



VALIDATION REPORT

SWITCHING OF FUEL FROM LOW SULPHUR WAXY RESIDUE FUEL OIL TO NATURAL GAS AT GANGNAM BRANCH KOREA DISTRICT HEATING CORPORATION

REPORT No. 2006-1853

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DET NORSKE VERITAS



VALIDATION REPORT

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Approved by: Einar Telnes Director	Organisational unit: DNV Certification, International Climate Change Services
Client: Korea District Heating Corporation	Client ref.: Mr. Jae-Hoon Chung

DET NORSKE VERITAS
CERTIFICATION LTD

Palace House
3 Cathedral Street
London SE19DE
United Kingdom
Tel: +44 (0)20 7357 6080
Fax: +44 (0) 20 7407 1239
<http://www.dnv.com>

Summary:

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the “Switching of fuel from Low Sulphur Waxy Residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation” project in the Republic of Korea 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 and the subsequent decisions by the CDM Executive Board.

The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan, 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 08 November, 2006, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology *ACM0009*. Hence, DNV requests the registration of the “Switching of fuel from Low Sulphur Waxy Residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation” project as a CDM project activity.

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Report title: Switching of fuel from Low Sulphur Waxy Residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation			
Work carried out by: Santhosh Jayaram, Kim Young-Keun, Buddika Hemashantha, Michael Lehmann			
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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
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
KDHC	Korea District Heating Corporation
LSWR	Low Sulphur Waxy Residue fuel oil
MP	Monitoring Plan
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change



1 INTRODUCTION

Korea District Heating Corporation (KDHC) has commissioned Det Norske Veritas Certification Ltd. (DNV) to perform a validation of the “Switching of fuel from Low Sulphur Waxy Residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation” project (hereafter called “the project”) in the Republic of Korea. This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for 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. Santhosh Jayaram	DNV Certification Sri Lanka	Team Leader and CDM validator
Mr. Kim Young-Keun	DNV Certification Korea	GHG auditor
Mr Buddika Hemashantha	DNV Certification Sri Lanka	GHG auditor
Mr Michael Lehmann	DNV Certification, Norway	Sector Expert
Mr Einar Telnes	DNV Certification, Norway	Technical Reviewer

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) and additional information provided or sourced in order to determine that the project meets the requirements for the CDM. The project documentation is reviewed the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures, the simplified modalities and procedures for small-scale CDM project activities and the relevant decisions by the CDM Executive Board.. The validation team has, based on the recommendations in the Validation and Verification Manual /4/, and employed a risk-based approach, focusing on the identification of significant risks for the project's eligibility under the CDM and for project performance.

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 consist of the conversion from low sulphur waxy residue fuel oil (LSWR) to natural gas at Suseo heat source facility, Gangnam branch, Korea District Heating Corporation (KDHC). The project is developed, financed and implemented by KDHC. In the project activity,



the existing four LSWR heat only boilers would be replaced by three natural gas heat only boilers until the end of 2007.

KDHC was established in November 1985 by the Korea Government. KDHC Gangnam branch is located at Suseo-Dong, Gangnam-Gu, Seoul, Korea. KDHC Gangnam branch has been in operation since 1992 and produced and supplied heat to Gangnam-Gu, Seocho-Gu, SongPa-GU in Seoul.

The project activity primarily aims at reducing greenhouse gas and producing heat by replacing fuel from LSWR to natural gas, which is a cleaner fuel than LSWR. As a result of the fuel switch it is estimated that emissions of 34703 tons CO_{2e}/annum will be mitigated. The project has the capacity to reduce 347 030 tons of CO₂ equivalents over a 10 year time frame.

The starting date of the crediting period will be 01 January 2008.

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.

This draft validation report summarises the findings after phase I and II of the validation.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /4/. 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 “Switching of fuel from Low Sulphur Waxy Residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation” project 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 initial Project Design Document (PDD) of 28 August 2006 /1/ and updated version of 1.2 of 8 November, 2006 submitted by KDHC as well as additional background calculations /2/ related to the project design and baseline were assessed in the initial stage of the project and during the validation.

