



VALIDATION REPORT

**WASTE HEAT RECOVERY FROM
PROCESS GAS COMPRESSORS (PGCs),
MUMBAI HIGH SOUTH (OFFSHORE
PLATFORM) AND USING THE
RECOVERED HEAT TO HEAT PROCESS
HEATING OIL**

REPORT No. 2006-9103-2

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DET NORSKE VERITAS



VALIDATION REPORT

Date of first issue: 2006-09-25	Project No.: 2006-9103-2.
Approved by: Einar Telnes Director	Organisational unit: DNV Certification Ltd, International Climate Change Services
Client: Oil and Natural Gas Corporation (ONGC) Limited	Client ref.: Ashok B. Chakraborty

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Summary:

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the “Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil” project in India. The validation is performed 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 October 13, 2006, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology AMS-II D, version 07. Hence, DNV requests the registration of the “Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil” project as a CDM project activity.

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***Abbreviations***

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH ₄	Methane
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EIA	Environment Impact Assessment
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MSP	Mumbai South Platform
MoEF	Ministry of Environment & Forests
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
ONGC	Oil and Natural Gas Corporation
PDD	Project Design Document
PGC	Process Gas Compressor
UNFCCC	United Nations Framework Convention on Climate Change
WHRU	Waste Heat recovery Unit



1 INTRODUCTION

ONGC has commissioned Det Norske Veritas Certification Ltd. (DNV) to perform a validation of the “Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil” 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 consists of the following personnel:

Mr Subhendu Biswas	DNV, India	Team Leader, CDM Validator.
Mr Vinod Richharia	DNV, India	GHG auditor
Mr C Kumaraswamy	DNV, India	Technical verifier
Mr Einar Telnes	DNV, Oslo	Energy sector expert

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. The validation team has, based on the recommendations in the Validation and Verification Manual /3/ 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 purpose of the project activity is to recover heat from the exhaust flue gases of two process gas compressors (PGC), installed at ONGC's offshore Mumbai South platform (MSP). The MSP is a new platform and the waste heat recovery system has been installed with the process gas compressors. The PGC's are primarily used for compressing the associated gas in crude oil production activities. ONGC has installed waste heat recovery units (WHRU) at each of the PGC exhaust points to heat process oil. This process oil is further used to heat various other process streams in the crude oil production activities. The MSP platform was commissioned in 2005 and



since then operates LP gas compressors to facilitate gas recovery and therefore ensure minimum flaring (for technical reasons only). Therefore it is apparent that no associated gas was being flared at this platform since its start. The project activity involving waste heat recovery (WHR) replaces this quantum of associated gas that would otherwise be used in the natural gas based heaters. In the absence of this project activity, the equivalent quantity of associated gas would either be used for internal consumption or sent to Uran plant for further processing.

The waste heat recovery unit is designed to extract heat from the exhaust flue gases of process gas compressors and further use this to heat the well fluid and glycol re-boiler in the glycol regeneration system. The system includes a hot process oil expansion tank, hot process oil circulation pumps, hot process oil filters, hot process oil dump coolers and well fluid heaters. The recirculation of the hot process oil takes place from the discharge of the hot process oil pump to the waste heat recovery units for charging the heat from the exhaust flue gases. After heat charging the hot process oil the temperature in the WHRU is at 230⁰C. Hot process oil is then circulated through (a) two glycol re-boilers in the glycol regeneration system to heat the glycol solution and (b) well fluid heaters to heat the well fluid. The outlet hot process oil from the heaters and re-boilers is collected back in the header, which is connected to hot process oil expansion tank. The cold hot process oil from this expansion tank is in continuous recirculation.

The total estimated GHG reduction from the project activity of ONGC is expected to be 5 320 tonnes of CO₂ equivalent per year.

2 METHODOLOGY

The validation consists of the following three phases:

- I a desk review of the project design documents
- 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 /3/. 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 “Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil” is enclosed in Appendix A to this report.



VALIDATION 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 5 June 2006) and final version-02 dated 13 October 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

On 29 July 2006, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of ONGC were interviewed. The main topics of the interviews are summarised in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
ONGC, MSP	<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.

2.3 Resolution of Clarification and Corrective Action Requests

The issues identified in DNV's draft validation report of 25 September 2006 (rev 01) were resolved to DNV's satisfaction during communication between 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-02 dated 13 October 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 final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation.

