



NO. 1, PERSIARAN DATO' MENTERI, SECTION 2,
40700 SHAH ALAM, SELANGOR DARUL EHSAN
MALAYSIA
Tel.: 603-55446479
Fax: 603-55446787
www.sirim-sqas.com.my

Validation Report

Project Title:

**GRID CONNECTED NATURAL
GAS BASED POWER PROJECT
IN RAIGAD DISTRICT,
MAHARASTRA, INDIA**

Report No.: SQAS-CDM- ES12880094

Date : 27th July 2015



| | |
|--|--|
| Date of first issue: 17 th August 2012 | Project No.: SQAS-CDM- ES12880094 |
| Approved by: Parama Iswara Subramaniam | Project title : Grid connected natural gas based power project in Raigad District, Maharashtra, India |
| Client: Pioneer Gas Power Limited (PGPL) | Designated Operational Entity : SIRIM QAS International Sdn Bhd |

Summary:

SIRIM QAS International Sdn Bhd has performed a validation of the project "Grid connected natural gas based power project in Raigad District, Maharashtra, India", based on the Kyoto Protocol requirements, UNFCCC rules and associated interpretations. The validation exercise was not meant to provide any consulting to the project participants. However, the stated requests for clarifications and/or corrective actions may provide input for improvement of the project design. The validation consisted of three phases; i) a document review of the project design documents and preparation of validation protocol, ii) on-site visit to the project activity and interviews with the project developer and the project consultant, and iii) resolution of outstanding issues and the issuance of final validation report and validation opinion.

The proposed CDM project activity is construction and operation of a new, Greenfield 388 MW grid connected natural gas based combined cycle power plant near the MIDC Ville-Bhagad, Mangaon Taluk, Raigad District, Maharashtra, India. The main energy generating components of the project activity include one gas turbine generator (1 x 259 MW), one heat recovery steam generator (HRSG) and one steam turbine generator (1 x 129 MW). The main purpose of the project activity is to generate electricity using natural gas, a less carbon intensive fuel and supply 2788 GWh of electricity every year to NEWNE Grid, dominated by fossil fuel fired generating unit and thereby reducing 1,328,673 tonnes of CO₂ annually.

The validation process, from contract review to the issuance of validation report and validation opinion was conducted in accordance with SIRIM QAS Intl.'s internal procedures. The first output of the validation process was a list of corrective action requests and clarification requests (CAR and CL) which is presented in Table 3 of Appendix A of this report. As a result of these findings, the PDD was revised by the client to version 6.0. In summary, it is the opinion of SIRIM QAS Intl.'s that the proposed CDM project activity has correctly applied the baseline and monitoring methodology for the project activity and meets the relevant UNFCCC requirements for the CDM and the relevant host country criteria.

| | | |
|--|-----------|------------------------|
| Report No.: SQAS-CDM- ES12880094 | | |
| Report title: Grid connected natural gas based power project in Raigad District, Maharashtra, India | | |
| Work carried out by: | | |
| Mr. A. Prabu Das | : | Validation team leader |
| Mr. V. Sai Prasad | : | Technical Expert |
| Mr. R. Vijayaraghavan | : | Validation team member |
| Mr. Nanjunda Reddy | : | Financial Expert |
| Technical reviewer : | | : Mr. K. Sudheendra |
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Abbreviations

| | |
|------------------|---|
| AM | Approved Methodology |
| BSE | Bombay Stock Exchange |
| CAR | Corrective Action Request |
| CAPM | Capital Asset Pricing Model |
| CDM | Clean Development Mechanism |
| CEA | Central Electricity Authority |
| CEF | Carbon Emission Factor |
| CER | Certified Emission Reductions |
| CERC | Central Electricity Regulatory Commission |
| CH ₄ | Methane |
| CIL | Coal India Limited |
| CL | Clarification Request |
| CO ₂ | Carbon Dioxide |
| CO _{2e} | Carbon Dioxide Equivalent |
| DOE | Designated Operational Entity |
| DNA | Designated National Authority |
| DPR | Detailed Project Report |
| EB | Executive Board |
| EPC | Engineering Procurement Contract |
| FSA | Fuel Supply Agreement |
| GAIL | Gas Authority of India Limited |
| GCV | Gross Calorific Value |
| GHG | Greenhouse gas(es) |
| GSCP | Global Stakeholders Consultation Process |
| GTG | Gas Turbine Generator |
| GWP | Global Warming Potential |
| HRSG | Heat Recovery Steam Generator |
| IEA | International Energy Association |
| IRR | Internal Rate of Return |
| IPCC | Intergovernmental Panel on Climate Change |
| LoA | Letter of Approval |
| LNG | Liquefied Natural Gas |
| MMBTU | Million Metric British Thermal Unit |
| MoC | Modalities of Communication |
| MoEF | Ministry of Environment and Forest |
| MoPNG | Ministry of Petroleum and Natural Gas |
| MoV | Means of Verification |
| MP | Monitoring Plan |
| MMPA | Million Metric Tonnes Per Annum |
| NG | Natural Gas |
| NCDMA | National CDM Authority |

| | |
|-----------------|---|
| NEWNE | North East West NorthEast |
| NTP | Notice To Proceed |
| ODA | Official Development Assistance |
| O&M | Operation and Management |
| ONGC | Oil and Natural Gas Corporation |
| OIL | Oil India Limited |
| PDD | Project Design Document |
| PGPL | Pioneer Gas Power Ltd |
| PLF | Plant Load Factor |
| PPA | Power Purchase Agreement |
| QA/QC | Quality Assurance/Quality Control |
| RIL | Reliance India Limited |
| RLNG | Regassified Liquefied Natural Gas |
| SCM | Standard Cubic Metre |
| SIRIM QAS Intl. | SIRIM QAS International Sdn Bhd |
| SHR | Station Heat Rate |
| STG | Steam Turbine Generator |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VVS | Validation and Verification Standard version 07 |
| WACC | Weighted Average Cost of Capital |

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Appendix A: Validation Protocol

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1.0 INTRODUCTION

1.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan (MP), and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. The validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope

The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

SIRIM QAS has based on the recommendations in the Validation and Verification Standard (VVS) version 7.0 employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.

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

1.3 Validation Team

The following validation team has been assigned to carry out the validation of the project.

| Name | Involvement | | | | | | |
|--------------------------------|------------------------|------------------------|------------------|-------------------|-------------|---------------|---------------------|
| | Validation team leader | Validation team member | Technical Expert | (Financial Expert | Desk review | On-site audit | Sectoral competence |
| Mr. A. Prabu Das | √ | | | | √ | √ | √ |
| Mr. V. Sai Prasad | | | √ | | √ | √ | √ |
| Mr. R. Vijayaraghavan | | √ | | | √ | | |
| Mr. Nanjunda Reddy (financial) | | | | √ | | | |

The qualification of each individual validation team member is detailed in Appendix C to this report

Mr. A. Prabu Das, holds a M. Tech Degree in Energy Conservation & Management and B. Tech Degree in Petrochemical Technology. He has around 6 years of work experience in design of biomass power plants, preparing Techno Economic Feasibility Reports (TEFR), carrying out energy audits, of which last four years have been in CDM consultancy and validation services. He is a certified Energy Auditor approved by the Government of India. He has undergone extensive training on CDM validation and verification and has been qualified in accordance with SIRIM QAS Intl.'s qualification criteria as CDM lead auditor.

Mr. Sai Prasad holds BE in Mechanical Engineering. He has more than 36 years of experience in the field of Engineering, Project Management, Construction, Operation & Maintenance and Industrial Health, Safety & Environment for oil & gas installations. He has been trained in the CDM validation and verification processes, and is a qualified Technical Expert as per SIRIM QAS Intl.'s qualification criteria.

Mr. R. Vijayaraghavan holds BE in Mechanical Engineering, M.Tech in Energy Conservation and Management and MBA in Technology Management. He is certified as Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has 7 years of working experience in energy sector. He has been trained in the CDM validation and verification processes, and has been qualified as trainee CDM lead auditor in accordance with SIRIM QAS Intl.'s qualification criteria.

Mr. Nanjunda Reddy is a B.Com graduate and passed C.A Inter. He has more than 12 years of experience in the field of accountancy. He is a qualified financial expert in accordance with SIRIM QAS Intl.'s qualification criteria.

The qualification criteria of each individual validation team member are presented in Appendix C to this report.

1.4 Technical Reviewer

Mr. K. Sudheendra holds a Degree in Bachelor of Engineering in Electrical Engineering. He has more than 30 years of experience in Energy Sector. He has been trained in the CDM validation and verification processes, and is a qualified Technical Reviewer as per SIRIM QAS Intl.'s qualification criteria.

2.0 METHODOLOGY

SIRIM QAS International's validation process consists of the following phases:

- i) a document review of the project design documents and preparation of validation protocol;
- ii) on-site visit to the project activity and interviews with project developer and project consultant; and
- iii) resolution of outstanding issues and the issuance of final validation report and opinion

In order to ensure transparency, a validation protocol was customised for the project according to the VVS version 07. The protocol describes criteria (requirements), means of verification and the results from the validation of the identified criteria, in a transparent manner. The validation protocol serves the following purposes:

- it organizes, details and clarifies the requirements that a CDM project is expected to meet;
- it ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The completed validation protocol is enclosed in Appendix A of this report.

During the validation, non-fulfillment of the validation protocol criteria or identified risks to the fulfillment of project objectives were raised as either CAR or CL. Corrective Action Requests (CAR) were issued, where:

- i) mistakes had been made that directly impacted on the project results; or
- ii) CDM requirements had not been met; or
- iii) there was a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The Clarification Requests (CL) were issued where additional information was needed to clarify issues, and Forward Action Requests (FAR) for issues relating to project implementation that required review during the first verification of the project activity.

2.1 Document Review of PDD and Other Documents

The first PDD version 01^{1/} submitted by the project participant and additional background documents related to the project design and baseline were reviewed as an initial step of the validation process. During the course of validation (document review, onsite visits and follow up interviews), the PDD was revised to version 6.0^{1.1/} based on the CAR/CLs raised. A complete list of all documents and records reviewed is as attached in Section 6.0 of this report.

Main changes between the version published for the 30 days stakeholder commenting period and the final version of PDD (version 6.0)^{1.1/} submitted for registration are as follows:

| Criteria | Webhosted PDD | Final PDD |
|-----------------------|---|--|
| PDD Version No. | Version 01 ^{1/} | Version 6.0 ^{1.1/} |
| Project Description | Incomplete / Inconsistent information on <ul style="list-style-type: none"> Equipment suppliers Choice of data/parameters considered in emission reductions | Complete and information provided on <ul style="list-style-type: none"> Equipment manufacturer/suppliers Justification for the choice of parameters chosen in CER calculations |
| Host Country Approval | Not Provided / indicated | Provided HCA letter dated 18 th December 2012 |
| CER estimate | 1,505,877 tonnes of CO ₂ e | 1,328,673 tonnes of CO ₂ e |
| Baseline | Coal based power plant with no mention of the technology type | Domestic coal based power plant based on supercritical technology |
| Baseline alternatives | Exhaustive alternative scenarios not considered Levelised cost of generation (INR/kWh) Coal plant - 2.00 NG plant - 3.54 | Following alternatives considered <ul style="list-style-type: none"> Sub-critical and super critical technology using imported coal Naphtha based power plant <u>Levelised cost of generation (INR/kWh)</u> NG combined cycle plant (credible alternative 1) - 3.821 Subcritical domestic coal based power plant (credible alternative 2) - 2.806 Subcritical imported coal based power plant (credible alternative 3) – INR. 3.925/kWh Supercritical domestic coal based power plant (credible alternative 4) – INR. 2.687/kWh Supercritical imported coal based power plant (credible alternative 5) – INR. 3.758/kWh |
| Additionality | Financial indicator: Levelised cost of generation | Financial indicator: Post tax project NPV <u>Benchmark analysis:</u> |

| | | |
|-----------------------------|--|--|
| | Levelised cost of generation analysis: Levelised cost of generation (INR/kWh) Coal plant - 2.00 NG plant - 3.54 | Project NPV of the NG power plant (the proposed project activity) – (-) 47560 (negative) |
| Monitoring | Monitoring practices in PDD not in line with actual practices | PDD updated with details of actual monitoring practices |
| Project Emissions / Leakage | PDD has considered GWP of methane as 21 kg CO ₂ /kg CH ₄ . | PP has considered GWP of methane as 25 kg CO ₂ /kg CH ₄ . for the second commitment period |

The complete details of the changes to PDD during validation process are indicated in Table 3 of the report as evidenced from the CAR/CLs, replies by PP and closure by the validation team.

2.2 Follow-up interviews

SIRIM QAS Intl. conducted visits to the project site from 27/06/2012 to 28/06/2012 confirm the information and to resolve issues identified in the document review. The table below provides a list of all persons interviewed and the main topics covered

| NAME | ORGANISATION | TOPICS |
|--|---|---|
| Mr. Rajeev Puri Ms. Seema Pant Mr. Sainath Mr. A. Mahendran | PGPL, President PGPL, Company secretary PGPL, Deputy General Manager Shreyas Corporate Concept Private Ltd, CDM Consultant | <ul style="list-style-type: none"> ➤ General information about the project. ➤ CDM consideration. ➤ Baseline determination ➤ Financial analysis, project barrier and additionality. ➤ Monitoring and management. ➤ Stakeholder consultation. |
| Mr. D. Pavan Kumar Mr. M. Sasi Kumar Mr. A. Mahendran | PGPL, Site incharge PGPL, General Manager, Projects Shreyas Corporate Concept Private Ltd, (CDM Consultant) | <ul style="list-style-type: none"> ➤ Operation and maintenance procedures. ➤ Training. ➤ Calibration and maintenance of monitoring & measuring equipment. ➤ Potential risk and the emergency procedures. |
| Mr. Mahadev Mr. Rajendra Ram | Sarpanch, Ville Bhagad Farmer, Ville Bhagad | <ul style="list-style-type: none"> ➤ Stakeholders consultation meeting |

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve the corrective action requests and clarifications and any other outstanding issues which needed to be clarified prior to SIRIM QAS Intl.

positive conclusion on the project design. During the validation process, 9 CARs and 17 CLs were raised.

All the CARs and CLs were resolved during this phase. In order to ensure the transparency of the validation process, the concerns raised and responses that were given are summarized in Section 3 of this report and documented in more detail in Table 3 of the Details of the findings and the resolutions are as in Table 3 of Appendix A of this report. All the corrective actions have been incorporated into the PDD version 6.0 and CER calculation spreadsheet

2.4 Internal quality control

SIRIM QAS Intl. has established an internal quality control process. A Technical Reviewer is appointed to review the final draft validation report and the final validation report. The comments made by the Technical Reviewer are taken into consideration and incorporated in the final report.

The final report (after resolutions of all findings) is then submitted to the CDM Quality Manager for review and approval.

3.0 VALIDATION FINDINGS

3.1 Participation requirements

Pioneer Gas Power Ltd. (PGPL) is the project participant and the host country is India. India ratified the Kyoto Protocol on 26th August 2002 and meets the participation requirements of the CDM. The validation team determines that PGPL (only project participant) has been authorized by the Party involved (NCDMA) in a letter of approval by the review of the letter of approval.

Further, the participation requirements were validated based on the confirmation of the following:

- The project participant is listed in section A.3 of the PDD.
- The information is consistent with the contact details provided in Annex 1 of the PDD.
- The participation of the project participant has been approved by the host Party (India) involved, as confirmed in the letter of approval.
- No entity other than that approved as project participant is included in the relevant sections of the PDD.

Further, on review of the Host country approval letter (Ref No. 4/16/2012-CCC, dated 18th December 2012)^{2/}, the following confirmation was done:

- The Party is a Party to the Kyoto Protocol;
- Participation of PP in the proposed project activity is voluntary;
- In the case of the host Party, the proposed project activity contributes to the sustainable development of the country;
- It refers to the precise proposed project activity title in the PDD being submitted for registration.
- letter(s) of approval is unconditional with respect to the above conditions

Hence it is concluded by the validation team that the project is in compliance with the participation requirements as in para 39 to 53 of the VVS.

Also it was determined that the letter(s) of approval has been issued by the Indian DNA (NCDMA, as confirmed from the list of DNAs available at UNFCCC) and is valid for the proposed project activity under validation.

In this section, one CL was raised as follows:

- CL 1 - The host country approval letter for the project activity has not been provided

These issues were adequately addressed, resolved and closed in the revised PDD. The resolution of the CAR is represented in Table 3: Resolution of Corrective Action and Clarification Requests.

3.2 Modalities of Communication

A statement of Modalities of Communication (MoC)^{/3/} with the EB and UNFCCC secretariat has been issued and signed by authorized person of PGPL. The latest version of the MoC was found to be appropriate as it clearly defined the responsible parties for communicating with the EB and UNFCCC regarding the issuance of CER of the proposed CDM project.

In line with para 55 of VVS, the corporate identity of the project participant has been verified by the FORM 1 - Certificate of Incorporation and Certificate for Commencement of Business^{/4/} during the document review and the on-site audit.

The validation team also verified that the MoC statement was received from the project participant with whom SIRIM has a contractual relationship. It was also verified that the official submitting the MoC statement to the validation team was duly authorized to do so on behalf of the respective project participant.

Hence the validation team also confirms that the MoC statement has been correctly completed and duly authorized and is in line with requirements of para 54-62 of VVS.

In this section, CL 2 was raised as during the on-site, the MoC was not provided to the validation team. Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.3 Project Design Document

The project document uses the latest CDM-PDD-FORM, version 5.0, currently valid and hence acceptable. Heading/logo, format/font follows the standard requirements. The corresponding sections of the PDD are correctly filled and followed according to the guidelines for completing Project Design Document form as indicated in the valid version of the CDM-PDD-FORM^{/5/}. Thus the PDD is complying with the current forms and guidelines and para 63 and 64 of VVS.

3.4 Description of Project Activity

The project activity of PGPL involves the installation of a 388 MW natural gas fired combined cycle power plant located near MIDC Ville-Bhagad, Mangaon Taluk, Raigad District, Maharashtra, India., for generation of electricity and the project activity is connected to the NEWNE Grid of India.

The geographical coordinates of the project activity are 73° 21' Latitude and 18° 22' Longitude. The geographical coordinates of the project activity as mentioned in the PDD were cross checked with globally accessible satellite based imagery data software and found to be consistent. The site details such as the survey number and village were cross checked with land documents^{/6/} and found to be correct. As on date of the site visit the validation team verified that the commercial operation had not started and erection of equipment was in progress.

The project activity is the construction and operation of a new natural gas fired grid-connected electricity generation using combined cycle power plant. As per the scopes of the project activity listed in the "List of Sectoral scopes" (Document CDM-ACCR-06 Version 04)', the project activity falls under

scope number 1, sectoral scope – Energy industries (non-renewable sources) being a Grid-connected electricity generating project using non-renewable fuel in energy industries.

This power plant, operating on a comparatively cleaner fuel natural gas will lead to lower carbon dioxide emissions for producing equivalent amount of power using carbon intensive fossil fuels like coal and will help in reducing the carbon intensity and power deficiency of NEWNE grid.

The PDD and other relevant documents such as EPC contract^{/8/}, Notice to proceed to EPC contractor^{/7/} and Host Country Approval^{/2/} were verified and found that the project activity capacity is 388 MW. Further, all the supporting documents submitted for CDM validation of the project activity such as determination of additionality and the estimation of the CERs, and the physical site verification confirmed the project capacity as 388 MW.

In order to validate the technical specifications of the project activity as mentioned in the PDD, the technical specifications of the equipment were cross verified with the details provided by the equipment supplier^{/8/} and were found to be correct and consistent.

The project activity has chosen a fixed crediting period of 10 years, starting from 01st April 2016 or the date of registration of the project activity with CDM EB, whichever is later. This was verified during the discussion with the PP and compared with the expected operational life time of 25 years as mentioned in CERC Tariff regulations, 2009^{/9/} and is considered reasonable.

The validation team has verified that the project has not received any public funding and/or Official Development Assistance (ODA). The project is a unilateral project and has considered 75%:25% (actual) debt to equity ratio as per the audited Annual Financial report^{/10/}.

The project design is sound and reflects good engineering practices and the geographical (Near MIDC Ville-Bhagad, Mangaon Taluk, Raigad District, Maharashtra, India) and temporal boundaries of the project are clearly defined. The project boundary consists of the equipment viz., gas turbine generator, steam turbine generator, heat recovery steam generator, auxiliary equipment of the combined cycle power plant, and all power plants connected physically to the baseline grid, which is the NEWNE Grid of India.

The project activity plant is not yet commissioned and PPA has not been signed. The project is expected to displace 2,788 GWh of fossil fuel dominated energy from NEWNE Grid, which is equivalent to 1,328,673 tonnes of CO_{2e} per annum.

The validation team confirms that the project descriptions and project design in PDD were accurate and complete based on the document review, on-site inspection and interviews conducted, thus meeting the requirement of para 65–70 of VVS.

In this section, one CAR and one CL were raised as follows:

- CAR 1 - the description of the project activity with respect to project implementation and subsequent operation, information on whether the generated electricity is sold to grid or any third party – any PPA signed with respect to sale of power, any Fuel Supply Agreement (FSA) in place to secure the fuel are not evident from section A.1 of the PDD.
- CL 3 - Section C.2.2 of the PDD indicates start date of crediting period as 09/10/12 or the date of registration. Since the project is in early stages of civil works as evident from the site visit, documents submitted and discussions, the indicated start date is not realistic.

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.5 Baseline and Monitoring Methodology

The 388 MW natural gas based combined cycle power project uses the approved baseline methodology AM0029 ("Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas", version 3) applying which the request for registration submission is permitted until 11 Dec 2015(<https://cdm.unfccc.int/methodologies/DB/WW4I82DG7LJUQE5E5YGT1NZE4PNS60>) and hence accepted. Further justification of the applicable methodology is provided below.

3.5.1 Applicability of the Selected Methodology

The 388 MW natural gas based combined cycle power project uses the approved baseline methodology AM0029 ("Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas", version 3). The applicability of the methodology has been discussed in section B.2 of PDD and the project fulfills the applicability conditions as below:

| Applicability condition as per AM0029 | Justification |
|---|--|
| <p>Condition 01 The project activity is the construction and operation of a new natural gas fired grid-connected electricity generation plant;</p> <p><i>Footnote reference cited for Applicability Condition – 01</i> <i>Natural gas should be the primary fuel. Small amounts of other start-up or auxiliary fuels can be used, but can comprise no more than 1% of total fuel use, on energy basis.</i></p> | <p>The validation team, by reviewing the EPC contract^{8/} and land sale documents and based on the onsite visit, has concluded that the project activity is the construction and operation of a new 388 MW capacity natural gas fired power plant.</p> <p>As verified from discussions with the PP and review of technical specifications^{8/} of the project equipment, the project activity involves utilization of natural gas (including LNG) as the only fuel source to generate power. No secondary fuels will be used for the electricity generation.</p> <p>Use of startup fuels if any will be less than 1% of total fuel use on energy basis, hence this applicability condition is satisfied and accepted.</p> |
| <p>Condition 02 The geographical / physical boundaries of the baseline grid can be clearly identified and information pertaining to the grid and estimating baseline emissions is publicly available;</p> | <p>As the project is located in Maharashtra, the baseline grid for the proposed project is the NEWNE Grid. The physical boundaries of the baseline grid are identified and its information is publicly available from CEA database^{12/} version 7.0 published by CEA Central Electricity Authority, Government of India.</p> <p>Hence the project satisfies condition 2.</p> |
| <p>Condition 03 Natural gas is sufficiently available in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity.</p> <p><i>Footnote reference cited for</i></p> | <p>Based on the CDM EB clarification (F-CDM-AM-Clar_Resp_ver 01.1 – AM_CLA_0091), the validation team has asserted that the spirit of emphasizing "sufficient availability" of NG in the methodology as an applicability criterion is:</p> <ul style="list-style-type: none"> ➤ to ensure that NG from other users are not diverted and ➤ to ensure future power generation facilities of comparable size are not deprived due to NG being taken up by the project activity. <p>Justification for gas availability is as detailed below:</p> |

| | |
|---|--|
| <p>Applicability Condition – 03 <i>In some situations, there could be price supply constraints (e.g., limited resources without possibility of expansion during the crediting period) that could mean that a project activity displaces natural gas that would otherwise be used elsewhere in an economy, thus leading to possible leakage. Hence it is important for the project proponent to document that supply limitations will not result in significant leakage as identified here.</i></p> | <p>Domestic Gas availability</p> <p>The PP has referred the data from Infraline in April 2009^{/11/} for substantiating the sufficient availability of natural gas to the project activity and that gas allocation from existing power plants is not diverted for the setting up for this project activity. The validation team has verified the source used and the data available. According to the document the 11th planning commission has projected domestic gas supply from 2007-2012. The gas availability from Government Agencies such as ONGC, OIL and from Private firms / Joint ventures has been projected at 197.09 MMSCMD during 2010-2011, just prior to the decision making of the project activity. Further during 2011-2012, the capacity was projected to increase to 202.3 MMSCMD. Accounting for a capacity of 8.87 MMSCMD in 2007-08, the total increase in capacity in 2011-2012 amounts to 57% increase which averages to approximately 11% increase / year. Consolidated data on the overall supply demand balance mentions projected demand of 262.07 MMSCMD natural gas in 2011-2012, as against a total supply of 267.09 MMSCMD, thus effectively bridging the demand supply gap. Moreover, the demand is based on all sectors such as power, fertiliser, city gas, industrial, petrochemical and steel industries. Out of this power sector alone is expected to account for 114.20 MMSCMD in 2010-2011. The document also lists the expected supply up to 2017 based on the privately owned / Joint venture field's alone. From 22.21 MMSCMD in 2007, the capacity is projected to increase to 99.09 MMSCMD excluding the anticipated additional gas production from RIL and GSPC. Including this there is an additional increase ranging from 3.50 -7.00 MMSCMD gas from 2010-2011 onwards.</p> <p>Considering the heat rate and GCV of NG being 1624.35 kCal/kWh and 10000 kCal/SCM respectively, the NG requirement works out to be 469.28 Million SCM /year, or 1.28 Million SCM per day which is only 1.18% of the projected total gas availability of 108.64 MMSCMD during 2010-2011. Even considering that the project plant is expected to utilise 85% of the total fuel from domestic gas supplies, the requirement decreases further.</p> <p>From the analysis of the above data, the validation team accepts that based on projections of domestic gas availability based on data available in 2011, the requirement of the applicability condition is fulfilled by the project activity.</p> <p>As the plant is expected to be commissioned in the year 2014, the validation team has assessed currently available data to further confirm the applicability condition to the project plant activity. The data on the projects yielding power with regard to the capacity addition targets set in the 11th planning commission indicated as 3316 MW from state sector NG power projects and 2037 MW from Private / joint venture sector NG power projects. The Petroleum and Natural Gas statistics published by MoPNG in</p> |
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January 2013^{47/} indicate the total domestic gas production from various sources in 2010-2011 as 140.40 MMSCMD which is higher than the total gas availability of 108.64 MMSCMD as projected during the 11th Year plan.

Moreover the report also lists the revised projections for natural gas production as on 30th April, 2012 projected to increase from 117.80 MMSCMD in 2012-2013 to 175 MMSCMD in 2016-2017. This works out to increase of 32% across five years which amounts to approximately 6% increase per year.

Hence based on the forecasted trends and considering the domestic NG requirement of the project activity, the validation team accepts that the requirements of the applicability conditions are fulfilled.

The validation team has also independently analyzed all the existing natural gas based power plants considered for indigenous natural gas allocation by the Government of India^{48/} during the month of March 2013 which establishes that the usage of natural gas from other users are not diverted due to the proposed project activity.

| No | Name of the existing natural gas power plants | Installed capacity |
|-----|---|--------------------|
| 1. | Faridabad CCPP | 432 MW |
| 2. | Anta CCPP | 419 MW |
| 3. | Auraiya CCPP | 663 MW |
| 4. | Dadri CCPP | 830 MW |
| 5. | Gandhar CCPP | 657 MW |
| 6. | Kawas CCPP | 656 MW |
| 7. | Ratnagiri CCPP | 1967 MW |
| 8. | I.P CCPP | 270 MW |
| 9. | Pragati CCPP-III | 1000 MW |
| 10. | Pragati CCPP | 330 MW |
| 11. | Dhuvaran CCPP | 219 MW |
| 12. | Hazira CCPP | 156 MW |
| 13. | Hazira CCPP Ext | 351 MW |
| 14. | Utran CCPP | 518 MW |
| 15. | Pipavav CCPP | 351 MW |
| 16. | Uran CCPP | 672 MW |
| 17. | Vatwa CCPP | 100 MW |
| 18. | Trombay CCPP | 180 MW |
| 19. | Rithula CCPP | 108 MW |
| 20. | Baroda CCPP GIPCL-11 | 160 MW |
| 21. | Essar CCPP | 300 MW |
| 22. | Peguhtan CCPP | 655 MW |
| 23. | Sugen CCPP | 1148 MW |
| 24. | Uno Sugan | 383 MW |
| 25. | Gautami CCPP | 464 MW |
| 26. | GMR Energy Tanirbavi | 220 MW |
| 27. | Godavari CCPP | 208 MW |

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|--------------|---------------------|-----------------|
| 28. | Jegurupadu CCPP | 455 MW |
| 29. | Konaseema CCPP | 445 MW |
| 30. | Kondapalli Ext CCPP | 366 MW |
| 31. | Kondapalli CCPP | 350 MW |
| 32. | Peddapuram CCPP | 220 MW |
| 33. | Vemagiri CCPP | 370 MW |
| 34. | Vijeswaram CCPP | 272 MW |
| Total | | 15895 MW |

The total NG consumption for the installed capacity of 15895 MW operating at 85% PLF (GCV of NG as 10000 kCal/SCM) works out to 60.24 MMSCMD. As the total domestic gas production from various sources as on 2010-2011 was 140.40 MMSCMD the validation team infers that the remaining NG is sufficient to supply the requirements (1.28 MMSCMD) of the project activity.

The validation team also analyzed all the natural gas based power plants which are under construction as on March 2013 which shows future power generation facilities of comparable size are not deprived due to NG being taken up by the proposed project activity.

| S. No | Name of the natural gas power plants under construction | Installed capacity |
|--------------|---|--------------------|
| 1. | Pragati III | 560 MW |
| 2. | Pipavav CCPP | 351 MW |
| 3. | Dhuvaran Ext | 375 MW |
| 4. | GMR Vemagiri | 768 MW |
| 5. | Kondapalli Ext | 770 MW |
| 6. | Samalkot Ext | 2400 MW |
| 7. | Panduranga CCPP | 116 MW |
| 8. | Kashipur Sravanthi I&II | 450 MW |
| 9. | Beta Infratech CCPP | 225 MW |
| 10. | Gama Infraprop CCPP | 225 MW |
| 11. | Dahej SEZ Torrent | 1200 MW |
| Total | | 7440 MW |

The above table shows that still there are proposals for the tune of 7440 MW natural gas based power plants in India which further reinforces the fact that the project activity does not displace natural gas that would otherwise be used elsewhere in an economy of the country or region. Hence, satisfying the project activity's demand for natural gas will not lead to shortages in supplies of the gas to other projects within the country

RLNG availability:

Based on the data provided by the PP^{11/} the forecasted LNG supply is projected to increase from 30.45 MMSCMD to 83.13 MMSCMD amounting to 64% increase which averages to approximately 12.5% increase/ year.

Also, in order to cater to additional LNG to be available from

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| | <p>future imports, emphasis is being laid on creation of additional LNG infrastructure. From the scenario in 2007-08, where there was two LNG terminals, namely 5 MMTA terminal at Dahej and 2.5 MMTA terminal at Hazira, the following para illustrates the rapid expansion of the RLNG terminal capacity which is expected to reach 20 million tonnes a year by 2012-13</p> <p>India consumed about 63 billion cubic metres (BCM) of gas in 2010-11, including about 12 BCM of LNG, mostly (over 80%) imported from Qatar. The largest shares of this gas (about 45%) went to the power sector, followed by the agricultural sector (28%), where it was used mostly as feedstock for fertiliser production. Piped natural gas for cooking in private homes, and compressed natural gas to power vehicles, were also major uses.</p> <p>The majority of this came through the Petronet terminal in Gujarat, which has a handling capacity of 10 million tons per year of LNG and has been running above capacity. The only other operating LNG terminal in the country is the Shell-and-Total owned Hazira terminal, which has a handling capacity of about 2.5 million tons per year and is considering an expansion.</p> <p>The validation team has reviewed the pipelines international website^{/11/} in which the following is reported. In Gujarat, in the northwest, the Dahej terminal is looking at an expansion. To the south along the west coast in Maharashtra, is the Dabhol terminal, a 5 million tonne per annum (MTPA) facility in Ratnagari district. It recently received its first LNG cargo and is planned to expand initially to 7.5 MTPA and then to 10 MTPA.</p> <p>Further south and still on the west coast, Petronet's Kochi terminal, is another 5 million MTPA facility which is set scheduled to begin commercial operations in the year 2013 On the southeast coast, Indian Oil is planning working on plans for a 5 MTPA terminal at Ennore, near Chennai in Tamil Nadu. Moving north along the east coast, GAIL is proposing at a 3.5-5 MTPA terminal offshore at Vishakapatnam. Even further north, Indian Oil is working a 5 MTPA terminal at Dhamara, in Odisha.</p> <p>Considering the projected LNG availability of 70 MMSCMD in 2010-2011 and the requirement of the project activity at 30% of the total fuel consumption, estimating NG GCV as 10000 kCal/SCM, the NG requirement of the project activity works out to be 140.78 Million SCM per year or 0.38 Million SCM per day which is 0.55% of the projected LNG available during 2010-2011.</p> <p>As the project plant is expected to be commissioned in the year 2016, the validation team has assessed currently available data to further confirm the applicability condition to the plant activity. The Petroleum and Natural Gas statistics published by MoPNG in January 2013^{/47/} indicate the total LNG imports from various sources in 2010-2011 as 11.03 MMSCMD out of the project requirement of 0.38 MMSCMD.</p> |
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| | <p>Moreover the report also lists the revised projections for natural gas production as on 30th April, 2012 projected to increase from 63 MMSCMD in 2012-2013 to 150 MMSCMD in 2016-2017. This works out to increase of 58 % across five years which amounts to approximately 11.5% increase per year.</p> <p>Hence based on the forecasted trends and considering the domestic LNG requirement of the project activity, the validation team accepts that the requirements of the applicability conditions are fulfilled.</p> <p>The above information was checked and verified to be correct from the note on gas availability provided^{/11/} which described the realistic historical gas supply scenario and the projected supply scenario which bridges the supply demand gap at the time of investment decision in 2011. Also during interview with PGPL, it was found that the management is in talks with major suppliers like Hazira LNG private Ltd, Petronet (suppliers of R_LNG), GAIL and RIL (suppliers of domestic gas) and PP has also already applied for 1.7 MMSCMD (which is the project activity requirement at 100% PLF) to MoPNG for gas allotment. Hence considering the above justification and the gas required by PGPL, it is reasonable to expect that gas is sufficiently available and there is no diversion of gas from other users nor will future expansion projects be affected by the operation of the project activity even at full load.</p> |
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In accordance with the requirements of paragraph 71 to 83 of the VVS, the validation team is of the opinion that the proposed project activity meets the applicability requirement of AM 0029 version 03.

