



VALIDATION REPORT

PATRIND HYDROPOWER PROJECT

REPORT No. GHGCC(A)11-002

REVISION No. 4.0

GHG Certification Office

KOREA ENERGY MANAGEMENT CORPORATION



 VALIDATION REPORT

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Approved by: Chang-Hoo Lee (Director)	Organisational unit: GHG Certification Office, Korea Energy Management Corporation
Client: Star Hydro Power Limited	Client ref.: Mr. Ahmed Mufeez Sadiq
Period for Comments	09 Apr 11 - 08 May 11
Category (Sectoral Scope)	1. Energy Industries (renewable-/non-renewable sources) (1)
First PDD (version and date)	Version 02, 29/03/2011
Final PDD (version and date)	Version 06, 17/12/2012
Summary: The Korea Energy Management Corporation (KEMCO) Validation Team has conducted validation of the "Patrind Hydropower Project" in Pakistan to ensure that the proposed project is in conformity with all applicable CDM requirements including the CDM modalities and procedures, and relevant decisions by the COP/MOP and the CDM Executive Board. The validation consisted of following three phases: <ol style="list-style-type: none"> 1) Desk review of the project design, baseline methodology and monitoring plan, and relevant data and information; 2) On-site assessment and follow-up interviews with relevant stakeholders in the host country, personnel with knowledge of the project design and implementation; and, 3) Resolution of outstanding issues and issuance of the final validation report and opinion. During the validation, the Team assessed, using objective evidence, the completeness and accuracy of the claimed emission reductions and conservativeness of the assumptions made in the project design document (PDD). In addition, based on its sectoral and regional expertise, the Team assessed whether the project activity complies with the relevant requirements set out in the CDM modalities and procedures, the applicability conditions of the selected methodology and guidance issued by the CDM Executive Board. In summary, KEMCO is of the opinion that the project, as described in the project design document as of 17/12/2012, meets all applicable UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology ACM 0002(ver 12.3). Hence, KEMCO requests the registration of the "Patrind Hydropower Project" as a CDM project activity.	

Report No.: GHGCC(A)11-002	Subject Group:	
Report title: Patrind Hydropower Project		
Work carried out by: Dae Hwan Kim(Team Leader) Jin Young Park, Young Jun Kim		
Work reviewed by: Seung Ho Han		
Date of this revision: 20/12/2012	Rev. No.: 04.0	Number of pages: 91

Indexing terms

UNFCCC/Kyoto Protocol/CDM

Validation / Verification

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Abbreviations

Explain any abbreviations that have been used in the report here.

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
KEMCO	Korea Energy Management Corporation
LOA	Letter of Approval
MP	Monitoring Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change
(CDM) VVM	Clean Development Mechanism (CDM) Validation and Verification Manual

Conversion Factors and Definitions

Insert and describe any conversion factors used in the report here. In addition, define any specific terminology used in the report.



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1 INTRODUCTION

Star Hydro Power Limited has commissioned Korea Energy Management Corporation (KEMCO) to perform a validation of the “Patrind Hydropower Project” in Pakistan (hereafter called “the project”). This report summarises the validation findings for the project, as well as means of validation to assess the correctness of the information provided by the project participants.

The validation team consisted of the following personnel:

Role	Name	Organization	Scope of work	Period
Team Leader, Validator	Dae Hwan Kim	KEMCO GHG Certification Office	Hydropower technology (Technical Area Expert), Baseline emission	All Validation period
Validator	Young Jun Kim	KEMCO GHG Certification Office	Additionality, environmental impact assessment, stakeholder comments process	All Validation period
Validator	Jin Young Park	KEMCO GHG Certification Office	Hydropower technology, Additionality, monitoring plan	Document Review
Technical Reviewer	Seung Ho Han	KEMCO GHG Certification Office	Technical review	

1.1 Objective

The purpose of validation is to ensure a thorough, independent assessment of proposed project activities submitted for registration as a proposed CDM project activity against all applicable CDM requirements. In particular, application of the baseline and monitoring methodology and demonstration of the project additionality is validated through document review, on-site observation, and interviews with relevant stakeholders and personnel.

1.2 Scope

The validation scope is defined as an independent and objective review of:

- Technical description of the project;
- GHG sources and types to be included within the project boundaries;
- Baseline scenario;
- Project additionality;
- Monitoring plan;
- Comments by local stakeholders; and,
- Environmental impacts by the proposed project



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The validation scope can be extended depending on project-specific situations or required by relevant decisions by the COP/MOP and the CDM Executive Board.

1.3 GHG Project Description

The Patrind Hydropower Project is a grid-connected hydro power plant developed by Star Hydro Power Limited in Pakistan. The project will be located in Patrind village, Muzaffarabad, provinces of Khyber-Pakhtunkhwa (KP) and Azad Jammu & Kashmir (AJ&K), Pakistan.

The proposed project will generate electricity using water of the river Kunhar that rises in KP and flows into the river Jhelum. The annual generation of electricity is estimated at 632,628MWh with the installed capacity of 150MW ($50\text{MW} \times 3$) and resulting emission reductions will arrive at 269,278 tCO₂e/year, by displacing electricity generation by fossil fuel-fired plants.

This project is the first private run of river hydropower project with headrace tunnel in Pakistan. The headrace tunnel passes through the Lohar Gali ridge towards the Jhelum River. It opens into an underground surge tank, at the start of a vertical pressure shaft connecting with a horizontal pressure tunnel (penstock), dividing into three manifolds conveying design discharges to a surface type Powerhouse located on the right bank of the Jhelum River.

The power from the Project will be evacuated through a new double circuit 132 kV transmission line (to be constructed by the power purchaser) to the city of Mansehra and a single circuit tie-in with existing Muzaffarabad-Hattian Bala 132 kV transmission line.

The project is based on the Build Own Operate and Transfer (BOOT) concept, with an envisaged construction period of 51 months. Construction is expected to start in Jan 2013 and thus the plant is expected to be operational in Apr 2017.

The project has the following positive impacts with respect to contribution to sustainable development in Pakistan:

- Environmentally offsetting fossil fuel use and lowering greenhouse gas emissions;
- Socially providing jobs, development of a cultural house, ensuring reliable electricity supply, roads;
- Technologically transfer of hydropower-related technology; and,
- Economically satisfying growing energy demands to allow the country and region to develop and alleviate poverty.



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2 METHODOLOGY

The validation may consist of the following three phases:

- 1) Desk review of the project design, baseline methodology and monitoring plan, and relevant data and information;
- 2) On-site assessment and follow-up interviews with relevant stakeholders in the host country, personnel with knowledge of the project design and implementation; and,
- 3) Resolution of outstanding issues and issuance of the final validation report and opinion.

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

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

The validation protocol consists of three tables. The different columns in these tables are described in Figure1. The completed validation protocol is enclosed in Appendix A to this report.

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

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

The validation team may also use the term Clarification, which would be where:

- iv) additional information is needed to fully clarify an issue.



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Figure 1 Validation protocol tables

Validation Protocol Table 1: Mandatory Requirements				
Requirement	Reference	Conclusion		Cross reference
The requirements the project must meet.	Gives reference to the legislation or agreement where the requirement is found.	This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.		Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.
Validation Protocol Table 2: Requirement checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	Gives reference to documents where the answer to the checklist question or item is found.	Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.	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.	This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). Clarification is used when the validation team has identified a need for further clarification.
Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests				
Draft report clarifications and corrective action requests	Ref. to checklist question in table 2	Summary of project owner response	Validation conclusion	
If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.	Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.	The responses given by the Client or other project participants during the communications with the validation team should be summarised in this section.	This section should summarise the validation team’s responses and final conclusions. The conclusions should also be included in Table 2, under “Final Conclusion”.	



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2.1 Review of Documents

The Project Design Document (PDD) version 02 dated 29/03/2011 submitted initially and final version 06 dated 17/12/2012 along with additional background document /2/ - /62/ related to the project design and baseline were assessed as a part of validation.

The desk review focused mainly on the following aspects:

- Participation Requirement
- Project Design Document
- Project Additionality
- Sustainable Development and Approval by Parties involved
- Baseline Methodology and Project Baseline
- Monitoring Methodology and Plan – Coverage of Emission Sources
- Monitoring Practices and GHG Data Management

2.2 Follow-up Interviews

On 15 ~ 16th December 2011, KEMCO performed a site visit and interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organisation(person)	Interview topics
Star Hydro Power Limited	<ul style="list-style-type: none"> ➤ Project background information ➤ Project technology, operation, maintenance and monitoring capability ➤ Project additionality ➤ Project monitoring and management plan. ➤ Project approval status (incl. EIA approval, CDM project status) ➤ Stakeholder consultation process
K-water	<ul style="list-style-type: none"> ➤ Project background information ➤ Investment Barrier
Environmental Protection Agency	<ul style="list-style-type: none"> ➤ Environmental impact, Compensation ➤ EIA approval procedure
Engineering Company	<ul style="list-style-type: none"> ➤ Project Technology
Local Residents	<ul style="list-style-type: none"> ➤ General opinions of residents about this project ➤ Stakeholder consultation process ➤ Compensation ➤ Environmental impact ➤ Job opportunity increase by this project



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2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve the requests for corrective actions and clarification and any other outstanding issues which needed to be clarified for KEMCO's positive conclusion on the project design. The Corrective Action Requests and Clarification Requests raised by KEMCO, presented to the project participant in KEMCO's NC report were resolved during communications between the project participants and KEMCO. To guarantee the transparency of the validation process, the concerns raised and responses given are documented in the validation protocol in Appendix A.

Since modification to the project design document were necessary to resolve KEMCO's concerns, the client decided to revise the PDD and resubmitted the PDD. After reviewing and assessing the revised PDD, KEMCO issued this final validation report and opinion.

2.4 Internal Quality Control

The final validation report underwent technical review before requesting registration of the project activity. The technical review was performed by one Review Member qualified in accordance with KEMCO's procedure for reviewing validation and verification reports mainly in terms of validation procedures and results, and approved by Director of KEMCO's GHG Certification Office.



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3 Validation Findings

In the following sections the findings of the validation are stated. The validation findings for each validation subject are presented as follows:

- 1) The findings from the desk review of the original project design documents, and the findings from physical site inspection and interviews during the follow-up visit are summarised. These findings are in detail described in the Validation Protocol in Appendix A.
- 2) Where the validation team had identified issues that needed clarification or that represented a risk to the fulfilment of the project objectives, a Clarification or Corrective Action Request, respectively, have been issued. The Clarification and Corrective Action Requests are stated, where applicable, in the following sections and are further documented in the Validation Protocol in Appendix A. The validation of the Project resulted in 11 Corrective Action Requests and 15 Clarification Requests.
- 3) Where Clarification or Corrective Action Requests have been issued, the communications between the Client and KEMCO to resolve these Clarification or Corrective Action Requests are summarised.
- 4) In conclusion, the validation opinion of the validation team has been presented.

The final validation findings are based on the revised project design document (version 06, dated 17/12/2012) and related supporting documentation.

3.1 Approval

The project participant is Star Hydro Power Limited, Pakistan. Pakistan had ratified the Kyoto Protocol on 11 January 2005 and Ministry of Environment takes on the DNA function.

The DNA of Pakistan has issued a Letter of Approval (LoA) dated 08/05/2012, precisely referring to the title of the project activity, and confirming that the participation is voluntary and the project assists in achieving sustainable development. There are no descriptions in the LoA with respect to version number of PDD and Validation Report.

KEMCO received this letter from the project participant. Validation team checked that the LoA from Pakistan DNA for this project (Patrind Hydropower Project) is authentic by comparing it with the other published LoAs.

3.2 Participation

The participation of the project participant has been approved by the LoAs of Pakistan which are



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authorizing Star Hydro Power Limited as project participant respectively.

Validation team drew this conclusion by checking LoAs and comparing it with other published LoAs.

3.3 Project Design Document

The PDD is prepared in accordance with the latest template (version 03) and guidance published by the CDM EB.

3.4 Project Description

The Patrind Hydropower Project is a grid-connected hydro power plant developed by Star Hydro Power Limited in Pakistan. The whole scheme lies in the West, North West and East of Patrind village. The project site is Patrind village, Muzaffarabad, provinces of Khyber-Pakhtunkhwa (KP) and Azad Jammu & Kashmir (AJ&K), Pakistan. The longitude and latitude of the site are 73° 25' 46" E and 34° 20' 38" N respectively.

The gross capacity of the Project is 150 MW while net capacity after auxiliary consumption is 147 MW and based on average hydrology, it is expected to generate 632,628 MWh of energy annually. The technology to be employed is a hydropower run of river system (the first private run of river hydropower project with headrace tunnel in Pakistan). A surface type powerhouse will accommodate three vertical Francis units, each of 50 MW capacity. The headrace tunnel passes through the Lohar Gali ridge towards the Jhelum River.

It is checked that main facilities are:

- Weir
- Intake structure
- Sandtrap system
- Headrace tunnel
- Surge tank
- Power house
- Switchyard

The power from the Project will be evacuated through a new double circuit 132 kV transmission line (to be constructed by the power purchaser) to the city of Mansehra and a single circuit tie-in with existing Muzaffarabad-Hattian Bala 132 kV transmission line.

The project is based on the Build Own Operate and Transfer (BOOT) concept, with an envisaged construction period of 51 months. Construction is expected to begin in Jan 2013 and thus the plant is expected to be operational in Apr 2017.



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The project has the following positive impacts with respect to contribution to sustainable development in Pakistan:

- Environmentally offsetting fossil fuel use and lowering greenhouse gas emissions;
- Socially providing jobs, development of a cultural house, ensuring reliable electricity supply, roads;
- Technologically transfer of hydropower-related technology; and,
- Economically satisfying growing energy demands to allow the country and region to develop and alleviate poverty.

The validation has been undertaken by reviewing documents and site inspection conducted on 15th ~ 16th Dec 2011 to check if the description of the proposed CDM project activity as contained in the PDD is sufficiently accurate and covers all relevant elements and provides the readers with a clear understanding of the nature of the proposed CDM project activity.

After checking, two CLs and two CARs have been raised.

- **CL1:** The estimated net power generation 632,628 MWh(in A.2 in PDD) is different from 687 GWh (in page 14-7 of FSR/4/)
 - **Corrective Actions:** 687 GWh of FSR is calculated based on past average monthly head while 632,628 MWh is based on past average daily head. This new value approved by NEPRA(National Electric Power Regulatory Authority) on August 2011.
 - **Conclusions:** Validation team checked 632,628 MWh is presented in 'Proposal for EPC Level Tariff' /5/ and approved by NEPRA /6/. So Validation team concluded that 632,628 MWh is more appropriate for explaining this project. NC is closed.
- **CL2:** PDD said that the total capacity is 150MW and the net capacity after auxiliary consumption is 147MW. It means that the portion of auxiliary consumption is 2%. Then the portion is not matched to 0.5% of auxiliary consumption in FSR(in page 14-7 of FSR)
 - **Corrective Actions:** The auxiliary consumption ratio in Feasibility Study had not considered transformer loss, head loss increase due to long water transfer. So the auxiliary consumption has been newly calculated and approved by NEPRA(National Electric Power Regulatory Authority) on August 2011.
 - **Conclusions:** Validation team checked 'Difference in Auxiliary consumption FS vs Basic Design' /7/ and PPA Schedule (page49) /8/ which states that 150MW is measured at generator terminal while the net capacity is 147MW measured by metering system. Validation team also checked that this is approved by NEPRA /6/. So Validation team concluded that 2% is reasonable for this project. NC is closed.



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- **CAR1:** During site visit, validation team checked that emergency fossil fuel generator will be installed on project site. The description on emergency fossil fuel generator has not been contained in PDD.
 - **Corrective Actions:** The introduction on emergency fossil fuel generator has been described in PDD.
 - **Conclusions:** Validation team checked that the existence of emergency fossil fuel generator is properly added in section A.2 in PDD. NC is closed.

- **CAR2:** 5.91 million tonnes CO₂e over the 21 year can be varied according to GEF of each crediting period.
 - **Corrective Actions:** This sentence has been removed from the PDD in response to this CAR.
 - **Conclusions:** Validation team checked that the sentence has been removed in revised PDD. NC is closed.