2.2 Follow-up Interviews

Follow-up interviews were performed on 19 April 2006 in Korea with representatives from KDHC. The main topics of the interviews are summarised in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
KDHC	<ul style="list-style-type: none"> ➤ Technology applied and operational lifetime ➤ Provisions for training, operation and maintenance ➤ Monitoring and reporting procedures ➤ Additionality ➤ Baseline methodology ➤ Estimated emission reductions and emission factors applied ➤ Stakeholder consultation process and environmental impacts ➤ Legal compliance

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve any outstanding issues which needed to be clarified for DNV's positive conclusion on the project design. The initial validation identified one *corrective action request* and eight requests for *clarification*. The corrective action requests and requests for clarification were presented to the project participants in DNV's draft validation report of 06/11/2006 (rev. 1.02) and resolved during communications between the Client and DNV. To guarantee the transparency of the validation process, the concerns raised and responses given are documented in the validation protocol in Appendix A.

Since modifications to the project design were necessary to resolve DNV's concerns, the Client decided to revise the PDD and resubmitted the PDD (Version 1.02, 08/11/2006). After reviewing the revised PDD, DNV issued this final validation report and opinion

3 VALIDATION FINDINGS

In the following sections the findings of the validation are stated. 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.

3.1 Participation Requirements

The project participants are Korea District Heating Corporation (KDHC). The Party involved, i.e. Republic of Korea as host Party meets the requirements to participate in the CDM. The project is approved by the DNA of Korea. No Annex I Party is yet identified.



3.2 Project Design

The project activity primarily aims at producing heat by replacing fuel from LSWR to natural gas. The existing four LSWR heat only boilers at the KDHC Gangnam branch facility would be replaced by three natural gas heat only boilers.

Each of the three new boilers will have a capacity of 103.2 Gcal/hour, operating at 16 kg/cm² pressure. The fuel used will be liquefied natural gas.

The technology applied is deemed current good practice and is not expected to be replaced within the crediting period. The project will have all inherent benefits of utilising LNG in place of LSWR and will result in reduction in emission in terms of SPM, SO₂, NO_x etc.

Starting date of the project is 1 November 2007, i.e. the planned operational start date. The operational lifetime of the project is estimated to be 25 years and a fixed crediting period of 10 years starting on 1 January 2008 is selected.

The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards Korea.

3.3 Project Baseline

The project applies the approved consolidated baseline methodology ACM0009 Version 03, titled "Consolidated baseline methodology for fuel switching from coal or petroleum fuel to natural gas".

The consolidated baseline methodology is applicable to the project activity since the fuel switching is undertaken in processes for heat generation that are located at and directly linked to a district heating system by means of heat-only boilers.

The appropriateness is justified addressing the applicability criteria's under ACM0009, Version 03:

- Prior to the implementation of the project activity, only Low Sulphur Waxy Residue (but no natural gas) have been used in the heat production process;
- The local regulations/programs do not constrain the facility from using LSWR;
- Regulations do not require the use of natural gas or any other fuel in the element process.
- The project activity does not increase the capacity of final outputs and lifetime of the existing facility during the crediting period. The existing boilers will have a lifetime more than the 10 year crediting period;
- The proposed project activity does not result in integrated process change;

The most plausible baseline scenario is determined using the 4 step process under ACM 0009, version 3.

Step 1: Identify all realistic and credible alternatives for the fuel use in the element process

There are 6 scenarios identified which represent realistic and credible alternatives. These are:

- Continuing the current practise with and without installation of pollution control equipments,
- Switching to a different fuel such as biomass,



- The project activity with and without a NO_x reduction facility not undertaken under CDM and
- Switching to natural gas at a future point during the crediting period.

Step 2: Eliminate alternatives that are not complying with applicable laws and regulations.

The alternatives of continuing the current practise without installation of pollution control equipments and the project activity without NO_x reduction facility can result in non compliance of the regulations which are being introduced in 2007 and 2008 and are as a result eliminated.

Step 3: Eliminate alternatives that face prohibitive barriers

It is established that the alternative of switching to a different fuel such as biomass face prohibitive barriers due to availability and also considering the capacities of the boilers.