3.1 Participation Requirements

ONGC is the sole project participant. The DNA of India has approved the project on 26th July 2006 /2/. 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. No public funding has been used for the project activity.

The project is expected to contribute to sustainable development by reducing fossil fuel consumption for oil production activities. The DNA of India has provided confirmation that the project assists in achieving sustainable development

3.2 Project Design

The project activity proposes to recover and use the waste heat from PGC exhaust flue gases, through WHRU, which otherwise would have been discharged into the atmosphere. The waste heat recovered by the project activity replaces the use of energy, derived from fossil fuels, which would have been used in the absence of project activity.

The energy efficiency technology installed at ONGC's offshore Mumbai South platform (MSP) accommodates the design of waste recovery unit to extract heat from the exhaust flue gases of process gas compressors and further use this to heat well fluid and glycol re-boiler in the glycol regeneration system. The system includes a hot process oil expansion tank, hot process oil circulation pumps, hot process oil filters, hot process oil dump coolers and well fluid heaters. The exhaust flue gases from PGC, at temperatures of 450-500⁰C, is brought into contact with circulating process oil through a WHRU. The waste heat of exhaust flue gases of PGC is gained by the process oil, which is being circulated from hot oil pumps to the WHRU.

The aggregate energy savings due to the project activity has been determined and verified to be 26.39 GWh. The project design and engineering reflects good practice for the project activity. The expected operational lifetime of the project activity is 20 years and a fixed crediting period of 10 years has been chosen with the starting date of the first crediting period to be 1 February 2007.

3.3 Baseline Determination

The project applies the approved simplified baseline methodology AMS-II D, version-07 for small-scale CDM project activities, titled "Energy efficiency and fuel switching measures for industrial facilities".

The project activity is an energy efficiency project implemented at a single industrial facility. The energy efficiency measure involves installation of two waste heat recovery units aimed primarily at utilizing the waste heat available, thus improving the overall energy efficiency of the



site. The annual thermal energy savings achieved due to the project activity has been demonstrated to be 26.39 GWh_{th} which is less than the stipulated limit of 45 GWh_{th} for small scale projects.

The application of simplified baseline methodology AMS-II.D, version 07, is justified as it is apparent that in the absence of the project activity, all the energy required for heating the process oil (used for other process heating applications), would have been derived from fossil fuels (natural gas) only. The use of fossil fuels for heating purposes results in CO₂ emissions into the atmosphere. Due to the project activity, the energy required for the heating of process oil is supplied through waste heat recovery unit, this results in net decrease in consumption of fossil fuel for the heating of process oil, thereby reducing the net GHG emissions to the atmosphere. The emission reductions are thus estimated based on the heat gained by the process oil through the waste heat recovery unit.

3.4 Additionality

The project's additionality has been demonstrated through the following barrier analysis:

Investment barrier:

The unit cost of service for the WHRU and the natural gas based heater, which would have been used otherwise in the absence of the project activity, has been determined. This has been demonstrated higher at INR 1670/ million kcal for the WHRU as against a cost of INR 340.55/ million kcal for the natural gas based system, thereby establishing an investment barrier for the project activity.

Other Barriers:

ONGC has presented that the alternative to the project activity is a natural gas based heater for the heating application in the plant. This option is deemed credible and realistic, as it is less costly and technologically simpler as compared to WHRU unit. The explanations provided for the barriers include the risk taken by ONGC in terms technological unfamiliarity and risk of stoppage of operations leading to production losses due to the use of the WHRU. Moreover, in case of any problem in the WHRU, the PGC's would have to be stopped in order to avoid overheating of hot oil. Overheating of hot oil results in coke formation in the WHRU heat exchanger therefore would lead to additional maintenance and operational problems in the WHRU. Thus the project activity has the possibility of not giving desired results, leading to loss of production and operational problems especially considering its implementation at offshore location.

It has also been confirmed that the project activity has not been undertaken at any of the other ONGC's sites, thus establishing that the activity is not common practice. As such, this also justifies the technology barrier.

From the aforementioned arguments, it can be concluded that the alternative to the project activity does not face any of the barriers faced by the project activity and hence the emission reductions resulting from the project are therefore 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-07.

