



VERIFICATION REPORT

NATURAL GAS BASED COMBINED CYCLE POWER PROJECT AT VALATHARAVAI VILLAGE, RAMANATHAPURAM DISTRICT, TAMIL NADU BY PENNA ELECTRICITY LIMITED [FORMERLY ARKAY ENERGY LIMITED]



South Asia

Document Prepared By

TÜV SÜD South Asia Pvt Ltd

Project Title	Natural Gas based Combined Cycle Power Project at Valatharavai Village, Ramanathapuram District, Tamil Nadu by Penna Electricity Limited [Formerly Arkay Energy Limited]
Version	5.0
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Report Title	VCS Verification of “Natural Gas based Combined Cycle Power Project at Valatharavai Village, Ramanathapuram District, Tamil Nadu by Penna Electricity Limited [Formerly Arkay Energy Limited].”
Client	Pioneer Power Limited (formerly Penna Electricity Limited)
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Summary:

TÜV SÜD South Asia Pvt. Ltd. has performed the third verification of the VCS project activity. The verification is based on the currently valid documentation of the VCS and United Nations Framework Convention on Climate Change (UNFCCC).

The Verification has been conducted for the monitoring period 01-July-2006 to 30-June-2012 (first and last date included).

The verification process includes three phases:

- Desk review of documents.
- Off-site audit and follow-up interviews with the relevant personnel;
- Resolution of outstanding issues and the issuance of final verification report and opinion.

The main purpose of the project activity is to set up a Natural Gas based Combined cycle power plant with a total installed capacity of 58.15 MW to meet the contract capacity i.e. net electricity generation of 52.8 MW. The plant consists of one gas turbine of 38.15 MW and steam turbine of 20 MW. Electricity are sold to the State utility company i.e. Tamil Nadu State Electricity Board (TNEB). This Power plant operate on the cleaner fuel like Natural gas will lead lower the carbon dioxide (GHG) emissions for producing equivalent amount of power as compared to the other power plants in the region operating on other fuels like coal/lignite/oil/naphtha.

The project envisages setting up a combined cycle (gas and steam cycles) power plant with an installed capacity of 58.15 MW consisting of one Gas Turbine Generating Unit of 38.15 MW rated capacity, one Heat Recovery Steam Generator Unit of 67 TPH rated capacity coupled to a Steam Turbine Generating Unit of 20 MW rated capacity along with all electrical systems, controls and Instrumentation, Civil, Structural and Architectural works.

Commissioning details of the plant has been cross verified with the commissioning certificates.

During the current monitoring period i.e. from 01-July-2006 to 30-June-2012 (first and last date included) the total emission reductions achieved is 508,044 tCO₂ e.

3 Clarification Requests (CLs) and 4 Corrective Action Request (CAR) have been raised during verification process and has been successfully closed. No Forward Action Request (FAR) was raised during this monitoring period.

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1 INTRODUCTION

1.1 OBJECTIVE

TÜV SÜD has been commissioned by the client to perform an independent verification assessment.

The objective of the verification work is to comply with the requirements of Verified Carbon Standards requirements. According to this assessment TÜV SÜD shall:

- ✓ Ensure that the project activity has been implemented and operated as per the registered PD, and that all physical features (technology, project equipment, monitoring and metering equipment) of the project are in place,
- ✓ Ensure that the published MR and other supporting documents provided are complete, verifiable and in accordance with applicable VCS and CDM VVS requirements,
- ✓ Ensure that the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology,
- ✓ Evaluate the data recorded and stored as per the applicable requirements.
- ✓ Assessment of the sustainability monitoring parameters as per the VCS requirements.

1.2 SCOPE AND CRITERIA

The scope of any assessment is defined by the underlying legislation, regulation and guidance given by relevant entities or authorities. In the case of VCS project activities, the scope is set by:

- ✓ VCS v4.3 requirements.
- ✓ Clean Development Mechanism Validation and Verification Standard (VVS) for Project Activities v3.0.
- ✓ Baselines and monitoring methodologies (including GHG inventories).
- ✓ Environmental issues relevant to the applicable sectoral scope.
- ✓ Current technical and operational knowledge of the specific sectoral scope and information on best practice.
- ✓ Stakeholder consultation and feedback

The verification process is not meant to provide any form of consulting for the project participant (PP). However, stated requests for clarifications, corrective actions, and/or forward actions may provide input for improvement of the project design.

1.3 Level of Assurance

The errors identified in the project are below the threshold limit of materiality and hence not material. The GHG emission reductions are calculated without material misstatements.

The VVB confirms that a reasonable level of assurance has been achieved during the verification process.

1.4 Summary Description of the Project

The project is a Natural Gas based Combined cycle power plant with a total installed capacity of 58.15 MW to meet the contract capacity i.e. net electricity generation of 52.8 MW. The plant consists of one gas turbine of 38.15 MW and steam turbine of 20 MW. Electricity are sold to the State utility company i.e. Tamil Nadu State Electricity Board (TNEB). The project increased the installed electricity generating capacity of Tamil Nadu State Electricity Board (TNEB), thereby helping in bridging the gap between demand and supply of electrical energy in the state. The project also enhances the economic growth and development of the area.

Brief description of the installed technology and equipment:

The project envisages setting up a combined cycle (gas and steam cycles) power plant with an installed capacity of 58.15 MW consisting of one Gas Turbine Generating Unit of 38.15 MW rated capacity, one Heat Recovery Steam Generator Unit of 67 TPH rated capacity coupled to a Steam Turbine Generating Unit of 20 MW rated capacity along with all electrical systems, controls and Instrumentation, Civil, Structural and Architectural works. The rating of the power plant is 38.15 MW at PF: 0.8 in Open Cycle and about 58.15 MW at PF: 0.8 in Combined Cycle.

This project adopts the renewable crediting period of 10 Years (Fixed). The expected average annual emission reductions are 90,339 tCO₂eq/y.

The total emission reductions achieved in this monitoring period i.e. from 01-July-2006 to 30-June-2012 (first and last date included) is 508,044 tCO₂ e.

2 VERIFICATIONPROCESS

2.1 Method and Criteria

The information provided by the project participants is assessed by applying the means of verification specified in the VCS v4.3, Toolkit and the VVS.

A competent assessment team is selected prior to the start of the verification. The team is selected to cover the technical area(s), sectoral scope(s) and relevant host country experience for evaluating the VCS project activity. Additionally, a competent Technical Reviewer or Technical Reviewer Team is appointed to conduct checks on quality and completeness.

