Validation Report

Report for:

M/s Sanjog Sugars & Eco-Power Private Limited

Validation of CDM project for

10 MW Biomass based Power Project by Sanjog Sugars & Eco-Power Private Limited

LRQA Reference	CDM-MUM-0061712 Version 1.4
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1 Executive Summary

Lloyd's Register Quality Assurance Limited has been contracted by M/s Sanjog Sugars & Eco-Power Private Limited, the project participant (PP), to undertake validation of the proposed project activity "10 MW Biomass based Power Project by Sanjog Sugars & Eco-Power Private Limited". The validation has been performed through a process of document review based on the project design document, Version 1 dated 03/02/2011 initially submitted for validation and the subsequent revisions, follow-up interviews with the stakeholders, resolution of outstanding issues and issuance of the validation report.

The proposed project is setting up a biomass fuel based power generation plant or unit with a rated capacity of 10MW located in the state of Rajasthan, India. The project activity will utilise only renewable biomass fuel for power generation and there will be no GHG emissions. By supplying the generated electricity to the Northern, Eastern, Western, and North-Eastern (NEWNE) grid, the project activity shall replace equivalent power generated predominantly by fossil fuel based power plants and thereby achieving GHG emission reductions.

The fulfilment of the requirements as set forth in Article 12 of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC), the modalities and procedures for a CDM (CDM M&P) and relevant decisions of the Conference of the Parties, serving as meeting of the Parties to the Kyoto Protocol (COP/MOP) and the Executive Board of the CDM (CDM-EB) have been evaluated and conformance to the validation requirements were confirmed based on the given information. A risk based approach was taken to conduct the validation and corrective action requests (CARs) and clarifications (CLs) were raised for relevant actions by the PP.

The validation team has found through the validation process 8 CARs and 5 CLs. The PP has taken actions and submitted the revised PDD, IRR & emission reduction calculation spreadsheet to LRQA. The validation team is of the opinion that the proposed project activity as described in the project design document Version 5 dated 02/01/2012 meets all the relevant UNFCCC requirements for the CDM, as well as the host country's national requirements and if implemented as designed, is likely to achieve the emission reductions and contribute to the sustainable development of the host country. LRQA therefore requests the registration of "10 MW Biomass based Power Project by Sanjog Sugars & Eco-Power Private Limited" to the CDM Executive Board as a CDM project activity.

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Abbreviations

ABT	Actual Basis Tariff
BAS	Biomass Assessment Study Report
BE	Baseline emissions
BM	Build Margin
CA	Chartered Accountant
CAR	Corrective Action Requests
CDM	Clean Development Mechanism
CDM-EB	Executive Board of Clean Development Mechanism
CDM M&P	Modalities and procedures for a clean development mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
CL	Clarification requests
COP/MOP	Conference of the Parties serving as meeting of the Parties to the Kyoto Protocol
CM	Combined Margin
DCS	Distributed Control System
DPR	Detailed Project Report
DNA	Designated national authority
DOE	Designated operational entity
DG	Diesel Generator
EA	Electricity Act
EB	Electricity Board
EF	Emission factor
EPC	Engineering, Procurement and Commissioning
EIA	Environmental impacts assessment
ER	Emission reductions
ESP	Electro Static Precipitator
FAR	Forward action requests
GCV	Gross Calorific Value
GHG	Greenhouse gas
GSP	Global stakeholders' consultation process
GoI	Government of India
HCA	Host Country Approval
IDC	Interest during Construction
INR	Indian Rupee
IPCC	Intergovernmental panel on climate change
IREDA	Indian Renewable Energy Development Agency
IRR	Internal rate of return
JMR	Joint Meter Reading
KP	Kyoto Protocol of the United Nations Framework Convention on Climate Change
kV	Kilo Volts
kW / kWh	Kilowatt / Kilowatt hour
LE	Leakage Emissions
LoA	Letter of approval
LR	Lloyd's Register
LRQA	Lloyd's Register Quality Assurance Limited
MAT	Minimum Alternative Tax
MoEF	Ministry of Environment and Forests

MW / MWh	Mega watt / Mega watt hour
MT	Metric Ton
NCDMA	National Clean Development Mechanism Authority
NCV	Net Calorific Value
NOC	No Objection Certificate
NGO	Non governmental organization
NEWNE	Northern, Eastern, Western, and North-Eastern regional grid
ODA	Official Development Assistance
O&M	Operation & Maintenance
OM	Operating Margin
PDD	Project design document
PE	Project emissions
PO	Purchase Order
PP	Project participant
PLF	Plant Load Factor
PLR	Prime Lending Rate
PPA	Power Purchase Agreement
QA	Quality Assurance
QC	Quality Control
RBI	Reserve Bank of India
RERC	Rajasthan Electricity Regulatory Commission
RRECL	Rajasthan Renewable Electricity Corporation Limited
RSEB	Rajasthan State Electricity Board
RVPN	Rajasthan Rajya Vidyut Prasaran Nigam Limited
SSEPPL	Sanjog Sugars & Eco-Power Private Limited
STG	Steam Turbo Generator
TPTL	Tata Power Trading Company Limited
tCO_2e	Tonnes of carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
CDM VVM	CDM Validation and Verification Manual

2 Introduction

The project participant (PP), Sanjog Sugars & Eco-Power Private Limited (SSEPPL) (herein also referred as Sanjog Sugars) has contracted Lloyd's Register Quality Assurance Limited (LRQA) to undertake validation of the proposed project activity "10 MW Biomass based Power Project by Sanjog Sugars & Eco-Power Private Limited". This report summarizes the findings of the validation process that has been conducted on the validation requirements of the CDM.

The validation has been undertaken by the team formed of the qualified personnel of LRQA as follows:

Imran Ustad	LRQA Ltd. India	Team Leader CDM Lead Validator
T Ramesh	LRQA Ltd. India	Team Member CDM Lead Validator
Subramanian Saravanan		External sector expert
Archak Pattanaik	LRQA Ltd. India	Technical Reviewer under training
Prabodha C Acharya	LRQA Ltd. India	Technical Reviewer
Rudra Charan Padhy		External Sector expert to Technical Reviewer
Michiaki Chiba	LRQA Ltd.	Decision maker

The Personnel being engaged in the CDM project validation are qualified based on the established procedures of LRQA to assure the resource requirements and satisfy all the requirements of competence criteria for an AE/DOE under CDM (CDM-Accreditation Standard version 03). LRQA is designated as an operational entity and holds the full responsibility of decision-making regarding the validation, in accordance with the accreditation requirements of the CDM-EB. The certificate of appointment of the team personnel is attached to this report.

2.1 Objective

Validation is the process of an independent third party evaluation of a project activity on the basis of the PDD, against the requirements of the CDM as set out in Article 12 of the Kyoto Protocol, the CDM M&P, the present annex, subsequent decisions made by the COP/MOP and CDM-EB, and other rules applicable to the proposed project activity including the host country's legislation and its specific requirements for sustainable development. The validation follows the requirements of the current version of the CDM validation and verification manual (CDM VVM) to ensure the quality and consistency of the validation work and the report.

2.2 Scope

The scope of validation is an independent and objective review of the project design. Review of the PDD is conducted against the requirements of the Kyoto Protocol, the CDM M&P and relevant decisions of the COP/MOP and the CDM-EB. LRQA follows a risk-based approach in the validation focusing on the identification of significant risks for project implementation and generation of CER. Validation is

not meant to provide any consulting towards the PP, however, the corrective actions requests (CAR) and clarifications (CL) might provide input for improvement of the project design. A validation conclusion shall become final subject to the decision maker's review by LRQA Ltd.

2.3 GHG Project Description

Sanjog Sugars & Eco-Power Private Limited (SSEPPL) has involved in the implementation of renewable biomass fuel based power plant with a rated capacity of 10 MW in the state of Rajasthan, India. The design of the biomass based power plant includes travelling grate with spread stoker, natural circulation, balanced draft, vertical bi-drum type boiler, Impulse type bleed cum condensing steam turbine and an air cooled condenser. The net electricity generated by the project will be supplied to the NEWNE grid.

Since the renewable biomass is a zero emission fuel, the net electricity supplied by the project activity will displace equivalent quantity of electricity generated by the NEWNE grid which is mainly dependant on fossil fuel and thereby result in the GHG emission reduction.

The project activity is categorized in the sectoral scope 1 – Energy industries (renewable/non-renewable sources). The rated output capacity of the proposed project activity is 10 MW and it meets the criteria of Type I of the small scale CDM project activities (SSC).

The estimated GHG emission reduction from the proposed project activity is 51,803 tonnes of CO_2e per annum during the fixed crediting period of 10 years. The emission reduction has been estimated based on the ex-ante plant load factors (PLF) as determined by a third party engineering company contracted by the project participant.

3 Methodology

3.1 Review of documents

The validation has been performed primarily based on the review of the project design document (PDD) and the other supporting documentation.

The PDD Version 1 dated 03/02/2011 was initially reviewed. LRQA requested the PP to present supporting information and documents relating to the project design and such additional information and documents were also reviewed by LRQA.

Through the process of the validation, the PDD and the supporting documents of the same were evaluated to confirm the actions taken by the PP to the CARs and CLs issued by LRQA. The documents reviewed by LRQA are listed in Appendix B. LRQA reviewed the final version of the PDD Version 5 dated 02/01/2012 to confirm that all changes agreed had been incorporated.

3.2 Follow-up interviews

Follow-up interviews with the stakeholders and a field survey were conducted as detailed in the schedule as below:

Date	Location/ Address	Party Interviewed	Subjects Covered	Team Member on Site
14/03/2011	Project site at Sangaria, Hanumangarh District, Rajasthan	Representatives of Shriram EPC Limited and SSEPPL	• Project idea – selection of technology • Project boundary issues • Physical identification of project equipment • biomass weighing system, storage yard and types of biomass fuel used	T Ramesh
15/03/2011	Project site at Sangaria, Hanumangarh District, Rajasthan	Representatives of Shriram EPC Limited and SSEPPL	• Procedures for monitoring & reporting, QA/QC, metering arrangements • Emergency preparedness on data monitoring • Laboratory procedures & standards followed in the estimation of biomass fuel properties	T Ramesh
15/03/2011	Sangaria, Hanumangarh District, Rajasthan	Biomass suppliers (M/s Moti Supplier & Sohan Contractors)	• Agricultural pattern and seasonal availability of biomass • Utilization and disposal pattern of biomass • Surplus availability and current pricing pattern of biomass fuels	T Ramesh
15/03/2011	Sangaria, Hanumangarh District, Rajasthan	Local Stakeholders	• Stakeholders consultation process	T Ramesh
16/03/2011	Jaipur, Rajasthan	Officials of Rajasthan Renewable Energy Corporation Limited (RREC)	• Approval & clearance procedures for biomass power project • Subsidies or other benefits available for biomass power project	T Ramesh

A full list of persons interviewed is shown in Appendix C.

3.3 Resolution of clarification and corrective action requests

LRQA 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.

Findings identified in the process are indicated under the titles corrective action requests (CAR) and clarification requests (CL) and forward action requests (FAR). CAR and CL 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 CDM 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 CDM requirements have been met.

FAR are to be raised to highlight issues related to project implementation that require review during the first verification of the project activity. FAR do not relate to CDM requirements for registration.

CAR and CL are to be resolved or closed out if the PP modifies the project design, rectifies the PDD or provides adequate additional explanations or evidence that satisfies the concerns. If this is not completed, the project activity cannot be recommended for registration to the CDM Executive Board.

3.4 Internal quality control

A technical review by a qualified person independent from the validation team and a review by an authorized decision maker were conducted prior to the submission of the validation report to the PP and prior to requesting the registration of the project activity.

4 Validation protocol and conclusions

This section provides an overview of the validation activities undertaken by LRQA in order to arrive at the final validation conclusions and opinion. It includes a general discussion of details captured by the validation protocol (which is based on the Clean Development Mechanism Validation and Verification Manual version 01.2) and conclusions related to CDM requirements. Further details in relation to specific findings are provided in the Validation Findings Log.

The protocol is structured based on the main validation requirements as follows:

- participation requirements
- general description
- baseline methodology
- emission reductions
- monitoring methodology and monitoring plan
- duration of the project activity / crediting period
- environmental impacts
- Stakeholders' comments.

4.1 Participation requirements

A CDM project shall be approved by the Parties involved.

In accordance with Annex 48 to the report of 50th meeting of the CDM-EB, LRQA confirms that it has entered into a contractual agreement with Sanjog Sugars & Eco-Power Private Limited (SSEPPL) for performing the validation. SSEPPL is the project participant at the time of completion of this report.

The host Party of the proposed project is India. India has ratified the Kyoto Protocol on 26 August 2002. The Designated National Authority (DNA) is the National Clean Development Mechanism Authority (NCDMA) established in the Ministry of Environment and Forests (MoEF), Government of India.

The project has currently been proposed as a unilateral CDM project and the Annex I Party has not yet been identified. In line with the provision of paragraph 57 of the 18th meeting of the CDM-EB, registration of a project activity can take place without an Annex I Party being involved at the stage of registration.

The information of the DNA has been confirmed by the validation team against the relevant information on the UNFCCC CDM website[1].

A letter of approval (LoA) from the host Party's DNA dated 13/09/2011 (reference number 4/20/2011-CCC) was made available by the PP.

The validation team reviewed the LoA presented by the PP against the requirements in 'Clarification on elements of a written approval' and confirmed that the LoA contain the elements requested by the CDM-EB, including:

- confirmation of the Party's ratification to the Kyoto Protocol
- voluntary participation
- the project activity's contribution to sustainable development of the country (host Party), and
- the precise title of the CDM project activity of the final PDD referenced.

The LoA was noted as unconditional with respect of the above elements. The contents of the LoA and the signature of the authorized issuer were also compared with the earlier approvals issued by the host country DNA for other CDM projects. Therefore, the team has confirmed the authenticity of the letter issued.

SSEPPL is a private entity having its registered office in India. The contact details of the PP are correctly provided in Annex 1 of the PDD.

Participation in the project activity of the PP has been authorized, as confirmed in the LoA issued by the DNA of the Party concerned. The validation team confirmed that no entity other than the authorized entity is indicated as project participant in the PDD.

CAR 01

CAR 01 was initially raised as the LoA from the DNA of the host country was not presented for the validation. In response, PP submitted the Letter of Approval dated 13/09/2011 (Reference number: 4/20/2011-CCC) from host country (National

[1] http://cdm.unfccc.int/DNA/index.html

CDM Authority). It was found appropriate and the finding was closed. (Ref Appendix F: Validation findings log of this report).

The Modalities of Communication has been signed by the project participant stating the focal point in accordance with the "Procedures for modalities of communications between project participants and the Executive Board", Version 01 (Annex 59 to report of 45th meeting of the CDM-EB

4.2 General description

Project design document

The PDD was checked and confirmed as complete against the Guidelines for completing the simplified project design document (CDM-SSC-PDD) and the form for proposed new small scale methodologies (CDM-SSC-NM) referring to the latest version (Version 05) applicable to the validation.

A valid form of the CDM-SSC-PDD (Version 03) is used which is the current form available on the CDM website.

Project description

SSEPPL has proposed to implement a green field renewable biomass based power plant (project activity) of 10 MW rated capacity at Hanumangarh district of Rajasthan, India. To implement the project activity, the PP has appointed Ms/ Chemprojects Consulting Pvt. Ltd., a third party detailed engineering service provider to develop the Detailed Project Report (DPR) for the project.
The project activity involves installation of 47 TPH Maximum Continuous Rating (MCR) capacity steam generating system (boiler) supplied by ISGEC John Thompson with outlet steam at a temperature of 66 kg/cm^2 and temperature of 475±5 °C. The combustion system for the boiler is a traveling grate type with spreader stoker. The design of the boiler is a bi-drum with natural circulation.