In conclusion, it is confirmed that the description of the proposed CDM project activity as contained in the PDD is sufficiently accurate and complete. Validation team also checked the document/18/ which states that this project is not related to official development assistance from Annex I Parties.

3.5 Baseline and Monitoring Methodology

3.5.1 Applicability of the selected methodology to the project activity

This project is using the ACM0002 (ver 12.3), which is valid until 11/01/2013 for request for registration. According to ACM0002 (ver 12.3), the methodology is applicable under the following conditions:

- The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;

This project is the installation of hydro power plant. So it is applicable.

Besides, in case of hydro power plants, one of the following conditions must apply:

- The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or
- The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m²; or



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- The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2 .

This project activity results in a new reservoir and the power density of the power plant is greater than 262 W/m^2 . So it is applicable.

In addition, it is applicable because this project is not

- the project activity that involves switching from fossil fuels to renewable energy source at the site of project activity
- a biomass fired power plant
- hydro power plants results in new reservoir where the power density is less than 4 W/m^3 .

In conclusion, it is determined that the baseline and monitoring methodology is correctly applied and is not subject to a clarification, revision or deviation. Validation team also confirmed that this project is not expected to result in emissions more than 1% of the expected ER/year and which are not addressed in the methodology.

3.5.2 Project boundary

Validation team checked project boundary by document review and site visit.

The spatial scope of the project boundary comprises the project site and all power plants connected physically into national grid. There are no significant transmission constraints between the power plants of the Pakistan.

The project activity is a construction and operation of a new hydropower plant with a 150 MW installed capacity that is located at plant on the stream of Jhelum in Khyber-Pakhtunkhwa (KP) and Azad Jammu & Kashmir (AJ&K) of Pakistan. The project will provide the electricity to the grid only generated by utilizing hydro resources and will supply.

Project participants justified and chosen sources or gases to be included within the project boundary according to the methodology. In addition, the emission from emergency fossil fuel generator is included. In conclusion, it is confirmed that all sources and GHGs required by the methodology have been included within the project boundary as shown in table of B.3 in PDD.

3.5.3 Baseline identification

As per ACM0002 (Ver.12.3), if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario should be as follow:

- Electricity delivered to the grid by the project activity would have otherwise been generated



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by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to Calculate the Emission Factor for an Electricity System”.

It is checked that there are no special national and/or sectoral policies and circumstances which should be considered in relation to baseline identification.

Given that the dispatch data for electricity system in the WAPDA (Water and Power Development Authority, Pakistan national electricity system) is not available and lowcost/must run resources constitute less than 50% of total grid generation in average of the 5 most recent years, Simple OM (Operating Margin) method was chosen. In addition, the project proponent calculated BM (Build Margin) taking into account the set of power capacity additions in the electricity system that comprise 20% of the system generation and that have been built most recently since it represents the larger annual generation than the set of five power units that have been built most recently.

In conclusion, it is confirmed that PDD provides clear description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity.

3.5.4 Algorithms and/or formulae used to determine emission reductions

The algorithms and formulae in the PDD are following those in the approved methodology of ACM0002(ver 12.3). As per ACM0002(ver 12.3) the emission reductions (ER_y) by the project activity during the crediting period is the difference between the baseline emissions (BE_y) and the project emissions (PE_y). The leakage (LE_y) is not considered according to the applied methodology.

$$ER_y = BE_y - PE_y$$

For hydro project activities power density is over $10W/m^2$ and result in new reservoirs the project emissions (PE_y) is zero according to the methodology.

The baseline emissions (BE_y) are demonstrated in Section B.6.1 of PDD and are calculated using methodology equations is as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year y (tCO₂/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂/MWh)



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The calculation of $EG_{PJ,y}$ for greenfield renewable energy power plants for this project activity which involves the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, is as follows:

$$EG_{PJ,y} = EG_{\text{facility},y}$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EG_{\text{facility},y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

Hence, the final derived equation from above is as per the methodology.

$$BE_y = EG_{\text{facility},y} * EF_{\text{grid,CM},y}$$

The baseline emission factor for the project is determined ex-ante as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM).

For the calculation of the OM, the Simple OM emission factor calculation method is selected because low cost/must run resources constitute less than 50% of the total grid generation in average of the five most recent years and data is not available for applying the dispatch data analysis.

The electricity generation and fuel consumption data by plants are used quoting from the Pakistan Energy Year Book 2009 /9/ published by the Hydrocarbon Development Institute of Pakistan, Ministry of Petroleum & Natural Resources, Government of Pakistan. Country specific data for net calorific value (NCVi) of each plant from the Pakistan Energy Statistical Yearbook /19/ and the IPCC 2006 default value of carbon emission factor of each type of fossil fuel are also used in calculating baseline emission factors. Three-year data from 2007 to 2009 are used for operating margin calculation. The OM is calculated to be 0.6013 tCO₂/MWh as a generation-weighted average for the consecutive three years. The BM is calculated to be 0.250 tCO₂/MWh. Given that the weighting factors, w_{OM} and w_{BM} are selected as 0.5 and 0.5, respectively, as stipulated by Tool to calculate the emission factor for an electricity system. The combined margin of 0.42565 tCO₂/MWh is fixed ex-ante for the crediting period.

With regards to the application of the approved methodology and to calculation of GHG emission reductions, four CARs and one CL were raised and then closed out as follows;

- **CAR3:** According to the ACM0002, PDD should use the latest version of tool to calculate the emission factor for an electricity system. This project has used 7 steps for CM calculation from previous version instead of 6 steps of the latest version.



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- **Corrective Actions:** The relevant sections of the PDD and associated Excel calculation files have been updated accordingly, following the latest version of the Tool.
- **Conclusions:** Validation team checked that the latest version of tool to calculate the emission factor for an electricity system has been applied in revised PDD. NC is closed.
- **CAR4:** Step1 of B.6.1 of PDD is not matched to the latest version of tool to calculate the emission factor for an electricity system. PDD has not identified any connected electricity systems.
 - **Corrective Actions:** The consideration to identify any connected electricity system has been added in revised PDD.
 - **Conclusions:** Validation team checked that PDD has considered the connected electricity system in revised PDD. NC is closed.
- **CL3:** It's not clear if imported electricity can be contained as Low-cost/Must-run electricity in OM calculation in Pakistan(refer to step3 of B.6.1 of PDD)
 - **Corrective Actions:** The imported electricity has been deleted in Low-cost/Must-run electricity in OM calculation.
 - **Conclusions:** Validation team checked that The imported electricity has been deleted in step 3 of B.6.1 in revised PDD. NC is closed.
- **CAR5:** According to Pakistan Energy Yearbook 2009, the each period of yearly generation data starts from July to June of next year while from January to December in PDD.
 - **Corrective Actions:** PDD has been revised accordingly.
 - **Conclusions:** Validation team checked that the year has been applied correctly following Pakistan Energy Yearbook 2009 /9/ in revised PDD. NC is closed.
- **CAR6:** In calculating emission factor, PDD doesn't select IPCC default values at the lower limit of the uncertainty at a 95% confidence interval according to the tool to calculate the emission factor for an electricity system.
 - **Corrective Actions:** IPCC default values at the lower limit of the uncertainty at a 95% confidence interval have been correctly selected according to the tool to calculate the emission factor for an electricity system.
 - **Conclusions:** Validation team checked that the values have been correctly applied in EF calculation according to the tool to calculate the emission factor for an electricity system. NC is closed.

In conclusion validation team determined like the followings.



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- Correct equations and parameters have been selected among the options and the adequate justification has been provided for the choice, in accordance with the methodology.
- The justification given in the PDD for the choice of data and parameters used in the equations been checked and concluded to be reasonable.
- All data sources and assumptions are appropriate and calculations are correct, applicable to the proposed CDM project activity.

3.6 Additionality

The project is a large scale project. Validation team checked that the additionality of the project was demonstrated based on the “Tool for the demonstration and assessment of additionality (Ver 7.0)”, in accordance with ACM0002.

3.6.1 Prior consideration of the clean development mechanism

It is confirmed that the proposed project is classified as a new project activity (a project activity with a start date on or after 02 August 2008). The main construction contract /11/ date is 20/09/2010. So the start date of the project activity is chosen as the date when the main construction contract had been signed according to the “Glossary of CDM terms” (ver05).

If the start date of project is after 2 August 2008, Project Participants should inform the Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status.

- **CL4:** The exact prior consideration date is not described in PDD according to guidelines on the demonstration and assessment of prior consideration of the CDM.
 - **Corrective Actions:** The PDD has been updated accordingly to provide a more detailed explanation of the procedures that the PP followed in accordance with the Prior Consideration Guidelines.
 - **Conclusions:** Validation team checked that the start date is defined as 20/09/2010 in table : Project timeline to date showing key milestones of B.5 of PDD when EPC contract was signed /11/. NC is closed.
- **CL5:** It's difficult to check when the investment decision date by K-Water in table : project timeline to date showing key milestones.
 - **Corrective Actions:** The decision date by K-Water is 29 Jan 2009 when the Board of Director approved investment decision.
 - **Conclusions:** Validation team checked that the decision by K-Water is established on 29 Jan 2009 /12/. NC is closed.



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Validation team checked the CDM prior consideration document (04/02/2011 and 08/09/2010 /20/) submitted to UNFCCC and Pakistan DNA.

It is checked that the main decision maker for this project was K-water. After checking documents and interview with PP, validation team could conclude that CDM benefits were seriously considered by K-water decision-makers in the decision to proceed with the project activity before the project activity started.

In conclusion, it is determined that the CDM was seriously considered in the decision to implement the project activity with the requirements of EB guidance for prior consideration.

3.6.2 Identification of alternatives

The project activity is the installation of a new grid-connected renewable power plant, so the baseline scenario is the following according to the ACM0002(ver12.3)

- Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the tool to calculate the emission factor for an electricity system.

So, PDD doesn't have to consider other alternatives for this project. But, according to Tool for the Demonstration and Assessment of Additionality (ver 7), project participant has identified three alternatives to the project activity, viz.

- a) The project activity not implemented as a CDM project;
- b) The continuation of the current situation (business as usual/ the additional power generated under the project would be generated in existing and new grid-connected power plants, which are mainly thermal, in the electricity system);
- c) All other plausible and credible alternatives to the project activity that provide an increase in the power generated at the site, which are technically feasible to implement.

The validation opinion on each alternative is as below:

	Alternative Description in PDD	Validation Opinion
a)	Alternative (a) is not a realistic alternative according to the investment barrier. Without the assistance of the CDM, the project is not attractive for investment.	It is evident that investment decision could be decided by the expectation for CDM registration. So it is acceptable that Alternative (a) is not a realistic.
b)	The continuation of the current situation (no project activity or other alternatives undertaken) with electricity provided from the Pakistan national grid is a credible and	It can be acceptable as baseline scenario.



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	realistic scenario.	
c)	<p>Other plausible and credible alternatives to the project activity are not realistic because:</p> <ul style="list-style-type: none"> - The site does not have the space or land required for an alternative power plant other than a hydropower project (e.g. a coal, gas or oil fired project) - The harsh terrain of the site is not suited to other types of renewable energy generation, such as wind energy - Small CCGT gas or DG set oil based generation projects that are built by the private sector in Pakistan would not be considered to be a sustainable option even if they could be built at the project site. - Small hydel IPPs would similarly not provide a comparable quantity of energy as the 147 MW hydropower project activity - Large public sector hydropower projects that are currently in the pipeline are facing long delays of 15-20 years due to high investment costs 	<p>It's not realistic to construct fossil fuel power plant at the site because of space and land problem. In addition, except for hydropower resources, other renewable alternatives are wind power, solar PV, geothermal and biomass. However, investment cost in solar PV is very high and not feasible to set up a project with the same installed capacity in Pakistan at present. Biomass resources can be considered in Pakistan, but so far investment of biomass technologies has been facing obstacles due to lack of technology and experiences as well high investment cost. As regards wind energy, the Project located in inland without special landform and lacks of feasible wind resources. Moreover, use of wind energy to construct a project of similar size would involve very high project cost. It's acceptable that it is difficult for small hydel IPPs to construct 150MW plant due to lack of money. It's also checked that it is difficult for public sector to start construction at the site because of financial problem. Many public projects have been delayed due to high investment cost.</p> <p>Therefore, validation team concluded that alternative (c) does not offer attractive investment opportunity.</p>

Hence, alternative (b) alone could be justified as realistic, credible and plausible alternative.

In relation to identification alternatives, two CLs are raised.

- **CL6:** “The current total installed power generation capacity from the Asian Development Bank (ADB) on Rental Power Projects in Pakistan (published January 2010), is about 20 GW. However, out of this base, the effective summer capacity is around 17.5 GW and winter capacity is a mere 14.6 GW. Computed power demand is 19.7 GW thereby creating a deficit of between 2.1 and 5 GW at various times during the year (step 1.a of B.5)” has difference with “The installed capacity in FY09 according to official statistics of the Private Power and Infrastructure Board (PPIB) was 19,780 MW. The current firm generation is 16,813 MW, but total peak demand is around 17,868 MW creating a deficit of 1,055 MW (A.2)”



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- **Corrective Actions:** This has been made consistent in the updated PDD.
- **Conclusions:** Validation team checked that PDD is changed according to ADB report. Considering that the Peak load of electricity can be investigated slightly differently according to investigation time, period or method. NC is closed.
- **CL7:** It's not clear if "2.1 and 5 GW" (step 1.a of B.5 of PDD) is correct.
 - **Corrective Actions:** PDD has been revised from "2.1 and 5 GW" to "2.2 and 5.1 GW".
 - **Conclusions:** Validation team checked that PDD has been changed accordingly. NC is closed.

In conclusion, Validation Team is, convinced that the project developer has taken into consideration all realistic and credible alternatives (having regard to the governing methodologies) including the project being undertaken as a non-CDM activity and continuation of current scenario.

3.6.3 Investment analysis

Investment analysis is not used to demonstrate the additionality of the proposed CDM project activity.

3.6.4 Barrier analysis

Barrier analysis has been used to demonstrate additionality of this proposed CDM project.

PDD has used Investment Barrier.

Validation team evaluated above barrier with following three criteria according to tool for the demonstration and assessment of additionality(ver7) and guidelines for object demonstration and assessment of barriers(ver1).

- If the investment barrier is real.
- If the barrier would not prevent the implementation of at least one of the alternatives.
- How the CDM alleviates the barrier to a level that the project is not prevented anymore from occurring.

1) If investment barrier is real

PDD has defined 'Lack of access to capital' is the investment barrier and listed the four explanations to support.



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1.1) Current situation - No private capital

Description in PDD	Validation opinion
The 21 hydropower plants dispatching energy to the national grid are all financed by the government	It is checked that currently operating hydropower plants dispatching energy to the national grid are all funded by government.
New Bong Escape Hydropower Project, which is still under construction, is the only private funded hydropower plant in Pakistan. The Patrind Project would be the second private-sector hydropower project.	Validation team checked the private hydro power plants under construction stage in www.ppib.gov.pk /13/ and found only two, New Bong Escape Project and Patrind Project. Validation team also checked that New Bong Escape Project is registered as CDM project (ref 2098) on UNFCCC website.

- **CL8:** Currently 15 hydropower plants in “i. Current situation – No private capital available” of Sub-step 3a of B.5 of PDD is not consistent with currently 21 existing hydroelectric power stations (non-CDM projects) in Sub-step 4a of B.5 of PDD.
 - **Corrective Actions:** The information of all 21 hydropower plants is correct. PDD has been revised.
 - **Conclusions:** Validation team checked that the number of currently existing hydro power plants is 21 in table 2-2 of ‘Hydel Power Potential of Pakistan, Private Power & Infrastructure Board, Government of Pakistan’ /10/. NC is closed.
- **CL9:** PDD said “according to the Private Power and Infrastructure Board, some IPP projects are apparently in the development pipeline but none are at an advanced stage like the Patrind Hydropower Project”. By the way, it’s not clear that the main reason of other IPP projects not being progressed is “No private capital available”.
 - **Corrective Actions:** Power projects are capital intensive. Equity investors and project lenders are generally reluctant to invest, in particular in hydropower projects, due to various policy, regulatory, political and commercial issues. Some of these issues faced by a hydropower project are:
 - Land acquisition is tedious and challenging
 - No clarity/ consensus on net hydel profit and water use charges (in case a project like Patrind falls in two ‘provinces’)
 - Political instability and lack of political will for implementation of the conceived or announced projects
 - Award of projects to parties without sound financial capacity
 - Inability of the power purchaser to make (timely) payments and the associated circular debt.