The verification team performs first a desk review, followed by a remote-site visit, which results in the formation of a draft report and a list of findings. The next step involves the evaluation of the findings through direct communication with the PPs and then finally the preparation of the verification report. This verification report and other supporting documents then undergo an internal quality control by the CB “Environment and energy” before submission to the VCS.

2.2 Document Review

The documents referred during this verification are provided in Appendix 1.

2.3 Interviews

The VVB has not conducted the on-site inspection for this current monitoring period due to obligations imposed by COVID 19. However, the VVB has ensured that reasonable level of assurance has been achieved as per Verra regulations on the relaxation of mandatory site visits by the VVB due to COVID 19. The VVB has conducted telephonic interviews and video calls to discuss with the client regarding the data and documents pertaining to the current verification period. The interviews and discussions were conducted successfully.

The topics covered during interview ranges from general features and implementation of project to technical details of the project like calibration details, ownership, monitoring and measuring system and data collection, recording and archiving procedures. The assessment was drawn based on the feedback received during interview coupled with the documentation and on-site observations.

Interviews with local stakeholders:

The verification team has interviewed the local stakeholders and they were questioned for various topics as summarized below.

Effect of project on their livelihood and income

Any problem related to project installation in nearby areas

Are they happy with the benefits and development as CSR activity of the PP?

General feedback about the project

Do they know about the grievance and feedback back register/mechanism?

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Mathur	Deepti	Penna Electricity Limited - In charge	08/12/2021	Plant technology and monitoring	Shailendra Kewat
2	Reddy	Venugopal	Penna Electricity Limited – Head O&M	08/12/2021	Plant technology and monitoring	Shailendra Kewat
3	Bade	Nancharaiah	Penna Electricity Limited	08/12/2021	Plant technology and monitoring	Shailendra Kewat
4	Veesam	Raghu	Penna Electricity Limited	08/12/2021	Plant technology and monitoring	Shailendra Kewat
5	Ladukar	Anant	EKI Energy Services Limited, Consultant	08/12/2021	Monitoring	Shailendra Kewat
6	Ramasamy	Karuppaiya	Local	08/12/2021	General awareness about the project	Shailendra Kewat
7	Kamatchi	Muniasamy	Local Gram panchayat member	08/12/2021	General awareness about the project	Shailendra Kewat
8	Rajeswari	Ulaganathan	Local	08/12/2021	General awareness about the project	Shailendra Kewat
9	Geetha	Chandrasekar	Local	08/12/2021	General awareness about the project	Shailendra Kewat

2.4 Site Inspections

On 08/12/2021, remote audit was undertaken by the verification team member Shailendra Kewat (Lead Auditor) to carry out the following;

An assessment of the implementation and operation of the registered project activity as per the registered VCS PD and VCS MR;

A review of information flows for generating, aggregating and reporting the monitoring parameters.

Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PD.

A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;

A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline.

A review of calculations and assumptions made in determining the GHG data and emission reductions.

An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

A review of proof of title, Ownership of GHG emission reductions and grievance mechanism by interviewing the plant officials.

2.5 Resolution of Findings

CL from this verification

CL ID	01	Section no.	4.2	Date:	14/12/2021
Description of CL					
Generation data does not match with the invoices for the following months: 1. Jul-2006 2. Sept & Dec – 2007 3. Apr – 2009, 10, 11 and 2012 Invoices are not provided for the year 2008. Also, in the ER sheet following months are repeated in the electricity generation tab: March – 09, 10, 11, 2012.					
Project participant response					Date:
					27/01/2022

PP has check the Generation data and the same are match with the invoices for the following months:

1. Jul-2006
2. Sept & Dec – 2007
3. Apr – 2009, 10, 11 and 2012

Invoices for the year 2008 has been submitted. From 15.11.2007 to 15.12.2008 joint meter reading was taken by TNEB including gas engine reading based on PPA.

Hence Net Export is calculated by following equation

Net export in Joint meter reading (JMR) - Gas engine export = Export unit invoiced for billing as per PPA.

In the ER sheet March – 09, 10, 11, 2012 months are not repeated in the electricity generation tab: As there are JMR available from 15.02.2010 to 15.03.2010, 15.03.2010 to 31.03.2010. The same practice follows for March 2010, 2011 and 2012

Documentation provided by project participant

JMR
Invoice
Revised ER sheet

DOE assessment

Date: 25/02/2022

Requested documents are submitted for the verification. CL is closed

CL ID	02	Section no.	1.1	Date:	14/12/2021
Description of CL					
“since 01-July-2006 and started exporting clean power to grid. However, the credit period of the Project Activity started from July 2006”. Please clarify this statement					
Project participant response					Date: 27/01/2022
This is a typo error and the same has been removed from Monitoring report					
Documentation provided by project participant					
Revised MR					
DOE assessment					Date: 25/02/2022
Revised MR is submitted. CL is closed					

CL ID	03	Section no.	2.1	Date:	14/12/2021
Description of CL					
Please provide the following documents					
1. NOC from pollution control board 2. EIA report 3. Scan copy of grievance register 4. Independent report for NCV of natural gas					
Project participant response					Date: 27/01/2022

Following documents has been submitted	
1. NOC from pollution control board	
2. EIA report	
3. Scan copy of grievance register	
4. Independent report for NCV of natural gas	
Documentation provided by project participant	
NOC from pollution control board	
EIA report	
Scan copy of grievance register	
Independent report for NCV of natural gas	
DOE assessment	Date: 25/02/2022
All requested documents are submitted. CL is closed	

CARs from this verification

CAR ID	01	Section no.	4.2	Date: 14/12/2021
Description of CAR				
Parameters EF _{CO2,NG,y} , EF _{NG, upstream, CH4} and OXID _{NG} are considered as default and as well as monitoring parameter.				
Project participant response				Date: 27/01/2022
Parameters EF _{CO2,NG,y} , EF _{NG, upstream, CH4} and OXID _{NG} has been remove from monitoring parameter.				
Documentation provided by project participant				
Revised MR				
DOE assessment				Date: 25/02/2022
Revised MR is submitted. CAR is closed				

CAR ID	02	Section no.	5.3	Date: 14/12/2021
Description of CAR				
GWp for the methane is considered 25, however monitoring period falls under first commitment period.				
Project participant response				Date: 27/01/2022
GWP for the methane has been updated as 21 in ER sheet and MR as per first commitment period.				
Documentation provided by project participant				
Revised MR				
Revised ER sheet				
DOE assessment				Date: 25/02/2022
Revised MR is submitted. CAR is closed				