Step 4: Compare economic attractiveness of remaining alternatives

The remaining 3 alternatives are examined for economic attractiveness through a NPV analysis and established that the alternative of continuing the current practise with installation of pollution control equipments will be the most attractive alternative and hence chosen as the baseline.

All of the above have been verified during the site visit. Given this, it is sufficiently demonstrated that the project is not a likely baseline scenario.

In terms of the lifetime of the existing boilers being more than the 10 year, the asset records of KDHC were assessed. These state that in 2005, the existing boilers and accessories had a estimated remaining life of 30 years.

3.4 Additionality

The additionality of the project is demonstrated using the 3 step process under ACM 0009 version 3.

Step 1: Investment and sensitivity analysis

The investment analysis of 3 scenarios which are plausible alternatives is carried out through a NPV analysis and the sensitivity of the analysis is tested. The NPV analysis results indicate a negative NPV for the project and also demonstrates that it is the least financially attractive alternative. This substantiates the existence of a financial barrier.

Step 2: Common practice analysis

By a comparison of district heating facility producing only heat such as in the proposed project activity it is evidenced that all these facilities mainly use LSWR and kerosene, LNG is used as peak load reserve or in small scale facility. Hence it is demonstrated that the proposed project for completely switching from LSWR to LNG is not a common practice for a similar capacity of heat only boiler.

Step 3: Impact of CDM registration

It is demonstrated through the negative NPV and being the least financial attractive alternative of 3 plausible alternatives, that the project would not occur in the absence of CDM benefits.



Since the project satisfies all 3 steps of the test, the project is considered additional.

3.5 Monitoring Plan

The project applies the approved consolidated monitoring methodology ACM0009 Version 03, titled “Consolidated monitoring methodology for fuel switching from coal or petroleum fuel to natural gas”.

The chosen monitoring methodology is applicable to the proposed project activity as the project aims to switch fuels – from low sulphur wax residue fuel oil to natural gas.

The monitoring plan adequately addresses all necessary information for monitoring and reporting of emission reductions due to the project activity. The NCV value for the baseline fuel as well as natural gas will be used as defined in the “Energy policy law” or “Annual Energy Statistic Report” published by the Korean Ministry of Commerce, Industry and Energy. Fuel efficiencies are estimated using a representative load factor of 100%, and a justification for the same is provided.

The project also include monitoring of environmental indicators other than GHG emissions

Procedures are also identified for dealing with possible monitoring data adjustments and uncertainties.

3.6 Calculation of GHG Emissions

Details of direct and indirect emissions are adequately discussed. The calculations and their derivative formulas are referenced to internationally recognised IPCC standards. The GHG emissions are made up of:

- carbon dioxide emissions (CO₂),
- methane (CH₄) and
- fugitive CH₄ emissions associated with natural gas transport, distribution and production.
- CO₂ emission due to fossil fuel combustion/ electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system.
- fugitive CH₄ emissions associated with LSWR production.

Total CH₄ emissions (from combustion and fugitive emissions) are converted to equivalent CO₂ emissions using GWPs as agreed for the first commitment period of the Kyoto Protocol.

3.7 Environmental Impacts

The environmental impacts have been assessed. Considering the nature of the project, there are no significant adverse environmental impacts expected. The host country legislation does not require an EIA study for the project considering the nature and scale of project.



3.8 Comments by Local Stakeholders

The stakeholders and local residents were consulted through 4 public hearings. Comments were also invited from stakeholders and experts through a questionnaire. The summary of comments was verified and no adverse comments found.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD (Version 1.00, dated 28 August 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 30 August 2006 to 28 September 2006. No comments were received.



5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the “Switching of fuel from Low Sulphur Waxy Residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation Project” at Suseo heat source facility, Gangnam branch, Korea District Heating Corporation (KDHC), Republic of Korea towards 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 and the subsequent decisions by the CDM Executive Board.

The validation consisted of the following three phases: i) a desk review of the project design documentation (August-October 2006), ii) follow-up interviews with project stakeholders (April 2006) and iii) the resolution of outstanding issues and the issuance of the draft validation report and opinion (November 2006). The validation of the initial project design documentation raised several minor issues and changes to the documentation were provided in an updated project design document.

