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# Validation Report

VALIDATION OF THE CDM-PROJECT:  
KDHC Daegu Biomass Cogeneration Project

REPORT NO. 1293418

**01 August 2011**

TÜV SÜD Industrie Service GmbH  
Carbon Management Service  
Westendstr. 199 - 80686 Munich – GERMANY

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<b>Subject:</b> Validation of a CDM Project			
<b>Accredited TÜV SÜD Unit:</b> TÜV SÜD Industrie Service GmbH Certification Body "climate and energy" Westendstr. 199 80686 Munich Germany		<b>TÜV SÜD Contract Partner:</b> TÜV SÜD Korea Ltd. 12F, KLI63 Bldg, #60, Yoido-dong Youngdeungpo-gu, Seoul 150-763 Republic of Korea	
<b>Project Participant:</b> Korea District Heating Corporation 186 Bundang-dong, Bundang-gu, Seongnam, Gyeonggi Province 463-908, Republic of Korea		<b>Project Site(s):</b> 895, Daecheon-dong, Dalseo-gu, Daegu Metropolitan city, Republic of Korea GPS coordinates: Latitude 35.8311°, Longitude 128.4896°.	
<b>Project Title:</b> KDHC Daegu biomass cogeneration project			
<b>Applied Methodology / Version:</b> AMS-I.C / Version 18		<b>Scope(s):</b> 1 <b>Technical Area(s):</b> 1.1	
<b>First PDD Version:</b> Date of issuance: 06-01-2009 Version No.: 05 Starting Date of GSP 17-02-2009		<b>Final PDD version:</b> Date of issuance: 03-04-2011 Version No.: 14	
<b>Estimated Annual Emission Reduction:</b>		20,855 tCO <sub>2</sub> e	
<b>Assessment Team Members:</b> Jung-Ho Yoon, In-Hwan Kim*, Konrad Tausche <b>Assessment Team Leader:</b> Robert Köhn		<b>Technical Reviewer:</b> Cuiyun Zhang, Luciano Grugni <b>Certification Body responsible:</b> Thomas Kleiser	
<b>Summary of the Validation Opinion:</b> <div style="margin-left: 20px;"> <input checked="" type="checkbox"/> The review of the project design documentation and the subsequent follow-up interviews have provided TÜV SÜD with sufficient evidence to determine the fulfilment of all stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM. Hence TÜV SÜD is recommending the project for registration by the CDM Executive Board if letters of approval of all Parties involved will be available before the expiring date of the applied methodology(ies) or the applied methodology version respectively. </div> <div style="margin-left: 20px;"> <input type="checkbox"/> The review of the project design documentation and the subsequent follow-up interviews have not provided TÜV SÜD with sufficient evidence to determine the fulfilment of all stated criteria. Hence TÜV SÜD will not recommend the project for registration by the CDM Executive Board and will inform the project participants and the CDM Executive Board on this decision. </div>			

\* Under the old standard appointed as validator for CDM-projects; currently is still not re-appointed

## Abbreviations

<b>AMS</b>	Approved Methodology Small scale
<b>BM</b>	Build Margin
<b>CAR</b>	Corrective Action Request
<b>CDM</b>	Clean Development Mechanism
<b>CDM EB</b>	CDM Executive Board
<b>CER</b>	Certified Emission Reduction
<b>CM</b>	Combined Margin
<b>CMP</b>	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
<b>CR / CL</b>	Clarification Request
<b>DNA</b>	Designated National Authority
<b>DOE</b>	Designated Operational Entity
<b>EF</b>	Emission Factor
<b>EIA / EA</b>	Environmental Impact Assessment / Environmental Assessment
<b>ER</b>	Emission Reduction
<b>FAR</b>	Forward Action Request
<b>FSR</b>	Feasibility Study Report
<b>GHG</b>	GreenHouse Gas(es)
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>IRL</b>	Information Reference List
<b>IRR</b>	Internal Rate of Return
<b>KP</b>	Kyoto Protocol
<b>MP</b>	Monitoring Plan
<b>NGO</b>	Non Governmental Organisation
<b>OM</b>	Operational Margin
<b>PDD</b>	Project Design Document
<b>PP</b>	Project Participant
<b>TÜV SÜD</b>	TÜV SÜD Industrie Service GmbH
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VVM</b>	Validation and Verification Manual

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## 1 INTRODUCTION

### 1.1 Objective

The objective of the validation process is to provide an independent assessment by a third party, a Designated Operational Entity (DOE), of a proposed project activity. The assessment involves the evaluation of the project basis and design identified in the Project Design Document (PDD) using the defined criteria outlined by the registration under the Clean Development Mechanism (CDM). Validation is part of the CDM project cycle and results in a conclusion by the executing DOE on whether or not a project activity is valid to be submitted for registration to the CDM Executive Board (CDM-EB). The ultimate decision on the registration of a proposed project activity rests with the CDM-EB and the Parties involved.

The project addressed in this validation report has been submitted under the following project title:  
KDHC Daegu biomass cogeneration project

### 1.2 Scope

The scope of any assessment is defined by the underlying legislation, regulation and guidance given by relevant entities or authorities. In the case of CDM project activities the scope is set by:

- The Kyoto Protocol, in particular § 12 and modalities and procedures for the CDM
- Decision 2/CMP1 and Decision 3/CMP.1 (Marrakech Accords)
- Further COP/MOP decisions with reference to the CDM (e.g. decisions 4 – 8/CMP.1)
- Decisions and specific guidance outlined by the EB which are published under <http://cdm.unfccc.int>
- Guidelines for Completing the Project Design Document (CDM-PDD) and the Proposed New Baseline and Monitoring Methodology (CDM-NM)
- Baselines and monitoring methodologies (including GHG inventories)
- Management systems and auditing methods
- Environmental issues relevant to the applicable sectoral scope
- Applicable environmental and social impacts and aspects of CDM project activity
- Sector specific technologies and their applications
- Current technical and operational knowledge of the specific sectoral scope and information on best practice

The validation is not meant to provide any form of consulting for the project participant (PP). However, stated requests for clarifications, corrective actions, and/or forward actions may provide input for improvement of the project design.

Once TÜV SÜD receives a first PDD version 5, it is made publicly available on the UNFCCC webpage and on TÜV SÜD's website, which initiates a 30 day global stakeholder consultation process (GSP). In special circumstances, such as when a project design changes, the GSP may need to be repeated. Information on the PDDs is presented on page 2 of this report.

The purpose of a validation is to demonstrate compliance or non-compliance of the project with all stated and valid CDM requirements. Additionally, the purpose of validation is to enable the registration of CDM projects, which is only a part of the total CDM project cycle.

## 2 METHODOLOGY

The project assessment is based on the “Clean Development Mechanism Validation and Verification Manual” and is conducted using standard auditing techniques to assess the correctness of the information provided by the project participants. Before the assessment begins, members of the team covering the technical scope(s), sectoral scope(s), and relevant host country experience for evaluating the CDM project activity are appointed. Once the project is made available for the stakeholder consultation process, members of the team carry out the desk review, follow-up actions, resolution of issues identified, and the preparation of the validation report. The prepared validation report and other supporting documents then undergo an internal quality control by the CB “climate and energy” before being submitted to the CDM-EB.

In order to ensure transparency, assumptions must be clear and stated explicitly and background material must also be referenced. TÜV SÜD has developed a methodology-specific protocol customized for the project. The protocol demonstrates, in a transparent manner, the project criteria (requirements), discussion on each criterion by the assessment team, and the results from validating the identified criteria.

The validation protocol serves the following purposes:

- To organize the details and provision of clarifications on the requirements of which a CDM project is expected to meet
- To elucidate how a particular requirement has been validated as well as to document the results of the validation and any adjustments made to the project design document.

The validation protocol consists of three tables. The different columns in these tables are described in the tables below.

Validation Protocol Table 1: Conformity of Project activity and PDD				
Checklist Topic / Question	Reference	Comments	PDD in GSP	Final PDD
<i>The checklist is organised in sections following the arrangement of the applied PDD version. 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 in case the comment refers to documents</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. In some cases sub-checklist are applied indicating yes/no decisions on the compliance with the</i>	<i>Conclusions are presented based on the assessment of the first PDD, version 5. This is either acceptable based on evidence provided (✓), or a <b>Corrective Action Request (CAR)</b> due to non-compliance with the checklist question (See below). <b>Clarification Request (CR)</b> is used when the validation team has identified a need for further clarification. <b>Forward action request</b> to highlight issues</i>	<i>Conclusions are presented in the same manner based on the assessment of the final PDD version and further documents including assumptions presented in the documentation.</i>

<i>criterion.</i>	<i>other than the PDD.</i>	<i>stated criterion. Any <b>Request</b> has to be substantiated within this column</i>	<i>related to project implementation that require review during the first verification.</i>	
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**Validation Protocol Table 2: Compilation and Resolutions of CARs, CRs and FARs**

	Comments and Results	Ref	Conclusion and IRL
Issue	<i>Corrective Action, Clarification or Forward Action Requests.</i>	<i>Reference to the checklist question number in Table 1</i>	<i>Final conclusions and relevant references.</i>
Response	<i>The responses given by the client or other project participants during communication with the validation team.</i>		
Assessment	<i>Summary of the discussion and revision of project documentation together with the validation team's responses</i>		

In case of a denial of the project activity more detailed information on this decision will be presented in table 3.

**Validation Protocol Table 3: Unresolved Corrective Action and Clarification Requests**

Clarifications and corrective action requests	Id. of CAR/CR	Explanation of the Conclusion for Denial
<i>Referenced request if final conclusions from table 2 resulted in a denial.</i>	<i>Identifier of the Request.</i>	<i>Detailed explanation of why the project is considered non-compliant with a criterion and a clear reference to the criterion</i>

The completed validation protocol is enclosed in Annex 1.

## 2.1 Appointment of the Assessment Team

According to the technical scopes and experiences in the sectoral or national business environment, TÜV SÜD has composed a project team in accordance with the appointment rules of the TÜV SÜD certification body "climate and energy".

The composition of an assessment team has to be approved by the Certification Body (CB) to assure that the required skills are covered by the team. The CB TÜV SÜD operates the following qualification levels for team members that are assigned by formal appointment rules:

- Assessment Team Leader (ATL);
- Validator (V);
- Validator Trainee (T);
- Technical Expert (TE).

It is required that the sectoral scope(s) and the technical area(s) linked to the methodology and project have to be covered by the assessment team.

**Assessment Team:**

Name	Qualification	Coverage of scope	Coverage of technical area	Coverage of financial aspect	Host country experience
Konrad Tausche	V	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-
Jung-Ho Yoon	V	-	-	-	<input checked="" type="checkbox"/>
Robert Köhn	ATL	<input checked="" type="checkbox"/>	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
In-Hwan Kim*	Auditor	-	-		<input checked="" type="checkbox"/>

**Technical Reviewer:** Cuiyun Zhang, Luciano Grugni

## 2.2 Review of Documents

The PDD version 5 for the GSP was submitted to the DOE in Feb. 2009. The PDD and additional background documents related to the project design and baseline have been reviewed to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources has been done as an initial step of the validation process. A complete list of all documents and evidence material reviewed is attached as annex 2 to this report.

## 2.3 Follow-up Interviews

On 25<sup>th</sup> and 26<sup>th</sup> Feb. 2009 TÜV SÜD performed interviews, telephone conferences and a physical site inspection with the project stakeholders to confirm relevant information and to resolve issues identified in the first document review. The following table provides a list of all persons interviewed during this process:

Name	Organisation
Lim, Jongwon (General Manager)	Operation Dep. of KDHC Daegu Branch
Song, Tae-Sop (Manager)	Environmental and chemical Dep. of KDHC
Kim, Young-Min (Manager)	Operation Dep. of KDHC Daegu Branch
Jang, Yu-Lee (Consultant)	Eco-Frontier
Choi, Ji-Seon (Consultant)	Eco-Frontier

## 2.4 Cross-check

During the validation process the team makes reference to available information related to similar projects or technologies as the CDM project activity. The documentation has also been reviewed against the approved methodology applied to confirm the appropriateness of formulae and correctness of calculations.

## 2.5 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to resolve the requests for corrective actions, clarifications, and any other outstanding issues which needed to be clarified for TÜV SÜD's conclusion on

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\* Under the old standard appointed as validator for CDM-projects; currently is still not re-appointed



the project design. The CARs and CRs raised by TÜV SÜD were resolved through the communication between the client and TÜV SÜD. To guarantee the transparency of the validation process the concerns raised and responses that have been given are documented in detail in the validation protocol (pls refer to Annex 1).

The final PDD, version 14, submitted in April 2011 serves as the basis for the final assessment presented. With respect to the main CDM objectives additional changes to the project during the validation process are not considered to be significant.. The two CDM main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

## **2.6 Internal Quality Control**

Internal quality control is the final step of the validation process and is conducted by the CB “climate and energy” who checks the final documentation, which includes the validation report and annexes. The completion of the quality control indicates that each report submitted has been approved either by the head of the CB or the deputy (a veto person is used if necessary). In projects where either the Head of the CB or his/her deputy is part of the assessment team, the approval is given by the one not serving on the project team.

After confirmation by the PP, the validation opinion and relevant documents are submitted to the EB through the UNFCCC web-platform.

### 3 SUMMARY

The assessment work and the main results are described below in accordance with the VVM reporting requirements. The reference documents indicated in this section and Annex 1 are stated in Annex 2.

#### 3.1 Approval

The project participant is the Korea District Heating Corporation of the Republic of Korea. The host country Korea meets the requirements to participate in the CDM.

The DNA of the Republic of Korea has issued a LoA (IRL #19) on 19 August 2009, authorizing Korea District Heating Corporation as a project participant. TÜV SÜD received this letter from the project participants directly and considers the provided letters as authentic.

The Korean LoA has further been double-checked with the staff of the Ministry of Knowledge Economy which is one of the approval entities of the Korean government, which further confirms the approval of this CDM project. The focal points of the Republic of Korea on the UNFCCC website were stated as “Environment Cooperation Division, Ministry of Foreign Affairs and Trade” & “The CDM Review Committee, Prime Minister’s Office”. However, the issuance organization of DNA approval for Korean CDM project varies depending on each CDM project type. The DNAs that issue the LoAs, may vary, depending on the CDM project type. The Korean focal points assign a CDM project to a related Ministry after reviewing each CDM project type. The review procedure of the DNA approval was announced by the Prime Minister’s office as ‘Notice of DNA approval for CDM project’ (IRL #89) and it was reviewed and confirmed by the audit team. For this project, the two Ministries have been assigned which are the Ministry of Knowledge Economy and the Ministry of Food Agriculture, Forestry and Fisheries.

After checking the provided LoA, TÜV SÜD confirms that the letter refers to the precise proposed CDM project activity title in line with the title in the PDD “KDHC Daegu biomass cogeneration project”.

The letter also indicates that the participating Party is a Party to the Kyoto Protocol, and that the participation in ‘KDHC Daegu biomass cogeneration project’ is voluntary. The Korean LoA also confirms that the proposed CDM project activity contributes to the sustainable development of Korea (host country). Based on the information given in this letter, TÜV SÜD considers the approval as unconditional with respect to these items.

The Korean LoA has been issued by the Ministry of Knowledge Economy as a main approver and co-approved by the Ministry of Food Agriculture, Forestry and Fisheries. The LoA does not refer to a specific version of the PDD or validation report.

TÜV SÜD therefore considers that the requirements of the VVM (§§ 45-48) have been met.

#### 3.2 Participation

The participant of the project activity has been approved by the corresponding Party, which is confirmed by the issued LoA.

The means of validation used are similar to the ones described in section 3.1, specifically in regard to the approval process of the project activity.

### 3.3 Project design document

The PDD is compliance with the relevant forms and guidance provided by UNFCCC.

The most recent version of the PDD form was used.

TÜV SÜD considers that the guidelines for the completion of the PDD in their most recent version have been followed. Relevant information was provided by the participants in the applicable PDD sections. Completeness was assessed through the checklist included in Annex 1.

### 3.4 Project description

The following description of the project as per PDD was verified during the on-site audit:

This project activity generates heat and electricity using the woody biomass as a renewable energy source. This project is not focused on fuel switch from fossil fuel to renewable biomass in the existing facilities, but the focus here is the generation of energy using renewable biomass at the new installed co-generation power plant. The generated electricity is supplied to the Korean grid and the generated heat is distributed to end-users by the district heating system of KDHC. For this project, the PP is planning to install the biomass boiler, steam turbine, DH system and some environmental equipments such as Electronic precipitator, Multi cyclone and ash handling system etc. The generated heat and thermal energy by the new co-generation power plant of this project activity will replace the electricity imported from the grid and the thermal energy produced by fossil fuels. The emission reduction volume is calculated by the generated energy multiplied with each emission factor. The capacities of the proposed project activity are 3 MW of electricity and 14.5 Gcal/hr.

The information presented in the PDD on the technical design is consistent with the actual planning and implementation of the project activity confirmed in the following ways:

- A review and cross check of data and information (see annex 2).
- An on-site visit with relevant stakeholders and personnel with knowledge of the project. In case of doubt, further cross checks through additional interviews were conducted.
- A review of available information related to similar projects or technologies, which have been used to validate the accuracy and completeness of the project description.

In conclusion, TÜV SÜD confirms that the project description, as included to the PDD, is sufficiently accurate and complete in order to comply with the requirements of the CDM.

### 3.5 Baseline and monitoring methodology

#### 3.5.1 Applicability of the selected methodology

The Compliance with each applicability as listed in the chosen baseline and monitoring methodology AMS-I.C Version 18 has been demonstrated.

Initially, the submitted PDD for GSP had applied AMS-I.C version 13. However, during the validation period, the validity was passed. Hence, the final PDD has been updated to AMS-I.C version 18 and the audit team has confirmed that the selected methodology and version is applicable.

The assessment was carried out for each applicability criterion and included , a compliance check of the local project setting with the applicability conditions in regard to baseline setting and eligible project measures, among other checks. This assessment also included the review of secondary sources to demonstrate the compliance with the applicability conditions.

The methodology-specific protocol, Annex 1, documents the assessment process. The results of the compliance check as well as relevant evidences are mentioned in detail in the protocol and the information reference list.

TÜV SÜD confirms that the chosen baseline and monitoring methodology is applicable to the project activity.

Emission sources, not addressed by the applied methodology and expected to contribute more than 1% of the overall expected average annual emission reductions, have not been identified.

### 3.5.2 Project boundary

The project boundary was assessed considering information gathered from the physical site inspection, interviews, and evidences received regarding the design of the project.

- The project contains the project facilities, the district heating network and the electricity grid for delivering the generated heat and electricity. The proposed project boundary is complete.

The relevant documentation assessed to confirm the project boundary is as follows:

- The construction contract between KDHC and Kenertec. (IRL #6)
- Technical specification in Process (Piping) & Instrument Drawing of the project facilities with heat balance figures (for Construction version – actual fabrication version) (IRL #58)

Details and observations are listed in Annex 1.

Therefore, TÜV SÜD confirms that the identified boundary, the selected sources, and gases as documented in the PDD are justified for the project activity and are in line with the requirements set by the applied methodology.

### 3.5.3 Baseline identification

The PDD defines the following baseline scenario:

- Electricity is imported from the grid and thermal energy (heat) is produced using fossil fuel (LNG).

The information presented in the PDD has been validated by an initial document review of all data. Further confirmation has been made based on the on-site visit and information from similar projects and/or technologies. The sources referenced in the PDD have been quoted correct. The information was verified against credible sources, such as the following:

- By law No. 2007-180 Using clean fuel etc (IRL #32)
- Renewable Energy RD & D strategy 2030 for woodchip issued by KEMCO (IRL #57)

TÜV SÜD has determined that no reasonable alternative scenario has been excluded.

Based on the validated assumptions used for project activity calculations, TÜV SÜD considers that the identified baseline scenario is reasonable.

Taking the definition of the baseline scenario into account, TÜV SÜD confirms that all relevant CDM requirements, including relevant and/or sectoral policies and circumstances, have been identified correctly in the project PDD.

A verifiable description of the baseline scenario has been included in the PDD.

In regard to item 87 of the VVM, TÜV SÜD confirms that:

- (a) All the assumptions and data used by the project participants are listed in the PDD, including their references and sources;
- (b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD;
- (c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence, and can be deemed reasonable;
- (d) Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD;
- (e) The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario, and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.

### **3.5.4 Algorithm and/or formulae used to determine emission reductions**

TÜV SÜD has assessed the calculations of project emissions, baseline emissions, leakage, and emission reductions. Corresponding calculations were carried out based on calculation spreadsheets. The parameters and equations presented in the PDD, as well as other applicable documents, have been compared with the information and requirements presented in the methodology and the respective tools. An equation comparison has been made to ensure consistency between all the formulae presented in the calculation files and in the PDD, methodology, and tools.

The assumptions and data used to determine the emission reductions are listed in the PDD and all the sources have been checked.