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- **Conclusions:** It is confirmed that there are 2 main policies to invite private investment for power plant construction in Pakistan according to www.ppib.gov.pk /13/. The first policy /14/ was established in 1995 and the second and current policy /15/ is established in 2002. It is checked that under 1995 policy, only one project (New Bong Escape Project, registered as CDM project) is under construction stage while 41 hydro projects had got LOIs from government. The main reason of not being progressed can be assumed as investment problem. Also validation team checked that most projects under policy 2002 have not started construction until now (Hydel projects in private sector /16/). From above, it is also assumed that the main reason of construction delay is financial problems. Finally, validation team concluded that the main reason of other IPP projects not being progressed is “No private capital available”. NC is closed.

- **CAR7:** According to para4 of Guidelines for object demonstration and assessment of barriers (ver01 EB50) PP shall provide the nature of companies and entities involved in this project including ownership. Daewoo Engineering & Construction Co., Ltd. is not a Subsidiary of Daewoo Group.
 - **Corrective Actions:** Reference to “Daewoo Group” to be deleted, and replace with Korea Development Bank (KDB)
 - **Conclusions:** Validation team checked that the ownership of Daewoo Engineering & Construction Co., Ltd. has been correctly changed as KDB. NC is closed.

From above Validation team finally concluded that it is almost impossible to find a private capital willing to invest a vast of money for this kind of project in Pakistan. So it is acceptable that ‘No private capital’ is a reason of investment barrier for this project.

1.2) Country risk

Description in PDD	Validation opinion
It is difficult to invest in Pakistan because of country risk.	It is checked that the country risk of Pakistan is the highest level in the world according to the OECD’s Country Risk Classifications of the Participants to the Arrangement on Officially Supported Export Credits. It is also checked that the credit rating for Pakistan is positioned as inadequate for investment.
The project site area is classified as more risky in Pakistan.	It is checked that Khyber Pakhtunkhwa where the certain parts of the Project including weir are considered more risky by Control risks group (http://www.crg-online.com/Country.aspx?cn=144).



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- **CL10:** It's not clear if country risk has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).
 - **Corrective Actions:** PDD has been revised accordingly. Refer to step 3 of section B.5 in PDD.
 - **Conclusions:** It is confirmed that PDD has sufficiently explained with objective evidence that country risk is one of main reason for investment barrier according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1). NC is closed.

It is also checked that:

- The PP, SHPL, established in 2006 as a SPC for this project by the subsidiary companies of Al-Ghurair Group, UAE could not get financing from banks. The main reason of financing failure is estimated as country risk.
- According to interview with Mr. Taekwon Seo, who was in charge of project financing in the latter half in 2008 in K-water, K-water understood that it's not easy to get financing from private bank because of the country risk. It is supported by the letter /28/ from Shinhan Bank explaining that commercial banks are reluctant to invest in Pakistan due to high country risk. So K-water requested financing from Korea Development Bank which is owned by Korea government. But the project financing team manager of Korea Development Bank rejected it because of country risk. After that K-water contacted with KEXIM(Korea Export and Import Bank) and SCB(Standard Chartered Bank) to get loan but failed due to the country risk. Later KEXIM re-evaluated this project from CDM perspective and decided to consider financing this project.

From above Validation team finally concluded that country risk has been existed since 2006 when SHPL established and this risk has been main reason of investment barrier for this proposed project.

1.3) No available financing

Description in PDD	Validation opinion
Financing is difficult for this project because banks are not willing to lend money due to the risk.	It is acceptable that it would be difficult for local company who has low credit rating to borrow money for construction from banks. In addition, it is also checked that banks demanded 25%



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	equity though local rules allow 20% equity for infrastructure project.
The multilateral banks (MLBs) are willing to consider the financing for the project below a competitive margin of 4.75% only due to the presence of the Government of Korea's state owned K-water as a major sponsor (having credit rating of A from S&P and A1 from Moody's)	It is checked that the subsidiary companies of Al-Ghurair Group, UAE which had established SHPL in 2006 as a SPC for this project could not get financing from banks until 2009. The reason is estimated as financing difficulties. It is also checked that the financing could be available after the participation of K-water focusing on CDM project development following Korea government's green growth policy.

- **CL11:** It's not clear if financing risk has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7.0) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).
 - **Corrective Actions:** Considering the country risks and the global financial market, it is difficult to attract investors to invest in a capital intensive industry on a non-recourse basis. Please see step 3 of section B.5 in PDD for details.
 - **Conclusions:** It is confirmed that financing is difficult for this project from the fact that the bank demanding 25% equity while Pakistan government allow 20% equity for infrastructure project or renewable energy project. From above Validation team concluded that financing risk is one of main reason for investment barrier according to para 42 of tool for the demonstration and assessment of additionality (ver7.0) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50). NC is closed.

From above, validation team concluded that 'No available financing' can be another reason of investment barrier. (please refer to CL 11)

1.4) High capital requirement

Description in PDD	Validation opinion
The capital cost required for the Patrind Hydropower Project is currently estimated at US\$ 436 million. It's not easy for private sector to gather such a high capital for hydropower project in Pakistan.	It can be acceptable that to arrange high capital in private sector for this kind of project is difficult considering investment risks. It is explained by the fact that there is no private hydropower plant which is currently operating in Pakistan.



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- **CL12:** It's not clear if high capital cost has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7.0) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).
 - **Corrective Actions:** This project is hydro power project in Pakistan and needs large private investment. Longer construction period translates into more Interest During Construction(IDC) and construction risks as well. Being a capital intensive project with long payback period attracting private investment to the tune of [US\$ 436 million] would not have been possible. There are only a few investors who may be willing to take up the project of such a large scale. Please see step 3 of section B.5 in PDD for details.
 - **Conclusions:** It is checked that there is no private hydropower plant which is currently operating in Pakistan. It is also checked that the unit investment cost per MW of this project is 2.9 million USD while that of New Bong Escape project is 1.23 million USD. It is also acceptable that normal investor will not invest the project with long payback period and high capital cost. From above Validation team concluded that high capital cost is one of main reason for investment barrier. NC is closed.

From above, validation team concluded that 'High capital requirement' can be one of the reasons of investment barrier. (please refer to CL 12)

It is also checked that the technological risks is the important factor of high capital requirements.

Description in PDD	Validation
The Patrind Project is therefore the first private sector initiated project in Pakistan that is run-of-river type with headrace tunnels that utilize the natural elevation difference to increase the head of water, which enables the site to use Francis turbines. Therefore, there is significant technical risk in developing the Project. Long construction period, lack of local expertise, environment and resettlement issues etc constitute a significant technological risk in developing the Project. However, the additional revenues and international experience from the CDM provide a buffer around these risks.	It is checked that this is the first private run-of-river hydro power project with headrace tunnels using Francis turbines in Pakistan. So it is acceptable that this project has technical risk which can result in investment cost increase due to construction delay, lack of local expertise, etc.

- **CL13:** It's not clear if this technological risk is real considering that there are some public projects using similar technology in Pakistan.



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- **Corrective Actions:** This project is the first private run of river hydropower project with headrace tunnel that utilize the natural elevation difference to increase the head of water in Pakistan. Tarbela and Ghazi Barotha projects are owned and operated by the public sector. So these two hydro power projects are not comparable to this project because the technical and financial circumstances are different. According to section 7. Liquidated Damages in PPA schedule /8/ if construction is delayed PP should pay penalty. It's difficult to predict what kind of rocks will be found during construction period. Considering that the above public constructions were also delayed due to the lack of expertise for tunnel excavation it can be said that there are not enough expertise and experiences of tunnel boring regarding this project in Pakistan.
- **Conclusions:** Validation team checked by site interview that this is the first private run of river hydropower project with headrace tunnel that utilize the natural elevation difference to increase the head of water and the experiences of tunnel boring regarding this project are little in Pakistan. So this project can be considered as risky business where nobody knows the rock type to be encountered during the execution and the geological uncertainty in the underground structures make things even more complex. Validation team also checked that PP should pay 12,250USD/day during delayed period according to PPA schedule and lose electricity revenue. If unexpected situation, i.e. finding difficult rock type, is raised during construction, the period might be extended over the defined 51months construction period agreed between PP and power purchaser, in that case, PP should pay the penalty. In addition, If the construction is delayed by more than 400 days, the concession agreements with the Pakistani Government will be terminated and the project owner has to give up the project. From above validation team concluded that this project is different from public projects which don't have to pay delay penalty to government and this project has evident technical risk which can cause investment increase.

Finally, It is concluded that to finance for the private hydropower project like this project is very difficult due to lack of private capital, high country risk, high capital requirements in Pakistan.; This conclusion can be also proved by the facts that;

- The condition for hydropower plant construction like this project by private sector has not been matured until now in Pakistan.
- The SHPL(Star Hydro Power Company) initially established and owned by UAE company couldn't find investment for construction from banks.
- K-water, Koran government owned organization, acquired SHPL to register CDM project following Korean government green growth policy. But it was not easy to find investment from banks.
- It took long 13 years for financial closing in case of recently CDM registered New Bong Escape hydropower project.

So, validation team decided that this investment barrier is real.



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2) If the investment barrier would not prevent the implementation of at least one of the alternatives.

- **CAR8:** PDD does not clearly show that the investment barrier would not prevent the implementation of at least one of the alternatives According to para 42 of tool for the demonstration and assessment of additionality (ver7). PDD should provide transparent and documented evidence, and offer conservative interpretations of this documented evidence, as to whether alternatives are prevented by these barriers.
 - **Corrective Actions:** It is clearly added in PDD that investment barrier does not prevent the continuation of current situation which is one of the alternatives defined in PDD.
 - **Conclusions:** PDD has revised to include that investment barrier would not prevent the continuation of current situation. Validation team concluded that it is acceptable because the alternative mentioned is the continuation of current situation. NC is closed.

3) How the CDM alleviates investment barrier to a level that the project is not prevented anymore from occurring

- **CAR9:** According to para5 of Guidelines for object demonstration and assessment of barriers(ver1 EB50) PDD should demonstrate in an objective way how the CDM alleviates investment barriers to a level that the project is not prevented anymore from occurring by any of the barriers. Also, PDD should provide transparent and documented evidence, and offer conservative interpretations of this documented evidence.
 - **Corrective Actions:** Investment barrier could be overcome by CDM scheme. K-water, the main shareholder could start this project according to company's internal policy which places CDM developments as part of high priority long term master plan for sustainable management. In addition, KEXIM, the largest lender for this project could provide loan on the condition that this project seeks CDM under the Kyoto Protocol of the UNFCCC. Moreover Shinhan BNP Paribas Global Infrastructure Fund (GIF) and ADB could participate in this project considering CER benefit. The documents related to above are submitted to DOE.
 - **Conclusions:** Validation team concluded that the possibility that this project can be registered as CDM project could allow to invest for this Pakistan hydro power project.
 - K-water is a public company to handle water resource in Korea. K-water has established its sustainable development criteria, which states that CDM developments are important activities for its sustainable development. Validation



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team checked above criteria in K-water's 2006 sustainability report /17/. It is checked that the above criteria has been strengthened following Korean government's green growth policy released by President on 15/08/2008 so K-water was seeking the chance to participate in CDM projects more earnestly. It is supported by that K-water has already developed 6 registered CDM projects and 5 projects at validation on UNFCCC website.

- The board of K-water decided to progress this project on 29/01/2009 after negotiation with KEXIM. But the loan was delayed and seemed to become null due to global financial crisis prevailing all over the world in 2008 ~ 2009.
- In relation to Korea government green growth policy, KEXIM decided to provide loan to this project again /33/ in condition that this project should be progressed as CDM project. Validation team also checked CDM supporting letter /29/ between K-water and KEXIM in which CDM is focused on seriously. So, validation team concluded that CDM is a main reason for K-water to participate in this Pakistan hydro project.
- Validation team also checked the MoU document between KEXIM (Export-Import Bank of Korea) and Korean government /35/. The main content of MoU is to establish 100 billion KRW (around 90 million USD) fund to invest mainly for overseas CDM projects. Validation team also found the news article on the above MoU /59/ which state that the main purpose of the MoU is to promote overseas CDM project development. Finally validation team concluded that CDM possibility enabled KEXIM to invest for this project.
- Shinhan BNP Paribas Global Infrastructure Fund (GIF), managed by Shinhan BNP Paribas Asset Management Co. Ltd. could participate in the project as a financial investor. Validation team checked the supporting letter from responsible person of Shinhan BNP Paribas Asset Management Co. Ltd. /22/ and concluded that CDM is direct motive to invest for this project.
- Validation also reviewed supporting letter from ADB /30/ and concluded that CDM was important reason of ADB investment.
- Finally validation team concluded that PDD has demonstrated that CDM could overcome the investment barrier for this project in objective way with appropriate documented evidences.

Finally, it is confirmed that:

- K-water would not start this proposed project due to country risk and financing problem unless CDM registration possibility.
- The participation of K-water, which has high credit rating, and the Korean government's Green Growth Policy to promote CDM projects could make KEXIM to invest on this project.
- The participation of KEXIM enabled other MLB to invest on this project.
- So, It is concluded that this project has a investment barrier, which would not prevent the implementation of at least one of the alternatives.
- CDM alleviates the barrier to a level that the project is not prevented anymore from occurring.



3.6.5 Common practice analysis

Common practice analysis has been fulfilled according to “Tool for the demonstration and assessment of additionality (ver07.0)” and “Guidelines on Common Practice (ver2.0).

- Applicable geographical area: PP selected all Pakistan area. Validation team checked the definition of guidelines and concluded that this is reasonable.
- Applicable output range: PP defined the output range as from 75MW to 225MW. Validation team checked that the capacity of this project is 150MW, so 75 ~ 225MW is appropriate to the guidelines.
- N_{all} : PP has taken all type of the power plants(not only hydro power but also other type, except for CDM applied plants) that deliver the same output or capacity, within 75 ~ 225MW and then found 20 projects. Validation team checked “Pakistan Energy Year Book 2010 /23/” and confirmed that $N_{all} = 20$.
- N_{diff} : PP identified all 20 projects as N_{diff} and validation team checked that all projects have at least one evident difference compared to proposed project.

Name	Type	note
Chashma (184MW)	Hydro	- Investment climate is different: This project was developed by public sector which is different to this proposed project.
KANUPP (137MW)	Nuclear	- Technical type is different: This is nuclear power plant.
Other 18 Thermal Power Plants including SPS Faislabad (132MW)	Thermal	- Technical type is different: These are thermal power plant.

- $N_{all} - N_{diff} = 0$

It is also confirmed that:

- All IPP power plants supplying power to grid are fossil fuel thermal type plants. No IPP hydro power plant is operating in Pakistan
- The only IPP hydro power plant currently under construction is New Bong Escape project already registered as CDM project (ref 2098)
- Other IPP hydro power projects listed in PPIB are delayed due to several problems including financial difficulty.

Finally, validation team concluded that large scale Hydro Power plant like Patrind project which is developed by private sector is not common practice in Pakistan.



3.7 Monitoring Plan

The monitoring plan for the project activity is established pursuant to the approved baseline and monitoring methodology, ACM0002(ver 12.3) and “Tool to calculate the emission factor for an electricity system (ver 3).”

Operational and management structure will be organized and training also be provided for CDM monitoring.

The grid emission factor($EF_{grid,CM,y}$) doesn't have to be monitored because combined margin emission factor (CM) is determined ex-ante based on the most recently available information.

The net electricity generated(EG_y) from the project will be measured continuously and recorded at least on a monthly basis according to PPA.

Validation team checked that the meters will be installed by SHPL but owned, maintained, procured by Power Purchaser according to PPA Schedule 6 /8/. A back up meter will also be installed to crosscheck and for main meter failure. The accuracy of each meter is 0.5% and the calibration and maintenance will be carried out following manufacture requirements according to PPA. PPA also has established a plan for emergency situation such as fire or blackout.

A Monthly report of metered net electricity export data will be generated by the Site Supervisor, and saved in electronic and paper form. This data will be cross verified against the sales receipt from the grid.

