Voluntary Carbon Standard 2007.1 Validation Report

No. 53804208-08/626

Validation Report:

Name of Validation company:	Date of the issue:
TÜV NORD CERT GmbH	2009-11-18
Report Title:	**Approved by:**
8MW Waste Heat Recovery Based Power Project by Sree Rengaraaj Power India Private Limited	Mr. Winter Rainer
Client:	**Project Title:**
Sree Rengaraaj Power India Private Limited.	8MW Waste Heat Recovery Based Power Project by Sree Rengaraaj Power India Private Limited
Summary:	
M/s Sree Rengaraaj Power India Private Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the validation of the project – "8MW Waste Heat Recovery Based Power Project by Sree Rengaraaj Power India Private Limited", with regard to the relevant requirements of VCS 2007.1 Standard as well as criteria for consistent project operations, monitoring and reporting. By GHG emission reductions through waste gas based power generation at Sree Rengaraaj Power India Private Limited which involves utilization of waste heat content of the by-product gasses emanating out of the process by installing Waste heat recovery boilers to generate steam and subsequently power, the project activity will result in reductions of greenhouse gas emissions that are real, measurable and give long-term benefits to the mitigation of climate change.	

The review of the VCS PD and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

A risk based approach has been followed to perform this validation. In the course of the validation 5 Corrective Action Requests (CAR) , 9 Clarification Requests (CR) and 1 Forward Action Request(FAR) were raised and successfully closed out.

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

As a result of the validation, the validators confirm that:The project fulfils criteria of VCS 2007.1 provided.

- The project additionality is sufficiently justified in the PD.
- The monitoring plan is transparent, adequate and inline with applied baseline and monitoring methodology of ACM0012, version-3.1.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 4, 31,790 tCO_2e (total) is most likely to be achieved within the 10 years renewable crediting period.
- No restrictions or uncertainties were identified related to the validation.

Work carried out by:	Number of pages:
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1 Introduction

1.1 Objective

The purpose of this validation is to have an independent third party assessment of the project design. In particular the project's baseline, the monitoring plan (MP), and the project's compliance with the requirements of:

- The requirements of VCS 2007.1 program guidelines
- Requirements of the Approved methodology, ACM0012 version 3.1,EB-44
- To assess the project's compliance with other relevant rules including the host country (India) legislation and VCS sustainability criteria
- Other relevant rules, of VCS sustainability criteria are validated in order to confirm that the project design as documented is sound and reasonable and meet the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders on the quality of the project and its intended generation of Verified Emission Reductions (VERs).

1.2 Scope and Criteria

The validation scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan (based on CDM approved methodology ACM0012. /Version 3.1:"Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" will be employed for the project), which are included in the VCS PD and other relevant supporting documents.

The items covered in the validation are described below:

- VCS 2007.1 & Host Country Criteria
  - To meet the requirements of VCS 2007.1 guidelines requirements, in particular,
  - Host country requirements / criteria
- VCS Project Description
  - Project design
  - Project boundaries and Predicted VCS project GHG emissions
- Project Baseline
  - Baseline methodology

  - Baseline GHG emissions

- Monitoring Plan
  - Monitoring methodology
  - Indicators/data to be monitored and reported
  - Responsibilities
- Project Additionality
- Background investigation and follow up interviews
- Draft validation reporting with CARs,CRs & FARs, if any
- Stakeholders consultation
- Final validation reporting.

The information included in the PD[/PD/] and the supporting documents were reviewed against the requirements and criteria mentioned above. The TÜV NORD CERT GmbH JI/CDM CP has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of VERs. The validation is based on the information made available to TÜV NORD JI/CDM CP and on the contract conditions.

TÜV can not be held liable by any entities for making its validation opinion based on false or misleading information during the course of validation.

The validation is not meant to provide any consulting to the project participant. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 **VCS project Description**

The project activity is waste heat recovery based to meet the entire power requirement of the steel plant of Sri Rengaraj steels and its sister concerns through the southern grid. The project involves the installation of Waste heat recovery boiler to recover the and utilize the sensible heat content of the waste gases generated from the DRI kiln installed at the steel plant. The project activity involves the generation of electrical energy through the steam produced by the waste heat recovery boiler of capacity 36 TPH operating at 64 kg/cm2 and 485^0C.the steam generated from the waste heat recovery boiler would fed to the turbine of 8MW for generation of power. The overall power requirement of the steel plant would be met from the project activity and the remaining surplus power is wheeled to its sister concerns through the southern grid.In absence of the project activity the

equivalent amount of power would have been imported from the southern grid which is a carbon intensive source most likely a coal based power plant. Further in the absence of this project activity the waste gas coming out from the DRI kiln would have been released to the atmosphere. Thus the project activity results in prevention of wastage of useful energy along with overall reduction of Green house gas emissions.The proposed project falls under Large-scale methodology ACM0012 version 3.1, of CDM methodologies. The estimated GHG emission reduction is 4, 31,790 tCO_2e (total) or average 43,179 tCO_2e per year for ten years of crediting period.

Table 1: Project location including geographic and physical information allowing the unique identification

No.	Project Location
Region:	Tamilnadu
Project location address:	Sipcot Industrial complex, Perundurai,Erode district
Latitude	$11^0 14'15''$
Longitude:	$77^0 32'53''$

1.4 Level of assurance

The validation report is based on VCS PD, site visit interviews and documents provided by the project proponent, as well as information got from on-site visit. The validation opinion is assured and provides the credibility of all above.

2 Methodology

The validation of the project was carried out between December 2008 to March 2009.

Preparations : 2009-02-15 to 2009-02-17
On-site validation : 2009-02-27,
(Draft) Reporting : 2009-07-15
(Final) Reporting : 2009-10-29

The validation consisted of the following three phases:

- a desk review of the project design and the baseline and monitoring methodology
- follow-up interviews
- background investigations
- on-site assessment

- the resolution of outstanding issues and
  the issuance of the final Validation report and opinion

2.1 Review of Document

The draft PD/PD/ submitted by the project participants in February 2009 and supporting background documents related to the project design and baseline were reviewed. Furthermore, the validation team used additional documentation by third parties like technical reports referring to the project design or to the basic conditions and technical data.

The documents that were considered during the validation process are given in chapter 5 of this report. They are listed as follows:

- Documents provided by the project proponent (Table 5-1)
- Background investigation and assessment documents (Table 5-2)
- Websites used (Table 5-3).