Based on the information reviewed it is confirmed that the sources used are correctly quoted and interpreted in the PDD.

The values presented in the PDD are considered reasonable based on the documentation and references reviewed and the result of the interviews.

The baseline methodology has been correctly applied according to requirements.

The estimate of the baseline emissions are considered correct as the calculations have been reproduced by the audit team with the attainment of the same results.

Detailed information on the verification of the parameters used in the equations are to be found in Annex 1. The algorithms for the determination of the baseline, project, and leakage are discussed in the following sections.

#### **3.5.4.1 Baseline Emissions**

The calculation of the baseline emissions have been conducted using procedures described in the methodology AMS-I.C Version 18.

The baseline emissions from fossil fuel combustion is calculated by the generated heat and electricity from fossil fuels, that are replaced by renewable energy source, times the CO<sub>2</sub> emission factor of grid electricity, and fossil fuel that would have been used in the absence of this proposed project activity. And then divided by the boiler efficiency, for the heat generation, which is the highest of the efficiency values provided by two or more manufacturers for units with similar specifications. The electricity usage of the cogeneration facility itself and the heat losses from the technical transmission and distribution were deducted in order to calculate the net energy generation for electricity and heat.

The CO<sub>2</sub> emission factor (56.1tCO<sub>2</sub>/TJ) per unit of the energy of the fuel, LNG, that would have been used in the baseline plant is adopted from IPCC 2006 guideline values, because there is no available data in Korea. The other CO<sub>2</sub> emission factor (ex-ante option was chosen and EF is calculated

to the value of 0.5215tCO<sub>2</sub>/MWh) for grid connected power generation that would have been used in the baseline plant is adopted from the Korean Grid.

The used formulae are as below.

Electricity:  $BE_{electricity,y} = EG_y \times EF_{grid,CM,y}$

Parameter	Unit	Description
$BE_{electricity,y}$	tCO <sub>2</sub> /year	Baseline emission for electricity
$EG_y$	MWh/year	Quantity of net electricity supplied to the grid in the year y
$EF_{grid,CM,y}$	tCO <sub>2</sub> /MWh	CO <sub>2</sub> emission factor for grid electricity

Heat:  $BE_{thermal,y} = (EG_{thermal,y} \times (1-HL_y)) / \eta_{BL,thermal} \times EF_k$

Parameter	Unit	Description
$BE_{thermal,y}$	tCO <sub>2</sub> /year	Baseline emissions from heat displaced by the project activity during the year y; tCO <sub>2</sub> e
$EG_{thermal,y}$	TJ/year	Total (Gross) quantity of heat generated by the project activity during the year y; TJ
$EF_k$	tCO <sub>2</sub> /TJ	CO <sub>2</sub> emission factor per unit of energy of the fuel k that would have been used in the baseline plant; tCO <sub>2</sub> /TJ, obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used
$\eta_{BL,thermal}$	%	Efficiency of the plant using fossil fuel that would have been used in the absence of the project activity
$HL_y$	%	Technical transmission and distribution Heat losses for providing heat to users in the year y : Heat loss is deducted to calculate the net quantity of heat supplied to the end-users from this project. It was verified through the historical statistic figure of KDHC. The maximum heat loss is applied for calculating BE for conservativeness.

Based on the reviewed information, it can be confirmed that the sources used are correctly quoted and interpreted in the PDD. And the values presented in the PDD are considered reasonable based on the documentation reviewed, further references and the result of the interviews.

As a result, the estimation of the baseline emissions can be confirmed as the same have been replicated by the audit team using the information provided.

### 3.5.5 Project emissions

According to the applied methodology, AMS-I.C ver.18, Project emissions should include:

- 1) CO<sub>2</sub> emissions from the on-site consumption of fossil fuel due to the project activity shall be calculated using the latest version of “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion”;
- 2) CO<sub>2</sub> emissions from electricity consumption by the project activity using the latest version of “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”;
- 3) Any other significant emissions associated with the project activity within the project boundary;
- 4) For geothermal project activity, project participants shall account for the following emission sources, where applicable: fugitive emissions of carbon dioxide and methane due to re-release of non-condensable gases from produced steam; and carbon dioxide emissions resulting from combustion of fossil fuels related to the operation of the geothermal power plant.

The calculation formula for the project emission through 1) the combustion of fossil fuel and 2) the consumption of electricity is as shown below.

$$PE_y = PE_{y,comb} + PE_{y,power}$$

Parameter	Unit	Description
$PE_y$	tCO <sub>2</sub> /year	Project Emission in the year y
$PE_{y,comb}$	tCO <sub>2</sub> /year	Emission through combustion of fossil fuel in the year y
$PE_{y,power}$	tCO <sub>2</sub> /year	Emission through electricity consumption in the year y

The calculation formula for the combustion of fossil fuel is as shown below i.e. item no. 1).

$$PE_{y,comb} = FF_{start-up,y,k} \times NCV_k \times EF_k$$

Parameter	Unit	Description
$FF_{start-up,y,k}$	m <sup>3</sup> or kℓ	Quantity of start-up fossil fuel k used in the year y
$NCV_k$	Kcal/ m <sup>3</sup> or kℓ	Net calorific value for fossil fuel k
$EF_k$	tCO <sub>2</sub> /TJ	The CO <sub>2</sub> emission factor per unit of energy of the fuel k that would have been used in the baseline plant, obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used

The calculation formula for the emission through electricity consumption is as shown below i.e. item no. 2)

$$PE_{y,power} = EG_{captive,y} \times EF_{grid,CM,y} \times (1 + TDL_y)$$

Parameter	Unit	Description
$EG_{captive,y}$	MWh	The electricity imported from the grid in the year y



$EF_{grid,CM,y}$	tCO <sub>2</sub> /MWh	CO <sub>2</sub> emission factor for electricity form public supply in the year y
$TDL_y$	%	Average technical transmission and distribution losses in the year y

The rest of item no. 3) & 4) are not applicable to this project activity.

Based on the reviewed information it can be confirmed that the sources used are correctly quoted and interpreted in the PDD and ER calculation sheet. The values presented in the PDD & ER calculation sheet are considered reasonable based on the documentation reviewed, further references and the result of the interviews.

### 3.5.6 Leakage:

According to AMS-I.C version 18, leakage should be considered:

- 1) if the energy generating equipment currently being installed is transferred from outside the boundary to the project activity.
- 2) in case collection/processing/transportation of biomass residues is outside the project boundary CO<sub>2</sub> emissions from collection/processing/transportation of biomass residues to the project site.

However, the energy generating equipments of this project is not transferred from outside the boundary to the project activity. Therefore leakage from the above item no. 1) is not considered to appear.

Leakage from collection/processing/transportation of biomass residues are considered as shown below.

$$LE_y = LE_{PB,y} + LE_{TB,y} + LE_{TA,y}$$

Parameter	Unit	Description
$LE_y$	tCO <sub>2</sub> /year	Emission from processing / transportation of biomass or ash in the year y
$LE_{PB,y}$	tCO <sub>2</sub> /year	Emission from processing of biomass in the year y
$LE_{TB,y}$	tCO <sub>2</sub> /year	Emission from transportation of biomass in the year y
$LE_{TA,y}$	tCO <sub>2</sub> /year	Emission from transportation of ash in the year y

- Emission from processing of biomass ( $LE_{PB,y}$ )

$$LE_{PB,y} = Q_{woodchip,y} \times FC_{woodchip,facility} \times NCV_{diesel} \times COEF_{diesel} \times CF_{thermal}$$

Parameter	Unit	Description
$Q_{woodchip,y}$	ton/year	Total biomass quantity required in the year y : The required biomass amount has been checked with the supporting calculation document, Annex 2, IRL #79
$FC_{woodchip,facility}$	liter/ton	Consumption of diesel per processing of biomass



		: The fuel consumptions have been verified with the possible 4 biomass processors (wood chipper) and their suppliers. The used value is the most conservative value among 4 values. The specifications of 4 processor were attached in Annex 2, IRL #69.
$NCV_{diesel}$	kcal/liter	Net calorific value of Diesel
$COEF_{diesel}$	tCO <sub>2</sub> /TJ	The CO <sub>2</sub> emission factor for Diesel
$CF_{thermal}$	TJ/ kcal	Unit conversion factor (kcal → TJ)
$LE_{PB,y}$	tCO <sub>2</sub> /year	Emission from processing of biomass in the year y

- Emission from transporation of biomass ( $LE_{TB,y}$ )

$$LE_{TB,y} = \frac{Q_{woodchip,y}}{TL_{woodchip,y}} \times MAD_{woodchip} \times \frac{NCV_{diesel} \times COEF_{diesel}}{FE_{woodchip, truck}} \times CF_{thermal}$$

Parameter	Unit	Description
$Q_{woodchip,y}$	ton/year	Total biomass quantity required in the year y
$TL_{woodchip,y}$	ton/unit	Average biomass load of trucks
$MAD_{woodchip}$	km	Max. round-trip distance between project site and biomass supply site
$FE_{woodchip, truck}$	km/liter	Fuel(Diesel) efficiency of a truck use for the transportation of biomass : It has been verified with three sources. One is the value from the one of daily newspaper and the other is the value from the truck registration certificate. The conservative value between these two sources has been used. They are attached in Annex 2, IRL # 20 & 68
$NCV_{diesel}$	kcal/liter	Net calorific value of Diesel
$COEF_{diesel}$	tCO <sub>2</sub> /TJ	The CO <sub>2</sub> emission factor for Diesel
$CF_{thermal}$	TJ/ kcal	Unit conversion factor (kcal → TJ)
$LE_{TB,y}$	tCO <sub>2</sub> /year	Emission from transportation of biomass in the year y

- Emission from transportation of ash ( $LE_{TA,y}$ )

$$LE_{TA,y} = \frac{Q_{ash,y}}{TL_{ash,y}} \times MAD_{ash} \times \frac{NCV_{diesel} \times COEF_{diesel}}{FE_{ash truck}} \times CF_{thermal}$$

Parameter	Unit	Description
$Q_{ash,y}$	ton/year	Total ash quantity generated in the year y
$TL_{ash,y}$	ton/unit	Average ash load of trucks

$MAD_{ash}$	km	Max. round-trip distance between the project site and the land-fill : It has been verified with the map of Korea.
$FE_{ash, truck}$	km/liter	Fuel(Diesel) efficiency of the truck for the transportation of ash : It has been verified with two sources. One is the value from the one of daily newspaper and the other is the value from the truck registration certificate. The conservative value between the two sources has been used. They are attached in Annex 2, IRL # 20 & 68
$NCV_{diesel}$	kcal/liter	Net calorific value of Diesel
$COEF_{diesel}$	tCO <sub>2</sub> /TJ	CO <sub>2</sub> emission factor of Diesel
$CF_{thermal}$	TJ/ kcal	Unit conversion factor (kcal → TJ)
$LE_{TA,y}$	tCO <sub>2</sub> /year	Emission from transportation of ash in the year y

There is no additional collection activity in this project activity. Therefore the leakage from the collection of biomass residues is not considered to appear. According to Annex 28, EB 47, 'General guidance on leakage in biomass project activities', the PPs have been interviewed and provided the necessary documents during and after on-site visits to support the statement that the source of biomass for the project activity is biomass residue and/or waste-. Bases on all information it is considered, that the project activity does not cause any leakage effect, according to the above mentioned guideline. Therefore, the only leakage emission source that should be taken into account is 'Competing use of the biomass.' It is clearly demonstrated in the PDD, with support of the official reports – summary in IRL #41 of Annex 2-, 'A study on the energy utilization of ligneous biomass', 'Report on basic design and important measures for the Daegu woodchip renewable energy project' and 'Statistics on New and Renewable Energy in 2007' which are included as IRL #9, #60 and #35 respectively in Annex 2, that the available biomass in the region is 25% higher than the quantity of biomass utilized including the project activity. Hence, no leakage should be considered according to Attachment C of Appendix B, Annex 28, EB 47. The information can be considered as correct.

The audit team has confirmed that all leakage sources of this project activity are complete, correct and conservative.

### 3.5.7 Emission Reductions

Emission reductions is calculated according the formula shown below.

$$ER_y = BE_y - PE_y - LE_y$$

In summary the calculation of the baseline emissions, project emissions, leakage and the emission reductions can respectively be considered as correct.

### 3.6 Additionality

The additionality of the project has been presented in the PDD using following approach:

The Additionality discussion is based on 'Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities' & 'Non-binding best practice examples to

demonstrate additionality for SSC project activities'. The investment barrier and other barriers were chosen for this project.

The approach used in the PDD has been assessed initially through the document review, during which following documents were reviewed:

- Excel file for 'Investment analysis of KDHC Biomass Cogeneration Project ' (IRL #18)

On-site, the additionality was discussed with Mr. Song, Tae-Sop who is responsible for this CDM project in KDHC. Further documents have been reviewed on-site (Annex 2).

Finally, the data, rationales, assumptions, justifications, and documentation provided have been verified using local knowledge as well as sectoral and financial expertise. This information was also confirmed through the following documentation:

- The contract for construction
- Feed-in-tariff
- Analytical criterion for the validation of the district heating project
- Tax law regarding the corporate tax
- A Study on the Energy Utilization of Ligneous Biomass
- The price of Carbon Credit and the exchange rate between Euro and Korea Won
- Etc.

Based on the aforementioned approach, TÜV SÜD confirms that the documentation provided is appropriate for this project.

### **3.6.1 Prior consideration of the clean development mechanism**

The starting date of the project activity is determined by the contract date of construction which is followed by 'Glossary of CDM terms, version 5' as per EB 47, Annex 71, stated "The starting date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a project activity begins. In light of the above definition, the start date shall be considered to be the date on which the project participant has committed to significant expenditures related to the implementation or related to the construction of the project activity". In order to confirm that this requirement was fulfilled, the assessment team has reviewed the following documents:

- Contract of construction between KDHC and Kenertec (IRL # 6)

Additionally the assessment team cross checked this information with Mr. Tae-Sop Song during an interview at the on-site audit and received Mr Song's confirmation regarding the contract of construction .

The starting date of the project activity is determined to be 28/09/2007 which is before 02 August 2008 as well as prior to the GSP. The PP has been requested and has presented the following documentation to the assessment team on order to assess whether the CDM consideration was properly performed before the starting date (?) of the project:

- Agenda for the 3<sup>rd</sup> KDHC Management meeting: 'Renewable energy business implementation' which is the Feasibility Study Report dated on April 2006 (IRL #4)
- The 3<sup>rd</sup> Management meeting results for decision making dated on 09/05/2006 (IRL #5)
- The progress of promotion for Daegu Biomass woodchip CDM (please refer to the below several documents)

The original documents presented have been reviewed and cross checked based on interviews with Mr. Tae-Sop Song from KDHC. Therefore, the documents can be considered appropriate to confirm the prior consideration of CDM. Additionally, in order to confirm that the PPs have taken real actions to continue the project activity as CDM, activities have been reviewed against the documents provided to the DOE and a timeline of events is shown in the table below:

#### Timeline of Project Activity

Activity	Document	Auditor conclusion
2006 April: Implementation of renewable energy project by use of pine wilt disease infected biomass	Feasibility Study Report 'Renewable energy business implementation' (IRL # 4)	The initial discussion for the CDM implementation. This is one of the supporting documents for the prior CDM considerations. The document has been checked by the audit team.
2006 May: CDM decision by the management board of KDHC	CDM decision – 'The 3rd Management meeting results' (IRL #5)	Checked the prior CDM consideration including the expected CDM benefits, the amount of emission reductions, CDM impacts and others. CDM decision.  It is considered to have been done properly.
2008 April: CDM project progress report	'CDM project progress report for KDHC Daegu Biomass project' (IRL #73)	The report contains a CDM time schedule, Proposal from the CDM consultants, Payment condition review and more. The document has been checked by the audit team and it is considered to be part of the CDM project process.
2008 June: CDM UN registration and CERs issuance consulting contract for Daegu biomass project signed ('08.6.18)	'Contract with Eco-frontier as a CDM consultant' (IRL #61)	Continuation of the CDM activity.  The attached document has been checked by the audit team. It is considered to be part of the CDM project process.
2008 October: Validation service contract with DOE	'Contract with TUV SUD for CDM validation service' (IRL #71)	Start of the CDM validation service with TUV SUD.

This confirms that the project complies with the requirements to demonstrate the prior consideration of the CDM.

### 3.6.2 Identifications of alternatives

The output of the project is Electricity and Heat. In accordance with the applied methodology, AMS-I.C version 18, one of the following baseline scenarios should be used. All baseline scenarios are mentioned in paragraph 15 of the applied methodology. All scenarios are as below.

- (a) Electricity is imported from the grid and thermal energy (steam/heat) is produced using fossil fuel;
- (b) Electricity is produced in an on-site captive power plant using fossil (with a possibility of export to the grid) and thermal energy (steam/heat) is produced using fossil fuel;
- (c) A combination of (a) and (b);
- (d) Electricity and thermal energy (steam/heat) are produced in a cogeneration unit using fossil fuel (with a possibility of export of electricity to the grid/other facilities and/or thermal energy to other facilities);
- (e) Electricity is imported from the grid and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export to the grid); steam/heat is produced from biomass;
- (f) Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to the grid) and/or imported from the grid; steam/heat is produced using fossil fuel;
- (g) Electricity and thermal energy (steam/heat) are produced in a biomass fired cogeneration unit (without a possibility of export of electricity either to the grid or to other facilities and without a possibility of export of thermal energy to other facilities);
- (h) Electricity and/or thermal energy produced in a co-fired system.

The list of alternatives to supply the above mentioned results, which are also presented in the PDD, includes the project activity without registration as CDM project. The remaining alternatives presented include all plausible scenarios taking into account the local and sectoral situations for the mentioned results. The list of alternatives is therefore considered complete. The alternative baseline scenario (a) has been finally chosen for the baseline scenario.

### 3.6.3 Investment Barrier analysis

The PP suggest the investment barrier analysis to demonstrate the additionality of the project according to the Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities and 'Non-binding best practice examples to demonstrate additionality for SSC project activities'. The financial returns of the proposed project are insufficient to justify the investment.

The Investment barrier has been assessed against the official documents such as 'Feed in Tariff', 'Analytical criterion for project validation' etc and based on interviews during and after the on-site audit. The result of this assessment clearly shows that the barrier presented in the PDD can be considered real.

This barrier would prevent the project activity but would not prevent the baseline of the project. This is confirmed through the documentation review, interviews, and the local and sectoral expertise of the assessment team.

Regarding the investment barrier, the PDD identified the negative NPV value (-1.44 billion Korea Won) and low Internal Rate of Returns (Project IRR = 4.81 %) for this proposed project compared to a benchmark of 6 % fixed by 'Analytical criterion for validation on district heating project (IRL #12) set by KDHC. This negative NPV value and low IRR figure have been assessed by the review of the financial calculation sheet supported by the several below presented documents. Furthermore, as

per paragraph 113 (a) of the VVM, version 1.02, the FSR has been the main data basis of the decision to proceed with the investment in this project and the period of time between the FSR approval and the investment decision is only one month. Therefore it can be confirmed that it is unlikely that the input values seem to have materially changed. In addition, the values used in the PDD and associated annexes are fully consistent with the FSR as per paragraph 113 (b) of the VVM version, 1.02. The input values from the FSR are valid and applicable at the time of the investment decision with the basis of local and sectoral expertise of the audit team as per paragraph 113 (c) of VVM version 1.02.

The parameters used in the financial calculations have been verified with the values of the Feasibility Study Report "Renewable energy business implementation" (IRL #4) and "Feasibility Study of Investment analysis\_Excel file" (IRL #27) which were the basis of the investment decision and have been validated with the below supporting documents acquired during the validation process. The main values presented in the PDD are consistent with the values of the FSR.

