Voluntary Carbon Standard 2007.1 Validation Report

No. 53803908-08/623

Final Validation Report:

Name of Validation company:	Date of the issue:
TÜV NORD CERT GmbH	2009-11-18
Report Title:	Approved by:
Natural Gas Based Grid Connected Power Generation Project at Valantharavai	Mr. Winter Rainer
Client:	Project Title:
Coromandel Electric Power Company Limited	Natural Gas Based Grid Connected Power Generation Project at Valantharavai
Summary:	

M/s. Coromandel Electric Company Limited (CECL) has commissioned the TÜV NORD JI/CDM Certification Program to carry out the validation of the project – "Natural Gas Based Grid Connected Power Generation Project at Valantharavai", with regard to the relevant requirements of VCS 2007.1 Standard as well as criteria for consistent project operations, monitoring and reporting.

The project activity generates power by utilising the natural gas in the natural gas engine and signed an agreement with Tamilnadu Electricity Board (TNEB) for wheeling & transmitting the generated power through the transmission lines of the TNEB which is part of the Southern Grid.

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 8 Corrective Action Requests (CAR) and 2 Clarification Requests (CL) were successfully raised and closed

.
The validation is based on the VCS Project Description, 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 the 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 AM0029 Version 3.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 434180 tCO_2e (total) is most likely to be achieved during the 10 years crediting period.

No restrictions or uncertainties were identified related to the validation

Work carried out by:	Number of pages:
Ma. Paa. Puratchikkanal B.J.M. Amarnath G.Ezhilarasu B. Rampradap	42

[Table of Contents]

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 VCS 2007.1 program guidelines
- The Approved Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas, AM0029 version 3.0 (30th May 2008),EB-39
- 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 AM0029. /Version 3.0:"Approved Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas" 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,CLs & FARs, if any
- stakeholders consultation
- Final validation reporting.

The information included in the 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 the installation of TNEB grid connected natural gas based power plant of total capacity 26.19 MW and the generated power is supplied to the TNEB grid and then wheeled for captive consumption. The project activity intends to install three natural gas engines in two phase manner (Phase-I: 17.46 MW & Phase-II: 8.73 MW) each of capacity 8.73MW. In absence of the project activity the equivalent amount of power would have been generated using fossil fuels, which is a carbon intensive source. Thus the project activity results in prevention of usage of fossil fuel along with overall reduction of Green house gas emissions.The proposed project falls under Large-scale methodology, "Approved Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas"AM0029 version 3.0, of CDM methodologies. The estimated GHG emission reduction is 434180 tCO_2e (total) or average *43418* 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:	Valantharavai village, Ramanathapuram district
Latitude:	9°22'05'' North
Longitude:	78°57'18'' East

1.4 Level of assurance

The final validation report is based on VCS /PD1/PD2/, 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 during May 2009 to August 2009.

Preparations : 2009-05-20 to 2009-05-27
On-site validation : 2009-06-12,
(Draft) Reporting : 2009-09-11
(Final) Reporting : 2009-11-18

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/PD1/ submitted by the project participants in April 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 2009-06-12, 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/ • Mr. M. Panneerselvam, Manager,(CECL) Mr.P. Sabarinathan (O&M Executive-Wartsila) 2. Consultants /IM02/ B.Priya Associate Consultant, E&Y	- Technical details of the project activity - Performance data of the Equipments - Approval procedures and status - Monitoring and measurement - Project activity starting date 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

Interviewed Persons / Entities	Interview topics
	life time of the project plant units - Editorial aspects of PD - Baseline study and additionality - Details of emissions reduction calculations - 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 & CLs were submitted to the project proponent. The project design document was revised addressing the CARs & CLs issued by TÜV NORD JI/CDM CP.

After reviewing the revised and resubmitted project documentation[/PD2/]; resolving the CARs & CLs 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 CL issued

Validation topic 1)	No. of CAR	No. of CL
Project Design (3.1)	1	2
Baseline (3.2)	7	-
Monitoring plan (3.3)	-	-
Calculations of GHG emissions (3.4)	-	-

Validation topic 1)	No. of CAR	No. of CL
Environmental Impact (3.5)	–	–
Local Stakeholder Comments (3.6)	–	–
SUM	**8**	**2**

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

For an in depth analysis/evaluation of all CARs and CLs 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 natural gas coming out from the Gas Authority of India Limited (GAIL) gas distribution header (located at a distance of 375m from the project activity) for power generation. The project activity comprises of three natural gas engines with a capacity of 8.73 MW. Each natural gas engine consumes 0.23 Standard Cubic Metre (SCM) of natural gas per kWh electricity generation, thus the annual electricity generation of the project activity is approximately 0.196 Million MWh which will be supplied and wheeled against the captive requirements.. These natural gas engines having a heat rate of 2038kCal/kWh and of type 20V34SG Gas Engine Generator Sets designed by Wartsila, Finland OY. In absence of the project activity the equivalent amount of electricity would have been generated using fossil fuel based electricity generation system, which is a carbon intensive source. 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 Key parameters of the technology and major equipments used in the project activity are as follows:

Table 3-1: Key parameters of the Gas Engine Generator Sets.

Gas Engine Generator Sets (GEGs):	
Capacity each (3*8.73MW)	26.19 MW
Heat rate	2038 kCal/kWh
Calorific value of fuel (kcal/scm)	8744
Auxiliary Power Consumption	140kWh
Frequency	47.5 – 51.5 HZ
Main Alternator Voltage	11,000 V
RPM	750

The project duration is: 20 years.

Project start date is: 2004/11/26(commissioning date)

Crediting period is: Ten years fixed crediting period

Coromandel Electric Company Limited has ownership of the proposed project. Proof of title was submitted. 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.

However CAR 3.1.1 and CL 3.1.1 to 3.1.2 were raised and successfully closed.

CAR/CL	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 3.1.1 The Para1 of the description of the project states that the electricity generated by the project activity is wheeled through the TNEB grid and the same is not substantiated with the agreement with TNEB and moreover the scanned copy of the TNEB statement submitted by PP is not clear – Justify	/Sec 1.4/VCS PD/	The TNEB wheeling agreements and clear copy of the statement are now being submitted. Please refer attachment No. 11.		The PP has submitted the wheeling agreement signed with TNEB and the description related to the wheeling of power mentioned in the sec 1.4 of VCS PD is cross verified with the agreement and found in order. Hence the CAR 3.1.1 is closed.
CL 3.1.1 The numbering, fonts, formatting of the entire VCS Project Description (PD) is not inline with the VCS	/VCS PD/ All Section	The PD version 1.2 has been revised in terms of the numbering, fonts and formatting.		The numbering, fonts and formatting of the VCS PD is cross verified with the

CAR/CL	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
2007.1 template-Clarify				VCS 2007.1 template and found in order. Hence the CL 3.1.1 is closed.
CL 3.1.2 Why the PD is referring VCS 2007 programme guidelines instead of the new version VCS 2007.1-Clarify	/Sec 1.2/VCS PD	The revised PD is referring to the new version VCS 2007.1.	/Sec 1.2/VCS PD	The revised PD submitted by the PP is cross verified with the VCS 2007.1 programme and found inorder. Hence CL 3.1.2 is closed

3.2 Baseline

The project activity has been designed on the "Approved Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas"- AM0029 – Version 3.0 for GHG emission reductions for Natural Gas based grid Connected Electricity Generation Plants using: valid from 30th May 2008 onwards.

