there are 28 States and 7 Union Territories in India (Host Country) and regulatory environment varies from state to state in the country. For particular this project, the major parameter in the decision making were cost of electricity, technology as biomass based power generation, availability of biomass. Both the parameters are widely varied across states to states.

Rate of Electricity: In India, independent regulatory agencies -- Central Electricity Regulatory Commission (CERC) and State Electricity Regulatory Commissions (SERCs) -- were constituted at the central and state levels respectively. The major regulatory functions of these bodies are licensing, **setting tariffs**, ensuring maintenance of service standards and promoting competition in the sector. However, outcomes across states have not been very encouraging as political interference has adversely affected the quality of regulation. For e.g. Rate of Electricity in India for Large Industry in 2011 varies from 3.17 INR/KWh to 8.80 INR/KWh.

Biomass Power: In India, the total estimated potential of Biomass Power is estimated to be 17538 MW. Out of this, Punjab state has the highest potential with 3172 MW of estimated potential. After Punjab, the next state with highest potential of Biomass Power is Maharashtra with 1887 MW of Capacity. As per analysis, it is clear that Biomass based power generation the PP has a very limited option as the availability of Biomass differs heavily from state to state.

Hence, the geographical area has been considered to Punjab State.

2) **Measure**: The project activity falls under the following measure:

"(b) Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies (example: energy efficiency improvements, power generation based on renewable energy);"

3) **Output**: "Power generation" may be considered to be the output in the context of the project activity.

4) **Different technologies**: in the context of the common practice of the project activity:

a) Energy source/fuel: In this case, the fuel is rice husk.

b) Feed Stock: This criterion is irrelevant in the context of the project activity as no feed stock is involved

c) Size of installation: Since the installed capacity of the project activity is 5 MW, the installation size shall be considered as "Small"

d) Investment climate:

i) Access to technology: Access to the biomass residues based co-generation technology is fairly same across the host country

ii) Subsidies or other financial cash flows: Though not applicable in the case of project activity, subsidies are regulated by the Ministry of New & Renewable Energy, India for the entire host country

iii) Promotional policies: In India, as per the Electricity Act 2003, the preferential tariff policy for the sale of power generated from renewable energy is there and is to be decided by respective state regulatory commissions. But in this case the PP would use electricity for captive purpose and there is no provision to sell electricity. Hence this is not applicable

iv) Legal regulation: Not applicable

Step 1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

Since the proposed project activity has a proposed installed capacity of 5 MW, the applicable output range for common practice analysis will be 2.5 MW to 7.5 MW (± 50% of 5 MW).

Step 2: Identify similar projects (both with carbon benefits and not) which fulfil all of the following conditions:

1.	The projects are located in the applicable	Projects located in the Punjab State.

	geographical area;	
2.	The projects apply the same measure as the proposed project activity;	Projects which has co-generation plants based on renewable energy
3.	The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;	Project use the energy fuel as Biomass.
4.	The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant	Plants which produce pressure steam and electricity for processes with comparable quality and properties as mentioned in section 1.8 above.
5.	The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;	The capacity of the projects is within the applicable capacity of 2.5 MW- 7.5 MW have been considered as set in Step 1.
6.	The projects started commercial operation before VCS the start date of proposed project activity.	The decision making was done in the September 2012. Hence all the projects, which started commercial operation prior to September 2012, have been considered.

As per the list from Haryana Energy Development Agency (HAREDA)[1]. Following table represents the projects, which are in the range of 2.5 MW to 7.5 MW and commissioned before September 2012.