Installed capacity and Reservoir area will also be monitored according to the ACM0002(ver 12.3). In addition, the yearly emergency generator fuel purchase receipt will be monitored to deduct emission from emission reduction for conservative calculation.

- **CAR10:** According to ACM0002, The monitoring plan for Installed capacity and Reservoir area should be contained. But PDD only mentioned Quantity of net electricity generated supplied to grid as monitoring point in B.7 of PDD.
 - **Corrective Actions:** The PDD has been updated accordingly.
 - **Conclusions:** Validation team checked that Installed capacity and Reservoir area has been inserted in monitoring parameters according to ACM0002. NC is closed.
- **CL14:** According to A.4.3 of PDD, the generated power will be evacuated 2 different transmission line(one line to the city of Mansehra and another line to Muzaffarabad-Hattian Bala). Considering above, it's not clear if the monitoring point is one or two.
 - **Corrective Actions:** The PP clarify that there is only one monitoring point at the power plant. The PDD has been updated accordingly in A.4.3.



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- **Conclusions:** Validation team checked that there will be one monitoring point through on site interview. NC is closed.
- **CL15:** KEMCO checked that there will be emergency generator on site during on site interview. Then it's not clear how the emission from the generator will be monitored and calculated for emission reduction of this project.
 - **Corrective Actions:** The method to calculate emission from emergency generators has been added in PDD.
 - **Conclusions:** Validation team checked that PP will monitor the diesel oil quantity from purchase receipt and calculate emission using IPCC emission factor. It is considered as conservative attitude. NC is closed.
- **CAR11:** The crediting time which begins in 2015 is not matched with the expected operating date (2017) (refer to page 6 of PDD).
 - **Corrective Actions:** The expected operation start date is delayed to Apr 2017 and starting date of credit period is changed as 01/04/2017.
 - **Conclusions:** Validation team checked that the credit period has been changed. NC is closed.

It is confirmed that the monitoring plan is established pursuant to the approved methodology and the monitoring arrangements described in the monitoring plan are feasible within the project design by document review and site visit.

The monitoring and QA/QC procedures including responsibilities and authorities for project management, calibration of metering equipment, double-check of key monitoring indicators are provided in the PDD and validation team confirmed that project participants have enough ability to the monitoring plan.

3.8 Local stakeholder consultation.

Validation team concluded that the invitation for local stakeholder consultation was proper after checking:

- PP sent invitations to nine stakeholders including the power purchaser, environmental protection departments and wildlife and forestry departments of the governments of the Khyber Pakhtunkhwa and Azad Jammu & Kashmir.
- Advertisement was published on The news(English), Jang Daily(Urdu), AJ&K Siasat & Mohasib(Local Urdu) on 10/09/2010 and KP Mohasib(Local Urdu) on 15/09/2010.



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- Advertising banners/hoardings were displayed in all the major communities living in the vicinity of the project activity regions.
- The management of Star Hydro Power made telephone calls to the important people belonging to the likely affected communities to ensure their participation.

It is also checked that:

- The local stakeholder meeting was held on 27th September 2010 in Azad Jammu & Kashmir and in Khyber Pakhtunkhwa on 28th September 2010.
- 71 people from local communities attended the meeting in AJ&K, and 114 people in KP attended the meeting.
- The proceedings of both meetings were recorded in audio format and the minutes of meeting were recorded in paper format.

The summary of comments received and due accounts taken in AJ&K are:

1. In view of excessive hurdles and requirements in the development of hydro power projects implementation, why don't we go for other projects like coal projects which is available in abundance in Pakistan?
 - Only renewable energy projects can be opted under CDM. The projects such as run-of-the-river are not common in Pakistan therefore these could be good candidates for development under CDM and CDM revenue can off-set a part of additional costs that arise from such barriers.
2. Who are the beneficiaries of the CDM revenues?
 - The revenues will be shared with the project participants. In indirect manner it may help the country in the shape of foreign exchange.
3. No poverty alleviation plan is mentioned in EIA and no baseline survey on fisheries has been conducted. The project sponsors should take these issues into consideration.
 - The community development plan is under consideration by SHPL and will be finalized with the help of government authorities.
4. How this project will be helpful to the ordinary citizens of the region. How the local unemployed youth can take the benefits from this project?
 - The construction activities will allow the opening of new jobs for the skilled and unskilled labour. Similarly, the Project Company, SHPL will prefer to hire local staff for operation of the project.

The summary of comments received and due accounts taken in KP are:



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1. Concern about the water availability after construction of weir. The water shortages can adversely affect a nearby nursery and tea orchards during low water months. The village Batangi Lower should also be included in the survey to see if it can be affected by the project. Also, the houses downstream of the weir are very close and can be face additional hazards during earthquake.
 - A minimum of 70.6 cusec amount of water shall be available even in low flow season which is considered adequate for usage by the locals. As per the calculation of of the SHPL engineers, this amount is sufficient during low flow season. Due to number of water streams and water to be released from the river Kunhar, the minimum required amount of water shall be available for consumption by locals (even though they are not directly dependent on river water for usage in winter season). Sufficient water will be discharged during low water months to meet the downstream needs.
2. Inquiry about the exact details of how many number of affected households, exact location of submerging areas and part of road shall go under water by constructing the weir.
 - Only one house will be needed to relocate while no other major structures will be submerged by rise of water. However a survey by the technical advisor is under progress which shall exactly locate the level of water rise and such point will be physically highlighted by various highlighters and coloured markers etc.
3. Concern about potential pollution caused due to the project, that all environmental aspects should be monitored before starting the project. All complaints of the local communities should be resolved properly.
 - All the necessary steps will be taken to preserve the local environment and all the necessary steps will be taken for satisfaction of the local communities.
4. Security issues due to the project location in terms of the colony and compound for project construction personnel.
 - All staff colonies including staff from Pakistan and Korea shall be built in AJ&K part and therefore people on KP side need not to worry about privacy aspects.
5. Concerns regarding the crushing plant planned in populated area.
 - The area designated for crushing is not located in populated area so people should not worry and should not feel endangered by crushing activity since selection of location has been made after due consideration.
6. Request for another meeting in Deedal Meera, Dalola and Sarati with more detailed information about the construction schedule and the exact number of affected households and areas. SHPL also needs to mark the rise in water level that would be assumed after construction of weir by some highlighters and placing colouring markers in order to demonstrate to the concerned villagers that how much water would rise after weir construction.



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- SHPL will send technical personnel to these villages in order to share the exact details with the public and they will elaborate all technical details including rise of water after Weir construction etc.

Validation team checked the above and concluded that the comments were received properly and due accounts has been taken appropriately. Especially, in relation with the NO 3 comment from AJ&K, validation team checked that community development plan is established properly in Resettlement Plan (March 2011) /24/ and Environment Management Plan (April 2011) /25/. In addition, validation team also checked that EIA public hearing was held at Deedal Meera on 1st February 2011 /26/ and at Sarati 18th February 2011 /27/ in order to satisfy demand of holding such a meeting there.

Validation team also checked that Land compensation procedure has been progressed properly following Pakistan laws (Land Acquisition Act 1894) under inspection by international loan bank investing to this project.

In conclusion, validation team confirmed by means of document review and interviews with local stakeholders that:

- a) Comments by local stakeholders that can reasonably be considered relevant for the proposed CDM project activity have been invited.
- b) The summary of the comments received as provided in section E.2 of the PDD is complete.
- c) There are no any negative comments or opinions received during the stakeholders' consultation.
- d) Local stakeholders consultation has been fulfilled adequately.

3.9 Environmental impacts

The Environmental Impact Assessment has been undertaken as per the related rules of Pakistan. Validation Team checked the Environmental Impact Assessment report which included potential environmental impacts by the proposed project to the neighboring area and how to minimize the identified impacts. The EIA was approved by the government of Azad Jammu on 11/08/2010 and Kashmir and the government of Khyber Pakhtunkhwa on 14/04/2011. Validation team also checked the above by document review and interview with Pakistan EPA person when site visit. It was therefore concluded that project does not have any significant environmental impacts.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

In accordance with Paragraph 40(c) of the CDM Modalities and Procedures, the project design



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document of the “Patrind Hydropower Project” had been posted on the UNFCCC CDM website for public comments and Parties, stakeholders and NGOs were through CDM website invited to provide comments during 30 days period from 09 Apr 11 - 08 May 11 (30days). PDD design has not been adjusted following stakeholder consultation because no comments were received during the period.

5 VALIDATION OPINION

KEMCO has undertaken the validation of Patrind Hydropower Project which claimed approximately 269,278 CO₂eq ton annually by generating electricity utilizing water resources. To ensure the transparency and integrity of the validation, the Validation Team first had established the validation protocol taking into account UNFCCC, Kyoto Protocol, Marrakesh Accords, Decision 3, 4/CMP.1 and relevant decisions of the CDM executive board. Based on the checklist the validation of the project activity was undertaken in three stages, i.e. desk review, on-site assessment and follow-up interviews, and review of corrective actions.

As a result of the desk review and on-site assessment, the validation team identified 11 Corrective Action Requests (CARs) and 15 Clarification Requests (CLs) and then requested the project proponents to take corrective actions against them. In response to the request, the project proponents submitted the revised project documentation to the Validation Team, of which the Validation Team made a full review. Then the team has fully agreed that all the significant CARs and CLs issued had been cleared.

Validation Report was written to reflect the results of the dialogue between DOE and PP, and the responses to CARs and CLs, and discussions on and revisions to project documentation following para 173(c) of VVM

All changes between initial PDD(GSC version) and final PDD are raised by CARs and CLs and they are described in validation report in detail. The main changes are as below.

item	Initial PDD	Final PDD	Note
version	02	06	
Submission Date	29/03/2011	17/12/2012	
Emergency Generator	Not presented	Presented in A.2, B.6.3, B.7.1 in PDD	CAR1, CL15
Monitoring	Net electricity to grid is only monitored	Installed capacity and Reservoir area have been added according to ACM0002	CAR10
The starting date of Crediting period	01/07/2015	01/04/2017	CAR11

Finally KEMCO is of the opinion that the project meets all applicable UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology ACM 0002. Hence, KEMCO requests the registration of the “Patrind Hydropower Project” as a CDM



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project activity.

6. REFERENCES

Category 1: Documents and electronic files submitted by the Project Participants

- /1/ Project Design Document, GSC version (Version 02, 29/03/2011)
- /2/ Project Design Document, Final version (Version 06, 17/12/2012)
- /3/ Emission Reduction Excel File (Sep 2011, developed by ERM)
- /4/ Feasibility Study Report (May 2007, Pakistan Engineering Services)
- /5/ Proposal for EPC level tariff (July 2010)
- /6/ Approval Document by NEPRA (Aug 2011)
- /7/ Difference in auxiliary consumption FS vs Basic Design (Star Hydropower Limited)
- /8/ PPA schedule (National Transmission and Dispatch Company Limited and SPHL, Mar, 2012)
- /9/ Pakistan Energy Year Book 2009 (Ministry of Petroleum and National Resources)
- /10/ Hydel power potential of Pakistan (Private power infrastructure board, Government of Pakistan)
- /11/ Construction contract document (Sep 2010)
- /12/ K-water board of directors decision document (29/01/2009)
- /13/ www.ppib.gov.pk
- /14/ Policy framework and package of incentives for private sector hydel power generation projects in Pakistan (May 1995)
- /15/ Policy for power generation project 2002 (Ministry of Water and Power)
- /16/ Hydel projects in private sector (PPIB website)
- /17/ 2006 Sustainable management report (K-water)
- /18/ Document relating to not ODA (Apr 2012, Star Hydropower Limited)
- /19/ Pakistan energy statistical year book
- /20/ Prior consideration document (Notification to CDM EB, 04/02/2011 and Pakistan DNA, 08/09/2010)
- /21/ K-Water's 2006 sustainability report (K-Water)



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- /22/ Supporting letter from responsible person of Shinhan BNP Paribas Asset Management Co. Ltd. (27/01/2012)
- /23/ Pakistan Energy Year Book 2010 (Ministry of Petroleum and National Resources)
- /24/ Resettlement Plan (March 2011, Pakistan Engineering Services)
- /25/ Environmental Management Plan (April 2011, Pakistan Engineering Services)
- /26/ EIA Regional Meeting Minute at Deedal Meera (01/02/2011)
- /27/ EIA Regional Meeting Minute at Sarati (18/02/2011)
- /28/ Letter from Shinhan Bank explaining that commercial banks are reluctant to invest in Pakistan due to high country risk (06/11/2012)
- /29/ Letter from KEXIM explaining that KEXIM strongly recommend the Project seeks the CDM(24/07/2009)
- /30/ Letter from ADB explaining the Project's attractiveness to ADB is its potential to create revenue from Clean Development Mechanism (07/12/2011)
- /31/ MoU between K-water and KEXIM's Carbon Fund (30/09/2009)
- /32/ Power Purchase Decision, NEPRA (13/02/2009)
- /33/ E-mail documentation of meeting result between K-water and KEXIM explaining that KEXIM would invest as CDM project (04/03/2009)
- /34/ Release about carbon fund launching by KEXIM (17/08/2009)
- /35/ MoU between MKE and KEXIM on carbon fund (17/08/2009)
- /36/ NEPRA determination on power tariff (13/02/2009)
- /37/ Minimum Premium Risk for Pakistan compared to other foreign country investments by KEXIM
- /38/ Lessons from the Independent Private Power Experience in Pakistan (May 2005), World Bank & Energy and Mining Sector Board Discussion Paper
Basic Information Report for Patrind Project (Business Plan Report for K-water Investment Committee, prepared by K-water Overseas Business Development Department), January 2009
- /39/ Shareholders Agreement by and among Korea Water Resources Corporation, Daewoo Engineering & Construction Co., Ltd., and Sambu Construction Co., Ltd., 30 April 2009
- /40/ Investment decision made by Korean consortium to acquire 49% share of SHPL, 30 April 2009
- /41/ Investment decision made by Korean consortium to acquire 51% share of SHPL, 10. 09, 2009
- /42/ Environmental Approval from Azad Jammu & Kashmir, 11/08/2010
- /43/ Environmental Approval from Khyber Pakhtunkhwa, 14/04/2011
- /44/ Investment contract with GIF (to purchase 27% of shares in SHPL), 29/07/2011



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/46/ Loan agreement with ADB, IFC, IDB and KEXIM, 13/12/2011

Category 2: Documents and websites referred to by KEMCO

- /51/ Clean Development Mechanism Validation and Verification Manual (ver 01.2)
- /52/ ACM0002 Consolidated Methodology for Grid Connected Electricity Generation from Renewable Sources (ver 12.3)
- /53/ Tool to calculate the emission factor for an electricity system (ver 03)
- /54/ Glossary of CDM terms (ver05),
- /55/ Tool for the demonstration and assessment of additionality (ver07.0)
- /56/ Guidelines for objective demonstration and assessment of barriers (ver01.0)
- /57/ <http://cdm.unfccc.int/DNA/index.html>
- /58/ IPCC, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- /59/ News article on the MoU (18/08/2009 etnews)
- /60/ Pakistan Hydro CDM registered projects
- /61/ An assessment of Pakistan's Private Sector Assessment implemented by ADB
- /62/ Guidelines on common practice (ver2.0)

Persons interviewed:

List persons interviewed during the validation, or persons contributed with other information that are not included in the documents listed above.