Applicability Condition as per the methodology	PD Reference	Assessment
Applicability Condition :1 ☒ Applicable ☐ Not Applicable	/PD/Sec 2.2	The project activity is the construction and operation of a Natural Gas based power plant by Phase manner (Phase-I&II). The agreement (wheeling & transmission of power for captive consumption) signed by the PP

Applicability Condition as per the methodology	**PD Reference**	**Assessment**
		with TNEB Phase-I(17.46MW)-dated 30th October 2004 & Phase-II(8.73MW)-dated 25th January 2006 and the statutory clearances/SC/ for this project activity has been submitted for validation. Based on the verification of the above said documents it was concluded that the project activity is the construction and operation of a new natural gas based electricity generation plant. The PP has signed an agreement with Gas Authority of India Limited (GAIL) for the supply of natural gas and based on the verification of the agreement it was concluded that the natural gas is the primary fuel for this project activity. Although the project activity utilises High Speed Diesel for start up, the consumption of HSD comprise less than 1% of total fuel use, on energy basis. The PP has provided the usage of start up fuel as negligible amount in their VCS PD. The information about the start up fuel provided by the PP in the PD was verified and concluded during the site visit.
Applicability Condition : 2 ☒ Applicable ☐ Not Applicable	/PD/Sec 2.2	This project activity falls under southern regional grid which is the baseline grid. The geographical/physical boundaries of the southern regional grid can be clearly identified through the information provided by Central Electricity Authority (CEA) of India in their website www.cea.nic.in and the information pertaining to the southern regional grid and the baseline emission estimation is

Applicability Condition as per the methodology	**PD Reference**	**Assessment**
		publicly available through the website: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Applicability Condition :3 ☒ Applicable ☐ Not Applicable	/PD/Sec 2.2	The PP has signed an fuel supply agreement with GAIL for a period of ten years. Moreover, the PP has substantiated the availability of natural gas by provided the weblinks (Source : http://www.thehindubusinessline.com/2008/06/07/stories/2008060751222100.htm) and the expansion activities undertaken by the GAIL (Source : http://www.tidco.com/news11.html) From the website /hindu 1/ it has been verified that the ONGC has found more potential zones of natural gas reserves in Ramanathapuram district. More over, from the web site /hindu 2/ it has been verified that the Reliance Industries have planned to lay a pipeline to bring the gas to Tamil Nadu from KG basin and the supply should start sometime. Thus it has been verified and concluded that Natural Gas is available in sufficient quantities in Tamil Nadu for setting up more projects of comparable size hindu1www.hindu.com/2006/09/05/stories/2006090507230500.htm

Applicability Condition as per the methodology	PD Reference	Assessment
		hindu2 www.thehindubusinessline.com/2006/12/04/stories/2006120403200300.htm

The baseline methodology selected for the project activity is deemed most applicable for the project activity, as the project activity involves utilization of natural gas as an energy source for generation of power.

Thus all the applicability conditions of baseline methodology are assessed to be correct. There is no methodology deviation or revision.

The project boundary and the GHG emission sources applicable to this project activity were verified to be in line with the methodology.

The selection of baseline scenario for this project activity is based on the conditions provided under the identification of the baseline scenario of the approved methodology AM0029 version 3.0.

Identification of baseline scenario:

A stepwise approach for the baseline determination has been carried out as per the methodology.

Step 1: Identification of plausible baseline scenarios

In accordance to the **Step 1** of the methodology following alternatives were analyzed:

- The project activity not implemented as a emission reduction project
- Power generation using natural gas, but technologies other than the project activity
- Power generation technologies using energy sources other than natural gas
- Import of electricity from connected grids, including the possibility of new interconnections

The project activity not implemented as a emission reduction project has been rightly identified as a plausible baseline scenario.

Power generation using Natural Gas, but technologies other than the project activity, Combined cycle gas turbine (CCGT)[B-CCGT] system have been analysed. Though Combined cycle gas turbine has higher efficiency than internal combustion gas turbines. It is argued that CCGTs are economical only for higher capacity gas turbines (above 200MW) due to their higher specific investment costs and therefore requires reasonable or even high grade steam to be generated from the flue gases. Based on the above mentioned reasons have excluded CCGT as plausible baseline alternatives for power generation.

Within the next step it was analyzed whether technologies with fuels other than natural gas can be considered as plausible baseline scenarios.

Under this context **Coal, Lignite, Nuclear and Renewable energy technology based** power plants have been analyzed,

Coal /B-Energy Source 1/ **and Lignite** /B-Energy Source 2/ based power plant have been identified as a plausible baseline scenario.

As per the national policy private sector are not allowed to develop **Nuclear** power plants. Apart from that, it is not feasible for such small (26.19 MW) capacities for this reason the same as been excluded as plausible scenario.

DG Based /Energy Source 3/ power generation technology was discussed in the PD whether it can be considered as plausible alternative. As a result this alternative was excluded as plausible baseline scenario.

As per the CEA CO2 Baseline Database for the Indian Power Sector (CEA Database) the total capacity of the diesel based power generation in the Southern region is 939.32

MW. This is makes up approximately 2.5% of the total installed capacity in this region (38353.63 MW). For this reason the Diesel based power technology can not be considered as a commonly used and widespread power technology within the grid boundary. Furthermore as per CEA Database the last DG based power plant in the southern regional grid[1] was installed in 2001 when the price of diesel was lower. The cost of Diesel at the time of decision making was around Rs.20[2] per litre (Rs.19.73[3] Per kg). The specific fuel consumption for diesel based DG sets is around 160[4] grams/kWh (0.16 kg/kWh). The fuel cost of generation = 0.16 X 19.73 = Rs.3.158 per kWh. As per Tamil Nadu power development plan report, there are no DG based power plants constructed recently or are under construction or are being planned/Energy Source 3/ within the grid boundary. For this reasons the exclusion of this alternative as not a plausible baseline alternative is deemed to be appropriately elaborated and documented.