2.2 Follow-up Interviews

On 2009-02-27, the TÜV NORD JI/CDM CP performed On-site validation visit with the project proponent.

During this visit, as well as earlier and after, interviews with the project proponent, Plant operating personnel's, the consultant, project stakeholders and with local authorities were carried out to confirm selected information and to resolve issues identified in the document review.

The key interview and main topics of the interview are summarised in Table 2-1.

Table 2-1 Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
1.Projects & Operations Personnel /IM01/ S.Shayam Sundar, Director,Sree Rengaraj Power India Pvt Ltd 2. Consultants /IM02/	- Technical details of the project activity - Performance data of the Equipments - Approval procedures and status - Monitoring and measurement - Project activity starting date

Interviewed Persons / Entities	Interview topics
K.Prabakaran Director, Abi Energy consultancy Pvt Ltd. 3. O & M Contractor /IM03/ G.Palanisamy Electrical Engineer, Operational Energy group India Private Limited.	and commissioning date - Crediting period - VER allocation /ownership - Sustainable development issues - Environmental Impact Assessment - Local stake holder consultation process - Roles & responsibilities, competency and training of the staff members w.r.t project management, monitoring and reporting - Operational Data – technical specification, capacity, estimated life time of the project plant units - Editorial aspects of PD - Baseline study and additionality - Details of emissions reduction calculations - Estimation of net energy (Import / Export) - QA/QC and calibration procedures - Data quality, archiving and reporting procedures - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification

A detailed list including the functions or designations of the interviewed persons is given in chapter 5 (see. Table 5-4). This table also includes reference codes to be used in the validation protocol.

2.3 Resolution of any material discrepancy

A few Discrepancies were found during the validation and the validation report containing a set of CARs & CRs were submitted to the project proponent. The project design document was revised addressing the CARs & CRs issued by TÜV NORD JI/CDM CP.

After reviewing the revised and resubmitted project documentation/PD/; resolving the CARs & CRs raised and

outstanding concerns, TÜV NORD JI/CDM CP issues this final validation report and opinion.

The results are shown in Table 2-2:

Table 2-2: Summary of CAR and CR issued

Validation topic 1)	No. of CAR	No. of CR	No. of FAR
Project Design (3.1)	2	8	0
Baseline (3.2)	2	0	0
Monitoring plan (3.3)	0	1	0
Calculations of GHG emissions (3.4)	1	0	1
Environmental Impact (3.5)	0	0	0
Local Stakeholder Comments (3.6)	0	0	0
SUM	**5**	**9**	**1**

1) The letters in brackets refer to the validation protocol/sections

For an in depth analysis/evaluation of all CARs and CRs can be referred to the below sections from 3.1 to 3.6.

3 Validation Findings

3.1 Project Design

The proposed project uses the waste heat of the flue gases coming out from the DRI Kiln in the sponge Iron plant and its converted as a steam in Waste heat recovery boiler which is further intended to generate electricity in the Turbine. The installed capacity is 8 MW and the estimated electricity supplied to the grid is 50,458 MWh per year after commissioning.The estimated annual generation of the power plant based on the plant load factor 80% which is based on the detailed project report/DPR/ of the project activity.The same has been verified with documents provided by the project proponents.The project activity description mentioned in the PD sufficiently covers all relevant elements which provide clear understanding of the nature of the proposed

project activity. The detailed technical description of the project activity as mentioned in the PD ,was cross checked with the reference of to the purchase orders along with technical specifications of the respective project equipments such as Waste heat recovery Boiler, Steam Turbo generator etc as provided in the contract documents and letter of intends issued to the project equipment suppliers .During onsite visit it was evidenced that the project facility was commissioned and under Operational so the equipment technical specifications has been cross verified with the installed equipments and found OK.

The Key parameters of the technology and major equipments used in the project activity are as follows:

Table 3-1: Key parameters of the major equipments used in the project activity.

Salient Features of Waste heat Recovery Boiler

Parameters	**Value and unit**
Steam output, Max. Continuous rating (MCR)	36 TPH
Steam pressure at super heater outlet	64Kg/cm^2
Steam temperature super heater outlet	485 deg C
Feed water temperature at the economizer outlet	200 deg C
Gas flow rate, (max.)	85,000 Nm3/hr
Gas flow rate (normal)	75,000 Nm3 /hr
Gas temperature	900 – 1000 deg C
Dust content	35 g/ Nm3
Exit temperature of the waste gas	35 g/ Nm3
Normal steam generating capacity of the WHRB	36 TPH

Salint Features of the Turbine

Parameters	**Value and unit**
Type	Impulse reaction straight condensing Type
Steam conditions at turbine Inlet	64Kg/cm^2 @485 deg C
Turbine capacity	8000KW

The project duration is: 20 years.

Project start date is: 2005/12/21(Parallel operation of the project activity with Tamilnadu electricity board Grid)

Crediting period is: Ten years starting from 2006/03/28.

Sree Rengaraj Power India Pvt limited has ownership of the proposed project. Proof of title was verified. Refer to Table 5-1.

The emission reduction was not double counted. The project was not registered under any other mechanism/dec/ and hence there is no rejection history.

The project was not registered under any other emission trading mechanism and hence there is no rejection history.

However, CAR 3.1.1, CAR 3.1.2 and CR 3.1.1 to 3.1.8 were raised.

CAR/CR	*Reference*	*Summary of project owner response*	*Revised sections (as applicable)*	*Conclusion*
CR 3.1.1 The project description is need to be elaborated in section 1.4 of the PD.	/PD/ 1.4	The project description in the section 1.4 of the PD was elaborated in the revised PD	/PD/ 1.4	Project description has been elobrated in section 1.4 of the revised PD.It provides the exact scenorio of the project activity and same has been verfiied during the onsite visit and interviewed with the personnels CR 3.1.1 is closed.
CR 3.1.2 Unique identification and description of the project boundary is missing in section 1.4 of PD.	/PD/ 1.5	Unique identification and description of project boundary was included in the revised PD.	/PD/ 1.5	The lattitude and longitude information and the description of the project boundary included in the revised PD. CR 3.1.2 is closed.
CR 3.1.3 The starting date of the project activity mentioned in section 1.6 of VCS PD is not inline with the definition for start date in VCS 2007.1.	/PD/ 1.6	The starting date of the project activity was corrected in the revised PD.	/PD/ 1.6	The start date of the project activity is revised based on the VCS 2007.1 guidelines.The prject was synchronized with the grid has taken as a revised project start date/SD/ of the project activity. CR 3.1.3 is closed.