The rated out put capacity of the steam turbo generator is 10 MW to be supplied by M/s.Triveni Engineering & Industries Ltd along with associated power plant accessories for generation of electricity. The electricity generation is at 11 KV and stepped up to 132 KV using the transformer before being synchronised to the grid.

Power plant equipment involves installation of other accessories such as air cooled condenser, Electro Static Precipitator (ESP), fuel handling system and ash handling system. The technical details of the power plant equipments provided in the PDD were confirmed from the DPR and from technical details of major equipment provided by Engineering Procurement and Commissioning (EPC) contractor.

The project activity will generate power by utilizing the surplus biomass residues[2], primarily cotton stalk and mustard husk available in the region along with other seasonal biomass residues depending on the availability. The estimated annual total biomass requirement of the power plant is 88,001 tons with the composition of the proposed renewable biomass to be used in the project activity is listed in

[2]Also referred as biomass fuel in other sections of the report

the PDD. The project is expected to supply 61,670 MWh[3] of net electricity to the grid.

The validation team confirmed the estimated quantity of biomass required (88,001 tonnes/ annum) is based on the Specific Fuel Consumption (SFC)[4]. SFC (kg/kWh) is calculated using the Station Heat Rate (in kcal/kWh) and Net Calorific Value (NCV in kg/kcal). The PP has accordingly estimated a SFC of 1.203 kg/kWh for cotton stalk and 1.308 kg/kWh as SFC for the mustard stalk. LRQA confirmed the calculations of biomass requirement as below:
Estimated annual biomass consumption (Tonnes/year) = Specific Fuel Consumption (SFC in kg/kWh) x Estimated gross power generation (MWh/year)

The PP has referred the station heat rate as 4,440 kcal/kWh, net calorific values of cotton stalk and mustard husk as 3,690 kcal/ kg and 3,394 kcal/kg respectively from the DPR considered during the investment decision.

Station Heat Rate is one of the key performance parameters for any power plant and is dependent on plant capacity, its design and configuration, technology of the boiler, plant operation and maintenance practices, quality of fuel and other operational performance over varying load conditions. The Central Electricity Authority has recommended a station heat rate of 4500 kcal/kWh, while RERC tariff order has recommended 4,400 kcal/kWh as the Station Heat Rate for biomass power plants equipped with air cooled condensing system after the stabilization period. Thus LRQA deems the station heat rate considered by PP to be appropriate.

The gross calorific values of cotton stalk is 3,916 kcal/kg (with net calorific value of 3690 kcal/kg at 10% moisture) and mustard husk 3,772 kcal/kg (net calorific value of 3394 kcal/ kg at 10% moisture) respectively. RERC tariff order dated 09/03/2007 specifies a GCV of 3300 kcal/kg. Thus LRQA confirms that calorific values[5] considered are appropriate.

The gross power generation has been estimated as 70,080 MWh/year at a plant load factor of 80%. LRQA has reviewed the "Tariff Order for wind and biomass projects" dated 09/03/2007 (Para 48) issued by Rajasthan Electricity Regulatory Commission (RERC) which prescribes a PLF of 75% for biomass based power projects for the life time of the power plant after the stabilization period of one year. LRQA confirmed that the tariff order dated 09/03/2007 was publicly available and applicable at the time of decision making. Hence the PLF of 80% considered for the project activity is deemed conservative.

Accordingly, the PP has estimated the total biomass requirement of 88,001 tonnes

[3] After deducting 12% (8410 MWh) for auxiliary consumption from the gross generation of 70,080 MWh

[4] SFC(kg/kWh)= Station Heat Rate (kcal/kWh) /NCV(kcal/kg)

[5] The difference between gross calorific value and net calorific value is the heat of vaporization of the moisture and atomic hydrogen (conversion to water vapour) in the fuel. Thus the PP has considered a high content for the biomass; higher is the heat content lesser is the fuel consumption which results in less cash outflow.

/annum. The biomass assessment study report for Hanumangarh district, the location of the project activity prepared by a third party engaged by the PP confirms that there is surplus of 300,018 tonnes/year of biomass in the region (after accounting for all types of consumption) which is 341% of the estimated requirement for the project activity. The biomass assessment report is an authenticated document which was duly certified by Rajasthan Renewable Energy Corporation Limited (RRECL), the nodal agency for the promotion of renewable energy in the State of Rajasthan.

Further, the biomass assessment study report[6] conducted (district wise) on behalf of RRECL as mandated by RERC, to establish the biomass surplus availability, estimates an average yearly biomass surplus of 330,040 tonnes[7] in Hanumangarh district (Refer Section 4.5.1 of the report). Thus LRQA confirms that the estimation of biomass requirement prepared by independent third party is appropriate to the project.

The net electricity generated from the project will be supplied to the NEWNE regional grid of India on the basis of power purchase agreement signed between SSEPPL and Tata Power Trading Company Limited (TPTL).

The Project Participant had considered the annual electricity generation details during the investment decision based on the estimation provided in the Detailed Project Report (DPR) prepared by the third party consultant. The third party consultant had considered 80% plant load factor and estimated the gross power generation of 70,080 MWh per annum for the entire life time of the project. PP had submitted a copy of the DPR to the bank while applying for project financing. LRQA compared the PLF considered by the third party consultant with the RERC tariff order and confirmed that the 80% PLF considered for the power generation estimation is higher than the PLF of 75% considered for the stabilization period, one year thereafter and for remaining life of the plan considered in the tariff order.

LRQA cross checked the DPR enclosed along with the loan application dated 14/11/2009 for project financing submitted to Punjab National Bank and confirmed the PLF of 80%. Since the PP had considered the PLF as per the third party report and the same copy was submitted to the bank, LRQA confirms that the determination of PLF for the project activity is in accordance with Para 3(a) of Annex 11 of the 48th meeting of CDM EB "Guidelines for the reporting and validation of plant load factors" (Version 01) and is acceptable.

The details of the project location have been confirmed through document review and site visit as follows:

[6] http://www.rrecl.com/Biomass%20Fuel%20Supply%20Study%20Report.pdf

[7] Calculated from four years surplus biomass of 1,320,161 tonnes for Hanumangarh district for the period of 2005-06 to 2008-09

Location	Geographical Co-ordinates
Village: Sangaria, District: Hanumangarh State: Rajasthan	Latitude 29^0 45′ 16.86′′ N
	Longitude 74^0 28′ 00.70′′ E

The description of the project activity has been confirmed through the site survey, interviews with the plant personnel and review of documents. The technical specifications of the project provided in the PDD were confirmed based on the interviews with the plant personnel and from the technical specifications provided by the turbine supplier. The PP had also presented approvals for the installation of the renewable biomass based power plant, DPR prepared by third party consultant, proposal from EPC contractor and purchase orders (Refer Appendix B of the validation report). Thus it was confirmed that the project description is complete and accurate.

The following three issues were raised as **CAR 02** during the validation process (Ref Appendix F: Validation findings log of this report):

1. Names of the other seasonal biomass residues to be used in the project activity not provided in the PDD.
   In response, the PP responded that the surplus cotton stalks and mustard husk available in the region shall be used mainly in the project activity. In addition other seasonal biomass residues shall be used depending upon the requirement and availability. Each type of biomass utilized in the project activity is monitored ex-post in the project and included under parameters to be monitored including the other seasonal biomasses in accordance with the applicable methodology. This is appropriate and the finding has been closed.

2. Offer letter from the boiler supplier (ISGEC John Thomson) and contract agreement between the PP & supplier mentions that the main auxiliary fuel is imported coal whereas the details of the boiler auxiliary fuel is not provided in the PDD submitted for validation.

   The PP responded that the project activity has been designed to operate with 100% biomass individually or in combination of various biomasses as provided in the DPR considered during the investment decision. It was confirmed during the discussion with the PP that the project shall utilize 100% biomass in the boiler and no coal shall be used in the project activity. Further, the Environmental clearance provided by Ministry of Environment & forest, Government of India also mentions that the coal as fuel will not be used in the project. Hence, it was confirmed that coal shall not be used as a fuel in the project activity and the finding has been closed.

3. Technical specifications of steam turbine condensing system, electrostatic precipitator and AC generator are not provided in the PDD.

   The PP has submitted the revised PDD that includes the technical specifications of major equipment involved in the project activity. The finding has been closed.

Sustainable development

The project activity supports the sustainable development criteria of the host country. Validation team confirmed the project's contribution of sustainable development from the review of LoA issued by host party DNA.

Small scale CDM criteria

The project generates electricity from the renewable energy sources and thus displaces electricity from the NEWNE grid system by installation 10 MW rated capacity steam turbine generator, which is less than 15MW. The validation team confirmed the capacity of the project through the investment decision, list of approved biomass power projects by Rajasthan Renewable Energy Corporation Limited (RRECL)[8], certificate from the lending bank, purchase order issued to turbine supplier and the power purchase agreement. The validation team confirmed during the interview with the PP that they do not intend to increase the installed generation capacity of the project throughout the project crediting period.

Thus, the validation team confirmed that the total size of the project will remain under 15 MW, the limit of small-scale project activity Type I "Renewable energy project activities with a maximum output capacity equivalent to up to 15 MW (or an appropriate equivalent)" during every year of the crediting period. Hence, LRQA confirms that the project activity satisfies the criteria set out for use of the SSC M&P with respect to Type I activities in accordance with paragraph 136(a) of CDM-VVM.

Public funding

SSEPPL is a Limited company and the entire investment is based on the 70% debt from the bank and 30% equity share of the company. Based on the review of the bank loan sanction letter and discussion with the PP, the investment structure of the project has been confirmed. Also, the PP provided a written declaration that they have not considered any Official Development Assistance (ODA). LRQA therefore confirms that the project does not use any other fund due to diversion of ODA from an Annex 1 Party.

De-bundling

During the document review as well as during the site visit, the validation team confirmed that the PP has installed the renewable biomass power plant of rated capacity of 10 MW. It was confirmed that the PP does not have any project whose boundary is within 1 km of the proposed project boundary. Also there are no registered small scale CDM project activities within the previous 2 years or an application to register another small scale CDM project activity in the same project category and technology/measure by the project promoters. Thus, it was confirmed that the proposed project is not deemed to be a de-bundled component of a large project and qualifies to use the simplified modalities and procedures for small-scale CDM project activities.

Hence, LRQA confirms that the project activity is not a de-bundled component of a large project and accepted as a small scale CDM project activity.

[8] http://www.rrecl.com/Biomass%20SLEC_Approved.pdf

4.3 Baseline methodology

Application of baseline and monitoring methodology

The project activity applies approved baseline and monitoring methodology AMS-I.D "Grid connected renewable electricity generation" Version 16. The applied version 16 of AMS-I.D is valid from 11 June 10 to 16 June 11 and requests for registration applying AMS-I.D version 16 can be submitted until 17 Feb 2012 23:59:59 GMT[9].

The project applicability was confirmed against each condition in the approved methodology selected as follows:

- The project activity involves the installation of new renewable biomass based power generation unit where there was no renewable energy power plant operating prior to the implementation of the project. LRQA has confirmed this during the site visit, review of purchase order placed by project participant to the turbine supplier and other approvals received from state government agencies such RERC and RRECL for the project.
- The electricity generated by the project activity will be supplied to the NEWNE. The electricity generated from the project activity shall be exported to the connected NEWNE grid. This was confirmed during interview of the PP, power evacuation approval from RRECL. The NEWNE grid is dominated by fossil fuel based power plants. LRQA has confirmed this from CO_2 baseline database, Version 5.0 published by the Central Electricity Authority (CEA) of the host country.
- The project activity utilizes renewable biomass only as confirmed from the DPR, biomass assessment report for the project, environmental clearance received from the ministry of environment & forests, government of India and approvals received from Rajasthan State Pollution Control Board for the project.
- The biomass power project does not involve switching over from fossil fuel to renewable energy sources at the site of the project activity. LRQA confirmed that the project is a new installation and hence does not involve switching over from fossil fuel to renewable energy source at the project site.
- The rated capacity of the project is 10 MW which is below 15 MW threshold limit. LRQA confirmed the capacity of the project through the investment decision, list of approved biomass power projects by Rajasthan Renewable Energy Corporation Limited (RRECL), certificate from the lending bank, purchase order issued to turbine supplier and the power purchase agreement.

The validation team has assessed the applicability requirements and cross-verified with the supporting information, though interviews with PP, erection & commissioning personnel and found all the applicability conditions of the methodology AMS-I.D Version 16 are satisfied by the project activity.

The validation of the project activity also did not reveal any other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to

[9] https://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X

contribute more than 1% of the overall expected average annual emission reduction that are not addressed by AMS-I.D Version 16.

As mentioned above, the requests for registration for the projects applying AMS-I.D Version 16 can be submitted until 17/02/2012 23:59:59 GMT, the validation team considered that it is appropriate to use the applied version of the methodology.

Project boundary

The PDD has correctly delineated the project boundary to include the biomass storage yard, boiler, steam turbine its auxiliaries, diesel generator and the NEWNE grid. The project boundary has been validated through the review of the DPR, PPA and site visit interviews. The information related to the NEWNE grid has been validated through the review of the CO_2 baseline database Version 5.0 which is the latest version available at the time of submission of the PDD for validation. The net electricity generated by the project activity will be supplied to the NEWNE regional grid and is in accordance with the methodology.

The project activity is a grid connected power plant and also having the provision to import electricity from grid for turbine start-up operation. The offer letter from the boiler supplier (ISJEC John Thomson) and the contract agreement between PP & supplier mentions that the coal shall be used as auxiliary fuel. However the PP has not envisaged consumption of coal in the project as clarified through **CAR 02** detailed above. The project was conceptualised as a 100% biomass based power generation confirmed by the validation team from DPR that mentions that the boiler will be operating on 100% of each biomass and also in combination of various biomass depending on the availability. Further the validation team noted from the letter on Environmental clearance provided by Ministry of Environment & forest dated 16/07/2009 (F.No J-13012/163/2007-IA.II (T) that mentions coal as fuel will not be used in the project. Hence, it was confirmed that coal shall not be used as a fuel in the project activity.

Further, the greenhouse gas emissions occurring within the proposed CDM project boundary as a result of the implementation of the project activity which are expected to contribute more than 1% of the overall expected average annual emissions reductions have not been identified.

Through the processes undertaken, the validation team confirmed that the identified project boundary and selected sources were justified for the project activity and meets the requirements of the approved methodology and Para 78 of CDM VVM (Version 01.2).

Baseline scenario

The paragraph 10 of the applied methodology AMS-I.D. Version 16 states that "If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources."

The baseline scenario prescribed in the PDD is in accordance with the applied approved methodology. Hence the validation team confirms that no further

analysis is required and the baseline scenarios are appropriate for the project activity in accordance with the requirements of Para 105 of CDM VVM Version 01.2.

According to AMS-I.D Version 16, the baseline for the project activity is the MWh of electricity produced by the renewable generating unit. The baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources. The baseline emissions are the electricity produced by the renewable generating unit multiplied by an emission factor (measured in tCO2e/MWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.
OR

(b) The weighted average emissions (in tCO_2e/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The PP has decided to use Option (a) of the above which is acceptable.

The statements in the PDD were cross-checked with contract agreement for supply of new-grid connected power plant and during the site visit.

The validation team confirms that:

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

During the validation, it was noted that the description of baseline was not in line with the methodology and national policies & circumstances relevant to it were not provided. **CAR03** was raised. In response, the PP had included it according to the requirement and the finding was closed. (Refer Appendix F: Validation findings log of this report).

Additionality

The PP applied Attachment A to Appendix B to the simplified modalities and procedures to demonstrate additionality for the project activity. This is appropriate since the project is a small-scale project activity.

Investment decision:

The board of directors of SSEPPL had approved the investment in the renewable biomass power generation project.

The PP presented extracts of the Board meeting held on 20/05/2008. The board discussed about the huge investment for the project and the expected returns from the project activity based on the DPR prepared by the third party consultant. The Chairman informed the board that taking into account the buy back rate of power and the cost of biomass, the revenue from the CDM is required to achieve the expected returns from the project. After detailed deliberation, the board of directors approved the implementation of 10 MW Biomass based power generation project at Sangaria, District: Hanumangarh, Rajasthan taking into consideration of the revenues under clean development mechanism.