[1] http://hareda.gov.in//writereaddata/document/hareda051632647.pdf

S.No.	Company and Location	Capacity	Date of commissioning	CDM/VCS?	Further Analysis
1.	M/s Sainsons Paper Industries, Village-Bakhli, Pehowa, Distt, Kurukshetra	3MW	2009-10	Yes[2]	No
2	M/s REI Agro Ltd, (Unit-II) Bawal Growth Centre, Jaliawas, Rewari	2.50MW	2010-11	No	Yes
3	M/s Best Food International (P) Ltd, Village Norata, Tehsil Indri, Karnal	4MW	2010-11	Yes[3]	No
4	M/s Satyam Industries Pvt. Ltd, Village Pardhana, Tehsil Israna, Panipat	3MW	2011-12	No	Yes
5	M/s Goel International Pvt. Ltd. Taraori, Karnal	3MW	2011-12	Yes (CDM Ref: 9484)	No
6	M/s REI Agro Ltd, (Unit-I) Bawal Growth Centre, Jaliawas, Rewari	3MW	2011-12	No	Yes
7	M/s Best Food International (P) Ltd, Village Norata, Tehsil Indri, Karnal	6MW	2012-13	Yes[4]	No
8	M/s NV International, Badhouli, Naraingarh, Ambala	4MW	2014-15	No	Yes
9	M/s Haryana Liquors,	2.5MW	2014-15	No	Yes

[2] http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/291/SAINSONS%20PDD.pdf

[3] https://cdm.unfccc.int/Projects/Validation/DB/EQ03X1N7X1OS8690JS0LKJPDPM8YSY/view.html

[4] http://www.cdmindia.gov.in/project_details_view_report.php?id=1319

	Jundla, Karnal				
10	M/s Shaktibhog Foods Ltd, Karnal	3.50MW	2014-15	Yes (CDM Ref: 9802)	No
11	M/s AB Grains Spirits Pvt. Ltd., Village Jatwar, Tehsil Narayangarh, district Ambala	8.9MW	2014-15	Yes (CDM Ref:7921)	No

This step gives a total of 5 biomass (non-bagasse) based co-generation projects in Haryana, which are eligible for further analysis.

Step 3: Within the projects identified in Step 2, identify those that are neither registered as a carbon benefit project activities, project activities submitted to registration, nor project activities undergoing validation. Note their number Nall.

5 projects are neither registered as a carbon benefit project activities, project activities submitted to registration, nor project activities undergoing validation.

N_{all} = 5

Step 4: Within the projects identified in Step 3 identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number Ndiff.

All 5 projects eligible for further analysis are small scale project activity with installed capacity of boiler and turbine is much lower than proposed project activity, hence considering output of proposed project activity these are not comparable.

Hence,

N_{diff} =5

Step 5: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity

F= 1-(5/5) = 0

The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and N_{all}-N_{diff} is greater than 3.

F=0 and N_{all}-N_{diff} = 0

Findings: CL#02 & CAR#04 was raised and closed satisfactorily; please refer Annex-2 of validation report, where same is discussed completely.

3.2.6 *Barrier analysis*

Discussion:

As per "Tool to demontrate Additionality of Small-Scale Project Activities" /46/, the project developer is required to provide an explanation to show that the project activity would not have occurred anyway due to at least one barrier out of five barriers. Since project developer had chosen investment barrier, additionality demonstration is in conformity with aforementioned tool.

3.2.7 *Common practice analysis*

Covered in above section.

3.2.8 Quantification of GHG Emission Reductions and Removals

The validation team has assessed all the calculations of baseline emissions, emission reductions and leakage emissions in PDD against the information and requirements presented in the selected methodology ACM0006/Version 12.1.1 and applied tools in the following steps.

Baseline Emission:

As Per the selected methodology, the following equation is applied for calculation of baseline emissions.

$$BE_y = EL_{BL,GR,y} \cdot EF_{EG,GR,y} + \sum_f FF_{BL,HG,y,f} \cdot EF_{FF,y,f} + EL_{BL,FF/GR,y} \cdot \min(EF_{EG,GR,y}, EF_{EG,FF,y}) + BE_{BR,y}$$