Star Hydro

Mr. Waqar Ahmed Khan (Chief Technical and Commercial Officer)
Mr. Ahmed Mufeez Sadiq (Manager Commercial)
Mr. Won-Cheol Park (Deputy Chief Executive Officer)
Mr. Syed Atif Ali Shah (Manager Civil)
Mr. Ali Shen (General Manager)

K-water

Mr. Haedong Choi (Project Manager)
Mr. Taewon Seo (Financing Team Leader)

Consulting company

Mr. Muhammad Naeem Akhtar (Pakistan Engineering Services)
MR. Manzar Naeem Qureshi (Hagler Bailly Pakistan)



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Pakistan EPA

Mr. Muhammad Shatiq Abbasi (Director, EPA AJ&K)

Mr. Sadar Nomar Rasheed (Assistant Director, Abbottabad Office)

Local Stakeholder

Aurangzob (Village Sarati)

Abdul Rehman (Village Sarati)

Saleem (Village Sarati)

Muhammad Saddique (Village Deedal)

Ghulam Ali (Village Deedal)

Muhammad Nazir (Village Deedal)

Sarjraz (Village Alda)

Haji Aslan (Village Alda)

Muhammad Aslam (Village Alda)

Muhammad Nanum Qureshi (Village Patrind)

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Appendix A

Validation Protocol


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


REQUIREMENT	Reference	Conclusion	Comments
1. All Parties involved have approved the project activity.	Kyoto Protocol (KP) Article 12.5(a), CDM Modalities and Procedures (M&P) paragraph 28, 40(a), CDM Validation and Verification Manual (VVM) para. 44	Checked	The LoA from Pakistan DNA (08/05/2012) has been received.
2. All project participants have been listed in a consistent manner in the project documentation, and their participation in the project activity has been approved by a Party to the Kyoto Protocol.	CDM VVM para. 51	Checked	The participation of all participants has been approved in the form of LoA.
3. Public funding for the project from Annex I Parties shall not result in a diversion of official development assistance	Decision 17/CP.7	Checked	Validation team checked the document which states that this project is not related to official development assistance from Annex I Parties.
4. Comments on the validation requirements shall be received, within 30 days, from Parties, stakeholders and UNFCCC accredited NGOs, and thereafter made publicly available.	CDM M&P paragraph 40(c)	Checked	The PDD of the project had been posted on the UNFCCC CDM website for public comments and Parties, stakeholders and NGOs were through CDM website invited to provide comments from 09/04/2011 to 08/05/2011 (30days). No comments were received during the period.
5. The PDD used as a basis for validation shall be prepared in accordance with the latest template and guidance from the CDM Executive Board available on the UNFCCC CDM website	CDM M&P paragraph 40(b), CDM VVM para. 55	Checked	The PDD is in line with the latest UNFCCC CDM- PDD format.


REQUIREMENT	Reference	Conclusion	Comments
6. The PDD shall contain a clear description of the project activity that provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation.	CDM VVM para. 58	Checked	Table 2, Section D.1
7. The DOE shall ensure that the baseline and monitoring methodologies selected by the project participants comply with the methodologies previously approved by the CDM Executive Board.	CDM M&P paragraph 37(e), CDM VVM para. 65	Checked	Table 2, Section E.1
8. The DOE shall validate that the selected baseline and monitoring methodology previously approved by the CDM Executive Board, is applicable to the project activity.	CDM VVM para. 68	Checked	Table 2, Section E.2
9. The PDD shall correctly describe the project boundary, including the physical delineation of the proposed CDM project activity included within the project boundary for the purpose of calculating project and baseline emissions for the proposed CDM project activity.	CDM M&P paragraph 52, CDM VVM para. 78	Checked	Table 2, Section E.5
10. The PDD shall identify the baseline for the proposed CDM project activity, defined as the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed CDM project activity.	CDM M&P paragraph 45(b), (c), (e), CDM VVM para. 81	Checked	Table 2, Section E.6
11. The steps taken and equations applied to calculate project emissions, baseline emissions, leakage and emission reductions shall comply with the requirements of the selected baseline and monitoring methodology.	CDM M&P paragraph 45(b), CDM VVM para. 89	Checked	Table 2, Section E.10~11
12. The PDD shall describe how a proposed CDM project activity is additional	KP Article 12.5(c), Decision 3/CMP.1 CDM M&P paragraph 37(d), 43, CDM VVM para. 94	Checked	Table 2, Section F.1-14


REQUIREMENT	Reference	Conclusion	Comments
13. If the project activity start date is prior to the date of publication of the PDD for stakeholder comments it shall be demonstrated that the that the CDM benefits were considered necessary in the decision to undertake the project as a proposed CDM project activity.	CDM VVM para. 98	Checked	Table 2, Section F.5
14. The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required (e.g., methodology ACM0002).	CDM M&P paragraph 45(b), (c), (e), CDM VVM para. 105	Checked	The proposed CDM project activity prescribes the baseline scenario and no further analysis is required to the ACM0002(ver 12.3) Table 2, Section F.8
15. If investment analysis has been used to demonstrate the additionality of the proposed CDM project activity, the PDD shall provide evidence that the proposed CDM project activity would not be: (a) The most economically or financially attractive alternative; or (b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs). The DOE shall comply with the latest version of the “Guidance on the Assessment of Investment Analysis” as provided by the CDM Executive Board.	CDM VVM para. 108	Checked	Investment analysis is not used to demonstrate the additionality of the proposed CDM project activity Table 2, Section F.9-11
16. If barrier analysis has been used to demonstrate the additionality of the proposed CDM project activity, the PDD shall demonstrate that the proposed CDM project activity faces barriers that: (a) Prevent the implementation of this type of proposed CDM project activity; or (b) Do not prevent the implementation of at least one of the alternatives.	CDM VVM para. 115	Checked	PDD has demonstrated (a), (b) all. Table 2, Section F.12-13


REQUIREMENT	Reference	Conclusion	Comments
17. For large-scale CDM project activities, unless the proposed project type is first-of-its kind, common practice analysis shall be carried out as a credibility check of the other available evidence used by the project participants to demonstrate additionality. This is a test to complement the investment analysis (Step 2 of the additionality tool) or barrier analysis (Step 3 of the additionality tool) to confirm that the project activity is not widely observed and commonly carried out in the region.	CDM VVM para. 119	Checked	Table 2, Section F.14
18. The PDD shall include a monitoring plan. This monitoring plan shall be based on the approved monitoring methodology applied to the proposed CDM project activity.	CDM M&P paragraph 37(f), CDM VVM para. 122	Checked	Monitoring plan is based on the approved monitoring methodology ACM0002(ver 12.3)
19. CDM project activities shall assist Parties not included in Annex I to the Convention in achieving sustainable development.	KP Article 12.2, CDM VVM para. 125	Checked	Table 2, Section A.1 The LoA from Pakistan has been received.
20. Local stakeholders shall be invited by the PPs to comment on the proposed CDM project activity prior to the publication of the PDD on the UNFCCC website.	CDM M&P paragraph 37(b), CDM VVM para. 128	Checked	Local stakeholders were invited by the PPs to comment prior to the publication of the PDD on the UNFCCC website.
21. Project participants shall submit documentation to the DOE on the analysis of the environmental impacts of the project activity in accordance with paragraph 37(c) of the CDM modalities and procedures	CDM M&P paragraph 37(c), CDM VVM para. 131	Checked	Project participants shall submit documentation to the DOE on the analysis of the environmental impacts of the project activity in accordance with paragraph 37(c) of the CDM modalities and procedures.


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
A. Approval <i>In this section, it is assessed that all Parties involved have approved the project activity and CDM project activities shall assist Parties not included in Annex I to the Convention in achieving sustainable development.</i>							
	A.1. Has the written letter(s) of approval been provided by the DNA of each Party indicated as being involved in the proposed CDM project activity in section A.3 of the PDD confirming the following: (a) The party is a Party to the Kyoto Protocol (b) Participation is voluntary (c) In the case of the host Party, the proposed CDM project activity contributes to the sustainable development of the country (d) It refers to the precise proposed CDM project activity title in the PDD being submitted for registration.	Para 44 Para125 Para 45 Para126 (Para49) (Para127)		Document Review	1. Checked: The project participant at the host Party's side is Star Hydro Power Limited, Islamic Republic of Pakistan. Islamic Republic of Pakistan had ratified the Kyoto Protocol on 11/01/2005 and Ministry of Environment takes on the DNA function. 2. KEMCO received the LoA from the project participants. 3. The DNA of Pakistan has issued a Letter of Approval (LoA) dated 08/05/2012, precisely referring to the title of the project activity, and confirming that participation is voluntary and the project assists in achieving sustainable development in Pakistan.	OK	OK
	A.2. Is the letter(s) of approval unconditional with respect to A.1 above?	Para 46		Document Review	1. Checked: there are no provisions in the LoA stipulating special conditions with respect to A.1 above.	OK	OK
	A.3. Has the letter(s) of approval been issued by the respective Party's designated national authority (DNA)? and is the letter(s) of approval valid for the proposed CDM project activity under validation?	Para 47		Document Review	1. Checked: It is confirmed that the LoA has been issued by Pakistan DNA by checking the Pakistan DNA website. It is also confirmed that the LoA is valid for validation for this proposed CDM project activity.	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	A.4. If the DOE doubts the authenticity of the letter of approval, has it been verified with the DNA that the letter of approval is authentic?	Para 48 (Para50)		Document Review	1. Checked: It is confirmed by comparing to the other published LoAs that the LoA are authentic. Also, validation team found the title of this project on the DNA approval list at http://www.cdmpakistan.gov.pk/cdm_prjtappraval.html	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
B. Participation <i>In this section, it is assessed that all project participants have been listed in a consistent manner in the project documentation, and their participation in the project activity has been approved by a Party to the Kyoto Protocol.</i>		Para 51					
B.1. Has it been confirmed that the project participants are listed in tabular form in section A.3 of the PDD and that this information is consistent with the contact details provided in annex 1 of the PDD? Has it been determined whether the participation of each project participant has been approved by at least one Party involved, either in a letter of approval or in a separate letter specifically to approve participation? Has it been confirmed that no entities other than those approved as project participants are included in these sections of the PDD?		Para 52 (Para54)		Docu- ment Review	1. Checked: the project participants are listed in tabular form in section A.3 of the PDD and this information is consistent with the contact details provided in annex 1 of the PDD 2. Checked: The participation of the project participants has been approved by the LoAs of Pakistan which are authorizing Star Hydro Power Limited as project participant respectively. 3. Checked: no entities except Star Hydro Power Limited are included in these sections of the PDD.	OK	OK
B.2. Has it been ensured that the approval of participation has been issued from the relevant DNA? If in doubt, has it been verified with the DNA that the approval of participation is valid for the proposed CDM project participant?		Para 53		Docu- ment Review	1. Checked: It is confirmed that the LoA is issued by the relevant DNA of Pakistan, Ministry of Environment, by comparing to the other published LoAs and searching the website of www.cdmpakistan.gov.pk	OK	OK
C. Project Design Document <i>In this section, it is assessed that the PDD used as a basis for validation shall be prepared in accordance with the latest template and guidance from the CDM Executive Board available on the UNFCCC CDM website.</i>		Para 55					
C.1. Has it been determined whether the PDD is in accordance with the applicable CDM requirements		Para 56		Docu- ment	1. Checked: The PDD is in accordance with the latest template (version 03) and guidance	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	for completing PDDs?			Review	published by the CDM EB.		
	D. Project Description <i>In this section, it is assessed that the PDD shall contain a clear description of the project activity that provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation.</i>	Para 58					
	D.1. Has it been confirmed that the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	Para 59		Document Review	1. Checked: This is a new 150 MW run of river hydro power project in Northern Pakistan. The Project is located on the boundary of the provinces of Khyber-Pakhtunkhwa (KP) and Azad Jammu & Kashmir (AJ&K) in Pakistan. 2. This project utilizes the waters of the river Kunhar that rises in KP and flows into the river Jhelum. 3. The purpose of the Project is to provide zero-emissions renewable electricity to the grid and also provide local and global environmental benefits as well as strong local socioeconomic benefits 4. The net capacity after auxiliary consumption is 147 MW. Based on average hydrology, it is expected to generate 632,628 MWh of energy annually resulting in estimated emission reductions of 269,278 tCO ₂ per year. A surface type powerhouse will accommodate three vertical Francis units, each of 50 MW capacity. An intake structure is proposed slightly upstream of a weir, within the same river bend, leading to the headrace tunnel.	CAR CL	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
					<p>The power from the Project will be evacuated through a double circuit 132 kV transmission line (to be constructed by the power purchaser). The detail specification of main facilities is described in A.4.3 of PDD.</p> <p>5. CL1: The estimated net power generation 632,628 MWh(in A.2 in PDD) is different from 687 GWh(in page 14-7 of FSR)</p> <p>6. CL2: PDD said that the total capacity is 150MW and the net capacity after auxiliary consumption is 147MW. It means that the portion of auxiliary consumption is 2%. Then the portion is not matched to 0.5% of auxiliary consumption in FSR (in page 14-7 of FSR /4/)</p> <p>7. CAR1 : During site visit, validation team checked that emergency fossil fuel generator will be installed on project site. The description on emergency fossil fuel generator has not been contained in PDD.</p> <p>8. CAR2 : 5.91 million tonnes CO₂e over the 21 year can be varied according to GEF of each crediting period.</p> <p>9. The project is based on the Build Own Operate and Transfer (BOOT) concept, with an envisaged construction period of 51 months. Construction is started in January 2012 and thus the plant is expected to be operational in April 2016.</p>		


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
					10. It is confirmed that the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements and provides the reader with a clear understanding of the nature of the proposed CDM project activity.		
	D.2. For proposed CDM project activities in existing facilities or utilizing existing equipments, Has a physical site inspection been conducted to confirm that the description in the PDD reflects the proposed CDM project activity for the following types of CDM project activities unless other means are specified in the methodology? (a) Large scale projects; (b) Non-bundled small scale projects with emission reductions exceeding 15,000 tonnes per year; (c) Bundled small scale projects, each with emission reductions not exceeding 15,000 tonnes per year; in such case the number of physical site visits may however be based on sampling, if the sampling size is appropriately justified through statistical analysis.	Para 60		Document Review	1. Checked: This proposed project is a newly built activity of hydro power plant and not an activity in existing facilities or utilizing existing equipments	OK	OK
	D.3. For other individual proposed small scale CDM project activities with emission reductions not exceeding 15,000 tonnes per year a physical site visit may be conducted as appropriate.	Para 61		Document Review	1. Checked: This proposed project is not a small scale CDM project.	OK	OK
	D.4. For all other proposed CDM project activities not referred to in paragraphs 59–61, has the validation been undertaken by reviewing available designs	Pars 62		Document Review	1. Checked: The validation has been undertaken by reviewing documents like available designs and feasibility studies and	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	and feasibility studies and comparison analysis to equivalent projects been conducted, as appropriate? <i>The DOE may conduct physical site visit to assess the plan. For proposed CDM project activities for which the DOE does not undertake a physical site inspection this shall be appropriately justified.</i>				comparison analysis to equivalent projects. 2. Checked: KEMCO conducted physical site visit on 15~16 th DEC 2011.		
	D.5. If the proposed CDM project activity involves the alteration of an existing installation or process, does the project description clearly state the differences resulting from the project activity compared to the pre-project situation?	Para 63		Document Review	1. Checked: This proposed project activity does not involve the alteration of an existing installation or process.	OK	OK
	E. Baseline and Monitoring Methodology <i>In this section, it is assessed that the baseline and monitoring methodologies selected by the project participants comply with the methodologies previously approved by the CDM Executive Board.</i> <i>To ensure that the project activity meets this general requirement, the DOE shall determine whether: (a) The selected methodology is applicable to the project activity; (b) The PP has correctly applied the selected methodology. The DOE shall ensure that the selected methodology applies to the project activity and has been correctly applied with respect to following: (a) Project boundary; (b) Baseline identification; (c) Algorithms and/or formulae used to determine emission reductions; (d) Additionality; (e) Monitoring methodology.</i>	Para 65 Para 66 Para 67					
	<i>Applicability of the selected methodology to the project activity: it should be validated that the selected baseline and monitoring methodology previously approved by the CDM Executive Board, is applicable to the project activity, including that the used version is valid. And it should be applied specific guidance provided by the CDM Executive Board in respect to any approved methodology.</i>	Para 68 Para 69					