Other power generation technologies like **wind**/Energy Source 5/ **and Hydro**/Energy Source 5/ technologies have also been excluded as plausible baseline scenarios. As these types of technologies cannot deliver output and services similar to the project activity. For this reason the exclusion of wind and hydro is deemed to be appropriate.

The **Import of electricity**/B-IMP/ from neighbourhood grids as also been excluded as a plausible baseline scenario because the choice of importing electricity from other grids is available only to the government utilities (TNEB in this case). The powers of managing the distribution and transmission of electricity in the state lie only with TNEB and no private players are allowed.

Power plants of various technologies and capacities by other promoters/B-TPP/ as also been excluded as a plausible baseline scenario because Third party power purchase is not allowed in the state. As per Tamil Nadu government's policy on "Captive Power Generation", purchase of power from third party promoters is not allowed. Hence as per the PD/PD1/PD2/ the three plausible baseline scenarios have been identified.

- The project activity not implemented as a emission reduction project (natural gas)
- Coal based power plant

[1] Refer CEA CO2 database version 03, worksheet "data", rows "909, 922, 935, 943, 947, 949, 956, 994, 1003 and 1005"

[2] http://uk.reuters.com/article/oilRpt/idUKDEL1697420080214

[3] At a density of 0.85 as per Bureau of Energy Efficiency (BEE) data – Refer page 4, Chapter 1, Book 2 of BEE reference material.

[4] Refer page 4, Chapter 9, Book 3 of BEE reference material

- Lignite based power plant.

In accordance to the **Step 2** of the methodology, an investment analysis including the sensitivity analysis for all alternatives has been carried out to identify the economically most attractive scenario out of the three plausible alternatives. The levelized power costs were correctly identified as a financial indicator and were calculated for all three alternatives within the investment analysis.

The calculation of the levelized power costs deemed to be duly elaborated. Assumptions the investment analysis is deemed to be appropriate. The conservative nature of the assumptions is justified in the PD and deemed to be appropriate elaborated. In particular and the levelised cost of generation for gas, coal and lignite based power plants are tabulated below.

Type of Power Project	Levelized Cost of Generation in INR/kWh
Gas Based	3.60
Coal Based	2.17
Lignite Based	2.32

- Basic **technical design data** of the considered power generation technologies deemed to be appropriately elaborated and is also in line with other official and publicly available data sources.
- Basic **financial assumptions** in particular with respect to capital expenditures, and operating expenditures of the considered power generation technologies is deemed to be appropriately elaborated and are also in line with other official and publicly available data sources.
- Assumptions made with regard to the **fuel prices** as well as the development of the fuel prices are deemed to be appropriate and conservative. They are also in line with other official and publicly available data sources.

Within the Step 2 of the methodology out of the three plausible baseline scenarios, the coal fired power plant has been identified as most economic attractive and thus considered as the most plausible baseline scenario.

Sensitivity analysis was also carried out for all the alternatives and the results are tabulated below

Parameters Considered for Sensitivity	Cost of Generation (Gas)	Cost of Generation (Coal)	Cost of Generation (lignite)
10% increase in PLF	3.59	2.17	2.32
10% decrease in PLF	3.60	2.19	2.32
10% increase in fuel cost	3.95	2.22	2.50
10% decrease in fuel cost	3.24	2.13	2.14

All the above analyses were verified and thus the identified baseline scenario "Coal based power generation" has been assessed to be appropriate.

Baseline emissions are calculated by multiplying the electricity generated in the project plant (EGPJ, y) with a baseline CO2 emission factor (EFBL,CO2,y). Baseline emission factor has been selected in accordance with the methodology.

Build Margin emission factor of current generation mix (713.3 tCO2/ GWh) (option 1) is lower than the other two options and was selected as baseline emission factor based on "Tool to calculate emission factor for an electricity system" which has been verified to be OK.

The calculation of EFy 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. It is deemed to be adequate, transparent and conservative.

The additionality has been assessed using project test. The implementation barrier: investment barrier and common practice approach have been established to demonstrate the additionality.

The additionality is assessed using project test-1.

Step as per VCS 2007.1	Argument	Assessment
Step1: Regulatory Surplus	• Local or National Legislation does not require the production of the underlying service	Validation team has checked all the National Regulations and Local legal

Step as per VCS 2007.1	Argument	Assessment
	or product with the chosen technology. - There is no legal requirement on the choice of a particular technology for power generation. - The applicable Environmental Regulations do not restrict the use of natural gas for power generation. • 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 natural gas and there is no legal requirement on the choice of a particular technology. Project Proponents have been issued with all required regulatory clearances before operation.	requirements. It was found that there is no legal requisite in India and at the local level which restricts the implementation of power generation through gas resources. Hence the argument is appropriate for this project activity. Required Statutory Clearances/SC/ were verified and found to be OK. ☒ Step passed ☐ Step not passed ☐ Not applicable

Step as per VCS 2007.1	Argument	Assessment
Step 2: **Implementation Barriers:** Investment Barrier	The project faces capital or investment return constraints that can be overcome by the additional revenues associated with the generation of VERs. So the PP has chosen Benchmark Analysis to demonstrate the additionality of the projects in the bundle. Weighted average costs of capital (WACC) have been considered as the benchmark for the project activity. To arrive at this benchmark risk free rate from Indian Government bond rates published by the RBI for various years till the date of placing the first Purchase order/PO/ of the project have been analyzed. BSE Sensex details for various years till conceptualisation date was also evaluated to understand the market returns. The difference in this annual market return and the interest rate on Central Government Securities available from RBI has been used to arrive at the market risk premium for the project. Beta	Various elements have been checked during the additionality assessment. Validation team has checked the identified financial indicator (Project IRR), which is most suitable for the project type and decision context. In order to verify the relevant benchmark value of WACC, validation team has referred all necessary supportive data and since the BSE Sensex index represents the majority consolidation in the stock market of India. The cost of debt calculations is found to be correct. The average prime lending rate used in cost of debt calculations were verified from the website[5] and found to have applied correctly. Thus the overall WACC calculations are deemed to be acceptable and the obtained bench mark value of 12.04% was