Parameter	Description	Applicability to the project
BE_y	Baseline emissions in year *y* (tCO2)	Applicable
$EL_{BL,GR,y}$	Baseline minimum electricity generation in the grid in year *y* (MWh)	Applicable
$EF_{EG,GR,y}$	Grid emission factor in year *y* (tCO2/MWh)	Applicable
$FF_{BL,HG,y,f}$	Baseline fossil fuel demand for process heat in year *y* (GJ)	Not considered for calculation of baseline emission. Since this approach is conservative for emission reduction estimate; hence it is accepted
$EF_{FF,y,f}$	CO2 emission factor for fossil fuel type f in year *y* (tCO2/GJ)	Not considered for calculation of baseline emission. Since this approach is conservative for emission reduction estimates; hence it is accepted
$EL_{BL,FF/GR,y}$	Baseline uncertain electricity generation in the grid or on-site in year *y* (MWh)	Not considered for calculation of baseline emission. Since this approach is conservative for emission reduction estimates; hence it is accepted
$EF_{EG,FF,y}$	CO_2 emission factor for electricity generation with fossil fuels at the project site in the baseline in year *y* (tCO_2/MWh)	Not considered for calculation of baseline emission. Since this approach is conservative for emission reduction estimates; hence it is accepted
$BE_{BR,y}$	Baseline emissions due to disposal of biomass residues in year *y* (tCO2e)	Not applicable The project participant does not claim the emission reductions caused by disposal of biomass residues during the crediting period, which is in compliance with the selected

		methodology. Thus, the parameter $BE_{BR,y}$ can be eliminated from above equation.

Hence the baseline emission is simplified as follows:

$BE_y = EL_{BL,GR,y} * EF_{EG,GR,y}$

Determination of $EL_{BL,GR,y}$

The calculation of the minimum amount of electricity that would be generated in the grid in the baseline is based on the assumption that the amount of electricity generated on-site in the baseline cannot be higher than the installed capacity of power generation available in the baseline scenario. Therefore equation 13 of ACM0006 has been used:

$$EL_{BL,GR,y} = \max\left(0, EL_{BL,y} - CAP_{EG,total,y}\right)$$

Where:

$EL_{BL,GR,y}$	=	Baseline minimum electricity generation in the grid in year *y* (MWh)
$EL_{BL,y}$	=	Baseline electricity generation in year *y* (MWh)
$CAP_{EG,total,y}$	=	Baseline electricity generation capacity in year *y* (MWh)
y	=	Year of the crediting period

Determination of Grid emission factor ($EF_{EG,GR,y}$)

The baseline grid emission factor is calculated in accordance with the "Tool to calculate the emission factor of an electricity system", (version 05.0). The following steps were performed to validate the grid emission factor:

- As the project is located in state of Hariyana which is connected to the NEWNE Electricity Grid, the assessment team confirmed that the NEWNE Grid is the relevant "project electricity system".
- It was confirmed by the assessment team that only grid power plants have been included in the calculation for the operating margin and build margin emission factor. This is in accordance with the Option I of step 2 of the latest "Tool to calculate the emission factor for an electricity system"
- It has been validated by the assessment team from the CO_2 Baseline Database version 07[/23/] (latest available at the time of webhosting) issued by Central Electricity Authority (CEA) that the percentage of total grid generation by low cost/must run plants (17.70% on the basis of average of five most recent years) for the NEWNE Regional Grid is less than 50 % of the total generation. Hence, the Simple OM method can be used to calculate the Operating Margin Emission factor for the project activity.
- The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. The Operating Margin and build Margin in the CEA database is calculated using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system" version 05.0
- The Operating Margin used in the PDD is a 3-year generation-weighted average Emission Factor. The generation data of the year 2012-13, 2013-14, and 2014-15 were used in the calculation. It was confirmed by the assessment team that it was based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. The verified value of OM is 0.9941 t CO_2/MWh (refer "ER spread Sheet")[/4/.]
- In accordance with the applied tool, the build margin is calculated in the CEA database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. The validated value of BM is 0.9285 t CO2/MWh (refer "ER spread Sheet")[/4/].

- According to the "Tool to calculate the emission factor of an electricity system", (version 05.0), the weights for OM and BM for calculating combined margin are 0.5 and 0.5 respectively for Thermal power generation. The validated value of CM is 0.9613tCO_2/MWh (refer "ER spread Sheet")[4].

The assessment team confirms that the result of the database is also consistent with the latest version (Version 05.0) of the tool to calculate emission factor for an electricity system, since the only change is the optional inclusion of off-grid power plants for calculation of emission factor.