The project correctly applies ACM0009 (Version 3) and the determination of the baseline is transparent. There are no local regulations/programs that constrain the project. An investment comparison analysis of the project without CER revenues sufficiently demonstrated that the project would not occur in the absence of CDM benefits and that emission reduction attributable to the project are thus additional.

By the switching of fuel from low sulphur waxy residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation, the project results in the reduction of CO₂ emissions that are real, measurable and give long-term benefits. The project is likely to achieve the estimated amount of emission reductions stated in the PDD version 1.02.

The key parameters for determining baseline emissions, project emissions, leakages and thus emission reductions are monitored.

The total emission reductions from the project are estimated to be on the average 34703 tCO₂e per year over the selected 10 year crediting period. The emission reduction forecast has been checked and is deemed likely that the state 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 “Switching of fuel from Low Sulphur Waxy Residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation Project” in the Republic of Korea, as described in the PDD of date 08 November, 2006 (Version 1.02), meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM 0009. DNV thus requests the registration of the project as a CDM project activity.



REFERENCES

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

- /1/ Eco-Frontier Co.: CDM-PDD for *Switching of fuel from Low Sulphur Waxy Residue fuel oil to natural gas at Gangnam branch Korea District Heating Corporation Project*, Version 1.00, 28 August 2006.
Version 1.02, 08 November 2006.
- /2/ Eco-Frontier Co.: Calculation work sheets – KDHC_Emission_Reductions_Ver100.xls
- /3/ Host country approval letter.

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

- /4/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /5/ CDM Executive Board: ACM0009 Consolidated baseline methodology for "fuel switching from coal or petroleum fuel to natural gas" Version 03, 28 July 2006
- /6/ IPCC: Revised 1996 IPCC guidelines for national green house gas inventories – Reference Manual (Volume 3)

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

- /7/ Interview on 19 April 2006
 - 1. Mr. JAE-HOON CHUNG, Manager of Fuel Policy Department, Korea District Heating Corp.(KDHC)
 - 2. Mr. Tak Son, Manager, Environmental Operation, Korea District Heating Corp.(KDHC)
 - 3. Mr. KWANG HEE JIN, Team Manager of Operation Team II Asst. Manager, Korea District Heating Corp.(KDHC)

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirements for 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	N/A	Table 2, Section E.4.1 No annex 1 Party yet identified
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, CDM Modalities and Procedures §40a	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, CDM Modalities and Procedures §40a	OK	
5. The emission reductions shall 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
6. Reduction in GHG emissions shall 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. 12.5c, CDM Modalities and Procedures §43	OK	Table 2, Section B.2
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 result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK	No annex 1 Party yet identified.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	Republic of Korea: Environment Cooperation Division, Ministry of

Requirement	Reference	Conclusion	Cross Reference / Comment
			Foreign Affairs and Trade.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	Republic of Korea ratified the protocol on 8 November 2002. Annex I party has not been identified yet.
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.
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	---	Annex I party has not been identified yet.
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section E
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK	Table 2, Section D
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	CDM Modalities and Procedures §37e	OK	Table 2, Section B.1.1 and D.1.1
15. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP	CDM Modalities and Procedures §37f	OK	Table 2, Section D
16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	CDM Modalities and Procedures §40	OK	The PDD version 1.00 was published on DNV's climate change website and comments by Parties, stakeholders and NGOs were invited through the UNFCCC CDM website in the period 2006-08-30 to 2006-09-28. No comments were received.

