



VALIDATION REPORT

UP-GRADATION OF GAS TURBINE 1 (GT 1) AND GAS TURBINE 2 (GT2) AT COGENERATION PLANT OF HAZIRA GAS PROCESSING COMPLEX OF OIL AND NATURAL GAS CORPORATION LIMITED (ONGC) PROJECT IN INDIA

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DET NORSKE VERITAS



VALIDATION REPORT

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Summary:

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the “Up-Gradation of gas Turbine 1 (GT 1) and gas Turbine 2 (GT2) at cogeneration plant of Hazira gas Processing Complex of Oil and Natural Gas Corporation Limited (ONGC) project in India” on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, the simplified modalities and procedures for small-scale CDM project activities and the subsequent decisions by the CDM Executive Board. This validation report summarizes the findings of the validation.

The validation consisted of the following three phases: i) a desk review of the project design documents, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In summary, it is DNV’s opinion that the project, as described in the project design document of 27th December 2006, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology AMS-II D, version 08. Hence, DNV requests the registration of the “Up-Gradation of gas Turbine 1 (GT 1) and gas Turbine 2 (GT2) at cogeneration plant of Hazira gas Processing Complex of Oil and Natural Gas Corporation Limited (ONGC) project in India” as a CDM project activity.

Report No.: 2006-9103-1		Subject Group: Environment					
Report title: Up-Gradation of gas Turbine 1 (GT 1) and gas Turbine 2 (GT2) at cogeneration plant of Hazira gas Processing Complex of Oil and Natural Gas Corporation Limited (ONGC) project in India							
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***Abbreviations***

BHEL-GE	Bharat Heavy Electricals Limited- GE
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EIA	Environmental Impact assessment.
EB	Executive Board.
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
GT	Gas Turbine.
HCA	Host Country approval.
HGPC	Hazira Gas Processing Complex
HGP	Hot Gas Path.
HPP	High Pressure Parts.
IGV	Inlet Guide Vane.
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return.
MP	Monitoring Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
ONGC	Oil and Natural Gas Corporation.
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change



1 INTRODUCTION

ONGC Limited has commissioned Det Norske Veritas Certification Ltd. (DNV) to validate the “Up-Gradation of gas Turbine 1 (GT 1) and gas Turbine 2 (GT2) at cogeneration plant of Hazira gas Processing Complex of Oil and Natural Gas Corporation Limited (ONGC) project in India” (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for small-scale CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consisted of the following personnel:

Mr Subhendu Biswas	DNV, India	Team Leader, CDM Validator
Mr Soumik Biswas	DNV, India	CDM Validator
Mr C Kumaraswamy	DNV, India	Sector expert
Mr. Michael Lehmann	DNV Certification Oslo	Technical verifier

1.1 Validation Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. 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 validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, the simplified modalities and procedures for small-scale CDM project activities and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology AMS-II D, version-08. The validation team has, based on the recommendations in the Validation and Verification Manual /6/ employed a risk-based approach, 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 project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

1.3 Description of Proposed CDM Project

The project activity undertaken at ONGC Hazira unit involves the retrofitting of the existing gas turbines GT#1 and GT#2 with up-rated components. The gas turbines were installed in the year 1987~88 and the hot gas path components of the turbines have completed their technical lifetime needing replacement. The project involves the replacement of the entire hot gas path components with up-rated components in place of the conventional standard components. The retrofitting with up rated components includes replacement of combustion liners, buckets, nozzles and HPP brush seal and will improve the heat rate besides improving the output of the turbines. The new



technology parts are expected to extend the recommended combustion inspection intervals up to 50% so as to reduce the planned outage due to periodic inspection.

The average anticipated emission reduction due to the project activity is expected to be around 7 802 tonnes of CO₂ equivalent per year.

2 METHODOLOGY

The validation consists of the following three phases:

- I a desk review of the project design and the baseline and monitoring methodology
- II follow-up interviews with project stakeholders
- III The resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /6/. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements 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 validation protocol consists of three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the “Up-Gradation of gas Turbine 1 (GT 1) and gas Turbine 2 (GT2) at cogeneration plant of Hazira gas Processing Complex of Oil and Natural Gas Corporation Limited (ONGC) project in India” is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of validation protocol criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- i) mistakes have been made with a direct influence on project results;
- ii) validation protocol requirements have not been met; or
- iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term Clarification may be used where additional information is needed to fully clarify an issue.



Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities			
Requirement	Reference	Conclusion	Cross reference
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>This is either acceptable based on evidence provided (OK), a Corrective Action Request (CAR) of risk or non-compliance with stated requirements or a request for Clarification (CL) where further clarifications are needed.</i>	<i>Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.</i>

Validation Protocol Table 2: Requirement Checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.</i>	<i>The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.</i>	<i>This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). A request for Clarification (CL) is used when the validation team has identified a need for further clarification.</i>

Validation Protocol Table 3: Resolution of Corrective Action Requests and Requests for Clarification			
Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<i>If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.</i>	<i>The responses given by the project participants during the communications with the validation team should be summarised in this section.</i>	<i>This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

Figure 1 Validation protocol tables



2.1 Review of Documents

The PDD /1/ in its initial version (version-01 dated 02nd June 2006), subsequent revisions and final version-05 dated 27th December 2006 submitted by ONGC along with additional background documents related to the project design and baseline were assessed during validation.