CAR ID	03	Section no.	4.3	Date: 14/12/2021
Description of CAR				
Single line diagram of the monitoring procedure is missing.				
Project participant response				Date: 27/01/2022
Single line diagram of the monitoring procedure has been updated				
Documentation provided by project participant				

Revised MR	
DOE assessment	Date: 25/02/2022
Revised MR is submitted. CAR is closed	

CAR ID	04	Section no.	MR	Date: 14/12/2021
Description of CAR				
Calibration details of the energy meters are missing in the MR				
Project participant response				Date: 27/01/2022
Calibration details of the energy meters has been updated in Appendix I of MR				
Documentation provided by project participant				
Revised MR				
DOE assessment				Date: 25/02/2022
Revised MR is submitted. CAR is closed				

2.5.1 Forward Action Requests

The project activity is undergoing verification in VCS, there were no FARs raised during the validation or previous verification.

2.6 Eligibility for Validation Activities

Not applicable

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The project has neither been registered nor seeking registration under any other GHG programs. The project is seeking registration only in VCS program.

PP has provided undertaking that in current monitoring period, it has not claim GHG emission reduction credits in any GHG program other than that in VERRA. There is no double counting of GHG emission reductions

3.2 Methodology Deviations

There is no request for methodology deviation applied during current monitoring period

3.3 Project Description Deviations

There is no Project description deviations applied during current monitoring period.

3.4 Grouped Project

This project activity is not a grouped project activity. Hence not applicable.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The project is being implemented by Penna Electricity Limited [Formerly Arkay Energy Limited] in Valatharavai Village, Ramanathapuram District, Tamil Nadu.

The project envisages setting up a combined cycle (gas and steam cycles) power plant with an installed capacity of 58.15 MW consisting of one Gas Turbine Generating Unit of 38.15 MW rated capacity, one Heat Recovery Steam Generator Unit of 67 TPH rated capacity coupled to a Steam Turbine Generating Unit of 20 MW rated capacity along with all electrical systems, controls and Instrumentation, Civil, Structural and Architectural works. The rating of the power plant is 38.15 MW at PF: 0.8 in Open Cycle and about 58.15 MW at PF: 0.8 in Combined Cycle.

The generators are of the air cooled type. The excitation systems for the generators are brushless or static type. It is envisaged to step up the power to 110 kV and evacuate the power through the Tamil Nadu Power grid through at 110 kV line to various consumers. The switchyard is outdoor air insulated type and has a nominal voltage of 110 kV.

There is no technology transfer in the project activity.

The Technical details of the project as follows:

Contract Capacity (MW)	52.8
Aux. consumption	4%
Gross electricity generation	55.0

Plant Load Factor (%)	85
Annual Gross energy generation (GWh)	409.53
Annual Auxiliary Consumption(GWh)	16.38
Annual Net electricity generated(GWh)	393.15
Heat rate (kcal/kWh)	1980
Calorific value of fuel (kcal/scm)	8775
Fuel requirement, (scm)	92406769
(SCMD)	253169

The current monitoring period is 01-July-2006 to 30-June-2012 (first and last date included). The total GHG emission reductions or removal generated is 508,044 tCO₂e.

The power plant is located at Survey Nos. 203 & 204 of Valantharavai Village, Ramanathapuram District, and Tamil Nadu State. The latitude and longitude of the site are 09°19'24" N and 78°54'42" E.

The Project Proponent plans to avail the VCS benefits for the project. The audit team has checked the commissioning certificates to confirm the location and the implementation of the project.

Parameters Available at Validation and Data Fixed Ex-ante:

Data/ parameter	Unit	Value applied	Assessment
EF _{CO₂,NG,y}	tCO ₂ /GJ	54.3	Confirmed as per the IPCC Default Value or Appendix B of vide web link https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_4.zip

OXID _{NG}	-	1	Value is confirmed from IPCC Fifth Assessment Report.
EF _{NG} , upstream, CH ₄	tCH ₄ /PJ	160 [Production : 72 Processing, transport and distribution: 88]	Confirmed as per the approved Methodology of AM0029 and the IPCC default values.

The VVB has checked that all ex-ante parameters were fixed in accordance with the VCS Standard 4.3 and the applied methodology and the registered PD. The consistency of the ex-ante values throughout the ER was also checked and confirmed.

Monitoring parameters:

Means of verification	Referring to VCS v4.3 and p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, the below tables provide a summary on the verification of each monitoring parameter listed in the registered monitoring plan.	
	Data / Parameter:	EG _{PJ,y}
	Data unit:	kWh
	Description:	Net quantity of electricity generated (exported) to the grid by the project activity.
	Source of data used:	Main meters and Check meters provided by project proponent at Project site.
	Means of verification/Comments:	Value monitored: 2,106,541,200 The difference of final value of export and import is used for monthly values of net electricity supplied to the grid by the project activity and same value will be considered for ER calculations. Verification team has checked the JMR/FORM-B/Credit note to check net generation value and

		same has been cross verified with monthly invoices or receipts raised by PP.
	Cross-check	Electricity Sales invoices submitted (as per PPA)
	Compliance with the calibration frequency requirements for measuring instruments As per the registered monitoring plan, the meters are calibrated as per industry standards/PPA and measured monthly using calibrated meters of accuracy class 0.2 and aggregated annually and confirmed by cross-checking the calibration records. The details of the calibration of meters are given in the table below.	
Conclusion	The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the registered monitoring plan. Referring to p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, VVB confirms through video call and telephonic interviews and from the document review, the actual monitoring system complies with the registered monitoring plan. The substantiation of this conformity on information flow for these parameters including the values in the monitoring reports is reported in the above section. During the verification, all relevant monitoring parameters of the registered monitoring plan have been verified with regard to the appropriateness of the verification method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. After appropriate corrections, carried out by the project participant, it is confirmed that all monitoring parameters have been measured / determined without material misstatements and are in line with all applicable standards and relevant requirements. All parameters required to be monitored are recorded at the intervals required by the registered monitoring plan and the applied methodology. On the basis of review of source and nature of available evidences and records, the verification team confirms the quality of evidence for emission reduction provided is sufficient as per CDM VVS PA, v3.0.	