In this section, two CARs were raised as follows:

- CAR 2 - The PDD mentions information in support of the applicability condition of the methodology which states that natural gas should be sufficiently available in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity. However evidences via documents / links are not provided to substantiate the same.
- CAR 4 - Power evacuation arrangement described in B.7.3 of the PDD is not in line with the grid connectivity letter submitted.

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.5.2 Project Boundary

As per the applicable methodology AM0029 version 03, the spatial extent of project boundary includes the project site and all power plants connected physically to baseline grid as defined in "Tool to calculate emission factor for an electricity system" version 4.0.

The spatial extent of the project boundary was verified by means of the description in the PDD and the grid details available from the Central Electricity Authority (CEA, version 07)^{/12/}. The project activity boundary therefore includes the project plant and also all power plants connected physically to the NEWNE grid of India that the CDM project power plant is itself connected to. As evidenced from the

physical inspection, the plant is yet to be commissioned and the erection of equipment is in progress. The power plant is proposed to be physically connected to the grid, at the project site switchyard from where the electricity generated by the plant is evacuated to the grid. The project activity is a new plant that would be set up and the validation team confirms from the site visit observations and interviews that the following project activity equipment would form part of the project boundary:

- a) Gas turbine and generator (GTG)
- b) Heat recovery steam generator (HRSG)
- c) Steam turbine generator (STG)

The validation team accepts that the above equipment can be indicated as part of the project boundary. The delineation of the project boundary is also clearly depicted in the plant layout drawing^{13/} submitted by the project participant to the validation team.

The project participant has chosen CO₂ as the GHG emissions that will take place in the project activity. This emission is accounted for in the project emissions calculations presented in section B.6.1 & B.6.3 of the PDD which is validated as per this report. As the combustion of natural gas in the project activity gives rise to CO₂ emissions, the inclusion of this gas as an emission source is considered appropriate.

In the absence of the project activity, an equivalent amount of energy generated by the project activity would be produced by carbon intensive power plants connected to the grid. As the power plants connected to the NEWNE grid are mainly fossil fuel fired plants, the emissions taking place in the baseline would also be CO₂ emissions. The consideration of only CO₂ gas for the baseline emissions is conservative and is in line with the methodology and hence acceptable.

The validation team confirms that there are no other sources of GHG emissions in the project boundary, other than the CO₂ emissions referred to above as project emissions. The project design is sound, the geographical (MIDC Ville-Bhagad, Mangaon Taluk, Raigad District, Maharashtra, India) and temporal boundaries of the project activity are clearly defined.

The identified project boundary for the project activity and the selected sources and GHG gases meets the requirement and in line with the para 84 to 89 of VVS.

3.5.3 Baseline Identification

The validation team has assessed whether the alternative analysis has included the following categories as per the requirements of the methodology:

- The project activity not implemented as a CDM 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 validation team has assessed that whether the alternatives analysis considered the parameters such as similar capacity, load factor and operational characteristics, delivery of similar services (e.g. peak vs. base load power) and compliance with all applicable legal and regulatory requirements prevailing in the host country.

As per the requirements of the methodology the identification of alternative baseline scenarios should include all possible realistic and credible alternatives that provide outputs or services comparable with the proposed CDM project activity (including the proposed project activity without CDM benefits), i.e., all type of power plants that could be constructed as alternative to the project activity within the grid boundary (as defined in "Tool to calculate emission factor for an electricity system").

In line with this, the proposed alternatives and their justification for inclusion as credible alternatives are as follows:

| No. | Alternative | Justification by the validation team |
|-----|---|--|
| 1. | The natural gas fired combined cycle project (388 MW) is intended to connect to the NEWNE grid of India and it complies with all the legal and regulatory requirement (Credible Alternative 1) Proposed project activity not undertaken as CDM project activity | The project activity which is the generation of power using Natural gas is a credible alternative, which is expected to supply base load to NEWNE grid. Compared to both subcritical and super-critical plants, the efficiency of 46.48% which is sourced from DPR ^{/23/} (Heat rate being 1850 kCal/kWh and considering 1 kWh is equal to 860 kCal) is higher and use of Natural Gas makes it less polluting and offers a cleaner source for energy production in comparison to the carbon intensive fossil fuel dominated grid. Neither the Indian Electricity Act 2003 ^{/14/} nor any law restricts the alternative. Hence this option is a realistic and credible alternative and therefore considered for economic analysis to identify the most attractive scenario. |
| 2. | Natural gas fired power generation in open cycle mode | Natural gas power plant in the open cycle mode can meet only the peak demand requirement as per the CERC tariff regulations, 2009 ^{/9/} whereas the purpose of proposed project activity is to meet the base load requirement. Further, due to low efficiency (25-35%) which is sourced from power plant reference book ^{/15/} as compared to the combined cycle because of the high exhaust (heat) loss, it does not deliver comparable output. Hence, it is not considered as the credible alternative and excluded from further analysis. Moreover, the validation team had observed that of the NG based power plants in India, there is almost none of the NG plant operating in open cycle mode ^{/12/} . Hence exclusion of open cycle NG power plant as a credible option, is accepted by the validation team. |
| 3. | Sub-critical domestic coal based power plant operating at the efficiency range of 35.47% (Heat rate being 2423.94 kCal/kWh) as specified in by CERC tariff regulations 2009 ^{/9/} . (Credible Alternative 2) | The sub critical coal based power plant, which is a viable and credible alternative and is expected to meet the base load requirements of the NEWNE grid, is acceptable. Neither the Indian Electricity Act 2003 ^{/14/} nor any law restricts the alternative. Hence this option is a realistic and credible alternative and therefore considered for economic analysis to identify the most attractive scenario. |
| 4. | Sub-critical imported coal based power plant operating at the efficiency of 37.14% (Heat rate being 2315.31 kCal/kWh) as specified in CERC tariff regulations, 2009 ^{/9/} . (Credible Alternative 3) | Sub-critical plant using imported coal is a viable and credible alternative as trends available at the time of investment decision indicate. In March 2011, India had imported a total tonnage of around 7.707 Million Metric Tonnes (up 66.42 percent from 4.631 Million Metric Tonnes in February) for supply to its power plants. India remained the largest importer of Indonesian coal since January 2011. The information was verified from lee universal blogspot ^{/16/} |
| 5. | Super critical domestic coal | Domestic coal based super-critical alternative is both a credible |

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| | based power plant operating at the efficiency of 37.11% (Heat rate being 2317.44 kCal/kWh) as specified in CERC tariff regulations 2009 ^{9/} . (Credible Alternative 4) | and viable alternative ^{42/} as it has higher efficiency compared to sub critical plant and is able to deliver the base load to the power deficient NEWNE gird. Considering the lesser coal consumption, comparatively less polluting technology and significantly higher efficiency with advanced technology, several plants of higher capacities in India have been planned with super critical technology. Neither the Indian Electricity Act 2003 nor any law restricts the alternative. Hence this option is a realistic and credible alternative and therefore considered for economic analysis to identify the most attractive scenario. |
| 6. | Super critical imported coal based power plant operating at the efficiency of 38.84% ^{9/} (Heat rate being 2214.14 kCal/kWh) as specified in CERC tariff regulations, 2009 ^{9/} . (Credible Alternative 5) | Imported Coal based super-critical alternative is both a credible and viable alternative ^{42/} as it has higher efficiency compared to sub critical plant and is able to deliver the base load to the power deficient NEWNE grid. The availability of imported coal in India was verified from http://leeuniversal.blogspot.in/2011/04/india-imports-more-coal-from-indonesia.html . |
| 7. | Lignite based power plant | Lignite based plants are set up only near the lignite mines (Pit head) owing to the specific fuel characteristics of the lignite. Since there are no such mines or lignite resources in Maharashtra ^{12/} , this is not a possible alternative. Hence, it is not considered as the credible alternative and excluded from further analysis. |
| 8. | Naphtha based power plants | The option though a credible alternative is not considered viable as it is costly compared to both coal and gas fired power plants for future power generation in India. In support of this the validation team has referred Oil and gas journal ^{17/} which is a publically available document which indicates that natural gas could replace Naphtha based power generation as the government is encouraging plants operating using Naphtha to convert to Natural gas as fuel source. The validation team has verified the non-viability of Naphtha for power generation as even during 2009-2012 no power project based on naphtha as fuel was cleared by the Indian Power Ministry ^{18/} . |
| 9. | Wind power generation | Wind mill based power generation is subjected to seasonal variations and has low PLF of 23 – 30 % as considered by Electricity Regulatory Commission of India (Central ^{46/} and Maharashtra State). These characteristics make the option unviable to deliver the base load output. Hence, it is not considered as the credible alternative and excluded from further analysis. |
| 10. | Hydro power projects; • Run of river • Reservoir based | Both types of hydro power projects are suited for meeting only the peak load ^{41/} requirement of the grid and also the varying plant load factor which ranges from 40-60%, makes it unreliable to deliver comparable output services. Hence, it is |

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| | | not considered as the credible alternative and excluded from further analysis. |
| 11. | Nuclear energy based power generation. | Policies related to nuclear energy based power generation are developed exclusively by Government of India (GoI), available to Nuclear Power Corporation of India Limited which shows that private parties cannot develop a nuclear power plant in India. The validation team has verified this information from the World Nuclear association website ^{19/} http://www.world-nuclear.org/info/inf53.html Nuclear Power Corporation is not governed by the Indian Electricity Act, 2003 and is not subject to jurisdiction of Indian Electricity Regulatory Commissions. Hence, it is not considered as the credible alternative and excluded from further analysis. |
| 12. | Import from regional grids | As the regional grids in India are power deficient themselves, the validation team verified the periodical reports published by the Central Electricity Authority (cea.nic.in), this option is not a possible scenario. Also, Indian Electricity Act, 2003 does not specify the huge withdrawal of power by independent power producing entities. Hence, it is not considered as the credible alternative and excluded from further analysis. |
| 13. | Diesel based power plant | Only a cluster of small capacity diesel based power plants can give a comparable output as that of the project activity. List of such plants connected to the NEWNE Grid that are in operation since 1960s ^{12/} were evaluated and found that only two such plants are in operation and the recent one being a decade old (of 6 MW) that was set up by Government in a remote hilly region. Further, the share of diesel based power plants in the entire (fossil fuel) energy mix of NEWNE is a meager 0.23%. It is evident from the analysis that grid connected diesel plants are set up only by Government and not considered as an option by the Independent Power Producers. Hence it is concluded that diesel option is not considered as a credible alternative and excluded from further analysis. |

As recommended in the methodology, the levelised cost of electricity generation in INR/kWh is used as financial indicator for selecting the cheapest credible alternative as baseline by investment comparison.

The levelised cost was calculated for the plausible baseline options to the proposed project activity, as mentioned below:

1. Combined cycle natural gas based power plant (Proposed project activity not undertaken as CDM project activity)- Credible Alternative 1
2. Sub critical domestic coal based power plant – Credible Alternative 2
3. Sub critical imported coal based power plant – Credible Alternative 3
4. Super critical domestic coal based power plant – Credible Alternative 4
5. Super critical imported coal based power plant – Credible Alternative 5

From the levelised cost analysis, (detailed in additionality section 3.6.2) it is concluded by the validation team that, Super Critical domestic coal based power plant (Credible alternative 4) is the most

economically attractive alternative for producing power in Maharashtra at the time of investment decision and thus conclusively establishes the baseline scenario.

The validation has validated that the requirements of baseline identification as per para 90 to 100 and 119 to 123 of the VVS are satisfied.

In this section, one CAR and one CL were raised as follow:

- CAR 3 - Option of super critical technology coal power plants is considered as a credible alternative using step 1 of the applied methodology, however it is not subjected to assessment based on investment analysis.
- CL 5 - The PDD does not justify the basis on which all the possible realistic and credible alternatives that provide outputs or services comparable with the proposed CDM project activity are identified.
- Clarify the reason of excluding the option of using diesel to generate power.

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.6 Additionality

As specified in the approved methodology AM0029 version 03, the assessment and demonstration of additionality has been carried out based on sub-step 2b - option II- Investment comparison analysis as well as by applying sub-step 2b – option III – benchmark analysis. The levelized cost of generation for all the plausible options to the proposed project activity for the investment comparison analysis and 'project NPV' for the benchmark analysis has been calculated and presented.

The key assumptions in validating the appropriateness and justification for each of the parameters for the project activity and the baseline alternatives without CDM benefits are explained in the investment analysis section 3.6.2 in the report subsequently.

3.6.1 Prior Consideration of the CDM

As per the CDM Guidance (Glossary of CDM terms, version 07, EB 70), the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. Minor pre-project expenses, e.g. the contracting of services / payment of fees for feasibility studies or preliminary surveys, are not to be considered in the determination of the start date as they do not necessarily indicate the commencement of implementation of the project (EB 41, Meeting Report, para 67).

The investment decision was made on April 15th, 2011^{/20/}. Subsequent to the investment decision date, the (Notice To Proceed) NTP (dated 09/02/2012^{/7/}) was accepted by the EPC contractors TATA Projects Ltd^{/21/}. The NTP was importantly linked to the financial closing as per EPC contract and without issuance of NTP, the agreements could be terminated by giving notice from either party. Hence, NTP is accepted as the start date as the project participant has committed to expenditures related to the implementation or related to the construction of the project activity which has led to the commencement of implementation of the project.

Thus, validation team based on the above has confirmed that the CDM start date of the project activity, reported in the PDD, is in accordance with Glossary of CDM terms version 7.0 fulfills the requirements of para 112 of VVS.

As the start date of the project activity is 09th February, 2012 (the date of acceptance of Notice to Proceed by the EPC contractor) which is after 2nd August, 2008, prior consideration of CDM for the project activity is demonstrated as per para 2 of Guidelines on the Demonstration and Assessment of Prior Consideration of the CDM, Version -04 (EB 62, Annex 13). The paragraph recommends that "*The project participant*

must inform a Host Party designated national authority (DNA) and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date and shall contain the precise geographical location and a brief description of the proposed project activity, using the standardized form F-CDM-Prior Consideration. Such notification is not necessary if a project design document (PDD) has been published for global stakeholder consultation or a new methodology proposed to the Executive Board for the specific project before the project activity start date."

The project participant had informed the Host Party Designated National Authority (NCDMA), of the commencement of the project activity and their intention to seek CDM status on 27th April 2012 (e-mail dated 27th April 2012)^{/22/} which is within six months of the project activity start date (09th February 2012).

The validation team has accessed the publically available notifications in the UNFCCC website^{/22/} as per the guidance provided in para 3 of the EB 62, Annex 13 which indicated the receipt of the prior consideration by UNFCCC on 27th April, 2012, which is within six months of the start date (09th February 2012).

Hence the information confirmed that PGPL had provided that notification for prior consideration to UNFCCC and as per requirements of para 4 of EB 62, Annex 13 guidelines the validation team determines that the CDM was seriously considered in the decision to implement the project activity.

The project was published for global stakeholders' consultation through UNFCCC website^{/1/} from 16th May 2012 to 14th June 2012. Since this is the first webhosting, the validation team has accepted as a CDM event.

The validation team has concluded that the requirements of prior consideration as per para 111 to 118 of the VVS are satisfied.

In this section, one CL was raised as follows:

- CL 4 - The board note mentions a natural gas power plant of capacity ranging from 380-425 MW. However the actual implemented capacity (as per technical specifications of the EPC contract) is 388 MW. The environmental clearances indicate a proposed plant capacity of 425 MW while the actual implemented capacity (as per technical specifications of the EPC contract) is 388 MW.

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.6.2 Investment Analysis

As recommended in the methodology, the levelised cost of electricity generation in INR/kWh is used as financial indicator for investment analysis.

The levelised cost was calculated for the plausible baseline options to the proposed project activity, as mentioned below. The key assumptions in validating the appropriateness and justification for each of the parameter for determining the levelised cost of generation for the project activity is detailed in below section. The validation team has observed that PP has used input parameters that are relevant to the type of technology used and therefore accepted by the validation team as reasonable as per the justification provided below.

1. Combined cycle natural gas based power plant (Proposed project activity not undertaken as CDM project activity)- Credible Alternative 1
2. Sub critical domestic coal based power plant – Credible Alternative 2
3. Sub critical imported coal based power plant – Credible Alternative 3

4. Super critical domestic coal based power plant – Credible Alternative 4
5. Super critical imported coal based power plant – Credible Alternative 5

Alternative 1. Combined cycle natural gas based power plant (Proposed project activity not undertaken as CDM project activity) – Credible Alternative 1

| Parameter / Value | Justification | | | | | | | | | |
|--|--|-----------------------------------|--|-----------------------|----------------------|---------------|--------|--|---------------|--------|
| Choice of financial indicator = post tax project NPV | PP has considered post tax Project NPV as financial indicator. In response to CL 8 raised by the validation team regarding the correctness of negative project IRR being indicated in the sensitivity analysis, PP had changed the financial indicator to Project NPV. Since project NPV is also taking into account debt and equity portions of the investment for the calculation, the validation team has accepted the project NPV as financial indicator for demonstrating additionality. | | | | | | | | | |
| Capacity = 388 MW (for the project activity not undertaken as CDM) Source: Third party DPR dated 20 th August 2010 ^{/23/} | <p>The validation team has reviewed the DPR and the capacity is mentioned as 388 MW in the DPR prepared by third party contractors and it is found available during investment decision period (15th April 2011).</p> <p>This was cross checked with the EPC contract^{/8/} dated December 2011 which has mentioned a 388 MW capacity for which the conditions of the contract have been finalized. Review of the technical specifications of the equipment also confirmed that the capacity of the project activity is 388 MW. Hence, the capacity indicated is correct and acceptable.</p> | | | | | | | | | |
| Auxiliary consumption =3.50% (for the project activity not undertaken as CDM) Source: Third party DPR dated 20 th August 2010 ^{/23/} | <p>The validation team has reviewed the DPR which was available at the time of investment decision based on which auxiliary consumption is considered as 3.50% and therefore accepted by the validation team.</p> <p>The validation team has crosschecked the value with auxiliary consumption for combined cycle NG power plants mentioned in CERC tariff regulations, 2009^{/9/} and as well as in Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/} found that the auxiliary consumption is indicated as 3%. The validation team has independently assessed the levelised cost of generation and project NPV with this value and found that the resultant levelised cost of generation is more than that of atleast one of the other credible alternatives and resultant project NPV is still less zero.</p> <table><tr><td>Auxiliary consumption as per CERC</td><td>Resultant Levelised cost of generation</td><td>Resultant project NPV</td></tr><tr><td>At 3.50% (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At 3% (as per CERC tariff regulations, 2009 and Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009)</td><td>INR 3.802/kWh</td><td>-44942</td></tr></table> | Auxiliary consumption as per CERC | Resultant Levelised cost of generation | Resultant project NPV | At 3.50% (Base case) | INR 3.821/kWh | -47560 | At 3% (as per CERC tariff regulations, 2009 and Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009) | INR 3.802/kWh | -44942 |
| Auxiliary consumption as per CERC | Resultant Levelised cost of generation | Resultant project NPV | | | | | | | | |
| At 3.50% (Base case) | INR 3.821/kWh | -47560 | | | | | | | | |
| At 3% (as per CERC tariff regulations, 2009 and Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009) | INR 3.802/kWh | -44942 | | | | | | | | |
| PLF = 85% (for the project activity not undertaken as CDM) Source: Explanatory Memorandum to the | <p>The validation team has reviewed the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/}, available at the time of investment decision based on which the input value is sourced. Hence the PLF is accepted by the validation team as appropriate.</p> <p>The validation team has reviewed CERC tariff regulations, 2009^{/9/} and found that the PLF is exactly matching hence accepted by the validation team.</p> | | | | | | | | | |

| Draft Amendments to the CERC tariff regulations, 2009 ^{/24/ 19/} | <p>Though sensitivity analysis has covered the increase of PLF by 10%, the validation team has further independently assessed the levelised cost of generation with PLF of 100% and the results are tabled below. From the table it is clear that even with 100% PLF, the resultant levelised cost of generation is more than that of atleast one of the other credible alternatives and resultant project NPV is still negative.</p> <table><tr><th>PLF</th><th>Resultant Levelised cost of generation</th><th>Resultant project NPV</th></tr><tr><td>At 85% (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At 100% (Maximum possible)</td><td>INR 3.686 / kWh</td><td>-26487</td></tr></table> | PLF | Resultant Levelised cost of generation | Resultant project NPV | At 85% (Base case) | INR 3.821/kWh | -47560 | At 100% (Maximum possible) | INR 3.686 / kWh | -26487 | | | |
|---|---|--------------------------|--|-----------------------|---------------------|---------------|--------|--|-----------------|--------|----------------------------------|-----------|-------|
| PLF | Resultant Levelised cost of generation | Resultant project NPV | | | | | | | | | | | |
| At 85% (Base case) | INR 3.821/kWh | -47560 | | | | | | | | | | | |
| At 100% (Maximum possible) | INR 3.686 / kWh | -26487 | | | | | | | | | | | |
| <p>Station heat rate = 1850 kCal/kWh</p> <p>(for the project activity not undertaken as CDM)</p> <p>Source : Third party DPR dated 20th August 2010^{/23/}</p> | <p>The validation team has reviewed the DPR^{/23/} dated 20th August 2010 which is available at the time of investment decision based on which the input value is considered.</p> <p>The validation team crosschecked the value in Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/} in which heat rate is mentioned as 2000 kCal/kWh. The validation team accepted the input value of 1850 kCal/kWh as it is conservative compared to 2000 kCal/kWh.</p> <p>As per the EPC contract^{/8/} signed, the heat rate for the project activity is 1624.35 kCal/kWh including correction factor of 1.05. The validation team has calculated the levelised cost of generation and project NPV with this value and found that the resultant levelised cost of generation is more than that of atleast one of the other credible alternatives and resultant project NPV is still less than zero.</p> <p>Further the validation team has crosschecked the heat rate in CERC Tariff regulations 2009^{/9/}, where range of heat rates of existing NG power plants is indicated to be falls between 2000 kCal/kWh and 2400 kCal/kWh, the validation team has independently calculated the levelised cost of generation and project NPV with this value and found that the resultant levelised cost of generation is more than that of atleast one of the other credible alternatives and resultant project NPV is still less than zero.</p> <table><tr><th>Design Station heat rate</th><th>Resultant Levelised cost of generation</th><th>Resultant project NPV</th></tr><tr><td>At 1850 (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At 2000 (as per CERC tariff regulations, 2009 and Explanatory Memorandum to CERC tariff regulations)</td><td>INR 4.058/kWh</td><td>-79704</td></tr><tr><td>At 1624.35 kCal/kWh (as per EPC)</td><td>INR 3.466</td><td>-1802</td></tr></table> | Design Station heat rate | Resultant Levelised cost of generation | Resultant project NPV | At 1850 (Base case) | INR 3.821/kWh | -47560 | At 2000 (as per CERC tariff regulations, 2009 and Explanatory Memorandum to CERC tariff regulations) | INR 4.058/kWh | -79704 | At 1624.35 kCal/kWh (as per EPC) | INR 3.466 | -1802 |
| Design Station heat rate | Resultant Levelised cost of generation | Resultant project NPV | | | | | | | | | | | |
| At 1850 (Base case) | INR 3.821/kWh | -47560 | | | | | | | | | | | |
| At 2000 (as per CERC tariff regulations, 2009 and Explanatory Memorandum to CERC tariff regulations) | INR 4.058/kWh | -79704 | | | | | | | | | | | |
| At 1624.35 kCal/kWh (as per EPC) | INR 3.466 | -1802 | | | | | | | | | | | |
| Period of assessment = 20 years (Common for all the credible alternatives) | PP has considered 20 years as the period of assessment which is in line with para 3 of EB 62, Annex 5 which state that calculations for financial indicators shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or if a shorter period is | | | | | | | | | | | | |

| <p>Source: Investment analysis guidelines (Para 3, EB 62, Annex 5)</p> | <p>chosen include the fair value of the project activity assets at the end of the assessment period. In general a minimum period of 10 years and a maximum of 20 years will be appropriate.</p> <p>Since PP has included the salvage value at the end of 20 years in the investment analysis, even though the lifetime of project and baseline alternatives is mentioned as 25 years in the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/}, , the validation team has accepted the approach.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------------------|---------------------|---------------|--------|-----|----------|-------------|---------|------------------------|---------|------------------------------|----------|---------------|---------|------------------------|---------|----------------------------|---------|--------|---------|-----------------------------|---------|--------------------|---------|--------------|---|---------------------|--|-----------------------|----------------------------|---------------|--------|---|---------------|--------|
| <p>Capital cost = INR 159,080 Lakhs (INR 410 Lakhs/MW)</p> <p>(for the project activity not undertaken as CDM)</p> <p>1 Lakh = 0.1 Million</p> <p>Source: Third party DPR dated 20th August 2010^{/23/}</p> | <p>The validation team has reviewed the DPR prepared by third party contractors for 388 MW capacity NG power plant from which the capital cost is based and accepted the same to be appropriate. This is in line with the requirements of para 6 of investment analysis guidelines and is hence accepted.</p> <p>The project cost of INR 410 Lakh/ MW is much lower than that mentioned for combined cycle natural gas power plant in Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/} (INR 450 Lakhs/MW). The validation team has accepted the value as it is conservative.</p> <p>The validation team has cross checked the cost with the loan sanction letter^{/25/} provided by the consortium of banks and accepted the estimated cost specified in the DPR^{/23/}. The break-up of the components indicated are as follows:</p> <table><tr><th>Component</th><th>Cost (INR in Lakhs)</th></tr><tr><td>Land and site</td><td>600.00</td></tr><tr><td>EPC</td><td>71180.00</td></tr><tr><td>Civil works</td><td>9706.00</td></tr><tr><td>Pre-operative expenses</td><td>6260.00</td></tr><tr><td>Interest during construction</td><td>14920.00</td></tr><tr><td>Contingencies</td><td>5087.00</td></tr><tr><td>Working capital margin</td><td>1551.00</td></tr><tr><td>Erection and commissioning</td><td>7898.00</td></tr><tr><td>Spares</td><td>3390.00</td></tr><tr><td>Engineering and consultancy</td><td>1379.00</td></tr><tr><td>Project management</td><td>1324.00</td></tr><tr><td>Total</td><td>INR. 123,295.00 Lakhs or INR. 317.77 Lakhs/MW)</td></tr></table> <p>The validation team has independently assessed the levelised cost of generation with these values and the results are tabled below.</p> <table><tr><th>Actual capital cost</th><th>Resultant Levelised cost of generation</th><th>Resultant project NPV</th></tr><tr><td>At 410 Lakh/MW (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At 450 Lakh/MW (as per Explanatory Memorandum to CERC tariff regulations)</td><td>INR 3.872/kWh</td><td>-59061</td></tr></table> | Component | Cost (INR in Lakhs) | Land and site | 600.00 | EPC | 71180.00 | Civil works | 9706.00 | Pre-operative expenses | 6260.00 | Interest during construction | 14920.00 | Contingencies | 5087.00 | Working capital margin | 1551.00 | Erection and commissioning | 7898.00 | Spares | 3390.00 | Engineering and consultancy | 1379.00 | Project management | 1324.00 | Total | INR. 123,295.00 Lakhs or INR. 317.77 Lakhs/MW) | Actual capital cost | Resultant Levelised cost of generation | Resultant project NPV | At 410 Lakh/MW (Base case) | INR 3.821/kWh | -47560 | At 450 Lakh/MW (as per Explanatory Memorandum to CERC tariff regulations) | INR 3.872/kWh | -59061 |
| Component | Cost (INR in Lakhs) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Land and site | 600.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EPC | 71180.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Civil works | 9706.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pre-operative expenses | 6260.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Interest during construction | 14920.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contingencies | 5087.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Working capital margin | 1551.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Erection and commissioning | 7898.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Spares | 3390.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Engineering and consultancy | 1379.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Project management | 1324.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | INR. 123,295.00 Lakhs or INR. 317.77 Lakhs/MW) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Actual capital cost | Resultant Levelised cost of generation | Resultant project NPV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| At 410 Lakh/MW (Base case) | INR 3.821/kWh | -47560 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| At 450 Lakh/MW (as per Explanatory Memorandum to CERC tariff regulations) | INR 3.872/kWh | -59061 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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|---|---|--|--|-----------------------|------------------------|---------------|--------|---|---------------|--------|--|---------------|--------|-------------------|----------------|--------|
| | <table><tr><td>At INR 317.77 Lakhs/MW (as per loan sanction letter)</td><td>INR 3.705/kWh</td><td>-21179</td></tr></table> | At INR 317.77 Lakhs/MW (as per loan sanction letter) | INR 3.705/kWh | -21179 | | | | | | | | | | | | |
| At INR 317.77 Lakhs/MW (as per loan sanction letter) | INR 3.705/kWh | -21179 | | | | | | | | | | | | | | |
| | <p>The table shows that even the actual value of capital cost, the resultant levelised cost of generation is more than that of atleast one of the credible alternatives and resultant project NPV is still less than zero. . From the above analysis it is evident that the project is additional even after applying the actual cost sanctioned by the lending banks. In the context that the project is expected to be commissioned in only in 2016 and due to escalation cost overruns are expected, the probability of any decrease is not considered a realistic possibility.</p> | | | | | | | | | | | | | | | |
| <p>Debt: Equity = 70% : 30%</p> <p>(Common for all the credible alternatives)</p> <p>Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/} /9/</p> | <p>The Debt Equity ratio is in line with the ratio mentioned in the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/} published by CERC which is the nodal agency for formulating the guidelines for power plants in India and hence acceptable.</p> <p>The validation team also cross checked the actual loan sanction amount provided by the bank^{/25/} which is INR 92500 Lakhs or 75% of the project cost. The validation team has independently assessed the levelised cost of generation with this value and found that the resultant levelised cost of generation is more than that of atleast one of the credible alternatives and the resultant project NPV is still less zero.</p> <table><tr><td>Actual debt :Equity</td><td>Resultant Levelised cost of generation</td><td>Resultant project NPV</td></tr><tr><td>At 70%:30% (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At 75%: 25% (as per loan sanction letter)</td><td>INR 3.84/kWh</td><td>-46963</td></tr></table> | Actual debt :Equity | Resultant Levelised cost of generation | Resultant project NPV | At 70%:30% (Base case) | INR 3.821/kWh | -47560 | At 75%: 25% (as per loan sanction letter) | INR 3.84/kWh | -46963 | | | | | | |
| Actual debt :Equity | Resultant Levelised cost of generation | Resultant project NPV | | | | | | | | | | | | | | |
| At 70%:30% (Base case) | INR 3.821/kWh | -47560 | | | | | | | | | | | | | | |
| At 75%: 25% (as per loan sanction letter) | INR 3.84/kWh | -46963 | | | | | | | | | | | | | | |
| <p>Interest rate for term loan =12.75%</p> <p>(Common for all the credible alternatives)</p> <p>Source: Money control website^{/25.1/}</p> | <p>PP has sourced interest rate for term loan from money control website available at the time of investment decision. The validation team has reviewed the web link and accepted the value.</p> <p>The validation team has crosschecked the actual loan sanction letters^{/25/} which indicate an interest rate ranging from 11.50 % to 13.25%. As the interest rate indicated is in the range of the interest rate prescribed by actual loan sanction letters the interest rate considered is appropriate. It is indicated as 10.75% in Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/}. Further, the validation team has assessed the levelised cost of generation even with the lowest actual interest rate and the results are tabled below.</p> <table><tr><td>Actual interest rate</td><td>Resultant Levelised cost of generation</td><td>Resultant project NPV</td></tr><tr><td>At 12.75% (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At 11.50% (as per loan sanction letter-Lower value)</td><td>INR 3.796/kWh</td><td>-48379</td></tr><tr><td>At 13.25% (as per loan sanction letter-Higher value)</td><td>INR 3.832/kWh</td><td>-47232</td></tr><tr><td>At 10.75% (as per</td><td>INR. 3.781/kWh</td><td>-48870</td></tr></table> | Actual interest rate | Resultant Levelised cost of generation | Resultant project NPV | At 12.75% (Base case) | INR 3.821/kWh | -47560 | At 11.50% (as per loan sanction letter-Lower value) | INR 3.796/kWh | -48379 | At 13.25% (as per loan sanction letter-Higher value) | INR 3.832/kWh | -47232 | At 10.75% (as per | INR. 3.781/kWh | -48870 |
| Actual interest rate | Resultant Levelised cost of generation | Resultant project NPV | | | | | | | | | | | | | | |
| At 12.75% (Base case) | INR 3.821/kWh | -47560 | | | | | | | | | | | | | | |
| At 11.50% (as per loan sanction letter-Lower value) | INR 3.796/kWh | -48379 | | | | | | | | | | | | | | |
| At 13.25% (as per loan sanction letter-Higher value) | INR 3.832/kWh | -47232 | | | | | | | | | | | | | | |
| At 10.75% (as per | INR. 3.781/kWh | -48870 | | | | | | | | | | | | | | |

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|--|---|-----------------------|--|----------------------|--|-----------------------|-----------------------|---------------|--------|---|---------------|--------|------------------------|---------------|--------|
| | Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009) | | | | | | | | | | | | | | |
| | From the table, it is found that even with the lowest actual values of interest rate, the resultant levelised cost of generation is more than that of atleast one of the other credible alternatives and resultant project NPV is still less than zero. | | | | | | | | | | | | | | |
| Moratorium = 0 years Loan period = 12 years (Common for all the credible alternatives) Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} | The validation team has assessed the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} based on which the moratorium and loan period have been considered and therefore accepts the same. | | | | | | | | | | | | | | |
| Working capital = O&M expenses of one month +Fuel cost of one month (Common for all the credible alternatives) Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} /9/ | The validation team has reviewed the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} from which the value is sourced and accepts it as appropriate as it was available at the time of investment decision. | | | | | | | | | | | | | | |
| Interest rate for working capital =12.75% Source: Money control website ^{/25.1/} (Common for all the credible alternatives) | <p>PP has considered interest rate of working capital same as that of interest rate of term loan which sourced from from money control website available at the time of investment decision. The validation team has accepted the same as reasonable. The validation team has reviewed the web link and accepted the value as appropriate.</p> <p>The validation team has crosschecked the actual loan sanction letters^{/25/} which indicate a rate ranging from 11.50 % to 13.25%. It is indicated as 12.25% in Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/}. The validation team has also independently assessed the levelised cost of generation with the lowest actual interest rate and the results are tabled.</p> <table><tr><td>Actual interest rate</td><td>Resultant Levelised cost of generation</td><td>Resultant project IRR</td></tr><tr><td>At 12.75% (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At 11.50% (as per loan sanction letter-Lower value)</td><td>INR 3.819/kWh</td><td>-47226</td></tr><tr><td>At 13.25% (as per loan</td><td>INR 3.823/kWh</td><td>-47694</td></tr></table> | | | Actual interest rate | Resultant Levelised cost of generation | Resultant project IRR | At 12.75% (Base case) | INR 3.821/kWh | -47560 | At 11.50% (as per loan sanction letter-Lower value) | INR 3.819/kWh | -47226 | At 13.25% (as per loan | INR 3.823/kWh | -47694 |
| Actual interest rate | Resultant Levelised cost of generation | Resultant project IRR | | | | | | | | | | | | | |
| At 12.75% (Base case) | INR 3.821/kWh | -47560 | | | | | | | | | | | | | |
| At 11.50% (as per loan sanction letter-Lower value) | INR 3.819/kWh | -47226 | | | | | | | | | | | | | |
| At 13.25% (as per loan | INR 3.823/kWh | -47694 | | | | | | | | | | | | | |