To confirm the authenticity of the copy of extracts from the board meeting, the original documents were verified and confirmed. The process of investment decision was also cross checked during the interview with the project participant. The meeting minute of the PP is in continuation of several other decisions taken by the PP in other meetings. Each of the meeting minutes commenced with the attendance of those board members present. Thus LRQA confirms that the extracts of the meeting minutes provided were actual extracts from the board meeting minutes held to approve the investment for the project.

Investment barrier

The PP has demonstrated the financial unattractiveness of the project activity through investment barrier by applying the benchmark approach of the investment analysis. The PP had chosen project Internal Rate of Return (IRR) as the financial indicator and Prime Lending Rate (PLR) as the benchmark for the project activity.

Appropriateness of the benchmark

The baseline for the project activity is the supply of electricity to the grid which is outside the direct control of the project participant and the project activity generates financial benefits other than CDM related income. Hence, the choice of benchmark approach for demonstration of additionality is relevant and is in accordance with Para 19 of the guidelines on the assessment of investment analysis (version 05).

The PP had evaluated the project IRR against Prime Lending Rate (PLR) available at the time of investment decision making. As per the 'Guidelines on assessment of investment analysis' (Version 05), in the cases of projects which could be developed by an entity other than the project participant, benchmark based on the parameters that are standard in the market is considered suitable. In accordance with paragraph 12, local commercial lending is considered appropriate benchmark for project IRR. Hence in the project case where the project could have been implemented by any other entity, the prime lending rate published by Reserve Bank of India (RBI) that is publicly available is the appropriate benchmark. This is

also not linked to the profitability expectations of the project proponent. The PLR of five major banks in India is published by the Reserve Bank of India on a weekly basis. The information on PLR applicable at the time of investment decision is publicly available. The PLR was in the range of 12.25 -12.75% [10] when the investment decision was taken on 20/05/2008. The PP had chosen 12.50% as benchmark for the project which is the average value from the available range. LRQA deemed it as appropriate.

LRQA has cross checked the PLR published by RBI for three months prior to investment decision. i.e. for February 2008[11], March 2008[12] and April 2008[13] and noted that the prime lending rates were in the range of 12.75 to 13.25% and 12.25% to 12.75% with averages of 13% and 12.50% respectively. The PP had chosen 12.50% as the benchmark which is the conservative value from the average PLR values and is appropriate.

Therefore the validation team concluded that the benchmark chosen by the project participant is appropriate in accordance with the paragraph 12 of Guidelines on the assessment of investment analysis and paragraph 112 of CDM VVM version 01.2. Hence this is appropriate.

Internal Rate of Return:
LRQA validated the input values and confirmed its appropriateness and consistent application that are valid and applicable at the time of investment decision in accordance with the Para 6 of the 'Guidelines on the assessment of investment analysis' Version 05.

The project IRR has been computed for a period of 20 years which reflects the period of expected operation of the project activity (technical lifetime). Technical life time of the project considered as 20 years is in accordance with the RERC tariff order dated 09/03/2007 applicable at the time of investment decision. Hence the period of assessment chosen is appropriate in the context of the project activity in accordance with the Para 3 of the 'Guidelines on the investment analysis'.

In the computation of project IRR, the PP had included the salvage value in the terminal year as the expected realization on the sale of the assets in accordance with the local accounting principles. This is in conformance to the Para 4 of the 'Guidelines on the assessment of investment analysis'.

In accordance with Para 5 of 'Guidelines on the assessment of investment analysis', LRQA confirms that the depreciation and interest on loan have been added back to net profits for the purpose of calculating the IRR.

The assessment of the major input parameters have been listed below along with the suitability of the values:

[10] http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/84504.pdf
[11] http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/83304.pdf
[12] http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/83784.pdf
[13] http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/84504.pdf

Parameter	Value	Validation opinion
Rated capacity of the Power Plant	10 MW	The rated capacity of the biomass power plant has been referred from the Detailed Project Report (DPR) prepared by the third party consultant M/s Chemprojects Consulting Pvt. Ltd., New Delhi. The capacity of the power plant has been cross checked from the following sources: 1. Technical specifications provided by M/s Triveni Engineering & Industries Ltd for supplying bleed condensing turbine along with the Techno-commercial offer 2. Letter of approval for power evacuation issued by Rajasthan Renewable Energy Corporation Limited (RRECL) by 05/11/2008 to the PP 3. List of biomass power projects approved in Rajasthan by Rajasthan Renewable Energy Corporation Limited (RRECL)[14]
Power consumption by auxiliary equipment	12%	Power consumption by auxiliary equipment connected to the power plant such as biomass/ash handling and pumping system has been sourced from the Detailed Project Report (DPR) prepared by third party consultant M/s Chemprojects Consulting Pvt. Ltd., New Delhi. This has been cross checked from Rajasthan Electricity Regulatory Commission (RERC) tariff order (paragraph 51) dated 09/03/2007 that prescribes an auxiliary consumption of 12% for the purpose of tariff determination for biomass based generation with air cooled condensing system. Hence as cross checked from the tariff order and confirmed through sectoral expertise, LRQA confirmed that the auxiliary consumption considered for the project activity is appropriate.
Annual electricity generation (gross)	70,080 MWh at a PLF 80%	Plant Load Factor and annual electricity generation has been referred from the Detailed

[14] http://www.rrecl.com/Biomass%20SLEC_Approved.pdf

Parameter	Value	Validation opinion
/ Plant Load Factor		Project Report (DPR) prepared by an independent third party consultant M/s Chemprojects Consulting Pvt. Ltd. Further the DPR was submitted to the bank along with the loan application for project financing. The PLF has been cross checked from the tariff order for wind and biomass projects dated 09/03/2007 issued by Rajasthan Electricity Regulatory Commission which recommended (in paragraph 48) a PLF of 75% throughout the life of the power plant. LRQA confirmed that the tariff order dated 09/03/2007 was publicly applicable at the time of investment decision. Hence the PLF of 80% considered for the project activity is deemed conservative. Thus the PLF considered for the project is in accordance with Annex 11 of 48th CDM EB meeting report "Guidelines for the reporting and validation of plant load factors".
Total project cost	INR 528.60 Million	Total Project Cost has been referred from the Detailed Project Report (DPR) prepared by third party consultant M/s Chemprojects Consulting Pvt. Ltd. The total project includes costs for land & site development, civil works, equipment for power generation, auxiliaries and utilities, project design & engineering, interest during construction and margin money for working capital. The total project cost has been cross checked from the followings: 1. Total project cost of INR 528.60 Million confirmed from the loan application dated 14/11/2009 submitted by the PP to Punjab National Bank (a government of India undertaking) requesting for project financing. 2. Total project cost of INR 528.60 Million confirmed from the loan sanction letter dated 05/03/2010 from Punjab National Bank 3. Total project cost of INR 528.60 Million along with the detailed break-up for the cost also confirmed from the certificate dated 04/05/2011 issued M/s Punjab National Bank, the financing bank, to confirm the means of financing for the project.

Parameter	Value	Validation opinion
		4. INR 408.19 Million as cost for the supply of mechanical, electrical and instrumentation equipment only as referred from the work order dated 24/04/2010 issued to M/s Shriram EPC Limited as against the estimated cost of INR 410.70 Million in the DPR. However, the estimated cost in the DPR includes both EPC (Engineering, Procurement and Commissioning) and non-EPC equipment cost whereas the actual cost available is the EPC portion only. However, the difference of less than 1% is covered in the sensitivity analysis. LRQA confirms that the total project cost considered by the PP is valid and appropriate since applicable at the time of investment decision in accordance with Para 6 of the "Guidance on the Assessment of Investment Analysis".
Annual Operation & Maintenance (O&M) cost and its escalation	6.5% of total project cost with 5% yearly escalation from second year	Annual Operation & Maintenance cost and its escalation rate has been referred from the DPR. The O&M cost for the project has been cross checked from RERC tariff order dated 09/03/2007 that recommends 6.5% of the total project cost (Paragraph 58 of the report) as O&M cost. RERC tariff order also confirms that Central Electricity Authority's (CEA) report on "Operational Norms for Biomass based power plants" 2005 provides for an annual O&M cost of 7%. The referred RERC tariff also recommends 5% escalation per annum in the O&M cost which is in accordance with the CEA norms. Annual escalation rate in O& M cost proposed is also reasonable due to the higher inflation rate of 9.5%[15] prevailing in the host country; thus the validation team confirmed that the O&M cost and its escalation of 5% considered in the project activity is appropriate and reasonable.

[15]Refer Table no-14, Year-on-year percent of Wholesale price index and Inflation from the data on key economic indicators provided by the Economic Adviser, Government of India.
http://eaindustry.nic.in/Key_Economic_Indicators/Key_Economic_Indicators.pdf

Parameter	Value	Validation opinion
Station heat rate (in kcal/kWh)	4,400 kcal/kWh	The Station heat rate (kcal/kWh) has been referred from the DPR. The validation team has cross-checked and confirmed that RERC tariff order dated 09/03/2007 has recommended 4,400 kcal /kWh as the station heat rate for biomass power plants with air-cooled condenser system. The referred tariff order also confirms that Central Electricity Authority recommends a station heat rate of 4500 kcal/kWh and Indian Renewable Development Agency (IREDA) [16] recommends 4200 to 4600 kcal/ kWh. Thus LRQA deems the station heat rate considered by PP to be appropriate.
Net calorific value for mustard husk	3,394 kcal/kg	The value has been referred from the DPR which also provides a net calorific value of 3,394 kcal/ kg and gross calorific value (GCV) of 3,772 kcal/ kg for mustard husk (with moisture content of 10%) The validation team has cross checked the parameter as follows: RERC tariff order dated 09/03/2007 provides a Gross Calorific Value (GCV) of 3,400 kcal/ kg for mustard husk whereas the DPR provides for a GCV of 3,772 kcal/ kg which is a conservative value. Biomass test report dated 30/09/2008 issued by M/s SGS India Pvt. Ltd. for the sample of mustard husk provides a Gross Calorific Value (GCV) of 3772 kcal/ kg at moisture of 10%. The RRECL certified biomass assessment study report prepared by the third party engaged by the PP provides a NCV of 3,394 kcal/ kg (Section 9.2) which is consistent with the DPR. Thus the validation team confirmed that the calorific value considered is appropriate.
Net calorific value for cotton stalk	3,690 kcal/ kg	The value has been referred from the DPR which also provides a net calorific value of 3,690 kcal/ kg and a gross calorific value (GCV) of 3,916 kcal/ kg for cotton stalk (with moisture content

[16] IREDA is a Public Limited Government Company, under the administrative control of Ministry of New and Renewable Energy (MNRE), Government of India, to promote, develop and extend financial assistance for renewable energy

Parameter	Value	Validation opinion
		of 10%). The value has been cross checked as follows: • Biomass test report dated 27/08/2010 issued by M/s Shriram institute for Industrial Research for the sample of cotton stalk provides a net calorific value of 3690 kcal/ kg and Gross Calorific Value (GCV) of 4040 kcal/ kg at a total moisture of 12.52% • The biomass assessment study report prepared by the third party consultant engaged by the PP provides a NCV of 3,690 kcal/ kg (Section 9.2) which is consistent with the DPR. Hence it was confirmed that the value considered is appropriate.
Specific Fuel Consumption (SFC)	1.308 kg/kWh (for mustard husk) and 1.203 kg/kWh (for cotton stalk)	Specific Fuel Consumption[17] has been calculated from station heat rate (kcal/kWh) and calorific values of the biomass fuels (kcal/kg). The validation of both parameters is detailed in the above paragraphs. The validation team also noted that the RERC tariff order dated 09/03/2007 indicated a specific fuel consumption of 1.36 kg/ kWh. Hence the validation team concluded that the specific fuel consumption considered is appropriate and conservative.
Annual biomass Consumption	88,001 tons/annum	The PP has calculated the annual biomass consumption/requirement from the specific fuel consumption and gross power generation as follows: Estimated annual biomass requirement (tonnes/year) = Estimated gross power generation (MWh/year) x Specific Fuel Consumption (SFC in kg/kWh). The validation team confirmed the reasonableness of estimated annual gross power generation as well as the calculation of specific fuel consumption from the station heat rate and calorific values of biomass fuels in the above paragraphs of this section. Accordingly LRQA deemed estimation of annual biomass

[17] SFC(kg/kWh)= Station Heat Rate /NCV

Parameter	Value	Validation opinion
		consumption to be appropriate.
Cost of biomass fuel and its annual escalation	INR 1400/ ton with 5% annual escalation	Cost of biomass fuel has been referred from the DPR considered during the investment decision. The cost of biomass and its annual escalation has been cross checked as follows: 1. Biomass assessment report provides cost in the range of INR 1300-1500 for both cotton stalks and mustard husk. 2. Quotations dated 09/01/2008 and 10/01/2008 from local biomass suppliers indicates price of biomass in the range of INR 1400 to INR 1450 per ton. 3. Rajasthan Electricity Regulatory Commission (RERC) had nominated Rajasthan Renewable Energy Corporation Ltd. (RRECL), the nodal agency for the promotion of renewable energy in the state, to get the prices and the price trend of biomass fuels in Rajasthan. Accordingly the Biomass price analysis report[18] prepared on behalf of RRECL has indicated the following results in the report: • Average selling price of the biomass in Hanumangarh is INR 2090 /ton (Section 4.2.1) • The price of biomass purchased by different power plants located in the State is INR 2077/ ton as per section 6.1 of the report • The report has projected the price of biomass as INR 2469/ ton based on the comparative study (Section 6.2) • Based on the survey conducted, the section 6.3 of the report establishes an increase of 17% in the biomass prices. 4. Further the whole sale price index of fuel as a commodity has seen an increase of 27.4% over a period of 5 years from 2006 as per data on key economic indicators provided by

[18] http://www.rrecl.com/Biomass%20Price%20report.pdf

Parameter	Value	Validation opinion
		the Office of Economic adviser, Government of India (Refer table 14, Page 10 of the report)[19] Hence the biomass cost and its annual escalation considered is deemed reasonable and appropriate.
Interest on Working Capital	12.50%	Interest rate on working capital of 12.50% has been confirmed from the Detailed Project Report (DPR). The PLR applicable for the project is 12.50 % during the investment decision. Further the term loan sanction letter dated 05/03/2010 from Punjab National Bank indicates the rate of interest as 12.50%. Hence, the interest rate has been applied consistently and is deemed appropriate.
Debt - Equity ratio	70:30	Debt Equity ratio has been referred from the Detailed Project Report (DPR) considered by the PP for the investment decision. The validation team has cross-checked the debt-equity ratio as follows: Debt equity ratio of 70:30 has been confirmed from the term loan sanction letter from Punjab National Bank dated 05/03/2010. Central Electricity Regulatory Commission (CERC) also indicates 70:30 as the normative debt and equity components of the capital cost for a biomass power plant. Thus the debt-equity ratio considered is deemed reasonable.
Interest on Term Loan	12.50%	Interest rate on term loan and tenure of loan repayment has been confirmed from the Detailed Project Report (DPR). Validation team confirmed the interest rate and loan repayment from the loan sanction letter dated 05/03/2010 issued by Punjab National Bank Hence, the considered interest on term loan and
Loan Repayment period	8 Years	

[19] http://eaindustry.nic.in/Key_Economic_Indicators/Key_Economic_Indicators.pdf