Requirement	Reference	Conclusion	Cross Reference / Comment
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	OK	

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A. General Description of Project Activity <i>The project design is assessed.</i>					
A.1. Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/ /7/	DR I	Yes, it is defined. The project boundaries are defined and limited to Suseo heat source facility in KDHC Gangnam Branch located at Suseo-Dong, Gangnam-Gu, Seoul.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	The project system boundaries are limited to three natural gas heat-only-boilers which generate hot water and supplementary installations — stack, burner, gas static pressurer, pipeline and heat care facility.		OK
A.2. Technology to be employed <i>Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i>					
A.2.1. Does the project design engineering reflect current good practices?	/1/ /7/	DR I	Yes, The project consists of 3 boilers, each of 103.2 Gcal/hr capacity, working at 16 kg/cm2 with efficiency not less than 86%. The efficiencies are verified based on internal technical review report and the	CL-1	OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			purchasing contract between KDHC and supplier (July 20, 2005). However, a benchmark comparison of boilers using NG was not available to substantiate the claim that project reflects current good practices.		
A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/ /7/	DR I	It is not clear in the PDD as well as through the interviews conducted during site visits whether the project uses state of the art technology or would the technology result in a significantly better performance than any commonly used technologies. A comparison of technologies currently in use shall be presented to make a judgement on this.	CL-2	OK
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR	No. It presently does not seem likely.		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/	DR	Yes, Since it will be new boilers with different fuel and different controls, the project require extensive initial training and maintenance efforts in order to work as presumed during the project period.		OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/ /7/	DR I	Yes, the project has made provisions for training and maintenance needs.		OK
A.3. Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i>					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/ /7/	DR I	The project is approved by Ministry of Commerce, Industry and Energy under the		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			relevant legislation and plans of the country.		
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/ /7/ /3/	DR I	Written confirmation that the project meets the host country specific CDM requirements and assists in achieving sustainable development has not yet been obtained.	CAR-1	OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/ /3/	DR	Yes, as confirmed by the host country approval letter.		OK
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project will have all inherent benefits of utilising LNG in place of LSWR. But quantification of the reduction in emission in terms of SPM, SO ₂ , NO _x etc. was not available for verification.	CL-3	OK
B. Project Baseline					
<i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
B.1. Baseline Methodology					
<i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?	/1/ /5/	DR	Yes, the project applies the approved baseline methodology ACM0009. (Version 03, 28 July 2006).		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/ /5/	DR	The appropriateness is justified addressing the applicability criteria's under ACM0009. - Prior to the implementation of the project activity, only Low Sulphur Waxy Residue (but not natural gas) have been used in the heat		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			production process; - The Local regulations/programs do not constrain the facility from using LSWR; - Regulations do not require the use of natural gas or any other fuel in the element process. - The project activity does not increase the capacity of final outputs and lifetime of the existing facility during the crediting period. The existing boilers will have a lifetime more than the 10 year crediting period; - The proposed project activity does not result in integrated process change.		
B.2. Baseline Determination <i>The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.</i>					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/ /5/	DR	Yes		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/	DR	Yes. The key assumption in determining the baseline scenario of the project activity is that continuity of LSWR fuel till end of the current equipment lifetime, without retrofits.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			According to the local regulation, there is no regulation restricting usage of LSWR. Other assumptions are related to the emission factors used in order to estimate greenhouse gas emissions in the baseline scenario. Considering there is no available local data on such factors, IPCC values are used.		
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	Yes.		OK
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes. It does consider the national policies and regulations. The project considers the Special Act on Metropolitan Air Quality Improvement, all installations whose annual emissions are over 30 tons of NO _x or 20 tons of SO ₂ , 1.5 tons of particles will be regulated by cap and trade scheme after July 2007. But the Act does not regulate using fuel type. It also considers the Seoul metropolitan ordinance "Standards for permitting air pollution emission" prescribed the standard for permitting nitrogen oxide emissions regarding power generation facilities, facilities which using boilers etc. in Seoul. But that ordinance does not regulate using LSWR fuel oil or enforce using natural gas.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	Yes.		OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or	/1/	DR	Yes, the project would have used LSWR for the period.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
discussed scenarios?					
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/ /7/	DR I	Net present value (NPV) calculation of the project shows a negative NPV. The appropriateness of the discount rate is not justified. The use of 3-year corporate bond (AA-) circulation profit rate by the end of year 2005 is not justified. Clarifications are requested on the methodology of estimating the residual value of equipment. Clarifications are also requested as to whether the cap and trade scheme under the special act will have an impact on the NPV calculation.	CL-4	OK
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	No major risks envisaged to the baseline.		OK
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	Yes		OK
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	/1/ /7/	DR I	The project starting date is 01/11/2007. According to the basic design description of this project (June, 2005), verified at site, the project will start operation on 01/11/2007.		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	The crediting period is fixed. A crediting period of 10 years with a starting date of 1/01/2008 is selected.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D. Monitoring Plan <i>The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).</i>					
D.1. Monitoring Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board?	/1/ /5/	DR	Yes, Monitoring methodology ACM0009 Version 03 – Consolidated monitoring methodology for fuel switching from coal or petroleum fuel to natural gas.		OK
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/ /5/	DR	The chosen monitoring methodology is applicable to the proposed project activity as the project aims to switch fuels – from Low Sulphur Wax Residue fuel oil to natural gas.		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/ /5/	DR	Fuel efficiencies are estimated using a representative load factor of 100%, but the justification of the same is not provided.	CL-5	OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	Yes		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.2. Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
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/ /5/	DR	Yes, all relevant data is included in monitoring.		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. KDHC will be monitoring both the total natural gas consumption as well as quantity consumed in each boiler.		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/1/	DR	Yes, but the expected natural gas consumption calculation is incorrect on page 33 and 34 of the PDD. The value should be 112 810 471 rather than 112 810 463.	CL-6	OK
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/	DR	Yes.		OK
D.3. Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/ /5/	DR	Yes. The monitoring includes quantity of project and baseline fuel and the respective emission factors. The parameters of calorific value of the		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			transportation fuel is not monitored in the project as the natural gas will be transported through pipelines, and in baseline it is not monitored and assumed zero for making the leakage calculation conservative. The leakage is estimated using the sum of leakage emissions due to fugitive upstream CH ₄ emissions and leakage emission due to fossil combustion/ electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system. The factors are taken as default values as given in approved methodology.		
D.3.2. Are the choices of leakage indicators reasonable?	/1/ /5/	DR	Yes, refer comments above.		OK
D.3.3. Will it be possible to monitor / measure the specified leakage indicators?	/1/	DR	Yes.		OK
D.3.4. Will the indicators give opportunity for real measurements of leakage effects?	/1/	DR	Yes		OK
D.4. Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
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/ /5/	DR	Yes, all relevant data is included in monitoring.		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	Yes.		OK