Means of verification	Referring to VCS v4.3 and p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, the below tables provide a summary on the verification of each monitoring parameter listed in the registered monitoring plan.	
	Data / Parameter:	FC _f
	Data unit:	Scm
	Description:	Annual quantity of Natural gas consumed in the project activity

	Source of data used:	Reading of Gas flow meters; The gas supplied to the project are metered at project site and accordingly billed by Gas Authority of India.
	Means of verification/Comments:	Value applied - 546,526,759 Data obtained from the Gas flow meter Verification team has checked the data obtained from the gas flow meter.
	Cross-check	-
	Compliance with the calibration frequency requirements for measuring instruments As per the registered monitoring plan, the meters are calibrated as per industry standards and measured monthly using calibrated flow meters. VVB confirmed it by cross-checking the calibration records. The details of the calibration of flow meters are given in the table below.	
Conclusion	The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the registered monitoring plan. Referring to p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, VVB confirms through video call and telephonic interviews and from the document review, the actual monitoring system complies with the registered monitoring plan. The substantiation of this conformity on information flow for these parameters including the values in the monitoring reports is reported in the above section. During the verification, all relevant monitoring parameters of the registered monitoring plan have been verified with regard to the appropriateness of the verification method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. After appropriate corrections, carried out by the project participant, it is confirmed that all monitoring parameters have been measured / determined without material misstatements and are in line with all applicable standards and relevant requirements. All parameters required to be monitored are recorded at the intervals required by the registered monitoring plan and the applied methodology. On the basis of review of source and nature of available evidences and records, the verification team confirms the quality of evidence for emission reduction provided is sufficient as per CDM VVS PA, v3.0.	

Means of verification	Referring to VCS v4.3 and p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, the below tables provide a summary on the verification of each monitoring parameter listed in the registered monitoring plan.	
	Data / Parameter:	NCV _{f,y}
	Data unit:	GJ/m ³ (or Kcal/scm)

	Description:	Net calorific value of natural gas (Fuel f)
	Source of data used:	The calorific value of natural gas is provided by the gas supplier in the fortnightly invoices. This are converted into the units required for estimation of project emissions i.e. TJ/scm. Besides Invoices of GAIL, the NCV will also be measured periodically independent of GAIL.
	Means of verification/Comments:	Value monitored – 2006: 8802.34 2007: 8837.90 2008: 8807.04 2009: 8791.67 2010: 8778.24 2011: 8769.71 2012: 8783.21 Verification team has checked the invoices provided by the GAIL.
	Cross-check	-
Conclusion	The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the registered monitoring plan. Referring to p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, VVB confirms through video call and telephonic interviews and from the document review, the actual monitoring system complies with the registered monitoring plan. The substantiation of this conformity on information flow for these parameters including the values in the monitoring reports is reported in the above section. During the verification, all relevant monitoring parameters of the registered monitoring plan have been verified with regard to the appropriateness of the verification method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. After appropriate corrections, carried out by the project participant, it is confirmed that all monitoring parameters have been measured / determined without material misstatements and are in line with all applicable standards and relevant requirements. All parameters required to be monitored are recorded at the intervals required by the registered monitoring plan and the applied methodology. On the basis of review of source and nature of available evidences and records, the verification team confirms the quality of evidence for emission reduction provided is sufficient as per CDM VVS PA, v3.0.	

Means of verification	Referring to VCS v4.3 and p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, the below tables provide a summary on the verification of each monitoring parameter listed in the registered monitoring plan. <table border="1" data-bbox="431 327 1377 936"> <tr> <td>Data / Parameter:</td><td>EG_{Gross}</td></tr> <tr> <td>Data unit:</td><td>kWh</td></tr> <tr> <td>Description:</td><td>Total quantity of Electricity generated from the project activity during the year y</td></tr> <tr> <td>Source of data used:</td><td>On-site measurements from the readings of meter installed at plant site.</td></tr> <tr> <td>Means of verification/Comments:</td><td>Value monitored – 2,256,858,600 Verification team has checked the JMR/FORM-B/Credit note to check net generation value and same has been cross verified with monthly invoices or receipts raised by PP</td></tr> <tr> <td>Cross-check</td><td>Invoices raised by the PP</td></tr> </table> Compliance with the calibration frequency requirements for measuring instruments As per the registered monitoring plan, the meters are calibrated as per industry standards/PPA and measured monthly using calibrated meters of accuracy class 0.2 and aggregated annually and confirmed by cross-checking the calibration records. The details of the calibration of meters are given in the table below.	Data / Parameter:	EG _{Gross}	Data unit:	kWh	Description:	Total quantity of Electricity generated from the project activity during the year y	Source of data used:	On-site measurements from the readings of meter installed at plant site.	Means of verification/Comments:	Value monitored – 2,256,858,600 Verification team has checked the JMR/FORM-B/Credit note to check net generation value and same has been cross verified with monthly invoices or receipts raised by PP	Cross-check	Invoices raised by the PP
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Data unit:	kWh												
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Cross-check	Invoices raised by the PP												
Conclusion	The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the registered monitoring plan. Referring to p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, VVB confirms through video call and telephonic interviews and from the document review, the actual monitoring system complies with the registered monitoring plan. The substantiation of this conformity on information flow for these parameters including the values in the monitoring reports is reported in the above section. During the verification, all relevant monitoring parameters of the registered monitoring plan have been verified with regard to the appropriateness of the verification method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. After appropriate corrections, carried out by the project participant, it is confirmed that all monitoring parameters have been measured / determined without material misstatements and are in line with all applicable standards and relevant requirements. All parameters required to be monitored are recorded at the intervals required by the registered monitoring plan and the applied methodology. On the basis of review												