[5] http://rbidocs.rbi.org.in/rdocs/Wss/DOCs/36275.doc

Step as per VCS 2007.1	Argument	Assessment
	calculation for the power generating companies listed at the time of decision making which were listed in BSE Sensex index has been carried out to arrive at the average beta applicable to this project activity. Along with this, interest rate on the debt, cost of equity and applicable rate of tax have been added together to arrive the benchmark WACC of 12.04%. But the project IRR arrived is well below the benchmark. Thus the bench mark considered is found to be reasonable. Since the Project IRR is chosen as the financial indicator to demonstrate the additionality; WACC is one of the appropriate benchmarks as per the Guidance on Investment Analysis EB 41, Annex 45, and version 2. Investment analysis was carried out with assumptions based on the Purchase Orders, Tamilnadu Electricity Regulatory Commission (TNERC) Tariff reports, GAIL Infraline Annexures & Loan sanction Letters at the time of project	found to be appropriate. Project proponents have demonstrated through the investment analysis that the financial returns of the project activity are below the requisite benchmark. TUV-Nord considers the benchmark chosen is conservative for the project. Using the investment analysis, the project proponent has demonstrated that the Project IRR without VER is of 5.40% from the project activity is lower than benchmark WACC of 12.04%. The project IRR for this project activity is lower than benchmark set by WACC of 12.04%. The availability of VER revenue increases the IRR to 13.0% which is above the benchmark WACC. More over, the established investment barrier has been assessed to be appropriate and sufficient. The

<table>
<tr><th>Step as per VCS 2007.1</th><th>Argument</th><th>Assessment</th></tr>
<tr><td></td><td>implementation and the Power Purchase Agreement (PPA).

The PLF of 87.84% which has been considered as per the O & M offer of the equipment supplier.

Thus the IRR works out to be 5.4% and is less than the benchmark of 12.04%. Thus, it is evident that the project faces investment constraint and it is not financially feasible.

Sensitivity Analysis was carried on with variation of critical parameters like power generation, project cost, fuel cost, and tariff and O& M expenses.

<table>
<tr><th>Factor</th><th colspan="3">Variation</th></tr>
<tr><td></td><td>-10%</td><td>Base case %</td><td>+10%</td></tr>
<tr><td>PLF</td><td>0.6</td><td>5.4</td><td>10.0</td></tr>
<tr><td>Fuel cost</td><td>-</td><td>5.4</td><td>0</td></tr>
<tr><td>O&M cost</td><td>9.1</td><td>5.4</td><td>0</td></tr>
<tr><td>Bench Mark*</td><td colspan="3">12.04%</td></tr>
</table>
</td><td>arguments with supporting spreadsheets/XLS-NG/ provide proof for the non-viability of the project. The input data and assumptions for calculation of IRR like (project cost, net cash flow, depreciation, interest on term loan) were verified with references provided by PP and found to be OK.

The estimated annual electricity is based on the PLF of 87.84% which has been considered as per the O & M offer of the equipment supplier. The project revenue is sensitive to the electricity generation, project cost, fuel cost, and tariff and O& M expenses. Hence the sensitivity analysis has been carried out by the PP for the above variables to the tune of -10% to +10%. The calculation has been reviewed and concluded that that the project activity has IRR less than the benchmark value, clearly indicating that the project is</td></tr>
</table>

Step as per VCS 2007.1	Argument	Assessment
		financially not feasible without carbon benefits. ☒ Step passed ☐ Step not passed ☐ Not applicable
Step 3: Common Practice	The other activities similar to the project activity are: ▪ Private sector grid connected power plants ▪ Of similar scale ▪ That take place in a comparable environment with respect to regulatory framework, investment climate, access to technology etc: Within Tamil Nadu (since power tariffs between states are variable) ▪ Those activities that are implemented previously or currently underway The prevalence of gas based power plants is analysed from statistics provided in "Natural Gas in India" – A reference book published by GAIL-Infraline (2003). As per the list of existing and proposed gas based power plants in the book, the	According to official and publicly available data sources of Indian power sector the power generation in India is mainly based on Coal, Gas and Diesel. The prevalence of gas based power plants is stated from statistics provided in "Natural Gas in India" – A reference book/A-CP/1 published by GAIL-Infraline (2003). As per the list of existing and proposed gas based power plants, the installed capacity of IPPs gas based power plants in Tamil Nadu owned by Pillai Perumal Nallur of 331MW. The same is verified from the annual report 2001-02 of Ministry of Power.As indicated above, a 331 MW gas based power plant existed in the region during the conceptualization

Step as per VCS 2007.1	Argument	Assessment
	installed capacity of gas based power plants in Tamil Nadu are as follows: • State owned: 331 MW • Private sector: 331 MW • Total: 662 MW **Occurrence of similar kind of project:** As mentioned above, a 331 MW gas based power plant existed in the region during the conceptualisation of the project activity. As indicated in the reference book, this private sector power plant, PPN Power, comes under the "merit-order" ranking of TNEB. As per TNEB's PPA with this plant, TNEB is liable to pay the fixed charges (allowing for 16% Return on Equity – ROE) irrespective of whether it purchases power from the plant or not. The variable costs are also paid by the TNEB at actual irrespective of fuel prices. This ensures the returns for this plant whereas CECL project activity does not have such provisions. Whereas PPN power can sustain its financial viability irrespective of fuel and other cost factors, CECL cannot	of the project activity. This private sector power plant, PPN Power, comes under the "merit-order" ranking of TNEB. As per TNEB's PPA with this plant,TNEB is liable to pay the fixed charges/A-CP/2 (allowing for 16% ROE) irrespective of whether it purchases power from the plant or not. The variable costs are also paid by the TNEB at actual irrespective of fuel prices. This ensures the returns for this plant, whereas, CECL project activity does not have such provisions. PPN power can sustain its financial viability irrespective of fuel and other cost factors, CECL cannot do so. It may be stated that PPN power and CECL are differentiated by the policy/regulatory framework and therefore are not similar to each other. Since there are no other similar options occurring in the region, the project

Step as per VCS 2007.1	Argument	Assessment
	do so. It may be stated that PPN power and CECL are differentiated by the policy/regulatory framework and therefore are not similar to each other. Since there are no other similar options occurring in the region, the project activity is not a common practice.	activity is not a common practice. ☒ Step passed ☐ Step not passed ☐ Not applicable

However, CAR 3.2.1 to 3.2.7 were raised and closed successfully.