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| | sanction letter-Higher value) | | |
| | At 12.25% (as per Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009) | INR. 3.811/kWh | -47426 |
| | From the table, it is clear that even with the lowest possible interest rate, the resultant levelised cost of generation is still more than that of atleast one of the other credible alternatives and resultant project NPV is less than the validated benchmark. | | |
| Working capital margin = 25% Source: Assumed / (Common for all the credible alternatives) | PP has assumed working capital margin as 25% which is accepted as reasonable. | | |
| Salvage value =10 % Source: : Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} (Common for all the credible alternatives) | The salvage value is in line with the rate mentioned in the Explanatory Memorandum to the Draft Amendments to the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009 ^{/24/} , published by CERC which is the nodal agency for formulating the guidelines for power plants in India and hence acceptable. The depreciation rate has been calculated considering the 90 % depreciable assets (excluding the salvage value of 10%) for assessment lifetime of 20 years, which is appropriate. | | |
| IT Tax depreciation = 15% Source: Rate of depreciation as Income tax act ^{/25.2/} (Common for all the credible alternatives) | The validation team has assessed the taxguru web link provided by PP and accepted the value, applicable at the time of investment decision, as correct. | | |
| Corporate Tax = 33.22% Source: Tax rate website ^{/25.2/} (Common for all the credible alternatives) | The validation team has assessed the taxguru web link provided by PP and accepted the value, applicable at the time of investment decision, as correct. | | |
| MAT = 19.93% Source: Tax rate website ^{/25.2/} (Common for all the credible alternatives) | The validation team has assessed the taxguru web link provided by PP and accepted the value, applicable at the time of investment decision, as correct. | | |

| <p>Annual O&M expenses = INR 18.49 Lakh/MW</p> <p>1 Lakh= 0.1 Million</p> <p>Source: CERC tariff order 2009, page 28^{/9/}</p> | <p>PP has considered the O & M expenses sourced from CERC tariff regulations, 2009^{/9/} which is available at the time of investment decision. As PGPL is proposed to be commissioned in 2016 the value is in line with the forecasted and estimated O & M costs for a NG based power plant operational in 2013-14, the same has been found to be appropriate and acceptable by the validation team. The validation has accepted the input value as correct.</p> <p>Since the O&M agreement is not available as on date, the validation team has crosschecked the value in CERC tariff regulations for the year 2010-2011 (at the time of investment decision) and found that it is mentioned as INR 15.65 Lakh/MW and in the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009^{/24/}, it is mentioned as 14.80 Lakh/MW. The validation has calculated the levelised cost of generation and project NPV using these values found that the resultant levelised cost of generation is more than that of atleast one of the other credible alternatives and resultant project NPV is still less than zero..</p> <table><tr><th>O&M charges in 2010-2011</th><th>Resultant levelised cost of generation</th><th>Resultant project NPV</th></tr><tr><td>At INR 18.49 Lakh/MW (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At INR 15.65 Lakh/MW (based on operational NG power plants as CERC Tariff regulations, 2009)</td><td>INR 3.762/kWh</td><td>-39871</td></tr><tr><td>At INR. 14.80 Lakh/MW (as per Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009</td><td>INR. 3.744</td><td>-37584</td></tr></table> | O&M charges in 2010-2011 | Resultant levelised cost of generation | Resultant project NPV | At INR 18.49 Lakh/MW (Base case) | INR 3.821/kWh | -47560 | At INR 15.65 Lakh/MW (based on operational NG power plants as CERC Tariff regulations, 2009) | INR 3.762/kWh | -39871 | At INR. 14.80 Lakh/MW (as per Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 | INR. 3.744 | -37584 |
|---|--|---------------------------|--|-----------------------|----------------------------------|---------------|--------|--|---------------|--------|---|------------|--------|
| O&M charges in 2010-2011 | Resultant levelised cost of generation | Resultant project NPV | | | | | | | | | | | |
| At INR 18.49 Lakh/MW (Base case) | INR 3.821/kWh | -47560 | | | | | | | | | | | |
| At INR 15.65 Lakh/MW (based on operational NG power plants as CERC Tariff regulations, 2009) | INR 3.762/kWh | -39871 | | | | | | | | | | | |
| At INR. 14.80 Lakh/MW (as per Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 | INR. 3.744 | -37584 | | | | | | | | | | | |
| <p>Annual escalation in O&M expenses = 5.72%</p> <p>Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/}</p> <p>(Common for all the credible alternatives)</p> | <p>PP has considered the annual escalation on O & M expenses sourced from Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/}which is applicable at the time of investment decision. The validation has accepted the input value as correct.</p> <p>Since the O&M agreement is not available as on date, the validation team has independently assessed the levelised cost of generation with zero O&M escalation and found that the resultant levelised cost of generation is still more than that of atleast one of the credible alternatives and resultant project NPV is less than zero.</p> <table><tr><th>Escalation on O&M charges</th><th>Resultant levelised cost of generation</th><th>Resultant project NPV</th></tr><tr><td>At 5.72% (Base case)</td><td>INR 3.821/kWh</td><td>-47560</td></tr><tr><td>At zero escalation (conservative value)</td><td>3.692/kWh</td><td>-31642</td></tr></table> | Escalation on O&M charges | Resultant levelised cost of generation | Resultant project NPV | At 5.72% (Base case) | INR 3.821/kWh | -47560 | At zero escalation (conservative value) | 3.692/kWh | -31642 | | | |
| Escalation on O&M charges | Resultant levelised cost of generation | Resultant project NPV | | | | | | | | | | | |
| At 5.72% (Base case) | INR 3.821/kWh | -47560 | | | | | | | | | | | |
| At zero escalation (conservative value) | 3.692/kWh | -31642 | | | | | | | | | | | |
| <p>GCV of natural gas = 10,000 kCal/SCM</p> <p>Source: Ministry of Petroleum and Natural Gas, India.</p> | <p>The validation team has found that GCV of the natural gas has been sourced by PGPL from the Basic statistics on Petroleum and Natural gas^{/26/}, published by MoPNG for 2009-10. This is appropriate as the document is relevant at the time of investment decision and the value reflects the GCV of the natural gas by the major domestic producers such as ONGC and OIL.</p> <p>The validation team also crosschecked the Explanatory Memorandum to the</p> | | | | | | | | | | | | |

(for the project activity not undertaken as CDM project activity)

Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} which mentions a GCV of 9000 kCal/SCM, indicating the value estimated to be conservative.

Further the validation team has reviewed the GCV of natural gas as mentioned in recently registered CDM project No. 6943 which infers a value of 9003.1 kCal/SCM. In Project Nos. 8048 and 7611 GCV of gas supply from Reliance (i.e. 8910 kCal/SCM of GCV) has been taken based on invoices of actual operating plant. Hence from the above analysis the validation team considers the GCV for NG acceptable and conservative. The results are tabled below.

| | | |
|--|--|-----------------------|
| GCV | Resultant levelised cost of generation | Resultant project NPV |
| At 10000 kCal/SCM (Base case) | INR 3.821/kWh | -47560 |
| At 9000 kCal/SCM (as per CERC tariff regulations, 2009) | INR 4.145/kWh | -92176 |
| At 9003.1 kCal/SCM (as per UNFCCC project no: 6943) | INR 4.144/kWh | -92016 |
| At 8910 kCal/SCM (as per UNFCCC project no: 8048 & 7611) | INR 4.178/kWh | -96954 |

NG: R-LNG usage: 70%:30%

Source: Third party DPR dated 20th August 2010^{/23/}

The validation team has validated the DPR^{/23/} available at the time of investment decision wherein it is assumed that the NG usage would be in the ratio of 50% to 70% and the balance would be from using R-LNG. PP has considered 70% for NG and 30% for R-LNG.

The validation team has also independently analysed all the existing natural gas based power plants considered for indigenous natural gas allocation^{/48/} by the Government of India for the month of March 2013 which establishes that only 70% of NG was being allocated to each NG power plant.

Further, to substantiate the argument, the validation team has independently analysed the NG usage in the recent CDM projects (UNFCCC no: 7611 and 8048), where it is mentioned NG usage would be in the ratio of 50% only which was observed to be based on the actual invoices. The value of 50%:50% shows that considering 70%:30% is more conservative.

The validation team has checked the levelised cost of generation and financial indicator using these values and found that the following table.

| | | |
|--|--|---|
| NG: LNG usage | Resultant levelised cost of generation | Resultant financial indicator (project NPV) |
| At 70%:30% (base) | INR 3.821/kWh | -47560 |
| At 100%: 0% (most conservative) | INR 3.173/kWh | +32603 |
| At 50%:50% (as per CDM projects, UNFCCC no: 7611 & 8048) | INR 4.254/kWh | -106789 |

| | |
|--|--|
| | <p>From the table, it is found that the resultant levelised cost of generation for proposed project activity is more than that of atleast one of the other credible alternatives and resultant project NPV is less than zero. Hence accepted by the validation team. At 100%:0%, the resultant NPV becomes positive, but since this scenario is not possible as confirmed from the allocation of NG to the NG power plant where the ratio is mentioned as 70% for NG, the validation team has accepted the assumed ratio as reasonable. Based on the above finding, the validation team has accepted the input ratio of 70%:30% in the investment analysis.</p> |
| <p>Landed price Domestic NG at the project site = USD 6.04 / MMBTU (including taxes and freight charges)</p> <p>Source: GAIL email dated 19th March 2011^{/35/}</p> <p>(for the project activity not undertaken as CDM project activity)</p> | <p>The validation team has reviewed the email provided by GAIL to the PGPL available at the time of investment decision which is found to be acceptable as the source document by the validation team.</p> <p>As PGPL is to be commissioned in 2016, the validation team has independently verified the current trends in NG price. The validation team has crosschecked the note by Cabinet Committee on Economic affairs, dated 27th June 2013^{/49/} which has proposed that the basic price of natural gas would be USD 8.4/MMBTU. The validation team has worked out the landed price with the same applicable taxes and freight charges referred in the GAIL e-mail which works out to USD 12.24/MMBTU. The revised pricing of natural gas is expected to be effective from April 2014 . The validation team is of the opinion that accounting for the price escalation of natural gas in the near future, the value taken by the PGPL at the time of investment decision is more conservative and hence acceptable.</p> <p>The validation team has also analysed the landed domestic NG price mentioned in registered CDM project No. 6943 (5.55 USD/ MMBTU) conceptualized in 2009 and considers the domestic NG price of 6.04 USD/MMBTU to be acceptable considering more recent vintage (2011) of this project and impact of the escalation factor.</p> |
| <p>Exchange rate = INR 44.90/USD</p> <p>(common for all the credible alternatives)</p> | <p>The validation team has accessed the web link^{/43/} provided by the PP and found it acceptable and appropriate as the input value considered is applicable at the time of investment decision.</p> |
| <p>Average landed price of imported R- LNG = USD 9.77/MMBTU (including regasification and marketing margin charges)</p> <p>Source: GAIL email dated 19th March 2011^{/35/}</p> <p>(for the project activity not undertaken as CDM project activity)</p> | <p>The PP has considered the long-term RLNG price of 9.77 USD/ MMBtu based on the e-mail sent to PGPL by GAIL available at the time of investment decision which is found acceptable. Further the validation team has verified the recent rate chart by GAIL for R-LNG base price (http://www.gail.nic.in/final_site/ratechart.html) which indicates the term R-LNG supplied by GAIL varied between 9.00 – 10.50 USD/MMBTU (excluding regasification charges and marketing margin). Hence the validation team accepts the term R-LNG pricing to be appropriate and conservative.</p> <p>Considering the rupee exchange rate of 44.90 existing at March 2011, the R-LNG price of INR 17.40 / SCM has been calculated, which is the most realistic and credible estimate of the R-LNG price and hence considered appropriate. Also considering the recent increase in exchange rate of the Indian rupee (as high as INR 60/USD http://www.oanda.com/currency/historical-rates/), and the expected commissioning of the plant in 2014, the cost of R-LNG is appropriate and conservative.</p> |

| | | | | |
|--|--|----------------------|---------------------|-------------------|
| <p>Annual escalation in domestic NG price = 1.31%</p> <p>Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/}</p> <p>Annual escalation in R-LNG price = 4.0 %</p> <p>Source: http://www.rbi.org.in/scripts/PublicationsView.aspx?id=13050</p> <p>(for the project activity not undertaken as CDM project activity)</p> | <p><u>Domestic Natural gas</u></p> <p>The validation team has reviewed Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} which is available at the time of investment decision and accepts the source to be appropriate. The escalation rate of NG is in line with the rate mentioned in the document , published in March 2010 by CERC which is the nodal agency for formulating the guidelines for power plants in India and hence it is appropriate and acceptable.</p> <p>The validation team has crosschecked publically available documents such as basic statistics on petroleum and natural gas, published by MoPNG for 2009-10^{/27/} which indicated the trends in consumer prices from consumers of natural gas (Power sector). From a base price INR 2.85/SCM in 2004, the price had increased to INR 10.78 / SCM (based on the average price of USD 6.05/MMBTU) at the time of investment decision in 2010-2011.</p> <p>The validation team also analysed the IEA working paper on natural gas in India published in 2010^{/28/}, which indicated a ceiling price of INR 2.85/SCM in 2001-02. Thus, analysing the trend of gas prices from 2001 – 2010, a realistic and credible escalation rate of 10.18% per annum was foreseen.</p> <p>MoPNG has also allowed ONGC and OIL (Domestic Gas producers) to market gas produced by them at market rates of USD 5.25/MMBTU, even higher than the existing base price of USD 4.2/MMBTU determined for RIL KG basin. In the context of the escalating gas prices in the future and information from publically available documents, the rate of annual escalation assumed is conservative.</p> <p><u>R-LNG</u></p> <p>The validation team has independently worked out the escalation rate based on the prices indicated in GAIL e-mail available at investment decision and recent prices indicated in GAIL website^{/45/}. The average term R-LNG price supplied by GAIL is 9.75 USD/MMBTU (price varied between 9.00 – 10.50 USD/MMBTU excluding regasification charges and marketing margin, average price). For similar comparison Excluding regasification and marketing margin, the RLNG price according to GAIL estimate in the e-mail to PGPL works out to be 8.79 USD / MMBTU The escalation across 2011-2013 for R-LNG base price works out to be 9.85 % which is approx. 4.9 % per annum. Compared to this, the annual escalation for R-LNG considered as 4.0% per annum by PP based on the forecasted inflation rate for next ten years published by the Reserve Bank of India in March 2011, prior to the investment decision date. Source: http://www.rbi.org.in/scripts/PublicationsView.aspx?id=13050 is acceptable and conservative.</p> <p>The validation team has calculated the levelised cost of generation and project IRR with the zero escalation on NG and R-LNG prices and found that the resultant levelised cost of generation are still more than that of atleast one of the other credible alternatives and the resultant project NPV is still less than zero. .</p> <table><tr><td>Annual escalation of</td><td>Resultant levelised</td><td>Resultant project</td></tr></table> | Annual escalation of | Resultant levelised | Resultant project |
| Annual escalation of | Resultant levelised | Resultant project | | |

| | | | | | | | | | | |
|--|---|------------|--------------------|-----|-------------------------|--------------|--------|----------------------------|---------------|-------|
| | <table><tr><td>fuel price</td><td>cost of generation</td><td>IRR</td></tr><tr><td>At zero escalation - NG</td><td>INR 3.69/kWh</td><td>-31108</td></tr><tr><td>At zero escalation – R-LNG</td><td>INR 3.501/kWh</td><td>-9068</td></tr></table> | fuel price | cost of generation | IRR | At zero escalation - NG | INR 3.69/kWh | -31108 | At zero escalation – R-LNG | INR 3.501/kWh | -9068 |
| fuel price | cost of generation | IRR | | | | | | | | |
| At zero escalation - NG | INR 3.69/kWh | -31108 | | | | | | | | |
| At zero escalation – R-LNG | INR 3.501/kWh | -9068 | | | | | | | | |
| Discount rate = 10.19% Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} (Common for all the credible alternatives) | The discount rate for the working capital is in line with the rate mentioned in the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} , published by CERC which is the nodal agency for formulating the guidelines for power plants in India and hence found appropriate and acceptable. | | | | | | | | | |
| Sale of electricity to grid (long term tariff): Sale of electricity to open market (short term tariff) = 70%: 30% (for the project activity) Source: Third party DPR dated 20 th August 2010 ^{/23/} | PP has considered ratio of sale of electricity to the grid (through long term PPA) and the sale of electricity through open market (short term tariff) in tune with usage of NG and R-LNG which is 70 %: 30%. Hence accepted by the validation team as correct. The validation team has reviewed the management review meeting documents submitted to the Board meeting held on 15 th April 2011 in which 70%:30% was proposed for % NG:% LNG usage for the project activity based on the review of the existing policies in 2011 and forecasted changes. This was further cross verified from the third party DPR dated 20 th August 2010 which recommended the similar ratio. | | | | | | | | | |
| Long term tariff = INR 3.87/kWh Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/} | <p>The validation team has reviewed the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 and accepted the value of INR 3.87/kWh for long term tariff as correct.</p> <p>The Electricity Act 2003 has empowered the Government of India to formulate the tariff policy and accordingly the Government has notified the Tariff Policy in 2006, by which the power procurement norms have been laid down. As per the tariff policy the Government of India has issued the guidelines for competitive bidding of power projects.</p> <p>As per the National Tariff Policy, the procurement of power by distribution licensees has to be made through competitive bidding. From January 2011, Central / State public sector companies have also been expected to compete with private sector to supply power to the distribution companies through competitive bidding.</p> <p>Under these norms, power can be sold by Independent Power producers (IPPs) by means of competitive bidding. In such projects, a long term/ mid-term Power Purchase Agreement (PPA) is signed between the Power Distribution Licensee and the winning bidder, who offers a competitive levelised tariff for its sale.</p> <p><i>Case 1 Bidding:</i></p> | | | | | | | | | |

Case 1 is an open bid where the developer / entrepreneur have to decide for fuel and location and compete against any other developers in general. The project developer can bid on the basis of:

- Any fuel
- Any Location
- Any technology

Such bidding entails higher risk for developer and lower risk for the state.

Case 2 Bidding:

In Case 2 bids the developer is expected to bid on the basis of:

- Specific fuel
- Specific location

The specifics are provided by the Central/State government which is calling for bids and the government (state or Central) offers to assist private developers to set up large power plants in securing land, water and mandatory clearances; signing of power purchase agreement; establishment of fuel linkages, etc. Such an arrangement entails higher risk for the state and lower risk for the developer as the tariff is expected to be lower than Case 1 bids.

The objective of competitive bidding as per the Electricity policy is to discourage monopoly in power price and to encourage competition amongst developers and procure power at minimum price. As the project activity has been planned without any assistance from the Government and the choice of location and fuel was also made by the project participant, the project activity qualifies for bidding under the Case-1 route.

The validation team has verified the data mentioned in the CRISIL report on economics of gas based power generation and accepted the tariff considered to be appropriate. Also the validation team has independently analysed the various possible scenarios in which the tariff could vary.

- The tariff, considered as a weighted average of the winning bids worked out to INR 2.668 per kWh
- The tariff computed as a arithmetic mean based on the winning bids works out to INR 3.010 per kWh
- The tariff computed as a arithmetic mean based on the winning bids of IPPs in Maharashtra works out to INR 3.147 per kWh
- The most recent maximum tariff (also in Maharashtra) successful bid is INR 3.290 per kWh.

The validation team has also independently analysed similar data from other publically available sources (Programme of capacity building for electricity regulatory commissions dated 23rd-28th August 2010 "competitive bidding : recent experience")^{52/} which gave the details of winning competitive bids of case 1 category plants in Maharashtra as mentioned below:

| Bidder | Quantity in MW | Levelised tariff (INR/kWh) | Levelised transmissi on charge (INR/kWh) | Net Levelised tariff (INR/kWh) | PPA signing date with MSEDCL |
|--------|----------------|----------------------------|--|--------------------------------|------------------------------|
|--------|----------------|----------------------------|--|--------------------------------|------------------------------|

| | | | | | | |
|---|--|------|------|-------------------------------|-------|-------------------|
| | GMR EMCO | 200 | 2.88 | 0.287 | 2.593 | March 2010 |
| | India bulls | 1200 | 3.27 | 0.287 | 2.983 | April & June 2010 |
| | Adani Power Mahar ashtra | 1200 | 3.28 | 0.287 | 2.993 | March 2010 |
| | Therefore, in view of the long term tariff (INT 3.87/kWh) considered by the PP, the validation team considers the value to be conservative. | | | | | |
| | The validation team has calculated the resultant financial indicator with the highest long term tariff of INR 3.29/kWh as per the market trends and found the following. | | | | | |
| | Long term tariff | | | Resultant financial indicator | | |
| | At INR 3.87/kWh(base) | | | -47560 | | |
| | At INR 3.29/kWh (as per case I bids) | | | -104712 | | |
| Selling price of electricity through open access system = INR 3.79/kWh Source: Third party DPR dated 20 th August 2010 ^{23/} (for the project activity not undertaken as CDM project activity) | The selling price of INR 3.79/kWh for open access system was mentioned in the DPR, which indicates that the value was available at the time of investment decision. This was verified to be based on the weighted average of the bilateral trading mechanism and open access charges based on IEX database which is appropriate. | | | | | |
| Discount factor for the calculation of project NPV= post tax WACC | PP has considered post tax WACC (benchmark) as the discount factor for the calculation of project NPV which is accepted by the validation team as reasonable. The validation of discount factor is demonstrated in sections below. | | | | | |
| Choice of Benchmark = Post Tax WACC Source: Investment analysis guidelines | <p>The PP has considered post tax Project NPV as financial indicator as project cost has been financed partly by the equity and remaining by debt. Since it is a predominant investment decision in non-core business, the management was particularly interested in the return of the investment. Hence Post tax project NPV was selected as the financial indicator to assess the additionality of the project. In response to CL 8 raised by the validation team regarding the correctness of negative project IRR being indicated in the sensitivity analysis, PP had changed the financial indicator to Project NPV.</p> <p>As per para 12 requirements of the investment analysis guidelines, ‘In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR.’</p> | | | | | |

| | |
|--|---|
| | <p>Thus, the selection of WACC as benchmark is justified as the indicator justifies both the claims as it includes both the fixed returns from the project and the returns as per the additional risk taken in prevailing market rates.</p> <p>As the project can be developed by an entity other than the project participant the benchmark, the WACC which is the benchmark is based on parameters that are standard in the market. In the absence of a company specific benchmark, it is the opinion of the validation team that in the context of the project activity, a benchmark based on parameters standard in the market is most suitable and appropriate.</p> |
| <p>Market Return = 17.90%</p> <p>Source: BSE website http://www.bseindia.com/histdata/hindices.asp</p> | <p>The expected market returns have been arrived using the share prices that prevailed during the period prior to the time when the investment decision was taken as sourced from BSE website. To reflect the true rate of return of the market, the BSE Sensex has been taken to calculate the market returns. As there is no specific index for the renewable energy sector, the closest appropriate index which is the power index has been taken to calculate the market return based on compound annual growth rate. As the BSE Sensex starts from 1979, it provides the longest historical database from which the investor has estimated his expected returns at the time of investment decision (April 2011)^{20/}. The sufficiently long time period (32 years vintage period prior to investment decision) and thus the choice of the source (BSE – Sensex) is justified as it is realistic compared to the lifetime (25 years) of the project activity. Based on the justification, the market return of 17.90 % is considered acceptable.</p> |
| <p>Risk free rate = 8.52%</p> <p>Source: RBI website</p> | <p>The risk free rate is understood as the rate of return on an asset that is theoretically free of any risk. Therefore, the rate of interest on government securities can be considered as risk free rate. The yield on long term government securities can be a suitable indicator of risk free rate for long term projects. Therefore, recent 4-months average rate of return (as recommended by CERC http://www.cercind.gov.in/rep1304.pdf, page 29) on government securities with 20 years maturity term is taken as risk free rate is considered appropriate. Based on the source http://rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=12131 the risk free rate of 8.52% is considered appropriate as it was prevailing at the time of investment decision.</p> |
| <p>Beta = 1.58</p> <p>Source: BSE website (http://www.bseindia.com/histdata/stockprc2.asp).</p> | <p>Beta indicates the sensitivity of the company to market risk factors. The project activity type is power generation and therefore the approach should be based on the beta values of listed power generation companies in India. Therefore, a sample of five listed power generation companies available from May 2008 onwards up to investment decision period of March 2011 covering a period of more than 2 years is taken to evaluate beta. The average beta of 1.58 is considered appropriate and acceptable based on the review of the source. PP has also assessed re-levered beta which is valued at 2.49. Since raw beta is conservative than re-levered beta, PP has used raw beta which is accepted by the validation team.</p> |
| <p>Cost of debt = 12.75%</p> <p>Source: Money control website</p> | <p>As stipulated in para 13 of the Guidelines (Annex 5, EB-62), the data used for arriving at the benchmark rate should be independent of the project proponent. Accordingly, the minimum prevailing lending rate of 12.75% prescribed as verified from http://www.moneycontrol.com/stocks/stock_market/corp_notices.php?autono=408921 was considered appropriate. For the project activity the validation</p> |

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| | team has crosschecked the actual loan sanction letters ^{/25/} which indicate a rate ranging from 11.50 % to 13.25%. As the interest rate indicated is in the range of the interest rate prescribed by actual loan sanction letters, it is considered acceptable. |
| Cost of equity = 23.36% http://www.investopedia.com/terms/c/capm.asp | <p>The cost of equity has been evaluated using the Capital Asset Pricing Model (CAPM) by considering Beta values of the power companies in India that generate electricity from renewable and non-renewable sources and were listed on the stock exchanges in India at the time of the investment. The Capital Asset Pricing Model (CAPM) is used to determine the required/expected return on equity based on potential risk of an investment.</p> <p>The cost of equity is evaluated using the formula sourced from investopedia website:</p> <p>Cost of equity = Risk free return + Beta x (Market return- Risk free return)</p> <p>Using the above formula the cost of equity has been calculated correctly to be 23.36%.</p> |
| Tax rate= 33.22% | Though the MAT rate of 19.93% is also applicable to companies, for a conservative estimate the regular tax rate of 33.22% as per Income tax act and relevant to financial year 2010-11, sourced from http://indiabudget.nic.in/ub2006-07/fb/bill10.pdf is used in calculation of tax rate for all the investments which is considered acceptable. |
| Debt: Equity = 70%:30% | The normally recommended debt/equity ratio by regulatory agencies is 70:30. The ratio applied is in line with the CERC order (http://www.infraline.com/power/setup/cerc/Order22Sep04.pdf) available at the time of investment decision ^{/20/} which provides for a debt equity ratio of 70:30 for electricity generation and transmission projects. This is in line with para 18 on the Guidelines on Assessment of Investment Analysis which states that in cases where the benchmark is based on parameters that are standard in the market, then the typical debt/equity finance structure observed in the sector of the country should be used. |
| Discount factor =Post tax WACC = 12.97% http://www.investopedia.com/terms/w/wacc.asp | <p>PP has used the formula from investopedia website to calculate the project NPV as follows</p> <p>WACC (Post-tax) = % Equity x Cost of equity + % Debt x Cost of debt x (1- Tax rate)</p> <p>The WACC is calculated as 12.97^{/17/} % which is considered acceptable by the validation team.</p> |
| Post tax Project NPV =-47,560 http://www.investopedia.com/terms/n/npv.asp | PP has used the formula from investopedia website to calculate the project NPV. Since the approach for the calculation of project NPV is correct, the validation team has accepted the formula as correct. |

Assumptions for Sub critical coal based power plant based on imported coal / domestic coal

| Parameter / Value | Justification |
|-------------------|---|
| Capacity / 500 MW | The capacity of the coal power plant using boiler from Indian manufacturer is |

| <p>(for subcritical coal power plant)</p> <p>Source: Nearest block size available as per manufacturer specifications</p> <p>(similar for subcritical domestic coal based power plant (credible alternative 2) and subcritical imported coal based power plant (credible 3))</p> | <p>taken as the nearest block size of 500 MW is available which corresponds to the project capacity of 388 MW. The availability of this capacity in the industry has been cross verified from the list of operating sub-critical coal power plants indicated in the Monthly Report on broad status of thermal power plants in the country- June 2010, published by CEA^{/29/}. In the context of the nearest available block size being 500 MW as compared to the project capacity of 388 MW, the capacity considered is acceptable.</p> | | | | | | | | | | | | | | | | | |
|---|--|---|--|-----------------------|-----------------------------------|---|------------------------|---------------|---------------|------------------------|---------------|---------------|------------------------|---------------|---------------|------------------------|---------------|---------------|
| <p>Auxiliary consumption = 6.5 %</p> <p>Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24//9/}</p> <p>(similar for subcritical domestic coal based power plant (credible alternative 2), subcritical imported coal based power plant (credible 3), supercritical domestic coal based power plant (credible alternative 4) and supercritical imported coal based power plant (credible alternative 5))</p> | <p>By reviewing the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24//9/}, the validation team have found that the auxiliary consumption is in line with the CERC regulations for subcritical coal fired power plant which is acceptable.</p> <p>The validation team has crosschecked the value with CERC tariff regulations, 2009^{/9/}, and found that the value is indicated as 8.5% for coal power plant. The validation team has calculated the levelised cost of generation with this value and found that the resultant levelised cost of generation of credible alternative 4 is less than the base values of other credible alternatives. The base value of credible alternative 4 is less than the resultant values of other credible alternatives. The results are shown below.</p> <table><tr><th>Credible alternatives</th><th>Base levelised cost of generation</th><th>Resultant levelised cost of generation at auxiliary consumption of 8.5%</th></tr><tr><td>Credible alternative 2</td><td>INR 2.806/kWh</td><td>INR 2.867/kWh</td></tr><tr><td>Credible alternative 3</td><td>INR 3.925/kWh</td><td>INR 4.011/kWh</td></tr><tr><td>Credible alternative 4</td><td>INR 2.687/kWh</td><td>INR 2.746/kWh</td></tr><tr><td>Credible alternative 5</td><td>INR 3.758/kWh</td><td>INR 3.840/kWh</td></tr></table> | | | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at auxiliary consumption of 8.5% | Credible alternative 2 | INR 2.806/kWh | INR 2.867/kWh | Credible alternative 3 | INR 3.925/kWh | INR 4.011/kWh | Credible alternative 4 | INR 2.687/kWh | INR 2.746/kWh | Credible alternative 5 | INR 3.758/kWh | INR 3.840/kWh |
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at auxiliary consumption of 8.5% | | | | | | | | | | | | | | | | |
| Credible alternative 2 | INR 2.806/kWh | INR 2.867/kWh | | | | | | | | | | | | | | | | |
| Credible alternative 3 | INR 3.925/kWh | INR 4.011/kWh | | | | | | | | | | | | | | | | |
| Credible alternative 4 | INR 2.687/kWh | INR 2.746/kWh | | | | | | | | | | | | | | | | |
| Credible alternative 5 | INR 3.758/kWh | INR 3.840/kWh | | | | | | | | | | | | | | | | |
| <p>PLF = 85%</p> <p>Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24//9/}</p> <p>(similar for subcritical domestic coal based power plant (credible alternative 2), subcritical imported coal based power plant (credible 3),</p> | <p>The PLF is in line with the rate mentioned for subcritical coal power plants in the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24//9/} published by CERC which is the nodal agency for formulating the guidelines for power plants in India and hence acceptable.</p> <p>The validation team has reviewed the CERC tariff regulations, 2009 ^{/9/}in which PLF is mentioned as 85% for coal based power plants. Hence accepted the input value as correct.</p> | | | | | | | | | | | | | | | | | |