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	Yes it is possible.		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?	/1/		Yes.		OK
D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	No, Monitoring plan does not include monitoring of environmental indicators other than GHG emissions.	CL-7	OK
D.5.2. Is the choice of indicators for sustainability development (social, environmental, economic) reasonable?	/1/	DR	Yes, the choice of environmental indicators is reasonable.		OK
D.5.3. Will it be possible to monitor the specified sustainable development indicators?	/1/	DR	No sustainable indicators are monitored.		OK
D.5.4. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	Refer comments above.		OK
D.6. Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/	DR	Yes, the authority and responsibility is with Gangnam district office Suseo source Operation team.		OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and	/1/	DR	Yes, as given above.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
reporting clearly described?					
D.6.3. Are procedures identified for training of monitoring personnel?	/1/	DR	Yes		OK
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	Yes, they will be identified under the environment management system currently certified against the requirements of ISO 14001.		OK
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	Yes, they will be identified under the environment management system currently certified against the requirements of ISO 14001.		OK
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	Yes, they will be identified under the environment management system currently certified against the requirements of ISO 14001.		OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	Yes		OK
D.6.8. 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	Yes, it is detailed in section B.7.2 of PDD.		OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR	No.	CL-8	OK
D.6.10. Are procedures identified for review of reported results/data?	/1/	DR	Yes.		OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/	DR	Yes, they will be identified under the environment management system currently certified against the requirements of ISO 14001.		OK
D.6.12. Are procedures identified for project	/1/	DR	Yes, they will be identified under the		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
performance reviews before data is submitted for verification, internally or externally?			environment management system currently certified against the requirements of ISO 14001.		
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	Yes, they will be identified under the environment management system currently certified against the requirements of ISO 14001.		OK
E. Calculation of GHG Emissions by Source					
<i>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.</i>					
E.1. Project GHG Emissions					
<i>The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.</i>					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/	DR	Yes, Only direct emissions are applicable. All direct emissions like emissions of CO ₂ and CH ₄ resulting from usage of natural gas is captured in project design.		OK
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/ /5/	DR	Yes. It is transparent.		OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/ /6/	DR	Yes, the IPCC figures are used in estimation.		OK
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/	DR	Yes. The uncertainties are low.		OK
E.1.5. Have all relevant greenhouse gases and source	/1/	DR	Yes. The relevant greenhouse gases		OK