CAR/CR	*Reference*	*Summary of project owner response*	*Revised sections (as applicable)*	*Conclusion*
CR 3.1.4 In section 1.8 provide the detailed technical specifications of the major equipments involved in the project activity.	/PD/ 1.9	Detailed technical specifications of the major equipments involved in the project activity was included in the revised PD	/PD/ 1.9	The detailed technical specifications of the major equipment is now included and the same has been cross verified with the documents/PO/ provided by the project proponent and during on site visit. CR 3.1.4 is closed.
CR 3.1.5 The section 2.5 refers the barriers associated with the project implementation, PP should provide the exact risks that may substantially affect the project's GHG emission reductions or removal enhancements in section 1.10 of the PD.	/PD/ 1.6	The operational barrier discussed in the section 2.5 affect the project's GHG emission reductions.	/PD/ 1.6	The exact barriers affects the projects GHG emissions reduction is explained in section 2.5 of the revised PD and found OK. CR 3.1.5 is closed.
CR 3.1.6 The justification for demonstration to confirm that the project was not implemented to create GHG emissions for the purpose of its removal or destruction in the section1.12 of VCS PD is not clear.	/PD/ 1.12	Section 1.12 was corrected in the revised PD.	/PD/ 1.12	The project activity is the new initiative and utilise the waste heat of the flue gas coming out from the sponge iron kiln. This will reduce the GHG emissions and the project was not implemented

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				to create GHG emissions for the purpose of its removal CR 3.1.6 is closed.
CR 3.1.7 The justification/proof (under taking by promoters) of demonstration that the project has not created another form of environmental credit by the project in section 1.13 of VCS PD is missing.	/PD/ 1.13	This project activity has not created any other form of environmental credit. The supporting document was submitted to the validator. The same was included in the revised PD.	/PD/ 1.13	This project activity has not created another form of environmental credit. The proof/DEC/ for the same has been verified and found OK. CR 3.1.7 is closed.
CR 3.1.8 In Section 7 of the PD is not inline with stipulations of the VCS PD Template. Revision is required	/PD/ 7	Corrected as per the VCS PD template.	/PD/ 7	The same has been revised as per the VCS PD template and the events mentioned in the schedule has been verified with the documents provided by the Project participants CR 3.1.8 is closed.
CAR 3.1.1 Proof for considering the PLF for the project activity is 80%.	/PD/ 1.3 1.4 4.2	PLF has taken from the detailed project report of this project activity.	/PD/ 1.3 1.4 4.2	The PLF considered for this project activity has taken from the detailed Project report/DPR/ prepared by the private consultant which is appropriate

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				and same has been used for the emission reductions calculations. CAR 3.1.1 is closed.
CAR 3.1.2 In section 2.2 of the PD ▪ Proof for no regulation constrain for this industrial facility to generate waste energy from fossil fuels prior to the implementation of the project activity.	/PD/ 2.2	The pollution control board norms for the emission of flue gas from the sponge iron unit can be satisfied by the project even in the absence of the project activity Implementation of this WHR project will further reduce the thermal, dust pollution levels from the flue gas and displace the electricity purchase from southern regional grid	/PD/ 2.2	There is no regulation constrain for this sponge iron unit to generate the waste gas from the fossils fuel prior to the implementation of the prject activity. The project proponent got the necessary approvals/SC/ from pollution control board for venting the waste gas to the atmosphere.
▪ Justification provided for the applicability condition no 7 in the PD is not clear. ▪ Demonstration of use of waste energy in absence of project activity is missing in the PD.		Applicability condition no 7 was corrected in the revised PD. Demonstration of use of waste energy in absence of project activity was included in the revised PD.		The same has been corrected and this project activity is the new facility. In the absence of this project activity the waste heat of the flue gases coming out from kiln was not utilised in the

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				existing facility. The industrial facility meets their entire energy demand for the process by importing power from the grid. The same has been reflected in their electricity bills. The same has been verified found OK. CAR 3.1.2 is closed

3.2 Baseline

The project activity has been designed on the approved baseline and monitoring methodology for GHG emission reductions for waste gas or waste heat or pressure based energy system version 3.1"Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects"-ACM0012 valid from 16th August 2008 onwards. Validation team observations with respect to applicability of the baseline methodology are as follows:

- The project activity utilizes the waste heat from gases coming out of DRI kiln for generating electricity.
- The electricity generated by the project activity is used within the industrial facility and surplus power exported to sister concerns using the southern grid.
- SRPIL is the owner of industrial facility producing waste heat and utilizes it to generate electricity.
- The regulation does not constrain the industrial facility to generate waste energy using fossil fuel used prior to the start of project activity.
- The project activity is the new initiative; Hence, the project activity is applicable as per the methodology.

- The waste heat from gases from the DRI kiln will be unutilized in the absence of the project activity. The same is proved by
    - All the energy required for the process before the implementation of the project activity was imported from grid. Electricity bills from TNEB was verified.
- The credits are claimed by SRPIL, which generates electricity by utilizing the waste gas heat.
- The Waste gas released under abnormal operation will not be accounted for.
- The project activity is generation of electricity only.

From the above discussions it is ascertained that the project activity meets the applicability criteria of ACM0012/ Version 3.1. The baseline methodology selected for the project activity is deemed most applicable for the project activity, as the project activity involves utilization of heat content of the waste gas generated from the DRI Kiln as an energy source for generation of electricity. The baseline selection for the project activity has been carried out following the guideline laid by the by Step 1,Step 2 ,Step 3 and step 4 for the identification of the baseline scenario of ACM0012 version 3.1. According to the step 1 the selection procedure of most plausible baseline scenario is that which is closely related to all of the Options stated in the methodology and the project proponent has chosen option W2/P6. The detailed assessment of baseline identification and elimination of the baseline is provided in Table 5.5 .Selection baseline alternative for waste gas (W2) and power baseline (P6) has been cross checked and found appropriate for the proposed project activity. Through selection procedure of step 2, the project proponent has adopted import power from grid which is in compliance with all applicable legal and regulatory requirements. Though the project proponent has chosen only one alternative the comparison with other alternatives for its non feasible options and lowest baseline emissions in step 3 and step 4 is not applicable. As only one credible and plausible alternative scenario has been identified, and it falls under scenario listed in the approved methodology ACM 0012, this alternative can be considered as the most likely baseline scenario.The selection of baseline scenario is assessed appropriately.