Project Emission:

The project activity envisaged to use 15% coal for generation of electricity so in line with methodology ACM0006 version 12.1.1 project emissions are calculated as emissions due to on-site consumption of fossil fuels according to the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion". The equation (1) and option B to calculate $COEF_{i,y}$ has been used to calculate the project emission

$PEFC_{,j,y} = FCi_{,j,y} * COEF_{i,y}$
$COEF_{i,y} = NCV_{i,y} * EFCO2_{,i,y}$

Where:
$PEFC_{,j,y}$ = CO2 emissions from fossil fuel combustion in process j during the year y (tCO2/yr);
$FC_{i,j,y}$ = Quantity of fossil fuel type i consumed in process j during the year y (mass or volume unit/yr);
$COEFI_{,y}$= CO2 emission coefficient of fossil fuel type i in year y (tCO2/mass or volume unit);
$NCV_{i,y}$ = Net calorific value of fossil fuel type i in year y (GJ/mass or volume unit);
$EFCO2_{,i,y}$ = CO2 emission factor of fossil fuel type i in the year y (tCO2/GJ)

Leakage Emission:

Since the baseline scenario for biomass usage has been identified as B1 as validated in section 4.8.4 above; hence in line with methodology ACM0006 leakage emission has been considered nil for the project activity.

Emission Reduction:

$ER_y = BE_y – PE_y - LE_y$

Parameter	Unit	Value
Baseline emission	tCO2/year	31,088
Project emission	tCO2/year	2,646
Leakage	tCO2/year	0
Emission reduction	**tCO2/year**	28,442

Findings:

CAR#03 was raised and closed satisfactorily; please refer Annex-2 of validation report, where same is discussed completely.

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Opinion:

As discussed above, the validation team confirms the following:

a) All assumptions and data used by the project participants are listed in the PDD, including their references and sources;
b) All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PD;
c) All values used in the PD are considered reasonable in the context of the proposed VCS project activity;

d) The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;
e) All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD and corresponding spreadsheets.

3.2.9 *Methodology Deviations*

No deviation applied.

3.2.10 *Monitoring Plan*

The monitoring plan is included in the PDD Section B.7 based on the approved monitoring methodology ACM0006/Version 12.1.1 titled "Consolidated methodology for electricity generation from biomass in power and heat plants", and was correctly applied to the proposed CDM project activity. Monitoring of GHG emission reduction is based on measuring the amount of biomass residual prevented from natural decay or burning, and the electricity and heat generation by the project activity, which is transparently presented in Section B.7 of the PDD.

Parameters Determined ex ante

The parameters determined ex-ante for calculation of emission reductions and not to be monitored during the crediting period have been mainly listed in the Section B.6.2 of PDD and were assessed by the validation team valid and applicable to the project (see details in Section 4.7.5).

Especially, in calculation of baseline emissions & project emissions caused by electricity consumption, the emission factor of NEWNE grid is reported to be determined ex-ante and would remain fixed during the crediting period in PDD, which is calculated as a combined margin (CM), consisting of the combination of OM and BM emission coefficient.

Key Parameters monitored ex post

Parameters to be monitored	Source of data	Monitoring frequency
Biomass residues categories and quantities used in the CDM project activity in year y for which the baseline scenario is B1 ($BR_{B1,n,y}$)	On-site measurements using weight meters	Continuous
Moisture content of the biomass residues	On-site measurements	The moisture content will be monitored for each batch of biomass of homogenous quality.
Total quantity of electricity generated in the project plant during the year y ($EL_{PJ,gross,y}$)	On-site measurements using energy meters	Continuous
Total quantity of electricity consumed by the project during the year y ($EL_{PJ,aux,y}$)	On site measurements using energy meters	Continuous
Net quantity of electricity generated in the project plant during the year y ($EL_{BL,y}$)	Calculated	Continuous
Net calorific value for biomass	Onsite measurement using bomb	Annual

used ($NCV_{BR,n,y}$)	calorimeter	
Quantity of fossil fuel of type i combusted in year y ($FC_{FF,i,y}$)	On-site measurements using weight meters	Continuous
Weighted average net calorific value of fossil fuel type i in year y ($NCV_{i,y}$)	Values provided by the fuel supplier in invoices or Measurements by the project participants or Regional or national default values or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories	The NCV will be obtained for each fuel delivery, from which weighted average annual values will be calculated.
CO_2 emission factor of fossil fuel type i ($EF_{CO2,i,y}$)	Values provided by the fuel supplier in invoices or Measurements by the project participants or Regional or national default values or IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories	The CO_2 emission factor will be obtained for each fuel delivery, from which weighted average annual values will be calculated

Data management and QA/QC:

PD clearly describes the detailed monitoring procedures, monitoring structure, monitoring items, training, calibration procedure and handling of emergency situation, which in conformity with applied methodology. The validation team confirms that the specific uncertainty levels, methods, and associated accuracy level of measurement instruments and calibration procedures used for various parameters and variables are identified in the PDD[/2/], along with detailed quality assurance and quality control procedures.