<table>
<tr><th>Parameter</th><th>Value</th><th>Validation opinion</th></tr>
<tr><td></td><td></td><td>loan repayment period are deemed conservative.</td></tr>
<tr><td>Tariff Rate</td><td>INR 3.96/kWh from 1st year with yearly escalation</td><td>The tariff rate and its escalation have been referred from the DPR. The DPR confirms that the electricity generated from the project activity will be supplied to the grid to be sold to Rajasthan Rajya Vidyut Prasaran Nigam Limited (RVPN), State transmission utility under Government of Rajasthan.
LRQA has cross checked the Policy for Non-Conventional Energy Resources issued by Government of Rajasthan that provides the tariff for biomass power plants [20] applicable during the investment decision and confirmed that the year-wise tariff rate provided in the PDD (with INR 6.72 kWh as 20th year tariff) is in accordance with the rate prescribed in the tariff order for biomass power plants operating with air-
cooled condenser as follows:
<table>
<tr><th>Year</th><th>Tariff (INR/kWh)</th><th>Year</th><th>Tariff (INR/kWh</th></tr>
<tr><td>1</td><td>3.96</td><td>11</td><td>4.80</td></tr>
<tr><td>2</td><td>3.99</td><td>12</td><td>4.98</td></tr>
<tr><td>3</td><td>4.05</td><td>13</td><td>5.17</td></tr>
<tr><td>4</td><td>4.12</td><td>14</td><td>5.36</td></tr>
<tr><td>5</td><td>4.19</td><td>15</td><td>5.57</td></tr>
<tr><td>6</td><td>4.27</td><td>16</td><td>5.78</td></tr>
<tr><td>7</td><td>4.35</td><td>17</td><td>6.00</td></tr>
<tr><td>8</td><td>4.43</td><td>18</td><td>6.23</td></tr>
<tr><td>9</td><td>4.52</td><td>19</td><td>6.47</td></tr>
<tr><td>10</td><td>4.62</td><td>20</td><td>6.72</td></tr>
</table>
Thus the validation team confirmed that the tariff rate used in the investment analysis is valid and applicable at the time of the investment decision by the project participant. The tariff rate is appropriate and consistently applied in all calculations in accordance with Para 6 of the Guidelines on the assessment of investment analysis.</td></tr>
</table>

[20] http://mop.rajasthan.gov.in/downloadpdf/nonconventinalenerypolicy.pdf

Parameter	Value	Validation opinion
Book Depreciation (SLM)	5.28% for Plant & Machinery and 3.34% for Civil Works	LRQA confirmed that the rate of depreciation as per the Companies Act 1956 has been applied for computation of Profit Before Tax. LRQA confirmed that depreciation, being a non-cash item has been added back to the Profit after Tax for calculating IRR, which is in accordance with guidance 5 of 'Guidelines on the Assessment of Investment Analysis'.
IT Depreciation (WDV)	80% for Plant & Machinery	IT depreciation rate has been confirmed from the companies act schedule XIV [Sections 250 and 350].
Minimum Alternate Tax (MAT)	11.33%	The tax rates have been sourced from Income tax act 1961 and subsequent finance bills of the host country. LRQA confirmed the host country taxation laws applicable during the investment decision and confirmed that the tax rate is calculated as base rate with 10% surcharge and 3% cess. Base rate for corporate tax is 30% and for MAT it is 10%. The PP had applied the above rates and is appropriate.
Corporate Tax Rate	33.99%	

Thus as detailed above the assumptions on input parameters are appropriate. Further, LRQA confirms that all the taxes are applied correctly as per the Income tax acts and Companies acts of India. The tax computation considers Minimum alternate tax and also the benefit under section 80 IA[21] of the Income Tax Act.

PP had presented the unprotected spreadsheet versions of all investment analysis, having readable formulas. LRQA confirm that the investment analysis is presented in a transparent manner, to the extent that the reader can reproduce the results. It was confirmed by the validation team from the available evidence and relevant accounting practices that in the estimation of the project IRR, the PP had applied the accepted local accounting and taxation principles. All the input values considered for the investment analysis were prevailing at the time of investment decision and is in conformity with the relevant guidelines of CDM EB and are appropriate. Thus the assessments of input parameters were done in accordance to paragraph 110 & 111 of VVM Version 01.2.

In accordance with Paragraph 113 of VVM Version 01.2, LRQA confirmed that the period of time between finalization of the DPR in April 2008, investment decision on 20/05/2008 and project start date on 16/06/2008 are sufficiently short that it is unlikely in the context of the underlying project activity that the input values

[21] Section 80 IA – Reduction in respect of profits and gains from industrial undertaking or enterprises engaged in infrastructure development etc. under which a deduction of an amount equal to 100% of the profit and gain derived from such business is allowed for any ten consecutive years out of fifteen years beginning from the year in which the undertaking or enterprise generates power or commences transmission or distribution of power.

would have materially changed.

It was also confirmed that the values used in the PDD are fully consistent with the DPR and on the basis of specific local and sectoral expertise it was confirmed that that the input values from the DPR are valid and applicable at the time of the investment decision.

The project IRR with the above mentioned input parameters is thus calculated as 4.22%, without considering the benefits from the CDM revenue, which is less than the benchmark of 12.50%.

The following issues related to investment analysis were raised during the validation as **CAR 04** (Ref Appendix F: Validation findings log of this report)

1. Investment analysis did not include subsidy from MNRE available for biomass power plants as stated in the DPR.
   The PP responded that subsidy from MNRE for biomass power plants is categorised under paragraph 6 (b), Annex 3 to 22nd meeting report of CDM EB. Since the provision of subsidy as a policy was implemented in year 2006, it can be excluded in the calculation of financial indicator. Accordingly, it was confirmed from the annual report (2006-07) of MNRE that the capital subsidy offered through financial institutions for grid connected renewable energy power plants was introduced in December 2006. Since it was appropriate, the finding was closed.
2. The proposed schedule for the implementation of the project activity was not provided along with the DPR.
   In response, the implementation schedule for the project activity was submitted that is appropriate with the financial analysis. The finding was closed
3. MAT rate considered was not correct.
   In response, the PP included the correct rate and provided the reference for the rate. The finding was closed.
4. Cost of land was not included in the calculation of salvage value.
   In response, the PP included the land cost in the calculation of salvage value and considered as a cash flow at the end of the assessment period which is in accordance with the guidelines on the assessment of investment analysis.
5. Evidence for the technical life time was not provided by the PP.
   The PP responded by referring to the RERC tariff that states that the technical life of the biomass power plant is 20 years. The finding was closed.
6. IT Depreciation is charged on total project cost including land cost which is a non-depreciable cost.
   In the revised financials, PP excluded the land cost in the calculation of IT depreciation and calculated it from the depreciable assets only and is appropriate.
7. Increase in working capital is considered as an expense and deducted from income to arrive at Profit Before Interest, Depreciation and Tax (PBIDT) which is not correct.
   However, the PP responded by referring to "Corporate Finance Spring 2008" by Aswath Damodaran which states that in the calculation of free cash flow to the firm, expenses due to change in the working capital can be deducted from the Earnings Before Interest, Depreciation and Tax. It was accepted and the finding was closed.

8. Interest on working capital was not added back to the net cash flow in the calculation of project IRR.
   The PP responded that the working capital is an operating liquidity to a business and not a financing expenditure hence it is considered as a part of operating expenses in the calculation of project IRR. The explanation is deemed appropriate and the finding has been closed.
9. In accordance with the local accounting procedures there is no restriction on carry forward of unabsorbed losses whereas losses on account of depreciation is accounted for 8 years only in the project.
   The PP revised the financials and the unabsorbed losses have been carried forward for the entire financial assessment period of 20 years and are appropriate.

CL02 was raised as a clarification for the following issues:

- Break-up for the total project cost was not provided in the earlier version of the PDD.
  Subsequently it was included in the revised PDD and appropriate with the DPR considered during the investment decision.
- The PP has not included the potential benefits due to the accelerated depreciation and tax savings in the financial analysis.
  The PP responded that since they are an independent power producer (IPP) with no other profit making business to adjust the potential benefits due to the accelerated depreciation, it has not been accounted in accordance with the host country accounting procedures. It was appropriate and the finding has been closed.
- Reference/evidence for the interest on working capital & debt, term of loan, moratorium, the station heat rate and net calorific value are not provided.
  The PP provided the reference / evidence for all the mentioned parameters in the revised financials. It was appropriate and confirmed from the relevant documents. The finding has been closed.

Sensitivity analysis

In order to check the robustness of the investment analysis, the PP has presented the sensitivity analysis by varying the critical input parameters i.e. project cost, biomass cost, tariff rate, O&M cost and plant load factor to a reasonable variation of +/- 10% in accordance with the guidelines on the assessment of investment analysis version 5.0 and the summary of the sensitivity analysis is provided below:

Parameter	IRR with ±10% variation	Base IRR	Cross over point
Total project cost (-10%)	8.06%	4.22%	-21.03%
PLF (+10%)	7.53%		+28.34%
O&M cost (-10%)	6.17%		-57.13%
Tariff (+10%)	12.47%		+10.07%
Biomass cost (-10%)	10.08%		-15.61%

Project cost:
The actual total cost incurred for the project activity is not finalized during the validation process since the project is still under implementation. In the DPR, cost estimated for EPC & non-EPC portion of equipment is approximately 80% of the estimated total project cost. LRQA reviewed the work order issued by the PP to the EPC contractor and it was confirmed that the actual cost for EPC portion alone is approximately 99% of the estimated EPC & Non-EPC portion of the project cost considered at the time of decision making. The validation team confirmed that project cost is within the range of sensitivity variation and it crosses the benchmark IRR when the project cost is decreased by more than 21% of the estimated cost which is not possible taking into account of the increasing inflation rates in the host country as detailed in the previous sections of the report.

Plant Load Factor
The project IRR is within the benchmark for the reasonable variations of the PLF. It crosses the benchmark IRR if the biomass power plant operates at a PLF 103% with an increase of 28.34% than the estimated PLF equivalent to 10.26MW which is higher than the rated capacity of the turbo-generator. Operating the biomass power plants at a PLF of 103% is not possible considering the periodic shut down necessitated due to furnace and boiler tube contaminations by soot, ash and scale commonly called as boiler fouling and clogging.

O&M cost:
The project IRR is within the benchmark for the reasonable variations of the O&M cost. The project crosses the benchmark when the O&M cost is decreased by 57.13%. Decrease in O&M cost by 57.13% is highly unlikely since the inflation in the host country is high. Further RERC recommends 6.5% and Central Electricity Authority recommends 7% of the total project as annual O&M cost with prevailing year-on-year wholesale price index and Inflation in the host country as 9.5%.

Biomass Cost:
The project IRR is within the benchmark even with a reasonable variation of 10% decrease in the biomass price. The project IRR matches the benchmark returns with a decrease of 15.60% than the estimated price to INR 1181.60. Whereas the Biomass Price analysis Report published by RRECL, establishes an increase of 17% in the biomass prices. Also the trend of fuel as a commodity has seen an increase of 27.4% over a five period from 2006. This demonstrates that the decrease in biomass fuel price is a very unlikely event. LRQA also confirmed during the site visit interviews with the biomass suppliers that there has been a historical rise in the biomass prices.

Electricity tariff rate:
The project IRR is within the benchmark for a reasonable variation of +10% to the considered escalated yearly tariff. The PP has signed a PPA for five years with Tata Power Trading Company Limited to sell the generated electricity for a fixed tariff rate of INR 4.00/kWh without any escalation. In the financials analysis considered during the investment decision the PP had already accounted every year escalation to the first tariff of INR 3.96/ kWh to the entire assessment period of 20 years as recommended in the RERC tariff order applicable during the investment decision.

The project IRR crosses the benchmark only with INR 4.36/ kWh as the first year tariff increased by 10% annually which is highly unlikely to happen since the PP has already signed the PPA with INR 4.00/ kWh as fixed tariff for 5 years without escalation. Further the validation team confirmed that the project IRR is well within the benchmark even if the fixed tariff rate of INR 4.00/kWh is considered for first 5 years and thereafter with 5% yearly escalation from 6th year for the entire assessment period.

CL 02 was raised since the PP has not included tariff rate and biomass fuel price under sensitivity analysis. In the revised PDD and the financial analysis, the PP had included it and the validation team confirmed that the project IRR is within the benchmark for reasonable variations of the parameters. The finding has been closed.

Prior serious consideration of CDM

The PDD indicates 16/06/2008 for the start date of the project activity, the date on which the Letter of Indent (LOI) was issued to the boiler supplier. LRQA has verified all other documents related to the project implementation that involved major investments and confirmed that the date of letter of intent issued to the boiler supplier M/s ISGEC John Thompson dated 16/06/2008 is the earliest action among all project related activities. This was confirmed through the review of the copy of letter of intent issued by the PP along with advance payment and acknowledgement from the supplier on receipt of LOI and the payment.

The start date considered for the project activity is 16/06/2008 which is before 02/08/2008 and the PDD was made publicly available for global stakeholders' consultation process during 09 February 2011 – 10 March 2011 which is after the start date of the project activity. Hence, in accordance with the "Guidelines on the demonstration and assessment of prior consideration of the CDM", the PP had demonstrated that the CDM was seriously considered in the decision to implement the project activity as follows:

The financials included in the DPR considers revenue from sale of carbon credits. The detailed project report of the project activity was prepared by M/s Chemprojects Consulting Pvt. Ltd. a third party engineering company in February 2008. The PP has decided to implement the project activity based on the detailed project report. The PP has provided a copy of the extract of the minutes of the meeting of board of directors held on 20/05/2008 to approve the implementation of the project. It was noted from the extract that the board of directors discussed in detail on the expected investment and returns which is lower than the expected return with out considering the revenue from CDM. The meeting then decided to implement the project under CDM since the revenue from CDM would help in achieving the expected returns.

Thus it was demonstrated that the benefits of the CDM were a decisive factor in the investment decision making process when the decision to implement the project was taken on 20/05/2008. To confirm the authenticity of the copy of extracts from the board meeting, the original documents were verified and confirmed. The process of investment decision was also cross checked during the interview with the project participant. The meeting minutes of the PP is a

continuation of several other decisions taken by the board in other meetings. Each of the meeting minutes commenced with the attendance of the board members present. LRQA confirms that the extracts of the meeting minutes provided were actual extracts from the board meeting minutes held to approve the investments for the project. Thus the awareness of the CDM prior to the project start date and benefits of the CDM were a decisive factor to proceed with the project as a CDM project activity demonstrated by the PP.

After the investment decision on 20/05/2008, the letter of intent to supply boiler was issued to M/s ISGEC John Thompson along with the advance payment. LRQA has verified the copy of the LOI along with the payment details acknowledged by the boiler supplier. Thereafter, LOI for supply of turbine to M/s Triveni Engineering & Industries Ltd was issued by the PP on 05/09/2008 subsequent to the technical & commercial offer dated 29/08/2008 from the supplier. The validation team confirmed the LOI and the details on the advance payment made by the PP along with the LOI. The PP had also received the approval for power evacuation from RRERC on 05/11/2008.

To secure CDM status along with its implementation, the PP had signed the Letter of Understanding with the CDM consultant on 26/05/2009 and appointed the CDM consultant to advice the PP in registering the project as under CDM. The authenticity of the letter was confirmed by cross checking with the original document. On 24/04/2010, the PP appointed M/s Shriram EPC Limited as EPC contractor to implement the project on a turnkey basis subsequent to letter to turbine and boiler suppliers on 12/01/2010 and 13/01/2010 respectively regarding the transfer of the order. The respective original documents were cross checked during the validation process and interview with the PP. The local stakeholders were invited by the PP to comment on the proposed CDM project and the meeting was held on 19/10/2010 at the project site. The CDM validation contract with the DOE for the project was signed by the PP on 31/01/2011 and subsequently the PDD was made publicly available for public comments on 09/02/2011.

In the 'Guidelines on the demonstration and assessment of prior consideration of CDM' version 04 (EB62 Annex 13) further guidelines were provided by EB for validating the continuing real action. Clause 7 states that "Assessment of real and continuing actions shall be validated by the DOE and the validation should focus on real documented evidence as indicated in paragraph 6 (b), including an assessment by the DOE of the authenticity of the evidence. " – The real and continuing action in the project case as was validated based on real documents are:

- Board Decision for seeking CDM status of the project – 20 May 2008
- Appointment of CDM consultant – 26 May 2009
- Appointment of DOE (LRQA Ltd) – 31 Jan 2011 (LRQA signed the contract on 02 Feb 2011)
- LoA from DNA – 13 Sept 2011.