The monitoring plan adequately addresses all necessary information for monitoring and reporting of emission reductions due to the project activity. Monitoring of GHG emission reductions due to the project activity will be based on the heat gained by the process heating oil from the waste heat recovery unit. The parameters to be monitored include:

- Flow rate of heating oil (Q_{oil})
- Inlet temperatures of heating (Oil $T_{oil,in}$)
- Outlet temperature of heating Oil ($T_{oil,out}$)
- Running hours per day (H)
- Working days per year (D)
- Specific gravity of heating oil
- Specific Heat of heating oil

There are no project emissions envisaged from the project activity. Based on the IPCC emission factors and monitored data the emission reductions are calculated.

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 project boundary consists of exhaust point of Process Gas Compressors (PGC) and Waste Heat Recovery Unit (WHRU) and gas heater for oil heating. The project will displace an equivalent amount natural gas due to the project activity. The energy recovered by the WHRU in a year is calculated and thereby the baseline emissions for energy saved is determined for natural gas.

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.

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

Major stakeholders identified for the project activity are its employees, the project consultants and equipment suppliers. Comments were invited from the employees of the organisation vide a notice issued on July 14, 2006.

No comments have been reported to be received from any of the stakeholders. As the project is not expected to have any considerable social and environmental impacts, the local stakeholder consultation process carried out for the project is deemed sufficient.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD of 5 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 17 June 2006 to 16 July 2006.

No comment was received.



5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has in the period June 2006 to November 2006 performed a validation of the “Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil” proposed as a small-scale CDM project activity. The validation is performed on the basis of UNFCCC criteria for small-scale CDM project activities, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The project activity involves the installation of waste heat recovery units (WHRU) at each of the PGC exhaust points, and the waste heat is being used to heat process oil which is further used to heat various process streams in the crude oil production activities.

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 45 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-07.

An analysis of the presented barriers demonstrates that the proposed project activity 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.

By displacing an equivalent amount of natural gas due to the project activity, the project is expected to result in annual emissions reductions of 5 320 t of CO₂ over the crediting period of 10 years that are real, measurable and give long-term benefits to the mitigation of climate change.

In summary, it is DNV Certification’s opinion that the “Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil” project, as described in the PDD of October 2006, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology for category II.D small-scale CDM project activities. DNV Certification thus requests the registration of the “Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil” as a CDM project.



REFERENCES

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

- /1/ Project design document “Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil” Version-01 dated 5 June 2006 and final version-02 dated 13 October 2006
- /2/ Approval letter from government of India, Ministry of Environment & Forests dated 26th July 2006.

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

- /3/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /4/ 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 07: 28th November 2005

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

- /3/ A B Chakraborty – GM, ONGC

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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	The project has been proposed as a unilateral project	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	OK	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	CAR 1	LOA has been issued by the DNA of India on 26 July 2006.
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	CL 2	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	The project is proposed as a unilateral project.

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	DNA of India: National Clean Development Mechanism Authority, 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	India ratified Kyoto Protocol on 26 August 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	Annex I Party has not been identified yet	The project is being proposed as a unilateral 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	As Above	The project is being proposed as a unilateral project.
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
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	OK
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 A.1.3, B and D

Requirement	Reference	Conclusion	Cross Reference/ Comment
15. Comments by local stakeholders are invited, and a summary of these provided	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22b	OK	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
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 be made publicly available on www.dnv.com/certification/climatechange and Parties, stakeholders and NGOs will through the CDM website be invited to provide comments during the 30 day period from 17 June 2006 to 16 July 2006. No comments were received.