The addtionality is assessed using project test-1.

Step as per VCS 2007.1	Argument	Assessment
Step 1: Regulatory Surplus	• Local or National Legislation does not require the production of the underlying service or product with the chosen technology. • The implementation of project activity is a voluntary initiative and it is not mandatory or a legal requirement. For power generation, the Electricity Act 2003 does not restrict or empower any authority to restrict the fuel choice, the applicable environmental regulations do not restrict the use of waste energy and there is no legal requirement on the choice of a particular technology. • Project Proponents have been issued with all required regulatory clearances before commissioning.	Validation team has checked all the National Regulations and Local legal requirements. It was found that there is no legal requisite in India and at the local level which restricts the implementation of waste heat recovery power generating projects. Hence the argument is appropriate for this project activity. OK ☒ Step passed ☐ Step not passed ☐ Not applicable
Step 2: Implementation Barriers: Technological barrier	<u>Operational barriers :</u> 1. The power generation mainly depends upon the parameters of temperature and volume of hot gases from the DRI kiln. Any change in the parameters will affect the power generation from the project activity and also low temperature of steam results the turbine blades erosion, increased the wear and tear of turbine components, and lower efficiency. The variation on power generation can be identified from the log sheets maintained on hourly basis by SRPIL. 2. This is the first of its kind in the southern regional area with 350 Tons per day (TPD) capacity Sponge Iron Plant. The other sponge iron plants are of 100 TPD capacity only. So it is difficult to operate due to its size and requires unique operating skills. The Process oriented	Waste hot gas availability and consistency of waste hot gas parameters are the most important aspects that can affect the performance of the project activity. Any non-availability of waste gas or inconsistency of key waste gas parameters and WHRB failure will result in inadequate steam and power generation. Waste gas from the DRI kiln is the only major source of heat energy for the project activity and its insufficiency would completely hinder the steam and power generation. Non availability of Waste gas may occur due to DRI kiln shut downs, functional disturbances in the DRI kiln or due to any kind of problem detailed in the PD. And since SRPIL plant operations would be

	technical personnel having experience will not be able to run the above 350 TPD Sponge iron plant. Any problem in the kiln will directly affect the operation of the Power plant. 3. There is no control in exit temperature of sponge iron kiln. If the temperature of the sponge iron kiln increases more than 1000degC it will affect the WHRB.Any variation in the concentrates feed to the kiln will adversely affect the properties of waste gas, which in turn affects the operation of the boiler. The NOx foramtion at high temperature will lead to corrosion in the boiler tubes in the waste heat recovery boiler which will lead to stoppage of DRI kiln. 4. The change in draft of waste flue gas will affect the draft in sponge iron kiln will lead to low quality sponge iron. As the Sponge iron plant is subjected to lots of variation such as Accretion formation i.e. fusion of Iron ore particles at a very high temperature inside the rotary kiln thereby blocking the flow of material. This will results the blocks flow of air and coal into the Rotary kiln thereby affecting the entire process and reducing the quality of the finished product. 5. Any breakdowns or maintenance in the waste heat recovery system will directly affect the sponge iron production. As the Boiler is totally connected with the rotary kiln of the Sponge iron Plant, hence any problem in the Waste Heat Recovery based boiler WHRB, the entire power generation will be stopped and the sponge iron plant also has to be stopped as there is no other alternative. 6. The inlet temperature of	significantly dependent on the project activity for electricity, disruption in steam and power generation would have a detrimental effect on SRPIL entire plant operations. Since the project activity is the first of its kind in the region, SRPIL belongs to sponge-iron manufacturing sector with limited knowledge and exposure of complications associated with production of power. The industry personnel lacked the necessary technical background to develop and implement a waste heat recovery based power plant. The barriers as described in the PD clearly demonstrate that the project activity faces a number of barriers and it is not a business-as-usual scenario. These were the foreseen barriers during the conceptualization of the project activity and same was extant during the operation of the plant. This was verified during the onsite visit through interview/IM01//IM03/ with operating personnel, Photographs of the problems faced in kiln and generation log sheets /GR/maintained by the monitoring personnel submitted by the PP.It was concluded that , it is most likely that in absence of the project activity SRPIL would opt for the business-as-usual scenario, i.e. releasing the waste heat into the atmosphere and generating equivalent electricity from grid.SRPIL went ahead

	Electrostatic Precipitator (ESP) has to be maintained between 150-170 deg C. If any change in the performance of WHRB will affect the ESP. The above operating parameters has been specified by the suppliers, hence variation in the temperature of the hot gases will impact the operating parameters of the Electro Static Precipitator(ESP) resulting malfunctioning of the electrical equipment, wear and tear of the components inside the ESP. Barrier due to Air-cooled Condenser: The conventional cooling towers which is the common practice in India for this kind of project activity, but requires lot of water. Due to the water scarcity in the region surrounding the project activity, air-cooled condenser (ACC) has been implemented. The cost of the air cooling system is about 3 to 4 times more than conventional water cooling system This has a spiralling effect leading to increased auxiliary power consumption. Thus the addition of the air cooling system increases the capital investment cost and the operational costs of the project: Source: http://www.rerc.gov.in/Order/Final%20order_NES_Chairman.pdf	with the complex, high cost waste heat recovery technology, considering the carbon credits to overcome these kind of operational barriers. The argument was justified and decisive barrier for the project activity. The order has been verified and the technology has increased the operating cost and increased the investment cost during the investment decision time. The argument was justified and it is a decisive barrier for implementation of the waste heat recovery system. ☒ Step passed ☐ Step not passed ☐ Not applicable
Step 3: Common Practice	This project activity is the first of its kind in the states of southern region such as Tamilnadu, Kerala and Karnataka. In India 203 sponge iron plants are in operation and 225 plants are under commissioning. In Tamilnadu only four plants are in operation. Out of these four projects Rengaraaj Steel project is the first project in Tamilnadu. This indicates a very low penetration (Out of	Similar activities are neither widely observed nor commonly carried out, It is evident that due to investment and technical barrier to the project activity has less likelihood to happen. This is first of its kind in this region and the same has been verified from the letter given by the letter/FIS/from Sponge Iron India limited which is