2.2 Follow-up Interviews

In the period 29th July 2006 to 30th July 2006, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of ONGC, Hazira Gas processing complex and BHEL-GE were interviewed. The main topics of the interviews are summarised in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
Oil and Natural Gas Corporation Limited, Hazira Gas processing complex.	<ul style="list-style-type: none"> ➤ Assessment of project details and proof of additionality of the project. ➤ Assessment of baseline for the project and calculation of baseline emissions. ➤ Review of monitoring and verification procedure of the organisation and management structure of the organisation for the project activity. ➤ Review of the stakeholder consultation process.
BHEL-GE	<ul style="list-style-type: none"> ➤ Assessment of availability of up-rated MS5001 gas turbines. ➤ Assessment of baseline determination for the project and ➤ Assessment of project additionality.

2.3 Resolution of Clarification and Corrective Action Requests

The issues identified in DNV's draft validation report of 18th September 2006 (rev 01) were resolved to DNV's satisfaction during communication between M/s ONGC and DNV. To guarantee the transparency of the validation process, the concerns raised and responses given are documented in Table 3 in the validation protocol in Appendix A.

Since modifications to the PDD were necessary to resolve DNV's concerns, ONGC decided to revise the PDD and eventually submitted final version-05 dated 27th December 2006. After assessment of the revised PDD, DNV issued this final report and opinion.

2.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.



3 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The validation findings relate to the project design as documented and described in the revised and resubmitted PDD, version 05 dated 27th December 2006.

3.1 Participation Requirements

The sole project participant is ONGC Limited. The DNA of India has approved the project on 8th August 2006. India has ratified the Kyoto protocol, established a DNA and thus meets the requirements to participate in the CDM. No participating Annex I Party has yet been identified for the project.

The project is expected to contribute to the sustainable development of the region as it results in lower fuel consumption for equivalent amount of power generated. It also results in the development of technical skills of the operation and maintenance personnel. The DNA of India has provided confirmation that the project assists in achieving sustainable development.

3.2 Project Design

The project plant at ONGC Hazira Gas processing complex has 2 numbers. of Frame-V gas turbine generators, GT#1 and GT#2, which were commissioned in the year 1987~88. These machines were fitted with standard hot gas path components. The machines have been running on natural gas since commissioning and had clocked around 137 500 run hours by the end of 2005. The last major inspections were conducted between 3rd October and 5th December 2002 for GT#1 and 16th January to 12th February 2003 for GT#2. The hot path components of both the turbines had completed their technical lifetime and the inspection identified that these hot path components needed to be replaced in the next major inspection which was due in 2006.

ONGC had the option of either replacement of the hot gas path with standard components or install up-rated components. The installation of up-rated components required an incremental cost of INR Rs. 47.8 Million per gas turbine. Technical consultations with BHEL-GE confirmed that the up-rated package for MS5001 series of turbines was available in India from 2002 onwards. ONGC opted to up grade the gas turbines by incorporating the new technology.

The programme also includes change in NOx control systems and replacement of compressor blades. These measures are not included as a part of the project activity as communication from BHEL-GE confirmed that the components had surpassed their estimated lifetime and had to be replaced even in the absence of the project.

The turbine upgrade package improves efficiency and output and increases maintenance intervals. The new technology parts extend the recommended combustion inspection intervals up to 50% and extend the hot gas path inspections to coincide with the major inspection and thus lead to reduced planned outage.



The up-rating to new technology (51P to P N/T), installation of chamber high flow IGV and high pressure packing brush seal decreases the heat rate by around 3.3%. Communication from BHEL-GE confirmed the decrease in heat rate as a result of the project

The uprate package utilizes technology advances as developed for the modern GE fleet of new unit turbine offerings. It is developed in house by GE and is provided in India by BHEL-GE.

The project proponent has chosen a fixed crediting period of 10 years duration with the starting date of the crediting period being 01st April 2007.

The project does not involve any public funding and the validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards India.

3.3 Project Baseline

The project applies the approved simplified baseline methodology AMS-II D, version-08 for small-scale CDM project activities, titled “Energy efficiency and fuel switching measures for industrial facilities”.

The baseline methodology adopted is applicable as it has been demonstrated that the project involves retrofitting gas turbines of the Hazira gas processing complex aimed primarily to improve the heat rate of the turbines. The annual energy savings in the project is 38.5 GWh_{th} which is less than the stipulated limit of 180 GWh_{th} for small scale projects

The last major inspection of the gas turbines GT#1 and GT#2 carried out in 2002~2003 indicated that the hot gas path components had completed their lifetime and needed replacement. The option for ONGC was to either go for replacement of the entire hot gas path with standard components or retrofit with uprated components. It has been confirmed from BHEL-GE, the turbine manufacturer for the project, that a replacement of the components with standard components is most prevalent practice in the industry and is thus justifiably selected as the baseline for the project.

Correspondence from BHEL-GE, who has been contracted to carry out the retrofit and has done the last major inspection of the turbines, confirmed that performance of gas turbine degrades with ageing. Whenever standard technology parts are replaced during a major inspection there is marginal improvement in power output in Frame-V gas turbines. The consequential improvement in heat rate is insignificant. Based on the confirmation from the turbine manufacturer the monitored value of heat rate of the gas turbines GT#1 and GT#2 over the last 3 years, 2003~2006, is taken as the baseline heat rate for the project. The calorific value of natural gas used in the turbines which is measured in the project plant for the baseline period is used to compute the baseline heat rate for the project. Thus, the baseline emissions are computed from the annual average generation of the turbines, baseline heat rate of the gas turbines and the IPCC default emission factor for natural gas.



3.4 Additionality

The project additionality has been analysed by assessing the presented barriers due to poor economic attractiveness of the project activity and technological barriers related with up-rating of gas turbine.

Investment comparison analysis:

An analysis has been made comparing the cost of up rating the gas turbines against the cost of replacement of the hot gas path components with standard components. The incremental cost of components along with the additional cost of installation is included as the capital cost of the project. The incremental cost of major inspection that is taken up every 6 years is also included as a cost component for the project.