Findings: CAR 02 was raised and closed successfully; please refer Annex-2 of validation report, where same is discussed completely.

Opinion: The assessment team confirms that:
The validation team confirms that:

(a) The monitoring plan based on the approved monitoring methodology, ACM0006 V12.1.1 is included in Section B.7 of the PDD and is correctly applied to the project activity. The monitoring plan has been found to be in compliance with the requirements of the applied methodology. The monitoring plan will give opportunity for real measurements of achieved emission reductions.

(b) The validation team considers that monitoring arrangements described in the monitoring plan are feasible within the project design and the PP will be able to implement the monitoring plan.

3.3 Environmental Impact

Since the project does not fall under the purview of the Environmental Impact Assessment (EIA) notification// of the ministry of Environment and forest, Government of India. Hence the validation team confirms that the project activity complies with the requirements of VVS, version 3.0/7/.

The proposed project activity contributes to generation of renewable fuel based energy and is expected to benefit the economic development of a backward region. Thus the project activity is expected to have only beneficial impacts and no adverse environmental impacts. Social & environmental impacts of the project have been sufficiently addressed. No adverse environmental impacts compared to baseline situation as well as trans-boundary impacts have been envisaged from this project activity.

Opinion:

The Host Party (India) does not require the project participant to conduct an environmental impact assessment (EIA) for such kind of project activities. The validation team confirms that the project activity is not in the list of projects requiring prior environmental clearance. Therefore in the opinion of validation team the project activity does not cause the adverse environmental impacts and is complying with the requirements of VVS 9.0.

3.4 Comments by Stakeholder

The stakeholder meeting was conducted on 18th Feb 2016/42/ at the project site for the projects developed by PP. The local stakeholder meeting was conducted prior to the start of validation activities with DoE. The local stakeholders were invited for comments through sending the invitation individually to local stakeholders on 08/02/2016. The comments by local stakeholders are to be invited in an open and transparent manner. A summary of the comments received has provided to the validation team along with the report indicating how due account was taken to the comments received.

Review of the Stakeholder meeting minutes held on 18th Feb 2016/42/ shows that people were supportive to the project activity and expressed no negative comments on the project activity. As part of the validation, KBS confirmed through document review that the stakeholders were invited in a transparent manner.

4 VALIDATION CONCLUSION

PA Research & Consultants Pvt. Ltd has commissioned the KBS Certification Services Pvt. Ltd. to carry out the Validation of the project - “5MW biomass based cogeneration project at Sainsons”, with regard to the relevant requirements of VCS Standard Version 03.4.

The project involves implemented a 5 MW cogeneration power project based on rice husk. The power will be produced by 5MW extraction-cum-condensing steam turbine with alternator. Major equipment of the power project comprises of 50 tonne per hour (TPH) capacity single drum travel grate type boiler. The average inflow of extraction steam is 30 tonne per hour, which is used for process steam requirement in the paper machine section. In pre project scenario the heat and power requirement was met using low-

pressure boiler with 3 MW turbine, wherein the remaining power is imported from grid.

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A risk based approach has been followed to perform this validation. In the course of the validation 03 Corrective Action Requests (CAR) and 01 Clarification Requests (CL) were raised and successfully closed out.

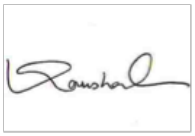
The validation is based on the VCS PD, proof of title, proof of right, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validation team by project proponent.