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

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Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
categories listed in Kyoto Protocol Annex A been evaluated?			considered in the project are CH ₄ and CO ₂ .		
E.2. Leakage <i>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.</i>					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/ /5/	DR	Yes. The leakage is estimated using the sum of Leakage emission due to fugitive upstream CH ₄ emissions and Leakage emission due to fossil combustion/ electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system.		OK
E.2.2. Have these leakage effects been properly accounted for in calculations?	/1/	DR	Yes		OK
E.2.3. Does the methodology for calculating leakage comply with existing good practice?	/1/ /5/	DR	Yes, the factors used are the default values as in approved methodology.		OK
E.2.4. Are the calculations documented in a complete and transparent manner?	/1/	DR	Yes		OK
E.2.5. Have conservative assumptions been used when calculating leakage?	/1/ /6/	DR	Yes		OK
E.2.6. Are uncertainties in the leakage estimates properly addressed?	/1/	DR	Yes. The uncertainties are low since IPCC emission factors are used.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E.3.Baseline Emissions <i>The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.</i>					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/	DR	Yes.		OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	Yes		OK
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Yes		OK
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/ /6/	DR	Yes		OK
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	Yes, uncertainties are low.		OK
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	/1/	DR	Yes		OK
E.4.Emission Reductions <i>Validation of ex-ante estimated emission reductions.</i>					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	Yes, The project will result in reduction of about 34703 t CO2 per annum.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
F. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /7/	DR I	Yes, this project has the inherent benefits of a fuel switch from coal to natural gas. No major adverse impacts are expected to occur.		OK
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	There is no requirement for Environmental Impact Assessment considering the scale of the project.		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	No major adverse environmental effects are envisaged from the project.		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	Not applicable as there are no such impacts identified.		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	There are no major adverse environmental effects.		OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/ /7/	DR I	Yes.		OK
G. Stakeholder Comments <i>The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.</i>					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR	Yes. The stakeholders and local residents were consulted through 4 public hearings.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/ /7/	DR I	Yes, comments were invited through a questionnaire sent to stakeholders and experts.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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?	/1/	DR	Yes it is required and was carried out in accordance with such regulations/laws.		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/ /7/	DR	Yes, the same was verified during site visit.		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/ /7/	DR	No adverse comments received.		OK