	of source and nature of available evidences and records, the verification team confirms the quality of evidence for emission reduction provided is sufficient as per CDM VVS PA, v3.0.
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Means of verification	Referring to VCS v4.3 and p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, the below tables provide a summary on the verification of each monitoring parameter listed in the registered monitoring plan.											
	<table border="1"> <tr> <td>Data / Parameter:</td><td>EG_{import}</td></tr> <tr> <td>Data unit:</td><td>kWh</td></tr> <tr> <td>Description:</td><td>Onsite electricity consumption of the project activity imported from the grid system during the year y</td></tr> <tr> <td>Source of data used:</td><td>Main meters and Check meters provided by project proponent at Project site.</td></tr> <tr> <td>Means of verification/Comments:</td><td>Value monitored – 209,997,288 Verification team has checked the JMR/FORM-B/Credit note to check net generation value and same has been cross verified with monthly invoices or receipts raised by PP</td></tr> <tr> <td>Cross-check</td><td>Invoices raised by the PP</td></tr> </table> Compliance with the calibration frequency requirements for measuring instruments As per the registered monitoring plan, the meters are calibrated as per industry standards/PPA and measured monthly using calibrated meters of accuracy class 0.2 and aggregated annually and confirmed by cross-checking the calibration records. The details of the calibration of meters are given in the table below.	Data / Parameter:	EG _{import}	Data unit:	kWh	Description:	Onsite electricity consumption of the project activity imported from the grid system during the year y	Source of data used:	Main meters and Check meters provided by project proponent at Project site.	Means of verification/Comments:	Value monitored – 209,997,288 Verification team has checked the JMR/FORM-B/Credit note to check net generation value and same has been cross verified with monthly invoices or receipts raised by PP	Cross-check
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Cross-check	Invoices raised by the PP											
Conclusion	The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the registered monitoring plan. Referring to p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, VVB confirms through video call and telephonic interviews and from the document review, the actual monitoring system complies with the registered monitoring plan. The substantiation of this conformity on information flow for these parameters including the values in the monitoring reports is reported in the above section. During the verification, all relevant monitoring parameters of the registered monitoring plan have been verified with regard to the appropriateness of the verification method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. After appropriate corrections, carried out											

	by the project participant, it is confirmed that all monitoring parameters have been measured / determined without material misstatements and are in line with all applicable standards and relevant requirements. All parameters required to be monitored are recorded at the intervals required by the registered monitoring plan and the applied methodology. On the basis of review of source and nature of available evidences and records, the verification team confirms the quality of evidence for emission reduction provided is sufficient as per CDM VVS PA, v3.0.
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Means of verification	Referring to VCS v4.3 and p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, the below tables provide a summary on the verification of each monitoring parameter listed in the registered monitoring plan.	
	Data / Parameter:	EF _{BL} , upstream, CH ₄
	Data unit:	tCH ₄ /GWh
	Description:	Emission factor for upstream fugitive methane emissions of natural gas from production, transportation and distribution.
	Source of data used:	Latest CEA data Base
	Means of verification/Comments:	Value monitored – 2006 : 8.43 2007 : 8.15 2008 : 8.96 2009 : 4.42 2010 : 10.79 2011 : 11.28 2012 : 11.52 Verification team has checked the CEA database for the yearly values.
	Cross-check	-
Conclusion	The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the registered monitoring plan. Referring to p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, VVB confirms through video call and telephonic interviews and from the document review, the actual monitoring system complies with the registered monitoring plan. The substantiation of this conformity on information flow for these parameters including the values in the monitoring reports is reported in the above section. During the verification, all relevant monitoring parameters of the registered monitoring plan have been verified with regard to the appropriateness of the	

	verification method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. After appropriate corrections, carried out by the project participant, it is confirmed that all monitoring parameters have been measured / determined without material misstatements and are in line with all applicable standards and relevant requirements. All parameters required to be monitored are recorded at the intervals required by the registered monitoring plan and the applied methodology. On the basis of review of source and nature of available evidences and records, the verification team confirms the quality of evidence for emission reduction provided is sufficient as per CDM VVS PA, v3.0.
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Means of verification	Referring to VCS v4.3 and p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, the below tables provide a summary on the verification of each monitoring parameter listed in the registered monitoring plan.	
	Data / Parameter:	EF _{BL,CO2,y}
	Data unit:	tCH ₄ /GWh
	Description:	Emission factor for upstream fugitive methane emissions of natural gas from production, transportation and distribution.
	Source of data used:	Latest CEA data Base
	Means of verification/Comments:	Value monitored – 2006: 701.2 ¹ 2007: 713.3 ² 2008: 817.9 ³ 2009: 763.3 ⁴ 2010: 733.8 ⁵ 2011: 852.1 ⁶ 2012: 947.2 ⁷

¹ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_6.zip

² https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_6.zip

³ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_7.zip

⁴ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_8.zip

⁵ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_8.zip

⁶ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_8.zip

⁷ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_10.zip

		Verification team has checked the CEA database for the yearly values and found PP has taken most conservative values to calculate the ERs.	
	Cross-check	-	
Conclusion	The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD. All parameters were monitored and determined as per the registered monitoring plan. Referring to p.360, p.361, p.363 and p.364 of CDM VVS PA, v3.0, VVB confirms through video call and telephonic interviews and from the document review, the actual monitoring system complies with the registered monitoring plan. The substantiation of this conformity on information flow for these parameters including the values in the monitoring reports is reported in the above section. During the verification, all relevant monitoring parameters of the registered monitoring plan have been verified with regard to the appropriateness of the verification method, the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. After appropriate corrections, carried out by the project participant, it is confirmed that all monitoring parameters have been measured / determined without material misstatements and are in line with all applicable standards and relevant requirements. All parameters required to be monitored are recorded at the intervals required by the registered monitoring plan and the applied methodology. On the basis of review of source and nature of available evidences and records, the verification team confirms the quality of evidence for emission reduction provided is sufficient as per CDM VVS PA, v3.0.		

Calibration of the meters

Energy Meter Calibration Details

Feeder	GTG		STG		Valuthur Feeder		Kavanoor Feeder	
Meter Details	Main meter		Main meter		Main meter		Main meter	
Make	Secure Meters		Secure Meters		Secure Meters		Secure Meters	
Model	E3M021		E3M021		E3M021		E3M021	
Accuracy Class	0.2s		0.2s		0.2s		0.2s	
Serial Number	ABB00271		ABB00273		ABB00268		ABB00278	
	Date of Calibration	Due Date of Calibration	Date of Calibration	Due Date of Calibration	Date of Calibration	Due Date of Calibration	Date of Calibration	Due Date of Calibration
	27-March-2006	27-March-2007	07-June-2006	07-June-2007	27-March-2006	27-March-2007	26-May-2006	26-May-2007
	28-March-2007	28-March-2008	28-March-2007	28-March-2008	28-March-2007	28-March-2008	28-March-2007	28-March-2008
	25-March-2008	25-March-2009	25-March-2008	25-March-2009	25-March-2008	25-March-2009	25-March-2008	25-March-2009

	23-March-2009	23-March-2010	23-March-2009	23-March-2010	23-March-2009	23-March-2010	23-March-2009	23-March-2010
	29-March-2010	29-March-2011	29-March-2010	29-March-2011	29-March-2010	29-March-2011	29-March-2010	29-March-2011
	23-March-2011	23-March-2012	23-March-2011	23-March-2012	23-March-2011	23-March-2012	23-March-2011	23-March-2012
	28-March-2012	28-March-2013	28-March-2012	28-March-2013	28-March-2012	28-March-2013	28-March-2012	28-March-2013