As a result of the validation, the validation team confirms that:

- *The project fulfils criteria of VCS Standard Version 03.4.*
- *The project is in line with all relevant VCS requirements.*
- *The project additionality is sufficiently justified in the PD.*
- *The monitoring plan is transparent, adequate and in line with applied baseline and monitoring methodology of ACM0006, version 12.1.1.*
- *The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of* 284,420 tCO2e/annum *is most likely to be achieved within the 10 years of first renewable crediting period.*

No restrictions or uncertainties were identified related to the validation.

Date: 13/09/2016



Kaushal Goyal
Managing Director
KBS Certification Services Ltd.

Annex – 1: Reference Documents

S. No.	Name of document (Validation/Registration Process)
/1/	VCS PD Version 01 dated 17/05/2016
/2/	VCS PD Version 03 dated 09/09/2016
/3/	/3.1/ Investment Analysis spread-sheet corresponding to PD Version 01 /3.2/ Investment Analysis corresponding to PD Version 03
/4/	/4.1/ ER spread-sheet dated corresponding to PD Version 01 /4.2/ ER spread-sheet dated corresponding to PD Version 03
/5/	VCS Program Guide Version 03.5
/6/	VCS Standard Version 03.4
/7/	Detailed Project Report for the "5MW biomass based cogeneration project at Sainsons"
/8/	Audit plan sent to PP for the site inspection.
/9/	Copy of Management Decision of "Sainsons Paper Industries Limited" dated 01/09/2012.
/10/	Quotation of boilers from 23/05/2012 from Cheema Boilers limited
/11/	Purchase orders placed to Cheema Boilers dated 04/01/2013
/12/	Proposal from Triveni Limited dated at 23/06/2015 for the supply turbine.
/13/	Purchase orders placed to Triveni for the supply of 5 MW turbine
/14/	"General Guidelines for SSC CDM Methodologies, version 20.0" (Annex 11 of EB 76)
/15/	"Methodological tool: Investment Analysis, version 06"
/16/	Schedule XIV of Companies Act
/17/	"General Guidance on Leakage in Biomass Project Activities" (Version 3, EB 47)
/18/	Lab reports of for the NCV of biomass
/19/	Invoices submitted by the biomass supplier dated Balaji international dated 10/08/2012
/20/	Tariff Order from CERC to validate the various input parameters.
/21/	Logbooks of the plant
/22/	Tool to calculate the emission factor of an electricity system", (version 05.0)
/23/	Biomass assessment report for demonstrating the surplus biomass dated February 2012
/24/	Declaration regarding right of use, not registered under any other GHG program etc. dated 31/08/2015
/25/	NCV test report for rice husk 05/08/2012, 12/09/2012, 20/07/2012
/26/	Electricity bill July 2012, June 2012, May 2012, August 2012
/27/	Quotation of coal dated 25/08/2012 received from Sardar Enterprise.
/28/	CERC tariff order dated 09/11/2010 used for crosschecks of input parameters considered for levelized cost. http://www.cercind.gov.in/2010/November/Signed_Order_256-2010_RE_Tariff_FY_11-12.pdf
/29/	Applied methodology ACM0006, version 12.1.1

Annex 2: Detailed Findings

Summary of findings	CAR	CL	FAR
	03	01	00

Date	Type & Number	Raised by	Reference
17/08/2016	CAR# 01	Assessment team	D-30
Non conformities raised			
During site visit the production was observed 220 TPD (max) however the VCS PD mentions the capacity as 175 TPD maximum. The information verified during onsite audit is inconsistent with the VCS PD			
Project Participants response		**Date:** 22/08/2016	
The capacity of plant prior to project activity was 150 TPD and post project activity is 225 TPD, the same has been corrected in revised VCS PD.			
Documentation Provided as Evidence by Project Participant			
Revised VCS PD Version-02			
Information Verified by Team Leader		**Date of review: 01/09/2016**	
Revised PD, version 02			
Reasoning for not acceptance or close out			
The capaciyty of project activity is updated in accordance with the information validated during site visit. CAR is closed.			
Date of acceptance or non- acceptance		**Date: 01/09/2016**	Status: Closed

Date	Type & Number	Raised by	Reference
17/08/2016	CL# 02	Assessment team	D-30
Non conformities raised			

1. Provide the following evidences to validate the information provided in the VCS PD: a) Declaration letter is required from the PP that the project activity is not registered under any other GHG programme. b) Supporting documents to validate the baseline electricity consumption. c) Technical specifications of key equipments used in the project activity; d) Submit copy of biomass assessment report to validate the requirement of methodology. e) Submit the supporting evidences to validate the input parameters used in the investment comparison. f) Documents related to the local stakeholder process. 2. Clarify, whether the project activity is 100% biomass based or it has provision of co-firing?