Clause 8(a) states, in validating proposed CDM project activities where: there is less than 2 years of a gap between the documented evidence, the DOE shall conclude that continuing and real actions were taken to secure CDM status for the project activity.

Through the process of validation, LRQA confirms that the CDM benefits were considered necessary in the decision to undertake the project as a CDM project activity by the management and the proposed CDM project activity complies with the requirements of the latest version of the Guidance on prior consideration of CDM.

CAR 05 was raised during the validation, since the awareness of the CDM prior to the project activity start date and subsequent continuing and real actions taken to secure CDM status for the project in parallel with its implementation were not detailed in the PDD. In response, PP included the detailed continuing and real actions taken to secure the CDM status in parallel with its project implementation. Further, the PP demonstrated that the benefits of the CDM were a decisive factor in the investment decision making process when the decision to implement the project was taken and submitted the relevant evidence. LRQA verified and validated the facts as detailed above and the finding was closed.
(Ref Appendix F: Validation findings log of this report)

4.4 Emission reductions

Emission reductions

As provided in the methodology, emission reduction is calculated from the equation

$ER_y = BE_y - PE_y - LE_y$

BE_y: Baseline emissions in the year y (tCO_2e/y)
PE_y: Project emissions in the year y (tCO_2e/y)
$LE_{y:}$ Leakage emissions in the year y (tCO_2e/y)
$ER_{y:}$ Emission Reductions in the year y (tCO_2e/y)

Project emissions (PE_y)

Project Emission (in case of fossil fuel consumption envisaged)

The project activity will be equipped with one number 250 kVA diesel generator set as stand-by. The project emission due to the usage of fossil fuel (diesel) in the power plant is to be calculated in accordance with tool to calculate project or leakage from fossil fuel combustion as follows:

$$PE_{FC,j,y} = FC_{i,j,y} * COEF_{,i,y}$$

and

$$COEF_{,i,y} = EF_{CO2,i,y} * NCV_{i,y}$$

Where

$PE_{FC,j,y}$ = CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr)

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

$COEF_{,i,y}$ = CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

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

$EF_{CO2,i,y}$ = Weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ))

$NCV_{j,y}$ = Weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit

The project activity will utilize 100% biomass for power generation and the types of biomass to be used in the project activity are provided in the PDD. As the usage of diesel in the DG set to be made only during shutdown, the project emissions due to the combustion of fossil fuel are considered as zero for estimation of ex-ante calculations of emission reductions.

Parameter	Unit	Value	Validation opinion
Quantity of diesel consumption in the project activity, $FC_{i,j,y}$	Litres/ annum	0	The consumption of diesel in DG set is only during emergency operations and is monitored continuously which is in accordance with the referred tool and the data is aggregated monthly. The quantity can be cross-checked from the purchase invoices.
Net Calorific Value of (NCV) diesel, $NCV_{i,y}$	TJ/tonne	0.0433	NCV of diesel is referred from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2,Chapter 1, Table 1.2 and the PDD confirms that the future revision of IPCC guidelines will be taken into account in determining it.
Emission factor of diesel, $EF_{CO2,i,y}$	tCO_2/TJ	74.8	
Density of diesel, ρ_{diesel}	Kg/m^3	860	The regional default value has been referred from the well-documented reliable source of the host country's leading supplier of oil and gas and will be checked for each fuel delivery.
Project emission due to consumption of diesel	tCO_2e/ annum	0	Assumed to be zero and will be calculated based on the consumption of diesel during the implementation of the project and deducted to estimate the emission reduction.

Hence, PE_y =0.

CAR 07 was raised since the PP had not included the DG set in the project boundary diagram and the emissions from the same were not considered in the ex-ante emission reduction calculation in the initial version of the PDD.

In response to the finding, the PP included the DG set in the project boundary and the CO_2 emissions due to combustion of fossil fuel (diesel) in one number of DG set have been included in the Section B.6.3 of the revised PDD. The finding has been closed.

Leakage (LE_y)

The methodology requires leakage consideration if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. The project activity involves new energy generation equipment which was confirmed through the review of the purchase orders placed by the PP to the equipment supplier.

Also, potentially significant sources of leakage and project emissions are analysed in accordance with the "General guidance on leakage in biomass project activities" as follows:

(A) Shift of pre-project activities – Not applicable as the project activity shall use surplus biomass residues and hence not lead to any decrease in carbon stocks as a result of deforestation, outside the land area where the biomass is grown, due to shift of pre-project activities.

(B) Emissions related to the production of the biomass – Not applicable as the project activity does not involve any production of biomass other buying the surplus quantity. The project shall use only surplus biomass available in the region as identified in the biomass assessment study report.

(C) Competing uses for the biomass –Since biomass may in the absence of the project activity be used elsewhere, for the same or a different purpose, this is considered as a source of leakage emissions.

The PP has conducted a detailed biomass assessment study through an independent consultant 'M/s Chemprojects Consulting Pvt. Ltd' prior to the implementation of the project that indicates the surplus availability of biomass in the project region. The validation team reviewed the biomass assessment report prepared by the third party consultant 'M/s Chemprojects Consulting Pvt. Ltd' and the following are confirmed:

i. The biomass assessment report is based on the primary data collection from the farmers & villagers and secondary data collection from various government departments of Hanumangarh district.
ii. The biomass assessment study area comprises of all tehsils/ talukas comprising of Hanumangarh district.
iii. The study area indicates a surplus availability of biomass residues in the region[22].
iv. The estimated total biomass residue requirement for the project activity is 88,001 tonnes/ annum against available total surplus of 300,018 tonnes/ annum The surplus availability of biomass residue in Hanumangarh district is 3.41 times more than the quantity of biomass that would be utilised in the project activity. The total biomass residue requirement of 88,001 tonnes/ annum is estimated

[22] The biomass assessment report indicates total surplus availability of 152,158 tonnes/year of mustard husk which is equivalent for a power generation of 16.75 MW and 147,860 tonnes of cotton stalk that can generate 17.69 MW of electricity. The surplus availability is estimated taking into account the consumption for fodder, thatching and domestic fuel. The total surplus biomass availability is 340% of the biomass required for the project activity.

based on the cotton stalk requirement of 42,162 tonnes/ annum and 45,839 tonnes/ annum of mustard husk. The surplus availability of cotton stalk is 147,860 tonnes/ annum (350% of the requirement) and mustard husk is 152,158 tonnes /annum (331% of the requirement) in the region as per the biomass assessment report.

Further, in accordance with the "Policy for promoting generation of electricity from biomass" [23] formulated by RRECL (refer paragraph 12), no other biomass power plant shall be permitted by RRECL, the State Nodal Agency for promoting & developing Non-conventional Energy Sources in Rajasthan, within the reserved area of 80 km radius of existing/ approved/ earlier registered projects with RRECL to ensure the sustainability of a biomass power plant.

Hence, $LE_y = 0$

As detailed above, since the project leakage (L_y) is not deemed to be considered for the project activity, the estimated baseline emission (BE_y) becomes the emission reduction (ER_y), i.e;
$LE_y = 0$
Thus,
$ER_y = BE_y - PE_y$

Baseline emissions

According to the applied methodology AMS-I.D Version 16, for new grid connected renewable power plant, the baseline emissions are the product of electricity produced by renewable energy generating unit multiplied by the emission factor of the grid.

$BE_y = EG_{BL,y} \times EF_{CO2,grid,y}$

$EG_{BL,y} = EG_{export,y} - EG_{Import,y}$
Where,
$EG_{BL,y}$ is the quantity of net electricity supplied to the grid by the project activity (MWh)
$EG_{export,y}$ is the electricity exported to the grid and
$EG_{Import,y}$ is the electricity imported from the grid
$EF_{CO2,grid,y}$ = CO_2 emission factor of the grid in year y (tCO_2/MWh) = Combined margin CO_2 emission factor in year y (tCO_2/MWh)

Calculation of the emission factor
The baseline emission factor is calculated as a Combined Margin (CM) consisting of Operating Margin (OM) and Build Margin (BM) factors based on data from an official source publicly available. The CM emission factor (EF) for the displaced electricity was calculated based on the 'Tool to calculate the emission factor for an electricity system' Version 02.2.0 (hereinafter referred to as "the tool"), in

[23] http://www.rrecl.com/Policy%20For%20Promoting%20Generation%20of%20Electricity%20From%20Biomass,%202010%20(Web).pdf

accordance with the applied methodology. This version of the tool is applicable from 03 June 2011.

The PP uses the EF for the grid electricity as calculated in CO2 Baseline Database for the Indian Power Sector published by the Central Electricity Authority (CEA), Ministry of Power, Government of India. The CEA publishes on an annual basis the General Review and the Performance Review of Thermal Power Stations which is used by the majority of CDM project developers. The database for baseline estimation issued by the CEA has been developed consistently with the availability of data in India. The database is an official publication of the Government of India for the purpose of CDM baselines. The CEA Database version 5.0 has been applied as it was current at the time of submission of the CDM-PDD for validation. The step wise estimation of EF is provided as below:

Step 1 of the *tool* requires identification of the relevant electric power system. In line with the requirements specified in the tool, the PP has selected the regional grid based on the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity. The Indian electricity system is divided into two grids, the integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid. Each grid covered several states. Since the project activity is located in the Northern region, the selection NEWNE Grid for the purpose of estimation of baseline emission factor is considered appropriate. Therefore, the validation team confirmed the applicability of Step 1 of the *tool*.

Step 2 of the *tool* gives the PP an option to include off-grid power plants in the project electricity system. The PP has chosen only grid power plants for analysis.

Step 3 of the *tool* requires selecting a method for estimation of operating margin. Of the four methods provided in the *tool* for calculating the operating margin ($EF_{grid,OM,y}$), the PP has selected simple OM method since the low-cost/must-run resources constitute less than 50% of total grid generation on average of the five most recent years, i.e from 2004-05 to 2008-09.

Year	Low-cost/must-run resources of net generation
2004-05	16.84%
2005-06	17.95%
2006-07	18.45%
2007-08	19.04%
2008-09	17.26%

Low operating cost/must run resources include hydro and nuclear.

The tool provides two options – (i) ex-ante option and (ii) ex-post option in calculating the simple OM. The PP has chosen the ex-ante option for determining the OM. This choice of ex-ante option which is based on a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, was found acceptable in view of the availability of the requisite data vintages.

Step 4 of the *tool* requires the calculation of the operating margin emission factor according to the Simple OM method chosen as per Step 3 above. In validating Step 3, LRQA confirmed the calculations with respect to the OM emission factor for the last three years for the NEWNE Grid and arrived at the following summary:

Year	Absolute emissions (including imports) (tCO_2)	Net generation (including imports) (GWh)	Specific emissions (tCO_2/MWh)
2006-07	388,067,225	384,805	1.00847
2007-08	410,083,778	410,124	0.99990
2008-09	430,502,442	427,700	1.00655

EF_{gridOM}= (388,067,225+410,083,778+430,502,442) / (384,805+410,124+427,700)x1000
= 1.0049 tCO_2/ MWh

Step 5 of the *tool* requires calculation of the build margin emission factor.
In terms of data vintage, the PP has chosen the Option 1 and calculated the BM emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of submission for validation. The CEA database provides a BM value for NEWNE Grid as 0.6752. As part of validation of Step 5 of the tool, LRQA confirmed the BM for the year 2008-09 as per the following summary:

Year	Absolute emissions (tCO_2)	Net Generation (GWh)	Specific emissions (tCO_2/MWh) BM
2008-09	69,297,387	102,589	0.6752

Step 6 of the *tool* requires calculation of the combined margin emission factor as per the following equation:

$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$

According to the guidance on selecting alternative weights in the tool, the default weights applicable for biomass projects are w_{OM} = 0.5 and w_{BM} = 0.5 for the first and subsequent crediting period have been applied,

The baseline grid emission factor has been calculated as;
$EF_{grid,CM,y} = EF_{CO2,\ grid,y}$ = 0.8400 tCO_2e/MWh

Baseline emissions thus can be estimated as:
$BE_y = EG_{BL,y} \times EF_{CO2,\ grid,y}$
= 61,670 MWh x 0.8400 tCO_2e/ MWh
= 51,803 tCO_2e

Annual average baseline emission is estimated to be 51,803 tCO_2e. Ex-ante electricity generation has been evaluated based on Guidelines for the reporting and validation of plant load factors.

Emission reductions

The annual emission reductions from the project activity can be estimated as the difference between the baseline emissions and the project emissions as follows:

$ER_y = BE_y - PE_y - LE_y$

ER_y = 51,803 tCO_2e -0-0
= 51,803 tCO_2e

The average annual emission reduction is 51,803 tCO_2e over 10 years fixed crediting period.

Through the validation process LRQA have confirmed that:

- All the assumptions and data used by the project participant are listed in the PDD, including their references and sources;
- All documentation used by the project participant as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD;
- All values used in the PDD are considered reasonable in the context of the proposed CDM project activity;
- The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;
- All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.

CAR 06 was raised during the validation since in step 4 of the calculation of grid emission factor, net generation in OM did not include electricity import; also weighted average Operating Margin emission factor does not includes the weighted average of absolute emissions including imports and net generation including imports.
In response, the PP revised the PDD to include the electricity import in net generation in OM and revised the estimation of weighted average Operating Margin emission factor in accordance with the Tool. This is appropriate and the finding has been closed.
CAR 08 was raised since the PDD refers to Version 01 of the "Tool to calculate the emission factor for an electricity system" which is no longer valid. The finding was closed later when the PP has revised the PDD accordingly to include the latest version of the tool.

4.5. Monitoring methodology and monitoring plan

The project activity applies the monitoring methodology AMS-I.D Version 16 which was applicable during the commencement of the validation and the requests for registration with the version can be submitted until 17/02/2012 23:59:59 GMT. The methodology prescribes the following parameters to be monitored during the crediting period.

- CO_2 Emission Factor of the grid electricity

- CO_2 Emission Factor of the fossil fuel
- Net Calorific value of the fossil fuel
- Quantity of fossil fuel consumed in the year y
- Quantity of net electricity supplied to the grid year *y*
- Quantity of biomass consumed (Cotton stalk ,Mustard husk and other biomass) in the year *y*
- Moisture content of biomass fuel (Cotton stalk ,Mustard husk and other biomass)
- Net calorific value of biomass fuel (Cotton stalk ,Mustard husk and other biomass)
- Density of diesel

The emission factor of the grid electricity in the year y, has been fixed ex-ante for the project activity and the emission factor is calculated based on the information provided in the CEA baseline database. The details of the calculation of the grid emission factor have been already discussed in the section 4.4. Also, the emission factor of the diesel and the net calorific value has been referred from the IPCC guidelines and monitored ex-post which is appropriate as per the applicable methodology.

The project activity does not intend to use fossil fuel for electricity generation. The consumption of diesel in the DG set during stand-by operations is included under the parameter to be monitored. The diesel consumption can be cross checked from log book maintained at the project site.

The net electricity supplied to the grid ($EG_{BL,y}$) is the difference of electricity export ($E_{Gexport,y}$) and import ($EG_{Import,y}$)as measured by "ABT" digital, tri-vector bi-directional meter of accuracy class 0.2s which is in accordance with the PPA and the host country regulations[24]. Main and check meters with similar specifications will be installed at the grid interconnection point. Export and Import values are monitored on a continuous basis through dedicated energy meter. The export and import values are measured automatically on a real time basis which ensures hourly measurement and the readings are recorded monthly. Hence, this is in accordance with the applied monitoring methodology.

The calculated net energy exported to the grid is multiplied with the grid emission factor. The determination of the grid EF is described in the above section 4.4 and ex-ante method has been selected by the PP. Therefore the monitoring plan includes monitoring of electricity exported to the grid and electricity imported from the grid.