CAR/CL	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 3.2.1 Phase-I&II CECL: Justify the following points 1. When the project has already been commissioned and the project cost figures are reported to be from Balance	/Assumptions /XLS-CECL_Phase-I& Phase-II	1. The project cost break up has been revised accordingly.	/Assumptions //XLS/CECL_NG	The PP has submitted the Purchase orders (PO). The cost mentioned in the financial spread sheet is cross verified

Sheet, the question of contingency cannot arise. 2. In the case of project activity – phase II, project cost at Rs.339 lakhs/MW is much higher than Rs.270 lakhs/MW recommended by Expert Committee on Fuel in February 2004; this project was commissioned in 2003 a year earlier. 3. The specific fuel consumption at 0.2331 going upto 0.2549 SCM/kWh is high compared to	/Assumptions /XLS-CECL_Phase-II /Assumptions /XLS-CECL_Phase-I& Phase-II	2. The project cost indicated by Expert Committee on Fuel in February 2004 is for plant capacity of 2000 MW. Due to economies of size, the project cost of such capacity plants will be lower when compared to that of the project activity – Phase II of capacity 8.73 MW. Further, the project cost of phase II is comparable to the TNEB gas power plant commissioned around the same time as mentioned in the IRR sheet[6]. 3. The SFC indicated by Expert Committee on Fuel in February 2004	/Assumptions //XLS/CECL_NG /Assumptions //XLS/CECL_NG	with PO mentioned above and found in line hence the CAR 3.2.1(1) is closed. As per the general engineering principles the per MW cost variation for larger capacity power plants will be lower than the smaller capacity power plants, hence the CAR 3.2.1(2) The specific fuel consumption details provided by the PP are based on the

[6] http://www.tn.gov.in/policynotes/archives/policy2003-04/energy.pdf

[7] http://www.worldwide-tax.com/india/ind_inflation.asp

[8] http://www.adb.org/Documents/Guidelines/Eco_Analysis/discount_rate.asp

the Expert Committee's recommendation of 0.190 SCM/kWh	/Assumptions /XLS-CECL_Phase-I& Phase-II	is for plant capacity of 2000 MW. Due to economies of size, the SFC of such capacity plants will be lower when compared to that of the project activity of capacity 25 MW. The specific fuel consumption of the project activity has been arrived based on the Net Calorific Value and heat rate as specified by the equipment supplier. Please refer attachment No. 1 & 2 (Technical specifications sheet – already submitted to the DOE).	/Assumptions //XLS/ CECL_NG	Technical specifications provided by the equipment supplier. Moreover, according to the general engineering principles the SFC for larger capacity power plants will be lower than the smaller capacity power plants. Hence the CAR 3.2.1(3) is closed.
4. When the project is already commissioned, actual term loan sanctioned and terms thereof should be considered instead of hypothetical figures, particularly having regard to the fact that the repayment and moratorium period are based on actual term loan	/Financials/ XLS-CECL_Phase-I& Phase-II	4. The actual loan terms are now considered.	/Assumptions //XLS/ CECL_NG	The loan amount provided in the financial spread sheet are cross verified with the loan sanction letters from Indian Overseas Bank, State Bank of India Andhra bank submitted by the PP and
5. When the				

fuel cost is escalated at 5%, escalating tariff at 4% would render the project additional artificially. Both the escalations should be the same.	/Financial/XLS-CECL_Phase-I& Phase-II	5. The tariff rate fixed by the government is dependent on several factors (like capital cost of power plants, government priorities, fuel mix including renewable energy etc) apart from the fuel cost alone. The pre-dominant quantity of power generation in India is from coal and therefore it is logical to fix the tariff escalation rate equal to that of coal, which is 4%.	/Financial/XLS-CECL_NG	found in order, hence the CAR 3.2.1 (4) is closed.
6. When the life of the plant is stated to be 15 years, restricting the projections to 10 years is not in conformity with Annex 45 of EB 41.	/Financials/XLS-CECL_Phase-I& Phase-II /Assumptions/XLS-CECL_Phase-I& Phase-II	This is also inline with the Indian inflation rate prevailing at that time [7]. Further, though the historic price escalation rate of natural gas	/Financial/XLS-CECL_NG /Assumptions/XLS-CECL_NG	Based on the verification of the agreement signed by the PP with TNEB it was found that there is no indication of escalation in tariff rate, but for a conservative approach the PP has considered the tariff rate escalation as 4%. More over the inflation for the time is cross verified using the weblink : http://www.indiaonestop.com/inflation.htm and found to be ok. Hence the CAR 3.2.1(5) is closed
7. Financia				

l years like 2003-04, 2004-05 etc, should be used instead of 1,2,3 and the projections should be in conformity with the commencement date of generation of the project.	/Assumptions /XLS-CECL_Phase-I& Phase-II	was around 16%, we have assumed a very conservative value of 5%. 6. The IRR has now been calculated for the lifetime of the project activity, which is 15 years.		The projections for the cashflow have been revised by the PP for 15 years and the projections were found ok. Hence the CAR 3.2.1 is closed.
8. The regular tax rate does not appear to be correct. When the MAT was 7.88%, regular tax rate was not 39.55%. Moreover, the financial year to which this rate pertains to and the justification for taking that year's rate should also be furnished	/Financials/ XLSCECL_Phase-I& Phase-II	7. The financial years have been included accordingly.	/Financials/ XLS/CECL_NG	The financial years mentioned in numbers are found removed and the financial years are found in order, hence the CAR 3.2.1(7) is closed.
9. While the O&M cost in the first year is in conformity with the input figures	/Financials/ XLSCECL_Phase-I& Phase-II	8. The regular tax rate is now revised to 35.875% (based on tax rates for the assessment year 2004 -05, IT rate - 35%, Surcharge - 2.5%). Please refer to attachment No. 12.	/Financials/ XLSCECL_NG	The PP has provided the IT rates for the year 2004 as per

given in Assumptions sheet, it is not from Year 2 onwards. 10. Discounting cannot commence right from first year. In the first year, the factor should be 1 and discounting should commence from 2nd year onwards. The basis for selecting the discount factor of 10% and its conformity with Additionality Tool should also be explained. 11. The salvage value has not been accounted in the terminal year.	/XLS/CECL_Phase-I& Phase-II	9. The O&M cost input figures are now included accordingly in the assumptions sheet. The O&M costs are based on the offer from the equipment supplier. Please refer attachment No. 13. 10. The discounting is now taken from the second year. The discounting rate is adopted as per prevailing rates used by banks as indicated by ADB8. 11. The salvage /	/XLS/CECL_NG	the Taxmann's Direct Tax 29th edition and the value is checked and found to be inline. Hence the CAR 3.2.1(8) is closed. The O&M cost for this project activity provided by the PP is based on the O&M contract with the equipment supplier and the input figures are found inline with O&M Contract. Hence the CAR 3.2.1(9) is closed. Since the discounting is accounted from the 2nd year the CAR 3.2.1 (10) is closed.