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	E.1. Is the methodology correctly quoted and applied by comparing it with the actual text of the applicable version of the methodology available on the UNFCCC CDM website?	Para 70		Document Review	1. Checked: The ACM0002 (ver12.3.0) has been applied, which can be used for CDM registration until 11/01/2013.	OK	OK
	E.2. During its validation of a small-scale project activity, has it been confirmed that: <ul style="list-style-type: none"> (a) The project activity qualifies within the thresholds of the three possible types of small-scale project activities. It may include more than one component; for example, a type III methane recovery component activity and a type I electricity component activity; (b) The project activity conforms to one of the approved small-scale categories and applies the relevant tool or methodology. <i>The DOE shall confirm that the small-scale methodologies are applied in conjunction with the General Guidelines to SSC CDM methodologies, which provides guidelines on equipment capacity, equipment performance/lifetime, baseline identification for type-II/III Greenfield project activities, sampling and other monitoring-related issues(refer to para 17. Monitoring in Guidelines to SSC CDM methodologies);</i> (c) The project activity is not a debundled component of a large-scale project, in accordance with the rules defined in appendix C of the simplified modalities and procedures for small-scale CDM project activities (d) Whether an assessment of the environmental 	Para 136		Document Review	1. Checked: This project is not a small scale project.	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	impacts of the proposed CDM project activity is required by the host Party						
	<p>E.3. A selected approved methodology applies to the project activity if the applicability conditions of the methodology are met and the project activity is not expected to result in emissions other than those allowed by the methodology.</p> <p>Has it been determined whether the choice of methodology is justified and the project participants have shown that the project activity meets each of the applicability conditions of the approved methodology or any tool or other methodology component referred to therein? <i>This shall be done by validating the documentation referred to in the PDD and by verifying that its content is correctly quoted and interpreted in the PDD. If the DOE, based on local and sectoral knowledge, is aware that comparable information is available from sources other than that used in the PDD, then the DOE shall cross check the PDD against the other sources to confirm that the project activity meets the applicability conditions of the methodology.</i></p>	Para 71 (Para76) (Para77)		Document Review	<p>1. Checked: The followings are suitable for the applicable conditions of approved methodology for this proposed project activity.</p> <ul style="list-style-type: none"> - A new installation of hydro power - The project activity results in new reservoir and the power density is greater than 4W/ m². - Not the project activity that involves switching from fossil fuels to renewable energy source at the site of project activity - Not a biomass fired power plant - Not hydro power plants results in new reservoir where the power density is less than 4W/ m². - It is determined that the choice of methodology is justified as shown in Section B.2 of PDD and the proposed project meets all applicability conditions of ACM0002(ver12.3.0) <p>2. CAR3: According to the ACM0002, PDD should use the latest version of tool to calculate the emission factor for an electricity system. This project has used 7 steps for CM calculation from previous version instead of 6 steps of the latest version.</p>	CAR	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
					3. Validation team confirmed that the proposed project activity meets all applicability criteria and this project is not expected to result in emissions other than those allowed by the methodology through the followings <ul style="list-style-type: none"> - Document review - Site visit - Comparison analysis with other similar projects 		
	E.4. If the DOE cannot make a determination regarding the applicability of the selected methodology to the proposed CDM project activity then the DOE shall request clarification of the methodology in accordance with the guidance provided by the CDM Executive Board. <i>If the DOE has requested clarification of, revision to or deviation from a methodology, the DOE shall not submit a request for registration until the CDM Executive Board has approved the proposed deviation or revision. Under no circumstance shall the DOE consider the submission of a request for registration as a means of seeking clarification from the CDM Executive Board on the applicability of a methodology.</i>	Para 72 Para 74 Para 75		Document Review	1. Checked: no clarification is required.	OK	OK
	E.5. If the DOE determines that the proposed CDM project activity does not comply with the applicability conditions of the methodology the DOE may proceed by means of requesting revision to or deviation from the methodology in accordance with the guidance provided by the CDM Executive Board. <i>If the DOE has requested</i>	Para 73 Para 74		Document Review	1. Checked: no revision to or deviation from the methodology is required.	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	<p><i>clarification of, revision to or deviation from a methodology, the DOE shall not submit a request for registration until the CDM Executive Board has approved the proposed deviation or revision.</i></p>						
	<p><i>Project boundary: The PDD shall correctly describe the project boundary, including the physical delineation of the proposed CDM project activity included within the project boundary for the purpose of calculating project and baseline emissions for the proposed CDM project activity.</i></p>	Para 78					
	<p>E.6. Based on documented evidence and corroborated by a site visit where required by paragraphs 59–62 above, has it been determined whether the delineation in the PDD of the project boundary is correct and meets the requirements of the selected baseline methodology?</p> <p>Has it been confirmed that all sources and GHGs required by the methodology have been included within the project boundary?</p> <p>If the methodology allows project participants to choose whether a source or gas is to be included within the project boundary, has it been determined whether the project participants have justified that choice?</p> <p>Has it been confirmed that the justification provided is reasonable, based on assessment of supporting documented evidence provided by the project participants and corroborated by observations if required?</p>	Para 79 (Para80)		Document Review	<p>1. Checked: The project boundary includes project power plant and all power plants connected physically to the electricity system that this CDM project plant is connected to.</p> <p>2. CAR4: Step1 of B.6.1 of PDD is not matched to the latest version of tool to calculate the emission factor for an electricity system. PDD has not identified any connected electricity systems.</p> <p>3. Checked: It is confirmed that all sources and GHGs required by the methodology have been included within the project boundary as shown in B.3 in PDD.</p> <p>4. Checked: Project participants justified and chose all sources or gases within the project boundary according to the methodology. In addition, the emission from emergency generators has been included by PP for conservative approach.</p> <p>5. Checked: Validation team confirmed that the justification above is reasonable after</p>	CAR	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	<p><i>Baseline identification: The PDD shall identify the baseline for the proposed CDM project activity, defined as the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed CDM project activity.</i></p> <p><i>The DOE shall confirm that any procedure contained in the methodology to identify the most reasonable baseline scenario, has been correctly applied. If the selected methodology requires use of tools (such as the Tool for the demonstration and assessment of additionality and the Combined tool to identify the baseline scenario and demonstrate additionality) to establish the baseline scenario, the DOE shall consult the methodology on the application of these tools. In such cases, the guidance in the methodology shall supersede the tool. The DOE shall check each step in the procedure described in the PDD against the requirements of the methodology.</i></p>	Para 81 Para 82			assessment of document and site visit.		
	E.7.If the methodology requires several alternative scenarios to be considered in the identification of the most reasonable baseline scenario, has it been determined, based on financial expertise and local and sectoral knowledge, whether all scenarios that are considered by the project participants and are supplementary to those required by the methodology, are reasonable in the context of the proposed CDM project activity and that no reasonable alternative scenario has been excluded?	Para 83		Document Review	<p>1. Checked: the project activity is the installation of a new grid-connected renewable power plant, the baseline scenario is automatically determined as the following according to the ACM0002(ver12.3.0)</p> <ul style="list-style-type: none"> - Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the tool to calculate the emission factor for an electricity system. 	OK	OK
	E.8.Has it been determined whether the baseline scenario identified is reasonable by validating the	Para 84 (Para87)		Document Review	1. Checked: the project activity is the installation of a new grid-connected	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	assumptions, calculations and rationales used, as described in the PDD? Has it been ensured that documents and sources referred to in the PDD are correctly quoted and interpreted? <i>The DOE shall cross check the information provided in the PDD with other verifiable and credible sources, such as local expert opinion, if available.</i>	(Para88)			renewable power plant, the baseline scenario of this project is fixed as above according to the ACM0002(ver12.3.0)		
	E.9. Has it been determined whether all applicable CDM requirements have been taken into account in the identification of the baseline scenario for the proposed CDM project activity, including relevant national and/or sectoral policies and circumstances? <i>Drawing on its knowledge of the sector and/or advice from local experts, the DOE shall confirm that all relevant policies and circumstances have been identified and correctly considered in the PDD, in accordance with the guidance by the CDM Executive Board.</i>	Para 85		Document Review	1. Checked: the project activity is the installation of a new grid-connected renewable power plant, the baseline scenario of this project is fixed as above according to the ACM0002(ver12.3.0).	OK	OK
	E.10. Has it been determined whether the PDD provides a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity?	Para 86		Document Review	1. Checked: PDD provides clear description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity.	OK	OK
	<i>Algorithms and/or formulae used to determine emission reductions: The steps taken and equations applied to calculate project emissions, baseline emissions, leakage and emission reductions shall comply with the requirements of the selected baseline and monitoring methodology.</i>	Para 89					


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	<p>E.11.Has it been determined whether the equations and parameters in the PDD have been correctly applied by comparing them to those in the selected approved methodology?</p> <p>If the methodology provides for selection between different options for equations or parameters, has it been confirmed that adequate justification has been provided (based on the choice of the baseline scenario, context of the proposed CDM project activity and other evidence provided) and that the correct equations and parameters have been used, in accordance with the methodology selected?</p>	Para 90		Document Review	<p>1. Checked: It is confirmed that correct equations and parameters have been selected among the options and the adequate justification has been provided for the choice, in accordance with the methodology.</p>	OK	OK
	<p>E.12.Has the justification given in the PDD for the choice of data and parameters used in the equations been verified?</p> <p>If data and parameters will not be monitored throughout the crediting period of the proposed CDM project activity but have already been determined and will remain fixed throughout the crediting period, has it been assessed that all data sources and assumptions are appropriate and calculations are correct, applicable to the proposed CDM project activity and will result in a conservative estimate of the emission reductions?</p> <p>If data and parameters will be monitored on implementation and hence become available only after validation of the project activity, has it been confirmed that the estimates provided in the PDD for these data and parameters are reasonable?</p>	Para 91 (Para92) (Para93)		Document Review	<p>1. Checked: the justification given in the PDD for the choice of data and parameters used in the equations been checked and concluded to be reasonable.</p> <p>2. Checked: the grid emission factor will not be monitored throughout the crediting period of the proposed CDM project activity according to the tool to calculate the emission factor for an electricity system.</p> <p>3. CL3: It's not clear if imported electricity can be contained as Low-cost/Must-run electricity in OM calculation in Pakistan(refer to step3 of B.6.1 of PDD).</p> <p>4. CAR5: According to Pakistan Energy Yearbook 2009, the each period of yearly generation data starts from July to June of next year while from January to December in</p>	CAR CL	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
					PDD. 5. CAR6: In calculating emission factor, PDD doesn't select IPCC default values at the lower limit of the uncertainty at a 95% confidence interval according to the tool to calculate the emission factor for an electricity system. 6. It is confirmed that all data sources, assumptions, estimates are appropriate and calculations are correct, applicable to the proposed CDM project activity and will result in a conservative estimate of the emission reductions. 7. It has been confirmed that the estimates provided in the PDD for these data above and parameters are reasonable.		
	F. Additionality of a Project Activity <i>In this section, it is assessed that the proposed CDM project activity is additional.</i>	Para 94					
	F.1. Have the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by project participants to support the demonstration of additionality, been assessed and verified? <i>This requires the DOE to critically assess the presented evidence, using local knowledge and sectoral and financial expertise.</i>	Para 95 (Para97)		Document Review	1. CL6: "the current total installed power generation capacity of from the Asian Development Bank (ADB) on Rental Power Projects in Pakistan (published January 2010), is about 20 GW. However, out of this base, the effective summer capacity is around 17.5 GW and winter capacity is a mere 14.6 GW. Computed power demand is 19.7 GW thereby creating a deficit of between 2.1 and 5 GW at various times during the year (step	CL	OK


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					<p>1.a of B.3)” has difference with “The installed capacity in FY09 according to official statistics of the Private Power and Infrastructure Board (PPIB) was 19,780 MW. The current firm generation is 16,813 MW, but total peak demand is around 17,868 MW creating a deficit of 1,055 MW (A.2)”</p> <p>2. CL7 : It’s not clear if “2.1 and 5 GW” (step 1.a of B.3 of PDD) is correct.</p> <p>3. CL8: currently 15 hydropower plants in “i. Current situation – No private capital available” of Sub-step 3a of B.5 of PDD is not consistent with currently 21 existing hydroelectric power stations (non-CDM projects) in Sub-step 4a of B.5 of PDD.</p> <p>4. Checked: the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by project participants to support the demonstration of additionality, been assessed and verified.</p>		
	F.2. Have tools and documents provided by the CDM Executive Board to demonstrate the additionality of proposed CDM project activities, as well as specific complementary or alternative requirements included in approved CDM methodology, been considered?	Para 96 (Para137)		Document Review	<p>1. Checked: the following tools and document are considered.</p> <ul style="list-style-type: none"> - Guidelines for object demonstration and assessment of barriers(ver1) - Tool for the demonstration and assessment of additionality(ver7) 	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	<i>Prior consideration of the clean development mechanism: If the project activity start date is prior to the date of publication of the PDD for stakeholder comments it shall be demonstrated that the CDM benefits were considered necessary in the decision to undertake the project as a proposed CDM project activity.</i>	Para 98					
	F.3. Has it been confirmed that the start date of the project activity, reported in the PDD, is in accordance with the Glossary of CDM terms? <i>If the reported date is not in accordance with the glossary, the DOE shall raise a CAR to ensure that the start date is correctly reported in a revised PDD. In particular, for project activities that require construction, retrofit or other modifications, the date of commissioning cannot be considered the project activity start date.</i>	Para 99 (Para104)		Document Review	1. CL4: The exact prior consideration date is not described in PDD according to guidelines on the demonstration and assessment of prior consideration of the CDM(ver3). 2. CL5: It's difficult to check when is the investment decision date by K-Water in table 1: project timeline to date key milestones. 3. Checked: It is surely confirmed that the start date of the project activity, reported in the PDD, is in accordance with the Glossary of CDM terms.	CL	OK
	F.4. Has it been determined, in accordance with the guidance from the CDM Executive Board, whether it is a new project activity (a project activity with a start date on or after 02 August 2008) or an existing project activity (a project activity with a start date before 02 August 2008)?	Para 100		Document Review	1. Checked: it is confirmed that the proposed project is classified as a new project activity (a project activity with a start date on or after 02 August 2008).	OK	OK
	F.5. For a new project activity with a start date on or after 2 August 2008, for which PDD has not been published for global stakeholder consultation or a new methodology proposed to the Executive Board before the project activity start date, had the Project Participants informed the Host Party DNA and/or the UNFCCC secretariat in writing of the commencement of the project activity and of their	Para 101		Docume nt Review	1. Checked: Validation team checked the CDM prior consideration document on UNFCCC website and checked DNA notification.	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	intention to seek CDM status? <i>If such a notification has not been provided by the project participants within six months of the project activity start date, the DOE shall determine that the CDM was not seriously considered in the decision to implement the project activity.</i>						
	<p>F.6. For an existing project activity with a start date before 2 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, has the Project Participant's prior consideration of the CDM been sufficiently evidenced as follows?</p> <p>(a) Evidence that must indicate that awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a proposed CDM project activity.</p> <p>(b) Reliable evidence from project participants that must indicate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this should include, inter alia, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the</p>	Para 102		Document Review	1. Checked: it is not an existing project activity with a start date before 2 August 2008.	OK	OK