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?	/1/	DR, I	The project activity recovers heat from the exhaust flue gases of two 'Process Gas Compressors' (PGC), (used for compressing the associated gas in crude oil production activities), installed at ONGC's offshore Mumbai South platform (MSP). Yes, the project qualifies as a small scale CDM project Type II (Energy efficiency improvement project), Category D (Energy efficiency and fuel switching measures for industrial facilities). It is claimed that the total thermal energy saving of 43.3 GWH/year does not exceed the stipulated 45 GWH/year for the project category. This shall be justified .	CL-4	OK
A.1.2. The small scale project activity is not a debundled component of a larger project activity?	/1/	DR	No similar projects under the same project proponent are registered in the previous 2 years, Neither are there any other projects under the same category / technology with project boundary within 1 km of this project activity , thus this project is not a debundled component of a large project.		OK
A.1.3. Does proposed project activity confirm to one of the project categories defined for small scale CDM project activities?	/1/	DR	The Project conforms to Type II (Energy efficiency improvement project), Category D (Energy efficiency and fuel switching measures for industrial		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			facilities).		
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?	/1/	DR, I	The project facility is located in the existing premises of ONGC's offshore Mumbai South Platform (MSP), near Mumbai seashore, Maharashtra, India.		OK
A.2.2. Are the project's system (components and facilities used to mitigate GHG's) boundaries clearly defined?	/1/	DR	The project boundary includes the process gas compressors 1 and 2, and the waste heat recovery unit at Mumbai High South platform.		OK
A.2.3. Does the project design engineering reflect current good practices?	/1/	DR	Yes, the project design engineering reflects good practices for extraction of heat from the exhaust flue gases of process gas compressors that is further used to heat well fluid and glycol re-boiler in the glycol regeneration system industry. The system includes hot process oil expansion tank, hot process oil circulation pumps, hot process oil filters, hot process oil dump coolers and well fluid heaters		OK
A.2.4. Will the project result in technology transfer to the host country?	/1/	DR	No transfer of technology is envisaged, as the same is available indigenously in India.		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?	/1/	DR	Though not specifically addressed in the PDD, this is not considered essential as operational philosophy of the project activity is similar and familiar to ONGC.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
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?	/1/	DR	Yes, the proposed project is providing benefits such as generating employment during construction of the project, ensuring environmental wellbeing and contributing towards resource and energy conservation.		OK
A.3.2. Will the project create any adverse environmental or social effects?	/1/	DR	The project is unlikely to create any adverse environmental or social effects, as this involves the use of waste heat from the process gas compressor exhaust to heat up oil.		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	Approval from the DNA of India shall be provided to demonstrate that the project is in line with the with sustainable development policies of India.	CAR-1	OK
A.3.4. Is the project in line with relevant legislation and plans in the host country?	/1/	DR	The proposed project is a voluntary initiative by ONGC. There are no regulatory requirements related to implementation of waste heat recovery systems.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
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?	/1/	DR	Yes. The selected baseline methodology is one of the simplified baseline methodologies proposed for the small-scale project, Type II for “Energy efficiency improvement projects” sub category D “Energy efficiency and fuel switching measures for industrial facilities”.		OK
B.1.2. Is the baseline methodology applicable to the project being considered?	/1/	DR	As the energy efficiency measure involves installation of two waste heat recovery units aimed primarily to utilize the waste heat available and thereby improving the overall energy efficiency of the site, the base line methodology is considered applicable. The energy savings of the project are within the limit of 45 GWh _{th} per year as stipulated in the baseline methodology.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
B.2. Baseline Determination It is assessed whether the project activity itself is not a likely baseline scenario and whether the selected baseline represents a likely baseline scenario.					
B.2.1. Is it demonstrated that the project activity itself is not a likely baseline scenario due to the existence of one or more of the following barriers: investment barriers, technology barriers, barriers due to prevailing practice or other barriers?	/1/	DR, I	<p>The additionality of the project has been demonstrated through the technological barrier; by comparing the risks associated with the project activity and two other alternatives that ONGC could have opted for. The alternatives are:</p> <p>Alternative 1: Electrical heating of heating oil by withdrawing power from captive power plant</p> <p>Alternative 2: Natural gas based heater</p> <p>The argument that the two alternatives to the project activity do not face any operational or technical barriers and involve investment costs are deemed acceptable.</p> <p>It has been presented that the project activity is:</p> <ul style="list-style-type: none"> • Is the first of its kind in India and is therefore not common practice • Involves higher operational and maintenance costs • the controls and instrumentation are linked to the main PGC's and any downtime/ malfunction of the WHR would lead to production losses <p>Thus the potential risks due to operation and maintenance are justified.</p> <p>However, while the two alternatives identified are</p>	CL-2	OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			use of electricity and natural gas for heating oil; argument to select WHR needs to be justified to demonstrate that in the absence of WHR, ONGC would have continued with one of the two alternatives.		