	448 plants in India only 4 sponge iron plants are in Tamilnadu) of this technology in this region. Hence this project activity is not a common practice in this region. Source: http://cdm.unfccc.int/UserManagement/FileStorage/QVQE67X4FRQB9FSE4SMYXP9J4IVRHP	undertaking of Govt of India and Government of Andhra Pradesh undertaken body. OK ☒ Step passed ☐ Step not passed ☐ Not applicable

However, CAR 3.2.1 to CAR 3.2.2 and CR 3.2.1 to 3.2.2 were raised. and closed

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
CAR 3.2.1 In section 2.4 of the PD Evidence to rule out the alternative W3 regarding waste energy is sold as an energy source needs to be submitted. Evidence to rule	/PD/ 2.4	This project activity generates electricity from waste heat only. Before the commissioning of this project activity between March 2005 to January 2006 project proponent released the waste heat to the atmosphere and it is not sold as an energy source. Hence in the absence of this project activity, waste heat is	/PD/ 2.4	Considering the economical viability and unavailability of waste gas distribution system in the neighboring area the alternative of waste heat sold as an energy source is not a credible alternative. The same has been confirmed during the on site visit and evidence/BAS / given by the project proponent. Hence this is not a realistic

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
out the alternative W6 is not clear. Moreover the project activity uses the waste heat available in flue gases coming out from the Kilns, it's entirely contradicts with argument provided in the same section of the PD. Evidence to rule out the alternative P4 regarding On-site or off-site existing/new fossil fuel based existing captive or identified plant needs to be submitted.		released to the atmosphere. This project activity generates electricity from waste heat not from waste gas. Hence alternative W6 is not an alternative for the project proponent. The same was revised in the PD. Evidence to rule out the alternative P4 regarding On-site or off-site existing/new fossil fuel based existing captive or identified plant was submitted.		alternative. The project activity is utilising the waste heat from the hot flue gases coming out from the kiln. The same has been revised in the PD and the alternative W6 is not the credible alternative for the project proponent. For the non feasible option for coal based power plant and diesel based has been verified through the document provide by the PP.From that it was evidenced the operating cost the plant is more and not feasible for the project promoter. The detailed assessment for elimination of this alternative is provided in table 5.5. CAR 3.2.1 is closed

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
CAR 3.2.2 In section 2.5 of the PD The arguments under operational barriers are not decisive the same need to be revised.	/PD/ 2.5	The arguments under operational barriers was revised in the revised PD.	/PD/ 2.5	The arguments under operational barriers has been revised in the PD .From that it was evidenced the project activity faces no of barriers and it is not a business-as-usual scenario.
Implementation of conventional cooling towers is not feasible for this project activity is need to be substantiated with proof.		Implementation of conventional cooling towers is not feasible for this project activity.RERC order was submitted to the validator.		The same has been verified in RERC order, from that it was evidenced that the air cooled condenser requires more investment cost than conventional water cooling system and it will lead to increased auxiliary power consumption results the increase the operational cost of the project activity. CAR 3.2.2 is closed.

3.3 Monitoring Plan

The proposed project used CDM approved methodology ACM 0012/Version 3.1: "Consolidated baseline methodology for

GHG Emission Reduction from waste energy recovery projects", which is approved under VCS 2007.1.

The project satisfies all criteria for ACM0012. The application of monitoring methodology is assessed as correct.

The revised monitoring plan/PD/ provides detailed information related to the collection and archiving of all relevant data needed to:

- Estimate or measure emissions occurring from GHG sources, sinks and reservoirs
- Determine the baseline emissions
- Estimate changes in emissions from the site

The monitoring of all baseline parameters is sufficiently addressed in the PD. Net electricity supplied by the project will be measured by the energy meters.The monitoring shall consist of metering the total electricity generated (EG_{gross}), Auxiliary consumption of electricity by the project activity from its own generation ($EG_{Aux-from\ CPP}$) and Import of power from grid ($EG_{Aux-from\ Grid)}$.The baseline emission factor for grid has been estimated ex-ante, according to the methods described in "Tool to calculate the emission factor for and electricity system". The net quantity of electricity supplied to the grid would be calculated ex-post from the recorded readings from the meter that is the difference between EG_{gross} and EG_{Aux}.The auxiliary power consumption ($EG_{Aux)}$ of the project activity is the difference between $EG_{Aux-from\ CPP}$ and $EG_{Aux-from\ Grid}$. The detailed procedure to calculate the net electricity generated by the project activity is explained in section 3 of the PD.All the monitoring parameters are recorded and maintained in logbooks and subsequently in electronic form. The same has been cross verified by the general manager of the service provider with the log books maintained by the supervisors and technicians.

Calibration, periodical testing, Responsibilities related to monitoring and maintenance procedures of monitoring equipment are clearly defined in the section 3 of the PD. During the on-site visit the monitoring personnel were interviewed/IM01//IM03/ to cross check their roles & responsibilities, competency and training of the staff members/TRG/ w.r.t project management, monitoring and reporting, operation and maintenance scheduled/O&M/, monitoring plan/PD/, net electricity generation records /GR/ , calibration procedures/frequency for the meters/CAL/ and were found to be satisfactory Data are monitored continuously.The monitoring procedures mentioned in the PD have been accessed by the validation team and found in

line with the monitoring plan. Also it was evidenced that the monitoring personnel are well trained/TRG/and competent for operating the project activity.

The data will be maintained till after two years after the date of the crediting period.

However, CR 3.3.1 has been raised.

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
CR 3.3.1 In section 3.2 of the PD is not inline with the VCS PD template correction is requested. In section 3.3 of the PD the description of measurement methods and procedures need to be elaborated as below. • Monitoring… • Data type… • Frequency… • Recording… • Archiving policy… • Responsibility… • Calibration frequency… • Accuracy	/PD/ 3.2 3.2	Section 3.2 has been revised in the PD. The details are provided in section 3.2 in the revised PD	/PD/ 3.2 3.3	The detailed description of the monitoring and calculation approaches is now incorporated in section 3.2 of the revised PD. All the relevant information about the monitoring methods and procedures is incorporated in the revised PD in section 3.3. CR 3.3.1 is closed.

3.4 Calculation of GHG Emissions

The calculation of emission reductions is based on subtracting project emissions and leakage from the baseline emissions.