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

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 4 Written confirmation that the project meets the host country specific CDM requirements and assists in achieving sustainable development has not yet been obtained.	A.3.2, A.3.3	Received the DNA approval, dated July 4 2006. (See the attachment 1)	OK.
CL 1 A benchmark comparison of boilers using NG was not available to substantiate the claim that project reflects current good practices.	A.2.1	There is no Korean heat supplier who has such a large capacity natural gas HOB (Heat Only Boilers) as Suseo heat source facility of KDHC Gangnam branch but KDHC Ilwon heat source facility which is located near Suseo Facility has the similar size of natural gas HOB. Ilwon facility has been operated and under the control of KDHC.	The project can be seen reflecting good practice as compared to the only other boiler of similar type. OK.
CL 2 It is not clear in the PDD as well as through the interviews conducted during site visits whether the project uses state of the art technology or would the technology result in a significantly better performance than any commonly used technologies. A comparison of technologies currently in use shall be presented to make a judgement on this.	A.2.2	New boilers in Gangnam Branch have 600 mm extended convection part tube and more baffle plate equipped, compared to Ilwon heat source facility. These activities can improve the efficiency of new boilers from 85.11% to 86%. By the proposed project, technology transferred from Finland and Japan is expected (i.e. design large scale natural gas hot water boiler, low NOx burner). So, the proposed project will contribute to the localization of new technology. PDD mentioned it a little bit (Please see page 5 of PDD).	OK.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>CL3</p> <p>Quantification of the reduction in emission in terms of SPM, SO₂, NO_x etc. was not available for verification.</p>	A.3.4	<p>The emission of air pollutants under the baseline scenario (LSWR) and project scenarios (natural gas) are calculated (Emission factors of air pollutants are referred to the local Clean Air Conservation ACT. The efficiency of air pollutant reduction unit is referred to "A Guide to defining type of installations related to air pollutants emissions" from Ministry of Environment. Please see the attachment 2-excel file).</p> <p>The project activity would reduce emission 95 ton of sulphur oxides, 5 ton of particulate matter and 120 ton of nitrogen oxides by using natural gas and contribute to improve local air quality. (Please see page 2 of PDD).</p>	The emission reductions estimated are per annum. OK.
<p>CL4</p> <p>The appropriateness of the discount rate is not justified. The use of 3-year corporate bond (AA-) circulation profit rate by the end of year 2005 is not justified.</p> <p>Clarifications are requested on the methodology of estimating the residual value of equipment.</p> <p>Clarification is also requested as to whether the cap and trade scheme under the special act will have an impact on the NPV calculation.</p>	B.2.7	<p>The use of 3-year corporate bond (AA-) circulation profit rate by the end of year 2005 is justified based on the report from The Bank of Korea. (Please the attachment 3).</p> <p>The residual value of equipment is calculated as 5% of price when purchased based on "Corporate tax Act" in Korea. (Please the attachment 4).</p> <p>The impact of cap & trade scheme is reflected into NPV as investment of facility to reduce air pollution - Cost of SCR at three NG Boilers and Operating cost of SCR at three NG boilers. (Please the attachment 5 - excel file).</p>	Verified, OK.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
<p>CL-5</p> <p>Fuel efficiencies are estimated using a representative load factor of 100%, but the justification of the same is not provided.</p>	D.1.3	<p>Fuel efficiency is estimated on the base of each boiler's 100% load factor. Boiler's operational mode consists of Start-up, Normal operating and Shut-down. Fuel efficiency is calculated on the base of normal operations which has the longest period of operational mode. Normal operating mode could be representative mode of HOBs. So, fuel efficiency is calculated based on the load factor of normal operating mode.</p> <p>It was reflected into PDD. (Please see page 28 of PDD).</p>	OK.
<p>CL-6</p> <p>Expected natural gas consumption calculation is incorrect on page 33 and 34 of the PDD. The value should be 112 810 471 rather than 112 810 463.</p>	D.2.4	<p>Difference of these two values is based on significant figure (or significant notation). The KDHC converted kcal to Gcal, (i.e 1,077,339,922,481 kcal ↔ 1,077,340 Gcal). If natural gas consumption is calculated as previous PDD, it is as follow:</p> $(1,077,340 \text{ Gcal} / 9,550 \text{ kcal/N m}^3) * 10^6 = 112,810,471 \text{ N m}^3$ <p>Considering significant figure, the accurate natural gas consumption is as follow:</p> $1,077,339,922,481 \text{ Kcal} / 9,550 \text{ Kcal/N m}^3 = 112,810,463 \text{ N m}^3$ <p>So, PDD was revised as using 'Kcal'. (Please, see page 32 of PDD and</p>	OK.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		attachment 6).	
CL 7 Monitoring plan does not include monitoring of environmental indicators other than GHG emissions.	D.5.1	These environmental indicators are included in monitoring plan in PD D. It will be monitored monthly. (Please see page 46 of PDD).	OK.
CL 8 procedures identified for dealing with possible monitoring data adjustments and uncertainties	D.6.9	The KDHC set up a procedure. The manager of Operation management team is in charge of monitoring data adjustments and uncertainties. If recorded data are different from monitored data, the manager of operational management team will call an urgent-meeting and discuss those problems. All records related to the meeting will be kept permanently in Gangnam district office data storage room. It is reflected into PDD. (Please see page 48 of PDD)	OK.

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APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Santhosh Jayaram

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

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	Yes	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	Sectoral scope 4 (cement)		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Young-Keun Kim

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

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

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Buddika Hemashantha

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



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

Einar Telnes

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 1,2,3,6 & 10		
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

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