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	potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat.						
	F.7. If evidence to support the serious prior consideration of the CDM as indicated above is not available, has it been determined that the CDM was not considered in the decision to implement the project activity?	Para 103		Document Review	1. Checked: Validation team checked the notification document to UNFCCC and Pakistan DNA so it is determined that the CDM was considered in the decision to implement the project activity.	OK	OK
	<i>Identification of alternatives: The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required.</i>	Para 105					
	F.8. Has the list of alternatives given in the PDD, been assessed and has it been ensured that: (a) The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity; (b) The list contains all plausible alternatives that the DOE, on the basis of its local and sectoral knowledge, considers to be viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity; (c) The alternatives comply with all applicable and	Para 106 (Para107)		Document Review	1. Checked: the project activity is the installation of a new grid-connected renewable power plant, the baseline scenario is the following according to the ACM0002(ver12.3.0) - Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the tool to calculate the	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	enforced legislation.				emission factor for an electricity system.		
	<p><i>Investment analysis: If investment analysis has been used to demonstrate the additionality of the proposed CDM project activity, the PDD shall provide evidence that the proposed CDM project activity would not be:(a) The most economically or financially attractive alternative; or(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).</i></p> <p><i>Project participants can show this through one of the following approaches, by demonstrating that: (a) The proposed CDM project activity would produce no financial or economic benefits other than CDM-related income. Document the costs associated with the proposed CDM project activity and the alternatives identified and demonstrate that there is at least one alternative which is less costly than the proposed CDM project activity;(b) The proposed CDM project activity is less economically or financially attractive than at least one other credible and realistic alternative;(c) The financial returns of the proposed CDM project activity would be insufficient to justify the required investment.</i></p> <p><i>The DOE shall comply with the latest version of the Guidance on the Assessment of Investment Analysis as provided by the CDM Executive Board and with other relevant guidance including the latest guidelines on plant load factors guidelines for the reporting and validation of plant load factors.</i></p>	Para 108 Para 109 Para 110					
	<p>F.9. Has the accuracy of financial calculations carried out for any investment analysis, been verified as follows?</p> <p>(a) Conduct a thorough assessment of all parameters and assumptions used in calculating the relevant financial indicator, and determine the accuracy and suitability of these parameters using the available evidence and expertise in relevant accounting practices;</p>	Para 111 (Para114)		Document Review	1. Checked: Investment analysis is not used to demonstrate the additionality of the proposed CDM project activity.	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	(b) Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices; (c) Review feasibility reports, public announcements and annual financial reports related to the proposed CDM project activity and the project participants; (d) Assess the correctness of computations carried out and documented by the project participants; (e) Assess the sensitivity analysis by the project participants to determine under what conditions variations in the result would occur, and the likelihood of these conditions. (f) Assess the consistency among the input parameters in investment analysis, for example the project lending rate and benchmark value, the escalation of O&M cost and the fixed power tariff. (g) Assess the validity of investment cost and other parameters used in the investment analysis by comparing with the region values.						
	F.10.Has the suitability of any benchmark applied in the investment analysis, been confirmed as follows? (a) Determine whether the type of benchmark applied is suitable for the type of financial indicator presented; (b) Ensure that any risk premiums applied in determining the benchmark reflect the risks	Para 112		Document Review	1. Checked: Investment analysis is not used to demonstrate the additionality of the proposed CDM project activity.	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	associated with the project type or activity; (c) Determine whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark by, for example, assessing previous investment decisions by the project participants involved and determining whether the same benchmark has been applied or if there are verifiable circumstances that have led to a change in the benchmark.						
	F.11. In cases where project participants rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed CDM project activities, has it been ensured that: (a) The FSR has been the basis of the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short for the DOE to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially changed; (b) The values used in the PDD and associated annexes are fully consistent with the FSR, and where inconsistencies occur the DOE should validate the appropriateness of the values; (c) On the basis of its specific local and sectoral expertise, confirmation is provided, by cross-checking or other appropriate manner, that	Para 113		Document Review	1. Checked: Investment analysis is not used to demonstrate the additionality of the proposed CDM project activity.	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	the input values from the FSR are valid and applicable at the time of the investment decision.						
	<i>Barrier analysis: If barrier analysis has been used to demonstrate the additionality of the proposed CDM project activity, the PDD shall demonstrate that the proposed CDM project activity faces barriers that: (a) Prevent the implementation of this type of proposed CDM project activity (b) Do not prevent the implementation of at least one of the alternatives.</i>	Para 115					
	F.12. Has the barrier analysis referred to either? (a) Risk related barriers, for example risk of technical failure, that could have negative effects on financial performance; or (b) Barriers related to the unavailability of sources of finance for the project activity.	Para 116		Document Review	1. Checked: This project selected both risk related barrier(technological barrier) and Barrier related to the unavailability of sources of finance(investment barrier) to prove additionality.	OK	OK
	F.13. Has the barrier analysis performed been assessed as follows?: (a) Determine whether the barriers are real. <i>The DOE shall assess the available evidence and/or undertake interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether the barriers listed in the PDD exist. The DOE shall ensure that existence of barriers is substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics. If existence of a barrier is substantiated only by the opinions of the project participants, the DOE shall not consider this barrier to be adequately</i>	Para 117 (Para118)		Document Review	1. PDD said that this project has investment barrier(lack of access to capital). 2. CL9: PDD said “according to the Private Power and Infrastructure Board, some IPP projects are apparently in the development pipeline but none are at an advanced stage like the Patrind Hydropower Project”. By the way, it’s not clear that the main reason of other IPP projects not being progressed is “No private capital available”. 3. CAR7: According to para4 of Guidelines for object demonstration and assessment of barriers (ver01 EB50) PP shall provide the nature of companies and entities involved in this project including ownership. Daewoo	CAR CL	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	<p><i>substantiated. If the DOE considers, on the basis of its sectoral or local expertise, that a barrier is not real or is not supported by sufficient evidence, it shall raise a CAR to have reference to this barrier removed from the project documentation;</i></p> <p>(b) Determine whether the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives. <i>Since not all barriers present an insurmountable hurdle to a project activity being implemented, the DOE shall apply its local and sectoral expertise to judge whether a barrier or set of barriers would prevent the implementation of the proposed CDM project activity and would not equally prevent implementation of at least one of the possible alternatives, in particular the identified baseline scenario.</i></p>				<p>Engineering & Construction Co., Ltd. is not a Subsidiary of Daewoo Group.</p> <p>4. The investment barrier from Pakistan's country risk can be acceptable according to OECD's Country Risk Classifications of the Participants to the Arrangement on Officially Supported Export Credits (refer to step3 barrier analysis of B.5 in PDD). Furthermore it is agreed that the particular location of Khyber Pakhtunkhwa has extremely higher regional risk for investment than other regions in Pakistan.</p> <p>5. Financing difficulty can be treated as one of the factors preventing this project. Bank Loans can be available in case that investors put up at least 25% of equity for a project. It is agreed that to find investors willing to put up 25% of the investment for such huge project is very difficult in Pakistan.</p> <p>6. It can be agreed that the capital cost is very high and it is one of the reasons preventing investment.</p> <p>7. CL10: It's not clear if country risk has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).</p>		


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
					<p>8. CL11: It's not clear if financing risk has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).</p> <p>9. CL12: It's not clear if high capital cost has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).</p> <p>10. CAR8: PDD does not clearly show that the investment barrier would not prevent the implementation of at least one of the alternatives According to para 42 of tool for the demonstration and assessment of additionality (ver7). PDD should provide transparent and documented evidence, and offer conservative interpretations of this documented evidence, as to whether alternatives are prevented by these barriers.</p> <p>11. CAR9: According to para5 of Guidelines for object demonstration and assessment of barriers(ver1 EB50) PDD should demonstrate in an objective way how the CDM alleviates investment barriers to a level that the project is not prevented anymore from occurring by</p>		


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
					<p>any of the barriers. Also, PDD should provide transparent and documented evidence, and offer conservative interpretations of this documented evidence.</p> <p>12.CL13: It's not clear if this technological risk is real considering that there are some public projects using similar technology in Pakistan.</p> <p>13.KEMCO determined that the information including nature, organization, ownership, financial information, previous experience in other locations of companies involved in this project is adequately provided in PDD.</p> <p>14.KEMCO checked K-water's 2006 sustainability report and MoU document between Kexim and the Ministry of Knowledge and Economy of Korea. Especially KEMCO checked that Kexim is investing with its Carbon Fund, a fund solely for CDM projects. After checking, KEMCO determined that CDM alleviates investment barrier and assures the financing of the project according to the para5 and para9 of guidelines for objective demonstration and assessment of barriers(ver01).</p> <p>15.KEMCO also determined that PDD provided adequately the existence of investment barrier by using evidence sources according to para6 of guidelines for objective demonstration and assessment of barriers(ver01).</p>		


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
					<p>16. Besides, KEMCO determined that it's not realistic that this barrier quantified and represented as cost in relation to para7 of guidelines for objective demonstration and assessment of barriers(ver01).</p> <p>17. PDD said that this is the first private run of river Francis type project so this project meets technological risk and that there are no private hydropower project in Pakistan which is run-of-river type with headrace tunnels that utilize the natural elevation difference to increase the head of water, which enables the site to use Francis turbines. KEMCO checked the above and determined that this risk can be acceptable.</p>		
	<p><i>Common practice analysis: For proposed large-scale CDM project activities, unless the proposed project type is first-of-its kind, common practice analysis shall be carried out as a credibility check of the other available evidence used by the project participants to demonstrate additionality. This is a test to complement the investment analysis (Step 2 of the additionality tool) or barrier analysis (Step 3 of the additionality tool) to confirm that the project activity is not widely observed and commonly carried out in the region.</i></p>	Para 119					
	<p>F.14. (Use F.14. if needed, in case of small-scale CDM project activity) Has the common practice analysis been assessed using local and sectoral expertise as follows?</p> <p>(a) Assess whether the geographical scope (e.g. the defined region) of the common practice analysis is appropriate for the assessment of</p>	Para 120 (Para121)		Document Review	<p>1. Checked: validation team confirmed that the selection for the common practice analysis is geographically and technologically proper. The objects of common practice analysis are as follows</p> <ul style="list-style-type: none"> - geographical scope : the whole Pakistan 	OK	OK

 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	<p>common practice related to the project activity's technology or industry type. For certain technologies the relevant region for assessment will be local and for others it may be transnational/global. If a region other than the entire host country is chosen, the DOE shall assess the explanation why this region is more appropriate;</p> <p>(b) Using official sources and local and industry expertise, determine to what extent similar and operational projects (e.g. using similar technology or practice), other than CDM project activities, have been undertaken in the defined region;</p> <p>(c) If similar and operational projects, other than CDM project activities, are already widely observed and commonly carried out in the defined region, assess whether there are essential distinctions between the proposed CDM project activity and the other similar activities.</p>				<p>region. Not expanded to other country.</p> <ul style="list-style-type: none"> - technology or industry type : hydro power generation. <p>2. It is checked by 'Hydel Power Potential of Pakistan, Private Power & Infrastructure Board, Government of Pakistan' that all 21 existing hydroelectric power stations (non-CDM projects), with a total installed capacity of 6,595 MW that currently supply electricity to the national grid, are owned by the public sector. The only private project is under construction and registered as CDM project.</p> <p>3. So, KEMCO determined that this project developed by private sector is distinct from above 21 projects and this project is not common practice in Pakistan.</p>		
	G. Monitoring Plan <i>It is assessed in this section that the monitoring plan is based on the approved monitoring methodology applied to the proposed CDM project activity</i>	Para 122					
	<p>G.1.Has the compliance of the monitoring plan with the approved methodology been assessed as follows?</p> <p>(a) By means of document review, identify the list of parameters required by the selected approved methodology;</p>	Para 123 (Para124)		Document Review	18.CAR10: According to ACM0002, The monitoring plan for Installed capacity and Reservoir area should be contained. But PDD only mentioned Quantity of net electricity generated supplied to grid as monitoring point	CAR CL	OK

 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	<p>(b) Confirm that the monitoring plan contains all necessary parameters, that they are clearly described and that the means of monitoring described in the plan complies with the requirements of the methodology.</p> <p>(c) In case of the project which transfers the electricity generated by project activities to a grid, for example renewable energy power generation project, check the all possible project emissions including the import of electricity from the grid and on-site standby fossil fuel generation.</p>				<p>in B.7 of PDD.</p> <p>19.CL14: According to A.4.3 of PDD, the generated power will be evacuated 2 different transmission line(one line to the city of Mansehra and another line to Muzuffarabad-Hattian Bala). Considering above, it's not clear if the monitoring point is one or two.</p> <p>20.CL15: KEMCO checked that there will be emergency generator on site during on site interview. Then it's not clear how the emission from the generator will be monitored and calculated for emission reduction of this project.</p> <p>21.Checked: The parameters which should be monitored according to the methodology are listed in revised PDD as below. It is confirmed that the monitoring plan contains all necessary parameters in line with the methodology.</p> <ul style="list-style-type: none"> - Quantity of net electricity generated supplied to grid - Installed capacity - Reservoir area - Emergency Generator Fuel Consumption <p>22.Emission factor will not be monitored owing to selecting ex-ante option.</p> <p>23.Checked: The import of electricity from the grid will be excluded when measuring net</p>		

 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	<p>G.2. Has it been assessed, by means of review of the documented procedures, interviews with relevant personnel, project plans and any physical inspection of the proposed CDM project activity site in accordance with paragraphs 59-62, whether:</p> <p>(a) The monitoring arrangements described in the monitoring plan are feasible within the project design. The means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, are sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified.</p>	Para 123 (Para124)		Document Review	<p>electricity supply to grid and the emission due to on-site standby fossil fuel generation will be deducted from emission reduction.</p> <p>1. It is confirmed that the monitoring arrangements described in the monitoring plan are feasible within the project design through site visit and interview.</p> <p>2. It is confirmed that the means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, are proper.</p>	OK	OK
	<p>H. Local Stakeholder Consultation</p> <p><i>In this section, it is assessed whether local stakeholders have been invited by the PPs to comment on the proposed CDM project activity prior to the publication of the PDD on the UNFCCC website.</i></p>	Para 128					
	<p>H.1. Has it been determined, by means of document review and interviews with local stakeholders as appropriate, whether:</p> <p>(a) Comments by local stakeholders that can reasonably be considered relevant for the proposed CDM project activity, have been invited;</p>	Para 129 (Para130)		Document Review	<p>1. Checked: The stakeholder consultation meetings took place on 27th September 2010 in Azad Jammu & Kashmir (71 people attended) and in Khyber Pakhtunkhwa (114 people attended) on 28th September 2010. Invitation Letters were sent to a total of nine stakeholders including the power purchaser,</p>	OK	OK

 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	(b) The summary of the comments received as provided in the PDD is complete; (c) The project participants have taken due account of any comments received and have described this process in the PDD.				environmental protection departments and wildlife and forestry departments of the governments of the Khyber Pakhtunkhwa and Azad Jammu & Kashmir. Public notices inviting general public to the stakeholder meetings were published in the two nationwide (English and Urdu languages) and two local newspapers. Validation team reviewed the original questionnaires gathered at the meeting and interviewed people living near the site. Finally validation team confirmed that the local stakeholders are considered relevant for this project and their comments have been invited properly. 2. Checked: PDD has provided the summary of comments. 3. Checked: Project participants have taken due account of comments and described this process in PDD.		
	I. Environmental Impacts <i>In this section, it is assessed that project participants shall submit documentation on the analysis of the environmental impacts of the project activity in accordance with paragraph 37(c) of the CDM modalities and procedures.</i>	Para 131					
	I.1 Has it been confirmed, by means of a document review and/or using local official sources and expertise, whether the project participants have undertaken an analysis of environmental impacts and, if required by the host Party, an environmental impact assessment?	Para 132 (Para133)		Document Review	1. The first Environmental Impact Assessment (EIA) report was prepared by Pakistan Engineering Services (Pvt.) Ltd. and was submitted to the government of North-West Frontier Province (now known as Khyber Pakhtunkhwa) and the government of Azad	OK	OK

 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
					<p>Jammu and Kashmir for approval in 2009. However, due to the relocation of the power house and the weir, revision of EIA was necessary. So the new EIA and Resettlement Plan (RP) study was updated in June 2010 in line with the relevant guidelines of Asian Development Bank (ADB), International Finance Corporation (IFC) as well as the Pakistan Environmental Protection Act 1997. The Resettlement Plan (RP) was further updated as per specific requirements of ADB's Environmental Compliance Team and was finalized in March 2011.</p> <p>2. EIA approval from EPA-AJK has been obtained on 11/08/2010 and from KP on 14/04/2011</p>		
	J. Duration of the Project/ Crediting Period <i>It is assessed whether the temporal boundaries of the project are clearly defined.</i>						
	J.1. Is the operational lifetime of the project activity clearly defined and reasonable?			Document Review	1. The operational lifetime of the project activity clearly defined and reasonable.	OK	OK
	J.2. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max. two times 7 years or fixed crediting period of max. 10 years)?			Document Review	1. This project selected fixed crediting period of 7 years in C.2.2. and it is reasonable. 2. CAR11: The crediting time which begins in 2015 is not matched with the expected operating date (2017) (refer to page 6 of PDD).	CAR	OK
	J.3. Is the assumed crediting time chosen as below the			Document	1. Checked: The assumed crediting time is	OK	OK


 KEMCO	Validation Checklist	VVM Criteria	Ref.	MoV	Comments	Draft Concl.	Final Concl.
	operational lifetime of the project activity?			Review	chosen as below the operational lifetime of the project activity.		