The benefits of the project that are included in the economic attractiveness analysis are.

- * Benefits due to increased output from the turbines as a result of the up-rating. The output of the machines is taken to be 10.6% more than the baseline equipment which is the guaranteed figure given by the machine manufacturer. The additional power will be sold to the regional grid. Letter from the Gujarat Electricity Board dated 19th March 2004 was presented as the documentary evidence for the basis of the rate at which power will be sold. The same is found to be in order. Monthly data from December 2002 to August 2004 was presented which confirm a power deficit situation with the Gujarat Electricity Board. The data when averaged out gives the number of hours during which the grid demand for power was not fulfilled due to capacity limitations. The same is used in computing the benefits from the project and is found to be justified.
- * Benefits due to lesser outage of the machine for maintenance is taken as an input for evaluating the economic attractiveness of the project. One of the benefits of the up-rate is an increase in maintenance interval and thus more availability of machine for power generation. The lesser outage is averaged out over a 6 year period which is the normal frequency of a major inspection for the turbines. The benefits are accounted for the amount of power that would have been imported from the grid during the maintenance of the turbines as well the amount of surplus power that can be sold to the grid due of availability of the turbines.
- * The savings on natural gas for generating equivalent amount of power is also taken as a benefit for the project. The project results in a decrease in heat rate by 3.3% which is the guaranteed figure given by the machine manufacturer BHEL-GE. The cost of natural gas is taken from the sales records and invoices of the organisation and found to be in order.

The analysis demonstrates that without CDM benefits the IRR of the project works out to be 9.63% which is lower than the internal hurdle rate of the organisation, which has been determined to be 10%. The IRR determination of the project is enclosed as a part of the revised PDD. The following primary documentation was evidenced against the internal benchmark of the organisation.

- * Circular No. DDN/PAS/PROJ/APPR/RR/2005 on “Hurdle rates and product prices for investment proposals” dated 19th July 2005 issued by Director, Finance, providing guideline on hurdle rates for considering an investment proposal. The same is found to be in order.



With CDM benefits the IRR of the project works out to be 14.15%, it is thus demonstrated that without CDM benefits the project does not meet the internal hurdle rate of the organisation. Without CDM benefits the project is not economically attractive and CDM help in overcoming this hurdle.

Technological Barrier:

The project design presents arguments that are based on technological barriers associated with the project. The MS5001 gas turbines are typically several decades old and are good propositions for re-replacements. GE offers technological up gradation after exhaustive engineering trials and validation of the packages being offered. The increase in output from the machine and decrease in heat rate are communicated by the manufacturer and are covered under the technical bid package of the organisation. DNV was not able to validate this argument as the technological uncertainties are generally taken care of by the turbine manufacturer who is engaged to carry out the up-rating.

The aforementioned arguments pertaining to economic attractiveness of the project sufficiently demonstrate that the project is not a likely baseline scenario and the emission reductions resulting from the project are additional.

3.5 Monitoring Plan

The selected monitoring methodology is in line with the approved simplified monitoring methodology AMS-II D, "Energy efficiency and fuel switching measures for industrial facilities" version-08.

The monitoring plan adequately addresses all necessary information for monitoring and reporting of emission reductions due to the project activity.

During the project period the monitoring plan provides for archiving the amount of natural gas consumed and power generated from the gas turbines (GT#1 and GT#2). The net calorific value of the natural gas consumed in the gas turbines is analysed and recorded during the project period. Heat rate is calculated on a monthly basis from the fuel consumed and power generation during the project period. The monitoring plan provides for archiving details of the measures that are taken up as a part of the project.

For baseline determination the amount of fuel consumed and the amount of power generated in the gas turbines GT#1 and GT#2 are monitored for a baseline period of 3 years, 2003~2006.

The project proponent has prepared monitoring and measurement procedures and defined the roles and responsibilities of the operating personnel of the unit. The monitoring plan details the parameters, sources, methods of collection and archiving of data. These were found to be adequate. The organisation has established a management structure for the CDM project with clear roles and responsibilities, calibration of measuring instruments and authority for necessary corrective actions.

3.6 Calculation of GHG Emissions

The annual average power generated from the gas turbines GT#1 and GT#2 are computed from the historical data of power generation for a period of 3 years. The baseline heat rate of the



existing machines is computed from the amount of natural gas fired in the turbines during the baseline period and the corresponding power generated from the units.

Based on the communication received from the turbine manufacturer it is assumed that the heat rate of the machines will remain unchanged on changing the hot gas path components with standard components, which is the baseline scenario for the project.

In the project period the reduced heat rate of the up-rated turbines is computed on monthly basis from the monitored amount of natural gas consumed and power generated from the machines. For *ex-ante* determination of emission reductions the guaranteed decrease in the heat rate of 3.3% is used to determine the reduction in heat rate due to the project activity. In the monitoring period the reduction in heat rate will be more than the minimum guaranteed figure and thus the assumption of 3.3% decrease in heat rate is considered to be conservative in nature. The monitored net calorific value of natural gas is used in calculating the heat rates both in the baseline period and the project period.

The difference of the heat rates in the baseline scenario and the project period is used to calculate the amount of energy saved due to the project activity.

The uprating of turbine will also result in an increase in the output from the machines. In line with the EB guidance for “treatment of existing and newly built facilities to make the emission reduction realistic in nature, emission reductions are calculated corresponding to amount of annual average power generated by the turbines before implementation of the project.

There is no leakage associated with the project activity. The presented calculations are transparent and verified by DNV. The IPCC default emission factors are used for emission reduction calculation which is justifiable as the change in emission factor does not significantly affect the emission reduction projections for the project activity.