Feeder	GTG		STG		Valuthur Feeder		Kavanoor Feeder	
Meter Details	Check meter		Check Meter		Check Meter		Check Meter	
Make	Secure Meters		Secure Meters		Secure Meters		Secure Meters	
Model	E3M021		E3M021		E3M021		E3M021	
Accuracy Class	0.2s		0.2s		0.2s		0.2s	
Serial Number	ABB00272		ABB00274		ABB00276		ABB00277	
	Date of Calibration	Due Date of Calibration	Date of Calibration	Due Date of Calibration	Date of Calibration	Due Date of Calibration	Date of Calibration	Due Date of Calibration
	20-March-2006	20-March-2007	26-May-2006	26-May-2007	20-March-2006	20-March-2007	26-May-2006	26-May-2007
	22-March-2007	22-March-2008	22-March-2007	22-March-2008	22-March-2007	22-March-2008	22-March-2007	22-March-2008
	18-March-2008	18-March-2009	18-March-2008	18-March-2009	18-March-2008	18-March-2009	18-March-2008	18-March-2009
	17-March-2009	17-March-2010	17-March-2009	17-March-2010	17-March-2009	17-March-2010	17-March-2009	17-March-2010
	23-March-2010	23-March-2011	23-March-2010	23-March-2011	23-March-2010	23-March-2011	23-March-2010	23-March-2011
	18-March-2011	18-March-2012	18-March-2011	18-March-2012	18-March-2011	18-March-2012	18-March-2011	18-March-2012
	21-March-2012	21-March-2013	21-March-2012	21-March-2013	21-March-2012	21-March-2013	21-March-2012	21-March-2013

Gas Flow Meter Calibration

Parameter	DPT	PT	TT/TE	Due date of calibration
Model	SISD2G3	-	RTD-PT100	

Serial No.	2468817	-	R-44985	
Accuracy Class	$\pm 0.075\%$	$\pm 0.075\%$	$\pm 1.0\%$	
Frequency	Once in a Year			
Date of Calibration	25/02/2006			24/02/2007
	30/08/2006			29/08/2007
	25/08/2007			24/08/2008
	22/02/2008			21/02/2009
	23/02/2009			22/02/2010
	19/02/2010			18/02/2011
	14/02/2011			13/02/2012
	25/02/2012			24/02/2013

Considering the monitoring period as 01-July-2006 to 30-June-2012, there has been delay in calibration of meters – hence conservative error factor 0.2% has been applied to the values of both electricity export and electricity import on respective months.

Also there has delay in calibration of gas flow meter hence application of error factor 0.075% on gas consumption has been applied on the respective months (Please refer Gas consumption sheet for more details of ER sheet).

Emissions trading programs and other binding limits

Assessment team confirms that the Net GHG emission reductions or removals generated by the project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits. Audit team checked the REC Mechanism database of India and found that the project activity is not accredited / registered under REC mechanism. Further, Declaration in effect of the same has been submitted by project proponent to audit team and found to be correct.

The project has not been registered under any other GHG programs. Also, the Project is not rejected by other GHG programs. A declaration for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows:

1. <https://www.recregistryindia.nic.in/>
2. <http://cdm.unfccc.int/>

3. <http://www.goldstandard.org/>
4. www.v-c-s.org

The Project has no intend to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

Thus, it is concluded that the project activity not involved on other Emissions trading programs and other binding limits.

Additional Information Relevant to the Project

Eligibility Criteria for grouped projects

This is not a grouped project activity. Hence not applicable.

Leakage Management for AFOLU projects

Not applicable as this is not an AFOLU project activity.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description. The details are presented transparently to the assessment team for analysis which leads to positive conclusion for this verification.

Sustainable Development

The expected contribution from the project to sustainable development can be studied under four broad heads, viz.

- Environment Wellbeing
- Technical Wellbeing
- Social Wellbeing, and
- Economic Wellbeing

Environment Wellbeing:

A substantial portion of energy generated in India is through coal and lignite. Power plants based on coal and lignite account for more than half of the installed capacity. Lignite, being mined in the State of Tamil Nadu, is used as one of the major fuels for power generation in

the State. Therefore, increase in demand for energy places stress on the environment. The stress can be relieved only through reduction of wastages and optimum use of Clean Energy sources, like Natural Gas, Water and Wind.

The project envisages using Natural Gas, a cleaner fuel as compared to fossil fuels like lignite (brown coal) and sub-bituminous coal. The plant help to replace this fuel, which is environmentally less clean. As the emission due to combustion of Natural Gas is substantially less as compared to combustion of coal or lignite, the project reduced SO_x, NO_x as well as GHG emissions. Further, since Natural Gas power projects do not lead to production of huge quantities of solid waste like ash in thermal power plants, the project are also reduce the burden on the environment. Finally, generation of power through Natural Gas by this plant would also go to reduce the demand for coal and lignite, which is used by other industries / sectors.

Technical Wellbeing

The project is employing the latest combined cycle technology. The technology envisages

- recovering flue gases through Heat Recovery Steam Generation (HRSG) and using the same for generation of energy;
- providing turbines with electro hydraulic governing system to regulate turbine speed during normal on-load operation and during turbine run-up control;
- used of forced draft air-cooled condenser with a frame structure supporting fin tube heat exchanger bundles;
- used of brushless or static type of excitation system for generators;
- used of DM water desalination plant instead of water from the river; and
- Reducing the water requirement to the bare minimum by recirculation of water.
- The project activity is least water intensive. In the first place it does not use water for cooling. Instead, it uses Air-cooled condenser, which cost as much as 4 times more than the Water-cooled condenser. Water Cooled Condenser requires additional water as much as 2050 cu.m per day. Secondly, the water used for (waste heat recovery) boiler is recycled and additional water requirement is only to take care of evaporation losses.
- Finally, the project activity is a zero discharge effluent plant. It does not discharge any effluent – gas, or solid or liquid and thus does not cause any harm to the environment.
- These kinds of facilities exist in very few gas based power plants in the country. Thus, this type of projects are not common in India and more particularly, Southern region.

The project also offers possibility of collaboration with the local engineering and technical schools, which are mutually beneficial.