During the site visit, it was confirmed that bidirectional electronic tri vector energy meters installed in the project site and the calibration of the metering equipment will be done once in a year which is in accordance with the host country regulations. In case the main meter becomes defective, the readings would be based on check meter of similar specifications. The electricity exported will be cross verified against invoices raised by SSEPPL. The process was confirmed through interview with the O&M team during the site visit.

[24] http://www.cea.nic.in/reports/regulation/meter_reg.pdf

All types of biomass consumed shall be monitored continuously. The biomass types procured from outside are brought to the project site through trucks. Weighbridge is used to measure the load in each truck. Each truck that enters the site will be recorded at the weighbridge installed at the factory and after unloading the biomass the empty truck will again be weighed to arrive at net quantity of biomass purchased. The readings are recorded on a daily basis in the logbooks. An annual mass balance based on purchased quantities, opening and closing stock will be performed. The weigh bridge used to measure the biomass quantity is of accuracy class III and will be calibrated as per statutory norms of Weights and Measures Act. The purchase receipts for the biomass type procured shall be used for cross-checking the biomass consumption. The process was confirmed during the discussions with the site personnel.

The moisture content of the biomass is monitored for every load of biomass purchased from the supplier. The moisture content of each biomass type received at the site is analysed in onsite laboratory and recorded in the plant log books. The weighted average shall be calculated for each monitoring period and used in the calculations.

The PP will monitor the net calorific value calculated from the measured gross calorific value of the sample biomass type consumed in the project activity using the bomb calorimeter on a monthly basis and the values are recorded in the plant log books. The consistency of the measurements can be cross checked with the similar measurements of 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 can be conducted. Weighing balance, standard weights and oven used for in the determination of moisture content and NCV of biomass residue will be calibrated at least once in every three years.

PDD confirms that all the monitored data will be archived electronically for a period of 2 years after the crediting period or last issuance whichever is later.

LRQA confirms that the parameters included in the monitoring plan as well the monitoring plan is in accordance with the requirements of the monitoring methodology and the real measurements of the emission reductions are possible with the implementation of the monitoring plan.
LRQA confirms that the monitoring arrangements described in the monitoring plan are feasible within the project design as confirmed during the site visit, discussions with the site personnel and document review. The means of implementation of the monitoring plan are sufficient are ensure that the emissions reductions estimated from the project activity can be reported ex-post and verified accordingly.

CAR 07 was raised during the course of validation since the PDD did not detail the monitoring plan in accordance with the methodology as follows
(Refer Appendix F: Validation findings log of this report):

- Calculation procedures and QA/QC procedures for cross-checking the net electricity supplied to the grid were not provided.

The finding was closed upon submission of the revised PDD with mentioned requirements.

- Monitoring/recording frequency of the quantity of biomass consumed and the moisture content in biomass residues were not in accordance with the monitoring methodology; Further monitoring of specific energy consumption for each type of biomass fuel are not provided.
  In the revised PDD, monitoring /recording frequency of biomass fuel consumption, moisture content and QA/QC procedures were included. The specific energy consumption of biomass residues is not included since the project activity involves 100% biomass with no fossil fuel consumption. This is appropriate in accordance with the applicable methodology and the finding has been closed.
- Measurement methods and standards used in the estimation of net calorific value of the biomass residue type and cross-checking of the measured values were not provided.
  The finding was closed after the measurement methods, standards and cross-checking of net calorific values were included in the revised PDD.
- Method of data archiving were not provided in the accordance with General Guidelines to SSC CDM methodologies.
  The finding was closed subsequent to the revision of archiving methods in the revised PDD as per the general guidelines to SSC CDM methodologies.

Refer Appendix F: Validation findings log of this report.

4.6 Duration of the project activity / crediting period

The PDD mentions the start date of the project activity as 16/06/2008. The operational lifetime is expected to be 20 years and it has been confirmed from the RERC tariff order for biomass power projects. The start date of the project activity and prior consideration of CDM have already been discussed in section 4.3 above.

The starting date of crediting period indicated in the revised PDD as 31/01/2012. The crediting period may only start after the date of registration of the proposed project activity as a CDM project activity. The PP has chosen a fixed crediting period for the project activity. The lifetime of the activity is 20 years, hence, 10 year fixed crediting period is considered acceptable.

4.7 Environmental impacts

LRQA through review of the most current Environmental clearance regulations of the host country confirmed that there is no requirement for carrying out any Environmental impact assessment.
LRQA confirms that no EIA study is required for this project as evidenced from the EIA notification from Ministry of Environment & Forests (MoEF)[25]. No adverse environmental impacts as well as trans-boundary impacts have been envisaged from the project activity.

[25] http://moef.nic.in/downloads/rules-and-regulations/3067.pdf

CL01 was raised since the earlier PDD refers to the notification dated 14/09/2006 on the requirement of Environmental Impact Assessment (EIA) which was not the recent notification. The PP revised the PDD and included the Environmental Impact Assessment notification dated 01/12/2009 in the revised PDD. The finding has been closed subsequently.

4.8 Stakeholders' comments

The comments by local stakeholders are invited in an open and transparent manner. A summary of the comments received is provided to the DOE together with a report indicating how due account was taken to the comments received.

The project activity intends to utilize the biomass fuel available in the region for power generation. PP had published an advertisement in the local newspapers namely Rajasthan Patrika and Dainik Bhaskar on 14/10/2010 to invite the local public for the local stakeholders meeting conducted on 19/10/2010. The advertisement in the newspapers for the local stakeholders meeting was provided in local language and in English. Further, the PP also invited the local people through invitation letters. The participants for the stakeholder meeting included residents of village, representatives from technology supplier and various other groups. Review of the minutes of the stakeholders' meetings shows that people were supportive of the project activity and expressed no negative comment on the project activity.

During the site visit, the validation team confirmed with a section of the stakeholders on the meet conducted by the PP and the mode of invitation extended for the meeting. It was also confirmed that they had no concerns with respect to the project activity.

LRQA confirms that the local stakeholder consultation was adequate with respect to identification of local stakeholders, seeking their views and taking due account of any comments and conducted in a transparent manner.

The stakeholder consultation process, targeted stakeholders and due actions for concerned issues have been clarified in the PDD.

CL 04 was raised during the validation, since the earlier version of the PDD did not include the processes of invitation and compilation of local stakeholders meeting, along with the identification of stakeholders who have made the comments. The finding was closed after it was included in the revised PDD.

5 Comments by parties, stakeholders and NGOs

In accordance with the requirement of the Procedures for Processing and Reporting on Validation of CDM project activities, the PDD is to be made publicly available for 30 days subject to confidentiality provisions agreed with the PP, to enable comments to be received from Parties, stakeholders and UNFCCC accredited NGOs on the validation and registration requirements.

The PDD was made publicly available in accordance with the requirements of the procedure during the period of 09 Feb 2011 - 10 Mar 2011 as per the web-link below:

https://cdm.unfccc.int/Projects/Validation/DB/EY2A3UMQVWJ7XHBDNWUX6I7EX0IWZX/view.html

The comments received during the commenting period are summarised in the Section 7.4 of this report.

There are numbers of changes from the PDD Version 1.1 uploaded for GSP and the revised Version 5, the major points are:

- The PP had included the description of the national policies and circumstances relevant to the baseline.
- Inclusion of diesel as monitoring parameter for calculating project emissions
- The financial indicator for the project was revised to 4.22% from 4.37% due to change in the loan repayment period, moratorium and residual value.
- Plant Load Factor, tariff and biomass price were subjected to sensitivity analysis.
- Awareness of the CDM prior to the project start date, continuing and real actions taken to secure CDM status for the project were included.
- Data and parameters to be monitored were revised in accordance with the monitoring methodology.

The above changes were to address the issues raised by the validation team in response to the CAR/CL raised during the validation process.

6 Validation Opinion

LRQA has undertaken the validation of the proposed project activity "10 MW Biomass based Power Project by Sanjog Sugars & Eco-Power Private Limited" based on the requirements of CDM as set out in Article 12 of the Kyoto Protocol, the CDM M&P, the present annex, subsequent decisions made by the COP/MOP and CDM-EB, and the other rules applicable to the proposed project activity including the host country's legislation and its specific requirements for sustainable development.

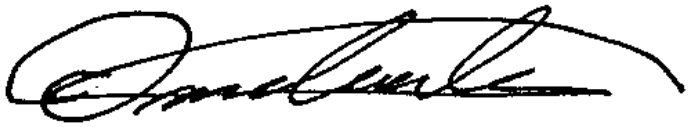
The proposed project activity involves the power generation from biomass with an installed capacity of 10MW located in the state of Rajasthan, India. The project activity will utilise only the renewable biomass fuel for power generation so there will be no GHG emission. By supplying the generated green power to the NEWNE grid, the project activity shall replace equivalent power generated predominantly by fossil fuel based power plants and thereby achieving GHG emission reduction.

In order to arrive at the final validation conclusions and opinion, LRQA carried out a thorough review of the PDD and related information, site visit, interview with PP, stakeholders and verified the evidence from alternate sources and an independent review. Through the process of validation the team has identified 8 CARs and 6 CLs. The PP has taken necessary actions and all CARs and CLs have been successfully closed. The overall conclusions for the project activity have been briefly summarized below:

- The PP has correctly applied AMS-I.D Version 16 to the project activity that involves electricity generation from 10MW biomass based power project that supplies electricity to an electricity distribution system.
- The NEWNE regional grid is the appropriate project electricity system considered for this CDM project activity.
- A combined margin grid emission factor of 0.8400 tCO_2e/ MWh has been validated based on the most recent CEA Database Version 5.0 available at the time of submission of the PDD. The data vintage selected is ex-ante.
- The PP was aware of CDM prior to the project start; benefits of CDM were seriously considered at the time of the investment decision.
- The validation confirmed that the financial returns of the proposed project activity (without CDM benefits) would be insufficient to justify the required investment and hence the project activity is additional.
- The monitoring plan has been suitably addressed and implementation of the plan by the PP is feasible within the project design.
- There is no significant environmental impact as a result of the project activity.
- The local stakeholder process was held in a clear and transparent manner and only positive comments were expressed. No negative comment was received during the local stakeholders' consultation process. One comment was received during the global stakeholders' consultation process and has been duly addressed.
- The project activity supports the sustainable development criteria of the host Party as evidenced by the Letter of Approval from the Host country's DNA.

The validation team is of the opinion that the proposed project activity conforms to all the relevant UNFCCC requirements for the CDM as well as the host country's national requirements, and if implemented as designed, is likely to achieve the emission reductions and contribute to the sustainable development of the host country. Therefore LRQA requests the registration of "10 MW Biomass based Power Project by Sanjog Sugars & Eco-Power Private Limited" to the CDM Executive Board as a CDM project activity.

Decision Maker



Michiaki Chiba

Climate Change Manager – Asia & Pacific

Date 27/01/2012

7 Appendices

7.1 Appendix A: Letter of approval for the project by the host and investing country DNA

Letter of Approval from Ministry of Environment and Forests (National CDM Authority) dated 13/09/2011 Ref No: 4/20/2011-CCC

7.2 Appendix B: List of documents reviewed

Category A documents (documents prepared by the PP)

1. Project Design Document Version 1 dated 03/02/2011, Version 1.1 dated 04/02/2011, Version 2 dated 01/06/2011, Version 3 dated 12/08/2011, Version 4 dated 26/09/2011, Version 5 dated 02/01/2012
2. IRR calculation and CER spreadsheet dated 04/02/2011, 01/06/2011, 26/09/2011, 21/11/2011
3. Modalities of Communication dated 27/09/2011
4. Certificate of Incorporation issued by the Registrar of companies
5. Extracts of Minutes of meeting of the Board of Directors dated 20th May 2008
6. Annual reports for Sanjog Sugars & Eco Power Pvt Ltd for year 2007-08 and 2008-09
7. RRECL approval for setting up of 10 MW biomass based power plant at Sangaria, Dist Hanumangarh dated 29/10/2007
8. Environmental Clearance from Ministry of Environment & Forests, Government of India for the project dated 16th July 2009
9. RRECL approval for Power evacuation dated 05/11/2008
10. Application for Consent to Establish dated 10/11/2010 from Sanjog Sugars & Eco Power Limited to Rajasthan State Pollution Control Board
11. Consent to Establish dated 18/01/2011 for the project from Rajasthan State Pollution Control Board
12. Letter from Central Ground Water Authority, Ministry of Water Resources, Government of India, dated 23 September 2010 on ground water clearance for the power plant
13. Work order issued to M/s Chemprojects Consulting Pvt. Ltd to prepare Biomass Assessment Study report dated 16/11/2007
14. Work order issued to M/s Chemprojects Consulting Pvt. Ltd for preparation of DPR for the project dated 04/02/2008
15. Power Purchase Agreement signed between Sanjog Sugars & Eco Power Pvt Ltd and Tata Power Trading Company Limited dated 10/02/2011.
16. Letter Of Intent (LOI) issued by Sanjog Sugars & Eco Power Pvt Ltd for EPC to M/s. Shriram EPC Limited dated 24/04/2010
17. Scope of Supply for EPC contract
18. Technical details of major equipment provided by M/s Shriram EPC Limited
19. Loan Application by Sanjog Sugars & Eco Power Pvt Ltd to Punjab National Bank dated 14/11/2009
20. Loan sanction letter from Punjab National Bank dated 05/03/2010
21. Biomass assessment report certified by RRECL
22. Test report for mustard husk from SGS India Pvt Ltd dated 30/09/2008
23. Test report for cotton stalk from Shriram Institute for Industrial Research dated 04/09/2010
24. Quotations from biomass suppliers dated 09/01/2008 and 10/01/2008

25. Letter of Intent for supply of boiler issued to M/s ISGEC John Thomson dated 16/06/2008
26. Agreement with M/s ISGEC John Thomson dated 03/07/2008 for supply of boiler
27. Certificate from the Chattered Accountant on non-availing of accelerated depreciation by Sanjog Sugars & Eco Power Pvt Ltd dated 24/04/2011.
28. Declaration from Sanjog Sugars & Eco Power Pvt Ltd on no ODA and public funding dated 25/02/2011
29. MNRE annual report for 2006-07 on capital subsidy for grid connected renewable energy power projects
30. Certificate from Punjab National Bank on the project cost and term loan dated 04/05/2011
31. Letter of Understanding between Sanjog Sugars & Eco Power Pvt Ltd & First Climate (India) Pvt. Ltd. for CDM advisory services dated 26th May 2009
32. Detailed Project Report dated April 2008
33. Copy of e-mail from UNFCCC on capital subsidy as a clarification on EB-22 Annex 3 dated 02 October 2009
34. Heat and Mass Balance Diagram provided by Blackstone Group Technologies Pvt. Ltd. dated 30/03/2010
35. Land document from Rajasthan State Industrial Development & investment Corporation Ltd dated 24/09/2009
36. Plant Layout diagram
37. Preliminary project report submitted by Sanjog Sugars & Eco Power Pvt Ltd to RRECL for approval
38. Implementation schedule for the project as provided by Sanjog Sugars & Eco Power Pvt Ltd
39. Policy for promoting electricity generation from biomass 2010 issued by Energy Department, Government of Rajasthan
40. Biomass price analysis report prepared by Rajasthan Renewable Energy Corporation Limited
41. Biomass fuel supply study in the state of Rajasthan prepared by RRECL
42. List projects approved in the state of Rajasthan provided by RRECL
43. Tariff Order for wind and biomass projects dated 09/03/2007
44. Revised Tariff Order for Wind and Biomass projects dated 14/03/2007
45. CDM Stakeholders meeting attendance sheet and feedback form dated 19th October 2010
46. Newspaper advertisement for local stakeholder meeting dated 14/10/2010
47. Invitation letters for local stakeholders meeting issued to individuals by Sanjog Sugars & Eco Power Pvt Ltd
48. Photographs taken during the local stakeholders meeting