- (a) Net electricity generation '14,400 MWh/year' from Feasibility Study Report "Renewable energy business implementation" (IRL #4) and it was verified with "Technical specification in P & ID of the project facilities with heat balance figures (For Construction version)" (IRL #58) containing the gross electricity output and "Electricity consumption capacity of the project facilities" (IRL #71) to calculate the net electricity generation amount. After reviewing IRL #58, 71 and the Plant load factor '54.79% (200 days/year)' which was shown in the governmental approval application 'The approval revision of district heating including application from KDHC' (IRL #30) complied with chapter II, paragraph 3 (a) of Annex 11, EB48, the net electricity generation amount has been reduced to 11,942 MWh/year.  
The investment analysis has been conservatively performed based on the data source from FSR at the time of the investment decision.
- (b) Net heat generation '57,600 Gcal/year' from Feasibility Study Report "Renewable energy business implementation" (IRL #4), and it was verified with "Technical specification in P & ID of the project facilities with heat balance figures (For Construction version)" (IRL #58) and "KDHC's balance sheets for year 2005 ~ 2009 (to prove Heat Loss value)" (IRL #72). After reviewing above mentioned IRL #58, 71 & 30, the net heat generation amount has been increased to 66,058 Gcal/year. Therefore, the audit team requested the PP to perform the additional investment analysis (IRL #85) with changed input values. The results of the additional investment analysis to prove additionality of the project is explained at the beginning of chapter 3.6.4. The investment analysis of this project has been performed with the data source from the FSR at the time of the investment decision.
- (c) Total investment costs of '14,500,000,000 Won' as shown in the Feasibility Study Report "Renewable energy business implementation" (IRL #4), and also shown in the 'Contract for construction between KDHC and Kenertec' (IRL #6), Follow up construction contract with Hyosung Ebara Engineering (IRL #74) & Total paid amount to Kenertec (Original contract) (IRL #75). Calculating with IRL #74 and 75, the actual investment cost was '18,345,944,200 Won'. The investment analysis has been performed conservatively based on the data source from the FSR at the time of the investment decision.
- (d) Fuel costs of '1,458,000,000 Won/year' from the Feasibility Study Report "Renewable energy business implementation" (IRL #4) further supported by 'Woodchip unit cost from manufacturers' (IRL #14) and the necessary woodchip amount "Boiler technical specification\_Woodchip consumption amount per hour" (IRL #79). After reviewing IRL # 14 and 79, the fuel cost has been increased to 1,674,720,000 Won/year. Therefore, the audit team requested the PP to perform the additional investment analysis (IRL #85) with changed input values. The results of the additional investment analysis to prove additionality of the project is explained at the beginning of chapter 3.6.4.



The investment analysis of this project has been performed with the data source from the FSR at the time of the investment decision.

- (e) Discount rate, WACC 5% from "Analytical criterion for validation of district heating project" (IRL #12) further supported by "The 23<sup>rd</sup> Balance sheets of KDHC (for 2007)" (IRL #13) which contains 'Commercial lending rates from the banker view (Kookmin bank - one of the biggest commercial banks in Korea)'
- (f) Discount rate, Risk premium 1% from "The revised guideline/criteria for feasibility study" (IRL #28) issued by the Korea Development Institute (one of the governmental research organization)
- (g) The expected lifetime of the project operation from "Standard durable years and scope of durable years from Korean Tax law enforcement" (IRL #8)
- (h) Electricity tariff '68.99 Won/KWh (excl. VAT)' from "Public hearings on Feed In Tariff on Renewable energy" (IRL #90) which was applicable at the investment time decision and it was verified with the "Feed In Tariff from the notice of Ministry of Knowledge Economy issued by Korea Energy Management Corporation)" (IRL # 10) which shows the electricity tariff under 50MW capacity using wooden biomass .
- (i) Heat tariff '49,264 Won/Gcal (excl. VAT)' from "Feasibility Study of Investment analysis\_Excel file" (IRL #27) and it was verified with "Heat income from the management statistic of KDHC (2005)" (IRL #11) and with "KDHC Balance sheet for year 2005" (IRL #86) to check KDHC Daegu's branch heat tariff. The heat tariff was further verified with the actual invoices "Invoices for heat consumption of Sungseo Hansem Town" (IRL #84) to end-users (apartment complex).
- (j) Other costs i.e. major maintenance and/or rehabilitation, cost of labour, paying for insurance and overhead expense etc from "Analytical criterion for project validation" of KDHC (IRL #17) supported by the below several documents.
- (k) Depreciation rate '5%' from the "Analytical criterion for project validation" (IRL #17) of KDHC and further supported by "Korean Tax Law" the residual value of the new equipment is zero. (IRL #17)

The above were confirmed verbally during the on-site audit. Further it can be confirmed with the above documents that the parameters are plausible and can be considered acceptable under the project situation.

The benchmark used, 6% (= 5% WACC + 1% Risk premium), for the financial comparison has been obtained from KDHC's internal guideline "Analytical criterion for validation of district heating project". KDHC is the sole provider of district heating to the local households in the region of the project boundary, Daegu and it was verified with the official document, 'Statistic figures of District Heating in Korea for 2007' (IRL #66) issued by the Korea Energy Management Corporation, which shows KDHC is the unique district heating provider in Daegu City. Also the benchmark of a similar project planned by KDHC, 'FSR for KDHC Community energy supply business in Goyang' (IRL #76) was reviewed and its value was 7% which was even higher than the discount rate of this project to demonstrate the justification of the internal company benchmark. The audit team therefore concludes that the usage of the internal benchmark defined by paragraph 14 of Annex 58, EB51 is justifiable. In addition, the benchmark of this project is a post-tax benchmark. Actual interest payable when calculating the income tax was not necessary to be considered, as the project is 100% equity financed and thus there is no interest payment involved in the project activity. Actual interest payable when calculating income tax as per EB51, Annex 58, paragraph 11 was not necessary. Moreover WACC 5% has been verified with the two supporting documents which are 'The 23<sup>rd</sup> Balance sheets of KDHC (for 2007)' - showing the interest in loan - 5% (Banker's view) (IRL #13) and 'Weight average cost of capital' (IRL #65). Risk premium 1% has been verified with the document 'The revised guideline/criteria for feasibility study', issued by Korea Development Institute which is one of the Korean governmental research organizations (IRL #28), which demonstrated 1.1% as a risk premium. 1.1% is the average value for the previous 20-year US Credit Spread which is a US government bond yield spread. But for this project, the risk premium of 1% is applied. This risk pre-

mium of 1% reflects the risk profile of the project activity being assessed, established according to the national accounting guideline adopting the international bond yield as per EB51, Annex 58. When the discount rates of other Korean CDM projects are considered i.e. Bangcheon-Ri Landfill gas project (ref. no. 0851, 7% applied), Hangeong second phase SS-wind power project (ref. no. 1000, 7% applied) and the Sudokwon Landfill Gas Electricity Generation Project (ref. no. 0941, 7% applied), the discount rate of this project is conservative enough, according to the audit team's assessment. Furthermore, the benchmark setting for the project has been checked against the source. The suitability for this project can be confirmed as conservatively based on TÜV SÜD's local and sectoral expertise.

The total investment cost in the investment analysis was taken from the feasibility study report "Renewable energy business implementation" (IRL #4) and it was verified with the actual contract between KDHC and Kenertec (IRL #6). There was a cost difference between the estimation in the FSR and the actual contract amount with Kenertec but the difference is very small and also the figure in the investment analysis should be based on the FSR. In reality, due to the financial crisis of the Kenertec, KDHC terminated the contract and payed them off ('Total paid amount to Kenertec' (IRL #75)), and contracted Hyosung Ebara Engineering for 'Follow up construction contract' (IRL #74). In total, after reviewing the three above mentioned documents, the actual investment cost was even higher than the value of the FSR.

The fuel cost was verified with the FSR and further checked with 'Woodchip unit cost from manufacturers' (IRL #14) by the audit team. TÜV SÜD also considers the application of a project life time and the electricity tariff as valid and appropriate based on the review of 'Standard durable years and scope of durable years from Korean Tax law enforcement' (IRL #8) and 'Feed In Tariff from the notice from the Ministry of Knowledge Economy issued by the Korea Energy Management Corporation' (IRL #10). Further major input values presented in the financial analysis, Heat tariff have also been reviewed and was found appropriate according to 'Heat income from the management statistic of KDHC (2005)' (IRL #11) and it was verified with the "KDHC Balance sheet for year 2005" (IRL #86) and the actual invoices "Invoices for heat consumption of Sungseo Hansem Town" (IRL #84) to check KDHC Daegu branch's heat tariff.

In addition, TÜV SÜD has assessed all other costs i.e. major maintenance and/or rehabilitation cost, cost of labour, paying for insurance and overhead expense as appropriate with PP's official document, 'Analytical criterion for project validation' (IRL #17) which was further supported by the several documents i.e. 'Explanation of input values (IRL # 80-1)', 'Supporting excel file for investment analysis (IRL #80-2)', 'Balance sheets (2002 ~ 2005) for personnel cost (IRL #80-3)', 'Balance sheets (2002 ~ 2005) for maintenance and/or rehalitation cost (IRL #80-4)' and 'Maintenance history and cost for 2002 ~ 2005 from ERP system (IRL #80-5)'. The above mentioned document which is the 'Analytical criterion for project validation (IRL #17)' was set by KDHC using the statistic figures of the historical operation. The appropriateness of each cost was checked by the audit team using the above mentioned supporting documents (IRL #80-1 ~ 4). These documents are attached in Annex 2 and they confirm/prove that the underlying assessments are appropriate for this project.

The financial calculations have been verified and no mistakes have been found. As a result, it can be concluded that the parameters are plausible and can be considered acceptable under the project situation.

Sensitivity analysis were performed based on the major 7 variables i.e. prices of electricity, heat and biomass (Woodchip) price, annual generation amounts of heat and electricity, investment cost and O&M cost. A range of +/-10% was covered as indicated in the "Guidance on the Assessment of Investment Analysis" (EB51, Annex 58 version 03.1). The sensitivity analysis reveals the IRR would



not cross the benchmark value of 6% as given in the PDD except for 2 scenarios among 14 cases. The 2 scenarios which cross the benchmark are 1) 10% increase of heat tariff and 2) 10% increase of heat generation. The results of these 2 scenarios are 6.52% for each. The benchmark crossing % of each sensitivity scenario is 6.84% increase of heat price and heat generation. These 2 scenarios are impractical, due to the following reasons:

For the scenario of the increase of the heat price, there is the internal policy, to which the policy of the 'Ministerial order of the District heat tariff Cap (IRL #78)' applies, which was issued by the Ministry of Knowledge Economy. It states, that the heat tariff should be combined with the fuel cost (Woodchip cost for this project) and will be additionally supervised by the government. This policy is defined and supported by the 'Community Energy Supply Business law (IRL #77)'. The policy regulates the heat price in connection with fuel (biomass) cost. KDHC can increase the heat tariff when the fuel cost is increased. It is clear that the heat price is in inverse relationship to the biomass cost. If the heat tariff is increased by 10%, it means that biomass costs should be increased at the same moment and/or a little bit earlier. In this case, the IRR results of the sensitivity analysis were 6.52% for the heat price increase and 3.87% for the biomass cost increase. That's why 6.52% of the IRR, due to the 10% up of heat price, is unrealistic. The combination pricing policy was stated in the 'Ministerial order of the District heat tariff Cap (IRL #78)' which is a binding law and it was reviewed by the audit team. All supporting documents for the heat tariff were attached in Annex 2, IRL#67(Heat tariff policy of district heating), IRL #77 (Community Energy Supply Business law), IRL #78 (Ministerial order of the District heat tariff). In case of the 14% increase of both parameters, the sensitivity crosses the benchmark. However, after the investigation of the increase of heat price compared to the increase of fuel cost for a 5-year data from the year 2001 to 2005 (Heat Sales from Management Statistics Figure (2001-2005) – IRL #87 & Fuel cost Operational Statistics Figure (2001 - 2005) – IRL #88), the quota was 4.5% (annual average increase ratio of heat price) vs 8.5% (annual average increase ratio of fuel cost). This means that, if the fuel cost increase 8.5%, it affects the increase of the heat price by 4.5%. In other words, the fuel cost and the heat price should be increased by 440% & 233% respectively to cross the benchmark of 6%.

In addition to the combination pricing policy (heat tariff & fuel cost), there is another regulation in the IRL #78 which is the heat tariff cap. It is applied to other expenses excluding the fuel cost which is already regulated by the combination pricing policy in the total heat production cost. The heat tariff cap can be renewed annually, according to Business circumstances but the heat tariff cap was fixed since 1999 and kept by the Korean government. Considering the above mentioned, the sharp increase of the heat tariff seems to be unreasonable and unrealistic.

For the scenario of increase of the heat generation, KDHC Daegu branch generates heat, using several sources for the district heating such as LFG, incineration heat, biomass CHP, etc. Since the unit cost of heat generated by LFG or incineration heat is cheaper than that of heat generated from woodchip CHP, LFG and incineration heat are utilized as must-run heat sources all the year long in accordance with the contract between KDHC and LFG/incineration heat suppliers.

According to 'The heat generation status of KDHC Daegu branch' (IRL #81), since the heat is generated by LFG and incineration heat enough to fulfill the heat demand from May to October (6 months), biomass CHP does not operate during that period and can only be operated during the other 6 months (180 days at maximum, November to April). That is why biomass CHPs cannot generate more than the amount of heat, based on 200 operating days. Therefore the 6.84% increase of the heat generation which crosses the benchmark is improbable to happen. The 2 contracts i.e. 'Contract with Incineration plant (IRL #82) and 'LFG supply contract (IRL #83) were submitted and reviewed by the audit team and are attached in Annex 2.

The sensitivity analysis contributes the demonstration of the project additionality.

During the validation process, some major values of FSR i.e. electricity and heat generation amount,

the biomass consumption amount, were changed due to the boiler capacity change. The changed value of each parameter was stated in the above parameter explanation (a), (b) and (d). In order to confirm the project additionality, the PP was requested to perform the additional investment analysis with the above mentioned three changed values. The other input values in the additional investment analysis were the same as the above assumptions. The additional investment analysis also identified the negative NPV value (-1.22 billion Korea Won) and low Internal Rate of Returns (Project IRR = 5.00 %) for this proposed project. The project IRR 5% of the additional investment analysis does not cross the benchmark of 6 %. Thus, it clearly demonstrates that this project is economically unattractive.

TÜV SÜD checked the calculations and confirms that the project is robust to any reasonable variations in the critical parameters mentioned above and is highly unlikely to become financially and/or economically attractive.

In summary, the financial calculation has been completely checked, all the calculation files were checked and no mistakes have been found. Hence it can be confirmed that the calculations are correct.

### **3.6.4 Other Barrier analysis**

The other barrier has been assessed against the official documents such as the 'Administrative guideline for industrial utilization of pine wood nematode' and 'A study on the energy utilization of ligneous biomass' based on the document reviews during the on-site audit. The results of this assessment clearly shows that the barrier presented in the PDD can be considered real.

This barrier does prevent the project activity and would not prevent at least the baseline of the project, this can be confirmed based on the documentation review, interviews and local and sectoral expertise of the assessment team.

Regarding the other barrier, two reports, the 'Administrative guideline for industrial utilization of pine wood nematode (IRL #22)' and 'A study on the energy utilization of ligneous biomass (IRL #9)', were respectively issued by the 'Korea Forest Service' and the 'Korea Energy Economics Institute (KEEI)' and these documents clearly show that the use of biomass in primary energy in Korea is extremely low, 0.14% compared to other countries' (page 5 in IRL #9). The extremely low figure clearly demonstrates the lack of infrastructure for biomass utilization, no fundamental surroundings for the development of biomass utilization, etc. and etc. After reviewing the above mentioned conditions, the barriers for the implementation of the biomass cogeneration project seems not be easy to overcome. Therefore, this project is the sole case in Korea, providing electricity to the grid and heat to local households using the district heating system.

Taking the description of the validation of the barriers presented above into account, the credibility of the barriers and the correct presentation of these are considered to demonstrate the additionality of the project. The assessment team confirms this with reasonable certainty.

### **3.6.5 Common practice analysis**

The Common practice analysis was not applied for this project according to the simplified modalities and procedures for small-scale clean development mechanism project activities.

### 3.7 Monitoring plan

The monitoring plan presented in the PDD complies with the requirement of the applicable methodology. The assessment team has verified all parameters in the monitoring plan against the requirements of the methodology and no deviations have been found.

The procedures have been reviewed by the assessment team through document review and interviews with the relevant personnel. The information together with a physical site inspection of the existing monitoring system for the other facility of the Daegu branch (IRL #46 – Sample screen copy of DCS in KDHC Daegu branch), allows the assessment team to confirm that the proposed monitoring plan is feasible within the project design. The relevant points of the monitoring plan have been discussed with the PPs. These points specifically include the location of meters, data management, and the quality assurance and quality control procedures to be implemented in the context of the project. Some of the major parameters to be monitored are shown in the following.

- The generated heat,  $EG_{thermal,y}$  is continuously monitored and measured by a flow meter and by temperature meters. The generated heat is expressed as difference in the enthalpy between the hot water supplied to and returned by the plant. Thus, the temperature metering points are in the front and rear of the heat exchanger. The measured values are automatically saved in the DCS and back up regularly.
- The generated electricity,  $EG_y$  is continuously monitored, integrated hourly and at least monthly recorded by watt-hour meter at the connection point of the national grid system. The measured values are automatically saved in the DCS and back up regularly. The measured data will be managed by the KDHC power management system and it can be cross-checked with KPX (Korea Power Exchange) data.
- The consumed biomass (woodchip) fuel type,  $Q_{woodchip,i,y}$  is measured by the weighing system in the Daegu branch of KDHC. The weighing system measures the loaded and unloaded truck and evaluates the difference between them.  
The woodchip/Biomass, is classified as forest waste or industrial & municipal waste and the information on source, delivery and the weight of woodchip are recorded by the weighing management system.

This project was approved on condition of using wood (or woodchip type) as a fuel by Daegu City (local entity) (IRL #29). Therefore, the fuel for this project is only biomass so there shall be no fossil fuels. Also a TMS (Tele Monitoring System) for flue gas will be installed at the stack of this project to control the composition and concentration of exhaust gases by Daegu City. The monitored data of exhaust gases is reported to local entity in real time.

Therefore, the PP will be able to implement the monitoring plan and the achieved emission reductions can be reported ex-post and can be verified.

### 3.8 Sustainable development

The LoA of the Host Country presented a statement that the project contributes to the sustainable development of the Host Party. (IRL # 19)

### 3.9 Local stakeholder consultation

The relevant key local stakeholders have been invited via web-survey on KDHC's web-site for a conventional survey method. The IT infrastructure of Korea is established relatively well. The public opinions are often published and suggested through the internet surroundings. The evidence of

these announcement/invitations is presented in the PDD. The assessment team has reviewed the documentation in order to validate the inclusion of all relevant stakeholders. By having local expertise, it can be confirmed that the communication method used to invite the stakeholders can be considered appropriate for Korea. The summary of comments presented in the PDD has been verified with the documentation of the stakeholder consultation and is found to be complete.

Comments presented by the local stakeholders have been taken into account by the PP and have also been verified with information obtained during interviews.

The local stakeholder consultation is confirmed to have been adequately performed, according to the CDM requirements.

### **3.10 Environmental impacts**

The project participant does not need to undertake an environmental impact assessment according to 'Act on Assessment of Impacts of Works on Environment, Traffic, Disasters, etc' for the district heating project in Korea. However, the PP performed the simple EIA for air, water, noise, vibration ,etc. in the designing stage. The assessment team made a document review of the information presented. The EIA results confirm the correctness of the approach used by the PP. In conclusion, the PPs have followed the requirements of the host country with regards to addressing environmental impacts.

## 4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

TÜV SÜD published the project documents on the UNFCCC website by installing a link to TÜV SÜD's own website, and invited comments by affected Parties, stakeholders, and non-governmental organisations during a 30 day period.

The following table presents all gathered key information:

<b>webpage:</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/RVY9T1Q0S6JWPDXUEKBL452OCG78HM">http://cdm.unfccc.int/UserManagement/FileStorage/RVY9T1Q0S6JWPDXUEKBL452OCG78HM</a>	
<b>Starting date of the global stakeholder consultation process:</b> 2009-02-17	
<b>Comment submitted by:</b> None	<b>Issues raised:</b> -
<b>Response by TÜV SÜD:</b> -	

## 5 VALIDATION OPINION

TÜV SÜD has performed a validation of the following proposed CDM project activity:

KDHC Daegu biomass cogeneration project

Standard auditing techniques have been used for the validation of the project. A methodology-specific protocol for the project has been prepared to conduct the validation process in a transparent and comprehensive manner.

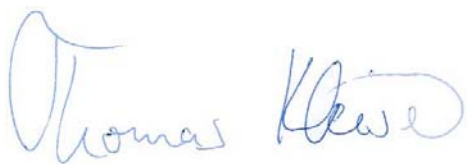
The review of the project design documentation, subsequent follow-up interviews, and further verification of references have provided TÜV SÜD with sufficient evidence to determine the fulfilment of stated criteria in the protocol. In the opinion of TÜV SÜD, the project meets all relevant UNFCCC requirements for the CDM if the underlying assumptions do not change. TÜV SÜD recommends the project for registration by the CDM Executive Board.

An analysis, as provided by the applied methodology, demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are additional to any that would occur in the absence of the project activity. Considering that the project will be implemented as designed, the project is likely to achieve the estimated amount of emission reductions of 20,855 tCO<sub>2</sub>e annually and a total estimated of 208,550 tCO<sub>2</sub>e as specified within the final PDD version.

The validation has been performed following the requirements of the latest version of the CDM VVM and on the basis of the contractual agreement. The single purpose of this report is its use during the registration process as part of the CDM project cycle.