3.7 Environmental Impacts

The project being an energy efficiency improvement project does not fall under the purview of the environmental impact assessment (EIA) notification of the Ministry of Environment and Forest, India.

The project activity does not affect the environmental performance of the unit in any manner. There are no trans-boundary effects for the project activity. All necessary statutory and regulatory clearances are available for the plant.

3.8 Comments by Local Stakeholders

The project is being implemented in the existing plant of ONGC, Hazira Unit and the major stakeholders identified for the project are its employees, local community, the project consultants and equipment suppliers.

Comments were invited from the employees of the organisation vide a notice issued by the Chief Engineer (Mechanical) dated 05th September 2006. The association of scientific and technical officers appreciated the efforts of the organisation for addressing the issue of climate change. No adverse comments were received during this stakeholder consultation process.

Officials of the organisation interacted with the local community and were commended for their voluntary action towards environmental well being.



4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD of 2nd June 2006 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 17th June 2006 to 16th July 2006.

No comment was received during the stakeholder consultation.



5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the “Up-Gradation of gas Turbine 1 (GT 1) and gas Turbine 2 (GT2) at cogeneration plant of Hazira gas Processing Complex of Oil and Natural Gas Corporation Limited (ONGC) project in India”. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host country is India and no Annex I country is yet identified for the project. India fulfils the participation criteria and has approved the project and authorized the project participant ONGC Limited. The DNA of India confirmed that the project assists in achieving sustainable development.

Having a net energy conservation capability of less than 180 GWh_{th} per annum, the project is eligible as type II small-scale CDM project activity. The project correctly applies the simplified baseline and monitoring methodology AMS-II.D, version-08.

By changing the hot gas path components of the existing gas turbines with up-rated components the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on average 7 802 tCO₂e per year over the selected 10 year crediting period. The emission reduction forecast has been checked and is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

Adequate training and monitoring procedures have been implemented.

In summary, it is DNV's opinion that the project, as described in the project design document version-05 dated 27th December 2006, meets all relevant UNFCCC requirements for the CDM, is eligible as category II small-scale CDM project activity and correctly applies the approved simplified baseline and monitoring methodology AMS-II.D version-08. Hence, DNV requests the registration of the “Up-Gradation of gas Turbine 1 (GT 1) and gas Turbine 2 (GT2) at cogeneration plant of Hazira gas Processing Complex of Oil and Natural Gas Corporation Limited (ONGC) project in India” as a CDM project activity.



REFERENCES

Documents provided by the project proponent that relate directly to the project:

- /1/ Project design document “Up-Gradation of gas Turbine 1 (GT 1) and gas Turbine 2 (GT2) at cogeneration plant of Hazira gas Processing Complex of Oil and Natural Gas Corporation Limited (ONGC) project in India” Version-01 dated 2nd June 2006, subsequent versions and final version-05 dated 27th December 2006.
- /2/ Approval letter from government of India, Ministry of Environment & Forests dated 8th August 2006.
- /3/ Inspection report on MS5001P(GT#1) carried out from 3rd October to 5th December 2002 from BHEL-GE Gas Turbine Services Limited.
- /4/ Inspection report on MS5001P(GT#2) carried out from 16th January to 12th February 2003 from BHEL-GE Gas Turbine Services Limited.
- /5/ Technical bid package for modification and up gradation of Gas Turbines #1&2, volume II

Background documents related to the design and/or methodologies employed in the design or other reference documents:

- /6/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /7/ Appendix B of the simplified modalities and procedures for small-scale CDM project activities: *Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity category AMS II D*. Version 08: 23rd December 2006.

Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above:

- /8/ S K Pandey, DGM (P). (ONGC, Hazira unit).
- /9/ Subodh Kumar, DGM (P). (ONGC, Hazira unit).
- /30/ Satish Nalgundwar, CE (M), (ONGC. Hazira Unit).
- /1/ R Ramakrishna, AGM(Engg.). (BHEL-GE).

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APPENDIX A

VALIDATION PROTOCOL FOR SMALL-SCALE CDM PROJECT ACTIVITIES

Table 1 Mandatory Requirements for Small Scale Clean Development Mechanism (CDM) Project Activities

Requirement	Reference	Conclusion	Cross Reference/ Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art. 12.2	OK	Table 2, Section E.4.1
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	CL-2	Table 2, Section A.3
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art. 12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	CL2	
5. The emission reductions should be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E.1 to E.4
6. Reduction in GHG emissions must be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5.c, Simplified Modalities and Procedures for Small Scale CDM Project Activities §26	CAR-1, CL-3	Table 2, Section B.2.1
7. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not	Decision 17/CP.7, CDM Modalities and Procedures Appendix B,	OK	No public funding is involved in the project activity.

* MoV = Means of Verification, DR= Document Review, I= Interview

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Requirement	Reference	Conclusion	Cross Reference/ Comment
result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	§ 2		
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures § 29	OK	Designated National Authority of India is The Ministry of Environment and Forests.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities and Procedures § 30, 31b	OK	The host country (India) has ratified the Kyoto Protocol in August 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	OK	No annex I Party is identified for the project.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	OK	
12. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakesh Accords and shall not be a debundled component of a larger project activity	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK	Table 2, Section A.1. The annual thermal energy savings due to the project activity is 38 GWh _{thermal} which is lower than the ceiling of 180 GWh _{thermal} for category II small scale projects.