| supercritical domestic coal based power plant (credible alternative 4) and supercritical imported coal based power plant (credible alternative 5) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|----------|---------------|--------------------|--------|---------------|------------|--------|---------------|----------------|--------|---------------|-----------------------|-----------------------------------|---|--|--|------------------------|---------------|---------|-------|--|---------|-------|---------|-------|------------------------|---------------|--|--|--|
| Heat rate = 2423.94 kCal/kWh (for subcritical domestic coal based power plant (Credible alternative 2)) Source: CERC tariff regulations, 2009 ^{/9/} /9/ | <p>The design station heat rate of 2276 (kCal/kWh) indicated for subcritical coal power plants operating at pressure of 170 Kg/cm² using sub-bituminous Indian coal has been considered, to which a correction factor of 1.065, as specified by CERC, has been applied to calculate the Gross Station heat rate which is appropriate. The source document is formulated by the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009^{/9/}, published by CERC which is the nodal agency for formulating the guidelines which is appropriate and acceptable.</p> <p>Further the validation team has crosschecked the GSHR applied using the document on “The advice of CEA on “Norms of operation for the tariff period 2009-14” for thermal power stations which lists the operating station heat rates of coal power plants.</p> <table><tr><th>Plant</th><th>Capacity</th><th>Operating SHR</th></tr><tr><td>Kothagudem stage V</td><td>500 MW</td><td>2365 kCal/kWh</td></tr><tr><td>Rayalseema</td><td>420 MW</td><td>2331 kCal/kWh</td></tr><tr><td>Lehra mohabbat</td><td>420 MW</td><td>2439 kCal/kWh</td></tr></table> <p>Comparing the operating heat rates of similar capacity private coal power plants, the heat rate estimated by PP is considered acceptable.</p> <p>The validation team has calculated the levelised costs of generation at these values and found that the base value of credible alternative 4 is still less than the resultant value of credible alternative 2. The results are shown below.</p> <table><tr><th>Credible alternatives</th><th>Base levelised cost of generation</th><th colspan="3">Resultant levelised cost of generation at heat rates (kCal/kWh)</th></tr><tr><td rowspan="3">Credible alternative 2</td><td rowspan="3">INR 2.806/kWh</td><td>At 2365</td><td>2.762</td><td rowspan="3"></td></tr><tr><td>At 2331</td><td>2.737</td></tr><tr><td>At 2439</td><td>2.817</td></tr><tr><td>Credible alternative 4</td><td>INR 2.687/kWh</td><td colspan="3"></td></tr></table> | Plant | Capacity | Operating SHR | Kothagudem stage V | 500 MW | 2365 kCal/kWh | Rayalseema | 420 MW | 2331 kCal/kWh | Lehra mohabbat | 420 MW | 2439 kCal/kWh | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at heat rates (kCal/kWh) | | | Credible alternative 2 | INR 2.806/kWh | At 2365 | 2.762 | | At 2331 | 2.737 | At 2439 | 2.817 | Credible alternative 4 | INR 2.687/kWh | | | |
| Plant | Capacity | Operating SHR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kothagudem stage V | 500 MW | 2365 kCal/kWh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rayalseema | 420 MW | 2331 kCal/kWh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lehra mohabbat | 420 MW | 2439 kCal/kWh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at heat rates (kCal/kWh) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Credible alternative 2 | INR 2.806/kWh | At 2365 | 2.762 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | At 2331 | 2.737 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | At 2439 | 2.817 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Credible alternative 4 | INR 2.687/kWh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Heat rate = 2315.31 kCal/kWh (for subcritical imported coal based power plant (Credible alternative 3)) Source: CERC tariff regulations, 2009 ^{/9/} /9/ | <p>The design station heat rate of 2174 (kCal/kWh) indicated for subcritical power plants operating at pressure of 170 Kg/cm² using bituminous imported coal has been considered, to which a correction factor of 1.065, as specified by CERC, has been applied to calculate the Gross Station heat rate which is appropriate. The source document is formulated by the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009^{/9/}, published by CERC which is the nodal agency for formulating the guidelines which is appropriate and acceptable.</p> <p>Further validation team has verified the advice of CEA on “Norms of operation for the tariff period 2009-14” which mentions that imported coal usage may lower the unit heat rate of about 50-75 kCal/kWh compared to</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | <p>domestic coal usage. Moreover the only coal power station of similar capacity (Trombay 1*500 MW) which uses blended coal (mix of domestic and imported) has an operational station heat rate of 2482 kCal/kWh. In this context, considering the SHR estimated for domestic coal usage, the value considered for imported coal usage is considered acceptable.</p> <p>The validation team has calculated the levelised costs of generation at these values and found that the base value of credible 4 is still less than the resultant value of credible alternative 3. The results are shown below.</p> <table><tr><th>Credible alternatives</th><th>Base levelised cost of generation</th><th>Resultant levelised cost of generation at heat rate of 2482 kCal/kWh</th></tr><tr><td>Credible alternative 3</td><td>INR 3.925/kWh</td><td>INR 4.136</td></tr><tr><td>Credible alternative 4</td><td>INR 2.687/kWh</td><td></td></tr></table> | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at heat rate of 2482 kCal/kWh | Credible alternative 3 | INR 3.925/kWh | INR 4.136 | Credible alternative 4 | INR 2.687/kWh | | | | |
|--|---|--|-----------------------------------|--|------------------------|---------------|-----------|------------------------|---------------|-----------|------------------------|---------------|--|
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at heat rate of 2482 kCal/kWh | | | | | | | | | | | |
| Credible alternative 3 | INR 3.925/kWh | INR 4.136 | | | | | | | | | | | |
| Credible alternative 4 | INR 2.687/kWh | | | | | | | | | | | | |
| <p>Project cost = INR 250000 Lakhs (INR. 50 million/ MW)</p> <p>1 Lakh = 0.1 Million</p> <p>similar for subcritical domestic coal based power plant (credible alternative 2) and subcritical imported coal based power plant (credible 3)</p> <p>Source: Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 ^{/24/}</p> | <p>Capital cost of the coal power plant has been indicated as 25,000 million for a capacity of 500 MW, as calculated from the per MW cost of 50.00 million mentioned as per the Explanatory Memorandum to the Draft Amendments to the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009^{/24/}, published by CERC which is the nodal agency for formulating the guidelines for power plants in India.</p> <p>As the policy document was available and in line with the requirements of para 6 of investment analysis guidelines it is hence appropriate.</p> <p>Further, the validation team has verified the cost of similar capacity coal power plants under construction in 2011 from the document on ‘monthly broad status on thermal power plants’ prepared by the CEA. The Khaperkheda plant of 500 MW capacity in Maharashtra mentioned an estimated cost of INR 43.4 million / MW. As higher project cost in baseline is more conservative as it increases the levelised cost, the validation team considers the project cost estimated to be conservative. Further, to substantiate the same, the validation team has calculated the levelised cost of generation with this value and found that the base value of credible alternative 4 is still less than the resultant values of credible alternatives 2 and 3). The results are shown below.</p> <table><tr><th>Credible alternatives</th><th>Base levelised cost of generation</th><th>Resultant levelised cost of generation at project cost of INR. 43.4 Million/MW</th></tr><tr><td>Credible alternative 2</td><td>INR 2.806/kWh</td><td>INR 2.72</td></tr><tr><td>Credible alternative 3</td><td>INR 3.925/kWh</td><td>INR 3.839</td></tr><tr><td>Credible alternative 4</td><td>INR 2.687/kWh</td><td></td></tr></table> | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at project cost of INR. 43.4 Million/MW | Credible alternative 2 | INR 2.806/kWh | INR 2.72 | Credible alternative 3 | INR 3.925/kWh | INR 3.839 | Credible alternative 4 | INR 2.687/kWh | |
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at project cost of INR. 43.4 Million/MW | | | | | | | | | | | |
| Credible alternative 2 | INR 2.806/kWh | INR 2.72 | | | | | | | | | | | |
| Credible alternative 3 | INR 3.925/kWh | INR 3.839 | | | | | | | | | | | |
| Credible alternative 4 | INR 2.687/kWh | | | | | | | | | | | | |
| <p>Annual O&M expenses = INR 16.24 Lakhs/MW</p> | <p>The O & M expense is in line with the rate mentioned for plants of 500 MW coal subcritical power plants in the Central Electricity Regulatory Commission (Terms and Conditions of Tariff), 2009^{/9/}, published by CERC</p> | | | | | | | | | | | | |

| <p>1 Lakh = 0.1 Million</p> <p>(similar for subcritical domestic coal based power plant (credible alternative 2) and subcritical imported coal based power plant (credible alternative 3))</p> <p>Source: CERC notification, dated 19th January 2009, page No. 27^{9/}</p> | <p>which is the nodal agency for formulating the guidelines for power plants in India and hence acceptable.</p> <p>As PGPL is proposed to be commissioned in 2014 the value is in line with the forecasted and estimated O & M costs for a Coal based power plant in 2013-14, the same has been found to be appropriate by the validation team. Hence the validation has accepted the input value as correct.</p> <p>The validation team has crosschecked with recently registered CDM project No. 6943 which mentions an annual O & M rate of 16.20 Lakhs/MW. Hence the value estimated by the PP is considered conservative. Further, to substantiate the same, the validation team has calculated the levelised cost of generation with this value and found that the base value of credible alternative 4 is still less than the resultant values of credible alternatives 2 and 3). The results are shown below.</p> <table><tr><th>Credible alternatives</th><th>Base levelised cost of generation</th><th>Resultant levelised cost of generation at O&M expenses of 16.20 Lakhs/MW</th></tr><tr><td>Credible alternative 2</td><td>INR 2.806/kWh</td><td>INR. 2.805</td></tr><tr><td>Credible alternative 3</td><td>INR 3.925/kWh</td><td>INR. 3.924</td></tr><tr><td>Credible alternative 4</td><td>INR 2.687/kWh</td><td></td></tr></table> | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at O&M expenses of 16.20 Lakhs/MW | Credible alternative 2 | INR 2.806/kWh | INR. 2.805 | Credible alternative 3 | INR 3.925/kWh | INR. 3.924 | Credible alternative 4 | INR 2.687/kWh | |
|---|--|--|-----------------------------------|--|------------------------|---------------|------------|------------------------|---------------|------------|------------------------|---------------|--|
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at O&M expenses of 16.20 Lakhs/MW | | | | | | | | | | | |
| Credible alternative 2 | INR 2.806/kWh | INR. 2.805 | | | | | | | | | | | |
| Credible alternative 3 | INR 3.925/kWh | INR. 3.924 | | | | | | | | | | | |
| Credible alternative 4 | INR 2.687/kWh | | | | | | | | | | | | |
| <p>GCV = 3865 kCal/kg</p> <p>(similar for subcritical domestic coal based power plant (credible alternative 2) and supercritical domestic coal based power plant (credible alternative 4))</p> | <p>PGPL has considered GCV of domestic coal as 3865 kCal/kg available at the time of investment decision, based on the document on discussions by the coal ministry, Govt. of India on December 2009. The Validation team has verified the link provided http://164.100.47.5:8080/members/website/quest.asp?qref=149034 and accepts the information and value to be appropriate and correct.</p> <p>The validation team has cross-checked the GCV of the domestic coal (4068.96 kCal/kg) as mentioned in the Explanatory Memorandum to the Draft Amendments to the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009, published by CERC in March 2010 which is the nodal agency for formulating the guidelines for power plants in India. As lower GCV of coal is more conservative in establishing the baseline, the validation team accepts the GCV of domestic coal as most appropriate.</p> <p>The validation team has calculated the levelised cost of generation with this value and found that the resultant levelised cost of generation of credible alternative 4 is less than the base value of credible alternative 2 and the base value of credible alternative 4 is less than the resultant value of credible alternative 2. The results are shown below.</p> <table><tr><th>Credible alternatives</th><th>Base levelised cost of generation</th><th>Resultant levelised cost of generation at GCV of 4068.96 kCal/kg</th></tr><tr><td></td><td></td><td></td></tr></table> | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at GCV of 4068.96 kCal/kg | | | | | | | | | |
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at GCV of 4068.96 kCal/kg | | | | | | | | | | | |
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|--|---|-----------------------------------|---|
| | Credible alternative 2 | INR 2.806/kWh | INR. 2.715/kWh |
| | Credible alternative 4 | INR 2.687/kWh | INR 2.601/kWh |
| | | | |
| <p>GCV = 5900 kCal/kg</p> <p>(similar for subcritical imported coal based power plant (credible alternative 3) and supercritical imported coal based power plant (credible alternative 5))</p> | <p>The PGPL has estimated GCV of imported coal as 5900 kCal/kg based on the document on discussions by the Coal Ministry, Govt. of India on December 2009. The validation team has verified the link provided http://164.100.47.5:8080/members/website/quest.asp?qref=149034 and accepts the information and value to be appropriate and correct and in line with para 6 of investment analysis guidelines.</p> <p>The validation team has verified the GCV of imported coal based on "report on blending of imported coal and domestic coal"^{54/} prepared by CEA, April 2012. As the report mentions the imported coal to have average GCV of 5000 kCal/kg, the value considered is acceptable. The validation team has calculated the levelised cost of generation at this value and found that the base value of credible 4 is still less than the resultant values of credible alternative 3 and 5. The results are shown below.</p> | | |
| | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at GCV of 5000 kCal/kg |
| | Credible alternative 3 | INR 3.925/kWh | INR 4.451/kWh |
| | Credible alternative 4 | INR 2.687/kWh | |
| | Credible alternative 5 | INR 3.758/kWh | INR 4.261/kWh |
| | | | |

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|--|---|--|-----------------------------------|--|------------------------|---------------|----------------|------------------------|---------------|---------------|
| <p>Indian Coal price = INR 1545.68/Metric Tonne</p> <p>(similar for subcritical domestic coal based power plant (credible alternative 2) and supercritical domestic coal based power plant (credible alternative 4))</p> <p>Source:</p> <p>http://164.100.47.5:8080/members/website/quest.asp?qref=149034</p> | <p>The PP has estimated the landed price of domestic coal as INR.1545.68 /MT (considering a distance of 1000 km from the nearest coal field in the state of Maharashtra) available at the time of investment decision, based on the document on discussions by the coal ministry, Govt. of India on December 2009. The validation team has verified the link provided http://164.100.47.5:8080/members/website/quest.asp?qref=149034 and accepts the information and value to be appropriate and correct.</p> <p>Further the validation team has crosschecked with recently registered CDM project No. 6943 which mentions landed coal cost of INR 1166/MT. Hence the value estimated by the PP is considered conservative as higher coal cost increases the cost of generation of the baseline options and offers a conservative way of estimating the baseline.</p> <p>The validation team has calculated the levelised cost of generation with this value and found that the resultant levelised cost of generation of credible alternative 4 is less than the base value of credible alternative 2. But the base value of credible alternative 4 is more than the resultant value of credible alternative 2. The results are shown below.</p> <table><tr><td>Credible alternatives</td><td>Base levelised cost of generation</td><td>Resultant levelised cost of generation at fuel price of INR. 1166/MT</td></tr><tr><td>Credible alternative 2</td><td>INR 2.806/kWh</td><td>INR. 2.363/kWh</td></tr><tr><td>Credible alternative 4</td><td>INR 2.687/kWh</td><td>INR 2.264/kWh</td></tr></table> <p>Notwithstanding the results of the above table, PP has selected credible alternative 4 as the baseline since it is more efficient (and hence have lesser emission rate) than the credible alternative 2. The validation has accepted the same as correct and reasonable as it is in accordance with the applied methodology.</p> | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at fuel price of INR. 1166/MT | Credible alternative 2 | INR 2.806/kWh | INR. 2.363/kWh | Credible alternative 4 | INR 2.687/kWh | INR 2.264/kWh |
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at fuel price of INR. 1166/MT | | | | | | | | |
| Credible alternative 2 | INR 2.806/kWh | INR. 2.363/kWh | | | | | | | | |
| Credible alternative 4 | INR 2.687/kWh | INR 2.264/kWh | | | | | | | | |
| <p>Imported Coal price = INR 4003.91/MT</p> <p>(similar for subcritical imported coal based power plant (credible alternative 3) and supercritical imported coal based power plant (credible alternative 5))</p> <p>Source:</p> <p>http://164.100.47.5:8080/members/website/quest.asp?qref=149034</p> | <p>The PP has estimated the landed price of imported coal as INR. 4003.91 /MT (considering a distance of 100 km based on location of nearest coal handling port to the project activity) available at the time of investment decision, based on the document on discussions by the Coal Ministry, Govt. of India on December 2009. The Validation team has verified the link provided http://164.100.47.5:8080/members/website/quest.asp?qref=149034 and accepts the information and value to be appropriate and correct and in line with para 6 of investment analysis guidelines.</p> <p>The validation team has reviewed the Indian Power Sector website dated 18th February 2013 and observed that the price of imported coal was INR 5,000/Metric tonne. The validation team has calculated the levelised cost of generation at this value and found that the base value of credible 4 is still less than the resultant values of credible alternative 3 and 5. The results are shown below.</p> <table><tr><td>Credible alternatives</td><td>Base levelised cost of generation</td><td>Resultant levelised cost of generation at imported coal price of</td></tr></table> | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at imported coal price of | | | | | | |
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at imported coal price of | | | | | | | | |

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|---|--|---|---------------|-----------------------|-----------------------------------|---|------------------------|---------------|---------------|------------------------|---------------|---------------|------------------------|---------------|---------------|------------------------|---------------|---------------|
| | | | INR. 5000/MT | | | | | | | | | | | | | | | |
| | Credible alternative 3 | INR 3.925/kWh | INR 4.652/kWh | | | | | | | | | | | | | | | |
| | Credible alternative 4 | INR 2.687/kWh | | | | | | | | | | | | | | | | |
| | Credible alternative 5 | INR 3.758/kWh | INR 4.453/kWh | | | | | | | | | | | | | | | |
| Annual escalation in coal price = 7.5% (similar for subcritical domestic coal based power plant (credible alternative 2), subcritical imported coal based power plant (credible 3), supercritical domestic coal based power plant (credible alternative 4) and supercritical imported coal based power plant (credible alternative 5)) Source: http://www.rbi.org.in/scripts/PublicationsView.aspx?id=13050 | <p>The annual escalation of both domestic coal and imported coal is considered as 7.5% based on the forecasted inflation rate for next ten years published by the Reserve Bank of India in March 2011, prior to the investment decision date. The WPI inflation rate mentions a range of 4% - 7.5% escalation that is forecasted for the next ten years. PP has estimated the maximum forecasted escalation rate of 7.5% which is considered conservative.</p> <p>Further the validation team has verified the coal escalation rate mentioned in the Explanatory Memorandum to the Draft Amendments to the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009^{24/}, published by CERC which mentions a value of 6.12%. In this context the escalation rate considered by the PP is conservative as higher escalation increases the cost of generation of the baseline options and offers a conservative way of estimating the baseline.</p> <p>The validation team has calculated the levelised cost of generation with this value and found that the resultant levelised cost of generation of credible alternative 4 is less than the base value of other credible alternatives. But the base value of credible alternative 4 is more than the resultant value of credible alternative 2 and less than that of other credible alternatives 3 and 5. The results are shown below.</p> <table><tr><td>Credible alternatives</td><td>Base levelised cost of generation</td><td>Resultant levelised cost of generation at annual escalation of 7.5%</td></tr><tr><td>Credible alternative 2</td><td>INR 2.806/kWh</td><td>INR 2.619/kWh</td></tr><tr><td>Credible alternative 3</td><td>INR 3.925/kWh</td><td>INR 3.622/kWh</td></tr><tr><td>Credible alternative 4</td><td>INR 2.687/kWh</td><td>INR 2.509/kWh</td></tr><tr><td>Credible alternative 5</td><td>INR 3.758/kWh</td><td>INR 3.469/kWh</td></tr></table> <p>Notwithstanding the results of the above table, PP has selected credible alternative 4 as the baseline since it is more efficient (and hence have lesser emission rate) than the credible alternative 2. The validation has accepted the same as correct and reasonable as it is in accordance with the applied methodology.</p> | | | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at annual escalation of 7.5% | Credible alternative 2 | INR 2.806/kWh | INR 2.619/kWh | Credible alternative 3 | INR 3.925/kWh | INR 3.622/kWh | Credible alternative 4 | INR 2.687/kWh | INR 2.509/kWh | Credible alternative 5 | INR 3.758/kWh | INR 3.469/kWh |
| Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at annual escalation of 7.5% | | | | | | | | | | | | | | | | |
| Credible alternative 2 | INR 2.806/kWh | INR 2.619/kWh | | | | | | | | | | | | | | | | |
| Credible alternative 3 | INR 3.925/kWh | INR 3.622/kWh | | | | | | | | | | | | | | | | |
| Credible alternative 4 | INR 2.687/kWh | INR 2.509/kWh | | | | | | | | | | | | | | | | |
| Credible alternative 5 | INR 3.758/kWh | INR 3.469/kWh | | | | | | | | | | | | | | | | |

Assumptions for Super critical coal based power plant based on imported coal / domestic coal

| Parameter / Value | Justification |
|---|--|
| <p>Capacity = 660 MW (similar for domestic coal and imported coal options)</p> <p>Source: Nearest block size available as per manufacturer specifications</p> | <p>The supercritical coal power plant of 660 MW capacity is taken as the nearest block size available based on recently registered CDM project in India.</p> <p>The availability of this capacity in the industry has been cross verified from the list of operating coal power plants indicated in the Monthly Report on broad status of thermal power plants in the country- June 2010, published by CEA^{/29/}. In the context of the nearest block size being 660 MW as compared to the project capacity of 388 MW, the capacity considered is acceptable.</p> |

| | |
|---|---|
| <p>Heat rate = 2317.44 kCal/kWh</p> <p>(supercritical domestic coal based power plant (credible alternative 4))</p> <p>Source: CERC Tariff regulations ^{/9/}</p> | <p>The Design station heat rate of 2176 (kCal/kWh) indicated for power plants operating at super critical parameters viz pressure of 247 Kg/cm² using sub-bituminous Indian coal has been considered to which a correction factor of 1.065, as specified by CERC, has been applied to calculate the Gross Station Heat rate which is appropriate. The source document is formulated by the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009^{/9/}, published by CERC which is the nodal agency for formulating the guidelines which is appropriate and acceptable.</p> <p>The validation team has reviewed the discussion paper for the coal based power plants^{/55/} in which design heat rate for supercritical domestic coal based is indicated as 2176 kCal/kWh and the station heat rate is mentioned as 2317 kCal/kWh. Hence accepted by the validation team as correct.</p> |
| <p>Heat rate = 2214.13 kCal/kWh</p> <p>(supercritical imported coal based power plant (credible alternative 5))</p> <p>Source: CERC notification, dated 19th January 2009, page No. 46^{/9/}</p> | <p>The Design station heat rate of 2079 (kCal/kWh) indicated for power plants operating at super critical parameters viz pressure of 247 Kg/cm² using sub-bituminous Indian coal has been considered to which a correction factor of 1.065, as specified by CERC, has been applied to calculate the Gross Station Heat rate which is appropriate. The source document is formulated by the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009^{/9/}, published by CERC which is the nodal agency for formulating the guidelines which is appropriate and acceptable.</p> <p>Hence the value estimated by the PP is considered conservative as higher heat rate increases the cost of generation of the baseline options and offers a conservative way of estimating the baseline.</p> <p>The validation team has reviewed the discussion paper for the coal based power plants^{/55/} in which design heat rate for supercritical imported coal based is indicated as 2079 kCal/kWh and the station heat rate is mentioned as 2214 kCal/kWh which includes correction factor of 1.065. Hence accepted by the validation team as correct.</p> |
| <p>Project cost = INR 327,954 Lakhs (for supercritical domestic coal based power plant (credible alternative 4) and supercritical imported coal based power plant (credible alternative 5))</p> <p>1 Lakh = 0.1 Million</p> <p>Source: Supercritical coal power plant cost indicated in project ref No. 3225 available at UNFCCC website (registered at the time of investment decision)</p> <p>http://mpcb.gov.in/notices/pdf/ExeSummary</p> | <p>Capital cost of the coal power plant has been calculated as INR 32,7954 Lakhs for a capacity of 660 MW, as calculated from the per MW cost of INR 496.9 Lakhs based on publically available document – <i>Energy efficient power generation in Tirora, India</i>^{/30/} which was registered as CDM project on 30th Nov. 2010.</p> <p>In the absence of publically available documents and policies by Indian government on the project cost estimates of supercritical power plants, the validation team accepted the cost of the supercritical power plant located in the state of Maharashtra (same state as project activity) as appropriate and in line with para 6 of investment analysis guidelines.</p> <p>The validation team has reviewed the project cost details^{/56/} from Lanco Vidarbha super critical based power plant in which the project cost is mentioned as INR. 346800 Lakhs for 660 MW.</p> <p>The validation team has calculated the levelised cost of generation with this value and found that the resultant levelised cost of generation of credible alternative 4 is less than the base value of credible alternative 5 and the base value of credible alternative 4 is less than the resultant value of credible alternative 5. The results are shown below.</p> |

| | | | |
|---|--|-----------------------------------|---|
| -R1.pdf | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at project cost of INR. 346800 Lakhs |
| | Credible alternative 4 | INR 2.687/kWh | INR 2.685/kWh |
| | Credible alternative 5 | INR 3.758/kWh | INR 3.795/kWh |
| | | | |
| <p>O&M expenses = INR 14.62 Lakhs/MW</p> <p>(for supercritical domestic coal based power plant (credible alternative 4) and supercritical imported coal based power plant (credible alternative 5))</p> <p>Source: CERC tariff order, 2009^{9/}</p> | <p>The O & M expenses is in line with the rate mentioned for coal power plant capacity of 600 MW and above in the Central Electricity Regulatory Commission (Terms and Conditions of Tariff), 2009^{9/}, published by CERC which is the nodal agency for formulating the guidelines for power plants in India and hence acceptable.</p> <p>As the value is the forecasted and estimated O & M costs for a coal based power plant in 2013-14, and PGPL is proposed to be commissioned in 2014, the same has been found to be appropriate by the validation team.</p> <p>The validation team has verified the O & M cost of the Supercritical coal power plant cost indicated in project ref No. 3225 available at UNFCCC website (registered at the time of investment decision) located in Maharashtra to be INR 8.0 lakhs / MW. Hence the value estimated by the PP is considered conservative as higher O & M cost increases the cost of generation of the baseline options and offers a conservative way of estimating the baseline.</p> <p>The validation team has calculated the levelised cost of generation with this value and found that the resultant levelised cost of generation of credible alternative 4 is less than the base value of credible alternative 5 and the base value of credible alternative 4 is less than the resultant value of credible alternative 5. The results are shown below.</p> | | |
| | Credible alternatives | Base levelised cost of generation | Resultant levelised cost of generation at O&M expenses of INR 8 Lakhs/MW |
| | Credible alternative 4 | INR 2.687/kWh | INR 2.544/kWh |
| | Credible alternative 5 | INR 3.758/kWh | INR 3.615/kWh |

Based on the assessment of input values, the levelised cost of generation for credible alternatives is tabled below:

| Credible alternatives | Levelised cost of generation (INR/kWh) |
|---|--|
| Combined cycle natural gas based power plant (Proposed project activity not undertaken as CDM project activity)- Credible Alternative 1 | 3.821 |
| Sub critical domestic coal based power plant – Credible Alternative 2 | 2.806 |
| Sub critical imported coal based power plant – Credible Alternative 3 | 3.925 |

| | |
|---|-------|
| Super critical domestic coal based power plant – Credible Alternative 4 | 2.687 |
| Super critical imported coal based power plant – Credible Alternative 5 | 3.758 |

From the table, it has been established that the super critical domestic coal based power plant (Credible alternative 4) is the most financially attractive compared to the project activity not taken as CDM project activity (Credible Alternative 1) and this alternative forms the most likely technology (baseline scenario) and domestic coal is the most likely fuel.

The same was also confirmed by performing sensitivity analysis on the critical parameters (project cost, fuel price, O&M, PLF and heat rate) as defined under the guidance of methodology and investment analysis.

Sensitivity analysis

Based on the requirements of the methodology AM0029, sensitivity analysis has been performed for all the realistic and credible alternatives as follows.

| Credible alternatives | Levelised cost of generation (INR/kWh) | | |
|--|--|---------|-------|
| Credible alternative 1- Combined cycle natural gas based power plant | Parameter | Change% | LCOG |
| | | 10% | 3.980 |
| | NG Cost | -10% | 3.663 |
| | | 10% | 3.954 |
| | R-LNG Cost | -10% | 3.689 |
| | | 10% | 3.739 |
| | PLF | -10% | 3.922 |
| | | 10% | 3.873 |
| | Project Cost | -10% | 3.770 |
| | | 10% | 4.113 |
| | Station Heat Rate | -10% | 3.530 |
| | | 10% | 3.860 |
| | O & M Cost | -10% | 3.783 |
| | | 10% | 3.556 |
| | GCV | -10% | 4.145 |
| | | 10% | |

| Credible alternative 2- Sub critical domestic coal based power plant | <table><tr><th>Parameter</th><th>Change%</th><th>LCOG</th></tr><tr><td rowspan="2">Fuel Cost</td><td>10%</td><td>2.986</td></tr><tr><td>-10%</td><td>2.626</td></tr><tr><td rowspan="2">PLF</td><td>10%</td><td>2.715</td></tr><tr><td>-10%</td><td>2.917</td></tr><tr><td rowspan="2">Project Cost</td><td>10%</td><td>2.871</td></tr><tr><td>-10%</td><td>2.741</td></tr><tr><td rowspan="2">Station Heat Rate</td><td>10%</td><td>2.986</td></tr><tr><td>-10%</td><td>2.626</td></tr><tr><td rowspan="2">O & M Cost</td><td>10%</td><td>2.841</td></tr><tr><td>-10%</td><td>2.771</td></tr><tr><td rowspan="2">GCV</td><td>10%</td><td>2.642</td></tr><tr><td>-10%</td><td>3.006</td></tr></table> | Parameter | Change% | LCOG | Fuel Cost | 10% | 2.986 | -10% | 2.626 | PLF | 10% | 2.715 | -10% | 2.917 | Project Cost | 10% | 2.871 | -10% | 2.741 | Station Heat Rate | 10% | 2.986 | -10% | 2.626 | O & M Cost | 10% | 2.841 | -10% | 2.771 | GCV | 10% | 2.642 | -10% | 3.006 |
|--|---|-----------|---------|------|-----------|-----|-------|------|-------|-----|-----|-------|------|-------|--------------|-----|-------|------|-------|-------------------|-----|-------|------|-------|------------|-----|-------|------|-------|-----|-----|-------|------|-------|
| Parameter | Change% | LCOG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fuel Cost | 10% | 2.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 2.626 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PLF | 10% | 2.715 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 2.917 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Project Cost | 10% | 2.871 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 2.741 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Station Heat Rate | 10% | 2.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 2.626 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O & M Cost | 10% | 2.841 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 2.771 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GCV | 10% | 2.642 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 3.006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Credible alternative 3- Sub critical imported coal based power plant | <table><tr><th>Parameter</th><th>Change%</th><th>LCOG</th></tr><tr><td rowspan="2">Fuel Cost</td><td>10%</td><td>4.217</td></tr><tr><td>-10%</td><td>3.633</td></tr><tr><td rowspan="2">PLF</td><td>10%</td><td>3.834</td></tr><tr><td>-10%</td><td>4.037</td></tr><tr><td rowspan="2">Project Cost</td><td>10%</td><td>3.990</td></tr><tr><td>-10%</td><td>3.860</td></tr><tr><td rowspan="2">Station Heat Rate</td><td>10%</td><td>4.217</td></tr><tr><td>-10%</td><td>3.633</td></tr><tr><td rowspan="2">O & M Cost</td><td>10%</td><td>3.960</td></tr><tr><td>-10%</td><td>3.890</td></tr><tr><td rowspan="2">GCV</td><td>10%</td><td>3.660</td></tr><tr><td>-10%</td><td>4.250</td></tr></table> | Parameter | Change% | LCOG | Fuel Cost | 10% | 4.217 | -10% | 3.633 | PLF | 10% | 3.834 | -10% | 4.037 | Project Cost | 10% | 3.990 | -10% | 3.860 | Station Heat Rate | 10% | 4.217 | -10% | 3.633 | O & M Cost | 10% | 3.960 | -10% | 3.890 | GCV | 10% | 3.660 | -10% | 4.250 |
| Parameter | Change% | LCOG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fuel Cost | 10% | 4.217 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 3.633 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PLF | 10% | 3.834 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 4.037 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Project Cost | 10% | 3.990 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 3.860 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Station Heat Rate | 10% | 4.217 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 3.633 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O & M Cost | 10% | 3.960 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 3.890 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GCV | 10% | 3.660 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -10% | 4.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | |
|--|--|-------------------|----------------|-------------|
| Credible alternative 4- Super critical domestic coal based power plant | | Parameter | Change% | LCOG |
| | | Fuel Cost | 10% | 2.860 |
| | | | -10% | 2.515 |
| | | PLF | 10% | 2.600 |
| | | | -10% | 2.795 |
| | | Project Cost | 10% | 2.752 |
| | | | -10% | 2.623 |
| | | Station Heat Rate | 10% | 2.860 |
| | | | -10% | 2.515 |
| | | O & M Cost | 10% | 2.719 |
| | | | -10% | 2.656 |
| | | GCV | 10% | 2.531 |
| | | | -10% | 2.879 |
| Credible alternative 5- Super critical imported coal based power plant | | Parameter | Change% | LCOG |
| | | Fuel Cost | 10% | 4.038 |
| | | | -10% | 3.479 |
| | | PLF | 10% | 3.671 |
| | | | -10% | 3.865 |
| | | Project Cost | 10% | 3.823 |
| | | | -10% | 3.694 |
| | | Station Heat Rate | 10% | 4.038 |
| | | | -10% | 3.479 |
| | | O & M Cost | 10% | 3.790 |
| | | | -10% | 3.727 |
| | | GCV | 10% | 3.504 |
| | | | -10% | 4.069 |

The range of the sensitivity analysis has covered, in a realistic way, the possible variations of all key parameters such as Fuel Price, PLF, Heat rate, Project cost, GCV and O&M that are related to the analysis and that could change over the crediting period.

The analysis is in line with the guidance which states that a sensitivity analysis shall be performed for all alternatives, to confirm that the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions (e.g. fuel prices and the load factor). The investment analysis provides a valid argument in selecting the baseline scenario only if it consistently supports (for a realistic range of assumptions) the conclusion that the pre-selected baseline scenario is likely to remain the most economically and/or financially attractive.

Further, the highest levelised cost of generation of credible alternative 4 from the sensitivity analysis (INR 2.879/kWh due to GCV reduced by '-10%') is lesser than the lowest levelised cost of generation of all other credible alternatives except of credible alternative 2 for which lowest one is INR. 2.626/kWh (due to fuel cost and station heat rate reduced by '-10%'). PP has selected credible alternative 4 as the

baseline since it is more efficient (and hence have lesser emission rate) than the credible alternative 2. The validation team has accepted the same as correct and reasonable as it is in accordance with the applied methodology.

As the sensitivity analysis conclusively supports that the most plausible baseline option is super critical domestic coal power plant it is chosen as the most credible baseline alternative. The sensitivity analysis of the project activity (Power generation using domestic natural gas) also confirms that in all scenarios accounting for probable variations, the levelised cost of generation of the baseline is always cheaper compared to the project activity.

Sensitivity analysis

A sensitivity analysis shall be performed to confirm that the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions (e.g. fuel prices and the load factor). The investment analysis provides a valid argument in selecting the baseline scenario only if it consistently supports (for a realistic range of assumptions) the conclusion that the pre-selected baseline scenario is likely to remain the most economically and/or financially attractive. Similarly the validation team has verified the sensitivity analysis on the IRR of project activity with the benchmark and verifies that under all conditions, the project is additional based on the analysis below.

| Parameter | Change% | Project NPV |
|-----------------------------|---------|-------------|
| Base case | | -47560 |
| NG Cost | 10% | -68987 |
| | -10% | -26789 |
| R-LNG Cost | 10% | -65324 |
| | -10% | -30270 |
| Tariff- Sale to grid | 10% | -12610 |
| | -10% | -84514 |
| Tariff- Sale to Open market | 10% | -32738 |
| | -10% | -62701 |
| PLF | 10% | -35582 |
| | -10% | -59717 |
| Project Cost | 10% | -59349 |
| | -10% | -35805 |
| Station Heat Rate | 10% | -87524 |
| | -10% | -9906 |
| O & M Cost | 10% | -52620 |
| | -10% | -42537 |
| GCV | 10% | -13280 |
| | -10% | -92176 |

As the sensitivity analysis conclusively supports that the most plausible baseline option is super critical coal power plant which has the lowest emission rate among the alternatives it is chosen as the most credible baseline alternative. The sensitivity analysis of the project activity (Power generation using domestic natural gas) also confirms that in all scenarios accounting for probable variations, the levelised cost of generation of the baseline is always cheaper compared to the project activity.

Hence, the validation team accepts that the project meets the requirement as per para 106 to 110 and 124 to 130 of the VVS.

Common practice analysis

Based on requirements of Additionality assessment as per step 2 of AM0029, it has been demonstrated that the project activity is not common practice in the relevant country and sector by applying Step 4 (common practice Analysis) of the latest version of the "Tool for demonstration assessment and of additionality" (version 07.0.0) which guides to the latest version of "Guidelines on common practice".

The common practice analysis spread sheet submitted by PGPL has applied a stepwise procedure in line with the requirements specified in EB 69 Annex 08 "Guidelines on common practice". The individual worksheets in the main excel spread sheet^{/33/} define each of the five steps that are involved in the demonstration of the common practice analysis.