Munich, 01-08-2011

Hamburg, 01-08-2011



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Thomas Kleiser

Certification Body "climate and energy"  
TÜV SÜD Industrie Service GmbH



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Robert Köhn

Assessment Team Leader

## Annex 1 - Validation Protocol

Project Title: "KDHC Daegu biomass cogeneration project"

Date: 01-08-2011

Project No.: 1293418



Industrie Service

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
<b>A. General description of small-scale project activity</b>				
<b>A.1. Title of the small-scale project activity</b>				
A.1.1. Does the used project title clearly enable to identify the unique CDM activity?	1	The title of this project clearly identifies the unique CDM activity.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.1.2. Are there any indication concerning the revision number and the date of the revision?	1	The revision number and the date of revision are established in the PDD. : Version 05, Revision date: 06/01/2009 The latest revision number and the date of PDD are as below. : Version 14, Revision date: 03/04/2011	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.1.3. Is this consistent with the time line of the project's history?	1,39, 62	According to the information provided the date of the revision is consistent with the time line of the project's history.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>A.2. Description of the small-scale project activity</b>				
A.2.1. Is the description delivering a transparent overview of the project activities?	1,39, 62	A transparent overview of the Project is described in the PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.2.2. What proofs are available demonstrating that the project description is in compliance with the actual situation or planning?	1,39, 62	Legal and technical documents and information available on site confirm the current situation of the project activity. Three kinds of approvals have been reviewed during on-site audit. 1. The approval for the usage of solid fuel was issued on 20 <sup>th</sup> November, 2008 by Daegu Metropolitan city. 2. The revision of business approval from the ministry of Commerce, Industry and Energy dated 2 <sup>nd</sup> July, 2007 3. The approval of plant construction from the Dalseo-gu local government of Daegu Metropolitan city dated 24 <sup>th</sup> December, 2007.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.2.3. Is the information provided by these proofs consistent with the information provided by the PDD?	1	The provided information is consistent with the contents of PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
A.2.4. Is all information presented consistent with details provided by further chapters of the PDD?	1,39, 62	The presented information is complied with the further chapter of PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.2.5. Does the description of the technology to be applied provide sufficient and transparent input to evaluate its impact on the greenhouse gas balance?	1,39, 62	Yes, PDD well described the technology to be applied and impact on the GHG balance resulting from this project.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.2.6. Is the brief explanation how the project will reduce greenhouse gas emission transparent and suitable?	1,39, 62	The brief explanation for reducing GHG emissions is presented in PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>A.3. Project participants</b>				
A.3.1. Is the form required for the indication of project participants correctly applied?	1	The form required for the indication of project participant clearly identifies the project participant and is correctly filled.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.3.2. Is the participation of the listed entities or Parties confirmed by each one of them?	1,3	The participant of this project is only one which is Korea District Heating Corporation (hereinafter KDHC).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.3.3. Is all information on participants / Parties provided in consistency with details provided by further chapters of the PDD (in particular annex 1)?	1,3	The project participant is KDHC and it is in consistency with the further chapters of PDD, especially Annex 1. Ecofrontier is participating in this project as a consultant only.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>A.4. Technical description of the small-scale project activity</b>				
<i>A.4.1. Location of the small-scale project activity</i>				
A.4.1.1. Does the information provided on the location of the project activity allow for a clear identification of the site(s)?	1,3	The location of the Project is clearly identified by the information provided. However, according to the audit team checking, the GPS coordinates of the project site are not correctly stated. The GPS coordinates of the site are Latitude 35.8311°, Longitude 128.4896°.	CL 1	<input checked="" type="checkbox"/>



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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
		<b>Clarification Request No. 1.</b> Please update the GPS coordinates of the project location in the PDD.		
A.4.1.2. How is it ensured and/or demonstrated, that the project proponents can implement the project at this site (ownership, licenses, contracts etc.)?	1,39, 62	The project participant, KDHC (Korea District Heating Corporation) has already started construction of the project facility from 28/09/2007 and the audit team checked the overall project time schedule. The project time schedule and construction status has been checked during on-site audit by the audit team.  <b>Corrective Action Request No. 13.</b> During the validation process, the construction company of the project facility have faced the financial crisis. Therefore, the project implementation may be delayed according to the audit team checking. Please provide the alternative plan if the construction company is bankrupt.	CAR13	<input checked="" type="checkbox"/>
<b>A.4.2. Type and category(ies) and technology/measure of the small-scale project activity</b>				
A.4.2.1. To which type(s) does the project activity belong to? Is the type correctly identified and indicated?	1,2	The project belongs to Type I "Renewable Energy Projects" – "Thermal Energy for the user with or without electricity." Yes, the proposed project is under Type 1 and correctly identified and indicated.  <b>Corrective Action Request No. 14.</b> According to Annex 11 of EB 48 <sup>th</sup> meeting, the plant load factor shall be defined ex-ante in the PDD according to one of the following three options which are by 1) project financing, 2) government approval and 3) third party determination. Please present the background of plant load factor determination based on the new guideline of EB and also please update it in PDD	CAR14	<input checked="" type="checkbox"/>
A.4.2.2. To which category (ies) does the project activity belong to? Is the category correctly identified and indicated?	1,2	The project activity belongs to category AMS-I.C. version 18 "Thermal Energy for the user with or without electricity"	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
		Please refer to CAR 17 in item no. B.1.1.2.		
A.4.2.3. Does the technical design of the project activity reflect current good practices?	1,23, 38,60	According to the technology employed, the project activity reflects current good practices.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.4.2.4. Does the implementation of the project activity require any technology transfer from Annex-I-countries to the host country (ies)?	1,60	No, the used technology is available in Korea but is the state of the art technology.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.4.2.5. Is the technology implemented by the project activity environmentally safe?	1,38	The project is considered to be environmentally safe and PP will introduce the environmental friendly methods such as the electric precipitator, Multi-Cyclone and Selective Non-Catalytic Reduction etc.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.4.2.6. Is the information provided in compliance with actual situation or planning?	1,39, 62	The current and actual situation on site is in compliance with the information provided in further chapters of the PDD. Please refer to Section A.4.1.2.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.4.2.7. Does the project use state of the art technology and / or does the technology result in a significantly better performance than any commonly used technologies in the host country?	1,23, 38,62	<p>The project activity is the second case using biomass as a fuel at the cogeneration facility in Korea. The technology used for the project is supposed to be a state of the art technology.</p> <p><b><u>Corrective Action Request No. 1.</u></b>  Please provide the detail specifications of the implementing facilities. The information in PDD is too brief for the equipment. According to the audit team checking, the capacity of the boiler in the technical specification is stated as 14.5Gcal/ h. However, the capacity in PDD stated as 14.3 Gcal/h. Please explain the difference and correct the value accordingly.</p>	CAR 1	<input checked="" type="checkbox"/>
A.4.2.8. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	1,3	It is unlikely that a new technology will substitute the project activity during the crediting period.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
A.4.2.9. Does the project require extensive initial training and maintenance efforts in order to be carried out as scheduled during the project period?	1,3	<p>PP has wide knowledge about equipments, operation, maintenance &amp; trouble shooting etc. for the district heating system. However, according to section 'B.7.2. Description of the monitoring plan', the operating team will be trained for operation and management from manufacturing company through operating simulation and pilot manufacturing program after the completion of construction. Please refer to B.7.2. of PDD.</p> <p><b><u>Corrective Action Request No. 2.</u></b></p> <p>The sentences regarding to the training in B.7.2 in PDD is unclear that whether KDHC will receive the trainings from the software program company or the equipment supplying company. Please state it correctly in the PDD.</p>	CAR 2	<input checked="" type="checkbox"/>
A.4.2.10. Is information available on the demand and requirements for training and maintenance?	1,3	See above A.4.2.9.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.4.2.11. Is a schedule available for the implementation of the project and are there any risks for delays?	1,62	The construction of project has already been started since 28/09/2007. Please see CAR 13 in A.4.1.2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>A.4.3. Estimated amount of emission reductions over the chosen crediting period</b>				
A.4.3.1. Is the form required for the indication of projected emission reductions correctly applied?	1,3,63	The indication of projected emission reduction calculation is correctly filled.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.4.3.2. Are the figures provided consistent with other data presented in the PDD?	1,3,	The figures presented are consistent with other data in the PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A.4.3.3. Are the figures consistent with the small-scale criteria for the used Type?	1,3	They are consistent with the criteria for the small-scale methodology Type I.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD										
A.4.4. Public funding of the small-scale project activity														
A.4.4.1. Is the information provided on public funding provided in compliance with the actual situation or planning as available by the project participants?	1,13, 62	According the information obtained during on-site audit, the project does not use any public funding. The financial report of KDHC was reviewed by the audit team.	☑	☑										
A.4.4.2. Is all information provided consistent with the details given in remaining chapters of the PDD (in particular annex 2)?	1	The A.4.4 information in PDD is consistent with the other details provided other chapters and Annex 2.	☑	☑										
A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity														
A.4.5.1. Is there a registered small-scale CDM project activity or an application to register another small-scale CDM project activity: with the following characteristics:	1,58	<table><tr><th>Debundling checklist</th><th>Yes / No</th></tr><tr><td>The same project participants?</td><td>Yes</td></tr><tr><td>In the same project category and technology/measure?</td><td>No</td></tr><tr><td>Registered within previous two years? Or in registration process?</td><td>No</td></tr><tr><td>Whose boundary is within 1 km of the project boundary of the small scale project activity under consideration?</td><td>Yes</td></tr></table> <p>The other project is only under validation process. The project is also using AMS-I.C meth. However, the project is using LFG from a landfill site. Therefore, the applied technology/measure of this project is different from the others. Finally, the project is neither registered nor in registration process.</p> <p>The PDD of the other project can be found in the below web-site. <a href="http://cdm.unfccc.int/Projects/Validation/DB/UI2A5NB0TJYTNGCQ3LR05EL35ITZN0/view.html">http://cdm.unfccc.int/Projects/Validation/DB/UI2A5NB0TJYTNGCQ3LR05EL35ITZN0/view.html</a></p>	Debundling checklist	Yes / No	The same project participants?	Yes	In the same project category and technology/measure?	No	Registered within previous two years? Or in registration process?	No	Whose boundary is within 1 km of the project boundary of the small scale project activity under consideration?	Yes	CAR16	☑
Debundling checklist	Yes / No													
The same project participants?	Yes													
In the same project category and technology/measure?	No													
Registered within previous two years? Or in registration process?	No													
Whose boundary is within 1 km of the project boundary of the small scale project activity under consideration?	Yes													

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
		<b><u>Corrective Action Request No. 16.</u></b> This project is not debudled project because there is no registered project. However, according to the paragraph 4 (b), Annex 27 EB36, once this project is registered, the other project cannot be registered with SSC CDM project activity. Please acknowledge of this information and confirm your acceptance.		
A.4.5.2. If the answer to all the above question is 'Yes' then does the total size of the small scale project activity combined with previously registered small scale CDM project activity exceeds the limits of small scale CDM project activities?	1,2,3	See above explanation.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>B. Application of a baseline and monitoring methodology</b>				
<b>B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity</b>				
B.1.1.1.Are reference number, version number, and title of the baseline and monitoring methodology clearly indicated?	1,2,3	Yes, the reference number, version number and title of the baseline and monitoring methodology are clearly indicated in this section of the PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.1.1.2.Is the applied version the most recent one and / or is this version still applicable?	1,2,3	<b><u>Corrective Action Request No. 17.</u></b> During the validation process, the validity of the applied methodology AMS-I.C ver. 13 was expired. Please update the methodology with the latest version 18.	CAR17	<input checked="" type="checkbox"/>
<b>B.2. Justification of the choice of the project category</b>				
B.2.1. Is the applied methodology considered the most appropriate one?	1,2,3	Yes, the applied methodology is the most appropriate one.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Integrate the required amount of sub-checklists on the applicability criteria as given by the applied methodology and comment on at least every line answered with "No"				

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD								
B.2.1.1.Criterion 1: Project comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	1,2,3	<table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table>	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Compliance verified?	Yes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	Yes											
Compliance provable?	Yes											
Compliance verified?	Yes											
B.2.1.2.Criterion 2: Biomass-based cogeneration systems consisting of steam generator(s) and steam turbine(s) are included in this category. For the purpose of this methodology .cogeneration. shall mean the simultaneous generation of thermal energy and electrical energy in one process. Project activities that produce heat and power in separate element processes (for example, heat from a boiler and electricity from biogas engine) do not fit under the definition of cogeneration project. Emission reductions from a biomass cogeneration system can accrue from one of the following activities:  (a) Electricity to a grid;  (b) Electricity and/or thermal energy (steam or heat) production for on-site consumption or for consumption by other facilities;	1,2,3,38,58	<table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <p>The technical specification of the plant clearly shows the production of electricity and heat with one process.</p> <p>This project supplies both electricity and heat so it is the case of ‘(c) Combination of (a) and (b)’</p>	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Compliance verified?	Yes	CAR3	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	Yes											
Compliance provable?	Yes											
Compliance verified?	Yes											

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD								
(c) Combination of (a) and (b).												
B.2.1.3.Criterion 3: Total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal (see criterion 5 for the applicable limits for cogeneration project activities).	1,2,3 , 38, 52	See below B.2.1.5 for cogeneration project <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table>	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Compliance verified?	Yes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	Yes											
Compliance provable?	Yes											
Compliance verified?	Yes											
B.2.1.4.Criterion 4: For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal (see paragraph 5 for the applicable limits for cogeneration project activities).	1,2,3	N.A. <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>NA</td></tr><tr><td>Compliance provable?</td><td>NA</td></tr><tr><td>Compliance verified?</td><td>NA</td></tr></table> <p>This project is not the case of co-fired system.</p>	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	NA	Compliance provable?	NA	Compliance verified?	NA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	NA											
Compliance provable?	NA											
Compliance verified?	NA											
B.2.1.5.Criterion 5: The following capacity limits apply for biomass cogeneration units:  (a) If the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3 shall be used for converting electrical energy to thermal energy (i.e., for renewable project activities,	1,2,3 , 38, 52	Please refer to CAR 1 for the capacity. <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> <b><u>Corrective Action Request No. 3.</u></b> During the on-site audit, the specification of woodchip boiler was 14.5 Gcal/h defined by the boiler manufacturer. Please update the capacity calculation in the revised PDD.	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Compliance verified?	Yes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	Yes											
Compliance provable?	Yes											
Compliance verified?	Yes											



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<p>the maximal limit of 15 MW(e) is equivalent to 45 MW thermal output of the equipment or the plant);</p> <p>(b) If the emission reductions of the co-generation project activity are solely on account of thermal energy production (i.e., no emission reductions accrue from electricity component), the total installed thermal energy production capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal;</p> <p>(c) If the emission reductions of the co-generation project activity are solely on account of electrical energy production (i.e., no emission reductions accrue from thermal energy component), the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not exceed 15 MW.</p>		<p>Further checking with the revised PDD, the capacity calculation is as below.</p> <p>[Thermal generation capacity]</p> $= \frac{14.5Gcal}{h} \times \frac{4.1868GJ}{1Gcal} \times \frac{10^3MJ}{1GJ} \times \frac{1h}{3600s}$ $= 16.864MJ / s$ $= 16.864MW_{th}$ <p>[Electrical energy converting to Thermal energy]</p> <p>- Electricity to Thermal Energy: <math>9MW_{th} (= 3MW_{el} \times 3)</math></p> <p>With electricity consideration, the total capacity of this project, <math>25.864MW_{th} (= 16.864MW_{th} + 9MW_{th})</math> is less than the criteria, <math>45MW_{th}</math> as the above calculation.</p>										
B.2.1.6.Criterion 6: In case electricity and/or steam/heat produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy		<p>Not applicable.</p> <table><tr><th>Applicability checklist</th><th>Yes / No / NA</th></tr><tr><td>Criterion discussed in the PDD?</td><td>NA</td></tr><tr><td>Compliance provable?</td><td>NA</td></tr><tr><td>Compliance verified?</td><td>NA</td></tr></table> <p>This project provides the electricity to the national electricity grid and heat to the district heating grid which is a system to supply heat to each individual home (end-user, around 100,000 homes).</p>	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	NA	Compliance provable?	NA	Compliance verified?	NA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	NA											
Compliance provable?	NA											
Compliance verified?	NA											



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displaced.		The quantity and price for electricity and heat used by an individual home are determined by the used amount by each home and the national guideline (IRL #77 & 78). So there is no contract between the supplier and consumer(s) for this project because the generated heat and electricity are going to supply to the end-users through the electricity and district heating grids system.										
B.2.1.7.Criterion 7: Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.		<div>Not applicable.</div> <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>NA</td></tr><tr><td>Compliance provable?</td><td>NA</td></tr><tr><td>Compliance verified?</td><td>NA</td></tr></table> <div>This project is the new implementation of biomass cogeneration power plant so it is not the case of the retrofit or modify an existing facility.</div>	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	NA	Compliance provable?	NA	Compliance verified?	NA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	NA											
Compliance provable?	NA											
Compliance verified?	NA											
B.2.1.8.Criterion 8: The capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in criterion 3 to 5 and should be physically distinct from the existing units.		<div>Not applicable</div> <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>NA</td></tr><tr><td>Compliance provable?</td><td>NA</td></tr><tr><td>Compliance verified?</td><td>NA</td></tr></table> <div>This project does not involve the addition of renewable energy units at an existing renewable energy facility.</div>	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	NA	Compliance provable?	NA	Compliance verified?	NA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	NA											
Compliance provable?	NA											
Compliance verified?	NA											
B.2.1.9.Criterion 9: Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renew-		<div>Not applicable</div> <table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>NA</td></tr><tr><td>Compliance provable?</td><td>NA</td></tr></table>	Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	NA	Compliance provable?	NA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Applicability checklist	Yes / No / NA											
Criterion discussed in the PDD?	NA											
Compliance provable?	NA											

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able biomass sources <sup>5</sup> provided:  (a) Charcoal is produced in kilns equipped with methane recovery and destruction facility; or  (b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered. These emissions shall be calculated as per the procedures defined in the approved methodology AMS-III.K. Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity can be used, provided that it can be demonstrated that the parameters from these are comparable e.g., source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln, operating conditions such as ambient temperature.		<table><tr><td>Compliance verified?</td><td>NA</td></tr></table> This project is not the case of Charcoal based biomass energy generation project activities.		Compliance verified?	NA								
Compliance verified?	NA												
B.2.1.10. Criterion 10: If solid biomass fuel (e.g. briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in emissions reduction calculation.	29	<table><tr><td>Applicability checklist</td><td>Yes / No / NA</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Yes</td></tr><tr><td>Compliance provable?</td><td>Yes</td></tr><tr><td>Compliance verified?</td><td>Yes</td></tr></table> The approval conditions of using solid fuel from Daegu city were limited to the clean biomass which does not include any fossil fuel		Applicability checklist	Yes / No / NA	Criterion discussed in the PDD?	Yes	Compliance provable?	Yes	Compliance verified?	Yes	CAR10	<input checked="" type="checkbox"/>
Applicability checklist	Yes / No / NA												
Criterion discussed in the PDD?	Yes												
Compliance provable?	Yes												
Compliance verified?	Yes												