Requirement	Reference	Conclusion	Cross Reference/ Comment
13. The project design document shall conform with the Small Scale CDM Project Design Document format	Simplified Modalities and Procedures for Small Scale CDM Project Activities, Appendix A	OK	The project uses the template for CDM-SSC-PDD version-02.
14. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and uses the simplified baseline and monitoring methodology for that project category	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	OK	Table 2, Section .1.3, B and D The project uses the approved baseline and monitoring methodology AMD II D which is applicable for the project.
15. Comments by local stakeholders are invited, and a summary of these provided	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22b	CL-5	Table 2, Section G
16. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	OK	Table 2, Section F, EIA is not mandatory the project activity.
17. Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available	Simplified Modalities and Procedures for Small Scale CDM Project Activities §23b,c,d	OK	The PDD was web-hosted on the validators' website for a 30 day period starting from 17/06/2006 to 16/07/2006. No comment was received during the period.

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
A. Project Description The project design is assessed.					
A.1. Small scale project activity It is assess whether the project qualifies as small scale CDM project activity.					
A.1.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?		DR/I	The project is an energy efficiency improvement project by retrofitting the existing gas turbines with up-rated components. This measure results in energy saving thus qualifying as a Type II group of small scale projects.		OK
A.1.2. The small scale project activity is not a debundled component of a larger project activity?		DR	No other project exists within one KM of the project boundary by the same project proponent and employing the same technology. So this is not a de-bundled component of a larger project.		OK
A.1.3. Does proposed project activity confirm to one of the project categories defined for small scale CDM project activities?		DR	Yes		OK
A.2. Project Design Validation of project design focuses on the choice of technology and the design documentation of the project.					
A.2.1. Are the project's spatial (geographical) boundaries clearly defined?		DR/I	The project boundary includes the gas turbines where the up-rated components are retrofitted and the natural gas network which supplies gas to the gas turbines.		OK
A.2.2. Are the project's system (components and		DR/I	Yes		Ok

* MoV = Means of Verification, DR= Document Review, I= Interview

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
facilities used to mitigate GHG's) boundaries clearly defined?					
A.2.3. Does the project design engineering reflect current good practices?		DR/I	As per communication received from BHEL the uprates on the MS5001 P turbines was available only for the last 4 years i.e. from 2002 instant. But the GT-03 which was installed in the year 1998 was with uprated components. Thus the uprates was available from 1998 instant on the machines. Clarification is requested on the availability of uprates on MS5001P machines prior to implementation in the project.	CL-1	OK
A.2.4. Will the project result in technology transfer to the host country?		DR/I	The uprated components are being supplied by GE-BHEL, an Indian company. No technology transfer is envisaged in the project.		OK
A.2.5. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period? Does the project make provisions for meeting training and maintenance needs?		DR/I	The retrofits and trials after modifications are included under the scope of work of the manufacturer. No major changes are envisaged in terms of maintenance and operations of the equipment.		OK
A.3. Contribution to Sustainable Development The project's contribution to sustainable development is assessed					
A.3.1. Will the project create other environmental or social benefits than GHG emission reductions?		DR/I	The project will contribute to enhancement of the technical skills of the maintenance and operational workforce of the unit.		OK
A.3.2. Will the project create any adverse environmental or social effects?		DR	No.		OK
A.3.3. Is the project in line with sustainable		DR	Clarification is requested on the status of the host	CL-2	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
development policies of the host country?			country approval for the project		
A.3.4. Is the project in line with relevant legislation and plans in the host country?		DR	The project has applied for host country approval. Clarification is requested on the status of the same.	CL-2	OK
B. Project Baseline The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.					
B.1. Baseline Methodology It is assessed whether the project applies an appropriate baseline methodology.					
B.1.1. Is the selected baseline methodology in line with the baseline methodologies provided for the relevant project category?		DR	The project applies the baseline methodology AMS IID version 07. It has been demonstrated that the methodology applied is appropriate for this project activity.		OK
B.1.2. Is the baseline methodology applicable to the project being considered?		DR/I	The baseline methodology applied to the project is rightly applicable to the project as it is demonstrated that the measures included result in improvement of energy efficiency of generation at Hazira complex. The total energy savings due to the project is less than 180 GWh _{th} which is the limit for group II small scale project activities.		OK

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* MoV = Means of Verification, DR= Document Review, I= Interview