Project Participant's response	**Date:** 22/08/2016
1. The supportive as mentioned above has been provided along with this response. 2. The project activity will utilise 100% biomass, however in case of exigency of coal is used the same will be monitored.	
Documentation Provided as Evidence by Project Participant	
1. Letter of declaration 2. Historical electricity generation and consumption 3. Offer letter from technology supplier for coal and biomass based cogen plant 4. Purchase orders of boiler and turbine 5. Biomass assessment report 6. Biomass purchase invoices prior to investment decision date 7. NCV report prior to investment decision date 8. Quotation for coal & NCV of coal 9. Stakeholder minutes of meeting 10. Invitation letter for local stakeholder consultation 11. Attendance sheet for local stakeholder consultation	
Information Verified by Team Leader	**Date of review: 01/09/2016**
Revised PD, version 02	
Reasoning for not acceptance or close out	
The aforementioned documents are submitted to validation team and the information among the documents and VCS-PD is found consistent. CL is closed.	

Date of acceptance or non- acceptance	**Date: 01/09/2016**	Status: **Closed**

Date	**Type & Number**	**Raised by**	**Reference**
17/08/2016	CAR# 03	Assessment team	D-30
Non conformities raised			

The diagram for pre project activity is not included in the submitted VCS PD, refer the requirement of applied methodology in this regard.		
Project Participant's response	**Date:** 22/08/2016	
The diagram for baseline scenario is included in revised VCS PD.		
Documentation Provided as Evidence by Project Participant		
VCS PD Version-02		
Information Verified by Team Leader	**Date of review: 01/09/2016**	
VCS PD Version-02		
Reasoning for not acceptance or close out		
The revised PD includes both the diagrams and the same was verified during on site audit. CAR is closed.		
Date of acceptance or non- acceptance	**Date: 01/09/2016**	Status: **closed**

Date	**Type & Number**	**Raised by**	**Reference**
17/08/2016	CAR# 04	Assessment team	D-30
Non conformities raised			
The applicable geographical area is limited to Punjab only. However, the choice of limiting/restricting the area, a suitable justification needs to be provided? Refer the additionality tool.			
Project Participant's response	**Date:** 22/08/2016		
For particular this project, the major parameter in the decision making were cost of electricity, technology as biomass based power generation, availability of biomass. Both the parameters are widely varied across states to states. Rate of Electricity: In India, independent regulatory agencies -- Central Electricity Regulatory Commission (CERC) and State Electricity Regulatory Commissions (SERCs) -- were constituted at the central and state levels respectively. The major regulatory functions of these bodies are licensing, setting tariffs, ensuring maintenance of service standards and promoting competition in the sector. However, outcomes across states have not been very encouraging as political interference has adversely affected the quality of regulation. For e.g. Rate of Electricity in India for Large Industry in 2011 varies from 3.17 INR/KWh to 8.80 INR/KWh. Biomass Power: In India, the total estimated potential of Biomass Power is estimated to be 17538 MW. Out of this, Punjab state has the highest potential with 3172 MW of estimated potential. After Punjab, the next state with highest potential of Biomass Power is Maharashtra with 1887 MW of Capacity. As per analysis, it is clear that Biomass based power generation the PP has a very limited option as the availability of			

Biomass differs heavily from state to state. Hence, the geographical area has been considered to Punjab State.		
Documentation Provided as Evidence by Project Participant		
VCS PD Version-02		
Information Verified by Team Leader	**Date of review: 01/09/2016**	
VCS PD Version-02		
Reasoning for not acceptance or close out		
The contention provided by PP to include the selected area 'Punjab' for the demonstration of common practice analysis is accepted. CAR is closed.		
Date of acceptance or non- acceptance	**Date: 01/09/2016**	Status: Closed