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		parts i.e. paints, oil, preservative and etc. Please refer to CAR10 in B.7.1.5. Project and leakage emissions are already considered in ER calculation.		
<b>B.3. Description of the project boundary</b>				
B.3.1. Does the project boundary include physical, geographical site where the project activity takes place?	1,2,3,58	The project boundary in PDD shows physical & geographical site where the project activity takes place.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.3.2. Do the spatial and technological boundaries as verified on-site comply with the discussion provided by / indication included to the PDD?	1,2,3,58	The audit team was able to verify the project boundary components on site and the boundary comply with the provided information in PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>B.4. Description of baseline and its development</b>				
Integrate questions concerning the determination of the additionality as provided by the methodology applied or insert the module provided when applying the "additionality tool"				
B.4.1. For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission factor for the fossil fuel displaced. For calculating the emission factor, reliable local or national data shall be used. IPCC default values shall be used only when country or project specific data are not available or demonstrably difficult to obtain.  Is this the case in this project activity, and	1,2,3,60	This project is the biomass cogeneration project. Please see below B.4.2.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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	if yes, has this baseline been identified correctly?				
B.4.2.	Project activities producing both heat and electricity including cogeneration shall use one of 8 options given in point 15 of AMS-I.C version 18 for choosing the baseline scenario.  Is this the case in this project activity, and if yes, has the correct option been chosen??	1,2,3	The proposed project is the cogeneration project therefore, the baseline scenario has been chosen one of the 8 options given in point 12 of AMS-I.C version 18.  Eight options defined in the applied methodology were explained in PDD.  The chosen baseline scenario is "(a) Electricity is imported from the grid and thermal energy (steam/heat) is produced using fossil fuel" and it is the most plausible scenario for this project activity.  Please refer to below B.4.9. and CAR 4.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.4.3.	In the case of project activities that involve the addition of renewable energy units at an existing renewable energy production facility, where the existing and new units share the use of common and limited renewable resources (e.g., biomass residues), the potential for the project activity to reduce the amount of renewable resource available to, and thus thermal energy production by, existing units must be considered in the determination of baseline emissions, project emissions, and/or leakage, as relevant.  Is this the case in this project activity, and if yes, has it been considered?	1,2,3	N.A.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.4.4.	For project activities that seek to retrofit or modify an existing facility for renewable energy generation, has the correct base-	1,2,3	N.A.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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line scenario been chosen as per the methodology?					
B.4.5.	Have all technically feasible baseline scenario alternatives to the project activity been identified and discussed by the PDD? Why can this list be considered as being complete?	1,2,3 ,47-57	The applied methodology defines 8 baseline scenario alternatives to the project activity. All 8 technically feasible baseline scenario alternatives to the project activities have been identified and discussed in PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.4.6.	Does project identify correctly and excludes those options not in line with regulatory or legal requirements?	1,2,3 ,47-57	This option is in line with regulatory or legal requirements.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.4.7.	Have applicable regulatory or legal requirements been identified?	1,2,3 ,47-57	Audit team checked that all regulatory and/or legal requirements during on-site visit. There are no mandatory laws, regulation or public limitation for using biomass for generation of thermal energy in the baseline scenario.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.4.8.	Does the PDD identify the most likely baseline scenario in absence of the project activity?	1,2,3 ,47-57	Yes, PDD shows the alternative baseline scenarios which are defined by the methodology and identifies the most plausible baseline scenario in absence of the project activity.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.4.9.	Is this identification supported by official and/or verifiable documents (e.g. studies, web pages, certificates, etc?)	1,2,3 ,47-57	<p>The baseline scenario is verifiable through various methods such as Law, Industrial common sense, statistic figures and etc.</p> <p><b><u>Corrective Action Request No. 4.</u></b></p> <p>Please submit the supporting materials of each baseline scenario alternatives to the project activity.</p>	CAR4	<input checked="" type="checkbox"/>
B.4.10.	Is the identified baseline scenario in line with regulatory or legal requirements?	1,2,3 ,29-34	Yes, the baseline scenario is in line with regulatory and legal requirements.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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<b>B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:</b>				
Integrate questions concerning the determination of the additionality when applying the "additionality tool"				
B.5.1. In case of applying step 2 / investment analysis of the additionality tool: Is the analysis method identified appropriately (step 2a)?	1,2,3	N.A. PP performed the additionality according to 'Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities' and 'Non-binding best practice examples to demonstrate additionality for SSC project activities'.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.5.2. In case of Option I (simple cost analysis): Is it demonstrated that the activity produces no economic benefits other than CDM income?	1,2,3	N.A.		
B.5.3. In case of Option II (investment comparison analysis): Is the most suitable financial indicator clearly identified (IRR, NPV, cost benefit ratio, or (levelized) unit cost)?	1,2,3	N.A.		
B.5.4. In case of Option III (benchmark analysis): Is the most suitable financial indicator clearly identified (IRR, NPV, cost benefit ratio, or (levelized) unit cost)?	1,2,3	N.A.		
B.5.5. In case of Option II or Option III: Is the calculation of financial figures for this indicator correctly done for all alternatives and the project activity?	1,2,3	N.A.		
B.5.6. In case of Option II or Option III: Is the analysis presented in a transparent manner including publicly available proofs for the utilized data?	1,2,3	N.A.		

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B.5.7. In case of applying step 3 (barrier analysis) of the additionality tool: Is a complete list of barriers developed that prevent the different alternatives to occur?	1,2,3	N.A.		
B.5.8. In case of applying step 3 (barrier analysis): Is transparent and documented evidence provided on the existence and significance of these barriers?	1,2,3	N.A.		
B.5.9. In case of applying step 3 (barrier analysis): Is it transparently shown that the execution of at least one of the alternatives is not prevented by the identified barriers?	1,2,3	N.A.		
B.5.10. Have other activities in the host country / region similar to the project activity been identified and are these activities appropriately analyzed by the PDD (step 4a)?	1,2,3	N.A.		
B.5.11. If similar activities are occurring: Is it demonstrated that in spite of these similarities the project activity would not be implemented without the CDM component (step 4b)?	1,2,3	N.A.		
B.5.12. Is it appropriately explained how the approval of the project activity will help to overcome the economic and financial hurdles or other identified barriers (step 5)?	1,2,3	N.A.		
If the additionality tool has not been used please answer B.5.13 to B.5.18				
B.5.13. If the starting date of the project activity	1,2,3	Audit team checked that KDHC considered CDM for this project	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



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is before the date of validation, is evidence available to prove that incentive from the CDM was seriously considered in the decision to proceed with the project activity?		from 9 <sup>th</sup> May 2006 and the project has been started since 28 <sup>th</sup> September 2007 when was the contract date with the construction company. The feasibility study for CDM project was finalized & reported to the management on April 2006 and the investment decision by the executive board meeting was made on May 9, 2006. The following documents have been reviewed by the audit team.  1. Feasibility study report ‘Renewable energy business implementation’ issued by KDHC Special business division on April 2006.  2. Meeting results report for Project Decision on the 3 <sup>rd</sup> management meeting held on May 2006  3. The progress of promotion for Daegu biomass woodchip CDM (CDM Timeline)																	
B.5.14. Is a complete list of barriers developed that prevents the project activity to occur?	1,2,3,4,8,10	No, two most credible barriers were identified and presented in PDD. The two barriers are investment and other barriers.	☑	☑															
B.5.15. Does this list include at least one of the following barriers?	1,2,3,4,6,7,8,10,11,17,12,13,17,28,67	<table><tr><th>Barrier</th><th>Discussed?</th><th>Verifiable?</th></tr><tr><td>Investment</td><td>Yes</td><td>Yes</td></tr><tr><td>Technological</td><td>No</td><td>No</td></tr><tr><td>Due to prevailing practice</td><td>No</td><td>No</td></tr><tr><td>Other</td><td>Yes</td><td>Yes</td></tr></table> <p><b>Investment Barrier:</b> The audit team has reviewed the following documents which are components of investment calculation and supporting materials.</p> <p>1. Directive/Regulation of Corporate Tax in Korea</p> <p>2. ‘A study on the Energy Utilization of Ligneous Biomass’ is-</p>	Barrier	Discussed?	Verifiable?	Investment	Yes	Yes	Technological	No	No	Due to prevailing practice	No	No	Other	Yes	Yes	CAR15 CL3	☑
Barrier	Discussed?	Verifiable?																	
Investment	Yes	Yes																	
Technological	No	No																	
Due to prevailing practice	No	No																	
Other	Yes	Yes																	

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		<p>sued by 'The Ministry of Commerce, Industry and Energy' and studied by 'Korea Energy Economics Institute'</p> <ol style="list-style-type: none"> <li>3. Feed In Tariff announced by Korea Energy Management Corporation under the Ministry of Knowledge of Economy on August, 2008 – E 2.4</li> <li>4. The management statistic of KDHC (2005)</li> <li>5. The KDHC's internal manual for the feasibility study, 'Analytical criterion for project validation' issued on April 2006</li> <li>6. The feasibility calculation for this project</li> <li>7. The feasibility study of Renewable Energy Business Implementation for this project</li> <li>8. Contract for construction</li> <li>9. KDHC's criteria of Feasibility study on District Heating issued on Sep. 1998 and revised on Jan. 2002.</li> <li>10. The Korea Won exchange rate against Euro</li> <li>11. EUA price status from 2005 to 2008</li> <li>12. 'Revised Criteria of Feasibility Study' issued by Korea Development Institute</li> </ol> <p><b><u>Corrective Action Request No. 15.</u></b></p> <p>Benchmark is not fully discussed in the presented PDD according to Annex 58, EB 51. Please explain more clearly for Benchmark in the PDD and all supporting documents should be submitted to the audit team.</p> <p><b><u>Clarification Request No. 3.</u></b></p> <p>The some among submitted files i.e. EF calculation excel sheet, Feasibility study excel sheet are mixed with Korean and English</p>		

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		<p>language. Please full translate the documents to English language.</p> <p><b>Other Barrier:</b></p> <p>The following documents have been reviewed by the audit team. Furthermore, the biomass cogeneration project in Korea has been investigated and it was confirmed that this project is the second case in Korea. The first one is also under validation for CDM project.</p> <ol style="list-style-type: none"> <li>1. Statistics on renewable energy (2007) issued by Korea Energy Management Corporation</li> <li>2. A study on the Energy Utilization of Ligneous Biomass' issued by 'The Ministry of Commerce, Industry and Energy' and studied by 'Korea Energy Economics Institute'</li> <li>3. 'Administrative guideline for industrial utilization of pine wood nematode' issued by the ministry of forest</li> </ol>		
B.5.16. Does the discussion sufficiently take into account relevant national and/or sectoral policies?	1,2,3	Yes, this project is in line with the national and/or sectoral policies in Korea. The approvals from Korean governments have been checked by the audit team. See A.2.2.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.5.17. Is transparent and documented evidence provided on the existence and significance of these barriers?	1,2,3	See above B.5.15.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.5.18. Is it appropriately explained how the approval of the project activity will help to overcome the identified barriers?	1,2,3	See above B.5.15.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>B.6. Emissions reductions</b>				
Integrate questions concerning methodological choices and selection of options, if necessary				

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<b>B.6.1. Explanation of methodological choices</b>				
B.6.1.1. Is it explained how the procedures provided in the methodology are applied by the proposed project activity?	1,2,3,47-57	The PDD explained the procedures for calculating baseline, project and leakage emissions.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.6.1.2. Is every selection of options offered by the methodology correctly justified and is this justification in line with the situation verified on-site?	1,2,3,47-57	PDD well followed the instructions defined by the methodology and the situation of project site is complying with the project time schedule. Please see CAR 13.	CAR13	<input checked="" type="checkbox"/>
B.6.1.3. Are the formulae required for the determination of baseline emissions correctly presented, enabling a complete identification of parameters to be used and / or monitored?  Note: if fossil fuel is used, the thermal energy or the electricity generation metered should be adjusted to deduct the thermal energy or electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel consumed.	1,2,3,47-57	Yes, the formulae describe in the PDD (ver.5) were correctly presented as mentioned in methodology AMS-I.C version 13. But the applied figure was not correct. Please refer to CAR 3. According to the CAR 17, the formulae in the final PDD (ver. 14) were correctly presented according to the AMS-I.C version 18.	CAR 3 CAR 17	<input checked="" type="checkbox"/>
B.6.1.4. Are the formulae required for the determination of project emissions correctly presented, enabling a complete identification of parameters to be used and / or monitored?	1,2,3,47-57	Project emissions for start up and electricity consumption of the cogeneration plant have been considered even though the applied methodology did not define for the project emission.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.6.1.5. Are the formulae required for the determination of leakage emissions correctly presented, enabling a complete identification of parameter to be used	1,2,3,47-57	Yes, the leakage emission for processing of biomass and transportation of biomass and ash has been taken into account for calculation.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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and / or monitored?																						
B.6.1.6.Are the formulae required for the determination of emission reductions correctly presented?	1,2,3 ,47-57	Yes, the formulae for the determination of emission reductions are correctly presented.	☑	☑																		
B.6.2. Data and parameters that are available at validation																						
B.6.2.1.Is the list of parameters presented in chapter B.6.2 considered to be complete with regard to the requirements of the applied methodology?	1,2,3	Yes, the list of parameters is not complete. Please see CAR 5.	CAR 5	☑																		
B.6.2.2.Comment on any line answered with “No”																						
B.6.2.2.1. Parameter Title: EF <sub>LNG, CO2</sub> the CO2 emission factor per unit of energy of the fuel, LNG that would have been used in the baseline (cogeneration) plant in (tCO2 / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.	1,2,3	<table><tr><th>Data Checklist</th><th>Yes / No / NA</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>NA</td></tr></table> IPCC default value is used for the calculation	Data Checklist	Yes / No / NA	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided?	Yes	Has this value been verified?	Yes	Choice of data correctly justified?	Yes	Measurement method correctly described?	NA	☑	☑
Data Checklist	Yes / No / NA																					
Title in line with methodology?	Yes																					
Data unit correctly expressed?	Yes																					
Appropriate description of parameter?	Yes																					
Source clearly referenced?	Yes																					
Correct value provided?	Yes																					
Has this value been verified?	Yes																					
Choice of data correctly justified?	Yes																					
Measurement method correctly described?	NA																					
B.6.2.2.2. Parameter Title: EF <sub>grid,CM,y</sub> the CO2 emission factor for grid connected power generation obtained from reliable local or national data if available, otherwise, IPCC default emission factors are	1,2,3 ,36	<table><tr><th>Data Checklist</th><th>Yes / No / NA</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr></table>	Data Checklist	Yes / No / NA	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	CAR6	☑										
Data Checklist	Yes / No / NA																					
Title in line with methodology?	Yes																					
Data unit correctly expressed?	Yes																					
Appropriate description of parameter?	Yes																					

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Project Title: "KDHC Daegu biomass cogeneration project"

Date: 01-08-2011

Project No.: 1293418



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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS		PPD in GSP	Final PDD																		
used.		<table><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>NA</td></tr></table> <p><b><u>Corrective Action Request No. 5.</u></b></p> <p>According to the audit team checking, the OM calculation was not correctly performed. Please recalculate the operating margin and update it in the revised PDD.</p>		Source clearly referenced?	Yes	Correct value provided?	Yes	Has this value been verified?	Yes	Choice of data correctly justified?	Yes	Measurement method correctly described?	NA										
Source clearly referenced?	Yes																						
Correct value provided?	Yes																						
Has this value been verified?	Yes																						
Choice of data correctly justified?	Yes																						
Measurement method correctly described?	NA																						
B.6.2.2.3. Parameter Title: $\eta_{BL,thermal}$ the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.  Does the PDD determine efficiency by adopting option (a), (b) or (c)?	1,2,3,51	<table><tr><td>Data Checklist</td><td>Yes / No / NA</td></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>NA</td></tr></table> <p>The efficiency was adopted by option (b).</p> <p><b><u>Corrective Action Request No. 6.</u></b></p> <p>The efficiency of the plant in the manufacturers' specification was stated as Gross Calorific Value. The stated value 86% with GCV should be correctly converted to the value with NCV. According to the audit team calculation, the efficiency of the plant from GCV to NCV was wrongly stated in PDD. Please correct the efficiency value with NCV. All further calculation should be corrected due to</p>		Data Checklist	Yes / No / NA	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided?	Yes	Has this value been verified?	Yes	Choice of data correctly justified?	Yes	Measurement method correctly described?	NA	CAR7	<input checked="" type="checkbox"/>
Data Checklist	Yes / No / NA																						
Title in line with methodology?	Yes																						
Data unit correctly expressed?	Yes																						
Appropriate description of parameter?	Yes																						
Source clearly referenced?	Yes																						
Correct value provided?	Yes																						
Has this value been verified?	Yes																						
Choice of data correctly justified?	Yes																						
Measurement method correctly described?	NA																						

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS		PPD in GSP	Final PDD																		
		this change. Pleas update all correct calculation accordingly in PDD.																					
B.6.2.2.4. Parameter Title: NCV <sub>LNG</sub> Net calorific value of the fossil fuel, LNG for boiler’s start-up.	1,2,3	According to CAR #17 <table><tr><th>Data Checklist</th><th>Yes / No / NA</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>NA</td></tr></table>		Data Checklist	Yes / No / NA	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided?	Yes	Has this value been verified?	Yes	Choice of data correctly justified?	Yes	Measurement method correctly described?	NA	CAR17	☑
Data Checklist	Yes / No / NA																						
Title in line with methodology?	Yes																						
Data unit correctly expressed?	Yes																						
Appropriate description of parameter?	Yes																						
Source clearly referenced?	Yes																						
Correct value provided?	Yes																						
Has this value been verified?	Yes																						
Choice of data correctly justified?	Yes																						
Measurement method correctly described?	NA																						
B.6.2.2.5. Parameter Title: NCV <sub>diesel</sub> Net calorific value of the fossil fuel, Diesel for energy source of the facility and transportation:	1,2,3	According to CAR #17 <table><tr><th>Data Checklist</th><th>Yes / No / NA</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>NA</td></tr></table>		Data Checklist	Yes / No / NA	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided?	Yes	Has this value been verified?	Yes	Choice of data correctly justified?	Yes	Measurement method correctly described?	NA	CAR17	☑
Data Checklist	Yes / No / NA																						
Title in line with methodology?	Yes																						
Data unit correctly expressed?	Yes																						
Appropriate description of parameter?	Yes																						
Source clearly referenced?	Yes																						
Correct value provided?	Yes																						
Has this value been verified?	Yes																						
Choice of data correctly justified?	Yes																						
Measurement method correctly described?	NA																						
B.6.2.2.6. Parameter Title: TDL <sub>y</sub> Average technical transmission and distribution losses in the year y	1,2,3	According to CAR #17 <table><tr><th>Data Checklist</th><th>Yes / No / NA</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr></table>		Data Checklist	Yes / No / NA	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	CAR17	☑								
Data Checklist	Yes / No / NA																						
Title in line with methodology?	Yes																						
Data unit correctly expressed?	Yes																						
Appropriate description of parameter?	Yes																						
Source clearly referenced?	Yes																						



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		Correct value provided?	Yes		
		Has this value been verified?	Yes		
		Choice of data correctly justified?	Yes		
		Measurement method correctly described?	NA		
B.6.2.2.7. Parameter Title: COEF <sub>diesel</sub> The CO <sub>2</sub> emission factor per unit of energy of the fuel Diesel:	1,2,3	According to CAR #17		CAR17	☑
		Data Checklist	Yes / No / NA		
		Title in line with methodology?	Yes		
		Data unit correctly expressed?	Yes		
		Appropriate description of parameter?	Yes		
		Source clearly referenced?	Yes		
		Correct value provided?	Yes		
		Has this value been verified?	Yes		
		Choice of data correctly justified?	Yes		
		Measurement method correctly described?	NA		
		IPCC default value is used for the calculation			
B.6.2.2.8. Parameter Title: FE <sub>Woodchip,truck</sub> For transportation of biomass residues: Fuel efficiency of truck for transportation of biomass	1,2,3	According to CAR #17		CAR17	☑
		Data Checklist	Yes / No / NA		
		Title in line with methodology?	Yes		
		Data unit correctly expressed?	Yes		
		Appropriate description of parameter?	Yes		
		Source clearly referenced?	Yes		
		Correct value provided?	Yes		
		Has this value been verified?	Yes		
		Choice of data correctly justified?	Yes		
		Measurement method correctly described?	NA		
B.6.2.2.9. Parameter Title: FE <sub>Ash,truck</sub> For transportation of ash: Fuel effi-	1,2,3	According to CAR #17		CAR17	☑
		Data Checklist	Yes / No / NA		

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ciency of truck for transportation of Ash		Title in line with methodology?	Yes		
		Data unit correctly expressed?	Yes		
		Appropriate description of parameter?	Yes		
		Source clearly referenced?	Yes		
		Correct value provided?	Yes		
		Has this value been verified?	Yes		
		Choice of data correctly justified?	Yes		
		Measurement method correctly described?	NA		
B.6.3. Ex-ante calculation of emission reductions					
B.6.3.1.Is the projection based on the same procedures as used for future monitoring?	1,2,3 ,46	Yes, there is consistency in the procedure and the future monitoring plan.		☑	☑
B.6.3.2.Are the GHG calculations documented in a complete and transparent manner?	1,2,3 63	<b><u>Corrective Action Request No. 18</u></b> In the revised PDD, the energy generations are 14,400 MW & 69,600 Gcal for one year operation based on 54.79% of plant load factor (200 days operation in a year). But according to the final technical specification of the cogeneration equipments, the calculated energy (electricity & heat) amount generated by this project seems to be not “Net” amount but “Gross” amount. Please calculate “Net” generation of each energy type.  The final specification of equipments is 3MW for electricity & 14.5 Gcal for heat generation. <ul style="list-style-type: none"><li>- 3MW capacity for electricity, the possible electricity generation should be less than 14,400 MWh (≤ 3MW x 8760 hrs x 54.79%). It means that the presented 14,400 MWh is the gross amount of electricity generation.</li><li>- 14.5Gcal capacity for heat, the possible heat generation should be less than 69,600 MWh (≤ 14.5 Gcal x 8760 hrs x 54.79%). It means that the presented 69,600 MWh is the</li></ul>		CAR18	☑