- a) The worksheet 'Data' lists all the power projects in the country (applicable geographical area – India). This list is drawn from the CEA database version 7. The list represents all the power plants installed within India including all categories such as Thermal (coal/gas/lignite/naphtha/diesel/oil), hydro and also nuclear power plants.
- b) As the project capacity is 388 MW, as per step 1, the "applicable output range" is determined as 194 MW (project capacity-50%) to 582 MW (project capacity + 50%) and the power plants are filtered accordingly as per the "step 1" worksheet.
- c) As per step 2, the default applicable geographical area (India-host country) is chosen. Within the similar projects identified under step 1 the projects that have started commercial operation before 09th Feb 2012 i.e the start date, which is also the earliest date than the date of CDM-PDD published for global stakeholder consultation and meet the conditions stipulated in para 6 of the EB 69, annex 8 are shortlisted. A total of 339 power projects have been identified to comply with the conditions defined in step 2.
- d) As per step 3, within the projects identified in step 2, N_{all} is derived excluding CDM project activities and projects activities undergoing validation. Hence, N_{all} is calculated as 334 as per "step 3" of worksheet.
- e) As per step 4, within similar projects identified in Step 3, those that apply technologies that are different from the technology of the proposed project activity are identified such as
 - Hydro and nuclear plants
 - Thermal power plants that use fuel/s other than natural gas (such as coal, diesel, lignite, naphtha)

As the project activity is a natural gas based plant, for the purpose of the common practice analysis, it is appropriate to compare only those power plants with technology and fuel similar to the project activity (as defined in paragraph 4a of the EB 69 Annex 8 Guidelines on common practice). The exclusion of hydro, nuclear as well as thermal power plants using fuels other than gas, is therefore justified. Hence, after elimination of the similar technology based plants, N_{diff} is calculated as 324 as per "Step 4" of worksheet.

- f) As per step 5, the diffusion factor is calculated in the "Step 4" of the worksheet based on the N_{all} and N_{diff} derived from the previous steps.

Factor $F = 1 - N_{diff}/N_{all}$ representing the share of similar plants using measure/technology similar to the measure/technology used in the proposed project activity, $F = 1 - 324/334 = 0.0299$.

As per paragraph 10 of the EB 69 annex 8, Guidelines on common practice (version 2.0), "The proposed project activity is a common practice within a sector in the applicable geographical area if **both** the following conditions are fulfilled:

- (a) the factor F is greater than 0.2, and
- (b) $N_{all}-N_{diff}$ is greater than 3.

In the case of the project activity, as $F = 0.0299 < 0.2$ and hence condition (a) referred to above (i.e. $F > 0.2$) is not fulfilled. Therefore, it is established that the project activity is not a common practice in the applicable geographical area.

The validation team accepts the results of stepwise procedure to be in line with the EB 69 annex 8, Guidance on common practice, and therefore concludes that the implementation of natural gas based power plants is not a common practice in the host country.

Hence, the validation team accepts that the project meets the requirement as per para 135 to 137 of the VVS.

In this section, following corrective action and findings were raised:

- CAR 5 - The breakup of the project cost is not indicated for NG and Coal options.

PGPL mentions R_LNG as potential source, however the cost analysis of the same has not been provided.
- CAR 6 - Submitted PDD (version 2.0) does not discuss the sensitivity analysis for all the alternatives, considering the NCV of the fuel, although excel spread sheets discuss the same.

The sensitivity analysis has not been provided for supercritical option.
- CAR 7 - PP is required to provide further information on why the guidance from Tariff Order available in the country is not considered to calculate the long term tariff for the project activity allocated as Case I
PP is required to justify the rate assumed for short term also.
- CAR 8 - PP is requested to support the following with evidence
 - a) Annual O&M expenses of INR 18.49 Lakh/MW
 - b) NG price of USD 6.04 USD / MMBTU and LNG price of 9.77 USD/MMBTU.
- CL 7 – It is evident from PDD section B.5 that the levelised cost of electricity generation is taken as financial indicator in proving the additionality. However, according to the 'Tool for the demonstration and assessment of additionality, Ver 6.0', Financial indicator such as IRR, most suitable for the project type and decision context is to be used in the Benchmark Investment Analysis. The applied methodology 'AM0029 ver 3 para 2' does not indicate any specific indicator and it allows any suitable financial indicator to be used. But under additionality clause in the methodology (page 3), it is clearly indicated that Option III Benchmark analysis is to be applied as per the latest additionality tool Ver 6.0 to demonstrate the additionality. PP to clarify and justify the approach of taking levelised cost of electricity generation as financial indicator instead of IRR for comparison and concluding additionality.
Long term Tariff for IRR calculation has been sourced based on information on winning tariff bids of Case 1 projects. Clarify / justify why CERC guideline is not referred.
- CL 8 – In sensitivity analysis, clarify on the exclusion of NCV from the parameters being considered to have a major impact on the project revenues / expenses.
In the sensitivity analysis, some of the resultant values of project IRR (at +10% or -10% of the parameters) shows as negative project IRR. PP to clarify whether negative IRR is mathematically correct

- CL 9 – In relation to common practice analysis, clarify the following
 - ✓ The basis for arriving at N_{all} in step 2 is not clear as the data analysis does not indicate the basis of inclusion / exclusion of power plants
 - ✓ In step 3, the fuel type of power plants identified to differ with respect to investment climate is not clearly mentioned.
- CL 12 - Regarding the formula used in the excel sheet, the auxiliary consumption is indicated in the assumption sheet while the same is not incorporated in the levelised cost calculations. Clarify if this correct and based on accepted formulae in line with accepted means of accounting practices.
- CL 13 - The technical life time for NG based plant and Coal based plant is indicated as 25 years in the PDD but the investment analysis (levelised cost and IRR) reflects 20 years only. Clarify / justify the approach chosen.
- CL 14 - The valid links and evidences to establish that the input values used in the investment analysis, are valid and applicable at the time of the investment decision has not been provided. Clarify / justify the conservativeness of the following assumptions:
 - Escalation rate of NG – 10.18%
 - Auxiliary consumption
 - Debt Equity ratio in comparison to loan sanction
- CL 15 - PP is requested to clarify on the value used (3.79 INR/kWh) for short term tariff rate on the basis of relevance and appropriateness
- CL 16 - PP is requested to clarify on the fuel ratio of NG, changed from 85% to 70% on the basis of relevance and appropriateness
- CL 17 - PP is requested to clarify on the proportion of electricity to open access, changed from 15% to 30%

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.6.3 Other barriers

The PP has substantiated the barrier facing the implementation of the project activity as financial barrier. Hence other barriers are not considered.

3.7 Monitoring Plan

The project uses approved monitoring methodology “Grid connected electricity generation plants using non-renewable and less GHG intensive fuel”, AM0029, version 3, which is applicable to the project.

Electricity generation at the project activity is at 15kV which is then stepped-up to 220kV, before power evacuation is done at the sub-station level. Grid interfacing is done through two numbers of double circuit transmission lines. Metering arrangements (accuracy class of 0.2s) will be in place to measure the electricity supplied, through the 220kV transmission line, to the NEWNE Grid from PGPL switch yard.

Section 7 of PDD has also included the provision for the following:

- Data to be monitored
- Calibration requirements
- Verification of monitoring results
- Data handling
- Training

- Data review

The responsibility, authority, monitoring, measurement, reporting, archiving, the QA / QC procedures related to calibration, meter testing, internal audits, maintenance of monitoring equipment and monitoring plan implementation which are found to comply with the requirements of the applicable methodology.

Further to assessment of the monitoring plan indicated in the PDD, the validation team is of the opinion that the project participant is able to implement the monitoring plan as

- The monitoring plan is in line with the requirements of the methodology;
- Monitoring arrangements described in the monitoring plan are feasible within the project design;

The validation team conforms that the monitoring plan has been validated inline with para 138 to 140 of VVS.

In this section, one CL was raised as follow:

- CL 10 – Section C.2.2.1 indicates the expected starting date of crediting period is the date of registration of the project. Whereas the JMR is taken on a fixed date, It is most likely that the date of registration may not coincide with the date of JMR. PDD does not identify procedures for dealing with possible monitoring data adjustments to handle such exigency. Identical situation is anticipated in the last month of crediting period.

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.7.1 Parameters Determined Ex-Ante

The ex-ante parameters that are available at the time of validation are indicated below:

| Parameter | Justification by the validation team |
|--|--|
| Build Margin emission factor of NEWNE Grid $EF_{BM,y} = 858.78$ tCO ₂ e/GWh Source: CEA database version 7.0 | As per the methodology, the build margin is to be calculated based "Tool for calculate emission factor for an electricity system" Version 4.0. Since CEA database is found based on the referred tool, the validation team has accepted the CEA database as the correct source. The CEA version 7.0 was the latest one available at the PDD submitted for validation which corresponds to the year 2010-2011. |
| Operating Margin emission factor of NEWNE Grid $EF_{OM,y} = 997.27$ tCO ₂ e/GWh Source: CEA database version 7.0 | Since the operating margin calculation is sourced from CEA database which is based on "Tool for calculate emission factor for an electricity system" Version 4.0. Since CEA database is found based on the referred tool, the validation team has accepted the CEA database as the correct source. The CEA version 7.0 was the latest one available at the PDD submitted for validation. . The value is corresponds to the weighted average of data vintages 2008-2009, 2009-2010 and 2010-2011. |
| Combined Margin emission factor of the NEWNE Grid $EF_{CM} = 928.03$ tCO ₂ e/GWh | PP has used a Weightage $W_{OM}:W_{BM} = 50:50$ as prescribed by the applied methodology to calculate the combined margin, the validation team has accepted the value as correct. |
| Fuel emission coefficient | PP has used the following formula for calculating the Fuel emission |

| | |
|---|---|
| <p>(COEF_{BL}) = 93.884 tCO₂e/TJ</p> <p>Source: CEA database version 7.0</p> | <p>coefficient (COEF_{BL}) = Emission factor of coal x oxidation factor of coal</p> <p>The validation team has reviewed the CEA database version 7.0 and accepted the emission factor of coal (95.8 tCO₂e/TJ) and oxidation factor (0.98) as correct. Emission factor of coal taken is conservative as compared to IPCC 2006 values (96.1 tCO₂e/TJ)</p> |
| <p>Power plant efficiency, η_{BL} of the most likely baseline scenario technology (supercritical domestic coal power plant-Credible alternative 4) = 37.11 %</p> <p>Source: CERC tariff order, 2009</p> | <p>The validation team has reviewed CERC tariff order, 2009 and observed that for supercritical technology heat rate is indicated as 2317.44 kCal/kWh which included the correction factor of 1.065.</p> <p>Efficiency = 860 /Heat rate which is correct.</p> |
| <p>Emission factor for upstream fugitive methane emissions of natural gas – $EF_{NG, upstream, CH_4}$ = 160 tCH₄/PJ</p> | <p>PP has used the USA and Canada values as per the Table -2 of the applied methodology AM 0029. As per the methodology this value corresponds to the relevant system element (gas production and/or processing/transmission/distribution) which is predominantly of recent vintage and built and operated to international standards. Appendix 4 of the PDD provides justification for the value chosen. The project activity envisages usage of both the domestic and imported R-LNG. PP has also referenced and justified with evidence the gas processing facilities in Petronet (LNG), Dabhol LNG, Rasgas (Qatar), Gorgon (Australia), and gas production facilities at Reliance industries limited and gas transportation and distribution facilities of reliance gas transportation infrastructure limited and Gujarat state petronet limited which are of recent vintage and are built and operated to international standards such as API, ASMI, ASTM and ISO. Also the validation team is of the opinion that the natural gas facilities including gas production, processing and transportation, in the country, are built with latest technologies adhering to international standards and are of recent vintage. Hence the value is accepted by the validation team.</p> |

In this section, the following CL was raised

CL 6 For ex-ante parameters clarify the following:

Efficiency of the baseline plant refers a value based on CERC guidelines, which however did not mention the specific value. Clarify whether the source used is appropriate.

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.7.2 Parameters Determined Ex-Post

The data that will be monitored ex-post are summarized below:

- EF_{BM,y} – Build Margin Emission Factor of NEWNE Grid published by CEA Ministry of Power, Government of India periodically with high reliability.
- FC_{f,y} – Net quantity of natural gas consumption by the project plant during year y will be monitored in SCM or m³ by use of Gas Flow meters which would be calibrated as per the manufacturers standards

- c) $FC_{LNG,y}$ - Net quantity of LNG consumption by the project plant during year, y in SCM or m³ would be monitored in case of usage by means of Gas Flow meters which would be calibrated as per the manufacturers standards.
- d) $NCV_{f,y}$ - Net calorific value of natural gas would be monitored in kCal/SCM or m³. The NCV is measured by using a Gas calorimeter by the fuel supplier and recorded every fortnight or as per the supply schedule.
- e) $EG_{PJ,y}$ -The net electricity supplied to the grid will be monitored in GWh by use of tri-vector meters. Calibration of the meters will be done annually as per manufacturer's standards.
- f) $EF_{CO_2,f}$ - CO₂ emission factor of natural gas in tCO₂/GJ would be updated in line with revised IPCC guidelines during crediting period.
- g) $OXID_f$ - The oxidation factor of natural gas would be updated in line with revised IPCC guidelines during crediting period.
- h) PE_y - Project emission due to combustion of natural gas in the project activity would be calculated by applying the monitored parameters
- i) $COEF_{f,y}$ - Emission coefficient of natural gas would be calculated by applying the monitored parameters viz net calorific value, emission factor of and oxidation factor of natural gas
- j) $EF_{BL,upstream,CH_4}$ - Emission factor for upstream fugitive methane emissions, occurring in the absence of the project activity electricity generation, would be calculated based on data from CO₂ baseline database or CEA data whichever is latest.

Calibration test records, equipment manufacturer's recommendations and the industry /national standards as applicable will be maintained for verification. It was confirmed from the site visit that the project design has got provisions to monitor the fuel (NG) from both the fuel supplier and the consumer (PGPL) which acts as a system of cross –verification to arrive at the correct value on a conservative basis.

In this section, the following CL was raised,

CL 6

For ex-post parameters clarify the following:

- b) The source of data for estimating the NCV of Natural gas is referred as the fuel supplier data. Clarify whether the source used is appropriate as it was mentioned during site visit that the FSA is yet to be signed.*
- c) The choice of source used for estimating the CO₂ EF of Natural Gas as per the requirements of the methodology indicates use of IPCC values in the absence of a national source. Clarify whether the source used is appropriate as national (CEA) database mentions the value.*
- d) The rationale behind applying default values for US and Canada, for fugitive methane upstream emissions, as indicated in appendix 4 of the PDD is not clearly justified.*
- e) The means of measurement of LNG referred in section B.7.1, is indicated as fuel flow meter – however, based on the discussions with PP it is evident that separate provision for measuring LNG consumption is not made. Clarify the measurement practice in this regard*

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

3.8 Calculation of GHG Emissions

As per AM0029, the baseline emission sources considered are the power plants connected to the NEWNE Grid that contribute to its build margin. The project activity uses a lesser GHG intensive fuel and thus proposes to reduce the GHG intensity of the grid to which it supplies. The baseline emission is obtained by multiplying net electricity generated by the project power plant with the build margin baseline emission factor of NEWNE regional grid as per the data of CO₂ baseline database published by CEA.

3.8.1 Baseline Emissions

The grid emission factor was calculated from the Operating Margin (OM) CO₂ emission factor, Build Margin (BM) CO₂ emission factor and emission factor of coal (sub-bituminous) and has been evaluated according to the procedures prescribed in 'Tool to calculate the emission factor for an electricity system Version 4.0'. Data from the CO₂ Baseline Database for the Indian Power Sector-Central Electricity Authority, version 7.0^{12/} applicable at the time of validation has been used in the PDD and based on the requirements of the methodology the lowest emission factor has been used for calculating baseline emissions.

| Options | Justification by the validation team |
|---|---|
| Option 1: Build Margin (BM) emission factor of NEWNE Grid = 858.78 tCO ₂ e/GWh | As per the methodology, the build margin is to be calculated based "Tool for calculate emission factor for an electricity system" Version 4.0. Since CEA database is found based on the referred tool, the validation team has accepted the value as correct. The value corresponds to the year 2010-2011. PP has used the official published data on OM and BM emission factors. The version of the data used is as available on the date of validation. This data is published by CEA, the sole authority for the publication of such data in India. This data is based on the emission factor tool approved by UNFCCC. Validation team accepted this emission factor, since it is based on the official background data published by CEA. |
| Option 2: Combined Margin emission factor of NEWNE Grid = 928.03 tCO ₂ e/GWh | PP has used a Weightage W _{OM} :W _{BM} of 50:50 as prescribed by the applied methodology to calculate the combined margin, the validation team has accepted the value as correct. |
| Option 3: Emission factor of technology identified as most likely scenario (EF _{BL, CO2}) = 910.78 tCO ₂ e/GWh Most likely technology = Super critical power plant Most likely fuel= domestic coal (Credible alternative 4) | PP has used the following formula for calculating the Fuel emission coefficient (COEF _{BL}) = Emission factor of coal x oxidation factor of coal. The validation team has reviewed the CEA database version 7.0 and accepted the emission factor of coal (95.8 tCO ₂ e/TJ) and oxidation factor (0.98) as correct. Emission factor of coal taken is conservative as compared to IPCC 2006 values (96.1 tCO ₂ e/TJ). The validation team has reviewed CERC tariff order, 2009 and observed that for supercritical technology heat rate is indicated as 2317.44 kCal/kWh or efficiency of 37.11%. Emission factor of technology identified as most likely scenario is calculated as follows. $EF_{BL, CO2} = COEF_{BL} \times 3.6 / \eta_{BL}$ $= 93.884 \times 3.6 / 37.11\%$ $= 910.78 \text{ tCO}_2\text{e/GWh}$ |
| Baseline CO ₂ emission factor (EF _{BL,CO2, y}) | As per the methodology, it is the lowest of the three |

| | |
|---|--|
| =858.78 tCO ₂ e/GWh (Option 1) | options; hence the value is accepted by the validation team. |
| Net electricity generated in the project activity =2787.93 GWh/year | <p>During validation, the net electricity is calculated as follows.</p> <p>Gross generation = Capacity x PLF x 8760 hours</p> <p>Net generation = Gross generation x (1-Auxillary consumption)</p> <p>Net generation = 388 MW x 85% x 8760 x (1-3.5%) = 2787.93 GWh/year</p> <p>During monitoring period, I net electricity supplied to the grid will be monitored by use of tri-vector meters. Calibration of the meters will be done annually as per manufacturer's standards.</p> |
| Baseline emission = 2,394,220 tCO ₂ e/year | <p>As per the methodology AM0029, version 3, baseline emissions (tCO₂e/year) are given by:</p> $BE_y = EG_{PJ,y} \times EF_{BL,CO_2,y}$ <p>Where,</p> <p>$EG_{PJ,y}$ = is the electricity generated by the power plant, GWh</p> <p>$EF_{BL,CO_2,y}$ = is the baseline carbon dioxide emission factor, tCO₂/GWh</p> $= 2787.93 \times 858.78$ $= 2,394,220 \text{ tCO}_2\text{e /year}$ |

The measurement of net electricity generated is according to the applied methodology, established in monitoring section, while the BM applied emission factor has been taken based on comparison of the different options, among which the lowest value has been applied based on CEA version 7^{/12/}, applicable at the time of validation. Oxidation factor for NG was taken as 1 based on IPCC 2006 "IPCC Guidelines for National Greenhouse Gas Inventories". The energy efficiency of technology in the most likely baseline scenario and is taken as 37.11 %, calculated based on CEA Version 7.0 based on 'Tool to calculate the emission factor for an electricity system'.

3.8.2 Project Emissions

The project activity consists of on-site combustion of natural gas to generate electricity. Then, CO₂ emissions from electricity generation (PE_y) are calculated as per the applied methodology. The validation of the input values used for calculating project emission is detailed below.

| Input values for project emission | Justification by the validation team |
|---|---|
| Total volume of natural gas combusted in the project activity including LNG in the year y = 469.28251188 Million SCM/year | During validation, natural gas combusted is calculated as follows. |
| Source: Natural gas flow meter located at the site | <p>Natural gas consumption</p> <p>= Gross generation x Heat rate /GCV</p> |

| | |
|--|---|
| | $= 2889.05 \text{ GWh} \times 1624.35 \text{ kCal/kWh} / 10000 \text{ kCcal/Kg}$ <p>During monitoring period: Net quantity of natural gas consumption by the project plant during year y will be monitored in SCM by use of Gas Flow meters which would be calibrated as per the manufacturer's standards.</p> |
| <p>Net calorific value of natural gas in the year y = 9090.91 kCal/SCM</p> <p>Source: Natural gas suppliers</p> | <p>The ratio of GCV to NCV is taken as 1.1 sourced from CEA database.</p> <p>Net calorific value of natural gas would be monitored in kCal/SCM. The NCV is measured by using a Gas calorimeter by the fuel supplier and recorded every fortnight or as per the supply schedule. The net calorific value of 9090.90 kCal/SCM (energy content) per volume unit of natural gas in year is provided by supplier and recorded by PGPL for verification, which will be cross verified on a continuous basis using a Gas Chromatograph and averaged in the invoice for the metered period.</p> |
| <p>CO₂ emission factor per unit of energy natural gas in the year = 56.1 tCO₂e/TJ</p> <p>Source: IPCC guidelines</p> | <p>CO₂ emission factor of natural gas in tCO₂/GJ would be updated in line with revised IPCC guidelines during crediting period.</p> |
| <p>Oxidation factor of natural gas in the year y = 1</p> <p>Source: IPCC guidelines</p> | <p>Oxidation factor of natural gas would be updated in line with revised IPCC guidelines during crediting period.</p> |
| <p>Fuel emission coefficient of natural gas in the year y = 0.00213486 tCO₂e/SCM</p> | <p>Fuel emission coefficient = NCV x CO₂ Emission factor x Oxidation factor</p> <p>Fuel emission coefficient = 9090.91 x 0.0561 x 1 = 0.00213486 tCO₂e/SCM</p> |
| <p>Project emission in the year y = 1,001,852 tCO₂e/year</p> | <p>Project emission = Fuel emission coefficient of natural gas x Quantity of natural gas combusted in the year y</p> <p>Project emission = 0.00213486 x 469,282,511.88 = 1,001,852 tCO₂e/year</p> |

3.8.3 Leakage Emissions

Leakages occurring due to upstream fugitive methane emissions have been considered on a conservative basis based on the methodology AM0029. Leakages have been taken into account considering:

- 1) Fugitive CH₄ emissions associated with fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of natural gas used in the project plant and fossil fuels used in the grid in the absence of the project activity. ($LE_{CH_4, y}$)
- 2) In the case LNG is used in the project plant: CO₂ emissions from fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression into a natural gas transmission or distribution system. ($LE_{LNG, CO_2, y}$)

The validation of the input values used for calculating project emission is detailed below.

| Input values for leakage emission | Justification by the validation team |
|--|--|
| Total volume of natural gas combusted including LNG in the project activity in the year y = 469.28251188 Million SCM/year | Net quantity of natural gas (NG + R-LNG) consumption by the project plant during year y will be monitored in SCM by use of Gas Flow meters which would be calibrated as per the manufacturer's standards. |
| Net calorific value of natural gas in the year y = 0.0380545 GJ/M ³ Source: Natural gas suppliers | Net calorific value of natural gas would be monitored in kCal/SCM. The NCV is measured by using a Gas calorimeter by the fuel supplier and recorded every fortnight or as per the supply schedule. |
| Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution and in the case of LNG, liquefaction, transportation, re-gasification and compression into a transmission or distribution system, in tCH ₄ per GJ of fuel supplied to final consumers (EF _{NG, upstream, CH4}) = 0.000160 tCH ₄ /GJ | PP has used the USA and Canada values as per the Table -2 of the applied methodology AM 0029. As per the methodology this value corresponds to the relevant system element (gas production and/or processing/transmission/distribution) which is predominantly of recent vintage and built and operated to international standards. Appendix 4 of the PDD provides justification for the value chosen. The project activity envisages usage of both the domestic and imported R-LNG. PP has also referenced and justified with evidence the gas processing facilities in Petronet (LNG), Dabhol LNG, Rasgas (Qatar), Gorgon (Australia), and gas production facilities at Reliance industries limited and gas transportation and distribution facilities of reliance gas transportation infrastructure limited and Gujarat state petronet limited which are of recent vintage and are built and operated to international standards such as API, ASMI, ASTM and ISO. Also the validation team is of the opinion that the natural gas facilities including gas production, processing and transportation, in the country, are built with latest technologies adhering to international standards and are of recent vintage. Hence the value is accepted by the validation team. |
| Electricity generated in the project activity =2,889,048 MWh/year | The electricity generated in the project plant will be monitored by use of tri-vector meters. Calibration of the meters will be done annually as per manufacturer's standards. |
| Emission factor for upstream fugitive methane emissions from production of the fuel type k (coal) in t CH ₄ per MJ fuel produced (EF _{k, upstream, CH4}) =0.8 tCH ₄ /kJ of coal | PP has selected the default value as per the applied methodology AM0029, Table 2 applicable for coal surface mining, on conservative basis the same value is applied for lignite also, this approach is accepted by the validation team. |
| Emission factor for upstream fugitive methane emissions from production of the fuel type k (oil) in t CH ₄ per MJ fuel produced (EF _{k, upstream, CH4}) = 4.1 tCH ₄ /PJ of oil | PP has selected the default value as per the applied methodology AM0029, Table 2 applicable for Oil, on conservative basis the same value is applied for diesel also, this approach is accepted |

| | |
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| <p>Emission factor for upstream fugitive methane emissions occurring in the absence of the project activity in t CH₄ per MWh electricity generation in the project plant (EF_{BL,upstream,CH4}) =</p> | <p>by the validation team.</p> <p>PP has selected option 1 for the calculation of EF_{BL,upstream,CH4} which is consistent with the calculation of EF_{BL, CO2}, and inline with the applied methodology hence accepted by the validation team.</p> $EF_{BL,upstreamCH4} = \frac{\sum_j FF_{j,k} \cdot EF_{k,upstreamCH4}}{\sum_j EG_j}$ $= 0.000552 \text{ tCH}_4/\text{MWh}$ <p>The EF_{BL,upstream,CH4} is calculated from the official data, CO₂ baseline database for the Indian power sector, version 7.0, published by Ministry of Power, Govt of India. The calculation is consistent with the calculation of CO₂ emissions in the build margin i.e same cohort of plants and data on fuel combustion and electricity generation has been used. Since the direct fuel consumption of the baseline grid build margin plants is not publically available, it is calculated based on the net electricity generation, heat rate and GCV available in the CO₂ baseline database. The fugitive methane emission factors for various applicable fuels as provided in Table 2 of the applied methodology is used to estimate the EF_{BL,upstream,CH4}.</p> |
| <p>GWP_{CH4} =25</p> | <p>Earlier PP has considered for the first commitment period as 21 kg CO₂/kg CH₄. Now, PP has considered GWP of methane as 25 for the second commitment period which is in accordance with decision 4/CMP 7 as prescribed by the "Standard for application of the global warming potentials to CDM PA and PoA for the second commitment period of the Kyoto protocol" Version 1.0 (EB 69 Annex 3). The verification team has also verified the CER sheet and application of GWP is correct.</p> |
| <p>Leakage emissions due to fugitive upstream CH₄ emissions in the year y (LE_{CH4,y})</p> | <p>LE_{CH4, y} = [FC y x NCV y x EF_{NG, upstream, CH4} – EG pJ, y x EF_{BL, upstream, CH4}] x GWP_{CH4} =31,550 tCO₂e/year</p> |
| <p>Total volume of R-LNG combusted in the project activity in the year y = 140.784754 Million SCM/year (30 % of the total fuel used)</p> | <p>Net quantity of R-LNG consumption by the project plant during year y will be monitored in SCM by use of Gas Flow meters which would be calibrated as per the manufacturer's standards.</p> |
| <p>Emission factor for upstream CO₂ emissions due to fossil fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system (EF_{CO2,upstream,LNG}) = 6 tCO₂/TJ</p> | <p>PP has used methodology provided default value of 6 tCO₂e/TJ for calculation, which the validation team has accepted since there is no other publicly available data.</p> |
| <p>Leakage emissions due to fossil fuel</p> | <p>LE_{LNG,CO2, y} = FCy x EF_{CO2,upstream,LNG}</p> |

| | |
|---|--|
| combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system during the year y in t CO ₂ e ($LE_{LNG,CO_2,y}$) = | = 32,145 tCO ₂ e/year |
| Leakage emissions during the year y (LE_y) = | $LE_y = LE_{CH_4,y} + LE_{LNG,CO_2,y}$ = 31,550 + 32,145 = 63,695 tCO ₂ e/year |

CL 6 was raised in this section as the Leakage calculations in Section B.6 of the PDD were not in conformance with the requirements of AM0029.

CAR 9 – was raised regarding GWP value of methane used in the ER calculations.

The CL and CAR raised was adequately addressed and satisfactorily resolved and closed as detailed in Table 3, of Appendix A of this report.

The gas (including R-LNG) to the project activity would be from new systems viz. new/recent gas fields, new pipelines, new LNG terminals and distribution systems which are built and operated to international standards as verified from the gas availability note submitted and MoPNG^{/11/}, the considered emission factor is appropriate.

3.8.4 Emission Reductions

The estimated emissions reduction ER_y by the project activity during a given year y is:

$ER_y = \text{Baseline Emissions} - \text{Project Emissions} - \text{Leakage},$

$ER_y = 2,394,220 - 1,001,852 - 63695 = 1,328,673 \text{ tCO}_2\text{e/year}$

These have been described adequately in section B 6.1 of the PDD and in CER calculation sheet^{/35/} as per the methodology AM0029, Version 3. Hence as per VVS para 101 to 105, it is the opinion of the validation team that

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

3.9 Environmental Impacts

As per the Environmental (Protection) Act 1986 of Government of India, (Ref. number S.O.1533(E), dated 14th September, 2006) EIA is mandatory requirement for natural gas based thermal power plant <500MW capacity (<http://envfor.nic.in/legis/eia/so1533.pdf>) and requires prior Environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA).

In line with the requirement, Environmental Impact Assessment (EIA)^{/36/} for the project activity has been conducted by M/s Sd Engineering Services Private Limited on May 2010. The project got environmental

clearance from Environment Department, Government of Maharashtra, India (Host Party) on 19th April 2011^{/37/}.

The scope of this EIA study covered an area of 10 km radius from the centre of the project site, and impacts on air, noise, water (surface and ground) and land were assessed based on two aspects:

- During the construction phase which may be regarded as temporary or short term;
- During the operation phase which would have long term effects.

The analysis did not indicate any significant environmental impacts. However mitigation measures were proposed for critical parameters and to ensure that pollution control measures are effective. The monitoring of the environmental parameters would be in line with the stipulations by Maharashtra Pollution Control Board (MPCB) and MoEF. No transboundary impacts have been identified due to the project activity.

The validation team verifies that the plant has been granted the environmental clearances and consents as per the requirements of the regulatory authority of the host country. Also the NCDMA of India through its approval letter^{/2/} has confirmed that the project contributes to sustainable development in India. The project activity in this regard meets the requirements of para 141 to 144 of VVS.

3.10 Crediting Period

PP has chosen a fixed 10-year crediting period, starting from 01st April 2016.

3.11 Comments by Local Stakeholders

A formal consultation process with the local stakeholders was held on 3rd May 2012 at the PGPL office at MIDC, Vile-Bhagad, Mangaon Taluk, Raigad District, Maharashtra. PP had communicated by written invitation in both English and regional language^{/38/} on 17th April 2012. The meeting was attended by 18 stakeholders comprising of village head, farmers and other residents as indicated in the attendance sheet^{/39/}.

The meeting^{/40/} discussed the environmental benefits of the CDM project activity and the stakeholders were provided with an interactive presentation on the project activity, its local and global benefits to the environment, the CDM process, and how the project would lead to sustainable development. The queries / comments were summarized and adequately addressed / accounted by PGPL as evident from the minutes of the stakeholder meeting and the description provided in the PDD. Thus appropriateness of local stakeholder consultation has been validated inline with para 145 to 147 of VVS.

In this section, one CL was raised as follow:

- CL –11 - Clarification was raised with respect to the nature of comments received during the local stakeholder consultation process, as it was not described in section E of the PDD and evidence for local stakeholder notice dated 17/04/2012 was not provided.

Details of the findings and the resolutions are as in Table 3 of Appendix A of this report.

4.0 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

SIRIM QAS Intl. uploaded the first version of the PDD^{/1/} on the UNFCCC's website <http://cdm.unfccc.int/Projects/Validation/DB/SY9RSTCKZ7MAZXTFQNTM1N0D3HKFJ/view.html> on 16th May, 2012. The global stakeholder process was from 16th May 2012 to 14 June, 2012. There were no comments received.

The validation team confirms that the global stakeholder consultation requirements defined in the para –35 to 38 of VVS were met.

5.0 VALIDATION OPINION

SIRIM QAS Intl. performed a validation of the proposed CDM project “Grid connected natural gas based power project in Raigad District, Maharashtra, India” in India. The validation was performed on the basis of the UNFCCC criteria for the Clean Development Mechanism and the host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting. Using a risk based approach, the review of the project design documentation and the subsequent follow-up interviews provided SIRIM QAS Intl. with sufficient evidence to determine fulfilment of the stated criteria.

The project participant is Pioneer Gas Power Ltd. (PGPL). The project is a unilateral project. The party involved and the host country is India. India fulfils the requirements to participate in the CDM. The DNA of India has confirmed that the project assists in achieving sustainable development and has authorized the project participant to request the project to be considered for registration with the UNFCCC. The proposed large scale CDM project is eligible under sectoral Scope 1 Category 1: Energy industries and the category is justified as the project is a grid connected electricity-generating project using non-renewable fuel in energy industries.

The project applies the simplified baseline and monitoring methodology of AM0029 version 03, “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas”.

The project activity involves construction and operation of grid connected 388 MW natural gas based combined cycle power plant near MIDC Ville-Bhagad, Mangaon Taluk, Raigad District, Maharashtra, India. The main purpose of the project activity is to generate electricity through less GHG intensive fuel such as natural gas (NG), that displaces electricity from an electricity distribution system (NEWNE Grid) dominated by more GHG intensive fossil fuel fired generating units. The project activity which is less carbon intensive will displace approximately 1,328,673 tonnes of CO₂ annually from a power deficit, more carbon intensive NEWNE Grid.

The project capacity is fixed and no addition will be made in capacity during the crediting period. The project will result in the reduction of greenhouse gas emissions that are real, measurable and give long term benefits to the mitigation of climate change.

It is demonstrated that the project faces an investment barrier that would prevent its implementation without the CDM. Without the CER revenue, the project NPV works out to -47560 and the levelised cost of generation is calculated to be INR. 3.821 / kWh which is more costly compared with the credible and feasible baseline alternative of energy generation using coal. Emissions reduction from the project is hence additional to any that would occur in the absence of the project activity.

The GHG emissions calculations were documented in a complete and transparent manner. The formulae and methodologies for accounting GHG emissions were appropriate and emission factors were deemed to be of sufficient accuracy. The total emissions reductions from the project as envisaged in the PDD version 6.0 are 1,328,673 tCO₂e annually over the 10-year crediting period. The forecasted emission reductions have been checked and it is deemed likely that the stated amount is achievable on the basis that the underlying assumptions do not change.

The monitoring plan is line with the approved monitoring methodologies of AM0029 version 03. The plan adequately addresses all necessary information for monitoring and reporting of emissions reductions due to the project activity. Responsibilities and authorities for project management, monitoring and reporting, and the data quality control and quality assurance procedures have been described in the PDD are implemented.

An Environmental Impact assessment (EIA) for the project activity has been conducted. The plant has been granted with the environmental clearances and consents as per the requirements of the regulatory authority of the host country. The project is not likely to create any significant adverse environmental impacts. The project complies with all environmental regulations of India. Also the NCDMA of India through its approval letter has confirmed that the project contributes to sustainable development in India.