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
B.2.2. Is the application of the baseline methodology and the discussion and determination of the chosen baseline transparent and conservative?		DR	The discussion on baseline selection is transparent in nature. Communication from the technology provider confirmed that the baseline scenario of changing the HGP with standard components would not result in change of heat rate of the existing GT's. The baseline determination is project specific and appropriate for the project.		OK
B.2.3. Are relevant national and/or sectoral policies and circumstances taken into account?		DR/I	The baseline of the project has been arrived at taking into account the recommendations of the last major inspection on the machines in 2002~2003.		OK
B.2.4. Is the baseline selection compatible with the available data?		DR/I	Yes		OK
B.2.5. Does the selected baseline represent the most likely scenario describing what would have occurred in absence of the project activity?		DR/I	The last major inspection on the machines carried out in 2002~2003 confirmed that the hot gas path needed to be changed in the next round of inspection. Abnormal cracks were observed all over the body of the exhaust diffuser and the thermal resistance of the material had been lost. Thus the most likely baseline for the project is the replacement of the entire hot gas path of the machines with standard components.		OK
C. Duration of the Project / Crediting Period					
It is assessed whether the temporary boundaries of the project are clearly defined.					
C.1.1. Are the project's starting date and operational lifetime clearly defined?		DR	Documentary evidence of the start date of the project is required.	CL-4	OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no		DR	The project has opted for a fixed crediting period of 10 years duration.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
renewal)?					
D. Monitoring Plan The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed.					
D.1. Monitoring Methodology It is assessed whether the project applies an appropriate monitoring methodology.					
D.1.1. Is the selected monitoring methodology in line with the monitoring methodologies provided for the relevant project category?		DR	The project applies the approved monitoring methodology AMS IID which is justifiably applicable for the project.		OK
D.1.2. Is the monitoring methodology applicable to the project being considered?		DR	Yes		OK
D.1.3. Is the application of the monitoring methodology transparent?		DR	Yes		OK
D.1.4. Will the monitoring methodology give opportunity for real measurements of achieved emission reductions?		DR/I	The monitoring plan provides for estimation of the heat rate of the gas turbines after the retrofit. This will provide inputs for real measurement of emission reductions.		OK
D.2. Monitoring of Project Emissions It is established whether the monitoring plan provides for reliable and complete project emission data over time.					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the		DR/I	The monitoring plan provides for monitoring of all parameters for determination of heat rate during the project period.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
greenhouse gas emissions within the project boundary during the crediting period?					
D.2.2. Are the choices of project GHG indicators reasonable?		DR/I	The monitoring of the reduced heat rate due to the project will help in proper accounting of emission reduction due to the project activity.		OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?		DR/I	All the parameters are monitored through dedicated instruments and measurable in nature.		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?		DR/I	Yes		OK
D.3. Monitoring of Leakage If applicable, it is assessed whether the monitoring plan provides for reliable and complete leakage data over time.					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?		DR/I	No equipment transfer is envisaged in the project activity. So no leakage is associated with the project activity.		OK
D.4. Monitoring of Baseline Emissions It is established whether the monitoring plan provides for reliable and complete project emission data over time.					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?		DR/I	The installation of the up-rated components on the machine will not only decrease the heat rate by 3.3% but will also increase the output by 10.6%. As per the EB guidance for "treatment of existing and newly built facilities" for any increase of output or lifetime of a facility which is due to the project activity a different baseline shall apply. Clarification	CL-5	OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			is requested as to how this issue is taken care of in the project as there is a corresponding increase in output due to the project activity.		
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?		DR	Yes		OK
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?		DR/I	The baseline heat rate of the equipment is measurable in nature.		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?		DR	Yes		OK
D.5. Project Management Planning It is checked that project implementation is properly prepared for and that critical arrangements are addressed.					
D.5.1. Is the authority and responsibility of project management clearly described?		DR/I	A dedicated team comprising of shift in charge and different operating personnel will oversee the management of the CDM project.		OK
D.5.2. Is the authority and responsibility for registration monitoring measurement and reporting clearly described?		DR/I	Yes		Ok
D.5.3. Are procedures identified for training of monitoring personnel?		DR/I	No such training is envisaged for the project activity.		OK
D.5.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?		DR/I	All the technological changes are developed by the equipment manufacturer and rigorously tested prior to passing it over to the clients. No such emergency scenario is envisaged for the project.		OK
D.5.5. Are procedures identified for calibration of monitoring equipment?		DR/I	The organisation is certified for ISO 9001 where in the calibration of the monitoring equipment are		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			taken care of.		
D.5.6. Are procedures identified for maintenance of monitoring equipment and installations?		DR/I	Yes		OK
D.5.7. Are procedures identified for monitoring, measurements and reporting?		DR/I	Yes		OK
D.5.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)		DR/I	All the data will be both electronically archived as well kept in paper format. Necessary provisions are made for safe storage of the same.		OK
D.5.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?		DR/I	Yes		OK
D.5.10. Are procedures identified for internal audits of GHG project compliance with operational requirements as applicable?		DR/I	Yes		OK
D.5.11. Are procedures identified for project performance reviews?		DR/I	Yes		OK
D.5.12. Are procedures identified for corrective actions?		DR/I	Yes		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E. Calculation of GHG emission It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.					
E.1. Project GHG Emissions The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.					
E.1.1. Are all aspects related to direct and indirect project emissions captured in the project design?		DR/I	All direct and indirect emissions are taken care of during project emission estimation.		OK
E.1.2. Have all relevant greenhouse gases and sources been evaluated?		DR	Yes		OK
E.1.3. Do the methodologies for calculating project emissions comply with existing good practice?		DR/I	The project emissions will be calculated based on the monitored value of heat rate after project implementation. The parameters are measured with instruments of high accuracy thus complying with existing good practice.		OK
E.1.4. Are the calculations documented in a complete and transparent manner?		DR	The mechanism for determination of project emissions as in E.1.2.1 is valid for ex-ante determination of the project emissions. But after project implementation the actual heat rate need to be estimated and used in the calculation for determination of emission reduction. Formulae to suitably modify to take into account the actual parameters monitored under the project activity.	CAR-2	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E.1.5. Have conservative assumptions been used?		DR	The heat rate improvement is based on the guaranteed figures by the equipment supplier. In actual scenario the heat rate may be further reduced thus making the estimation conservative in nature. The plan includes monitoring of the calorific value of the natural gas used in the gas turbine. Clarification is requested if the calorific value to be monitored is "Net" or "gross" calorific value.	CL-6	
E.1.6. Are uncertainties in the project emissions estimates properly addressed?		DR	No such uncertainties are envisaged for the project.		OK
E.2. Leakage It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed and estimated ex-ante.					
E.2.1. Are leakage calculation required for the selected project category and if yes, are the relevant leakage effects assessed?		DR	As there is no equipment transfer envisaged leakage determination is not required in the project activity.		OK
E.3. Baseline GHG Emissions The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.					
E.3.1. Are the baseline emissions boundaries clearly defined and do they sufficiently cover sources for baseline emissions?		DR	Yes		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E.3.2. Are all aspects related to direct and indirect baseline emissions captured in the project design?		DR/I	All direct and indirect baseline emissions are taken care of during baseline emission determination.		OK
E.3.3. Have all relevant greenhouse gases and sources been evaluated?		DR	Yes.		OK
E.3.4. Do the methodologies for calculating baseline emissions comply with existing good practice?		DR	As given below.	CAR-3	OK
E.3.5. Are the calculations documented in a complete and transparent manner?		DR	The baseline heat rate of the existing GT-1 and 2 to be based on monitored values of energy input and power output of the machines for at least 2 years of operations prior to start of the project. The baseline determination based on trial run data and design data is not representative of the baseline heat rate of the unit. Heat rates for the two machines to be separately evaluated and emission reduction based on average annual power output of the two machines are to be separately calculated.	CAR-3	OK
E.3.6. Have conservative assumptions been used?		DR/I	For conservative assumption of the baseline emissions the power generated by the gas turbines is to be based on the historical trend of power generation of the units and not on the maximum power that can be generated by the units.	CAR-4	OK
E.3.7. Are uncertainties in the baseline emissions estimates properly addressed?		DR	Yes		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
E.4. Emission Reductions Validation of ex-ante estimated emission reductions.					
E.4.1. Will the project result in fewer GHG emissions than the baseline case?		DR/I	The emission reductions are calculated based on the rating of 20MW of the gas turbines. But as per the technical details on the gas turbines the name plate capacity of the machines is 19.52 MW. Calculation to be done based on 19.52 MW of installed capacity.	CAR-5	OK
F. Environmental Impacts It is assessed whether environmental impacts of the project are sufficiently addressed.					
F.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?		DR/I	The project activity does not fall under the purview of the Environment Impact Assessment notification of the Ministry of Environment and Forests.		OK
F.1.2. Does the project comply with environmental legislation in the host country?		DR/I	The project complies with environmental legislations in India.		OK
F.1.3. Will the project create any adverse environmental effects?		DR/I	The project has no adverse effect on the surrounding environment.		OK
F.1.4. Have environmental impacts been identified and addressed in the PDD?		DR/I	All possible impacts are identified and addressed suitably under the project activity.		OK
G. Comments by Local Stakeholder Validation of the local stakeholder consultation process.					
G.1.1. Have relevant stakeholders been		DR/I	Clarification is requested on the mode of requesting comments from the employees who are the	CL-7	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
consulted?			stakeholders to the project. Clarity is required on the comments received during the employee consultation process.		
G.1.2. Have appropriate media been used to invite comments by local stakeholders?		DR/I	As above	CL-7	OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?		DR/I	No such regulation exists in the host country (India) regarding stakeholders' consultation process.		OK
G.1.4. Is a summary of the comments received provided?		DR/I	As above	CL-7	OK
G.1.5. Has due account been taken of any comments received?		DR/I	As Above	CL-7	OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>CAR 1</p> <p>The IRR of the project activity as well as the baseline scenario is to be presented separately to evaluate the economic attractiveness of the project. IRR based on incremental cost of project is not representative of the economic attractiveness of the project. One of the major out come of the up-rate is the increase in maintenance intervals. The same has to be reflected in the IRR determination of the project</p>		<p>The IRR has been calculated based on the incremental cost associated with uprated component over standard component. The additional cost incurred due to uprated components in comparison with standard component only has been considered to reflect the actual financial scenario of the project activity. In the IRR calculation the savings incurred due to increase in maintenance interval has been taken as a benefit.</p>	<p>Accepted</p> <p>Revised IRR based on incremental cost of components related to the up-rating of turbine presented and found to be in order.</p> <p>CAR 1 is closed.</p>
<p>CAR 2</p> <p>The mechanism for determination of project emissions as in E.1.2.1 is valid for ex-ante determination of the project emissions. But after project implementation the actual heat rate need to be estimated and used in the calculation for determination of emission reduction. Formulae to suitably modified to take into account the actual parameters monitored under the project activity.</p>		<p>Section E.1.2.1 has been revised as per the requirement.</p>	<p>Accepted.</p> <p>Changes incorporated in the revised PDD version-05 and found to be in order.</p> <p>CAR 2 is Closed.</p>
<p>CAR 3</p> <p>The baseline heat rate of the existing GT-1 and 2 to be based on monitored values of energy input and power output of the machines for at least 2 years of operations prior to start of the project. The baseline determination based on trial run data and design data is not representative of the baseline heat rate of the unit. Heat rates for the two machines to be separately evaluated and</p>		<p>In the revised estimation of CER the baseline heat rate has been fixed based on the monitored historical fuel consumption and power generation data for the period of 2003-06.</p>	<p>Accepted.</p> <p>Changes incorporated in the revised PDD version-05 and found to be in order. CAR 3 is Closed.</p>