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		gross amount of heat generation.  Based on the results of "Net" energy generation, please update PDD, ER calculation file & IRR calculation. Also please provide the clear supporting documents for the results.  <u>Further Comment:</u> Please include the monitoring parameter for Heat loss in PDD according to the results of the revised calculation for net heat generation.		
B.6.3.3.If there is more than one component of the project activity, then, are emission reduction calculations provided separately for each component?	1,3	Not applicable. Only one component exists in this project.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.6.3.4.Is the data provided in this section consistent with data as presented in other chapters of the PDD?	1,3	Partly, all presented data in this part should be consistent with the data of other parts in PDD. However, the used data should be updated according to the above issued CAR 17.  Further checking with the revised PDD, all data are consistent with the data in other parts of PDD.	CAR17	<input checked="" type="checkbox"/>
<b>B.6.4. Summary of the ex-ante estimation of emission reductions</b>				
B.6.4.1.Will the project result in fewer GHG emissions than the baseline scenario?	1,2,3	Yes, the activities involved in the proposed project will generate fewer GHG emissions than the baseline scenario.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.6.4.2.Is the form/table required for the indication of projected emission reductions correctly applied?	1,2,3	Yes, the table is according to CDM-SSC-PDD Version 03.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.6.4.3.If the project activity involves more than	1,2,3	Only one cogeneration plant will be operating in the proposed	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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one component, is separate table included for each of the component.		project.						
B.6.4.4.Do these values comply with small-scale criteria for every year?	1,2,3	Yes, the capacity of cogeneration plant is less than 45MW. See above B.2.1.4.	☑	☑				
B.6.4.5.Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting period?	1,2,3	See above A.4.1.2.	☑	☑				
B.6.4.6.Is the data provided in this section in consistency with data as presented in other chapters of the PDD?	1,2,3	See above B.6.3.4.	☑	☑				
<b>B.7. Application of the monitoring methodology and description of the monitoring plan</b>								
<i>B.7.1. Data and parameters monitored</i>								
B.7.1.1.Is the list of parameters presented in chapter B.7.1 considered to be complete with regard to the requirements of the applied methodology?	1,2,3	The list of parameters is completed for the monitoring of the project with regard to the requirements of the applied methodology.	☑	☑				
B.7.1.2.Does the PDD clearly state which of the given options for monitoring (a, b or c) is applied?	1,2,3	No, PDD does not state the applied monitoring option. According to the audit team checking, the applied monitoring options is '(b) Metering the thermal and electrical energy generated for co-generation projects.  <b><u>Corrective Action Request No. 9.</u></b> Please provide the explanation for the chosen monitoring option among the ones suggested by the methodology.	CAR9	☑				
B.7.1.3.Parameter title: EGy Electricity generated by the project activity, the renewable energy technology	1,2,3	<table><tr><td>Monitoring Checklist</td><td>Yes / No</td></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	CAR19	☑
Monitoring Checklist	Yes / No							
Title in line with methodology?	Yes							

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during the year, y  Note) In case the project activity is exporting electricity to other facilities, the metering shall be carried out at the recipient's end and measurement results shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts).		Data unit correctly expressed?	Yes										
		Appropriate description of parameter?	Yes										
		Source clearly referenced?	Yes										
		Correct value provided for estimation?	Yes										
		Has this value been verified?	Yes										
		Measurement method correctly described?	Yes										
		Correct reference to standards?	Yes										
		Indication of accuracy provided?	No										
		QA/QC procedures described?	Yes										
		QA/QC procedures appropriate?	Yes										
Electricity meter of KPX is managed by 'The operation rule of Electricity market' in Korea. As far as the audit team checking, the calibration frequency of electricity meter is 3.5 years +/- 6 months. However, PP confirms the calibration frequency of the meter every 3-year which is more conservative than the rule.													
The generated electricity by this project activity is not supplied to other facilities but to the national grid. Therefore, the measurement at the recipient's end is not necessary. However, the supplied electricity to the grid shall be cross checked with the confirmation of KPX who is the electricity buyer.													
<b><u>Corrective Action Request No. 19.</u></b>													
Please indicate the accuracy of the meters for the monitoring equipments.													
B.7.1.4.Parameter title: $EG_{\text{captive},y}$ Electricity used by the project cogeneration facility from the national grid during the year, y	1,2,3	<table><tr><td>Monitoring Checklist</td><td>Yes / No</td></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr></table>		Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	CAR17 & 19	<input checked="" type="checkbox"/>
Monitoring Checklist	Yes / No												
Title in line with methodology?	Yes												
Data unit correctly expressed?	Yes												
Appropriate description of parameter?	Yes												

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		<table><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table> <p>According to CAR 17 &amp; 19 (the update request according to the version up of the applied methodology &amp; the update of the accuracy of meter), it was revised.</p>		Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	Yes	QA/QC procedures appropriate?	Yes										
Source clearly referenced?	Yes																												
Correct value provided for estimation?	Yes																												
Has this value been verified?	Yes																												
Measurement method correctly described?	Yes																												
Correct reference to standards?	Yes																												
Indication of accuracy provided?	Yes																												
QA/QC procedures described?	Yes																												
QA/QC procedures appropriate?	Yes																												
<p>B.7.1.5.Parameter title: <math>EG_{thermal,y}</math> For cogen. plants: net quantity of steam/heat supplied by the project activity</p> <p>For projects where only biomass or biomass and fossil fuel are used the amount of biomass and fossil fuel input shall be monitored. In the case of project activity consuming biomass and fossil fuel to produce thermal and or electrical energy, specific energy consumption of each type of fuel (biomass or fossil) to be used shall be specified ex ante. The consumption of each type of fuel shall be monitored.</p> <p>Note) Heat generation is determined as the difference of the enthalpy of the steam or hot fluid and/or gases gener-</p>	1,2,3	<table><tr><td>Monitoring Checklist</td><td>Yes / No</td></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table> <p>The generated thermal energy (hot water for district heating) is supplied to the thermal grid for district heating. The generated energy is calculated with the difference in the enthalpy between hot water supplied to and returned by the plant.</p>		Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	Yes	QA/QC procedures appropriate?	Yes	CAR10	<input checked="" type="checkbox"/>
Monitoring Checklist	Yes / No																												
Title in line with methodology?	Yes																												
Data unit correctly expressed?	Yes																												
Appropriate description of parameter?	Yes																												
Source clearly referenced?	Yes																												
Correct value provided for estimation?	Yes																												
Has this value been verified?	Yes																												
Measurement method correctly described?	Yes																												
Correct reference to standards?	Yes																												
Indication of accuracy provided?	Yes																												
QA/QC procedures described?	Yes																												
QA/QC procedures appropriate?	Yes																												

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<p>ated by the heat generation equipment and the sum of the enthalpies of the feed-fluid and/or gases blow-down and any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure.</p> <p>In case of equipment that produces hot water/oil this is expressed as difference in the enthalpy between the hot water/oil supplied to and returned by the plant.</p> <p>In case of equipment that produces hot gases or combustion gases, this is expressed as difference in the enthalpy between the hot gas produced and all streams supplied to the plant. The enthalpy of all relevant streams shall be determined based on the monitored mass flow, temperature, pressure, density and specific heat of the gas.</p> <p>In case the project activity is exporting heat to other facilities, the metering shall be carried out at the recipient's end and measurement results shall be cross checked with records for sold/purchased thermal energy (e.g. invoices/receipts).</p>		<p><b><u>Corrective Action Request No. 10.</u></b></p> <p>According to the paragraph 5 of the definition of renewable biomass, the renewable biomass is the non-fossil fraction of an industrial or municipal waste. Therefore, please provide the deduction plan for the thermal energy &amp; electricity comes from fossil fraction of an industrial and municipal waste.</p>		



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B.7.1.6.Parameter title: HL <sub>y</sub> Technical transmission and distribution heat losses for providing heat to users in the year y	1,2,3,72	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table> <p>According to CAR 17 (the update request according to the version up of the applied methodology), it was added.</p>	Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	Yes	QA/QC procedures appropriate?	Yes	CAR17 & 18	☑
Monitoring Checklist	Yes / No																											
Title in line with methodology?	Yes																											
Data unit correctly expressed?	Yes																											
Appropriate description of parameter?	Yes																											
Source clearly referenced?	Yes																											
Correct value provided for estimation?	Yes																											
Has this value been verified?	Yes																											
Measurement method correctly described?	Yes																											
Correct reference to standards?	Yes																											
Indication of accuracy provided?	Yes																											
QA/QC procedures described?	Yes																											
QA/QC procedures appropriate?	Yes																											
B.7.1.7.Parameter title: FF <sub>start-up,y,LNG</sub> Quantity of start-up fossil fuel, LNG used: For cogeneration projects, the amount of fossil fuel input	1,2,3	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	CAR17	☑				
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Data unit correctly expressed?	Yes																											
Appropriate description of parameter?	Yes																											
Source clearly referenced?	Yes																											
Correct value provided for estimation?	Yes																											
Has this value been verified?	Yes																											
Measurement method correctly described?	Yes																											
Correct reference to standards?	Yes																											
Indication of accuracy provided?	Yes																											

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Date: 01-08-2011

Project No.: 1293418



Industrie Service

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		QA/QC procedures described?	Yes																										
		QA/QC procedures appropriate?	Yes																										
		According to CAR 17 (the update request according to the version up of the applied methodology), it was revised.																											
B.7.1.8.Parameter title: $Q_{\text{woodchip},i,y}$ Total woodchip/biomass i quantity consumed by the project activity	1,2,3	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table> <p>According to CAR 17 (the update request according to the version up of the applied methodology), it was revised.</p>		Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	Yes	QA/QC procedures appropriate?	Yes	CAR17	☑
Monitoring Checklist	Yes / No																												
Title in line with methodology?	Yes																												
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Source clearly referenced?	Yes																												
Correct value provided for estimation?	Yes																												
Has this value been verified?	Yes																												
Measurement method correctly described?	Yes																												
Correct reference to standards?	Yes																												
Indication of accuracy provided?	Yes																												
QA/QC procedures described?	Yes																												
QA/QC procedures appropriate?	Yes																												
B.7.1.9.Parameter title: $Q_{\text{ask},y}$ Total ask quantity generated	1,2,3,26	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr></table>		Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	CAR17	☑								
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Data unit correctly expressed?	Yes																												
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Source clearly referenced?	Yes																												
Correct value provided for estimation?	Yes																												
Has this value been verified?	Yes																												
Measurement method correctly described?	Yes																												

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		Correct reference to standards?	Yes		
		Indication of accuracy provided?	Yes		
		QA/QC procedures described?	Yes		
		QA/QC procedures appropriate?	Yes		
		According to CAR 17 (the update request according to the version up of the applied methodology), it was revised.			
B.7.1.10. Parameter title: BU <sub>woodchip,y</sub> The quantity of biomass utilized in the region	1,2,3 ,9,35	Monitoring Checklist	Yes / No	CAR17	
		Title in line with methodology?	Yes		
		Data unit correctly expressed?	Yes		
		Appropriate description of parameter?	Yes		
		Source clearly referenced?	Yes		
		Correct value provided for estimation?	Yes		
		Has this value been verified?	Yes		
		Measurement method correctly described?	Yes		
		Correct reference to standards?	Yes		
		Indication of accuracy provided?	Yes		
		QA/QC procedures described?	Yes		
		QA/QC procedures appropriate?	Yes		
		According to CAR 17 (the update request according to the version up of the applied methodology), it was added.			
B.7.1.11. Parameter title: BA <sub>woodchip,y</sub> Demonstration that the quantity of available biomass in the region, is at least 25% larger than the quantity of biomass that is utilised including the project activity	1,2,3 ,41,9 ,60,3 5	Monitoring Checklist	Yes / No	CAR 5 & 17	☑
		Title in line with methodology?	Yes		
		Data unit correctly expressed?	Yes		
		Appropriate description of parameter?	Yes		
		Source clearly referenced?	Yes		
		Correct value provided for estimation?	Yes		
		Has this value been verified?	Yes		
		Measurement method correctly described?	Yes		

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		<table><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table>	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	Yes	QA/QC procedures appropriate?	Yes																			
Correct reference to standards?	Yes																												
Indication of accuracy provided?	Yes																												
QA/QC procedures described?	Yes																												
QA/QC procedures appropriate?	Yes																												
		According to CAR 17 (the update request according to the version up of the applied methodology), it was added.																											
		<b><u>Corrective Action Request No. 05.</u></b>																											
		According 'C. Competing uses for the biomass' in Annex 28 of EB47, PP should evaluate ex ante biomass availability in the region of the project activity. Please demonstrate the quantity of available biomass in the region should be at least 25% larger than the quantity of biomass that is utilised including the project activity. And also update it as a monitoring parameter in PDD.																											
B.7.1.12. Parameters title: FC <sub>Woodchip, facility</sub> For processing of biomass residues: Fuel consumption per unit production of woodchip	1,2,3	According to CAR 17 (the update request according to the version up of the applied methodology), it was added.		CAR17	<input checked="" type="checkbox"/>																								
		<table><tr><td>Monitoring Checklist</td><td>Yes / No</td></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>NA</td></tr><tr><td>QA/QC procedures appropriate?</td><td>NA</td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	NA	QA/QC procedures appropriate?	NA			
Monitoring Checklist	Yes / No																												
Title in line with methodology?	Yes																												
Data unit correctly expressed?	Yes																												
Appropriate description of parameter?	Yes																												
Source clearly referenced?	Yes																												
Correct value provided for estimation?	Yes																												
Has this value been verified?	Yes																												
Measurement method correctly described?	Yes																												
Correct reference to standards?	Yes																												
Indication of accuracy provided?	Yes																												
QA/QC procedures described?	NA																												
QA/QC procedures appropriate?	NA																												

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B.7.1.13. Parameter Title: TL <sub>Woodchip,y</sub> For transportation of biomass residues: Average biomass load of truck	1,2,3	According to CAR 17 (the update request according to the version up of the applied methodology), it was added. <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>NA</td></tr><tr><td>QA/QC procedures appropriate?</td><td>NA</td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	NA	QA/QC procedures appropriate?	NA	CAR17	☑
Monitoring Checklist	Yes / No																											
Title in line with methodology?	Yes																											
Data unit correctly expressed?	Yes																											
Appropriate description of parameter?	Yes																											
Source clearly referenced?	Yes																											
Correct value provided for estimation?	Yes																											
Has this value been verified?	Yes																											
Measurement method correctly described?	Yes																											
Correct reference to standards?	Yes																											
Indication of accuracy provided?	Yes																											
QA/QC procedures described?	NA																											
QA/QC procedures appropriate?	NA																											
B.7.1.14. Parameter Title: TL <sub>Ash,y</sub> For transportation of Ash: Average ash load of truck	1,2,3	According to CAR 17 (the update request according to the version up of the applied methodology), it was added. <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>NA</td></tr><tr><td>QA/QC procedures appropriate?</td><td>NA</td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	NA	QA/QC procedures appropriate?	NA	CAR11 &17	☑
Monitoring Checklist	Yes / No																											
Title in line with methodology?	Yes																											
Data unit correctly expressed?	Yes																											
Appropriate description of parameter?	Yes																											
Source clearly referenced?	Yes																											
Correct value provided for estimation?	Yes																											
Has this value been verified?	Yes																											
Measurement method correctly described?	Yes																											
Correct reference to standards?	Yes																											
Indication of accuracy provided?	Yes																											
QA/QC procedures described?	NA																											
QA/QC procedures appropriate?	NA																											

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD																								
		<b><u>Corrective Action Request No. 11.</u></b> According to the audit team checking, the value of Ash quantity was not identical with the supporting documents. Please correct the value and update it in the revised PDD.																										
B.7.1.15. Parameter Title: MAD <sub>Woodchip</sub> For transportation of biomass residues: Maximum distance between project site and biomass supply site	1,2,3	According to CAR 17 (the update request according to the version up of the applied methodology), it was added. <table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?	Yes	Data unit correctly expressed?	Yes	Appropriate description of parameter?	Yes	Source clearly referenced?	Yes	Correct value provided for estimation?	Yes	Has this value been verified?	Yes	Measurement method correctly described?	Yes	Correct reference to standards?	Yes	Indication of accuracy provided?	Yes	QA/QC procedures described?	Yes	QA/QC procedures appropriate?	Yes	CAR17	<input checked="" type="checkbox"/>
Monitoring Checklist	Yes / No																											
Title in line with methodology?	Yes																											
Data unit correctly expressed?	Yes																											
Appropriate description of parameter?	Yes																											
Source clearly referenced?	Yes																											
Correct value provided for estimation?	Yes																											
Has this value been verified?	Yes																											
Measurement method correctly described?	Yes																											
Correct reference to standards?	Yes																											
Indication of accuracy provided?	Yes																											
QA/QC procedures described?	Yes																											
QA/QC procedures appropriate?	Yes																											
B.7.1.16. Parameter Title: MAD <sub>Ash</sub> For transportation of Ash: Maximum distance between project site and biomass supply site	1,2,3	According to CAR 17 (the update request according to the version up of the applied methodology), it was added.	CAR11 & 17	<input checked="" type="checkbox"/>																								

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		Monitoring Checklist	Yes / No		
		Title in line with methodology?	Yes		
		Data unit correctly expressed?	Yes		
		Appropriate description of parameter?	Yes		
		Source clearly referenced?	Yes		
		Correct value provided for estimation?	Yes		
		Has this value been verified?	Yes		
		Measurement method correctly described?	Yes		
		Correct reference to standards?	Yes		
		Indication of accuracy provided?	Yes		
		QA/QC procedures described?	Yes		
		QA/QC procedures appropriate?	Yes		
B.7.1.17. Parameter Title: % water Moisture content of the biomass residues	1,2,3	Monitoring Checklist	Yes / No	CAR17	<input checked="" type="checkbox"/>
		Title in line with methodology?	NA		
		Data unit correctly expressed?	NA		
		Appropriate description of parameter?	NA		
		Source clearly referenced?	NA		
		Correct value provided for estimation?	NA		
		Has this value been verified?	NA		
		Measurement method correctly described?	NA		
		Correct reference to standards?	NA		
		Indication of accuracy provided?	NA		
		QA/QC procedures described?	NA		
		QA/QC procedures appropriate?	NA		
		The moisture content of the biomass residues is used to find out the NCV of the biomass for the below situations. It is for paragraph 39 and 41 in the applied methodology which are the cases of "when the metering of thermal energy output is			



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		not plausible" and "when the amount of thermal energy from biomass cannot be distinguished with the one from fossil fuel".  Contrary to the above two cases, this project can measure the output of thermal energy. Therefore, it is not applicable.		
B.7.1.18.Are there any parameters missing or unclear for future monitoring in order to determine emission reductions?	1,2,3	The parameters for monitoring are completed.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>B.7.2. Description of the monitoring plan</b>				
B.7.2.1.Is the operational and management structure clearly described and in compliance with the envisioned situation?	1,3,4 4	The operational and management structures have been clearly defined.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.7.2.2.Are responsibilities and institutional arrangements for data collection and archiving clearly provided?	1,3,4 4	Regarding to Data collection & storage, works are well defined and responsibility are well assigned.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.7.2.3.Does the monitoring plan provide current good monitoring practice?	1,3,4 4	The current practice of data recording, storage, retrieval and back up is done through the DCS (Distributed Control System). The validation team was able to verify the various data from other operating facilities through the DCS.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.7.2.4.If applicable: Does annex 4 provide useful information enabling a better understanding of the envisioned monitoring provisions?	1,3,4 4	Please refer to CR5	CR5	<input checked="" type="checkbox"/>
<b>B.8. Date of completion of the application of the baseline study and monitoring methodology an the name of the responsible person(s)/entity(ies)</b>				
B.8.1.1.Is there any indication of a date when the baseline was determined?	1,3,6 1	The latest date of determination of baseline has been indicated as 15/12/2009.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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B.8.1.2.Has dd/mm/yyyy format been used to indicate the date.	1,3	The format has been correctly used and the date indicated.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.8.1.3.Is this consistent with the time line of the PDD history?	1,3	The given date is consistent the development of PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.8.1.4.Is the information on the person(s) / entity (ies) responsible for the application of the baseline and monitoring methodology provided consistent with the actual situation?	1,3	The name of Mr. Tae-Sop Song (KDHC CDM responsible) and Ms. Yu-Lee Jang (Consultants from Ecofrontier) who are involved in this project has been shown as responsible for the application of the baseline and monitoring. During the validation, the consultant has been changed from Ms. Yu-Lee Jang to Ms. Ji-Seon Choi & Mr. Hae-Myung Ok.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B.8.1.5.Is information provided whether this person / entity is also considered a project participant?	1,3,6 1	Mr. Song is an employee of KDHC that is the sole project participant of this project. Ms. Jang is an employee of Ecofrontier which is involved in this project as a consult.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>C. Duration of the project activity / crediting period</b>				
<b>C.1. Duration of the project activity</b>				
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	1,3	Yes, the project's starting date in PDD was September 28 <sup>th</sup> , 2007 when the contract for CHP construction was made between KDHC and Kenertec. The contract was checked by the audit team and was attached in Annex 2.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>C.2. Choice of the crediting period and related information</b>				
C.2.1. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max. 10 years)?	1,3	The fixed crediting period of max. 10 years has been chosen for this project. [Further checking with the final PDD] The starting date of the crediting period was changed from 01/10/2009 to 01/09/2011.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C.2.2. Has dd/mm/yyyy format been used to	1,3	Yes, the format of the starting date has been correctly used.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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indicate the start date of the crediting period.				
<b>D. Environmental impacts</b>				
<b>D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:</b>				
D.1.1. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, has an EIA been approved?	1,3	No, the host country does not request EIA for this project based on the Act on Assessment of Impact of Works on Environment, Traffic & Disasters. However, the project proponents executed the environmental impact consideration for the project activity including Air quality, water quality and etc. in the designing stage. The audit team checked that the results of EIA were positive during the on-site audit.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
D.1.2. Has the analysis of the environmental impacts of the project activity been sufficiently described?	1,3	N.A.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
D.1.3. Will the project create any adverse environmental effects?	1,3	N.A.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
D.1.4. Were transboundary environmental impacts identified in the analysis?	1,3	N.A.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party</b>				
D.2.1. Have the identified environmental impacts been addressed in the project design sufficiently?	1,3	The significant negative environmental impact is not expected from the project activity. See above D.1.1.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
D.2.2. Does the project comply with environmental legislation in the host country?	1,3	Yes. See above A.2.2.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
<b>E. Stakeholders' comments</b>				
<b>E.1. Brief description how comments by local stakeholders have been invited and compiled</b>				
E.1.1. Have relevant stakeholders been consulted?	1,24, 25,26	Yes, the stakeholders' process was executed through the survey & the notice at KDHC web-site from Oct. 9 <sup>th</sup> to 28 <sup>th</sup> , 2008.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	1,24, 25,26	Korea well established IT infrastructure and leads IT culture in the world. Also the public opinions are often suggested through the internet surroundings commonly. Therefore it seems the appropriate methods have been used for the comments from local stakeholders.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
E.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?	1,24, 25,26	The host country does not request a stakeholder consultation process for this kind of project.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
E.1.4. Is the undertaken stakeholder process that was carried out described in a complete and transparent manner?	1,24, 25,26	Yes, the description of the process is complete with transparent manner.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>E.2. Summary of the comments received</b>				
E.2.1. Is a summary of the received stakeholder comments provided?	1,24, 25,26	Partly yes, the comments were very briefly summarized in the PDD. <b><u>Corrective Action Request No. 7.</u></b> Please provide the received comments and questions from the local stake holders. And also provide the KDHC's reply for the questions in the PDD.	CAR12	<input checked="" type="checkbox"/>