In summary, it is SIRIM QAS Intl.'s opinion that the Grid connected natural gas based power project in Raigad District, Maharastra, India" as described in the PDD version 6.0 dated 04/06/2015, meets all relevant UNFCCC requirements for the CDM, is eligible as category 1 under scope 1 of the large-scale CDM project activities and correctly applies the baseline and monitoring methodology specified in AM0029 (version 03). As such, SIRIM QAS Intl. recommends the registration of the project as a CDM project activity.

Prepared by



A. Prabu Das
(Validation Team Leader)

Approved by



Parama Iswara Subramaniam
(DOE Representative)

6.0 REFERENCES

Information Reference List

| Ref. No. | Document or Type of Information |
|----------|---|
| /1/ | Webhosted PDD version 01 dated 7 th May 2012 http://cdm.unfccc.int/Projects/Validation/index.html and other financial sheets, CER sheets |
| /1.1/ | Final PDD version 6.0 dated 04 th June 2015 and other financial sheets, CER sheets |
| /2/ | Host country approval letter (Ref No. 4/16/2012-CCC, dated 18 th December 2012) |
| /3/ | Modalities of Communication |
| /4/ | Certificate of Incorporation and Certificate for Commencement of Business |
| /5/ | CDM-PDD-FORM version 05 |
| /6/ | Land documents dated 15 th September 2010 |
| /7/ | Notice to proceed to EPC contractor dated 9 th February 2012 |
| /8/ | Technical specifications of the equipment provided by equipment supplier – (NG, HRSG, STG) in EPC contract dated 16 th December 2011 |
| /9/ | Central Electricity Regulatory Commission, dated 19 th January 2009 http://cercind.gov.in/2009/Whats-New/tariff-pdf/CERC-(Terms-and-Conditions-of-Tariff)-Regulations-2009-14.pdf |
| /10/ | Annual Financial report for the year 2010-2011 |
| /11/ | Gas availability note published from infraline dated April 2009 Pipelines international website http://pipelinesinternational.com/news/dabhol_lng_and_pipeline_commissioned/080358/ Petronet LNG website http://www.petronetlng.com/kochi-terminal.aspx |
| /12/ | CO2 Baseline Database for the Indian Power Sector" Version 7.0, January 2012, published by the Central Electricity Authority, Ministry of Power, Government of India. http://cea.nic.in/reports/planning/cdm_CO2/user_guide_ver7.pdf |
| /13/ | Plant layout drawing |
| /14/ | Indian Electricity Act 2003 effective from 10 th June 2003 http://powermin.nic.in/acts_notification/electricity_act2003/pdf/The%20Electricity%20Act_2003.pdf |
| /15/ | Power plant reference book http://books.google.co.in/books?id=KJOsQm3fEoC&pg=PT433&lpg=PT433&dq=efficiency+of+open+cycle+power+plant+source+web&ots=fv-onepage&q=efficiency%20of%20open%20cycle%20power%20plant&f=false |
| /16/ | Lee universal blogspot http://leeuniversal.blogspot.in/2011/04/india-imports-more-coal-from-indonesia.html |
| /17/ | Oil and Gas Journal http://www.ogj.com/articles/2011/08/india-gas-use-could-displace-some-naphtha.html |
| /18/ | Newsala website http://www.newsala.com/India-National-News/Naphtha-based-Power-Projects-24280.html |
| /19/ | World Nuclear Association website http://www.world-nuclear.org/info/inf53.htm |
| /20/ | Board resolution (Investment decision) dated 15 th April, 2011 |
| /21/ | Acceptance of NTP by the EPC contractors, TATA Projects Ltd. on 09/02/2012 |
| /22/ | Prior consideration form and e-mail sent to NCDMA for prior intimation dated 27 th April 2012 UNFCCC snapshot indicating intimation to UNFCCC UNFCCC website |

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|--------|---|
| | http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html |
| /23/ | Third party DPR dated 20 th Aug 2010 |
| /24/ | Explanatory Memorandum to the Draft Amendments to the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009 http://cercind.gov.in/2010/Whats-New/Explanatory_Memo.pdf |
| /25/ | Loan sanction letter provided by the Consortium of banks |
| /25.1/ | Money control website for interest rate of 12.75% http://www.moneycontrol.com/stocks/stock_market/corp_notices.php?autono=408921 |
| /25.2/ | Taxguru website for IT depreciation of 15% http://taxguru.in/income-tax/rates-of-depreciation-as-per-income-tax-act-for-a-y-2010-11.html |
| /26/ | Tax guru website for corporate tax of 33.22% and MAT of 19.93% http://taxguru.in/income-tax/income-tax-rate-dividend-distribution-tax-rate-stt-rate-wealth-tax-rate-mat-tax-rate-and-rate-applicable-to-special-income-for-a-y-2011-12-f-y-2010-11-as-provided-in-budget-2010.html |
| /27/ | Basic statistics on petroleum and Natural gas, published by MoPNG for 2009-10 (for GCV of NG) |
| /28/ | IEA working paper on Natural gas In India published in 2010 http://www.iea.org/publications/freepublications/publication/natural_gas_india_2010.pdf |
| /29/ | Monthly Report on broad status of thermal power plants in the country- June 2010, published by CEA http://www.cea.nic.in/archives/thermal/bs/june10.pdf |
| /30/ | UNFCCC ref. No. 3225, Energy efficient power generation in Tirora, India http://cdm.unfccc.int/Projects/DB/SGS-UKL1260815245.04/view |
| /31/ | Revised Price list from Coal India Ltd. published on 3 rd March 2011 |
| /32/ | Petition to CERC dated 16 th June 2009 |
| /33/ | Common practice analysis worksheet |
| /34/ | 2006 IPCC Guidelines for National Greenhouse Gas Inventories http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html |
| /35/ | NG gas price by GAIL email dated 19 th March 2011 |
| /36/ | Environmental Impact Analysis (EIA) analysis report dated May 2010 |
| /37/ | Environmental clearance by Environment Department of Govt. of Maharashtra dated 19 th April 2011 |
| /38/ | Invitation by notice dated 17 th April 2012 to local stakeholders in English and regional language |
| /39/ | Minutes of local stakeholder meeting |
| /40/ | Attendance sheet of the local stakeholder meeting |
| /41/ | Hydro Sector Development in India (Growth & Investment Opportunities) – By R.V.Shahi, Secretary, Ministry of Power, Government of India July, 2003 powermin.nic.in/whats_new/pdf/icold.doc |
| /42/ | CEA – Special report on super critical power plants |
| /43/ | Oanda website for conversion INR to USD http://www.oanda.com/currency/converter/ |
| /44/ | RBI website for R-LNG Annual escalation http://www.rbi.org.in/scripts/PublicationsView.aspx?id=13050 |
| /45/ | GAIL website for NG price http://www.gail.nic.in/final_site/ratechart.html |
| /46/ | CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009 http://www.cercind.gov.in/Regulations/CERC_RE-Tariff-Regualtions_17_sept_09.pdf |
| /47/ | The Petroleum and Natural Gas statistics published by MoPNG in January 2013 |

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| | http://petroleum.nic.in/pngstat.pdf |
| /48/ | List of Power Plants considered for pooling as on March 2013 |
| /49/ | Cabinet Committee on Economic affairs, dated 12 th June 2013 http://www.moneylife.in/article/ccea-approves-hike-in-natural-gas-price-to-84-per-mmbtu/33387.html |
| /50/ | Report on "INDIA – Power Sector: Emerging Developments & Critical issues" prepared by Energy Research and Social Advancement Foundation (ERSAF) |
| /51/ | CRISIL report on economics of gas based power generation, dated May 2010 |
| /52/ | Programme of capacity building for electricity regulatory commissions dated 23 rd -28 th August 2010 on "competitive bidding: recent experience" |
| /53/ | Open access charges for Maharashtra for the year 2010-2011 CERC Report on Short Term Power Market in India |
| /54/ | Report on blending of imported coal and domestic coal, prepared by CEA, April 2012 |
| /55/ | Discussion paper on Coal power plants –determination of operating parameters |
| /56/ | EIA report of LANCO Vidarbha project for crosschecking project cost of super critical power plant |

APPENDIX A
VALIDATION PROTOCOL
Project No. SQAS-CDM-ES12880094

TABLE 1: VVS VERSION 7.0 REQUIREMENT CHECKLIST

| | REQUIREMENT | REFERENCE | COMMENTS | DRAFT CONCLUSION | FINAL CONCLUSION |
|-----|--|--------------------|---|--------------------------------------|------------------|
| 1. | Approval Validation requirements The DOE shall determine whether the designated national authority (DNA) of each Party indicated as being involved in the proposed CDM project activity in the PDD has provided a written letter of approval. | | | | |
| 1.1 | The following shall be determined whether each letter confirms that: (a) The Party is a Party to the Kyoto Protocol; (b) Participation is voluntary; (c) In the case of the host Party, the proposed project activity contributes to the sustainable development of the country; (d) It refers to the precise proposed project activity title in the PDD being submitted for registration. | VVS para 39 | Document review: As evident from the webhosted PDD, PP is yet to get the host country approval for the project activity. Site visit: Interview with the PP indicated the same <i>The host country approval letter for the project activity has not been provided.</i> | CL4 | OK |
| 1.2 | Determine whether the letter(s) of approval is unconditional with respect to 39 (a) to (d) above. | VVS para 40 | HCA letter has not been provided to determine the conditions stipulated in sec 1.1 | Depends on closure of CL4 | OK |
| 1.3 | Determine whether the letter(s) of approval has been issued by the respective Party's DNA and is valid for the proposed project activity under validation. (A list of DNAs is available on the UNFCCC CDM website.) | VVS para 41 | HCA letter has not been provided to determine whether the letter(s) of approval has been issued by the respective Party's DNA and is valid for the proposed project activity under validation. | Depends on closure of CL4 | OK |

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| 1.4 | If the validation team doubts the authenticity of the letter of approval, the validation team shall verify with the DNA that the letter of approval is authentic. | VVS para 42 | HCA letter has not been provided to verify the same. Refer CL1 | Depends on closure of CL1 | OK |
| 2. | Authorization Validation requirement The DOE shall determine whether each project participant has been authorized by at least one Party involved in a letter of approval | | | | |
| 2.1 | The project participants shall be listed in tabular form in section A.4 of the PDD, and this information shall be consistent with the contact details provided in annex 1 of the PDD. | VVS para 46 | The project participant is consistently indicated as 'Pioneer gas power limited' in tabular form in sections A.4 and appendix 1 of the PDD. | OK | OK |
| 2.2 | The validation team shall confirm that no entities other than those authorized as project participants are included in these sections of the PDD. | VVS para 47 | Yes, the validation team confirms that no entities other than 'pioneer gas power limited', authorized as project participants, are included in these sections of the PDD. | OK | OK |
| 2.3 | The validation team shall confirm that the approval of participation has been issued from the relevant DNA and if in doubt shall verify with the DNA that the approval of participation is valid for the proposed CDM project participants. | VVS para 48 | HCA letter has not been provided to verify the same. Refer CL1 | Depends on closure of CL1 | OK |
| 3. | Contribution to sustainable development Validation requirement The DOE shall confirm that the DNA has considered whether the proposed CDM project activity assists the host Party in achieving sustainable development. | | | | |
| 3.1 | The validation team shall determine whether the letter of approval by the DNA of the host Party confirms the contribution of the proposed CDM project activity to the sustainable development of the host Party. | VVS para 51 | HCA letter has not been provided to verify the same. Refer CL1 | Depends on closure of CL1 | OK |

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| 4. | Modalities of communications Validation requirement The DOE shall validate the corporate identity of all project participants and focal points included in the Modalities of Communication (MoC) statement, as well as the personal identities, including specimen signatures and employment status, of their authorized signatories. | | | | |
| 4.1 | The validation team shall validate paragraph 53 above through: (a) Directly checking evidence for corporate, personal identity and other relevant documentation; (b) Notarized documentation; or (c) Written confirmation from the project participant or the coordinating/managing entity that submits to it the MoC statement that all corporate and personal details, including specimen signatures, are valid and accurate. | VVS para 54 | Corporate identity of the project participant has been verified by the FORM 1 - Certificate of Incorporation and Certificate for Commencement of Business during on-site and document review. <i>Statement of MoC has not been submitted to verify and confirm the corporate and personal details of the project participant along with their signatures.</i> | CL-2 | OK |
| 4.2 | When the validation team validates identity by applying paragraph 54 (c) above, the validation team shall ensure that the MoC statement is received from a project participant with whom the DOE has a contractual relationship. For CDM PoAs, the DOE shall ensure that the MoC statement is received from the coordinating/managing entity. | VVS para 55 | Refer to CL2 | Depends on closure of CL2 | OK |
| 4.3 | When the validation team validates identity by applying paragraph 54 (c) above, the validation team shall ensure that the official who submits the MoC statement to the validation team and the official who signed the written confirmation (if a different person) is/are duly authorized to do so on behalf of the respective project participant or coordinating/managing entity. | VVS para 56 | Refer to CL2 | Depends on closure of CL2 | OK |

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| 4.4 | If the validation team is unable to validate the requirements by applying paragraph 54 (a), (b) or (c) above, then the DOE may perform further validation activities in order to confirm that the corporate and personal details, employment status and specimen signatures included in the MoC statement are valid and accurate and comply with the requirements of this section. | VVS para 57 | Refer to CL2 | Depends on closure of CL 2 | OK |
| 4.5 | The validation team shall validate that the MoC statement has been correctly completed and duly authorized. | VVS para 59 | Refer to CL2 | Depends on closure of CL 2 | OK |
| 4.6 | The validation team shall check that: (a) The latest version of the form "Modalities of Communication statement" (F-CDM-MOC) has been used; (b) The information required as per the F-CDM-MOC, including its annex 1, is correctly completed; (c) The project participant's authorized signatories signing the F-CDM-MOC correspond to the project participant's authorized signatories included in F-CDM-MOC, annex 1. | VVS para 60 | Refer to CL2 | Depends on closure of CL 2 | OK |
| 5. | Project design document | | | | |
| | Validation requirement The DOE shall determine whether the PDD was completed using the latest version of the PDD form appropriate to the type of project activity. | | | | |
| 5.1 | The validation team shall provide a statement regarding the compliance of the PDD with relevant forms and instructions. | VVS para 63 | The project activity correctly applies the valid version of F-CDM-PDD form version 05.0 meant for large scale project activities and is in compliance with the " <i>Instructions for filling out the project design document form for CDM project activities</i> " contained in the F-CDM-PDD form guidelines for completing the project design form version | | |

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| | | | <p>1.0.</p> <p>Following clarification is raised with respect to start date of Crediting period.</p> <p><i>Section C.2.2 of the PDD indicates start date of crediting period as 09/10/12 or the date of registration, since the project is in early stages of civil work as evident from the site visit, documents submitted and discussions, the indicated start date is not realistic, clarify.</i></p> | CL-3 | OK |
| 6. | <p>Description of project activity</p> <p>Validation requirement</p> <p>The DOE shall determine whether the description of the proposed project activity in the PDD is accurate, complete, and provides an understanding of the proposed CDM project activity.</p> | | | | |
| 6.1 | <p>Unless other means are specified in the methodology, the validation team shall conduct a physical site inspection for the following proposed project activities in existing facilities or utilizing existing equipment:</p> <p>(a) Large-scale projects;</p> <p>(b) Non-bundled small-scale projects with emission reductions exceeding 15,000 tonnes/year;</p> <p>(c) Bundled small-scale projects, each with emission reductions not exceeding 15,000 tonnes/ year; in such cases the number of physical site visits may, however, be based on sampling, if the sampling size is justified through statistical analysis.</p> | VVS para 65 | <p>The project activity falls under large scale project category (a), the validation team has conducted the physical on-site inspection on 27th and 28th of June 2012.</p> <p>Following corrective action is raised:</p> <p><i>The clear description of the project activity with respect to project implementation and subsequent operation, information on whether the generated electricity is sold to grid or any third party – any PPA signed with respect to sale of power, any Fuel Supply Agreement (FSA) in place to secure the fuel are not evident from section A.1 of the PDD.</i></p> <p>Following clarification is sought:</p> | CAR-1 | OK |

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| | | | <p><i>Clarify the following</i></p> <ul style="list-style-type: none"> <i>The board note mentions a natural gas power plant of capacity ranging from 380-425 MW. However the actual implemented capacity (as per technical specifications of the EPC contract) is 388 MW. Clarify.</i> <i>The environmental clearances indicate a proposed plant capacity of 425 MW while the actual implemented capacity (as per technical specifications of the EPC contract) is 388 MW, Clarify.</i> | GL-4 | OK |
| 6.2 | For other individual proposed small-scale CDM project activities with emission reductions not exceeding 15,000 tonnes/year, the validation team should conduct a physical site visit as appropriate. For proposed CDM project activities for which the validation team does not undertake a physical site inspection this shall be justified. The validation team may apply a sampling approach in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities". | VVS para 66 | Not applicable as the project activity falls under large scale project category (a), the validation team has conducted the physical on-site inspection on 27 th and 28 th of June 2012. | OK | OK |
| 6.3 | For all other proposed CDM project activities not referred to in VVS paragraphs 65-66, the DOE shall undertake the validation of project description by reviewing available designs and feasibility studies and should conduct comparison analysis with equivalent projects, as appropriate. | VVS para 67 | Not applicable as the project activity falls under large scale project category (a), the validation team has conducted the physical on-site inspection on 27 th and 28 th of June 2012. | OK | OK |
| 6.4 | If the proposed CDM project activity involves the alteration of an existing installation or process, the validation team shall ensure that the project description states the differences | VVS para 68 | The project activity is a Green field project as verified by the validation team during on-site inspection and the documents review. | OK | OK |

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| | resulting from the project activity compared to the pre-project situation. | | | | |
| 6.5 | In case that the project has been implemented during the on-site validation, ensures that the PDD had described the following: <ul style="list-style-type: none"> Implementation status of the project Details of the equipment involved in the project activity. This should include the technical specification of the equipment. | | During on-site validation visit, it was observed that the project activity was in early stages of construction phase. | OK | OK |
| 7. | Application of the selected baseline and monitoring methodology and selected standardized baseline Applicability of the selected baseline and monitoring methodology to the project activity Validation requirement The DOE shall validate that the selected baseline and monitoring methodology is applicable to the project activity and that the selected version is valid at the time of submission of the proposed project activity for registration. | VVS para 73 | | | |
| 7.1 | The DOE shall determine whether the methodology is correctly quoted and applied by comparing it with the actual text of the applicable version of the methodology. | VVS para 74 | The methodology AM0029 version 3.0 is correctly quoted and applied in the PDD. | OK | OK |
| 7.2 | If the PDD of a proposed project activity is based on a previous version of a methodology and was published for global stakeholder consultation but was not submitted for registration within the grace period, the validation team shall request the project participants to provide a revised PDD in accordance with the Project cycle procedure. | VVS para 75 | The applied methodology AM0029 version 3.0 was valid during global stakeholder consultation period. The validity period of the methodology is from 30 May 2008 to 15 April 2015 and the request for registration can be submitted until 11 Dec 2015. The validity of the methodology is verified from https://cdm.unfccc.int/methodologies/DB/ | OK | OK |

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| | | | WW4I82DG7LJUQE5E5YGT1NZE4PNS60 | | |
| 7.3 | The validation team shall determine whether the project activity meets each of the applicability conditions of the approved methodology or any tool or other methodology component referred to therein. This shall be done by validating the documentation referred to in the PDD and by verifying that the documentation content is correctly quoted and interpreted in the PDD. If the validation team, based on local and sectoral knowledge, is aware that comparable information is available from Credible sources other than that used in the PDD, then the validation team shall Cross-check the PDD against other sources to confirm that the project activity meets the applicability conditions of the methodology. | VVS para 76 | <p>The applicability conditions 01 and 02 of AM0029 is fulfilled as the project activity involves construction and operation of the new natural gas fired power plant, connected to NEWNE grid of India whose physical boundary including the baseline grid is clearly identified and this information is publicly available from Central Electricity Authority (CEA) database version 7.0 published by Ministry of Power, Government of India.</p> <p>For Condition 03, CAR 2 is raised as follows: <i>The PDD mentions information in support of the applicability condition of the methodology which states that natural gas should be sufficiently available in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity. However, evidences via documents / links are not provided to substantiate the same.</i></p> | CAR-2 | OK |
| 8. | Project boundary Validation requirement The DOE shall determine whether all main GHG emission sources, the physical delineation of the proposed project activity and other relevant project and baseline emission sources covered in the methodology are included within the project boundary for the purpose of calculating project and baseline emissions for the proposed project activity. | | | | |

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| 8.1 | The project boundary shall be confirmed based on documented evidence and shall corroborate it by a site visit where required. | VVS para 83 | Third party detailed project report (DPR) indicates all the project equipment viz one Gas Turbine Generator (GTG), one Heat Recovery Steam Generator (HRSG), one Steam Turbine Generator (STG), associated auxiliary equipment and the generated electricity is proposed to be supplied to the regional grid. Review of EPC agreement and supply contracts confirm the project equipment. Hence the project boundary comprises of all the project equipment and the baseline grid (NEWNE) which the project activity is connected to. On-site visit confirmed the physical location of the plant only as the plant was in early stages of construction. | OK | OK |
| 8.2 | If the methodology allows project participants to choose whether a source or gas is to be included within the project boundary, the validation team shall determine whether the project participants have justified that choice. The validation team shall determine whether the justification provided is reasonable, based on an assessment of supporting documented evidence provided by the project participants and corroborated by observations if required. | VVS para 84 | The methodology defines emission sources to be power generation in baseline and on-site fuel combustion due to the project activity, and gives choices for the type of gas to be included in the project boundary. It has been determined by the validation team that CO ₂ has been identified to be the type of gas included in the project boundary and adequately justified which is correct. | OK | OK |
| 9. | Baseline scenario identification and description of validation requirement The DOE shall determine whether the baseline identified for the proposed project activity is the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed project activity. | | | | |
| 9.1 | The validation team shall determine whether any procedure contained in the methodology to identify the most reasonable baseline | VVS para 89 | The most reasonable baseline scenario has been identified by comparison of a list of plausible baseline alternatives as per | OK | OK |

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| | scenario has been correctly applied. If the selected methodology requires the use of tools (such as the “Tool for the demonstration and assessment of additionality” and the “Combined tool to identify the baseline scenario and demonstrate additionality”) to establish the baseline scenario, the validation team shall consult the methodology on the application of these tools. In such cases, the specific guidance in the methodology shall supersede the corresponding requirements of the tool. | | the requirements of the meth AM0029 in step 1. In step 2, the most economically attractive baseline scenario (power generation using coal) has been identified by use of the “Tool for demonstration and assessment of additionality”. In this the validation team infers that the procedure and guidance using tool referred in the methodology is correctly applied. | | |
| 9.2 | If the methodology requires several alternative scenarios to be considered in the identification of the most plausible baseline scenario, the validation team shall, based on financial expertise and local and sectoral knowledge, determine whether all scenarios that are considered by the project participants and any scenarios that are supplementary to those required by the methodology, are realistic and credible in the context of the proposed project activity and that no alternative scenario has been excluded. | VVS para 90 | <p>Methodology stipulates following alternatives to analyse the baseline scenario:</p> <ul style="list-style-type: none"> • The project activity not implemented as a CDM 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. <p>However,</p> <ul style="list-style-type: none"> • <i>The PDD does not clearly justify the basis on which all the possible realistic and credible alternatives that provide outputs or services comparable with the proposed CDM project activity are identified.</i> • <i>Clarify the reason of excluding the option of using diesel to generate power.</i> | CL-5 | OK |

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| 9.3 | The validation team shall determine whether the most plausible baseline scenario identified is reasonable by validating the assumptions, calculations and rationales used in the PDD. It shall determine whether documents and sources referred to in the PDD are correctly quoted and interpreted. The validation team shall crosscheck the information provided in the PDD with other verifiable and credible sources, such as local expert opinion, if available. | VVS para 91 | <i>Option of super critical technology coal power plants is considered as a credible alternative using step 1 of the applied methodology. However it is not subjected to assessment based on investment analysis.</i> | CAR-3 | OK |
| 9.4 | The validation team shall determine whether the PDD provides a description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed project activity. | VVS para 92 | The PDD provides a description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed project activity. However refer to CL 5 for further resolution. | Depends on closure of CL-5 | OK |
| 9.5 | The validation team shall determine whether, drawing on its knowledge of the sector and/or advice from local experts, that all applicable CDM requirements have been taken into account in the identification of the baseline scenario for the proposed project activity, as well as relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector. Two (2) types of national and/or sectoral policies have to be taken into account: a) National and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels over less emissions-intensive technologies or fuels, otherwise known as policies that increase GHG | VVS para 93 | Not applicable | | |

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| | <p>emissions, and are called type E+. For this type of national and/or sectoral policies or regulations, only those that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11 December 1997) shall be taken into account when identifying a baseline scenario. If such national and/or sectoral policies were implemented since the adoption of the Kyoto Protocol, the baseline scenario shall refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place;</p> | | | | |
| | <p>b) National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programmes), otherwise known as policies that decrease GHG emissions, are called type E-. For this type of national and/or sectoral policies or regulations, those that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account in identifying a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place).</p> | | | | |

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| 10. | Algorithms and/or formulae used to determine emission reductions Validation requirement The DOE shall determine whether the steps taken and the equations and parameters applied in the PDD to calculate project emissions, baseline emissions, leakage and emission reductions comply with the requirements of the selected methodology including applicable tool(s). | | | | |
| 10.1 | Where the methodology allows for selection between options for equations or parameters, the DOE shall determine whether adequate justification has been provided (based on the choice of the baseline scenario, context of the proposed project activity and other evidence provided) and that the correct equations and parameters have been used, in accordance with the methodology selected including applicable tool(s). | VVS para 97 | The PDD correctly applies the equations as per the requirement of the meth AM 0029 for determining the project emission, baseline emission and leakage. The choices provided in estimating the emission factor (EF) for baseline emissions involve using build margin / combined margin / the emission factor of the technology (and fuel) identified as the most likely baseline scenario under "Identification of the baseline scenario". Among this the PDD has correctly applied the lowest baseline emission factor (i.e build margin) and emission factor for upstream fugitive CH ₄ emissions occurring in the absence of the project activity for leakage estimation is also consistently calculated with the baseline EF chosen. | OK | OK |
| 10.2 | The validation team shall verify the justification given in the PDD for the choice of data and parameters used in the equations. | VVS para 98 | <u>Baseline parameters</u> : The efficiency of the baseline plant is referred from CERC guidelines – clarification is raised with respect to the appropriateness of the source referred as below. NCV, emission factor and oxidation factor of coal are sourced Central Electricity Authority (CEA) CO ₂ database which the validation team | | |

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| | | <p>considers appropriate.</p> <p><u>Project emission parameters:</u> IPCC values of Emission factor and oxidation factor of natural gas are referred, and NCV is sourced from fuel supplier – clarification is raised on the appropriateness of referring to IPCC as CEA database provides these values</p> <p><u>Leakage parameters:</u> For estimating Emission factor for upstream fugitive methane emissions of natural gas, the project activity applies US/Canada values – however justification is not provided hence clarification is raised.</p> <p><i>For ex-ante parameters clarify the following:</i></p> <p><i>a) Efficiency of the baseline plant refers a value based on CERC guidelines, which however did not mention the specific value. Clarify whether the source used is appropriate. Also clarify the approach of using a value of 37.11% efficiency for supercritical plant option when CERC itself mentions a maximum efficiency of 40%.</i></p> <p><i>For ex-post parameters clarify the following:</i></p> <p><i>b) The source of data for estimating the NCV of Natural gas is referred as the fuel supplier data. Clarify whether the source used is appropriate as it was mentioned during site visit that the FSA is yet to be signed.</i></p> <p><i>c) The choice of source used for</i></p> | GL-6 | OK |
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| | | | <p>estimating the CO2 EF of Natural Gas as per the requirements of the methodology indicates use of IPCC values in the absence of a national source. Clarify whether the source used is appropriate as national (CEA) database mentions the value.</p> <p>d) The rationale behind applying default values for US and Canada, for fugitive methane upstream emissions, as indicated in appendix 4 of the PDD is not clearly justified.</p> <p>e) The means of measurement of LNG, referred in section B.7.1, is indicated as fuel flow meter – however based on the discussions with PP it is evident that separate provision for measuring LNG consumption is not planned. Clarify the measurement practice in this regard.</p> <p>f) Though RLNG is envisaged to be used in the project activity in a specified ratio as mentioned in the board decision, the emission reduction calculations have not accounted for leakage from LNG usage. Clarify the appropriateness of excluding RLNG leakage.</p> <p>As per the above replies of PP, it is learnt that the project activity is expected to be commissioned only in 2016. However, GWP of methane is still used 21 which is not relevant in 2016. PP is therefore requested for corrective action.</p> | CAR-9 | OK |
| 10.3 | If data and parameters will not be monitored throughout the crediting period of the | VVS para 98 | The PDD considers Build Margin emission factor and Operating margin emission | Depends on closure of CL-6 | OK |

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| | proposed project activity but have already been determined and will remain fixed throughout the crediting period, the validation team shall determine whether all data sources and assumptions are appropriate and calculations are correct as applicable to the proposed project activity, and will result in an accurate or otherwise conservative estimate of the emission reductions. | | factor of NEWNE Grid, NCV of coal, CO ₂ EF of coal, Oxidation factor of coal, power plant efficiency of the baseline plant and EF for upstream fugitive methane emissions of natural gas as ex-ante parameters. Refer (a) in CL 6 for further resolution. | above | |
| 10.4 | If data and parameters will be monitored or estimated on implementation and hence become available only after validation of the project activity, the validation team shall determine whether the estimates provided in the PDD for these data and parameters are reasonable. | VVS para 98 | The PDD considers Build Margin Emission Factor of NEWNE Grid, quantity of Natural Gas combusted in the project plant, quantity of LNG combusted in the project plant, net calorific value of natural gas, net electricity generation in the project plant (delivered to the grid), CO ₂ Emission Factor of Natural Gas, oxidation Factor of Natural Gas, project emissions due to combustion of natural gas in the project activity, CO ₂ Emission coefficient for natural gas, emission factor for upstream fugitive methane emissions occurring in the absence of the project activity electricity generation as ex-post parameters. Refer (b-d) in CL 6 for further resolution. | Depends on closure of CL 6 above | OK |
| 11. | Additionality of a project activity Validation requirement The DOE shall determine whether the proposed project activity is additional as demonstrated in the PDD. | | | | |
| 11.1 | The validation team shall assess and verify the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by project participants to support the demonstration of additionality. | VVS para 102 | Refer to CL raised in section 14 and Table 2. | Depends on closure of CAR/CL raised in Sec 14 and Table 2 | OK |
| 11.2 | If required by the applicable approved | VVS para 103 | The applied methodology prescribes Step | Depends on | OK |

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| | methodology, the validation team shall consider tools and guidelines provided by the Board to demonstrate the additionality of proposed project activities. The DOE shall also consider specific complementary or alternative requirements included in the methodology for demonstrating the additionality of the proposed project activity. | | 1-3 referring to the latest version of the 'Tool for the demonstration and assessment of additionality' to assess the additionality of the project. Refer to Sec 14 and Table 2 for further resolution. | closure of CAR/CL raised in Sec 14 and Table 2 | |
| 12. | Assessment on demonstration of prior consideration of the clean development mechanism Validation requirement The DOE shall determine whether CDM benefits were considered necessary in the decision to undertake the project as a proposed project activity if the starting date of the proposed project activity is prior to the start of validation, which is the date of publication of the PDD for global stakeholder consultation. | | | | |
| 12.1 | The validation team shall determine whether the start date of the project activity, reported in the PDD, is the earliest date at which either the implementation or construction or real action of a project activity begins. For project activities that require construction, retrofit or other modifications, the date of commissioning cannot be considered the project activity start date. The validation team shall determine whether it is a project activity with a start date: (a) On or after 2 August 2008; or (b) Before 2 August 2008. | VVS para 106 | The project activity adopts Notice to proceed (NTP) as the start date (09/02/2012), since this is the earliest date which signifies the commencement of real action of the project activity. The validation team determines that, as the start date for the project activity is 09/02/2012, the project falls under category (a) on or after 02 August 2008. | OK | OK |
| 12.2 | For a project activity with a start date on or after 2 August 2008, for which a PDD has not been published for global stakeholder consultation or a new methodology has not been proposed to the Board before the project | VVS para 107 | The PP has conveyed CDM consideration to both the UNFCCC and host country DNA intimation (via prior F-CDM form) for project titled "115 MW Grid connected natural gas power project by PGPL in | OK | OK |

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| | <p>activity start date, the DOE shall confirm by referring to the list of prior consideration notifications from the UNFCCC website and communication between the project proponent, the secretariat and the host Party DNA regarding the commencement of a new project activity. If such notification has not been provided by the project participants within 180 days of the project activity start date, the validation team shall determine that the CDM was not seriously considered in the decision to implement the project activity.</p> | | <p>Maharastra, India” on 13 May 2010. However there was no earliest date at which either the implementation or construction or real action of a project activity had occurred within 6 months from the intimation date. In conformance with para 5 of EB 62 Annex 13 guidelines on demonstration and assessment of prior consideration of the CDM, PP has intimated the progress of the project on 27th April 2012 to UNFCCC and the host country DNA within the subsequent two year period after the initial notification. The information in the intimation pertained, to the capacity enhancement of the project to 388 MW and change of title to “Grid connected natural gas based power project Raigad District, Maharastra, India”. The validation team accepts this intimation as correct as verified from the list of intimations available at UNFCCC site. Also, as such notification has been provided by the project participants within 180 days of the project activity start date, the validation team determines that the CDM was seriously considered in the decision to implement the project activity.</p> | | |
| 12.3 | <p>For a project activity with a start date before 2 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, the DOE shall assess the project participant's prior consideration of the CDM. Specifically, the validation team shall assess whether the project participants:</p> <p>a) Had an awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor</p> | VVS para 108 | <p>Not applicable as the start date of project activity falls under (a) On or after 2 August 2008.</p> | OK | OK |

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| | in the decision to proceed with the project. Evidence to support this could include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participants, to undertake the project as a proposed project activity; | | | | |
| | b) Demonstrated that real and continuing actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this could include one or more of the following: contracts with consultants for CDM/PDD/methodology services, draft versions of PDDs and underlying documents such as letters of authorization, and if available, letter of intent, emission reduction purchase agreements (ERPA) term sheets, ERPAs or other documentation related to the potential sale of the certified emission reductions (CERs) (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology or requests for clarification or revision of existing methodologies to the Board, publication in a newspaper, interviews with the DNA, and earlier correspondence on the project with the DNA or the secretariat. | | | | |
| 12.4 | Assessment of real and continuing actions shall be conducted by the validation team and should focus on real documented evidence as indicated in paragraph 108(b) above, including an assessment by the validation team of the | VVS para 109 | Not applicable as the start date of project activity falls under (a) On or after 2 August 2008. | OK | OK |