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
emission reduction based on average annual power output of the two machines are to be separately calculated.			
<p>CAR 4</p> <p>For conservative assumption of the baseline emissions the power generated by the gas turbines is to be based on the historical trend of power generation of the units and not on the maximum power that can be generated by the units.</p>		<p>In the revised estimation of CER the baseline heat rate has been fixed based on the monitored historical fuel consumption and power generation data for the period of 2003-06.</p>	<p>Accepted.</p> <p>Changes incorporated in the revised PDD version-05 and found to be in order.</p> <p>CAR 4 is closed.</p>
<p>CAR 5</p> <p>The emission reductions are calculated based on the rating of 20MW of the gas turbines. But as per the technical details on the gas turbines the name plate capacity of the machines is 19.52 MW. Calculation to be done based on 19.52 MW of installed capacity.</p>		<p>In the revised estimation of CER the baseline heat rate has been fixed based on the monitored historical fuel consumption and power generation data for the period of 2003-06.</p>	<p>Accepted.</p> <p>Changes incorporated in the revised PDD version-05 and found to be in order.</p> <p>CAR 5 is closed.</p>
<p>CL 1</p> <p>As per communication received from BHEL the uprates on the MS5001 P turbines was available only for the last 4 years i.e. from 2002 instant. But the GT-03 which was installed in the year 1998 was with uprated components. Thus the uprates was available from 1998 instant on the machines. Clarification is requested on the availability of uprates on MS5001P machines prior to implementation in the project</p>		<p>GT# 3 model is 5371 PA commissioned in 1997. GT#1 and GT#2 are being upgraded as 5371 P N/T. This technology is available for last 4 years only which has been confirmed by technology supplier. The copy of the official communication received from the technology provider in this matter is provided to the validator.</p>	<p>Accepted.</p> <p>Stakeholder consultation held with representative of the M/s BHEL-GE (supplier of the GT) confirmed that there are technical differences in the turbine built with the up-rated components (MS5001 PA) and retrofit programme for up-rating of MS5001 turbines (MS5001 PN/T). The difference is with regards to the sealing system and the</p>