12. Since both the phases of the project activity belong to the same company, though the projections have rightly been prepared separately, they should be merged into one taking care of the years in which each phase commenced generation.		residual value has been now included in the financial assessment sheet. 12. The Phase I and II sheets are now merged and the same is being submitted.		The salvage value provided in the financial spread is cross verified and found inline with general accounting principles, hence the CAR 3.2.1 (11) is closed. The PP has merged the financial spread sheets of both Phase I & Phase II implementation and the assumptions, net cashflow and tax calculations were verified with reference to the commencement period of Phase I & II and found ok. Hence the CAR 3.2.1(12) is closed.

CAR 3.2.2 One of the applicability condition of the Methodology is the availability of adequate natural gas. The Directors' Report for the year 2007-08 states, "Due to reduced availability of gas during the year the unit could generate only 17.37 Crore Units of power during the year as compared to 20.75 Crore Units in the previous year, which was wheeled and used at the cement plants of your company in Tamil Nadu". In the above background, the project activity does not seem to conform to this requirement.	/Sec 2.2/VCS PD	The Company has a fuel supply contract with GAIL, which ensures a supply of gas for a period of 10 years. Further, the production of gas has been on the increasing trend over the last few years. With private players like Reliance entering the market, the production is expected to rise by 40%[9]. Also, the recent report of the CEA has indicated that the NG based projects capacity is likely to increase by 3,500 – 4,500 MW[10].		The PP has signed a fuel supply contract with GAIL for a period of ten years, moreover the availability of the natural gas is adequately assessed in the applicability conditions. Hence the CAR 3.2.2 is closed.

[9] http://www.india-briefing.com/news/india-increase-domestic-oil-and-gas-production-40-percent-117.html/

[10] http://www.financialexpress.com/news/kg-gas-to-increase-power-output-by-3-5004-000-mw-cea/423255/

CAR 3.2.3 On what basis the O&M cost is provided in the assumptions	/Assumptions /XLS-CECL_Phase-I& Phase-II	The O&M Cost is based on the O&M offer provided by the equipment supplier. Please refer attachment no. 13.		The O&M cost provided the financial spread sheet is cross verified with the O&M offer provided by the service provider and found inline. Hence CAR 3.2.3 is closed.
CAR 3.2.4 Justify the appropriateness of the of the financial indicator	/Sec 2.2/VCS PD	According to paragraph 11 of Annex 45 of EB 41 of CDM, "*Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR*". WACC has been now chosen as the appropriate benchmark for the project IRR. The justification		The PP has considered WACC as the benchmark for this project activity, all necessary supportive data for the calculation of WACC were verified and the complete assessment is provided in the Sec 3.2,Step:2 Implementation barrier of the additionalit

		is now provided in section 2.5 of the PD. The project internal rate of return (IRR) is chosen as the appropriate financial indicator for this project activity. The additionality tool states that "For the benchmark analysis, the IRR shall be calculated as project IRR. In line with the above guidance, the project IRR is a suitable financial indicator for the project activity. The justification is now provided in section 2.5 of the PD.		y assessment of this Final Validation Report. Hence the CAR 3.2.4 is closed.
CAR 3.2.5 The following documents to be submitted a) Annual Reports of the		a) Please		The PP has submitted

Company for the years 2004-05 to 2008-09 with annual accounts together with all schedules b) Loan sanction letter c) O&M agreement d) Station Heat Rate – project activity, coal and lignite e) Calorific value – project activity, coal and lignite f) NG cost, coal cost and lignite cost for both the phases	/XLS/CECL /NG	refer attachment No. 14. b) Please refer attachment No. 15 c) Please refer attachment No.16 d) Please refer attachment No. 1, 2 & 3 (already submitted to the DOE) e) Please refer attachment No. (No. 1, 2 & 3 (already submitted to the DOE) f) Please refer attachment No. 17, 18 and 19.		the following documents Annual reports of the company , Loan sanction letter from banks. O&M agreement signed with equipment supplier , CERC notification stating the heat rate. CERC notification stating the Calorific value GAIL Infraline report for the NG price, TNERC report on tariff order (http://tnerc.nic.in/tarorder/chapter4.pdf)

g) Basis for NG, coal and lignite cost escalation		g) Please refer attachment No. 18.		GAIL Infraline Reference book- Annexures for NG price. TNERC report tariff order (http://tnerc.nic.in/tarorder/chapter4.pdf)
h) Basis for power tariff escalation		h) Please refer attachment No. 18		TNERC report tariff order (http://tnerc.nic.in/tarorder/chapter4.pdf)
i) Basis for O&M cost escalation		i) Please refer attachment No. 13.		O&M offer Equipment supplier. The cost inputs provided in the financial spread sheets were verified and found in line with the above mentioned supporting documents. Hence the CAR 3.2.5 (a,b,c,d,ef, g,h,i) is

				closed
CAR 3.2.6 **COAL Phase I&II** Justify the following points 1. CERC Order seems to provide 0.5% loss (though it does not term it as transformer loss) over and above auxiliary consumption only during the stabilization period and not permanently. This may be checked 2. As against an	/Financials/ XLS/ COAL Phase I & II /Assumptions /XLS/COAL Phase I & II	1. This is now removed from the calculations. 2. The coal cost escalation (basic cost and transport cost) has been based on the TNERC tariff order available during the conceptualizat	/Financials/ XLS/ COAL /Assumptions /XLS/COAL /	Since it is removed the CAR 3.2.6 (1) is closed. The inflation for the time is cross verified using the weblink: http://www.indiaonestop.com/inflation.htm and

[11] http://www.adb.org/Documents/Guidelines/Eco_Analysis/discount_rate.asp

escalation of 5 % in the case of NG cost, coal cost has been escalated at 4% only. This does not seem to conform to Additionality Tool. Moreover, in the Financials worksheet, fuel cost has not been subjected to escalation in the I Phase.	/Financials/ XLS/COAL Phase I & II	ion period. Refer Page 114-115, Chapter 4, TNERC Tariff order 2003 – http://tnerc.nic.in /tarorder /chapter4.pdf Further, though the historic price escalation rate of natural gas was around 16%, we have assumed a very conservative value of 5%. The additionality tool states that "(9) Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated." Coal and Gas are different types of fuels with different characteristics, market	/Financials/	found to be ok. The volatile inflation for the time period when compared with the types of inflation the different escalations considered can be accepted. Hence the CAR 3.2.6(2) is closed

		influences, calorific values. Therefore, they will not follow the same trend of market pricing and the same escalation cannot be adopted for the two fuels.	XLS/COAL /	Refer CAR 3.2.1(7)
3. Financial years like 2003-04, 2004-05 etc, should be used instead of 1,2,3 and the projections should be in conformity with the commencement date of generation of the project.	/Assumptions /XLS/COAL Phase I & II Financials/XLS/COAL Phase I & II	The escalation has been included in the IRR workings for coal. 3. The years have been indicated accordingly in the IRR sheets.	/Assumptions /XLS/COAL Financials/XLS/COAL	Refer CAR 3.2.1(8)
4. The regular tax rate does not		4. The regular tax rate is now revised to 35.875% (based on tax rates for the		