Baseline Emissions:

The baseline emission is calculated as per the following equation.

$BE_{Elec\ y} = f_{cap} * f_{wcm} * \sum_j \sum_I (EG_{i,j,y} * EF_{i,j,y})$

The input parameters for the calculation of the baseline emissions depends on the above equation parameters.

f_{cap-} The capping of baseline emissions has been applied in accordance with the approved consolidated methodology, following the method 2, by the project participant as the project caters to implementation in a new facitlity.The selection of method 2 for capping of baseline emissions and adopting the manufactures data for calculation of the same is inline with the requirement of the methodology.

f_{wcm}–Fraction of total electricity generated by the project activity using waste energy. This fraction is 1 if the electricity generation is purely from use of waste energy as per the methodlogy.The same has been confirmed during the onsite visit.

$EG_{i,j,y-}$The electricity generated from the project activity which in the absence of the project activity would have been sourced from the grid which is a monitored parameter ex post.

$EF_{i,j,y}$ – Following the ACM 0012 methodology, the baseline emission factor to be determined by the "Tool to calculate the emission factor for an electricity system". In this case the Combined Margin (weighted average of Simple Operating Margin and Build Margin) is estimated based on three years average (05-06, 06-07 and 07-08) of Simple Operating Margin and 20 % Build Margin of current year (07-08) is in line with steps of "Tool to calculate the emission factor for an electricity system". Both the value of Simple Operating Margin and Build Margin are selected under ex-ante approach. The grid boundary w.r.t the connected state grid is Southern Grid of India.

In accordance with "Tool to calculate the emission factor for an electricity system", 'Dispatch Data Analysis' is the first methodological choice out of four options of calculating OM emission factor. Nevertheless the "Dispatch data analysis operating margin" is ruled out in India due to lack of necessary dispatch data of the grids. The same fact is also considered by the Central Electricity Authority[/cea/](Ref the user guide for CO_2 Baseline Database for the Indian Power Sector version 4, November 2008).

Out of other 3 options of calculating OM Project Participant has rightly selected simple OM emission factor calculation as the share of low cost / must run resources of the selected grid over the three most recent years (05-06,06-07 and 07-08) is < 50% of the gross grid generation[/cea/]. For other projects, "Tool to calculate the emission factor for an electricity system" allows the

usage of the default weights are as follows: w_{OM} =0.50 and w_{BM} = 0.50. Using the above values the combined margin emission factor is valued at 0.85573754 tCO_2e/MWh.

The calculation of EF_y is current and publicly available and published by the Central Electricity Authority on its web-site/cea/. The validation team is convinced of the result of the emission coefficient calculation.

Project emissions due to combustion of auxiliary fuels to supplement the waste gas and project emissions due to electricity consumption has not been considered,as in the project activity no auxiliary fuel is used to supplement waste gas and hence there would be no emissions from the combustion of auxiliary fuels. Further the gas is not cleaned before its use is generating electricity; the same was evidenced during onsite visit.

No leakage effect has been considered for the project activity as no leakage is applicable under ACM 00012.

The equations and parameters mention in the PD have been correctly applied as per the approved methodology. The calculation is assessed as transparent and conservative. Altogether the project activity reduces emissions of 4, 31,790 tCO2e over the ten year fixed crediting period.

The project satisfies all criteria for ACM0012. The application of baseline methodology is assessed as correct. There is no methodology deviation or revision However, CAR 3.4.1 and FAR 3.4.1 has been raised.

CAR/CR/FAR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
CAR 3.4.1 Calculation and justification to arrive the f_{cap} is missing in section 4.2 of PD. Justification for project emissions and	/PD/ 4.1 4.2	Calculation of fcap was included in the section 4.2 of the revised PD. Justification for leakage and	/PD/ 4.1 4.2	The same has been provided in the revised PD and all the parameters used for calculation of capping pf baseline emission has been cross checked with specification of the respective equipment/installation and calculation assessed transparent and conservative.

CAR/CR/FAR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
leakage are not considered for the project activity is missing.		project emissions was not considered was included in the revised PD.		The same has been included in the revised PD and found OK.
FAR 3.4.1 The Methodology is requiring f_{cap} in order to cap the baseline emissions to an extent which has happened in the base year. Since the way of monitoring $Q_{WCM,y}$ is not clear, and assuming that the plant will be operating without any change in load, so $Q_{WCM,y}$ can be calculated in the same fashion like $Q_{WCM,BL}$. $Q_{WCM,y}$ is mainly dependent on the operation hours/days the plant operates in year y hence the waste gas quantity and the operating days has to be demonstrated during the verification..		Yes. we do accept that and the same will be demonstrated through out the crediting period and the data with supporting documents will be made available to the verifier for verification for every monitored period.		The $Q_{WCM,y}$ and number of operating days will be verified with the help of external expert to assess the appropriateness during the verification. The demonstration of f_{cap} would be thus verified.

3.5 Environmental Impact

As per the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated 14th September 2006, 38 Categories of project activities are

required to undertake environmental impact assessment studies. The details of these activities are available at: http://envfor.nic.in/legis/eia/so1533.pdf

The proposed project doesn't fall under the list of activities requiring EIA as it will not involve any negative environmental impacts, Even though the project activity is eco-friendly in nature, the waste hot flue gas utilised for power generation consists of pollutants and it must be removed before vented to the environment. However the Project proponent has conducted the Environmental Impact study for the project activity as required by the host party in accordance with procedures. The summary of the same has been provided in the section 5 of the PD.SRPIL has also obtained relevant air and water consents and all necessary statutory clearances from the respective bodies/SC/. From the study it was evidenced that no significant impact is estimated on the environment due to the project activity.

No CAR/ CR was raised.

3.6 Comments by stakeholders

The promoters organized formal & informal stakeholder consultation with the objective to inform the local interested stakeholders which include villagers, technology suppliers,consultants,representatives from electricity board and farmers on the environmental and social impacts of the project activity and discuss their concerns related to the development and operation of the activity. A stakeholder consultation meeting of the project were conducted and the schedule of same is provided under section 6 of VCD PD.

A summary of the stakeholder comments have been included in the VCS PD. All comments were positive and it has been verified that all comments sufficiently have been addressed. The same has been confirmed with the documents/LSC/ provided by the project proponent.

No CAR/ CR was raised.