B.2.2. Is the application of the baseline methodology and the discussion and determination of the chosen baseline transparent and conservative?	/1/	DR	Yes, the methodology has been chosen and applied in a transparent and conservative manner. The baseline scenario selected is the use of natural gas for heating purposes.		OK
B.2.3. Are relevant national and/or sectoral policies and circumstances taken into account?	/1/	DR	There are no current specific policies on installation of WHRU at offshore platforms.		OK
B.2.4. Is the baseline selection compatible with the available data?	/1/	DR	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?	/1/	DR	In the absence of the project activity the baseline scenario is the continued use of natural gas for heating purposes.		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?	/1/	DR, I	Yes the project starting date is June 2005 and the expected operational life time is 20 years.		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 renewal)?	/1/	DR	Fixed crediting period of 10 years has been chosen starting from 2006-12-01.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
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?	/1/	DR, I	Yes, The monitoring methodology – in accordance with Category II.D. contained in Appendix B of the simplified M&P has been adopted.		OK
D.1.2. Is the monitoring methodology applicable to the project being considered?	/1/	DR	Yes. The project involves installation of two waste heat recovery units to recover heat from the process gas compressors, which otherwise would have been vented to the atmosphere, and using recovered heat for process heating will lead improved energy efficiency, thereby reducing the consumption of fossil fuel based energy at the offshore platform of ONGC.		OK
D.1.3. Is the application of the monitoring methodology transparent?	/1/	DR	Yes, the application of the monitoring methodology is simple and transparent.		OK
D.1.4. Will the monitoring methodology give opportunity for real measurements of achieved emission reductions?	/1/	DR	Yes. Monitoring of GHG emission reductions due to project activity will be based on the heat gained by the process heating oil from the waste heat recovery unit. Based on the IPCC emission factors and monitored data the emission will be calculated.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
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 greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR	The monitoring plan provides for monitoring of relevant data such as oil flow, inlet and out let temperatures of heating oil, running hours per day and working days per year.		OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR	Yes.		OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR	Yes.		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/1/	DR	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?	/1/	DR	The project does not include any equipment transfer hence no leakage has been considered.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
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?	/1/	DR,	Yes, the baseline indicators have been chosen in line with the small-scale methodologies approved by the CDM EB. It is the energy recovered by the BHRU		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	Yes.		OK
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	Yes.		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?	/1/	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?	/1/	DR, I	DGM (Production) is mainly responsible for project management. Chief Engineer (Electrical) and Shift Engineer will be responsible for data collection related to GHG emissions.		OK
D.5.2. Is the authority and responsibility for registration monitoring measurement and reporting clearly described?	/1/	DR	Authority and responsibility for registration monitoring measurement and reporting have been described.		OK
D.5.3. Are procedures identified for training of	/1/	DR	Procedures for training have not been indicated in		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
monitoring personnel?			the PDD. However ONGC has in place a QMS / EMS which adequately cover the training for the monitoring personnel.		
D.5.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	Procedures for emergency have not been indicated in the PDD. However ONGC has in place a QMS / EMS which adequately cover procedures for emergency preparedness.		OK
D.5.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	Procedures for calibration of monitoring equipment have not been indicated in the PDD. However ONGC has in place a QMS / EMS which adequately cover procedures for calibration of monitoring equipment.		OK
D.5.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	Same as D.5.5		OK
D.5.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	Same as D.5.5		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)	/1/	DR	Retention period of the records generated and maintained have not been clearly addressed.	CL-3	OK
D.5.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR	As ONGC has in place a QMS / EMS system which adequately cover for procedures, this is considered acceptable.		OK
D.5.10. Are procedures identified for internal audits of GHG project compliance with operational requirements as applicable?	/1/	DR	Same as D.5.9		OK
D.5.11. Are procedures identified for project performance reviews?	/1/	DR	Same as D.5.9		OK
D.5.12. Are procedures identified for corrective actions?	/1/	DR	Same as D.5.9		OK