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
			up-rate technology was available only after 2002. CL 1 is closed.
CL 2 Clarification is requested on the status of the host country approval for the project		The HCA approval has been obtained on 08/08/2006. A copy of the same has been provided to the validator.	Accepted. HCA for the project has been presented and found to be in order. CL 2 is closed.
CL 3 The installation of the emission control systems, replacement of Mark IV control systems and replacement of compressor blades have been identified as a technological barrier for the project. As per documentation received from ONGC it is evident that the emission control system was installed to meet the statutory regulations. Replacement of mark-IV control system was undertaken as it is obsolete and the components are not available. It does not also support emission control system. Communication from the BHEL and the inspection report of GT-1 and GT-2 during the 1st major overhaul reveal that the lifetime of the blades were surpassed and needed replacement. Clarification is requested as to why these measures are cited as technological barrier when it was necessary for continuation of operation of the unit		The arguments related to technological barrier has been modified for the project. Barriers associated with the installations of control system. Blade replacements have been removed in the revised PDD.	Accepted. The barriers related to replacement of control system and blade replacement have been removed in the revised PDD version-05. CL 3 is closed.
CL 4 Documentary evidence of the start date of the project is required.		The project is a future project. Though the actual date of action regarding the start date of the project activity is the tender opening date which	Accepted CL 4 is closed.

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
		is 07/07/2006	
<p>CL 5</p> <p>The installation of the up-rated components on the machine will not only decrease the heat rate by 3.3% but will also increase the output by 10.6%. As per the EB guidance for “treatment of existing and newly built facilities” for any increase of output or lifetime of a facility which is due to the project activity a different baseline shall apply. Clarification is requested as to how this issue is taken care of in the project as there is a corresponding increase in output due to the project activity.</p>		<p>The project activity will claim emission reduction for only reduction in heat rate component. To avoid any additional claim due to 10.6% increase in out put the baseline power generation is used in calculating the emission reduction for the project. This has been incorporated in section E.</p>	<p>Accepted,</p> <p>The revised algorithm for calculation of emission reduction for the project has been presented in the revised PDD version-05 and found to be in order.</p> <p>CL 5 is closed.</p>
<p>CL 6</p> <p>The plan includes monitoring of the calorific value of the natural gas used in the gas turbine. Clarification is requested if the calorific value to be monitored Is “Net” or “gross” calorific value.</p>		<p>The calorific value included in the monitoring plan is “Net calorific value.” Monitoring plan has been suitably modified to reflect the same.</p>	<p>Accepted.</p> <p>The changes have been incorporated in the revised PDD version-05 and found to be in order.</p> <p>CL 6 is Closed.</p>
<p>CL 7</p> <p>Clarification is requested on the mode of requesting comments from the employees who are the stakeholders to the project. Clarity is required on the comments received during the employee consultation process.</p>		<p>ONGC had invited comments from various identified stakeholders and comments received have been submitted to the validator. Over and above a separate notice was circulated to invite comments from the ONGC employees other than officers. No adverse comments were received by ONGC.</p>	<p>Accepted.</p> <p>CL 7 is closed.</p>

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	Yes
CDM Verifier:	Yes	JI Verifier:	Yes
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1,2,3 & 9		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0021	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	Yes	AM0023	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0024	Yes
ACM0004	Yes	AM0027	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0028, AM0034	Yes
ACM0007	Yes	AM0030	Yes
ACM0008	Yes	AM0031	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0032	Yes
AM0006, AM0016, AMS-III.D	Yes	AM0035	Yes
AM0009, AM0037	Yes	AM0038	Yes
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	AM0041	Yes
AM0014	Yes	AM0034	Yes
AM0017	Yes	AMS-II.A-F	Yes
AM0018	Yes	AMS-III.A	Yes
AM0020	Yes	AMS-III.E, AMS-III.F	Yes

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Kumaraswamy Chandrashekara

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	Yes	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 4 & 5		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0021	Yes
ACM002, AMS-IA-D, AM0019, AM0026, AM0029	Yes	AM0023	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0024	Yes
ACM0004	Yes	AM0027	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0028, AM0034	Yes
ACM0007	Yes	AM0030	Yes
ACM0008	Yes	AM0031	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0032	Yes
AM0006, AM0016, AMS-III.D	Yes	AM0035	Yes
AM0009, AM0037	Yes	AM0038	Yes
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	AM0041	Yes
AM0014	Yes	AM0034	Yes
AM0017	Yes	AMS-II.A-F	Yes
AM0018	Yes	AMS-III.A	Yes
AM0020	Yes	AMS-III.E, AMS-III.F	Yes

Høvik, 6 November 2006

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CERTIFICATE OF COMPETENCE

Soumik Biswas

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-
CDMJi-i1

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	--	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	--		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

Subhendu Biswas

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-
CDMJi-i1

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	--	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	--		

Høvik, 6 November 2006

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