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| | authenticity of the evidence. The validation team shall assess letters, e-mail exchanges and other documented communications submitted by the project participants to substantiate the above information, and these shall be considered as evidence only after the validation team has assessed the reliability and authenticity of such communications, inter alia through Cross-checking (e.g. interviews). | | | | |
| 12.5 | <p>In validating proposed project activities where:</p> <p>(a) There is less than two years of a gap between the documented evidence, the validation team shall conclude that continuing and real actions were taken to secure CDM status for the project activity;</p> <p>(b) The gap between documented evidence is greater than two years and less than three years, the validation team may determine that continuing and real actions were taken to secure CDM status for the project activity and shall justify any positive or negative validation opinion based on the context of the evidence and information assessed;</p> <p>(c) The gap between documented evidence is greater than three years, the validation team shall conclude that continuing and real actions were not taken to secure CDM status for the project activity.</p> | VVS para 110 | Not applicable as the start date of project activity falls under (a) On or after 2 August 2008. | OK | OK |
| 12.6 | If evidence to support the serious prior consideration of the CDM as indicated above is not available, the validation team shall determine that the CDM was not considered in the decision to implement the project activity. | VVS para 111 | Serious prior consideration of CDM have been established for the project activity by way of intimation to UNFCCC and host DNA as explained in section 12.2 above. | OK | OK |

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| 13. | Identification of alternatives Validation requirement Where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the project activity in the PDD selected to determine the most realistic baseline scenario. | | | | |
| 13.1 | The validation team shall assess the list of alternatives given in the PDD and to determine whether: (a) The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed project activity; | VVS para 114 | The applied methodology AM0029 stipulates following alternatives to analyse the baseline scenario: <ul style="list-style-type: none"> • The project activity not implemented as a CDM 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 undertaken without being registered as a proposed project activity is considered as one of the baseline alternatives in the PDD. | OK | OK |
| 13.1 | (b) The list contains all plausible alternatives that the validation team, on the basis of its local and sectoral knowledge, considers to be viable means of supplying the comparable outputs or services that are to be supplied by the proposed project activity; | VVS para 114 | The plausible alternatives considered in the webhosted PDD include power generation using natural gas by open cycle, power generation using other energy sources viz coal (sub critical and super critical), lignite, wind, hydro, nuclear fuel and grid import. The clarification CL 5 was raised to justify the basis of identification of credible alternatives that | Depends on closure of CL 5 | OK |

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| | | | <p>deliver comparable output or services as that of the project activity.</p> <p>Refer to CL.5 raised in section 9.2 for further resolution of the issues.</p> | | |
| 13.1 | (c) The alternatives comply with all applicable and enforced legislation. | VVS para 114 | <p>All the plausible alternatives listed in the webhosted PDD comply with legal regulations.</p> <p>Refer to CL.5 raised in section 9.2 for further resolution of the issues.</p> | Depends on closure of CL-5 | OK |
| 13.2 | Where the baseline scenario is prescribed in the approved methodology, no further analysis is required. | VVS para 115 | <p>The applied methodology stipulates alternatives to analyse the baseline scenario as detailed in sec 13.1 (a) above.</p> <p>Refer to CL.5 raised in section 9.2 for further resolution of the issues.</p> | Depends on closure of CL-5 | OK |
| 14. | <p>Investment analysis</p> <p>Validation requirement</p> <p>If investment analysis has been used to demonstrate the additionality of the proposed project activity, the DOE shall determine whether the proposed project activity would not be:</p> <p>(a) The most economically or financially attractive alternative; or</p> <p>(b) Economically or financially feasible without the revenue from the sale of CERs.</p> | | | | |
| 14.1 | The validation team shall apply the latest version of the “Guidelines on the assessment of investment analysis” as provided by the Board and with other relevant provisions. (Assessment on Investment Analysis is as in Table 2) | VVS para 118 | Refer Table 2 of the protocol for the investment analysis which has been assessed based on the latest version of the “Guidelines on the assessment of investment analysis”. | OK | OK |

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| 14.2 | <p>The validation team shall determine whether the project activity is not the most economically or financially attractive alternative, or that it is not economically or financially feasible without CDM:</p> <p>a) The proposed project activity would produce no financial or economic benefits other than CDM-related income. The validation team shall determine whether the documented costs associated with the proposed project activity and the alternatives identified demonstrate that there is at least one alternative which is less costly than the proposed project activity;</p> <p>b) The proposed project activity is less economically or financially attractive than at least one other credible and realistic alternative;</p> <p>c) The financial returns of the proposed project activity would be insufficient to justify the required investment.</p> | VVS para 119 | <p>The project activity generates benefits other than CDM related income by way of selling the produced electricity; hence this option is not applicable in this case.</p> <p>The project activity demonstrates additionality by comparing, the financial attractiveness, with the alternatives considered and concludes natural gas based power generation is the costliest option amongst them and therefore the project activity ceases to be financially attractive. The validation team wishes to refer CAR / CL raised in section 9 for arriving at the contenders, for alternatives, for additionality demonstration; also refer to Table 2, on investment analysis for further resolution.</p> <p>Not applicable, as the project activity compares the financial attractiveness with the alternatives.</p> | Depends on closure of CAR 3 in sec 9.3 and Table 2 | OK |
| 14.3 | <p>To verify the accuracy of financial calculations carried out for any investment analysis, the validation team shall:</p> <p>a) Determine the suitability of the financial indicator selected by the project participants and conduct a thorough assessment of all parameters and assumptions used in calculating such financial indicators, and determine the accuracy and suitability of these parameters using available evidence and applying its expertise in relevant accounting practices;</p> | VVS para 120 | <p>The project activity applies Levelised cost of electricity generation, as the financial indicator in the investment analysis to prove the additionality. The validation team has raised clarification CL on suitability of the financial indicator chosen in accordance with the applied methodology and the guided additionality tool as follows.</p> <p>It is evident from PDD, section B.5 that the</p> | CL-7 | OK |

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| | | <p>levelised cost of electricity generation is taken as financial indicator in proving the additionality. However, according to the 'Tool for the demonstration and assessment of additionality, Ver 6.0', Financial indicator such as IRR, most suitable for the project type and decision context is to be used in the Benchmark Investment Analysis. The applied methodology 'AM0029 ver 3 para 2' does not indicate any specific indicator and it allows any suitable financial indicator to be used. But under Additionality clause in the methodology (page 3), it is clearly indicated that Option III Benchmark analysis is to be applied as per the latest additionality tool Ver 6.0 to demonstrate the additionality. PP to clarify and justify the approach of taking levelised cost of electricity generation as financial indicator instead of IRR for comparison and concluding additionality.</p> <p>Long term Tariff for IRR calculation has been sourced based on information on winning tariff bids of Case 1 projects. Clarify / justify why CERC guideline is not referred.</p> | | |
| | <p>b) Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;</p> | <p>The validation team has cross verified the assumptions and parameters indicated in the PDD and financial spread sheet against the publicly available sources viz CERC (central electricity regulatory commission) regulations, RBI (Reserve Bank of India) and project specific documents viz DPR (Detailed Project Report), bank loan documents, EPC (Engineering Procurement Construction) agreements. Refer to issues raised in</p> | <p>Depends on closure of issues raised in Table 2</p> | <p>OK</p> |

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| | | | Table 2 | | |
| | <p>c) Review, as appropriate, feasibility reports, public announcements and annual financial reports related to the proposed project activity and the project participants;</p> <p>d) Assess the correctness of computations carried out and documented by the project participants; and</p> <p>e) Assess, where applicable, the sensitivity analysis by the project participants to determine under what conditions variations in the result would occur, and the likelihood of these conditions.</p> | | <p>DPR of the project activity, annual financial reports of the PP have been verified to assess the project cost, project financing and expenditures incurred by the PP.</p> <p>Refer to issues raised in Table 2</p> | <p>Depends on closure of issues raised in Table 2</p> | <p>OK</p> |
| | | | <p>Critical parameters that influence the variations in the result have been identified as heat rate, PLF, project cost, fuel cost and these parameters have been subjected to sensitivity analysis. The likelihood of occurrence of these conditions is evaluated by verifying the publicly available and project specific documents and a clarification is raised as follow</p> <p><i>In sensitivity analysis, clarify on the exclusion of NCV from the parameters being considered to have a major impact on the project revenues / expenses.</i></p> <p><i>In the sensitivity analysis, some of the resultant values of project IRR (at +10% or -10% of the parameters) shows as negative project IRR. PP to clarify whether negative IRR is mathematically correct</i></p> <p><i>PP is required to provide further information on why the guidance from Tariff Order available in the country is not considered to calculate the long term tariff for the project activity allocated as Case I</i></p> <p><i>PP is required to justify the rate assumed</i></p> | <p>CL-8</p> <p>CAR-7</p> | <p>OK</p> <p>OK</p> |

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| | | | <p><i>for short term also.</i></p> <p><i>PP is requested to support the following with evidence</i></p> <p><i>a) Annual O&M expenses of INR 18.49 Lakh/MW</i></p> <p><i>b) NG price of USD 6.04 USD / MMBTU and LNG price of 9.77 USD/MMBTU.</i></p> | CAR-8 | OK |
| 14.4 | <p>To confirm the suitability of any benchmark applied in the investment analysis, the validation team shall:</p> <p>a) Determine whether the type of benchmark applied is suitable for the type of financial indicator presented;</p> <p>b) Ensure that any risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity;</p> <p>c) Determine whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark.</p> | VVS para 121 | Refer to CL 7 raised in section 14.3 (a) | Depends on closure of CL 7 | OK |
| 14.5 | Where project participants rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed project activities, the validation team shall determine whether: | VVS para 122 | The project activity refers to FSR (in this case DPR) for assessment of additionality. In the host country i.e India, DPR/FSR approval is not required either by national authorities or any department / authorised agency prior to implementation of the project activity. Hence, not applicable. | OK | OK |

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| | a) The FSR is the basis for the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short that it is unlikely in the context of the underlying project activity that the input values would have materially changed; | | Not applicable. | OK | OK |
| | b) The values used in the PDD and associated annexes are fully consistent with the FSR, and where inconsistencies occur the validation team shall assess the appropriateness of the values; | | Not applicable | OK | OK |
| | c) The input values from the FSR are valid and applicable at the time of investment decision. The DOE shall confirm this on the basis of its specific local and sectoral expertise and by Cross-checking or other appropriate means. | | Not applicable | | |
| 15. | Barrier analysis Validation requirement If barrier analysis ¹³ was used to demonstrate the additionality of the proposed project activity, the DOE shall determine whether the proposed project activity faces barriers that: a) Prevent the implementation of this type of proposed project activity; ¹⁴ b) Do not prevent the implementation of at least one of the alternatives. | | | | |
| 15.1 | The validation team shall determine whether issues that have a direct impact on the financial returns of the project activity are not considered barriers and shall be assessed by investment analysis. This does not refer to | VVS para 125 | The project activity has considered investment analysis to prove the additionality of the project activity, hence requirement of barrier analysis are not applicable for this project activity | OK | OK |

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| | <p>either:</p> <p>a) Risk related barriers, for example risk of technical failure, that could have negative effects on financial performance; or</p> <p>b) Barriers related to the unavailability of sources of finance for the project activity.</p> | | | | |
| 15.2 | <p>The validation team shall apply a two-step process to assessing the barrier analysis performed, as follows:</p> <p>a) Determine whether the barriers are real: The validation team shall assess the available evidence and/or conduct interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether the barriers listed in the PDD exist. The validation team shall determine whether the existence of barriers is substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics. If the existence of a barrier is substantiated only by the opinions of the project participants, the validation team shall not consider this barrier to be adequately substantiated. If the validation team considers, on the basis of its sectoral or local expertise, that a barrier is not real or is not supported by sufficient evidence, it shall raise a CAR to have reference to this barrier removed from the project documentation;</p> | VVS para 126 | Not applicable | OK | OK |
| | <p>b) Determine whether the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives: Since not all barriers present an insurmountable hurdle to a</p> | | Not applicable | OK | OK |

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| | project activity being implemented, the validation team shall apply its local and sectoral expertise to judge whether a barrier or set of barriers would prevent the implementation of the proposed project activity and would not equally prevent implementation of at least one of the possible alternatives, in particular the identified baseline scenario. | | | | |
| 16. | Common practice analysis Validation requirement For proposed large-scale project activities, unless the proposed project type is first-of-its-kind as determined in accordance with the relevant guidelines, the DOE shall assess whether the project participants have conducted a common practice analysis. | | | | |
| 16.1 | <p>The validation team shall use official sources and its local and sectoral expertise to:</p> <p>a) Assess whether the geographical scope (e.g. the defined region) of the common practice analysis is appropriate for the assessment of common practice related to the project activity's technology or industry type. For certain technologies, the relevant region for assessment will be local and for others it may be transnational / global. If a region other than the entire host country is chosen, the validation team shall assess the explanation of why this region is more appropriate;</p> <p>b) Determine to what extent similar and operational projects (e.g. using similar</p> | VVS para 129 | <p>The common practice analysis spread sheet submitted by the PP, applies a stepwise procedure in line with the requirements specified in 'Tool for the demonstration and assessment of additionality' EB 69 Annex 20 paragraph 47. The individual worksheets in the main excel spread sheet define each of the four steps that are involved in the demonstration of the common practice analysis. The project activity uses host country as the default geographical area which is acceptable as per the tool.</p> <p>Step 2 of the common practice analysis spreadsheet lists all the power plants that</p> | OK | OK |

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| | <p>technology or practice), other than project activities, have been undertaken in the defined region;</p> <p>c) Assess, if similar and operational projects, other than project activities, are already “widely observed and commonly carried out” in the defined region, whether there are essential distinctions between the proposed project activity and the other similar activities.</p> | | <p>delivers output +/- 50% of the project activity capacity and that have commenced commercial operation before the start date of the project activity i.e 9th Feb 2012. Projects that are in CDM cycle have not been considered as per the applied tool. Clarification is raised below on the basis of inclusion / exclusion of the power plants further in the analysis by applying the steps defined. However the basis for arriving at the calculated data was not clear for which CL 9 was raised as follow,</p> <p><i>In section B.5 of the PDD, under common practice analysis, clarify the following</i></p> <ul style="list-style-type: none"> <i>The basis for arriving at N_{all} in step 2 is not clear as the data analysis does not indicate the basis of inclusion / exclusion of power plants</i> <i>In step 3, the fuel type of power plants identified to differ with respect to investment climate is not clearly mentioned.</i> <p>Step 4 of the common practice analysis spreadsheet lists, the penetration of the similar and operational projects in the geographical area, by the factor F defined by the tool.</p> <p>Refer CL.9 above for further resolution</p> | <p>CL.9</p> <p>Depends on closure of CL.9</p> | <p>OK</p> <p>OK</p> |
| 17. | <p>Monitoring plan Validation requirement</p> <p>The DOE shall determine whether the description of the monitoring plan included in</p> | | | | |

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| | the PDD is based on the approved monitoring methodology including applicable tool(s). | | | | |
| 17.1 | <p>The validation team shall apply a two-step process to meet the above requirement:</p> <p>a) To assess compliance of the monitoring plan with the approved methodology and the applicable tool(s), the validation team shall:</p> <p>i) Identify the list of parameters required by the selected approved methodology including applicable tool(s) by means of document review;</p> <p>ii) Confirm that the description of the monitoring plan contains all necessary parameters, that they are described and that the means of monitoring described in the plan complies with the requirements of the methodology including applicable tool(s).</p> | <p>VVS para 132</p> <p>VVS para 132</p> | <p>The applied monitoring methodology AM0029 specifies following a) <u>project emission parameters</u> viz annual quantity of natural gas consumed in the project activity, NCV , oxidation factor and emission factor of the natural gas, CO2 emission coefficient and project emission due to combustion of the fuel to be monitored, b) <u>Leakage parameters</u> - usage of LNG and Emission factor for upstream fugitive methane emissions in the project activity in case it is used, c) <u>baseline emission parameters</u> -, the methodology refers to "Tool to calculate emission factor for an electricity system" for ex-post determination of the baseline emission factor and the relevant baseline parameters are build margin and net electricity generation by the project activity.</p> <p>Monitoring plan is inclusive of all the parameters and their means of monitoring described are as per the requirement of the applied monitoring methodology AM0029 and the referred tool.</p> | <p>OK</p> <p>OK</p> | <p>OK</p> <p>OK</p> |

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| | | | <i>in B.7.3 of the PDD is not in-line with the grid connectivity letter submitted.</i> | CAR.4 | OK |
| 17.2 | Is the monitoring plan includes apportioning mechanism? | VVS para 132 | Not applicable for NG based power plant | OK | OK |
| 17.3 | Is the PDD indicating all the apportioning mechanism parameters? | VVS para 132 | Not applicable for NG based power plant | OK | OK |
| 17.4 | Is the PP submitted sample invoice, breakups, JMRs for a month? | VVS para 132 | Not applicable for NG based power plant | OK | OK |
| 18. | Environmental impacts Validation requirement a) The DOE shall determine whether the project participants conducted an analysis of the environmental impacts of the proposed project activity, including transboundary impacts, and whether those impacts are considered significant by the project participants or the host Party. b) The DOE shall also determine whether the project participants conducted an environmental impact assessment, if required to do so by the host Party, in accordance with the host Party's procedures. | | | | |
| 18.1 | The validation team shall assess the above requirements by means of a document review and/or using local official sources and expertise. | VVS para 136 | Environmental (Protection) Act 1986 of Government of India in the Ministry of Environment and Forests, vide number S.O.1533(E), dated 14 th September, 2006 requires prior Environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA) for natural gas based thermal power plants <500MW capacity (http://envfor.nic.in/legis/eia/so1533.pdf). As the project activity capacity is less than 500 MW, in line with the requirement, | OK | OK |

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| | c) The project participants have taken due account of all comments received and have described this process in the PDD. | | <ul style="list-style-type: none"> • <i>PDD does not clearly indicate the nature of comments received from the local stakeholders and actions taken by the PP to address the same.</i> • <i>Evidence for local stakeholder notice dated 17/04/2012 is not provided</i> | OK | OK |
| 20. | Global stakeholder consultation | | | | |
| 20.1 | Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available (include the start date and the end date of the GSCP period) | | The PDD was webhosted for global stakeholder consultation process for the period between 16 th May 2012 – 14 th June 2012. http://cdm.unfccc.int/Projects/Validation/D/B/SY9RSTCKZ7MAZXDTDFQNTM1N0D3HKFJ/view.html | OK | OK |
| 20.2 | Any comments received? If yes, has the comments been validated? | | No GSCP comments were received | OK | OK |

TABLE 2: ASSESSMENT ON INVESTMENT ANALYSIS

| | REQUIREMENT | COMMENTS | DRAFT CONCLUSION | FINAL CONCLUSION |
|----|---|--|------------------|------------------|
| 1. | Is an appropriate analysis method chosen for the project (simple cost analysis, investment comparison analysis or benchmark analysis)? | <p>Additionality assessment based on applied methodology AM0029,</p> <p><i>Step1 – Benchmark investment analysis</i>, mentions to demonstrate that the proposed CDM project activity is unlikely to be financially attractive by applying Sub-steps 2b (Option III: Apply benchmark analysis) of the latest version of the “Tool for demonstration and assessment of additionality”. In this context, justify the approach of using levelised cost of generation (investment comparison analysis) as the financial indicator.</p> <p><i>The choice of levelised cost as financial indicator has been justified by PGPL with ref to CL No. 7. Project IRR sheet and benchmark sheets have also been submitted which have been reviewed.</i></p> | OK | OK |
| 2. | <p>If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used.</p> <p>The benchmark approach is suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest.</p> | <p>The PP has chosen levelised cost via investment comparison analysis. However depends on closure of query to No. 1 above</p> <p><i>The choice of levelised cost as financial indicator has been justified by PGPL with ref to CL No. 7. However in line with Methodology requirements, Project IRR sheet and benchmark sheets have also been submitted which have been reviewed.</i></p> | OK | OK |

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| 3. | <p>Is a clear, viewable and unprotected Excel spreadsheet available for the investment calculation?</p> <p>Are all formulas used in this analysis readable and all relevant cells be viewable and unprotected?</p> <p>Are all the relevant costs indicated for means of cross-check?</p> | <p>Yes all the formulas used in this analysis are readable and all the cells are viewable and unprotected. However the same needs to be checked in the revised sheets to be submitted.</p> <ul style="list-style-type: none"> • <i>The breakup of the project cost is not indicated for NG and Coal options.</i> • <i>PGPL mentions R_LNG as potential source, however the cost analysis of the same has not been provided.</i> | CAR-5 | OK |
| 4. | <p>Are all formulas used in the excel sheet correct and based on accepted formulae in line with accepted means of accounting practices?</p> | <ul style="list-style-type: none"> • <i>The same needs to be checked in the revised sheets to be submitted.</i> • <i>Regarding the formula used in the excel sheet, the auxiliary consumption is indicated in the assumption sheet while the same is not incorporated in the levelised cost calculations. Clarify if this correct and based on accepted formulae in line with accepted means of accounting practices.</i> | GL-12 | OK |
| 5. | <p>In cases where a benchmark approach is used, the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate if the DOE can validate that they are applicable to the project activity and the type of IRR calculation presented.</p> | <p>The PP has chosen post tax project NPV as financial indicator which has been compared with WACC based on market based parameter which is appropriate and acceptable.</p> | OK | OK |
| 6. | <p>In the cases of projects which could be developed by an entity other than the project participant the benchmark should be based on parameters that are standard in the market. The validation team's validation of the benchmark shall also include opinion on whether a company-specific benchmark or a benchmark based on parameters that are standard in the market is suitable in the</p> | <p>As the project can be developed by an entity other than the project participant the benchmark, the WACC which is the benchmark is based on parameters that are standard in the market. In the absence of a company specific benchmark, it is the opinion of the validation team that in the context of the project activity, a benchmark based on parameters standard in the market is most suitable and appropriate.</p> | OK | OK |

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| | context of the underlying project activity. | | | |
| 7. | Does the period chosen for the investment analysis reflect the technical lifetime of the project activity or in case a shorter period is chosen, is the fair value of the project activity's assets at the end of the investment analysis period (as a cash inflow) included? | <ul style="list-style-type: none"> The technical lifetime of the project is 25 years as per CERC. PP has considered 20 years assessment period and the fair value of the remaining 5 year period has been added as cash inflow as salvage value which is appropriate. The technical life time for NG based plant and Coal based plant is indicated as 25 years in the PDD but the investment analysis (levelised cost and IRR) reflects 20 years only. Clarify / justify the approach chosen. | CL-13 | OK |
| 8. | Is the fair value calculated in accordance with local accounting regulations (where available) or international best practice? | The fair value calculated has been in accordance with local accounting regulations (where available) or international best practice and has been included in the cash flow in line with investment analysis guidelines | OK | OK |
| 9. | Are depreciation and other non-cash related items, which have been deducted in estimating gross profits on which tax is calculated, has been added back to net profits for the purpose to calculate the financial indicator? Note: Taxation should only be included as an expense in the IRR/NPV calculation in cases where the benchmark or other financial indicator is intended for post-tax comparisons. | As post tax NPV is chosen, depreciation and other non-cash related items, which have been deducted in estimating gross profits on which tax is calculated, has been added back to net profits for the purpose to calculate the financial indicator in accordance with the guidelines. | OK | OK |
| 10. | Is taxation excluded in the investment analysis or is the benchmark intended for post tax comparisons? | As post tax project NPV is chosen, taxation, based on the applicable tax rates has also been considered which is appropriate as the benchmark is also post tax in nature. | OK | OK |
| 11. | Are the input values used in the investment analysis valid and applicable at the time of the investment decision? | <ul style="list-style-type: none"> The input parameters considered in the investment analysis for the project activity and alternatives are not justified with evidences hence clarification is raised as below: The valid links and evidences to establish that the input values used in the investment analysis, are valid and applicable at the time of the investment decision has not been provided. | CL-14 | OK |

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| | | <ul style="list-style-type: none"> Clarify / justify the conservativeness of the following assumptions: <ol style="list-style-type: none"> Escalation rate of NG – 10.18% Auxiliary consumption Debt Equity ratio in comparison to loan sanction <p>PP is requested to clarify on the value used (3.79 INR/kWh) for short term tariff rate on the basis of relevance and appropriateness</p> <p>PP is requested to clarify on the fuel ratio of NG, changed from 85% to 70% on the basis of relevance and appropriateness</p> <p>PP is requested to clarify on the proportion of electricity to open access, changed from 15% to 30%</p> | <p>CL15</p> <p>CL16</p> <p>CL17</p> | <p>OK</p> <p>OK</p> <p>OK</p> |
| 12. | Are the cost of financing expenditures (i.e. loan repayments and interest) been excluded in the calculation of project IRR? | Project IRR sheet and benchmark sheets have also been submitted which have been reviewed to assess that loan repayments and interest) been excluded in the calculation of project IRR. | OK | OK |
| 13. | In the calculation of equity IRR only the portion of investment costs which is financed by equity should be considered as the net cash outflow, the portion of the investment costs which is financed by debt should not be considered a cash outflow. | Not applicable for this project as the PP has chosen project NPV which has both equity and debt portions. | OK | OK |
| 14. | Due to the impact of loan interest on income tax calculations it is recommended that when a project IRR is calculated to demonstrate additionality a pre-tax benchmark be applied. In cases where a post-tax benchmark is applied the validation team shall ensure that actual interest payable is taken into account in the calculation of income tax. | As a post tax benchmark is chosen, the actual interest payable has also been accounted for calculation of income tax. | OK | OK |
| 15. | Are variables/parameters that constitute more than 20% of either total project costs or total project revenues been identified with | <ul style="list-style-type: none"> According to AM 0029 “A sensitivity analysis shall be performed for all alternatives, to confirm that the conclusion regarding the financial attractiveness is robust to reasonable | | |

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| | potential material impact on the financial parameter? | <p>variations in the critical assumptions (e.g. fuel prices and the load factor). The investment analysis provides a valid argument in selecting the baseline scenario only if it consistently supports (for a realistic range of assumptions) the conclusion that the pre-selected baseline scenario is likely to remain the most economically and/or financially attractive”</p> <ul style="list-style-type: none"> • The PP has not selected all credible alternatives as evident in CAR 3 and sensitivity analysis performed has not covered all the parameters that have a material impact on the financial parameters, as raised in CL 8. Hence to be resolved further based on the revised responses in which all alternatives are considered. • Submitted PDD does not discuss the sensitivity analysis for all the alternatives, considering the NCV of the fuel, although excel spread sheets discuss the same. • The sensitivity analysis has not been provided for supercritical option. | CAR-6 | OK |
| 16. | Has the sensitivity analysis been presented in the PDD and related spreadsheets? | Yes, sensitivity analysis has been presented in the PDD and related spreadsheets. However, refer to query 15 above for further resolution. | Depends on closure of CAR 6 | OK |
| 17. | Is the range of variation reasonable in the specific context of the project activity, taking into consideration historic trends in the business sector? | The range of variation considered is reasonable for the project activity and the alternatives under consideration. However refer to query 15 and 16 above for further resolution. | Depends on closure of CAR 6 | OK |