appear to be correct. When the MAT was 7.88%, regular tax rate was not 39.55%. Moreover, the financial year to which this rate pertains to and the justification for taking that year's rate should also be furnished	Financials/XLS/COAL Phase I & II	assessment year 2004 -05, IT rate - 35%, Surcharge - 2.5%). Please refer to attachment No.12.		Refer CAR 3.2.1(10)
5. Discounting cannot commence right from first year. In the first year, the factor should be 1 and discounting should	/XLS/COAL Phase I & II	5. The discounting is now taken from the second year. The discounting rate is adopted as per prevailing rates used by banks as indicated by ADB[11].	Financials/XLS/COAL /XLS/COAL	Refer CAR 3.2.1(11) Refer CAR 3.2.1(12)

commence from 2nd year onwards. The basis for selecting the discount factor of 10% and its conformity with Additionality Tool should also be explained.		6. The salvage / residual value has been now included in the financial assessment sheet.		
6. The salvage value has not been accounted in the terminal year.		7. The Phase I and II sheets are now merged and the same is being submitted.		
7. Just as in the case of project activity, though the projections have been prepared separate				

ly to maintain uniformity with project activity, they should be merged into one taking care of the years in which each phase commenced generation.				
CAR 3.2.7 **LIGNITE Phase I&II:** Justify the following points 1. CERC Order seems to provide 0.5% loss (though it does not term it as transformer loss) over and above auxiliary	/XLS/Lignite Phase I & II	1. This is now removed from the calculations.		Since it is removed the CAR 3.2.6 (1) is closed.

[12] http://www.cercind.gov.in/03022007/orderin5of2002.pdf
[13] http://www.adb.org/Documents/Guidelines/Eco_Analysis/discount_rate.asp

consumption only during the stabilization period and not permanently. This may be checked 2. As against an escalation of 5 % in the case of NG cost, Lignite cost has been escalated at 4% only. This does not seem to conform to Additionality Tool. Moreover, in the Financials worksheet, fuel cost has not been subjected to escalation in the I Phase.	/XLS/Lignite Phase I & II /XLS/Lignite Phase I & II	2. The lignite cost escalation (basic cost and transport cost) has been based on the CERC tariff order available during the conceptualization period[12]. Further, though the historic price escalation rate of natural gas was around 16%, we have assumed a very conservative value of 5%. The additionality tool states that "(9) Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated." Lignite and Gas are		The inflation for the time is cross verified using the weblink : http://www.indiaonestop.com/inflation.htm and found to be ok. The volatile inflation for the time period when compared with the types of inflation the different escalations considered can be accepted. Hence the CAR 3.2.7(2) is closed

		different types of fuels with different characteristics, market influences, calorific values. Therefore, they will not follow the same trend of market pricing and the same escalation cannot be adopted for the two fuels.		Refer CAR 3.2.1(7)
	/XLS/Lignite Phase I & II			
3. Financial years like 2003-04, 2004-05 etc, should be used instead of 1,2,3 and the projections should be in conformity with the commencement date of generation of the project.		3. The years have been indicated accordingly in the IRR sheets.		Refer CAR 3.2.1(8)
	/XLS/Lignite Phase I & II			
4. The regular		4. The regular tax rate is now revised to 35.875% (based on tax rates for the assessment year 2004 -05, IT rate - 35%,		

tax rate does not appear to be correct. When the MAT was 7.88%, regular tax rate was not 39.55%. Moreover, the financial year to which this rate pertains to and the justification for taking that year's rate should also be furnished	/XLS/Lignite Phase I & II /XLS/Lignite Phase I & II	Surcharge – 2.5%). Please refer to attachment No.12. 5. The discounting is now taken from the second year. The discounting rate is adopted as per prevailing rates used by banks as indicated by ADB[13].		Refer CAR 3.2.1(10)
5. Discounting cannot commence right from first year. In the first year, the				Refer CAR 3.2.1(11) Refer CAR 3.2.1(12)

factor should be 1 and discounting should commence from 2nd year onwards. The basis for selecting the discount factor of 10% and its conformity with Additionality Tool should also be explained.		6. The salvage / residual value has been now included in the financial assessment sheet. 7. The Phase I and II sheets are now merged and the same is being submitted.		
6. The salvage value has not been accounted for in the terminal year.				
7. Just as in the case of project activity, though the				

projections have been prepared separately to maintain uniformity with project activity, they should be merged into one taking care of the years in which each phase commenced generation.				

3.3 Monitoring Plan

The proposed project uses CDM approved monitoring methodology AM0029 (Version 03, 16th May 2008) – "Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel", which is approved under VCS 2007.1.

The project satisfies all criteria for AM0029. The application of monitoring methodology is assessed as correct.

The monitoring plan 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 following parameters are monitored

- Amount of Gas Consumption during the power generation (scm).
- Net calorific value of Natural gas used for generation of power (kcal/scm or GJ/scm)
- Gross electricity generation (kWh) by the project activity.
- Electricity Import from the grid system (kWh).
- Net quantity of Electricity generated (exported) to the grid by the project activity (kWh).
- Emission factor for Natural gas (tCO2/GJ).
- Oxidation factor of the fuel
- Emission factor for upstream fugitive methane emissions of natural gas from production, transportation and distribution (tCH4/GJ)
- Emission factor of the plants included in the build margin (tCO2/GWh)
- Periodical calibration of monitoring equipments.

The above parameters which are monitored are in line with the monitoring methodology AM0029 and found to be OK.

The gas flow meters are fixed at the site to measure the gas consumption and the flow meter readings are taken by the GAIL personnel and it is informed to the shift incharge. Gas flow meters are calibrated once in three months.

CECL energy meter are used for metering the exported electricity to the grid & imported electricity from grid system. The meters are of accuracy 0.2 % and calibrated as per Industry standards or Power Purchase Agreement. CECL energy meters are used for metering Gross electricity generation and Auxiliary power consumption.

Thus the above monitoring equipments and monitoring procedures have been clearly defined and found to be OK.

Responsibilities related to monitoring are clearly defined in the monitoring plan.

The plant manager is leading a team of shift engineers to operate the power plant and all the data items monitored under the monitoring plan are recorded. A VCS coordinator will be reported by the various departments of the plant personnel.

The on-site visit was carried out on 12/06/2009. Two member of the Validation team attended the site visit.