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
<b>E.3. Report on how due account was taken of any comments received</b>				
E.3.1. Has due account been taken of any stakeholder comments received?	1,24, 25,2 6	KDHC provided the reply against each comment. See above CAR 12.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>F. Annexes 1 – 4</b>				
<b>F.1. Annex 1: Contact Information</b>				
F.1.1. Is the information provided consistent with the one given under section A.3?	1,3	Yes, the given information is the same as section A.3.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
F.1.2. Is the information on all private participants and directly involved Parties presented?	1,3	The information is completed in all respects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>F.2. Annex 2: Information regarding public funding</b>				
F.2.1. Is the information provided on the inclusion of public funding (if any) in consistency with the actual situation presented by the project participants?	1,3	No additional information is provided in this section.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
F.2.2. If necessary: Is an affirmation available that any such funding from Annex-I countries does not result in a diversion of ODA?	1,3	No additional information is provided in this section.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>F.3. Annex 3: Baseline information</b>				
F.3.1. If additional background information on baseline data is provided: Is this information consistent with data presented by other sections of the PDD?	1,3	Yes, the provided data is consistent with the other chapters of PDD.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PPD in GSP	Final PDD
F.3.2. Is the data provided verifiable? Has sufficient evidence been provided to the validation team?	1,3	Yes, the audit team verified the data provided in this section and also checked the source of the data. <b><u>Clarification Request No. 2.</u></b> Please provide the web-site address where can be found the source of the electricity data in PDD.	CL 2	<input checked="" type="checkbox"/>
F.3.3. Does the additional information substantiate / support statements given in other sections of the PDD?	1,3	Yes.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>F.4. Annex 4: Monitoring information</b>				
F.4.1. If additional background information on monitoring is provided: Is this information consistent with data presented in other sections of the PDD?	1,3	No additional information is provided in this section. <b><u>Clarification Request No. 5.</u></b> Please provide the detail information for the monitoring system at this section.	CR 5	<input checked="" type="checkbox"/>
F.4.2. Is the information provided verifiable? Has sufficient evidence been provided to the validation team?	1,3	Please refer to CR5 Measuring points according to the monitoring parameter were shown in this section.	CR 5	<input checked="" type="checkbox"/>
F.4.3. Do the additional information and / or documented procedures substantiate / support statements given in other sections of the PDD?	1,3	Please refer to CR5 No additional information for procedures.	CR 5	<input checked="" type="checkbox"/>

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**Table 2 Resolution of Corrective Action and Clarification Requests**

Clarifications and corrective action re-quests by validation team	Ref. to table 1	Summary of project owner response	Validation team Conclusion
<b><u>Corrective Action Request No. 1.</u></b> Please provide the detail specifications of the implementing facilities. The information in PDD is too brief for the equipment. According to the audit team checking, the capacity of the district heating in the technical specification is stated as 14.5Gcal/ h. However, the capacity in PDD stated as 14.3 Gcal/h. Please explain the difference and correct the value accordingly.	A.4.2.7.	The explanation of the project facilities are updated in the section A.4.2. of the revised PDD.	The updated contents are checked with reviewing the technical documents by the audit team. This issue has been solved.
<b><u>Corrective Action Request No. 2.</u></b> The sentences regarding to the training in B.7.2 in PDD is unclear that whether KDHC will receive the trainings from the software program company or the equipment supplying company. Please state it correctly in the PDD.	A.4.2.9.	Operation team will be trained from each equipment supplier, which is updated in the section B.7.2. of the revised PDD.	This issue has been solved.
<b><u>Corrective Action Request No. 3.</u></b> During the on-site audit, the specification of woodchip boiler was 14.5 Gcal/h defined by the boiler manufacturer. Please update the capacity calculation in the revised PDD.	B.2.1.2	Since the operating capacity of woodchip boiler is 14.3 Gcal/h but its specification is 14.5 Gcal/h, all of the values related to the capacity of woodchip boiler are updated in the revised PDD. - Description in the section A.2. - DH system capacity in the section A.4.2. - Thermal generation capacity in the section B.2. - The net quantity of heat in the section B.6.3, etc	The technical specification of the facility has been checked. This issue has been solved.
<b><u>Corrective Action Request No. 4.</u></b>	B.4.9.	- <b>Scenario 2:</b> LNG power plant is the most practical	The submitted documents



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<p>Please submit the supporting materials for elimination of each baseline scenario alternatives to the project activity.</p>	<p>alternative in Korea. However since the cost of the electricity generated through the LNG power plant is not cheaper than the buying price of electricity supplied from the national grid.</p> <ul style="list-style-type: none"> <li>- <b>Scenario 4:</b> According to "The Public Notice on the Use of a Clean Fuel (Law No.2007-180)", the new cogeneration facility must use LNG as a fuel. LNG co-generation is less economically attractive than the purchase of the electricity from the national grid, even the small-scale LNG co-generation in operation is a few.</li> <li>- <b>Scenario 5:</b> As a biomass for supplying heat, it can be a LFG (Landfill Gas) or woodchip. However, with the limitation of resource and location, just 3 heating facilities using LFG as a fuel are operating and only one woodchip cogeneration facility is operating.</li> <li>- <b>Scenario 6:</b> As a biomass for supplying heat, it can be a LFG (Landfill Gas) or woodchip. However, with the limitation of resource and location, just 3 heating facilities using LFG as a fuel are operating and only one woodchip cogeneration facility is operating.</li> <li>- <b>Scenario 7:</b> As a biomass for supplying heat, it can be a LFG (Landfill Gas) or woodchip. However, with the limitation of resource and location, just 3 heating facilities using LFG as a fuel are operating and only one woodchip cogeneration facility is operating.</li> <li>- <b>Scenario 8:</b> As a biomass for supplying heat, it can be a LFG (Landfill Gas) or woodchip. However, with the limitation of resource and location, just 3</li> </ul>	<p>have been reviewed by the audit team and the contents seem to be reasonable.</p> <p>This issue has been solved.</p>
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		<p>heating facilities using LFG as a fuel are operating and only one woodchip cogeneration facility is operating.</p> <p>The supporting materials for each baseline scenario are submitted to the audit team. The explanation of each baseline scenario is updated in section B.4. of the revised PDD.</p>	
<p><b><u>Corrective Action Request No. 5.</u></b></p> <p>According 'C. Competing uses for the biomass' in Annex 28 of EB47, PP should evaluate ex ante biomass availability in the region of the project activity. Please demonstrate the quantity of available biomass in the region should be at least 25% larger than the quantity of biomass that is utilised including the project activity. And also update it as a monitoring parameter in PDD.</p>	B.7.1.6.	<p>According to the various national reports, the biomass availability (456%) in the region of the project activity is much larger than the criteria (&gt;25%). The sources of the detail figures are as follow.</p> <ol style="list-style-type: none"> <li>1. The amount of Biomass availability: 361,205 ton/yr (Source: 'A study on the Energy Utilization of Ligneous Biomass' issued by 'The Ministry of Commerce, Industry and Energy' and studied by 'Korea Energy Economics Institute')</li> <li>2. The amount of Biomass utilization: 64,944 ton/yr including the amount of project activity: 33,494 t/yr. (Source: 'Statistics on New and Renewable energy -2007' issued by Korea Energy Management Corporation)</li> <li>3. Wood density: 500 kg / m<sup>3</sup> (Source: 'Basic design review report of this proposed project – Nov. 2006' issued by KDHC)</li> </ol> <p>Therefore, the ex-ante of available biomass which is not utilised in the region is <b>456%</b> (&gt;25%). All related supporting materials are submitted to the audit</p>	<p>The submitted documents have been assessed by the audit team.</p> <p>This issue has been solved.</p>

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		team.	
<b><u>Corrective Action Request No. 6.</u></b> According to the audit team checking, the OM calculation was not correctly performed. Please recalculate the operating margin and update it in the revised PDD.	B.6.2.2.3	<b>EF (0.5243)</b> was calculated incorrectly by mistake. So <b>EF (0.5215)</b> calculation was performed correctly and all of the value related to EF are update in the revised PDD. - EF <sub>grid,CM,y</sub> in the section B.6.2. - EF <sub>grid,CM,y</sub> in the section B.6.3. - CM in the section Annex 3	The calculation of EF has been checked by the audit team and it was correctly calculated. This issue has been solved.
<b><u>Corrective Action Request No. 7.</u></b> The efficiency of the plant in the manufacturers' specification was stated as Gross Calorific Value. The stated value 86% with GCV should be correctly converted to the value with NCV. According to the audit team calculation, the efficiency of the plant from GCV to NCV was wrongly stated in PDD. Please correct the efficiency value with NCV. All further calculation should be corrected due to this change. Please update all correct calculation accordingly in PDD.	B.6.2.2.3	The efficiency of the plant was recalculated as below. The efficiency = 86%(presented with GCV) x 10,550 (GCV) / 9,550 (NCV) = 95% The above correct value, 95% was updated in PDD and all further calculation were also corrected and updated in PDD.  The updated PDD was submitted to the DOE	The audit team has been checked the value with the manual calculation.  This issue has been solved.
<b><u>Corrective Action Request No. 8.</u></b> Please add the parameter for 'Specific fuel consumption' which is the amount of biomass consumption for this project activity.	B.6.2.2.4	The estimated amount of biomass (woodchip) consumption is 33,494 ton/year and the data table on the total amount of woodchip is added, which is updated in the section B.6.2. of the revised PDD.	This issue has been solved.
<b><u>Corrective Action Request No. 9.</u></b> Please provide the explanation for the chosen monitoring option among the ones suggested by the methodology.	B.7.1.2	Since the project is generating the heat and electricity by the co-generation facility, according to AMS I.C, the project selects <b>option (b)</b> metering the thermal and electrical energy generated for co-generation projects. - Heat: the flow of district heating water and the temperature of heat exchanger are measured. - Electricity: net generation of electricity is meas-	This issue has been solved.

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		ured by watt-hour meter.	
<b><u>Corrective Action Request No. 10.</u></b> According to the paragraph 5 of the definition of renewable biomass, the renewable biomass is the non-fossil fraction of an industrial or municipal waste. Therefore, please provide the deduction plan for the thermal energy & electricity comes from fossil fraction of an industrial and municipal waste.	B.7.1.5.	According to the conditions on the approval for the use of solid fuels from the local government, Daegu Metropolitan, the project can't use the polluted woodchip as a fuel. Pollutant material can be paint, oil, preservative etc. The cogeneration facility can't be installed without the approval for the use of solid fuels by the local government and cannot be operated beyond the approval criteria. The approval clearly stated the biomass as a fuel should be without pollutant materials.  The approval for the usage of solid fuel is submitted to the audit team.	The approval from local government is limited to the solid fuels without any pollutants. So, if PP uses the pollutants in this project, the approval of this project will be cancelled or suspended by the local government.  This issue has been solved.
<b><u>Corrective Action Request No. 11.</u></b> According to the audit team checking, the value of Ash quantity was not identical with PDD and the supporting document. Please correct the value and update it in the revised PDD.	B.7.1.10	The Ash quantity (690) was written incorrectly in PDD by typo mistake (The value of supporting document is correct). According to the supporting document, the correct value of Ash quantity (670) is updated in the section B.7.1. of the revised PDD.	Updated information has been checked by the audit team.  This issue has been solved.
<b><u>Corrective Action Request No. 12.</u></b> Please provide the received comments and some questions and KDHC's reply for the questions in the PDD.	E.2.1.	<b>Comments</b> - This project activity is contributed to the environmental improvement especially for air and water. It's because the waste wood originally fumigated and incinerated is reused as a fuel for the energy. - As this project activity is making a positive effect to the creation of employment, the raise of public awareness, regional economy development, it is expected to contribute to the sustainable development.  The summary of stakeholder comments is updated in the section E.2. of the revised PDD.	The relevant documents have been reviewed by the audit team.  This issue has been solved.

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<p><b><u>Corrective Action Request No. 13.</u></b></p> <p>During the validation process, the construction company of the project facility have faced the financial crisis. Therefore, the project implementation is likely to be delayed according to the audit team checking. Please provide the alternative plan if the construction company is bankrupt.</p>	<p>A.4.1.2</p>	<p>PP is discussing this matter with all related parties including an administrative court etc. If the construction company is not able to proceed to finish the construction, PP instead of the company will continue the construction of the project facilities. Under the present conditions, the delay of project implementation is inevitable. So, the starting date of the crediting period is changed from 01/10/2009 to 01/07/2011. The revised PDD is submitted to the DOE.</p>	<p>The presented document from PP was reviewed by the audit team.</p> <p>This issue has been solved.</p>
<p><b><u>Corrective Action Request No. 14.</u></b></p> <p>According to Annex 11 of EB 48<sup>th</sup> meeting, the plant load factor shall be defined ex-ante in the PDD according to one of the following three options which are by 1) project financing, 2) government approval and 3) third party determination. Please present the background of plant load factor determination based on the new guideline of EB and also please update it in PDD</p>	<p>A.4.2.1</p>	<p>According to the new guideline, Annex 11 of EB 48<sup>th</sup> meeting, 'GUIDELINES FOR THE REPORTING AND VALIDATION OF PLANT LOAD FACTORS', the explanation of plant load factor has been updated at section A.4.2 in PDD. The PLF was provided to the government for approval and all supporting documents were submitted to the audit team.</p>	<p>The supporting documents including the government approval application has been reviewed by the audit team.</p> <p>This issue has been solved.</p>
<p><b><u>Corrective Action Request No. 15.</u></b></p> <p>Benchmark is not fully discussed in the presented PDD according to Annex 58, EB 51. Please explain more clearly for Benchmark in the PDD and all supporting documents should be submitted to the audit team.</p>	<p>B.5.15.</p>	<p>As DOE's request, PP revised the part of benchmark, page 17 and 18 in PDD. The supporting materials for the benchmark justification were submitted to the audit team.</p>	<p>This issue has been solved.</p>
<p><b><u>Corrective Action Request No. 16.</u></b></p> <p>This project is not debullded project because there is no registered project. However, according to the paragraph 4 (b), Annex 27 EB36, once this project is registered, the other project cannot be registered with SSC CDM project activity. Please acknowledge of this information and confirm your accep-</p>	<p>A.4.5.1.</p>	<p>Well noticed the explanation and PP confirms that once this project is registered, the other project will not request for registration with SSC CDM project activity.</p>	<p>This issue has been solved.</p>

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tance.			
<p><b><u>Corrective Action Request No. 17.</u></b></p> <p>During the validation process, the validity of the applied methodology AMS-I.C ver. 13 was expired. Please update the methodology with the latest version 18.</p>	B.1.1.2	<p>During the final step of validation process, the validity of the applied methodology, AMS-I.C version 13 was expired therefore, the latest version of methodology, AMS-I.C version 18 was applied again in this project activity. The updated PDD was submitted to the audit team</p>	<p>The updated PDD has been assessed according to the latest version 18 of AMS-I.C.</p> <p>This issue has been solved.</p>
<p><b><u>Corrective Action Request No. 18</u></b></p> <p>In the revised PDD, the energy generations are 14,400 MW &amp; 69,600 Gcal for one year operation based on 54.79% of plant load factor (200 days operation in a year). But according to the final technical specification of the cogeneration equipments, the calculated energy (electricity &amp; heat) amount generated by this project seems to be not "Net" amount but "Gross" amount. Please calculate "Net" generation of each energy type.</p> <p>The final specification of equipments is 3MW for electricity &amp; 14.5 Gcal for heat generation.</p> <ul style="list-style-type: none"> <li>- 3MW capacity for electricity, the possible electricity generation should be less than 14,400 MWh (<math>\leq 3\text{MW} \times 8760 \text{ hrs} \times 54.79\%</math>). It means that the presented 14,400 MWh is the gross amount of electricity generation.</li> <li>- 14.5Gcal capacity for heat, the possible heat generation should be less than 69,600 MWh (<math>\leq 14.5 \text{ Gcal} \times 8760 \text{ hrs} \times 54.79\%</math>). It means that the presented 69,600 MWh is the gross amount of heat generation.</li> </ul>	B.6.3.2	<p>The energy generation, 14,400MWh &amp; 69,600Gcal, is not net amount. PP overlooked that fact at that moment. The net generation of each energy type is as follows.</p> <p>1. <u>Net generation of electricity</u></p> <p>According to the final technical specification of equipments and operation result of cogeneration system, 512kW of electricity will be and is consumed for cogeneration power plant itself. Therefore net generation of electricity is calculated as below.</p> <p><i>Net generation of electricity</i>  <math>= (\text{Total capacity} - \text{Capative use capacity}) \times \text{Operation time}</math>  <math>= (3 - 0.512)\text{MW} \times 200\text{day} \times 24\text{h} / \text{day}</math>  <math>= 11,942\text{MWh}</math></p> <p>2. <u>Net generation of heat</u></p> <p>When the heat generated is supplied to end-users,</p>	<p>The submitted technical specifications of equipments (IRL #58 &amp; 71) and KDHC's balance sheets for last 5 years (IRL #72) have been checked by the audit team.</p> <p>The presented net energy generation calculation (electricity &amp; heat) are reasonable based on the review of the above documents.</p> <p>The new monitoring parameter (HL: Heat loss) has been checked by the audit team.</p> <p>This issue has been solved.</p>



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<p>Based on the results of "Net" energy generation, please update PDD, ER calculation file &amp; IRR calculation. Also please provide the clear supporting documents for the results.</p> <p><u>Further Comment:</u> Please include the monitoring parameter for Heat loss in PDD according to the results of the revised calculation for net heat generation.</p>		<p>heat losses occur in district heating network. According to KDHC's last 5-year balance sheets, the average heat loss of Daegu branch of KDHC was 5.089%.</p> <p>Therefore, net generation of heat is 66,058Gcal as below calculation.</p> <p>Net generation of heat = Gross generation of heat <math>\times</math> (1 – Heat Loss) = (14.5Gcal / h <math>\times</math> 200day <math>\times</math> 24h / day) <math>\times</math> (1 – 0.05089) = 66,058Gcal</p> <p>The updated PDD, Investment analysis, ER calculation sheets and supporting documents such as balance sheets, technical specification were submitted to the audit team.</p> <p><u>Further reply for DOE's further comment:</u> The Heat loss parameter was added in the monitoring parameter in PDD.</p>	
<p><b><u>Corrective Action Request No. 19.</u></b> Please indicate the accuracies of the meters for the monitoring equipments.</p>	B.7.1.1.	The accuracies of meters were provided in tables of monitoring parameters in section B.7.1 of PDD	This issue has been solved.
<p><b><u>Clarification Request No. 1.</u></b> Please update the GPS coordinates of the project location in the PDD.</p>	A.4.1.1	The GPS coordinates of the project location are E 128° 49' and N 35° 49' and these coordinates are updated in the section A.4.1.4. of the revised PDD.	This issue has been solved.
<p><b><u>Clarification Request No. 2.</u></b> Please provide the web-site address where can be</p>	F.3.2.	According to the statistics of electric power issued by KEPCO and status of generation facility issued	This issue has been solved.