Social Wellbeing

The project is a conferring benefit on the society as a whole and the nearby areas in particular, both directly and indirectly. The project provides employment to about 70 persons directly. The employed are represent an amalgam of both skilled and unskilled workers and engineering graduates. Direct employment apart, the project gives rise to ancillary economic activity in the vicinity of the project site as well as in the proximity. The direct employment provided by the project apart, the industrial units using the energy generated by the project provide employment to thousands of skilled and unskilled workforce. The spread and demonstration effect the project are conferring on the country in general and the State in particular and the contribution it make to the hinterland development are substantial.

Economic Wellbeing

The project is essentially an infrastructure projects. As such, its contribution is not restricted to only direct contribution, but also extends to contribution derived indirectly from the economic activity arising out of this project. Setting up of this project in Valuthur Village in Ramanathapuram District would give rise to development of social and physical infrastructure in and around the area. Besides, being an infrastructure project, the resultant industrialization (consequent upon this project) are also contribute to the development of physical, social and institutional infrastructure in the State as a whole. The successful operation of this project are lead to the setting up of socially desirable projects like schools, colleges, technical institutes, hospitals, clinics etc. among others by the project proponents. The project proponent has already taken up a project to construct a community hall in the village and the Panchayat building to start with.

In sum, the project activity are contribute to the environment, social and economic issues both locally and globally by

- Net generating power 52.8 MW through relatively clean fuel and augment the power supply in the country;
- reducing GHG emissions;
- conserving lignite/coal for other sectors, which cannot use natural gas;
- providing employment both directly as well as indirectly;

- contributing to the overall development of the area nearby and the State as a whole; and
- space requirements per MW for a gas based stations are less than coal based stations

Hence the project is not likely to have any significant adverse negative environmental effects during execution/after commissioning /during the operational lifetime of the project.

Further the project are support to establish, promote the development, manage and safeguard the rational and sustainable exploitation and utilization of renewable energy resources for social and economic development, and can play a critical role in improving the overall energy scenario of the country, particularly of the remote and inaccessible areas. There by support the global climate change programme by cleaner energy.

Please see the project's SDG Contribution Report prepared by TÜV SÜD. The report is uploaded to the project's Verra Registry Project Setup Page.

Conclusion: In view of the assessment of MR and supporting documents as listed in Appendix 1 of this report, the validation team is able to confirm that the description contained in the MR of the project activity provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation. Consequently, assessment team confirms that the project description of the project contained in the MR to be complete and accurate. The MR complies with the relevant forms and guidance for completing the VCS MR.

4.2 Safeguards

4.2.1 No Net Harm

As per the Indian Government rule and regulations, the project activity are get an environmental clearance in the form of “No Objection Certificate” from the Tamil Nadu Pollution Control Board. Besides, the project site is approved from the environmental angle.

Comprehensive environmental impact assessment studies are conducted for the project and the study reveals that the impact of the project activity on the environment is not significant. The major findings of the study are given below:

Topography: The present topography of the study area is a coastal plain sandy terrain and nearly 30% of the buffer zone is occupied by sea. In the core zone, few small sand dunes are noted. The constructions of the combined cycle power project are affecting the existing land surface of 18.89 acres acquired by Penna Electricity Limited. Planting of a thick canopy of trees at a width of 5 meter. Along the periphery of the core zone and proper formation of roads and other infrastructural facility would upgrade and preserve topography. Due to the project, there are not any changes in the topography of the buffer zone.

Climate: Normally, the regional factors such as monsoon and depressions are the main factors that govern the climatic conditions like temperature variations, wind direction and velocity, rainfall and humidity. The gas based power generation are not tend to influence the existing climatic conditions. Though exit gas temperature through the stack is slightly higher than the atmospheric temperature, it is not affect the local climate due to high dispersion through suitably designed stack.

Air Environment: Dispersion of different pollutants released into the atmosphere have significant impacts on surrounding environment of any industrial project and forms an important part of impact assessment studies. The collection of baseline information with respect to air pollutants comprises of Suspended Particulate Matter (SPM), Oxides of Nitrogen (NO_x) and Carbon Monoxide (CO). Anticipated impacts with respect to air pollutants are super imposed on the present ambient air quality parameters to find out the net impacts in the air environment.

Air Pollution Potential – Fugitive emissions: Since the fuel for the power generation, natural gas, is transported through pipeline from the nearby ONGC gas gathering station, there is no chance of fugitive dust generation to raw material transportation. However to avoid dust generation, all roads inside the power plant are concreted. In addition, water spray is done regularly to avoid fugitive dust generation.

Air Pollution Potential – Impact due to the usage of natural gas: The gaseous emission generated during the ignition process is exhausted through a 34.50 mtr. main stack. Natural gas comprises Methane, which is the combustible component. The natural gas is an environmental friendly fuel and hence the quantum of emission would be negligible and there are no impacts on air quality.

Air Pollution Potential – Air quality model and predictions: The study reveals that the increase in Ground Level Concentration value for the pollutant NO_x is very low and well within the prescribed standards for ambient air quality. When compared to other fuels such as coal, furnace oil, LSHS, the natural gas does not generate any solid waste. Though by virtue of its gaseous fractions, the emitted flue gas contains the gaseous pollutants such as NO_x, the anticipated increase in the ground level concentration of SO₂ and NO_x is well below the standard prescribed by CPCB/TNPCB.

Noise Environment- Noise pollution potential: Generally, GT, STG and GEs are noise generating. These are housed in concrete hollow block civil structure, which is suitably located on the site to ensure compliance with the industrial noise norms of 55 DB (A) during day time and 45 DB (A) during night time. The noise level outside the plant is lower because noise intensity decreases as the distance from the noise source increases. The time of exposure to these noise levels outside plant premises are less than for the workers inside the plant. Thus, the impact of the project on the ambient environment and consequently on the human are minimal.

Land Use: About 18.89 acres of uncultivable land are purchased by Penna Electricity Limited (PEL) for the power generation projects. 34% of the land is utilized for project activities and 30% for developing green belt. Since there are no vehicle movement either for supply of raw material or for transportation of finished goods, the fugitive emissions from the project activity is nil. Since the project activity are using radiator type cooling, noise generation are also be very low. The green belt around the power plant is reducing the noise propagation around the proposed power plant. The green belt also reduces, to a certain extent, the air pollution impact.

Ecological Factors: The core zone does not present a picture of natural species of vegetation due to the limitation in the agricultural activities. Hence, except for changed in land use, there is no perceptible effect by the project. Used of natural gas for power generation are generate any suspended particulate matter, gaseous pollutants, and solid waste and hence the question of project activity affecting the available cropland or vegetations over the buffer zone is nil. Moreover, since natural gas is not discharge any metal pollution, oil pollution, pesticide pollution and microbiological pollution, the project would not affect the biosphere.