During the onsite-visit the information above was verified (the Joint Calibration report GAIL India Ltd., Customer Fortnight statement on Net Calorific Value, TNEB Certificate for meter calibration) and all are deemed to be ok.

3.4 Calculation of GHG Emissions

The calculation of emission reductions is based on subtracting project emissions and leakage from the baseline emissions. The baseline emission is calculated by multiplying the generated electricity of the project activity with the baseline CO_2 emission factor

Following the AM0029 methodology, Out of the three options available for selecting baseline emission factor, the Build margin factor of current generation mix (0.71 tCO2/MWh) is lower than the other two options; hence it has been selected as baseline emission factor.

the build margin (BM) methodology calculated ex-post was chosen to calculate the emission factor for the electricity consumption by the project activity.

The calculation method of the BM is derived from the guide of BM calculation issued by CO_2 Baseline Database for the Indian Power Sector, User Guide (Version 4, Date: November, 2008) issued by CEA.

Project emission calculations are done as per the methodology AM0029 and found to be OK.

Hence no CARs/CLs were raised

3.5 Environmental Impact

The Environmental Impact Assessment (EIA) study for this project activity was conducted by M/s.Enviro Care Engineers, Madurai, and Tamilnadu. and the report of the EIA study was submitted by the PP. The general principle of EIA study has been followed by the environmental consultant and same was incorporated in the report. The PP has also obtained the relevant air and water consents from Tamilnadu Pollution Control Board (TNPCB) and all necessary statutory clearances from the respective bodies/SC/.

Hence, no CAR/ CL were raised.

3.6 Comments by stakeholders

The promoters organized formal & informal stakeholder consultation with the objective to inform the local interested stakeholders which include local residents, local panchayat, Tamil Nadu Electricity Board, NGOs. 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 15th October 2004

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.

No CAR/ CL were raised.

4 Validation conclusion

M/s. Coromandel Electric Company Limited (CECL) on behalf of the project participant has commissioned the TÜV NORD JI/CDM Certification Program to carry out the validation of the project – "Natural Gas Based Grid Connected Power Generation Project at Valantharavai", with regard to the relevant requirements of VCS 2007.1 Standard as well as criteria for consistent project operations, monitoring and reporting.

The project activity generates electricity which will be wheeled through the Southern regional Grid of India and then transmitted for captive consumption..

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 8 Corrective Action Requests (CAR) and 2 Clarification Request (CL) 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 methodology of AM0029 version 3.0.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 434180/XLS-NG/ tCO_2e (total) is most likely to be achieved during the chosen fixed 10 years crediting period.

No restrictions or uncertainties were identified related to the validation.

Mr. Ma. Paa. Puratchikkanal Rainer Winter

Team Leader	Final approval
Bangalore, 2009-11-10	Essen, 2009-11-18

TÜV NORD JI/CDM Certification Program

5 References

Table 5-1:Documents provided by the project proponent

Reference	Document
/CC/	Commissioning Certificates of Natural Gas engines
/DEC/	Declaration letter that the "the project has not created another form of environmental credit"
/XLS/	IRR calculation sheets consisting of Investment Analysis, Emission Reduction Calculation, Returns from Project activity, profitability projections of the Project and levelised cost for Natural gas, Coal & Lignite power plants.
/LSC/	Local stakeholder interviews
/ORG/	Organization chart.
/PD/	• PD draft version • PD Final version
/CR/	Calibration Report of all monitoring equipments.
/PO/	Purchase orders Natural Gas Engines
/O&M/	Operation and maintenance agreement
/LOG/	Daily Log book sample copies
/SC/	Consent for operation from Tamil Nadu Pollution control Board
/SD/	Proof of starting date of project activity. (based on Commissioning Certificates)
/B-CCGT/	For exclusion of Based on the Heat rate of NG – 2000 Kcal/kWh, Coal – 2500 KCal/kWh, lignite – 2750 KCal/kWh, – CERC Norms 2001
/B-Energy	For inclusion of Energy Source-3(Baseline Scenario -1-

Reference	Document
Source-1/	Power generation technologies using energy sources other than natural gas)as an alternative Based on the Heat rate of NG – 2000 Kcal/kWh, Coal – 2500 KCal/kWh, lignite – 2750 KCal/kWh, – CERC Norms 2001
/B-Energy Source-2/	For exclusion of Energy Source-2(Baseline Scenario –3- Power generation technologies using energy sources other than natural gas)as an alternative Based on the Heat rate of NG – 2000 Kcal/kWh, Coal – 2500 KCal/kWh, lignite – 2750 KCal/kWh, – CERC Norms 2001
/B-Energy Source-3/	For exclusion of Energy Source-3(Baseline Scenario –3- Power generation technologies using energy sources other than natural gas)as an alternative- Diesel prices as of March 2003 - http://uk.reuters.com/article/oilRpt/idUKDEL169742008021 4
/B-Energy Source-4/	For exclusion of Energy Source-4(Baseline Scenario –3- Power generation technologies using energy sources other than natural gas)as an alternative- **http://www.thehindu.com/2008/02/12/stories/2008021255351000.htm**
/B-Energy Source-5/	For exclusion of Energy Source-5(Baseline Scenario –3- Power generation technologies using energy sources other than natural gas)as an alternative- **http://greenbusinesscentre.com/Documents/smallhydro.pdf**
/B-IMP/	For exclusion of Import from other grid as an alternative- **http://www.tn.gov.in/policynotes/energy.htm#1**
/B-TPP/	For exclusion of Third party purchase as an alternative- TamilNadu government's "Policy on Captive Power Generation"

Table 5-2:Background investigation and assessment documents

Reference	Document
/AM0029/	Approved Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas (Version

Reference	Document
	3.0)
/CPM/	TÜV Nord JI / CDM CP Manual (incl. CP procedures and forms)
/GCP/	• Voluntary Carbon Standard Project Description Template • UNFCCC: Guidelines for Completing the Project Design Document (CDM- -PDD)
/GHG/	The Greenhouse Gas Protocol, The GHG Protocol for Project Accounting
/IPPC-RM/	• 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book • 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/KP/	Kyoto Protocol (1997)
/MA/	Decision 17/CP.7 (Marrakesh - Accords)
/VVM/	Validation and Verification Manual

Table 5-3: Websites used

Reference	Link	Organisation
/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.	M. Panneerselvam	Manager,(CECL)
/IM01/	☒ Mr. ☐ Ms.	P. Sabarinathan	O&M Executive, (Wartsila)

/IM01/	☐ Mr. ☒ Ms.	B. Priya	Associate Consultant (E&Y)

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