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found the source of the electricity data in PDD		by KPX, the electricity emission factor is calculated. The web-site address of 2007 statistics of electric power in Korea(2008.5) is as follows; <a href="http://cyber.kepco.co.kr/kepco_new/elec_info/info/statistical_kepco.jsp?div=3">http://cyber.kepco.co.kr/kepco_new/elec_info/info/statistical_kepco.jsp?div=3</a> The address is updated in the Annex 3 of the revised PDD.	
<b><u>Clarification Request No. 3.</u></b> Some documents among the submitted files i.e. EF calculation excel sheet, Feasibility study excel sheet are mixed with Korean and English language. Please full translate the documents to English language.	B.5.15.	The fully translated documents into English are submitted to the audit team.	This issue has been solved.
<b><u>Clarification Request No. 4.</u></b> The audit team haven't received the Modalities of Communication of the project. Please submit the MoC of the project to the audit team.	-	MoC of the project was submitted to the audit team.	This issue has been solved.
<b><u>Clarification Request No. 5.</u></b> Please provide the detail information for the monitoring system at this section.	F.4.1.	The detail information regarding the measuring points are presented in this section. The revised PDD was submitted to the audit team	The revised and updated monitoring information has been checked. This issue had been solved.

**Table 3 Unresolved Corrective Action and Clarification Requests (in case of denials)**

Clarifications and / or corrective action requests by validation team	Id. of CAR/CR	Explanation of Conclusion for Denial
-	-	-

Date: 01-08-2011  Project No.: 1293418	<b>Annex 2 - Information Reference List</b>  Validation of the CDM Project <b>“KDHC Daegu biomass cogeneration project”</b>	Page 1 of 10	 Industrie Service
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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)														
	TÜV SÜD	<p>On-site interviews at KDHC Daegu Branch located in 895, Daecheon-dong, Dalseo-gu, Daegu Metropolitan City in Republic of Korea conducted on February 25 ~ 26, 2009 carried out by the auditing team of TÜV SÜD:</p> <p>Validation team:</p> <table><tr><td>Jung-Ho Yoon</td><td>TÜV SÜD Korea Ltd / GHG auditor</td></tr><tr><td>In-Hwan Kim</td><td>TÜV SÜD Korea Ltd / GHG auditor</td></tr></table> <p>Interviewed persons:</p> <table><tr><td>Jong-Won Lim</td><td>General manager of Operation Department / KDHC Daegu Branch</td></tr><tr><td>Tae-Sop Song</td><td>Manager of Operation Department / KDHC Head quarter</td></tr><tr><td>Yeong-Min Kim</td><td>Manager of Project Operation Department / KDHC Daegu Branch</td></tr><tr><td>Yu-Lee Jang</td><td>Senior Consultant / Ecofrontier</td></tr><tr><td>Ji-Seon Choi</td><td>Consultant / Ecofrontier</td></tr></table>	Jung-Ho Yoon	TÜV SÜD Korea Ltd / GHG auditor	In-Hwan Kim	TÜV SÜD Korea Ltd / GHG auditor	Jong-Won Lim	General manager of Operation Department / KDHC Daegu Branch	Tae-Sop Song	Manager of Operation Department / KDHC Head quarter	Yeong-Min Kim	Manager of Project Operation Department / KDHC Daegu Branch	Yu-Lee Jang	Senior Consultant / Ecofrontier	Ji-Seon Choi	Consultant / Ecofrontier	26/02/2009	Participants
Jung-Ho Yoon	TÜV SÜD Korea Ltd / GHG auditor																	
In-Hwan Kim	TÜV SÜD Korea Ltd / GHG auditor																	
Jong-Won Lim	General manager of Operation Department / KDHC Daegu Branch																	
Tae-Sop Song	Manager of Operation Department / KDHC Head quarter																	
Yeong-Min Kim	Manager of Project Operation Department / KDHC Daegu Branch																	
Yu-Lee Jang	Senior Consultant / Ecofrontier																	
Ji-Seon Choi	Consultant / Ecofrontier																	
0.	UNFCCC Webpage	Project Design Document for CDM project “KDHC Daegu biomass cogeneration project” <a href="http://cdm.unfccc.int/UserManagement/FileStorage/RVY9T1Q0S6JWPDxUEKBL452OCG78HM">http://cdm.unfccc.int/UserManagement/FileStorage/RVY9T1Q0S6JWPDxUEKBL452OCG78HM</a>	17/02/2009	PDD version 5_GSP														
1.	KDHC	Final Project Design Document for CDM project “KDHC Daegu biomass cogeneration project”	03/04/2011	PDD version 14														
2.	UNFCCC Webpage	Indicative simplified baseline and monitoring methodology AMS-I.C ver. 18, “Thermal energy for the user with or without electricity”	Date of download of documents	Methodology														

Date: 01-08-2011  Project No.: 1293418	<b>Annex 2 - Information Reference List</b>  Validation of the CDM Project <b>“KDHC Daegu biomass cogeneration project”</b>	Page 2 of 10	 Industrie Service
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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		Methodological Tool, “Tool to calculate the emission factor for an electricity system, ver. 02”		
3.	TÜV SÜD	List of Participants on-site interview	26/02/2009	List of Participants
4.	KDHC	Feasibility Study Report ‘Renewable energy business implementation’	April 2006	CDM consideration
5.	KDHC	The results report of the 3 <sup>rd</sup> management meeting	09/05/2006	CDM Decision
6.	KDHC	The contract for construction between KDHC and Kenertec	28/09/2007	Project starting date
7.	KDHC	Korean Tax Law	24/03/2009	Law (Investment)
8.	KDHC	Annex 6. Standard durable years and scope of durable years from Korean Tax law enforcement	24/03/2009	Law (Investment)
9.	Korea Energy Economics Institute (KEEI)	A study on the Energy Utilization of Ligneous biomass	February 2007	Report issued by KEEI
10.	Korea Energy Management Corp.	Feed In Tariff from the notice of Ministry of Knowledge Economy issued by Korea Energy Management Corporation)on 30/08/2006	30/08/2006	FIT issued by KEMCO
11.	KDHC	Heat income from KDHC management statistics of KDHC (2005)	24/03/2009	Heat tariff of Investment analysis
12.	KDHC	Analytical criterion for validation on district heating project	January 2002	Investment analysis
13.	KDHC	The 23 <sup>rd</sup> Balance sheets of KDHC (for 2007)	31/12/2007	Investment analysis
14.	KDHC	Woodchip unit cost from manufacturers	01/08/2008	Investment analysis
15.	KDHC	Foreign exchange rate	March ~ April 2006	Trend of Ex. Rate

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
16.	KDHC	EUA price (The price of Carbon Credit)	September 2005 ~ April 2006	Trend of Carbon credit price
17.	KDHC	KDHC's internal Guideline_ 'Analytical criterion for project validation'	April 2006	Guideline for project feasibility
18.	KDHC	Investment analysis of KDHC Biomass Cogeneration Project Revised investment analysis of KDHC Biomass Cogeneration Project	19/02/2009 03/02/2011	Additionality – Excel sheet of Investment analysis
19.	Korean DNA	The letter of Approval from Korean DNA	19/08/2009	DNA approval
20.	KDHC	Calculation explanation and backgroud of Leakage_transportation (including the fuel efficiency of truck and Ash amount	24/03/2009	Technical spec./ Newspaper
21.	Korea Forest Service	The media annoucement for utiliztion of damaged wood infected by pine wood nematode	24/05/2006	Newspaper / Korea forest service
22.	KDHC	A study of utilization of damaged wood infected by pine wood nematode	November 2006	Several purposes
23.	Boiler manufacturers	The boiler efficiencies presented by the boiler manufacturers	Different	Technical spec.
24.	KDHC	The summary of local stakeholders process	24/03/2009	Local stakeholder
25.	Several	Local stakeholders comments received through Survey	24/03/2009	Local stakeholder
26.	Lee, Mi-Young	The local stakeholder comment received throuhg KDHC website	24/03/2009	Local stakeholder
27.	KDHC	Feasibility Study of Investment analysis_Excel file	April 2006	Excel file
28.	Korea Development	The revised guileline/creteria for feasibility study	December 2004	Guideline

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
	Institute			
29.	Daegu city	The approval of solid fuel, Biomass	25/01/2007	Approval
30.	Korean government	The approval revision of district heating (including application from KDHC)	02/07/2007	Approval & PLF
31.	Dalseo district office	The approval for building construction	24/12/2007	Approval
32.	The Ministry of Environment	Law No. 2007-180 Using clean fuel etc	29/11/2007	Baseline identification - Law
33.	Korea Forest Service	Administrative guideline for industrial utilization of pine wood nematode	01/06/2006	Guideline
34.	Korean government	The law regarding the measurement	29/02/2008	Law
35.	KEMCO	Statistics on New & Renewable energy of 2007	24/03/2009	Biomass consumption in the region
36.	KDHC, KEPCO & KPX	The calculation excel file for the emission factor of the grid	26/05/2009	EF
37.	KDHC and Kenerte	The Contract for construction (including main equipments supply)	20/09/2007	Contract date
38.	KDHC	Technical specifications for Environmental equipments in the Design requirements (Multi-cyclone, Electrostatic Precipitator and Selective Non-Catalytic Reduction system)	17/04/2009	Facility specification
39.	KENERTEC	Project time schedule for Construction updated by the construction company	28/11/2008	Project time schedule

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		KENERTEC		
40.	KDHC	Heat generation status of KDHC Daegu branch	24/03/2009	Plant load factor
41.	KDHC & KEEL report	The biomass availability in the region based on the KEEL report_ A study on the energy utilization of ligneous biomass	08/07/2009	Biomass availability
42.	KDHC and several report	The Plant load factor calculation supported by the above several documents_IRL 30, 33 & 40	Different	Plant load factor
43.	KDHC	The alternative scenario for possible delay of the project implementation caused by the financial crisis of Kenertec	14/05/2009	Project implementation
44.	KDHC	The organization chart of KDHC Daegu Branch	26/05/2009	Monitoring organization
45.	KPX	The operation directive of the electricity market_KPX	01/11/2008	Monitoring_Calibration
46.	KDHC	Sample screen copy of DCS in KDHC Daegu branch	17/04/2009	Monitoring_DCS
47.	KDHC	The explanation for the selection of baseline scenario with the detail supporting values_Refer to the below IRL 48 ~ 58 for the back-up documents.	11/05/2009	Baseline scenario selection
48.	KPX	#1 LNG power generation cost (Korea Won / kWh) issued by KPX_Supporting document for the baseline scenario selection	April 2006	Baseline scenario selection
49.	KPX	#2 Electricity tariff from National grid (Korea Won / kWh) issued by KPX_Supporting document for the baseline scenario selection	April 2006	Baseline scenario selection
50.	KEMCO	#3 Statistic figure for small LNG cogeneration plants issued by KEMCO: Supporting document for the baseline scenario selection	September 2007	Baseline scenario selection
51.	Boiler	#4 The boiler efficiencies presented by the boiler manufacturer	Different	Baseline scenario

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
	manufacturers			selection
52.	KDHC	#5 The consideration of technical specification for small cogeneration plant	February 2009	Baseline scenario selection
53.	KPX	#6 The unit cost of electricity receiving from the grid	January 2007	Baseline scenario selection
54.	Directive	#7 The calorific value of fuels_Directive	March 2008	Baseline scenario selection
55.	Daegu City Gas	#8 The average price of LNG in Daegu City	2006	Baseline scenario selection
56.	The Ministry of Knowledge Economy	#9 The statistic figures of electricity and heat supply	December 2008	Baseline scenario selection
57.	KEMCO	#10 The study for Renewable energy RD & D strategy 2030 (Biomass) issued by the ministry of Commerce, Industry and Energy and Korea Energy Management Corporation_Page 51_Statistic figure of heat supply using LFG	November 2007	Baseline scenario selection & several purposes
58.	KDHC	<ul style="list-style-type: none"> <li>- Technical specification in P &amp; ID of the project facilities with heat balance figures (For approval version)</li> <li>- Technical specification in P &amp; ID of the project facilities with heat balance figures (For Construction version)</li> </ul>	08/07/2009 23/12/2010	Technical spec. / Project boundary / Heat generation basis
59.	KDHC & Korea Forest Service	Contract agreement between KDHC and Korea Forest Services'	May 2006	Biomass supply
60.	KDHC	Report on basic design and important measures for the Daegu woodchip renewable	25/01/2007	Technical



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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		energy project		specification
61.	KDHC & Ecofrontier	Contract with Eco-frontier as a CDM consultant'	18/06/2008	CDM project progress
62.	KDHC	The progress of promotion for Daegu Biomass Woodchip CDM	17/04/2009	CDM consideration
63.	KDHC	KDHC Daegu Biomass Emission Reduction Calculation_Final	25/01/2011	CER calculation excel file
64.	KDHC	Modalities of Communication	20/10/2009	MoC
65.	KDHC	Weighted Average Cost of Capital	25/10/2009	Investment analysis
66.	KEMCO	Statistic figures of District Heating in Korea for 2007	Year 2008	Market share status
67.	KDHC	Heat tariff policy of district heating	25/10/2009	Sensitivity analysis
68.	Local governmental eneti	Fuel efficiency of Transportation_Truck Registration certificate	21/04/2008	Leakage calculation
69.	Crusher manufacturers, KDHC	Energy consumption for biomass processing	27/01/2010	Leakage calculation
70.	KDHC	Additional explanation of Baseline scenario selection	15/02/2010	Baseline scenario selection
71.	KDHC	Electricity consumption capacity of the project facilities	16/11/2010	Calculation of Net Electricity generation & Project emission

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
72.	KDHC	KDHC's balance sheets for year 2005 ~ 2009	24/12/2010	Calculation of Net heat generation & Heat loss ratio
73.	KDHC	CDM project progress report for KDHC Daegu Biomass project	17/04/2008	CDM time line
74.	KDHC & Hyosung Ebara Engineering	Follow up construction contract with Hyosung Ebara Engineering	03/09/2010	Investment and Sensitivity analysis – Investment cost
75.	KDHC	Total paid amount to Kenertec (Original contract)	05/03/2009	Investment cost – Sensitivity analysis
76.	KDHC	FSR for KDHC Community energy supply business in Goyang_Confidential	August 2008	Benchmark_Similar project planned by KDHC
77.	Law	Community Energy Supply Business law – Revised in 2010	Year 2010	Heat tariff - Law
78.	The Ministry of Knowledge, Economy	Ministerial order of the District heat tariff Cap (2006-82)	08/08/2006	Heat tariff Regulation
79.	Kenertec	Boiler technical specification_Woodchip consumption amount per hour	19/08/2008	Biomass required amount_ $Q_{woodchip,y}$
80.	KDHC	1) Explanation of input values_Investment analysis 2) Supporting excel file for investment input values 3) Balance sheets (2002 ~ 2005) for personnel cost_Labor cost, overhead expenses, insurance cost	18/01/2011	Investment analysis: Input values i.e. Overhead expenses, Labor cost, Insurance bill, Retirement

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
		4) Blance sheets (2002 ~ 2005) for maintenance and/or rehabilitation cost 5) Maintenance history and cost_ year 2002 ~ 2005_from ERP system		wages, maintenance cost
81.	KDHC	Heat generation status of KDHC Daegu Branch	20/01/2011	Sensitivity analysis_heat generation amount
82.	KDHC & Daegu Environmental facility organization	Sensitivity_Incinerator_Must run plant_Contract with Incineration palnt (2003.9.22)	22/09/2003	Sensitivity analysis_heat generation amount
83.	KDHC & Daegu City	Sensitivity_Must run plant_LFG Supply contract	04/11/2004	Sensitivity analysis
84.	KDHC	Invoice for heat consumption of Sungseo Hansem Town (Apartment complex)	Feb. 2005	Heat tariff checking
85.	KDHC	Additional Investment Analysis with changed input values	03/02/2011	Additional investment analysis
86.	KDHC	KDHC Balance sheet for heat tariff	2006	Heat tariff
87.	KDHC	Heat Sales from Management Statistics Figure (2001-2005)	2001 ~ 2005	Sensitivity analysis – Unit Heat price & Heat sales
88.	KDHC	Fuel cost Operational Statistics Figure (2001 - 2005)	2001 ~ 2005	Sensitivity analysis – Unit fuel cost (calculated)

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Ref. No.	Author/Editor/ Issuer	Title/Type of Document. Publication place	Issuance and/or submission date (dd/mm/yyyy)	Additional Information (Relevance in CDM Context)
89.	Prime Minister's Office	Notice of DNA approval for CDM project_Republic of Korea	April 2010	DNA approval
90.	Korea Electro Technology Research Institute	Public hearings on Feed In Tariff on Renewable energy	March 2006	Feed In Tariff



Industrie Service

## **ANNEX 3**

### **Appointment certificates of the assessment team**

REPORT NO. 1293418

VALIDATION OF THE CDM-PROJECT:  
“KDHC Daegu biomass cogeneration project”



Industrie Service

# CERTIFICATE OF APPOINTMENT

Mr Jung-Ho, Yoon, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	27.04.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		27.04.11	27.04.11			

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	27.04.11				
Financial Expertise					
Date					

Qualification in technical areas	
Technical Area	Date
13.1_Waste handling and disposal	27.04.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0048/00.

Date	Signature
27.04.11	<i>Thomas Kleiss</i>





Industrie Service

# CERTIFICATE OF APPOINTMENT

Mr Köhn, Robert, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	13.04.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		13.04.11	13.04.11	13.04.11		

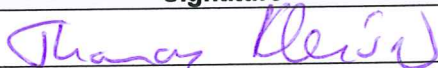
Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	13.04.11				
Financial Expertise					
Date	13.04.11				

Qualification in technical areas	
Technical Area	Date
1.2_Energy generation from renewable energy source	13.04.11
4.6_Electric and electronic industry	13.04.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0044/00.

Date	Signature
13.04.11	





Industrie Service

# CERTIFICATE OF APPOINTMENT

Mr Tausche, Konrad, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	30.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		30.03.11	30.03.11	30.03.11	30.03.11	

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	30.03.11				
Financial Expertise					
Date	30.03.11				

Qualification in technical areas	
Technical Area	Date
1.1_4.10_Thermal energy generation...	30.03.11
5.1_4.9_11.1_12.1_Chemical process industries	30.03.11
13.1_Waste handling and disposal	30.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0035/00.

Date	Signature
30.03.11	



Industrie Service

# CERTIFICATE OF APPOINTMENT

Mr Kleiser, Thomas, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	25.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		25.03.11	25.03.11	25.03.11	25.03.11	

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	25.03.11				
Financial Expertise					
Date	25.03.11				

Qualification in technical areas	
Technical Area	Date
1.1_4.10_Thermal energy generation...	25.03.11
1.2_Energy generation from renewable energy source	25.03.11
4.1_Cement sector	25.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0027/00.

Date	Signature
25.03.11	





Industrie Service

# CERTIFICATE OF APPOINTMENT

Mr Grugni, Luciano, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	23.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		23.03.11	23.03.11			

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	23.03.11				
Financial Expertise					
Date					

Qualification in technical areas	
Technical Area	Date
1.1_4.10_Thermal energy generation...	23.03.11
1.2_Energy generation from renewable energy source	23.03.11
2.2_Heat distribution	23.03.11
13.1_Waste handling and disposal	05.05.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0021/01.

Date	Signature
23.03.11	
05.05.11	



Industrie Service

# CERTIFICATE OF APPOINTMENT

Ms Zhang, Cuiyun, fulfills the requirements of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH to participate in audits.

Qualification applicable to						
Standard	CDM	JI	GS	VCS	VER	Other
Date	30.03.11					

Qualification as						
Status	Trainee	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		30.03.11	30.03.11	30.03.11	30.03.11	

Other qualification					
Country Expertise					
Region	1	2	3	4	5
Date	30.03.11				30.03.11
Financial Expertise					
Date					

Qualification in technical areas	
Technical Area	Date
1.2_Energy generation from renewable energy source	30.03.11
13.1_Waste handling and disposal	30.03.11

This appointment is valid for 1 year from its date of signature below and is bound by internal requirements of the Management System of the Certification Body "climate and energy" of TÜV SÜD Industrie Service GmbH.

In case of loss of validity of this certificate as per result of an assessment according internal procedures or due to any other reason, it will be properly communicated to you.

Your Certificate has the internal reference No. CMS-Z-0033/01.

Date	Signature
30.03.11	