Category B documents (other documents referenced)

1. AMS-I.D Grid connected renewable electricity generation, Version 16.
2. Tool to calculate the emission factor for an electricity system Version 02.2.0
3. General guidance on leakage in biomass project activities" Version 3
4. CO_2 Baseline Database for the Indian Power Sector, User Guide Version 5.0
5. User guide version 5.0 CO_2 baseline database for Indian power sector.
6. Clean Development Mechanism Small Scale Project design document form (CDM-SSC - PDD)

7. Guidelines for completing the Simplified Project Design Document (CDM-SSC-PDD) and the Form for proposed new small scale methodologies (CDM-SSC-NM) Version 05
8. Procedures for modalities of communications between project participants and the Executive Board", Version 01
9. Guidelines on the Assessment of Investment Analysis version 05 (Annex 5 to the report of 62nd meeting of the CDM-EB)
10. Guidelines on the Demonstration and Assessment of prior consideration of the CDM (Version 04)
11. General guidelines to SSC CDM Methodologies Version 16 (Annex 9 to the report of 59th meeting of the CDM-EB)
12. Guidelines for assessing compliance with the calibration frequency requirements Version 01 (Annex 60 to the report of 52rd meeting of CDM-EB)
13. Guideline for the reporting and validation of plant load factors (Version 01)
14. Clean Development Mechanism Validation and Verification Manual version 1.2 (Annex 01, EB 55)
15. Glossary of CDM Terms
16. Eligibility Criteria for Host Country Approval, National CDM Authority, Ministry of Environment & Forests
17. Notification by Ministry of Environment & Forests dated 01/12/2009

7.3 Appendix C: List of persons interviewed

S. No.	Name	Organization
1.	Hari Ram	Farmer, Ratanpura Village
2.	Satar Mohammad	Farmer, Gahru Village
3.	Gulbhag Singh	Farmer, Bhagtpura Village
4.	Jasweer singh	Farmer, Padampur Village
5.	Baljeet Saini	Local, Ratanpura village
6.	PremKumar	Farmer, Tibbi Village
7.	Ved Parkash	Farmer, Tibbi Village
8.	Bharat Bhushan	Farmer, Choutala Village
9.	Somesh Kumar	Farmer, Sangaria village
10.	Amarjeet Singh	Farmer, Sangaria village
11.	Sudeep	Jardwala Sikhar
12.	Ram mohan	Jardwala Sikhar
13.	Vijay Godarr	Teja Khara
14.	Harsh Vardhan	Tejabhera
15.	Virender Singh	Farmer, Bhagipur
16.	Sarbjeet Singh	Biomass supplier
17.	Naveen k Soni	Biomass supplier
18.	Sandeep	Lab in-charge, Sanjog Sugars & Eco Power Pvt Ltd

S. No.	Name	Organization
19.	Sanjay Kumar	Sanjog Sugars & Eco Power Pvt Ltd
20.	Satvindar	Sanjog Sugars & Eco Power Pvt Ltd
21.	Maneesh Mathur	Sanjog Sugars & Eco Power Pvt Ltd
22.	Rajiblochan Sarangi	Orient Green Power Company Ltd
23.	R. Mohanakrishnan	Orient Green Power Limited
24.	R Sivasankari	First Climate India Pvt Ltd

7.4 Appendix D: How due account has been taken to the public input made to the validation requirements

The PDD was made publicly available in accordance with the requirements of the Procedures for processing and reporting on validation of a CDM project activity for the period of 09 Feb 11 - 10 Mar 11. The project details can be viewed from the web-link below:
https://cdm.unfccc.int/Projects/Validation/DB/EY2A3UMQVWJ7XHBDNWUX6I7EX0IWZX/view.html

The following comments were received during the global stakeholder consultation:

Global Stakeholder Comment	Details of action
Though the formula for arriving at the WACC is mentioned, PP has not transparently described the input assumptions for the same for global stakeholders to understand and comment.	**PP Response** The comment is not clear. WACC has not been used as benchmark for the project. **Validation Opinion** The benchmark for the project is BPLR as referred from the RBI and the reference for it is provided in the PDD. The comment is therefore not relevant to the project activity.
PDD indicates that the PP planned to install a 10 MW project. Was CDM considered at that stage? Or did the PP modify the project so as to make the project a CDM feasible project? DOE is requested to critically analyse the DPR for 10 MW	**PP Response** The copy of the DPR and the true extract of the investment decision have been provided to the DOE for validation. The Board of directors of SSEPPL had decided to undertake the project activity with due consideration of CDM and specifically authorized its personnel to take actions for securing the CDM status to make the project financially viable.

	Validation Opinion The capacity of the project has been confirmed from the DPR applicable during the investment decision. The SSEPPL board discussed about the huge investment for the project and the expected returns from the project activity based on the DPR prepared by the third party consultant. The board was informed that taking into account the buy back rate of power and the cost of biomass, the revenue from the CDM is required to achieve the expected returns from the project. After detailed deliberation, the board of directors approved the implementation of the project taking into consideration of the revenues under clean development mechanism. Critical analysis of the all available evidence were made as detailed in the validation report section 4.3, pages 31 -33.
The assumptions for financial analysis are NOT AT ALL given in the PDD. Where's the transparency??? How did the DOE find such a PDD to be web hosted??? PDD is of poor quality to be web-hosted for Global stakeholder consultation.	**PP Response** The assumptions / reference for the financial analysis have been incorporated in the PDD.

	Validation Opinion The PP has included the assumptions in the revised PDD. LRQA confirmed that the parameters/ data used in the investment analysis are valid and applicable at the time of investment decision. Critical input parameters such as total project cost applicable during the investment decision were confirmed from the certificates issued by the bank which is a government of India undertaking. Auxiliary consumption rate, O&M cost with its escalation rate and tariff rate for electricity generated have been cross-checked from authenticated public documents such as RERC tariff order for biomass projects applicable during the investment decision. It was confirmed that the input values are consistently applied in all calculations in accordance with Para 6 of "Guidelines on the assessment of investment analysis". The details of the validation of all input parameters are provided in the report section 4.3 above.
The basis of input parameters taken at the time of investment decision is not adequately demonstrated with justification in the section B.5 of the PDD.	**PP Response** The basis of input parameters is included in the Section B.5 of the PDD.
	Validation Opinion LRQA confirmed that the input parameters used in the investment analysis are demonstrated in the Section B.5 of the PDD. The parameters are valid and applicable at the time of investment decision. Input parameters such as O&M cost, station heat rate, price and calorific value of biomass fuels were cross-checked with publicly available sources such as RERC tariff order and biomass study reports conducted by RRECL. It was also confirmed that the input values are consistently applied in all calculations in accordance with Para 6 of "Guidelines on the assessment of investment analysis". Please refer section 4.3 of the validation report for details.
The basis of choosing Bank PLR as benchmark for the determination of additionality is not correct.	**PP Response** The PP has considered PLR as the benchmark during the investment decision and is in accordance with paragraph 12 of the guidelines on the assessment of investment analysis

	Validation Opinion The PP had evaluated the project IRR against Prime Lending Rate (PLR) available at the time of investment decision making. As per the 'Guidelines on assessment of investment analysis' (Version 05), in the cases of projects which could be developed by an entity other than the project participant, benchmark based on the parameters that are standard in the market is considered suitable. In accordance with paragraph 12, local commercial lending is considered appropriate benchmark for project IRR. Hence in the project case where the project could have been implemented by any other entity, the prime lending rate published by Reserve Bank of India (RBI) that is publicly available is the appropriate benchmark
The basis for IDC is to be validated by DOE	**PP Response** The parameter has been sourced from the DPR applicable at the time of investment decision.
	Validation Opinion LRQA confirmed that Interest during construction (IDC) period is to be capitalised to calculate the project cost. The IDC was calculated in the Detailed Project Report (DPR) considering the phasing of the capital expenditure and was estimated as INR 16 million. This has been confirmed from the certificate issued by Punjab National Bank (PNB). Even if the IDC is considered to be zero, the project IRR would marginally improves to 5.35%, well below the bench mark of 12.5% . The project IRR would only become 12.5% when the total project cost is decreased by 19% assuming IDC as nil, which is very unlikely to happen.
Chronology of events is not adequate. What is the status of the project implementation?	**PP Response** Detailed chronology of evens has been included in the PDD. The project is under implementation.
	Validation Opinion The PDD has clearly indicated the real and continuing actions that were taken to secure the CDM status in parallel with its implementation. LRQA confirmed various actions through the document review of original documents and also through interview with appropriate persons as discussed in section 4.3 above in the report. LRQA has further confirmed during the site visit that the project is in the implementation stages.

Leakage emissions due to transportation of biomass and ash disposal to be calculated and to then PP can prove leakage is negligible.	**PP Response** The project participant has evaluated the surplus availability of biomass in the region of the project activity by conducting a biomass assessment study for the region (of 50 km radius)by an independent third party which confirmed that it is at least 25% larger than the quantity of biomass that is utilized including the project activity. Hence, this source of leakage is neglected. The power plant generates around 7665 tonnes of ash per annum. The ash will be stored in the ash silo through belt conveyer, which will be closed to the stack. The ash will be sent to nearby brick manufactures. The number of trips to dispose the ash to the nearby destination is around one trip per day. However, the average distance of transport of ash from the plant to the nearby destination is approximately 10 km and hence the no of truck trips per annum amounts to less than 500. Hence the emission due to the same is negligible. Moreover, it should also be noted that in the absence of the project activity, equivalent amount of power would have been generated by thermal power plants (mainly coal fired) connected to the grid wherein equivalent amount of ash would have also been generated and disposed. Thus, ash disposal from the plant is not a new source of emission on account of the project activity.
	Validation opinion The PP has detailed that the emissions due to the ash disposal is negligible and otherwise would have happened in the baseline case also is appropriate. As per the General guidance on leakage in biomass project activities, one of the leakage sources for the project activity is the competing use of biomass. The PP has conducted a biomass assessment survey through an independent consultant M/s Chemprojects Consulting Pvt. Ltd. The survey indicates the surplus availability of biomass in the district of Hanumangarh and it was confirmed from the policy of Government of Rajasthan that no other biomass power plant will permitted within 80km from the location of the existing/ approved biomass power plant that ensures availability of surplus biomass. Thus it was confirmed that there are no leakage emissions due to the project activity.

No of hours of operation should be included in the sensitivity analysis. The measurement of cotton stalk combusted in the boiler should be based on direct method. Pls clarify.	**PP Response** The PP has included the PLF (that takes into account of the operational hours) under the sensitivity analysis. The biomass is brought from outside through trucks. Each truck that enters the site will be recorded at the weighbridge installed at the factory and net quantity of biomass purchased will be recorded. The data recorded will be cross checked against purchase receipts and inventory records. And an annual mass balance that is based on purchased quantities, opening and closing stock will be performed. This can be cross checked with the balance stock to monitor the amount of biomass procured and combusted. The weigh bridge will undergo calibration as per statutory norms of Weights and Measures Act on annual basis. As direct measurement methods are not feasible in the context of the project activity, a foolproof indirect method has been adopted.
	Validation opinion The operating hours/ PLF of the project activity has been confirmed from the DPR and bank loan application. It was also confirmed that the PP has included the PLF under sensitivity analysis. The validation team had also assessed on the likelihood of occurrence of the scenario that covers the range. The biomass procured is measured using the weighbridge scale and recorded in the plant log books used later in the calculation of emissions reduction. Since no activity other than the power generation from the biomass residues mentioned in the PDD is taking place within the project boundary, the entire quantity of biomass procured that is measured and recorded in the plant log books is utilized in the project activity, Hence, the prescribed measurement method is appropriate and sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified

Submitted by: james smith

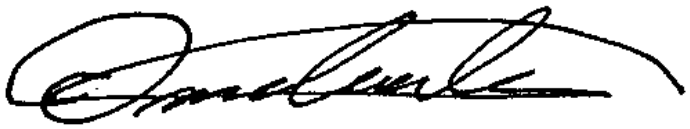
7.5 Appendix E: Certificate of Appointment

Validation of "10 MW Biomass based Power Project by Sanjog Sugars & Eco-Power Private Limited"

We hereby certify that the following personnel have engaged in the validation process that has fully satisfied the competence requirements of the validation of the CDM project activity.

Name of Person	Assigned Roles
Imran Ustad	Team Leader
T Ramesh	Team Member
Subramanian Saravanan	Sector Expert
Archak Pattanaik	Technical Reviewer under training
P C Acharya	Technical Reviewer
Rudra Charan Padhy	Sector Expert to technical review
Michiaki Chiba	Decision Maker

Signed by



Decision Maker
Michiaki Chiba
Climate Change Manager – Asia & Pacific

7.6 Appendix F: Validation findings log

1. Grade / Reference:	CAR 01	2. Date:	06/04/2011	3. Status:	Closed
4. Requirement	Para 44 & 51 of CDM VVM Version 01.2				
5. Finding: The Letter of Approval (LOA) for the project activity from the host country has not been submitted for validation.					
6. Conclusion: The Letter of Approval (LOA) dated 13/09/2011 with a reference number 4/20/2011-CCC has been submitted by PP for validation and the following information are confirmed by the validation team. • The host Party is a Party to the Kyoto protocol having ratified it on 26 August 2002 • Statement includes voluntary participation in CDM • The project activity contributes to sustainable development of the host country. LRQA also confirmed that the title of the project activity and the name of the PP is exactly the same as that mentioned in the PDD. In addition, LRQA reviewed similar approvals issued by the Host Party and confirmed the authenticity of the LoA.					

1. Grade / Reference:	CAR 02	2. Date:	06/04/2011	3. Status:	Closed
4. Requirement	Guidelines for completing the CDM SSC PDD Version 05				
5. Finding: <u>Section A.2 & A.4:</u> 1. Names of the other seasonal biomass residues to be used in the project activity not provided 2. Offer letter from the boiler supplier (ISJEC John Thomson) and contract agreement between the PP & supplier mentions that the main auxiliary fuel is imported coal whereas the details of the boiler auxiliary fuel not provided in the PDD 3. Technical specifications of condensing system of the steam turbine, electrostatic precipitator and AC generator not provided in the PDD					
6. Conclusion: 1. The PDD consistently mentions that surplus cotton stalks and mustard husk available in the region shall be mainly used in the project activity along with other seasonal biomass residues depending upon the requirement and availability. Each type of biomass utilized in the project activity is monitored ex-post in the project and the parameters are included under parameters to be monitored including the other seasonal biomasses in accordance with the applicable methodology. This is appropriate and the finding has been closed. 2. The project activity has been designed to operate with 100% biomass individually or in combination of various biomasses as provided in the DPR considered during the investment decision. It was confirmed during the discussion with the PP that the project shall utilize 100% biomass in the boiler and no coal shall be used in the project activity. The validation team also confirmed from letter on Environmental clearance provided by Ministry of Environment & forest dated 16th July 2009 (F.No J-13012/163/2007-IA.II (T) which mentions that the coal as fuel will **not** be used in the project. Hence, it was confirmed that coal shall not be used as a fuel in the project activity. 3. The revised PDD includes the technical specifications of major equipment involved in the project activity, those were verified from the respective specifications.					

1. Grade / Reference:	CAR 03	2. Date:	06/04/2011	3. Status:	Closed
4. Requirement	Specific guidelines for completing CDM-SSC-PDD Version 05 / AMS-I.D. Version 16.0				

5. Finding:

Section B.4 & B.5

Description of the baseline for the project activity is not provided in the Section B.4 in accordance with the Para 10 of the applicable methodology AMS-I.D. Version 16

National policies and circumstances relevant to the baseline of the proposed project activity are not summarized in section B.5 of the PDD

6. Conclusion:

The PP has included the description of baseline for the project activity in the revised PDD which is in accordance with the methodology AMS-I.D Version 16

In Section B.5 of the revised PDD, the PP has included the reference to the National Electricity Policy (August 2004) and the Electricity Act (2003). Also, the PP has included details to support that the NEWNE grid is currently dominated with fossil fuels

1. Grade / Reference:	CAR 04	2. Date:	06/04/2011	3. Status:	Closed
4. Requirement	Paragraph 110 of VVM Version 01.2; Guidelines on the assessment of investment analysis				

5. Finding:

Section B.5 & Spread sheet on the financial analysis

1. Para 2.4 of the DPR states that the MNRE had extended capital subsidy for biomass based power plants. The basis for investment decision being the DPR, the capital subsidy has not been considered in the financial analysis.