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

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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?	/1/	DR, I	No project emissions are envisaged due to the project activity.		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?	/1/	DR, I	No leakage is envisaged from the project activity.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
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?	/1/	DR, I	The baseline emissions are defined in accordance with Type II.D in the CDM small-scale methodology scheme. It is the energy recovered by the BHRU.		OK
E.3.2. Are all aspects related to direct and indirect baseline emissions captured in the project design?	/1/	DR	All the emission sources have been captured in the project design.		OK
E.3.3. Have all relevant greenhouse gases and sources been evaluated?	/1/	DR	Yes.		OK
E.3.4. Do the methodologies for calculating baseline emissions comply with existing good practice?	/1/	DR	Detailed calculations shall be provided	GL-4	OK
E.3.5. Are the calculations documented in a complete and transparent manner?	/1/	DR	Yes.		OK
E.3.6. Have conservative assumptions been used?	/1/	DR	Yes		OK
E.3.7. Are uncertainties in the baseline emissions estimates properly addressed?	/1/	DR	No uncertainties are foreseen.		OK
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?	/1/	DR	The project activity is expected to result in 53 200 t CO ₂ emission reductions during the ten year		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
			crediting period		
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?	/1/	DR, I	Indian legislation does not warrant an analysis of environmental impacts for projects such as the project activity by ONGC.		OK
F.1.2. Does the project comply with environmental legislation in the host country?	/1/	DR	Yes.		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	No adverse environmental impacts are expected from this project.		OK
F.1.4. Have environmental impacts been identified and addressed in the PDD?	/1/	DR	No major environmental impacts are expected to occur due to the project activity.		OK
G. Comments by Local Stakeholder Validation of the local stakeholder consultation process.					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR, I	The following is not clear: <ul style="list-style-type: none"> Who are the stakeholders consulted? When was consultation carried out and how? 	CL-5	OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	As in G.1.1	CL-5	OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host	/1/	DR	Indian regulation does not require stakeholder consultation for projects such as the project activity.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?					
G.1.4. Is a summary of the comments received provided?	/1/	DR	Summary of the comments received from stakeholders is not provided.	CL-5	OK
G.1.5. Has due account been taken of any comments received?	/1/	DR	Same as G.1.4	CL-5	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
CAR 1: Approval from the DNA of India shall be provided to demonstrate that the project is in line with the with sustainable development policies of India.	A.3.3	DNA approval has been received and same is submitted.	The approval is evidenced and accepted. The CAR 1 is closed
CL 1: It is claimed that the total thermal energy saving of 43.3 GWH/year does not exceed the stipulated 45 GWH/year for the project category. This shall be justified.	A.1.1	In the revised PDD instead of design data, CER calculation has been performed based on the average of last three months actually monitored operational data. In the revised calculation the net annual savings comes out to be 26.39 GWH which is well below the cap of 45 GWH.	The change in PDD is evidenced and accepted. CL 1 is closed
CL 2: While the two alternatives identified are use of electricity and natural gas for heating oil; argument to select WHR needs to be justified to demonstrate that in the absence of WHR, ONGC would have continued with one of the two alternatives.	B.2.1	Unit cost of service is now calculated and included in the PDD which clearly demonstrated that the natural gas option is coming out to be cheaper than waste heat option in absence on CDM funds. So, ONGC would have continued the use of alternatives in absence of CDM.	The NG option to be cheaper alternative is demonstrated and accepted. CL 2 is closed
CL 3: Retention period of the records generated and maintained have not been clearly addressed.	D.5.8	Data will be archived for entire crediting period+2 years. The same has been corrected in PDD.	The change in PDD is evidenced and accepted. CL 3 is closed
CL 4: Detailed calculations shall be provided.	E.3.4	Detailed calculation with all the baseline data has been given with this DVR.	The baseline information is provided and accepted.

Draft report corrective action requests and requests for clarification	Ref. to Table 2	Summary of project participants' response	Final conclusion
			CL4 is closed.
CL 5: The following shall be addressed: - Who are the stakeholders consulted? - When was consultation carried out and how? - Summary of the comments received?	G.1.1, 1.4	As the project is at offshore location, so there are no local stakeholders apart from employees. ONGC has invited comments from its employees by putting up a notice at offshore platform and communicated orally with the employees. Summary of the comments is now included in revised PDD. Copy of the circular inviting comments from the employee is also being provided.	The circular was verified and accepted. CL 5 is closed.

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APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Einar Ternes

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:	Yes
CDM Verifier:	Yes	JI Verifier:	Yes
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1,2,3,6 & 10		
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

Einar Ternes
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-CDMJi-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-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

Subhendu Biswas

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:	--	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	--		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

Vinod Richharia

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

GHG Auditor:	Yes		
CDM Validator:	--	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
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