Socio Economic Environment: The project activities go to augment the power supply of the State through relatively clean and efficient technology for power generation without significantly affecting the environment. The project activity are provides employment to a few skilled workers and also push other industrial/commercial avenues in the region.

Environmental Pollution: The project activity does not generate any trade effluent. The waste water generated from the domestic usage of water and DM plant reject. These effluents are treated to meet the standard prescribed by CPCB and the same are used for green belt development. Hence, there is not any deterioration in water quality. Since the project activity are utilizing most eco-friendly natural gas for power generation, though there are a marginal increase in the gaseous pollutant such as NO_x, it is well within the limit prescribed by the CPCB.

During the construction phase, there are a chance for noise propagation due to the movement of vehicles and construction activities. However, the noise propagation are controlled through regulated movement of vehicles. During the operational phase, the developments of green belt reduced the noise level. GT, STG & GE are located in a hollow brick walled construction are ensure the noise level is maintained within the prescribed limit.

4.2.2 Local Stakeholder Consultation

The stakeholder meeting was conducted on during registration of the project activity. PP took due care of the comments received during LSC.

The process of local stakeholder consultation is continuous. During the current monitoring period, the project proponent has kept grievance register in plant site office and sought comments/grievances/suggestions from local stakeholders including local community, government agencies and NGOs. However, no major comments/grievances/suggestions have been received from the aforementioned stakeholders during the current monitoring period and all such minor suggestions have been take care by the PP.

4.3 AFOLU-Specific Safeguards

Not applicable as this is not an AFOLU project activity.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	The assessment of data and the calculation of baseline emission reduction in the MR and the ER excel sheet have been verified as per the following set of supporting documents:
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	1. Export, Import & transmission loss data 2. Joint meter readings 3. VER spreadsheets 4. Sales Invoices (as per PPA)
Conclusion	Calculations applied formulae and method for calculation of baseline emission are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology.

Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the project activity. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan
Conclusion	Project emissions during the current monitoring period are 1,092,744tCO ₂ e as per the requirement of the methodology and registered VCS PD.

Calculation of leakage GHG emissions

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the project activity. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan
Conclusion	Leakage emissions during the current monitoring period are 48,653 tCO ₂ e, according to the applied methodology and registered VCS PD

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

Means of verification	No lack of evidence and missing data were detected during this monitoring period. All values as per the monitoring plan were crosschecked by the verification team against basic monitored data and the calculations were found to be correct. The verification team confirms that all assumptions, emission factors and default values have been correctly justified. All the emission factors, application of maximum permissible errors and default values are explicitly mentioned in the monitoring report. Hence the VVB confirms that the methods and formulae used to obtain the emissions are appropriate. No reporting risks have been identified for the data reported. Troubleshooting procedure, maintenance, and calibration of monitoring equipment, monitoring measurements and reporting, record handling and maintenance, reviewing monitored data are available at the plant. All the monitored data are archived partially in electronic and paper form. The data
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	will be kept for the whole crediting period and 2 years after the last crediting period thereby meeting the requirement of the monitoring plan.
Conclusion	The formulae and the methods referred in the MR and the emission reduction calculation spread sheet comply with the methods described in the registered PDD. No lack of evidence and missing data were detected during this monitoring period. All values as per the monitoring plan were crosschecked by the verification team against basic monitored data and the GHG emission calculation is found correct. TUV SUD confirms that all assumptions, emission factors and default values have been correctly justified. All the emission factors and default values are explicitly mentioned in the monitoring report. Calculations applied formulae and method for calculation of GHG emission are in accordance with the registered monitoring plan and are in line with the requirements of VCS, the applied methodology and p. 372, p.373 of CDM VVS PA ver 3.0.

4.6 Non-Permanence Risk Analysis

Not applicable.

5 VERIFICATION CONCLUSION

The VVB confirms that

- The development and maintenance of records and reporting procedures are in accordance with the registered monitoring plan.
- The project is operated as planned and described in the project design document approved by the EB;
- The installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately.
- The monitoring system is in place and generates GHG emission reductions data.
- The monitoring plan in Monitoring Report is as per the PD and monitoring plan approved by the VCS.
- The approved monitoring plan in the approved PD is as per the applied methodology.
- There is an audit trail that contains the evidence and records that validate the stated figures.

Based on the information we have seen and evaluated, we confirm that the project activity achieved the verified amount of reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the project activity

Verification period: From 01-July-2006 to 30-June-2012

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01-July-2006 to 31-December-2006	135,410	98,495	4,467	32,448
01-January-2007 to 31-December-2007	256,166	182,556	8,370	65,240
01-January-2008 to 31-December-2008	257,790	183,455	8,528	65,807
01-January-2009 to 31-December-2009	250,714	169,494	9,036	72,184
01-January-2010 to 31-December-2010	270,728	184,290	7,423	79,015
01-January-2011 to 31-December-2011	308,897	183,204	7,247	118,446
01-January-2012 to 30-June-2012	169,736	91,250	3,582	74,904
Total	1,649,441	1,092,744	48,653	508,044

APPENDIX 1: DOCUMENTS REVIEWED

No	Author	Title	References to the document
1	UNFCCC	CDM VVS for PA v3.0	
2	UNFCCC	AM0029 – “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas” Version 03	-
3	Verra	VCS Standard v4.1	-
4	EKI	VCS MR – Version 5.0	03/05/2023
5	EKI	ER Calculation sheet Version 5.0	03/05/2023
6	Tamilnadu Electricity board	Commissioning Certificates for Natural gas power plant	01/07/2006
7	Electronic test and development Centre / Cauvery basin pipeline system	Calibration test certificates for main and check meters Calibration details of the flow meters	2006 - 2012
8	Tamilnadu Electricity board	Monthly Joint meter reading report	2006 - 2012
9	Penna Electricity Limited / Pioneer power	Monthly invoices for lar power plant.	2006 - 2012
10	Tamilnadu Electricity board	PPA	-
11	Pioneer power	No double counting declaration	
12	Pioneer power	Grievance register	
13	Google Earth	GPS coordinates for Natural Gas plant	
14	EKI	Site photographs of power plant and energy meters	
15	Pioneer power	Name change certificate from Penna Electricity Limited to the Pioneer power	22/09/2010