4 Validation conclusion

M/s Sree Rengaraaj Power India Private Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the validation of the project – "8MW Waste Heat Recovery Based Power Project by Sree Rengaraaj Power India Private Limited", with regard to the relevant requirements of VCS 2007.1 Standard as well as criteria for consistent project operations, monitoring and reporting.

By GHG emission reductions through waste gas based power generation at Sree Rengaraaj Power India Private Limited which involves utilization of waste heat content of the by-product gasses emanating out of the process by installing Waste heat recovery boilers to generate steam and subsequently power, the project activity will result in reductions of greenhouse gas emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

The review of the VCS PD and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

A risk based approach has been followed to perform this validation. In the course of the validation 5 Corrective Action Requests (CAR) ,9 Clarification Requests (CR) and 1 Forward Action Request(FAR) were raised and successfully closed out.

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

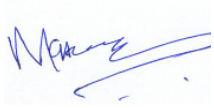
As a result of the validation, the validators confirm that:

The project fulfils criteria of VCS 2007.1 provided.

- The project additionality is sufficiently justified in the PD.
- The monitoring plan is transparent, adequate and inline with applied baseline and monitoring methodology of ACM0012, version-3.1.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 4, 31,790

t CO_2e (total) is most likely to be achieved within the 10 years renewable crediting period which will be renewed once.

No restrictions or uncertainties were identified related to the validation.



Mr. Ma. Paa. Puratchikkanal
Verification Team Leader
Bangalore, 2009-10.29

Rainer Winter
Final approval
Essen, 2009-11-18

TÜV NORD JI/CDM Certification Program

5 References

Table 5-1: Documents provided by the project proponent

Reference	Document
/COM/	Commissioning Certificates of the major equipments
/DEC/	Declaration letter that the "the project has not created another form of environmental credit"
/ER/	• Emission reduction worksheet for monitoring (draft) • Emission reduction worksheet for monitoring (final)
/LSC/	Local stakeholder consultation and summary of comments.
/GR/	Generation statements of the power plant.
O&M	O&M agreement with OEG group.
/TRG/	Boiler operator certificates.
/ORG/	Organization chart.

/DPR/	Detailed Project report for the project activity.
/FIS/	First of its kind in southern region supporting document provided by Sponge Iron India limited.
/PD/	• PD draft version • PD final version
/CAL/	Calibration Report of all monitoring equipments.
/PO/	Purchase orders of the major equipments.
/SC/	Statutory clearances.
/BAS/	1.Letter from the IPS Engineering consultants Private Limited 2. Letter from ARK engineering and consultancy to SRPIL. 3. Quotation from POWERICA limited for DG set. 4. Photgraphs shows the failures and repairs in the kiln and boiler.
/SD/	Proof of starting date of project activity. (based on Commissioning Certificates)

Table 5-2: Background investigation and assessment documents

Reference	Document
/ACM0012/	Consolidated baseline methodology for GHG Emission Reduction from waste energy recovery projects" version 3.1.
/CEA/	CO2 Baseline Database for Indian Power Sector –User Guide, Ver 4 dated September 2008 published by CEA.
/CPM/	TÜV Nord JI / CDM CP Manual (incl. CP procedures and forms)
/GCP/	1. Voluntary Carbon Standard Project Description Template 2. UNFCCC: Guidelines for Completing the Project Design Document (CDM- -PDD)
/GHG/	The Greenhouse Gas Protocol, The GHG Protocol for

Reference	Document
	Project Accounting.
/IPPC-RM/	1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book. 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book.
/KP/	Kyoto Protocol (1997).
/MA/	Decision 17/CP.7 (Marrakesh – Accords)
/TOOL/	"Tool to calculate the emission factor for an electricity system" version 1.1.
/VVM/	Validation and Verification Manual.

Table 5-3: Websites used

Reference	Link	Organisation
/cea/	www.cea.nic.in	Central Electricity Authority.
/moef/	http://envfor.nic.in/	Ministry of Environment and Forests.
/unfccc/	www.unfccc.int	Unfccc website.
/unfccc/	http://cdm.unfccc.int	UNFCCC.
/vcs/	www.v-c-s.org	VCS website.

Table 5-4: Interviewed Persons

Reference		Name	Organisation / Function
/IM01/	☒ Mr. ☐ Ms.	Shayam Sundar,	Director,Sree Rengaraj Power India Pvt Ltd
/IM02/	☒ Mr. ☐ Ms.	K.Prabakaran	Consultant ,Abi Energy consultancy Pvt Ltd

/IM03/	☒ Mr. ☐ Ms.	G.Palanisamy	Electrical Engineer, Operational Energy group India Private Limited

Table 5.5: Assessment of Baseline Identification

Baseline Alternatives identified	Eliminated	Reason for elimination	Evidence used	Assessment of validation team	
				Appropriateness of information source	Explanation of final result
W1	☒	Local regulations		☒	There is no generation of waste gas in the process it is only waste heat from the flue gas from DRI Kiln. The local regulations restrict venting of waste gas is restricted by local regulation. The same is validated using Tamilnadu Pollution Control Board document. The documents/SC/ were verified and found ok; hence this is not a realistic alternative.
W2	☐	NA		☒	The waste heat available in the waste gas coming out of DRI Kiln recovered using WHRB system. In this alternative, the waste heat would be released unutilized to the atmosphere. This could be a possible baseline scenario. Since, it abides by the local regulation and is also a credible alternative. In the absence of project activity, the water spray based gas cooling system could be used to cool down the waste gas temperature.Further; implementation of water spray based water cooling system is inline with the local regulations. This is identified to be a credible alternative.
W3	☒	No requirement for waste heat in the neighboring industry	/BAS/ 1	☒	Considering the economical viability and unavailability of waste gas distribution system in the neighboring area the alternative of waste heat sold as an energy source is not a credible alternative. The same has been confirmed during the on site visit and evidence given by the project proponent. Hence this is not a realistic alternative.