Table 3 Resolution of Corrective Action and Clarification Requests

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
|--|--------------------------|--|--|
| <p><u>CAR 01</u></p> <p>The clear description of the project activity with respect to project implementation and subsequent operation, information on whether the generated electricity is sold to grid or any third party – any PPA signed with respect to sale of power, any Fuel Supply Agreement (FSA) in place to secure the fuel are not evident from section A.1 of the PDD.</p> | 6.1 | <p>PGPL gives the reasons below for justifying the project description indicated in the PDD as follows:</p> <p>MoP&NG, which is the state regulatory body, intends to put in place regulations by which domestic gas, if supplied to the power plant would also mean that the plant needs to sell it back to the power distribution companies (DISCOMs) through long term PPAs which impose a severe constraint on the operational viability of the plant due to steep increase in the NG prices.</p> <p>PGPL is in talks with major suppliers like Hazira LNG private Ltd, Petronet (suppliers of R_LNG), GAIL and RIL (suppliers of domestic gas) and PP has also already applied for 1.7 MMSCMD (which is the project activity requirement at 100% PLF) to MoPNG for gas allotment.</p> <p>As MoPNG does not give confirmation of allotment unless the plant is commissioned, the PP would finalise the fuel supply agreements only upon expected commissioning of the plant which is scheduled to be in 2016.</p> <p>As there is no pricing control mechanism by government in place, PGPL would seek to regulate the power sold via a combination of long term PPAs and Short term (1-4</p> | <p>The explanation by PP is found justified as the NG power plant has not reached operational status and is still in the process of finalising the gas supply and mode of sale.</p> <p>However during discussions and interview with PP, it has been clarified that MoPNG, to whom PP has applied for gas allocation would provide the confirmation of allocation only upon commissioning which is expected to happen in 2016.</p> <p>The PP has also told that combinations of sale to grid to DISCOM or to third party would be decided only upon mode of supply of gas (either through domestic / private suppliers or imported as RLNG), which determines the cost of generation due to variability in NG prices.</p> <p>As per CERC 2009 guidelines available at the time of investment decision, PGPL has considered procurement of gas from RIL and GAIL at existing base price in 2011 to calculate levelised cost of generation based on CERC guidelines, which is appropriate and acceptable.</p> <p>The validation team has assessed the suitability of the ratio applied (70% long term PPA : 30 % short term PPA)</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
|---|--------------------------|---|---|
| | | <p>months) or medium term (2-3 years) PPAs / power trading / power exchange in the open market. Third party DPR indicates the ratio of sale of power by long term/short term to be 70%:30%</p> <p>As CERC stipulates levelised cost of generation, envisaging sale to DISCOMs, the PP has considered the option as available at the time of investment to be procurement of gas from GAIL or RIL at the market base price in 2011 and calculation of levelised cost of generation based on the CERC guidelines 2009, taking in to account all variable parameters.</p> <p>To address concern of the DoE, the levelised cost of generation using RLNG (for 30% of the generated power) has also been calculated. Due to the revised values, CER value is now changed to 1,328,673 tCO₂e/year. PP is now submitting the revised CER sheet.</p> <p>PP, in its previous reply, mentioned that the project would be commissioned in February 2014. But due to delay in construction, the project is expected to be commissioned in 2016. The revised PDD is submitted for validation.</p> | <p>Considering the variability in the ratio in future, the validation team has also assessed various combinations to establish the additionality of the project.</p> <p>Also considering the scenario of plant to be operational using 30% RLNG, the levelised cost of generation using RLNG has also been calculated by the PGPL which has been verified.</p> <p>The validation team has validated the DPR available at the time of investment decision wherein it is assumed that the NG usage would be in the ratio of 50% to 70% and the balance would be from using R-LNG. PP has considered 70% for NG and 30% for R-LNG.</p> <p>The validation team has also independently analysed all the existing natural gas based power plants considered for indigenous natural gas allocation by the Government of India for the month of March 2013 which establishes that only 70% of NG was being allocated to each NG power plant.</p> <p>Further, to substantiate the argument, the validation team has independently analysed the NG usage in the recent CDM projects (UNFCCC no: 7611 and 8048), where it is mentioned NG usage would be in the ratio of 50% only which was observed to be based on the actual invoices.</p> <p>PP has considered ratio of sale of electricity to the grid (through long term PPA) and the</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion | | | | | | |
|--|---|-----------------------------------|---|--|---|-------------------|--------|--|--------|
| | | | <p>sale of electricity through open market (short term tariff) in tune with usage of NG and R-LNG which is 70 %: 30%. Hence accepted by the validation team as correct.</p> <p>The validation team has reviewed the management review meeting in which 70%:30% was proposed for % NG:% LNG usage for the project activity.</p> <p>The validation team has reviewed the publically available document by Ministry of Power http://www.powermin.nic.in/whats_new/national_electricity_policy.html which mentioned that ratio would be in the ratio of 85%:15%.</p> <p>The validation team has crosschecked the resultant values of financial indicator with 85%: 15% also and found the following table.</p> <table><tr><td>Sale of electricity to grid (long term tariff): Sale of electricity to open market (short term tariff)</td><td>Resultant financial indicator (project NPV)</td></tr><tr><td>At 70%:30% (base)</td><td>-47560</td></tr><tr><td>At 85%:15% (as per Ministry of Power document)</td><td>-45983</td></tr></table> | Sale of electricity to grid (long term tariff): Sale of electricity to open market (short term tariff) | Resultant financial indicator (project NPV) | At 70%:30% (base) | -47560 | At 85%:15% (as per Ministry of Power document) | -45983 |
| Sale of electricity to grid (long term tariff): Sale of electricity to open market (short term tariff) | Resultant financial indicator (project NPV) | | | | | | | | |
| At 70%:30% (base) | -47560 | | | | | | | | |
| At 85%:15% (as per Ministry of Power document) | -45983 | | | | | | | | |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion | | | | |
|--|--------------------------|--|--|-------------|--------|-------------|--------|
| | | | <table><tr><td>At 100%: 0%</td><td>-44407</td></tr><tr><td>At 0%: 100%</td><td>-54970</td></tr></table> <p>At all the possible scenarios, the resultant value of Project NPV is negative. Hence accepted by the validation team.</p> <p>The validation team has checked the CER sheet and accepted the same as all the calculations are correct as per the applied methodology.</p> <p>The validation team has observed that the project would now be commissioned in 2016. The start date of the crediting period is in line with the date of commissioning in the PDD.</p> <p>CAR 01 resolved</p> | At 100%: 0% | -44407 | At 0%: 100% | -54970 |
| At 100%: 0% | -44407 | | | | | | |
| At 0%: 100% | -54970 | | | | | | |
| <p>CAR 02</p> <p>The PDD mentions information in support of the applicability condition of the methodology which states that Natural gas should be sufficiently available in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity. However evidences via documents / links are not provided to substantiate the same.</p> | 7.4 | <p>The note on Gas availability has been attached which gives adequate justification to the applicability clauses:</p> <ul style="list-style-type: none">Natural gas should be sufficiently available in the region or country <p>Future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity.</p> <p>Gas availability note is attached as Annexure 1</p> | <p>The note on gas availability has now been submitted. Upon review of the same it was found to sufficiently address the concerns on the applicability conditions of AM0029, and supports that, Natural gas is sufficiently available in the region or country and in case of insufficiency, infrastructure is in place for importing NG</p> <p>The recent proposed expansions of NG power plants infer that future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural</p> | | | | |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
|--|--------------------------|--|--|
| | | | gas in the project activity. CAR 02 resolved. |
| <u>CAR 03</u> Option of super critical technology coal power plants is considered as a credible alternative using step 1 of the applied methodology, however it is not subjected to assessment based on investment analysis. | 9.3 | The revised PDD and financial sheets are also considering the option of super critical coal power plant for investment analysis as a credible alternative. Coal based super critical option is detailed with assumptions and sources referenced in section B.5 of the revised PDD. Inline with the corrective action raised and subsequent analysis – Domestic coal based super critical option is chosen as the most conservative baseline option and the same is presented in the PDD and financial analysis sheet. Consequently CER estimation is revised and relevant sections of the PDD have been modified and CER sheet is submitted herewith. | Section B.5 of the submitted PDD (version 2) does not discuss the coal super critical option although excel spread sheets for the option considered are provided. Also relevant sections in the revised PDD infer subcritical as baseline alternative. The assumptions considered for financial analysis of super- critical option have not been supported by relevant and appropriate sources. Levelised cost has been calculated for the option of supercritical coal and the relevant links and sources have been verified to be appropriate. Also, the revised submission has chosen supercritical domestic coal plant as conservative baseline option. CAR 03 resolved. |
| <u>CAR 04</u> Power evacuation arrangement described in B.7.3 of the PDD is not inline with the grid connectivity letter submitted. | 17.1(b) | Grid interfacing is done at the 220kV line, the same is updated in the revised PDD. | The information on power evacuation has been added in the revised PDD which provides the actual scenario at implementation. Hence acceptable. CAR 04 resolved. |
| <u>CAR 05</u> | S. No. 3, | Break up of cost for all the alternatives | The breakup of the project cost has been |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
|---|--------------------------|--|--|
| <p>The breakup of the project cost is not indicated for NG and Coal options.</p> <p>PGPL mentions R_LNG as potential source, however the cost analysis of the same has not been provided.</p> | Table 2 | <p>analysed viz</p> <ul style="list-style-type: none"> coal based sub-critical and super critical, based on appropriate sources natural gas power plant – domestic fuel and imported R-LNG based on DPR <p>are presented in the revised PDD and the financial spread sheets.</p> | <p>provided for the NG power plant based on the third party DPR which is appropriate.</p> <p>The cost for the coal-subcritical power plant has been sourced from Explanatory Memorandum to the Draft Amendments to the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009, which is appropriate.</p> <p>For supercritical coal power plant, in the absence of any other publically available super critical coal power plant, the cost has been assumed based on UNFCCC registered project located in Maharashtra (ref no.3225) which is appropriate.</p> <p>CAR 05 resolved.</p> |
| <p>CAR 06</p> <p>Submitted PDD (version 2.0) does not discuss the sensitivity analysis for all the alternatives, considering the NCV of the fuel, although excel spread sheets discuss the same.</p> <p>The sensitivity analysis has not been provided for supercritical option.</p> | S. No. 15, Table 2 | <p>Sensitivity analysis have been done for the fuel cost for all alternatives considered, including supercritical. As fuel cost is based on the NCV the same is captured adequately in the revised PDD.</p> | <p>The fuel cost which is dependent upon NCV is also considered as parameter for sensitivity analysis for all the alternatives and the project activity in the revised workings which is acceptable.</p> <p>CAR 06 resolved.</p> |
| <p>CAR 07</p> <p>PP is required to provide further information on why the guidance from Tariff Order available in the country is not considered to calculate the long term tariff for the project activity allocated as Case</p> | 14.3 | <p>PP is now considering CERC guidance for the long term tariff for the project activity by taking INR 3.87/kWh and revised PDD and excel sheets are submitted for validation.</p> | <p>The validation team has reviewed the revised PDD and revised financial sheets and verified that now CERC guidance is used for the long term tariff. PP has revised the long term tariff to INR 3.87/kWh for the</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
|---|--------------------------|--|--|
| <p>I</p> <p>PP is required to justify the rate assumed for short term also.</p> | | <p>For the short term, PP has assumed INR. 3.79/kWh sourced from the board note. PP has calculated the net realisation from HT tariff and applicable charges like Transmission losses, Transmission charges, wheeling loss and wheeling charges etc.</p> | <p>calculation of investment analysis. Hence accepted by the validation team.</p> <p>For short term tariff:</p> <p>The validation team has reviewed the selling price of electricity considered at the time of investment decision and value is found to be INR 3.79/kWh. The board note had also added that charges^{/53/} is inclusive of Transmission losses of 4.85%, Transmission charges of INR 56.4/MWh, Wheeling losses of 6% and Wheeling charges of INR. 0.04/kWh. Since the charges like transmission and wheeling charges are applicable for the open access system, the validation team has accepted the approach as correct. Cross subsidy charges are not applicable at the time of investment decision.</p> <p>The validation team has independently calculated the current net realization prices for electricity after applying the additional charge of INR 1.63/kWh (cross subsidy charges) and worked out to be INR 3.57/kWh. Since the net realisation through short term of INR 3.79/kWh is less than INR 3.87/kWh, the validation team accepted the input value as correct and conservative.</p> <p>CAR 07 resolved.</p> |
| <p><u>CAR 08</u></p> <p>PP is requested to support the following with evidence</p> | 14.3 | <p>PP has considered the CERC tariff order 2009 page no 28; the value is considered against NG power plants for the year 2010-</p> | <p>O&M charges:</p> <p>PP has considered the O & M expenses sourced from CERC tariff regulations, 2009</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
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| <p>a) Annual O&M expenses of INR 18.49 Lakh/MW</p> <p>b) NG price of USD 6.04 USD / MMBTU and LNG price of 9.77 USD/MMBTU.</p> | | <p>2011.</p> <p>NG and LNG prices are taken from GAIL email which is submitted to the validating DOE.</p> | <p>which is available at the time of investment decision. As PGPL is proposed to be commissioned in 2016 the value is in line with the forecasted and estimated O & M costs for a NG based power plant operational in 2013-14, the same has been found to be appropriate and acceptable by the validation team. The validation has accepted the input value as correct.</p> <p>Since the O&M agreement is not available as on date, the validation team has crosschecked the value in CERC tariff regulations for the year 2010- 2011 (at the time of investment decision) and found that it is mentioned as INR 15.65 Lakh/MW and in the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009, it is mentioned as 14.80 Lakh/MW. The validation has calculated the levelised cost of generation and project NPV using these values found that the resultant levelised cost of generation is more than that of at least one of the other credible alternatives and resultant project NPV is still less than zero..</p> <p>NG price: The validation team has reviewed the email provided by GAIL to the PGPL available at the time of investment decision which is found to be acceptable as the source document by the validation team.</p> <p>As PGPL is to be commissioned in 2016, the validation team has independently verified the current trends in NG price. The</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
|---|--------------------------|-----------------------------------|---|
| | | | <p>validation team has crosschecked the note by Cabinet Committee on Economic affairs, dated 27th June 2013^{/49/} which has proposed that the basic price of natural gas would be USD 8.4/MMBTU. The validation team has worked out the landed price with the same applicable taxes and freight charges referred in the GAIL e-mail which works out to USD 12.24/MMBTU. The revised pricing of natural gas is effective from April 2014. The validation team is of the opinion that accounting for the price escalation of natural gas in the near future; the value taken by the PGPL at the time of investment decision is more conservative and hence acceptable.</p> <p>The validation team has also analysed the landed domestic NG price mentioned in registered CDM project No. 6943 (5.55 USD/ MMBTU) conceptualized in 2009 and considers the domestic NG price of 6.04 USD/MMBTU to be acceptable considering more recent vintage (2011) of this project and impact of the escalation factor.</p> <p>LNG price: The PP has considered the long-term RLNG price of 9.77 USD/ MMBtu based on the e-mail sent to PGPL by GAIL available at the time of investment decision which is found acceptable. Further the validation team has verified the recent rate chart by GAIL for R-LNG base price (http://www.gail.nic.in/final_site/ratechart.html) which indicates the term R-LNG</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
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| | | | <p>supplied by GAIL varied between 9.00 – 10.50 USD/MMBTU (excluding regasification charges and marketing margin). Hence the validation team accepts the term R-LNG pricing to be appropriate and conservative.</p> <p>Considering the rupee exchange rate of 44.90 existing at March 2011, the R-LNG price of INR 17.40 / SCM has been calculated, which is the most realistic and credible estimate of the R-LNG price and hence considered appropriate. Also considering the recent increase in exchange rate of the Indian rupee (as high as INR 60/USD http://www.oanda.com/currency/historical-rates/), and the expected commissioning of the plant in 2016, the cost of R-LNG is appropriate and conservative. CAR 08 resolved.</p> |
| CAR 09 <p>The project activity is expected to be commissioned only in 2016. However, GWP of methane still used 21 which is not relevant in 2016.</p> | 10.2 | <p>The value of GWP is corrected to 25. PP herewith submits revised PDD and CER sheet to the validating DOE.</p> | <p>PP has changed the GWP of methane as 25 for the second commitment period which is in accordance with decision 4/CMP 7 as prescribed by the “Standard for application of the global warming potentials to CDM PA and PoA for the second commitment period of the Kyoto protocol” Version 1.0 (EB 69 Annex 3). The verification team has also verified the CER sheet and application of GWP is correct.</p> <p>CAR 09 is resolved.</p> |
| CL 01 | | | |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
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| The host country approval letter for the project activity has not been provided. | 1.1 | The application for the host country approval has been sent to NCDMA which is the Indian DNA. The interview is awaited for meeting the NCDMA subsequent to which the LoA would be submitted. | HCA letter dated 18 th Dec 2012, issued by MoEF, is submitted by PP and verified to be met the participation requirement. CL 01 resolved |
| <u>CL 02</u> Statement of MoC has not been submitted to verify and confirm the corporate and personal details of the project participant along with their signatures. | 4.1 | Signed MoC form by PP has been submitted to the DOE. | Relevant filled up MoC form has been submitted now. CL 02 resolved |
| <u>CL 03</u> Section C.2.2 of the PDD indicates start date of crediting period as 09/10/12 or the date of registration, since the project is in early stages of civil work as evident from the site visit, documents submitted and discussions, the indicated start date is not realistic, clarify | 5.1 | As the project is expected to be commissioned in 2016, the start date of crediting period is revised in the PDD to reflect a realistic possibility. | The start date of crediting period is revised in the PDD to reflect a realistic possibility. CL 03 resolved |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
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| <p><u>CL 04</u></p> <p>Clarify the following</p> <p>The board note mentions a natural gas power plant of capacity ranging from 380-425 MW. However the actual implemented capacity (as per technical specifications of the EPC contract) is 388 MW.</p> <p>The environmental clearances indicate a proposed plant capacity of 425 MW while the actual implemented capacity (as per technical specifications of the EPC contract) is 388 MW.</p> | <p>6.1</p> <p>6.1</p> | <p>The management of PGPL had authorised a third party assessor in August 2009 to assess the viability of setting up a NG based plant based on the various configurations available in the market. A DPR for a capacity of 388 MW was prepared and submitted to the PGPL management for review. It is common to assume a higher capacity plant taking in to consideration the other variables such as PLF and auxiliary consumption which becomes clearer only when EPC contracts are awarded.</p> <p>Hence the PGPL board seriously considered setting up of a NG based power plant in the range of 380-425 MW and for this reason environmental clearances were also applied for the higher capacity. As evident from the EPC contract a 388 MW capacity plant was fixed based on the market options available which was within the range of 380 -425 MW considered in the board meeting.</p> | <p>The reply by PGPL is justified as during investment decision, PGPL had decided to procure quotes from NG engine manufacturers and thus board note indicates range of 380-425 MW, though the DPR on which bank has sanctioned loan mentions 388 MW capacity.</p> <p>The EIA has been done taking in to account any changes in activity for a maximum of 425 MW, for which approval has been provided by state regulatory board. Hence the reply by PP is justified</p> <p>CL 04 resolved</p> |
| <p><u>CL 05</u></p> <p>The PDD does not justify the basis on which all the possible realistic and credible alternatives that provide outputs or services comparable with the proposed CDM project activity are identified</p> <p>Clarify the reason of excluding the option of using</p> | <p>9.2</p> <p>9.2</p> | <p>The basis of identifying the possible alternatives to the project activity, including diesel option, that deliver comparable outputs / services are elaborated in the revised PDD with weblink references and supporting documents. Alternatives are considered based on their ability to deliver comparable output capacity, base load/peak load etc.</p> <p>Discussion on choice of diesel based power</p> | <p>The reply pertains to identifying credible alternatives for power generation. However sufficient justification for excluding diesel as a credible option is not provided in the reply.</p> <p>Diesel based option has been analysed in</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
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| diesel to generate power | | plant as baseline option and justification for its exclusion as baseline contender have been presented in the version 2.0 of the PDD. List of diesel based power plants (cluster of small capacity plants equating to the project capacity) that are planned, in operation (since 20 years) and connected to the NEWNE grid are analysed from the national data publicly available. From the data available, the diesel based option is ruled out from the baseline option. | the revised PDD and sufficient justification has been provided for its exclusion for further analysis. CL 05 resolved |
| <p>CL 06</p> <p>For ex-ante parameters clarify the following: Efficiency of the baseline plant refers a value based on CERC guidelines, which however did not mention the specific value. Clarify whether the source used is appropriate. Also clarify the approach of using a value of 37.11% efficiency for supercritical plant option when CERC itself mentions a maximum efficiency of 40 %.</p> <p>For ex-post parameters clarify the following: The source of data for estimating the NCV of Natural gas is referred as the fuel supplier data. Clarify whether the source used is appropriate as it was mentioned during site visit that the FSA is yet to be signed</p> | <p>10.2</p> <p>10.2</p> | <p>Efficiency of the baseline plant considered in the excel sheet is a calculated value from the heat rate specified for new thermal generating stations by CERC dated 19th January 2009 which justifies usage</p> <p>The source used is appropriate as per the requirements of the methodology as it is ex-post parameter. For estimating CERs the value is sourced from CEA database which is appropriate at the time of validation</p> | <p>Though the efficiency of sub critical baseline option is provided, efficiency value of super critical option is not supported by credible source.</p> <p>The source of data for estimating the NCV of Natural gas is from CEA database which exists at the time of validation as fuel supply agreement has not been finalised yet.</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
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| The choice of source used for estimating the CO2 EF of Natural Gas as per the requirements of the methodology indicates use of IPCC values in the absence of a national source. Clarify whether the source used is appropriate as national (CEA) database mentions the value. | 10.2 | Though National CEA database mentions the CO2 EF of Natural Gas, it has only accounted for the lower value, whereas the IPCC indicates a range. In the context of the conservative CER estimates, the PP has taken the default mid value specified by the IPCC which results in conservative estimates of project emissions. | The mid value of the CO2 emission factor of NG provided as a range by IPCC has been used which results in conservative project emissions and hence acceptable. |
| The rationale behind applying default values for US and Canada, for fugitive methane upstream emissions, as indicated in appendix 4 of the PDD is not clearly justified. | 10.2 | Default values for US and Canada, have been applied for fugitive methane upstream emissions, as the gas processing facilities are of recent vintage which are built to international specifications. Detailed justification is given in appendix 4 of the revised PDD. | Appendix 4 of the PDD justifies the rationale of applying the default value of 160 tCH4/PJ which is acceptable. |
| The means of measurement of LNG, referred in section B.7.1, is indicated as fuel flow meter – however, based on the discussions with PP it is evident that separate provision for measuring LNG consumption is not made. Clarify the measurement practice in this regard. | 10.2 | PGPL wishes to state that there is no separate flow meter to monitor LNG consumption as same infrastructure (pipeline) is used to transport both Natural Gas and R-LNG. However the usage of R-LNG can be assessed through the gas invoices, raised by gas transporter, which mention the type of the gas used. | The explanation by PP is justified and it is opined by the validation team that usage of both NG and R-LNG can be monitored. |
| Though RLNG is envisaged to be used in the project activity in a specified ratio as mentioned in the board decision, the emission reduction calculations have not accounted for leakage from LNG usage. Clarify the appropriateness of excluding RLNG leakage. | 10.2 | Consequent of the CAR raised, super critical coal power plant is identified as the baseline plant, the efficiency in excel sheet is a calculated value from the heat rate specified for new thermal generating stations with super critical parameters by CERC dated 19 th January 2009 which justifies usage and the same is presented in the Section B.6.2 of the PDD and the CER sheet. | The source document is now provided which is appropriate and the PDD and calculations have been revised accordingly. CL 06 Resolved. |

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| <p><u>CL 07</u></p> <p>It is evident from PDD section B.5 that the levelised cost of electricity generation is taken as financial indicator in proving the additionality. However, according to the 'Tool for the demonstration and assessment of additionality, Ver 6.0', Financial indicator such as IRR, most suitable for the project type and decision context is to be used in the Benchmark Investment Analysis. The applied methodology 'AM0029 ver 3 para 2' does not indicate any specific indicator and it allows any suitable financial indicator to be used. But under Additionality clause in the methodology (page 3), it is clearly indicated that Option III Benchmark analysis is to be applied as per the latest additionality tool Ver 6.0 to demonstrate the additionality. PP to clarify and justify the approach of taking levelised cost of electricity generation as financial indicator instead of IRR for comparison and concluding additionality.</p> | 14.3 (a) | <p>The basis of choosing Levelised cost of generation (INR/kWh) as the financial indicator for the project activity is explained as follows:</p> <p>Levelized cost of generation is a realistic approach when comparisons are done among different technologies (alternatives) with varying lifetime since it allows to quantify, the unitary cost of the electricity (kWh) generated. It is also important to note that for all power generation projects in India CERC which is the nodal agency which formulates the guidelines, has recommended the levelised cost of generation as the evaluation criteria (ref. CERC tariff regulation 2009).</p> <p>The para 30 of sub-step 2b: option III (benchmark analysis) of additionally tool, version 6.1 says 'Any other indicators, if the project participants can demonstrate that the above Options are not applicable and their indicator is appropriately justified'.</p> <p>In absence of option 30 (d) Government / official approved benchmark and other options 30 (a-c) not applicable to this project – the chosen financial indicator is appropriate.</p> <p>Also as per para 17 of investment analysis guidelines, The purpose of an investment analysis in the context of the CDM is to determine whether the project is less financially attractive than at least one</p> | <p>The validation team has reviewed the benchmark analysis in which project NPV is considered as the financial indicator to prove additionality. Hence the validation team has accepted the approach as correct as it is in line with the tool.</p> |

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| | | <p>alternative in which the project participants could have invested. In cases where the alternative requires investment anyhow and baseline emissions are based on that alternative, the only means of determining that the project activity is less financially attractive than at least one alternative is to conduct an investment comparison analysis. The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest.</p> <p>Also recently registered projects (project id no: 4334, 4828) applying the same methodology AM 0029 version 03 have adopted the same approach of taking Levelised cost as the financial indicator in the benchmark analysis.</p> <p>However to address the DoE's concerns, benchmark analysis using Project NPV as a financial indicator is used to prove additionality and the relevant worksheets are submitted to the DoE.</p> | CL 07 Resolved |
| Long term Tariff for IRR calculation has been sourced based on information on winning tariff bids of Case 1 projects. Clarify / justify why CERC guideline is not referred. | 14.3 (a) | PP has now revised the long term tariff to INR. 3.87/kWh which is as per the CERC guidelines. The revised excel sheets and PDD is submitted to the DOE for validation. | <p>The validation team has reviewed the Explanatory Memorandum to the Draft Amendments to the CERC tariff regulations, 2009 and accepted the value of INR 3.87/kWh for long term tariff as correct.</p> <p>CL 07 resolved.</p> |

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| <p>CL 08</p> <p>In sensitivity analysis, clarify on the exclusion of NCV from the parameters being considered to have a major impact on the project revenues / expenses.</p> | 14.3 € | <p>Sensitivity analysis is now performed for all the identified alternatives viz sub-critical coal based, Super critical coal and NG based Power Plants and the same is indicated in the revised PDD version 02. Fuel price, PLF, Heat rate, O & M cost and project cost are considered by the PP as significant variables and have been treated as “parameters with material impact on sensitivity analysis”. The sensitivity analysis is done for both project activity and alternatives, subjecting the parameters to +/- 10% variation. This is as per applied methodology. PLF and project cost has to vary more than the maximum possible variation to reach the benchmark. It may be found in the financial sheets that the financial attractiveness of the project activity is robust to all the variations. Sensitivity analysis have been done for the fuel cost for all alternatives considered, including supercritical. As fuel cost is based on the NCV the same is captured adequately in the revised PDD.</p> | <p>Revised PDD and excel spread sheets considers all the significant parameters that have material impact. Sensitivity analysis has been performed for all the alternatives and the project activity. As the cost of the fuel is determined by the NCV of the fuel, the validation team accepts the analysis done by subjecting the fuel cost parameter to variations</p> <p>The query raised as CAR 6 has been resolved. Refer to CAR 6 resolution for conclusion.</p> <p>CL 08 resolved.</p> |
| <p>In the sensitivity analysis, some of the resultant values of project IRR (at +10% or -10% of the parameters) shows as negative project IRR. PP to clarify whether negative IRR is mathematically correct</p> | 14.3 (e) | <p>Based on the query raised by the validating DOE, PP is now changing the financial indicator from project IRR to project NPV and final excel sheets are submitted for validation. And some of the above replies are also changed accordingly. PP has taken WACC as the discount rate for project NPV. We sincerely hope that the validating DOE is accepting the project NPV scenario.</p> | <p>The validation team has reviewed the benchmark analysis in which project NPV is considered as the financial indicator to prove additionality. Hence the validation team has accepted the approach as correct as it is in line with the additionality tool. Moreover, the results of sensitivity analysis now give mathematical values which are clear to the reader.</p> |

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| | | | <p>PP has considered post tax WACC (benchmark) as the discount factor for the calculation of project NPV which is accepted by the validation team as reasonable.</p> <p>PP has considered post tax Project NPV as financial indicator as project cost has been financed partly by the equity and remaining by debt. Since it is a predominant investment decision in non-core business, the management was particularly interested in the return of the investment. Hence Post tax project NPV was selected as the financial indicator to assess the additionality of the project.</p> <p>CL 08 resolved.</p> |
| <p>CL 09</p> <p>In section B.5 of the PDD under common practice analysis, clarify the following The basis for arriving at N_{all} in step 2 is not clear as the data analysis does not indicate the basis of inclusion / exclusion of power plants.</p> <p>In step 3, the fuel type of power plants identified to differ with respect to investment climate is not clearly mentioned.</p> | <p>16.1</p> <p>16.1</p> | <p>The criteria for arriving at N_{all} in step 2 with justification of inclusion / exclusion as per the common practice guidelines. Those projects that are registered under CDM are not considered as per the requirement of Step 2 of the guidelines and the CDM ref no is indicated in the excel sheet. The data is also provided to the DoE.</p> <p>Step 3 is applied to identify those plants that run on fuels other than natural gas and they are identified as N_{diff} in the revised PDD.</p> | <p>The basis of arriving at N_{all} has been clarified in the revised PDD, which is in line with the common practice guidelines.</p> <p>Step 3 has been applied to calculated N_{diff} based on the common practice guidelines.</p> <p>CL 09 resolved.</p> |
| <p>CL 10</p> <p>Please clarify Section C.2.2.1 indicates the expected starting</p> | 17.1 (b) | The power plant would be equipped with DCS system wherein the 'net electricity export' can be retrieved for any time period, in the event of the crediting period / | The reply from PP is justified as procedures are in place for dealing with possible monitoring data adjustments to handle exigencies in case of start date of JMR and |

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| date of crediting period is the date of registration of the project. Whereas the JMR is taken on a fixed date, It is most likely that the date of registration may not coincide with the date of JMR. PDD does not identify procedures for dealing with possible monitoring data adjustments to handle such exigency. Identical situation is anticipated in the last month of crediting period. | | 'Monitoring report' dates not matching with the JMR date, the data will be adjusted with the help of 'reading' that is retrievable from DCS system. In case data is not retrievable PGPL would only claim for the emission reductions for the time period coinciding with the JMR. | crediting period date not exactly coinciding. CL10 resolved |
| <p>CL 11</p> <p>PDD does not clearly indicate the nature of comments received from the local stakeholders and actions taken by the PP to address the same.</p> <p>Evidence for local stakeholder notice dated 17/04/2012 is not provided</p> | <p>19.1</p> <p>19.1</p> | <p>Minutes of meeting of the stakeholder's meeting which is submitted to the DOE indicates the comments received by the stakeholder's and the actions taken by the PP to address the same, these information is also updated in the revised PDD.</p> <p>Notice inviting stakeholder's, in the regional language as well as in English, which were used for the purpose of CDM stakeholder's meeting has been submitted to the DOE.</p> <p>Now the PDD captures the local stakeholder consultation process, detailing the issues/concerns raised by the stakeholders and satisfactory clarifications provided by the PP.</p> | <p>MoM indicates the comments received and the explanation provided to address them. However PDD does not detail the process undertaken.</p> <p>The revised PDD details the process of local stakeholder consultation conducted by PGPL which is satisfactory and hence acceptable.</p> <p>CL 11 resolved.</p> |
| <p>CL 12</p> <p>Regarding the formula used in the excel sheet, the auxiliary consumption is indicated in the assumption sheet while the same is not incorporated in the levelised cost calculations Clarify if this correct and based on accepted formulae in line with accepted means of accounting practices.</p> | S. No. 4, Table 2 | The parameter auxiliary consumption is indicated in the revised financial spread sheet for all the baseline options considered, and is now correctly applied. | <p>The revised worksheets have accounted for the auxiliary consumption in the levelised cost calculations now.</p> <p>CL 12 resolved.</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
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| <p>CL 13</p> <p>The technical life time for NG based plant and Coal based plant is indicated as 25 years in the PDD but the investment analysis (levelised cost and IRR) reflects 20 years only. Clarify / justify the approach chosen.</p> | S. No. 7, Table 2 | <p>As per para 3 of investment analysis guidelines - calculations for financial indicators shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or if a shorter period is chosen include the fair value of the project activity assets at the end of the assessment period. In general a minimum period of 10 years and a maximum of 20 years will be appropriate.</p> <p>Thus though the lifetime of project and baseline alternatives is 25 years (ref CERC, 2009) the salvage value of 10 % has also been considered as the project activity is considering lifetime of 20 years.</p> | <p>All the options such as project activity (NG power plant) and baseline alternatives (subcritical and supercritical coal power plant) have used 20 years lifetime for financial assessment which is acceptable and appropriate in line with the specified investment analysis guidelines as salvage value is also considered.</p> <p>CL 13 resolved</p> |
| <p>CL 14</p> <p>The valid links and evidences to establish that the input values used in the investment analysis, are valid and applicable at the time of the investment decision has not been provided. Clarify / justify the conservativeness of the following assumptions: Escalation rate of NG – 10.18%</p> | <p>No. 11, Table 2</p> <p>No. 11, Table 2</p> | <p>The valid links and evidences to establish that the input values used in the investment analysis, are valid and applicable at the time of the investment decision has been provided now in the cost sheet.</p> <p>Escalation rate of NG assumed is taken from the historical price trend of natural gas available in the country. Sufficient time period and impact of APM (Administered Pricing Mechanism) regime on the domestic natural is considered to reflect the realistic possibility of the price of natural gas. Referring to the proposed national policy guidelines and international market. However as the assumed escalation rate is not conservative, the rate of 1.31% mentioned as per CERC explanatory</p> | <p>Links and evidences to establish that the input values used in the investment analysis have been provided in the revised workings. However based on review, CL 14 was not resolved.</p> <p>The escalation rate has been computed based on CERC explanatory memorandum to 2009 tariff guidelines, which is conservative.</p> |

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| <p>Auxiliary consumption</p> <p>Debt Equity ratio in comparison to loan sanction</p> | <p>No. 11, Table 2</p> <p>No. 11, Table 2</p> | <p>document published in 2010 has been taken now.</p> <p>Now financial analysis considers 3.5% auxiliary consumption in line with para 6 guidelines as it is sourced from DPR.</p> <p>The investment analysis sheet considers debt equity ratio of 70:30 which is as per the CERC explanatory memorandum to 2009 tariff guidelines. However the actual debt component for the project activity is 75%, the investment analysis for the actual ratio is also presented in the financial excel sheet.</p> | <p>The auxiliary consumption is now made consistent as 3.5% in both the PDD and financial calculations as per DPR in line with para 6 guidelines.</p> <p>The project component has considered debt: equity ratio of 70:30, the validation team accepts the ratio as it is in line with CERC order available at the time of investment decision. The actual loan sanction letters provided by banks refers to 75% of the project cost, were also checked and found that even after applying 75:25, the project is still additional.</p> <p>CL14 resolved.</p> |
| <p>CL 15</p> <p>PP is requested to clarify on the value used (3.79 INR/kWh) for short term tariff rate on the basis of relevance and appropriateness</p> | | <p>PP submits the DPR available at the time of investment decision for source of the short term tariff rate. This is the weighted average of the bilateral trading mechanism and open access charges based on IEX database.</p> | <p>The validation team has reviewed the selling price of electricity considered at the time of investment decision and value is found to be INR 3.79/kWh.</p> <p>CL 15 resolved</p> |
| <p>CL 16</p> <p>PP is requested to clarify on the fuel ratio of NG, changed from 85% to 70% on the basis of relevance and appropriateness</p> | | <p>The board decision dated 15th April 2011 had inferred the fuel ratio of NG and LNG to be 85:15 based on the power ministry notification policy 2005</p> | <p>The validation team has verified the DPR^(23/) available at the time of investment decision wherein it is assumed that the NG usage would be in the ratio of 50% to 70% and the balance would be from using R-</p> |

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| | | <p>http://www.powermin.nic.in/whats_new/national_electricity_policy.htm</p> <p>Clause 5.7.1 of the policy specifically says that 15 % of total generated power may be sold to outside market. As the economics of the fuel ratio of the NG and LNG used is based on the cost of fuel and also its market rate, it was decided to link up power production using 85% NG to long term sale and power production using 15% LNG to open market.</p> <p>However, the Management Review meeting consisting of the project execution team had recommended that based on the most recent policies on NG allocation a 70% allocation of NG is most appropriate as and that due to expansion facilities of LNG there will be more access to LNG. The financial advisors of the project have also indicated that as a 70: 30, Debt : Equity model is proposed for the project, it is advisable to adopt the sale of electricity by firm commitments for the debt portion and sale of electricity by open market for the equity portion, to minimise risks.</p> <p>Hence considering the above facts, PGPL has now decided to apply the decision taken at the management review, reflecting actual scenario and submits the management review document as evidence. Also that similar fuel ratio was proposed during the DPR stage can be verified from the DPR dated 20th August</p> | <p>LNG. Further the Management Review note which is more realistic and relevant has been also considered and the facts verified to establish the actual scenario existing at the time of investment decision.</p> <p>The validation team has also independently analysed all the existing natural gas based power plants considered for indigenous natural gas allocation^{48/} by the Government of India for the month of March 2013 which establishes that only 70% of NG was being allocated to each NG power plant.</p> <p>Further, to substantiate the argument, the validation team has independently analysed the NG usage in the recent CDM projects (UNFCCC no: 7611 and 8048), where it is mentioned NG usage would be in the ratio of 50% only which was observed to be based on the actual invoices. The value of 50%:50% shows that considering 70%:30% is more conservative.</p> <p>The validation team accepts the PPs justification that the board note had considered the Government policy drafted in 2005 during its Board Review meeting and further the actual usage of NG as indicated in the revised calculations are based on the DPR and also on the Management review meeting, which is appropriate and reflects the actual scenario prevailing during the board decision. Hence the source of both the DPR and the Management review meeting for fuel ratio is</p> |

| Correction Action Request (CAR) or Clarification Request (CL) or Forward Action Request (FAR) | Reference to Table 1 & 2 | Response from project participant | Validation team conclusion |
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| | | 2010. | acceptable. CL 16 resolved |
| <p>CL 17</p> <p>PP is requested to clarify on the proportion of electricity to open access, changed from 15% to 30%</p> | | <p>The board decision dated 15th April 2011 had inferred that 15% electricity to open access be sold, based on the power ministry notification policy 2005</p> <p>http://www.powermin.nic.in/whats_new/national_electricity_policy.htm</p> <p>Clause 5.7.1 of the policy specifically says that 15 % of total generated power may be sold to outside market. Also ,as the economics of the fuel ratio of the NG and LNG used is based on the cost of fuel and also its market rate, it was decided to link up power production using 85% NG to long term sale and power production using 15% LNG to open market.</p> <p>However, the Management Review meeting consisting of the project execution team had recommended that based on the most recent policies on NG allocation a 70% allocation of NG is most appropriate and that due to expansion facilities of LNG there will be more access to LNG. The financial advisors of the project have also indicated that as a 70: 30, Debt : Equity model is proposed for the project, it is advisable to adopt the sale of electricity by firm commitments for the debt portion and sale of electricity by open market for the equity</p> | <p>PP has considered ratio of sale of electricity to the grid (through long term PPA) and the sale of electricity through open market (short term tariff) in tune with usage of NG and R-LNG which is 70 %: 30%. Hence accepted by the validation team as correct.</p> <p>The validation team has reviewed the management review meeting in which 70%:30% was proposed for % NG:% LNG usage respectively for the project activity. The validation team accepts the PPs justification that the board note had considered the Government policy drafted in 2005 during its Board Review meeting whose objective was to make a commitment for initiating the project with CDM benefits. Further the actual recommended usage of NG, which is one of the parameters that determines technical feasibility as indicated in the revised calculations is based on the DPR and also on the Management review meeting, which is appropriate and reflects the actual scenario prevailing during the board decision. Hence as the source of both the DPR and the Management review meeting for fuel ratio is acceptable based on which the ratio of sale of electricity is proposed, it</p> |

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| | | <p>portion, to minimise risks.</p> <p>Hence considering the above facts, PGPL has now decided to apply the decision taken at the management review, reflecting actual scenario and submits the management review document as evidence. PGPL submits that the board decision does not reflect the technical considerations that went in to the projects being conceptualised as a CDM project rather it indicates commitment of the board to initiate the project by consideration of CDM benefits. Due to fuel ratio that was proposed during the DPR stage and subsequently confirmed during management review, the ration of sale of electricity was revised.</p> | <p>is acceptable.</p> <p>CL 17 resolved</p> |

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APPENDIX B
AUDITOR'S CERTIFICATE



Sijil Certificate

This is to certify that

A. PRABU DAS

has been qualified as

**LEAD AUDITOR
FOR
CDM VALIDATION AND VERIFICATION SCHEME**

in accordance with the relevant provisions of SIRIM QAS International's CDM procedure

Sectoral Scopes No. : 1 – Energy industries (renewable/non-renewable sources)

TA 1.1 - Thermal energy generation from fossil fuel and biomass including
thermal electricity from solar

TA 1.2 - Energy generation from renewable energy sources.

Parama Iswara Subramaniam
Chairman
Auditor Evaluation Panel
Management System Certification Department
SIRIM QAS International Sdn. Bhd.

Qualification Date : **22 December 2011**

Sijil Certificate

This is to certify that

R. VIJAYARAGHAVAN

has been qualified as

**TRAINEE LEAD AUDITOR
FOR
CDM VALIDATION AND VERIFICATION SCHEME**

in accordance with the relevant provisions of SIRIM QAS International's CDM procedure.

Sectoral Scopes No. : 1 – Energy industries (renewable/non-renewable sources)

TA 1.2 – Energy generation from renewable energy sources.



Parama Iswara Subramaniam
Chairman
Auditor Evaluation Panel
Management System Certification Department
SIRIM QAS International Sdn. Bhd.

Qualification Date : **20 February 2012**



Sijil Certificate

This is to certify that

SAI PRASAD

has been qualified as

**TECHNICAL EXPERT
FOR
CDM VALIDATION AND VERIFICATION SCHEME**

in accordance with the relevant provisions of SIRIM QAS International's CDM procedure.

Sectoral Scopes No. : 1 – Energy industries (renewable/non-renewable sources)

TA 1.1 – Thermal energy generation from fossil fuel and biomass including thermal electricity from solar (COMPLEX).

Parama Iswara Subramaniam

Chairman

Auditor Evaluation Panel

Management System Certification Department

SIRIM QAS International Sdn. Bhd.

Qualification Date : **1 June 2011**