2. Para 9.1 of the DPR states that the schedule for the implementation of the project activity is enclosed. However, it is not found.

3. MAT rate considered during investment decision for the FY 2009-10 is not correct and the reference/evidence is not provided.

4. Cost of the land is not included in the calculation of salvage value

5. Evidence /reference for the technical life time for the boiler/steam turbine not provided in accordance with the Para II of the "Tool to determine the remaining lifetime of equipment" Version 01 to justify the period of assessment in the financial analysis.

6. IT Depreciation is charged on total project cost including land cost which is not in accordance with the local accounting procedures.

7. In the IRR calculation sheet, increase in working capital is considered as expense and deducted from income to arrive at Profit Before Interest, Depreciation and Tax (PBIDT) which is not correct

8. In the calculation of project IRR, interest on term loan is added back whereas the interest on working capital is not added back to the net cash flow.

9. In accordance with the local accounting procedures there is no restriction on carry forward

of unabsorbed losses whereas losses on account of depreciation is accounted for 8 years only.
6. Conclusion: 1. The PP responded that the subsidy from MNRE for biomass power plants is categorised under paragraph 6 (b), Annex 3 to 22nd meeting report of CDM EB. Since the provision of subsidy as a policy was implemented in year 2003, it can be excluded in the calculation of financial indicator. Accordingly, it was confirmed from the annual report (2006-07) of MNRE, the capital subsidy offered through financial institutions for grid connected renewable energy power plants was introduced in December 2006. Hence it was appropriate that the capital subsidy has not been included in the financial analysis. 2. The implementation schedule for the project activity as per the DPR has been provided and is appropriate with the financial analysis. 3. MAT rate as applicable at the time of investment decision has been provided along with the reference web-link and it is appropriate. 4. Land cost has been included in the calculation of salvage value which is appropriate. 5. Technical life time of the project has been considered as 20 years and is in accordance with the RERC tariff order applicable at the time of investment decision. 6. In the revised IRR, the PP had excluded the land cost in the calculation of IT depreciation and has calculated it from the depreciable assets only and is appropriate. 7. In the calculation of free cash flow to the firm, expenses due to change in the working capital can be deducted from the Earnings Before Interest, Depreciation and Tax as referred from the "Corporate Finance Spring 2008" by Aswath Damodaran. Hence this is appropriate and the finding has been closed. 8. It is appropriate that the working capital is not a financing expenditure and it is represents operating liquidity available to a business / organization and is considered as a part of operating expenses in the calculation of project IRR 9. Unabsorbed losses have been carried forward to the entire financial assessment period of 20 years and are appropriate in accordance with the established accounting procedures.

1. Grade / Reference:	CAR 05	**2. Date:**	06/04/2011	**3. Status:**	Closed
4. **Requirement**	Paragraph 98 of VVM Version 01.2, Para 6(b) of Guidelines on the demonstration and assessment of prior consideration of the CDM –Version 04				
5. Finding: Section B.5 The PP had not detailed the awareness of the CDM prior to the project activity start date and subsequent continuing and real actions that were taken to secure CDM status for the project in parallel with its implementation.					
6. Conclusion: The PDD is revised to include the details of the continuing and real actions taken to secure the CDM status for the project in parallel with its project implementation. Further, the PP has demonstrated that the benefits of the CDM were a decisive factor in the investment decision making process when the decision to implement the project was taken. LRQA confirms that the extracts of the meeting minutes provided were actual extracts from the board meeting minutes held to approve the investments for the project. Thus the awareness of					

the CDM prior to the project start date and benefits of the CDM were a decisive factor to proceed with the project as a CDM project activity demonstrated by the PP.

Through the document review, it was confirmed that the gap between the date of investment decision on 20/05/2008 and the project start date (16/06/2008) and the actions for securing the CDM status (26/05/2009) is less than 2 years as detailed above, LRQA concluded that the continuing and real actions were taken to secure the CDM status for the project in accordance with the latest guidelines on the demonstration and assessment of prior consideration of the CDM version 04.

1. Grade / Reference:	CAR 06	**2. Date:**	06/04/2011	**3. Status:**	Closed
4. Requirement	Tool to calculate the emission factor for an electricity system Version 02.2.0/AMS-I.D Version 16				
5. Finding: Section B.6.1: In Step 4, net generation in OM does not includes electricity import; Weighted average Operating Margin emission factor does not includes the weighted average of absolute emissions including imports and net generation including imports					
6. Conclusion: In Section B.6.1 of the revised PDD, the PP has included the net generation in OM with electricity import. The PP has calculated the Weighted average Operating Margin emission that includes the weighted average of absolute emissions including imports and net generation including imports. The above changes are in accordance with the Tool to calculate the emission factor for an electricity system and the finding has been closed.					

1. Grade / Reference:	CAR 07	**2. Date:**	06/04/2011	**3. Status:**	Closed
4. Requirement	Monitoring Methodology AMS-I.D. Version 16.0 & General Guidelines to SSC CDM methodologies Version 16				
5. Finding: Section B.6.3 1. It was mentioned in the DPR that the start-up load for auxiliary equipment of the power plant shall be provided by 2x250 kVA DG sets which was later confirmed during the discussions with the site personnel. However, this is not included in the project boundary and in the estimation of project emissions in the Section B.6.3 Section B.7.1 The following details in accordance with Para 22 of the monitoring methodology are not provided: 2. Calculation procedures in the estimation of the net electricity supplied to the grid ($EG_{BL,y}$), QA/QC procedures for cross-checking the estimated quantity of net electricity generated consumption as per point no 5 3. Monitoring/recording frequency of the quantity of biomass consumed in the year y, and moisture content of the biomass residues are not in accordance with the monitoring methodology; Further, the cross-checking of electricity generated using biomass fuels					

consumed and specific energy consumption of each type of biomass fuel as provided in point no 6 are not provided

4. Measurement methods and standards used in the estimation of net calorific value of the biomass residue type and cross-checking of the measured values are not provided as per point 8

5. Method of archiving not provided in the accordance with the Para 17(a) of the General Guidelines to SSC CDM methodologies Version 16

6. Conclusion:

1. The PP had included one number of 250 kVA DG set (another DG set is a stand-by unit) in the project boundary and the CO_2 emissions due to combustion of fossil fuel (diesel) during the operation of one number of DG set in emergency situation have been included in the Section B.6.3 of the revised PDD.)Also, the equations to calculate the project CO_2 emissions included in the Section B.6.1 are in accordance with the "Tool to calculate project or leakage from fossil fuel combustion

2. The calculation procedures for the estimation of net electricity supplied to the grid has been included in the revised PDD. Also, the cross-checking of net electricity is based on the records for sold/purchased electricity has been included in the QA/QC procedures which are in accordance with the paragraph 22(5) of the methodology.

3. Quantity of biomass fuel consumed is monitored continuously and recorded daily. This is in accordance with AMS-I.D. Para 22 (point 6). The PP had included the QA/QC procedures for quantity of biomass consumed in accordance with the paragraph 22 (point 6) of AMS-I.D
   Monitoring of the moisture content in the biomass residue is in accordance with the monitoring methodology. The weighted average of the moisture content in the biomass residues and residue other than cotton stalk and mustard husk shall be calculated for each monitoring period and used in the calculations
   Specific energy consumption of biomass residues is not included since the project activity includes 100% biomass with no fossil fuel consumption and is appropriate in accordance with the applicable methodology.

4. The measurement methods and standards used in the estimation of net calorific value of the biomass residue type and cross-checking of the measured values are provided as per point 8 of the methodology AMS-I D, in section B.7.1 of the revised PDD.

5. The PP has included that the monitored data are archived electronically and maintained for a period of 2 years after the crediting period. This is in accordance with the General Guidelines to SSC CDM methodologies.

1. Grade / Reference:	CAR 08	**2. Date:**	09/09/2011	**3. Status:**	Closed
4. Requirement	Para 110 of CDM VVM Version 01.2 & Tool to calculate the emission factor for an electricity system				

5. Finding:

The PDD refers to the Guidelines on the assessment of investment analysis Version 03.1 whereas version 05 is the latest available for the referred guidelines.

The PDD refers to Version 01 of the "Tool to calculate the emission factor for an electricity system" which is no longer valid.

6. Conclusion: The revised PDD refers to the Guidelines on the assessment of investment analysis, version 5 which is the latest version of the guidelines. Tool to calculate the emission factor for an electricity system version 2.2, EB 61, Annex -12.has been referred in the revised PDD and is appropriate.

1. Grade / Reference:	CL 01	**2. Date:**	06/04/2011	**3. Status:**	Closed
4. Requirement	Para 131 of CDM VVM Version 01.2				
5. Finding: The PDD refers to the notification dated 14/09/2006 on the requirement of Environmental Impact Assessment (EIA) in the Section D.1 of the PDD whereas the recent Environmental Impact Assessment notification is dated 01/12/2009.					
6. Conclusion: The PP had included the Environmental Impact Assessment notification dated 01/12/2009 in the revised PDD. This is appropriate since the referred version is the latest one and the finding has been closed.					

1. Grade / Reference:	CL 02	**2. Date:**	06/04/2011	**3. Status:**	Closed
4. Requirement	Guidance on assessment of investment analysis Version 03.1/Version 05				
5. Finding: <u>Section B.5 & Spread sheet on the financial analysis</u> 1. Break-up for the total project cost is not provided in the IRR spread sheet 2. Whilst the PP had considered the accelerated depreciation rates as per the IT Act, the potential benefits due to the accelerated depreciation and tax savings are not included. 3. Tariff rate and biomass price are not subjected to sensitivity analysis 4. Reference/evidence for the interest on working capital & debt, term of loan, moratorium, number of installments are not provided; 5. Reference / evidence for the station heat rate and Net Calorific Value considered in the estimation of specific fuel consumption are not provided					
6. Conclusion: 1. Total Project Cost and the break up for the total project cost has been referred from the Detailed Project Report (DPR) prepared by third party consultant M/s Chemprojects Consulting Pvt. Ltd. The total project includes costs for land & site development, civil works, equipment for power generation, auxiliaries and utilities, project design & engineering, interest during construction and margin money for working capital. Total project cost also has been confirmed from the loan application submitted by the PP to Punjab National Bank (a government of India undertaking) dated 14/11/2009 requesting for debt financing for the project. LRQA confirms that the total project cost considered by the PP is valid and appropriate since applicable at the time of investment decision in accordance with Para 6 of the "Guidance on the Assessment of Investment Analysis" 2. The PP is an independent power producer (IPP) with no other profit making business as					

certified by the independent chartered accountant and cannot avail the potential tax benefits due to the accelerated depreciation of its assets. This is appropriate in accordance with the standard operating procedures.

3. The PP has subjected tariff rate and biomass price under sensitivity analysis and included in the revised IRR sheet.

4. The values for working capital & debt, term of loan, moratorium, and number of installments have been referred from the DPR applicable at the time of investment decision. Also, the rate of interest on the working capital has been cross-checked from the prevailing commercials interest rate at the time of investment decision and is appropriate.
   Validation team confirmed the interest rate and loan repayment from the loan sanction letter dated 05/03/2010 issued by Punjab National Bank. Hence, the considered interest on term loan and loan repayment period are deemed conservative.

5. Station heat rate (kcal/kWh) has been referred from the DPR. The validation team has cross-checked and confirmed that RERC tariff order dated 09/03/2007 has recommended 4,400 kcal /kWh as the station heat rate for biomass power plants with air-cooled condenser system. Also the referred tariff order confirms that Central Electricity Authority recommends a station heat rate of 4500 kcal/kWh and Indian Renewable Development Agency (IREDA) recommends 4200 to 4600 kcal/ kWh. Thus LRQA deems the station heat rate considered by PP to be appropriate.

   Net Calorific Value has been referred from the DPR which also provides a Gross Calorific Value (GCV) of 3,772 kcal/ kg for mustard stalk (with moisture content of 10%) ERC tariff order dated 09/03/2007 provides a Gross Calorific Value (GCV) of 3,400 kcal/ kg for mustard husk whereas the DPR provides for a GCV of 3,772 kcal/ kg which is a conservative value.
   Biomass test report dated 30/09/2008 issued by M/s SGS India Pvt. Ltd. for the sample of mustard husk provides a Gross Calorific Value (GCV) of 3772 kcal/ kg at a moisture of 10%
   RRECL certified biomass assessment study report prepared by the third party engaged by the PP provides a NCV of 3,394 kcal/ kg (Section 9.2) which is consistent with the DPR. Thus the validation team confirmed that the value considered is appropriate.

1. Grade / Reference:	CL 03	**2. Date:**	06/04/2011	**3. Status:**	Closed
4. Requirement	General guidance on leakage in biomass project activities (Version 03)				

5. Finding:

Related to Biomass Assessment Report:

1. The generation details for mustard and cotton for the year 2005-06 and 2006-07 provided in the table 3.4 in page 17 and the corresponding consolidated generation and consumption provided in the table in page no. 18 are not matching.
2. Net Calorific Value of cotton stalk as mentioned in page no 28 of the report is 3916 kcal/kg whereas it is 3690 kcal/kg in other sections of the report.

6. Conclusion:

1. It is appropriate that the generation and consumption details for mustard and cotton provided in Page 18 is the average of the yearly details provided in the Page 17. The finding is closed

2. The PP has mentioned that it was unintentional typographical error and stated that the Net calorific value of cotton stalk is 3690 kcal/kg only. Net calorific value of cotton stalk as confirmed from the other documents such as DPR is 3690 kcal/kg. The finding has been closed.

1. Grade / Reference:	CL 04	2. Date:	06/04/2011	3. Status:	Closed
4. Requirement	Para 128 of CDM VVM Version 01.2; Guidelines for completing the CDM SSC PDD Version 05				
5. Finding: In the Section E.1, the processes by which comments by local stakeholders have been invited and compiled are not detailed. In the Section E.2, the stakeholders who have made the comments are not identified					
6. Conclusion: The PP had included the processes by which comments by local stakeholders have been invited and compiled. PP had released the advertisement in the local newspapers on 14/10/2010 to invite the local public for the local stakeholders meeting conducted on 19/10/2010. The advertisement in the newspapers for the local stakeholders meeting was provided in local language and English. Further, the PP had also invited the local people through invitation letters. The participants for the stakeholder meeting included residents of village, representatives from technology supplier and various other groups. Review of the minutes of the stakeholders' meetings shows that people were supportive of the project activity and expressed no negative comment on the project activity. Since the description is appropriate the finding has been closed.					

1. Grade / Reference:	CL 05	2. Date:	10/09/2011	3. Status:	Closed
4. Requirement	Para 81 of CDM VVM Version 01.2 & Specific guidelines for completing CDM-SSC-PDD.				
5. Finding: 1. Values of data applied for $EG_{export,y}$ and $EG_{import,y}$ in the calculation of expected emission reductions are not provided. 2. PP to clarify how the emission reductions would be estimated during the period when both the meters are reported to be malfunctioning or out of acceptable limits as part of the emergency preparedness process for monitoring.					
6. Conclusion: 1. The ex-ante values of data applied for $E_{G\ export,y}$ and $E_{G\ import,y}$ in the calculation of expected emission reductions are included in the revised PDD. 2. The PP has included in the revised PDD a description that when both the meters are not functioning, the net electricity supplied to the grid during such period shall not taken into account in the emission reduction calculation which is conservative and appropriate.					