Baseline Alternatives identified	Eliminated	Reason for elimination	Evidence used	Assessment of validation team	
				Appropriateness of information source	Explanation of final result
W4	☒	Waste heat is used for meeting energy demand.	/PD/	☒	There is no requirement of waste energy for the process of sponge iron manufacturing industry. The same has been confirmed during the onsite visit and further the generalized practice of the sponge iron industry. Power generation with waste heat recovery system similar to that of project activity (without VCS revenues) is a plausible alternative and also comply with legal and regulatory requirements. This alternative faces the barrier as discussed in the section B.5 of the PDD. Hence, the project activity without VCS revenues is not a credible alternative.
W5	☒	Part of the Waste gas used for captive electricity generation and rest is flared/vented	/PD/	☒	There is no generation of waste gas in the process .The project activity utilizes the waste heat from the flue gas from DRI Kiln. The same has been confirmed during the onsite visit. Hence this is not a realistic alternative.
W6	☒	All the waste gas used for electricity generation.	/PD/	☒	There is no generation of waste gas in the process it is only waste heat from the flue gas from DRI Kiln. The same has been confirmed during the onsite visit. Hence this is not a realistic alternative.
P1	☒	Proposed project activity	/PD/ 2.5	☒	The proposed project activity which abides by the legal and regulatory requirements of the host country. The recovery of waste gas heat for power generation is a

Baseline Alternatives identified	Eliminated	Reason for elimination	Evidence used	Assessment of validation team	
				Appropriateness of information source	Explanation of final result
		not undertaken as a CDM project activity			realistic alternative. But, due to the technological barriers in the section 2.5 of the PD, possess risk to the project activity (without VCS revenues). Hence, this alternative is found not to be a credible alternative.
P2	☒	Generation of both Power and Heat energy using fossil fuel	/PD/	☒	The project activity of generation of power only. Implementation of cogeneration system would result in non-utilization of steam generated. The sponge iron unit has no steam requirements; the same has been confirmed during the onsite visit. Therefore this alternative is found to be unattractive, considering plant energy requirements. Hence, this alternative is found not to be a credible alternative.
P3	☒	Generation of both Power and Heat energy using renewable energy	/PD/	☒	As stated earlier, in the P2 scenario, the steam generated by the cogeneration system (in the baseline scenario) would be unutilized. Hence, it is found to be unattractive scenario, considering plant energy requirements.
P4	☒	Fossil fuel based captive plant	/PD/ /BAS/ 2,3	☒	Based on the energy demand of the sponge iron manufacturing unit, the project proponent import power from the state electricity grid .Considering the demand required which is less than 1400kVA, installation of coal and diesel power plant for this small capacity meeting the energy demand was not economically viable to the project proponent. The demand of the industrial facility has been confirmed through the electricity bill

Baseline Alternatives identified	Eliminated	Reason for elimination	Evidence used	Assessment of validation team	
				Appropriateness of information source	Explanation of final result
					supplied by the state electricity board. For the non feasible option for coal based power plant has been verified through the third party technical consultant provide letter/BAS2/ to the PP which states that the initial investment and operating cost would be more for this capacity power plant without steam requirement for the sponge iron process. For the non feasible option for diesel based power plant has been verified through the equipment suppliers quotation/BAS3/ to PP for requirement of 1010kVA DG set. From that it was evidenced that the operating cost for the diesel based power plant is Rs 8.81/kWH.The same has been confirmed through report of expert committee on fuels for power generation by central electricity of India, February 2004 which states that cost of generation of diesel based power plant at 80% PLF would be Rs5.96/KWH.This shows that investment in fossil fuel based power plant is not economically viable for the project promoters. Hence (On-site or off-site existing/new fossil fuel based existing captive or identified plant) this is not an alternatives for this project activity. Source: http://www.cea.nic.in/thermal/Special_reports/Report%20of%20the%20expert%20committee%20on%20fuels%20for%20power%20generation.pdf
P5	☒	Renewable energy	/PD/	☒	The credibility of this alternative is assessed based on the fuel availability and previous experience of the PP

Baseline Alternatives identified	Eliminated	Reason for elimination	Evidence used	Assessment of validation team	
				Appropriateness of information source	Explanation of final result
		based captive plant			in renewable sector. The availability of renewable energy resources like wind, hydro is assessed. Since, wind energy is a seasonal power generation. It does not found to meet the continuous energy requirements of the plant. Further, hydro is not a realistic alternative. Since, there is no potential river in the near by areas. The renewable energy sources are not in comparison to the output from the project activity. Hence, it is not considered to be credible alternative.
P6	☐	Sourced Grid-connected power plants	/PD/	☒	The energy demand for the industrial facility and its sister concerns were previously met by import power from the grid considering the commercial viability. The same has been confirmed by the electricity bill supplied by the state electricity board to the respective concerns. From above it was evidenced that, this alternative is both realistic and credible.
P7	☒	Replace the Captive Electricity generation using waste energy with lower efficiency	/PD/	☒	This project activity is the new initiative. There is no existing captive power plant for meeting their energy demand. The same has been confirmed during onsite visit and energy bills produced by the project promoters. Hence this alternative is not a realistic alternative.
P8	☒	Replace the existing cogeneration power	/PD/	☒	This project activity is the new initiative. There is no existing cogeneration power plant for meeting their energy demand. The same has been confirmed during onsite visit and energy bills produced by the project

Baseline Alternatives identified	Eliminated	Reason for elimination	Evidence used	Assessment of validation team	
				Appropriateness of information source	Explanation of final result
		plant with lower efficiency.			promoters. Moreover the process does not require the steam. Hence this alternative is not a realistic alternative.
P9	☒	Replace the existing power equipment or installing new equipment with higher efficiency	/PD/	☒	This project activity is the new initiative. There is no existing power generating equipment meeting their energy demand. The same has been confirmed during onsite visit and energy bills (import power from grid) produced by the project promoters. Hence this alternative is not a realistic alternative.
P10	☒	Replace the existing power equipment or installing new equipment with higher efficiency to produce electricity from waste gas(already utilized	/PD/	☒	This project activity is the new initiative. There is no existing power generating equipment meeting their energy demand. The same has been confirmed during onsite visit and energy bills (import power from grid) produced by the project promoters. Hence this alternative is not a realistic alternative.

Baseline Alternatives identified	Eliminated	Reason for elimination	Evidence used	Assessment of validation team	
				Appropriateness of information source	Explanation of final result
		portion plus the portion flared/vented)			
P11	☒	Existing power generating equipment is maintained and additional electricity by grid connected power plants.	/PD/	☒	This project activity is the new initiative. There is no existing power generating equipment meeting their energy demand. The same has been confirmed during onsite visit and energy bills (import power from grid) produced by the project promoters. Hence this alternative is not a realistic alternative.