Table 3. Resolution of Corrective Action and Clarification Requests

Non-conformities	Reference	Corrective Actions	Comments
1. CL1: The estimated net power generation 632,628 MWh(in A.2 in PDD) is different from 687 GWh (in page 14-7 of FSR/4/)	A.2 in PDD	687 GWh of FSR is calculated based on past average monthly head while 632,628 MWh is based on past average daily head. This new value approved by NEPRA(National Electric Power Regulatory Authority) on August 2011.	Validation team checked 632,628 MWh is presented in 'Proposal for EPC Level Tariff' /5/ and approved by NEPRA /6/. So Validation team concluded that 632,628 MWh is more appropriate for explaining this project. NC is closed.

Non-conformities	Reference	Corrective Actions	Comments
2. CL2: PDD said that the total capacity is 150MW and the net capacity after auxiliary consumption is 147MW. It means that the portion of auxiliary consumption is 2%. Then the portion is not matched to 0.5% of auxiliary consumption in FSR(in page 14-7 of FSR)	A.2 in PDD	The auxiliary consumption ratio in Feasibility Study had not considered transformer loss, head loss increase due to long water transfer. So the auxiliary consumption has been newly calculated and approved by NEPRA(National Electric Power Regulatory Authority) on August 2011.	Validation team checked 'Difference in Auxiliary consumption FS vs Basic Design' /7/ and PPA Schedule (page49) /8/ which states that 150MW is measured at generator terminal while the net capacity is 147MW measured by metering system. Validation team also checked that this is approved by NEPRA /6/. So Validation team concluded that 2% is reasonable for this project. NC is closed.
3. CAR1: During site visit, validation team checked that emergency fossil fuel generator will be installed on project site. The description on emergency fossil fuel generator has not been contained in PDD.	A.2 in PDD	The introduction on emergency fossil fuel generator has been described in PDD.	Validation team checked that the existence of emergency fossil fuel generator is properly added in section A.2 in PDD. NC is closed.
4. CAR2: 5.91 million tonnes CO ₂ e over the 21 year can be varied according to GEF of each crediting period.	A.2 in PDD	This sentence has been removed from the PDD in response to this CAR.	Validation team checked that the sentence has been removed in revised PDD. NC is closed.
5. CAR3: According to the ACM0002, PDD should use the latest version of tool to calculate the emission factor for an electricity system. This project has used 7 steps for CM calculation from previous version instead of 6 steps of the latest version.	B.6 in PDD	The relevant sections of the PDD and associated Excel calculation files have been updated accordingly, following the latest version of the Tool.	Validation team checked that the latest version(ver 2.2.1) of tool to calculate the emission factor for an electricity system has been applied in revised PDD. NC is closed.
6. CAR4: Step1 of B.6.1 of PDD is not matched to the latest version of tool to calculate the emission factor for an electricity system. PDD has not identified any connected electricity	B.6 in PDD	The consideration to identify any connected electricity system has been added in revised PDD.	Validation team checked that PDD has considered the connected electricity system in revised PDD. NC is closed.

Non-conformities	Reference	Corrective Actions	Comments
systems.			
7. CL3: It's not clear if imported electricity can be contained as Low-cost/Must-run electricity in OM calculation in Pakistan(refer to step3 of B.6.1 of PDD)	B.6 in PDD	The imported electricity has been deleted in Low-cost/Must-run electricity in OM calculation.	Validation team checked that The imported electricity has been deleted in step 3 of B.6.1 in revised PDD. NC is closed.
8. CAR5: According to Pakistan Energy Yearbook 2009, the each period of yearly generation data starts from July to June of next year while from January to December in PDD.	B.6 in PDD	PDD has been revised accordingly.	Validation team checked that the year has been applied correctly following Pakistan Energy Yearbook 2009 /9/ in revised PDD. NC is closed.
9. CAR6: In calculating emission factor, PDD doesn't select IPCC default values at the lower limit of the uncertainty at a 95% confidence interval according to the tool to calculate the emission factor for an electricity system.	B.6 in PDD	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval have been correctly selected according to the tool to calculate the emission factor for an electricity system.	Validation team checked that the values have been correctly applied in EF calculation according to the tool to calculate the emission factor for an electricity system. NC is closed.
10. CL4: The exact prior consideration date is not described in PDD according to guidelines on the demonstration and assessment of prior consideration of the CDM.	B.5 in PDD	The PDD has been updated accordingly to provide a more detailed explanation of the procedures that the PP followed in accordance with the Prior Consideration Guidelines.	Validation team checked that the start date is defined as 20/09/2010 in table : Project timeline to date showing key milestones of B.5 of PDD when EPC contract was signed /11/. NC is closed.
11. CL5: It's difficult to check when the investment decision date by K-Water in table 1: project timeline to date key milestones.	B.5 in PDD	The decision date by K-Water is 29 Jan 2009 when the Board of Director approved investment decision.	Validation team checked that the decision by K-Water is established on 29 Jan 2009 /12/. NC is closed.
12. CL6: "The current total installed power generation capacity from the Asian Development Bank (ADB) on Rental Power Projects in Pakistan (published January 2010), is about 20 GW.	B.3 in PDD	This has been made consistent in the updated PDD.	Validation team checked that PDD is changed according to ADB report. Considering that the Peak load of electricity can be investigated slightly differently according to investigation

Non-conformities	Reference	Corrective Actions	Comments
However, out of this base, the effective summer capacity is around 17.5 GW and winter capacity is a mere 14.6 GW. Computed power demand is 19.7 GW thereby creating a deficit of between 2.1 and 5 GW at various times during the year (step 1.a of B.3)” has difference with “The installed capacity in FY09 according to official statistics of the Private Power and Infrastructure Board (PPIB) was 19,780 MW. The current firm generation is 16,813 MW, but total peak demand is around 17,868 MW creating a deficit of 1,055 MW (A.2)”			time, period or method. NC is closed.
13. CL7: It's not clear if “2.1 and 5 GW” (step 1.a of B.5 of PDD) is correct.	B.5 in PDD	PDD has been revised from “2.1 and 5 GW” to “2.2 and 5.1 GW”.	Validation team checked that PDD has been changed accordingly. NC is closed.
14. CL8: Currently 15 hydropower plants in “i. Current situation – No private capital available” of Sub-step 3a of B.5 of PDD is not consistent with currently 21 existing hydroelectric power stations (non-CDM projects) in Sub-step 4a of B.5 of PDD.	B.5 in PDD	The information of all 21 hydropower plants is correct. PDD has been revised.	Validation team checked that the number of currently existing hydro power plants is 21 in table 2-2 of ‘Hydel Power Potential of Pakistan, Private Power & Infrastructure Board, Government of Pakistan’ /10/. NC is closed.
15. CL9: PDD said “according to the Private Power and Infrastructure Board, some IPP projects are apparently in the development pipeline but none are at an advanced stage like the Patrind Hydropower Project”. By the way, it's not clear that the main reason of other IPP projects not being progressed is “No private capital available”.	B.5 in PDD	Power projects are capital intensive. Equity investors and project lenders are generally reluctant to invest, in particular in hydropower projects, due to various policy, regulatory, political and commercial issues. Some of these issues faced by a hydropower project are: • Land acquisition is tedious and	It is confirmed that there are 2 main policies to invite private investment for power plant construction in Pakistan according to www.ppib.gov.pk /13/. The first policy /14/ was established in 1995 and the second and current policy /15/ is established in 2002. It is checked that under 1995 policy, only one project (New Bong Escape Project, registered

Non-conformities	Reference	Corrective Actions	Comments
		<p>challenging</p> <ul style="list-style-type: none"> • No clarity/ consensus on net hydel profit and water use charges (in case a project like Patrind falls in two 'provinces') • Political instability and lack of political will for implementation of the conceived or announced projects • Award of projects to parties without sound financial capacity • Inability of the power purchaser to make (timely) payments and the associated circular debt. 	<p>as CDM project) is under construction stage while 41 hydro projects had got LOIs from government. The main reason of not being progressed can be assumed as investment problem. Also validation team checked that most projects under policy 2002 have not started construction until now (Hydel projects in private sector /16/). From above, it is also assumed that the main reason of construction delay is financial problems. Finally, validation team concluded that the main reason of other IPP projects not being progressed is "No private capital available". NC is closed.</p>
16. CAR7: According to para4 of Guidelines for object demonstration and assessment of barriers (ver01 EB50) PP shall provide the nature of companies and entities involved in this project including ownership. Daewoo Engineering & Construction Co., Ltd. is not a Subsidiary of Daewoo Group.	B.5 in PDD	Reference to "Daewoo Group" to be deleted, and replace with Korea Development Bank (KDB)	Validation team checked that the ownership of Daewoo Engineering & Construction Co., Ltd. has been correctly changed as KDB. NC is closed.
17. CL10: It's not clear if country risk has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).	B.5 in PDD	PDD has been revised accordingly. Refer to step 3 of section B.5 in PDD.	It is confirmed that PDD has sufficiently explained with objective evidence that country risk is one of main reason for investment barrier according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50). NC is closed.

Non-conformities	Reference	Corrective Actions	Comments
18. CL11: It's not clear if financing risk has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).	B.5 in PDD	Considering the country risks and the global financial market, it is difficult to attract investors to invest in a capital intensive industry on a non-recourse basis. Please see step 3 of section B.5 in PDD for details.	It is confirmed that financing is difficult for this project from the fact that the bank demanding 25% equity while Pakistan government allow 20% equity for infrastructure project or renewable energy project. From above Validation team concluded that financing risk is one of main reason for investment barrier according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50). NC is closed.
19. CL12: It's not clear if high capital cost has sufficiently explained investment barrier with objective evidence according to para 42 of tool for the demonstration and assessment of additionality (ver7) and para6 of Guidelines for object demonstration and assessment of barriers(ver1 EB50).	B.5 in PDD	This project is hydro power project in Pakistan and needs large private investment. Longer construction period translates into more IDC and construction risks as well. Being a capital intensive project with long payback period attracting private investment to the tune of [US\$ 400 million] would not have been possible. There are only a few investors who may be willing to take up the project of such a large scale. Please see step 3 of section B.5 in PDD for details.	It is checked that the unit investment cost per MW of this project is 2.4mUSD while that of New Bong Escape project is 1.23 mUSD. It is also acceptable that normal investor will not invest the project with long payback period and high capital cost. From above Validation team concluded that high capital cost is one of main reason for investment barrier. NC is closed.
20. CAR8: PDD does not clearly show that the investment barrier would not prevent the implementation of at least one of the alternatives According to para 42 of tool for the demonstration and assessment of additionality (ver7). PDD should provide transparent and	B.5 in PDD	Please see step 3 of section B.5 in PDD.	PDD has revised to include that investment barrier would not prevent the continuation of current situation. Validation team concluded that it is acceptable because the alternative mentioned is the continuation of current


Non-conformities	Reference	Corrective Actions	Comments
documented evidence, and offer conservative interpretations of this documented evidence, as to whether alternatives are prevented by these barriers.			situation. NC is closed.
21. CAR9: According to para5 of Guidelines for object demonstration and assessment of barriers(ver1 EB50) PDD should demonstrate in an objective way how the CDM alleviates investment barriers to a level that the project is not prevented anymore from occurring by any of the barriers. Also, PDD should provide transparent and documented evidence, and offer conservative interpretations of this documented evidence.	B.5 in PDD	Investment barrier could be overcome by CDM scheme. K-Water, KEXIM, Shinhan BNP Paribas Global Infrastructure Fund (GIF) and ADB could participate in this project due to CDM. The documents related to above are submitted to DOE. Please refer to step 3 of section B.5 in PDD.	K-Water, the main developer, was seeking the chance to participate in CDM projects following green growth policy of Korean government. Validation team checked 2006 sustainable management report /17/ which states that CDM development is a part of high priority long term master plan for sustainable management. Validation team also checked that K-Water has developed 6 registered CDM projects and 5 projects at validation on UNFCCC website. It is also checked that the important reason of other investors participating in this project is CDM possibility. Please refer to section 3.6.4 in VR.
22. CL13: It's not clear if this technological risk is real considering that there are some public projects using similar technology in Pakistan.	B.5 in PDD	This project is the first private run of river hydropower project with headrace tunnel that utilize the natural elevation difference to increase the head of water in Pakistan. Tarbela and Ghazi Barotha projects are owned and operated by the public sector. So these two hydro power projects are not comparable to this project because the technical and financial circumstances are different. According to section 7. Liquidated Damages in	Validation team checked by site interview that this is the first private run of river hydropower project with head race tunnel that utilize the natural elevation difference to increase the head of water and the experiences of tunnel boring regarding this project are little in Pakistan. So this project can be considered as risky business where nobody knows the rock type to be encountered during the execution and


Non-conformities	Reference	Corrective Actions	Comments
		PPA schedule /8/ if construction is delayed PP should pay penalty. It's difficult to predict what kind of rocks will be found during construction period. Considering that the above public constructions were also delayed due to the lack of expertise for tunnel excavation it can be said that there are not enough expertise and experiences of tunnel boring regarding this project in Pakistan.	the geological uncertainty in the underground structures make things even more complex. Validation team also checked that PP should pay 12,250USD/day during delayed period according to PPA schedule and lose electricity revenue. If unexpected situation, i.e. finding difficult rock type, is raised during construction, the period might be extended over the defined 51months construction period agreed between PP and power purchaser, in that case, PP should pay the penalty. In addition, If the construction is delayed by more than 400 days, the concession agreements with the Pakistani Government will be terminated and the project owner has to give up the project. From above validation team concluded that this project is different from public projects which don't have to pay delay penalty to government and this project has technical risk.
23. CAR10: According to ACM0002, The monitoring plan for Installed capacity and Reservoir area should be contained. But PDD only mentioned Quantity of net electricity generated supplied to grid as monitoring point in B.7 of PDD.	B.7 in PDD	The PDD has been updated accordingly.	Validation team checked that Installed capacity and Reservoir area has been inserted in monitoring parameters according to ACM0002. NC is closed.
24. CL14: According to A.4.3 of PDD, the generated power will be evacuated 2 different transmission line(one line to the	B.7 in PDD	The PPs clarify that there is only one monitoring point at the power plant. The PDD has been updated	Validation team checked that there will be one monitoring point through on site interview. NC is closed.


Non-conformities	Reference	Corrective Actions	Comments
city of Mansehra and another line to Muzuffarabad-Hattian Bala). Considering above, it's not clear if the monitoring point is one or two.		accordingly in A.4.3.	
25. CL15: KEMCO checked that there will be emergency generator on site during on site interview. Then it's not clear how the emission from the generator will be monitored and calculated for emission reduction of this project.	B.7 in PDD	The method to calculate emission from emergency generators has been added in PDD.	Validation team checked that PP will monitor the diesel oil quantity from purchase receipt and calculate emission using IPCC emission factor. NC is closed.
26. CAR11: The crediting time which begins in 2015 is not matched with the expected operating date (2016) (refer to page 6 of PDD).	C.2 in PDD	The expected operation start date is delayed to Apr 2017 and starting date of credit period is changed as 01/04/2017.	Validation team checked that the credit period has been changed. NC is closed.


APPENDIX B

CVS OF VALIDATION TEAM AND THE TECHNICAL REVIEWER

 KEMCO	<h2>Personal History</h2>		
Family name	KIM	Date of Birth	15/06/1972
Given name	Dae-Hwan	Sex	Male
Organization	KEMCO	Phone No.	+82-31-260-4884
Position	Manager	Fax No.	+82-31-260-4886
Address	1157, Pungdukchun 2, Suji, Yongin, Gyeonggi, 448-994, Republic of Korea		E-mail goodwin@kemco.or.kr
Title	Proposed Title		Qualification
	Full-time Validator/verifier		<input checked="" type="checkbox"/>
Sectoral Scope	Proposed Sectoral Scope		Qualification
	1. Energy industries (renewable - / non-renewable sources)	1-2 Energy generation from renewable energy sources	<input checked="" type="checkbox"/>
	13. Waste handling and disposal	13-1 Waste handling and disposal	<input checked="" type="checkbox"/>
Work experience			
* Please describe every employment you have had			
From	to	Details of Duties	
2001-01-02	2005-10-31	Managing the projects on the development, performance assessment and demonstration assessment of new and renewable energy, the New and Renewable Center, KEMCO.	
2005-11-01	2010-01-25	Supporting national climate change policy and corporation plan management, Climate Change Strategy department, KEMCO.	
2010-01-26	Present	CDM auditing, GHG Certification Office, KEMCO	

 KEMCO	<h2 style="text-align: center;">4 Personal History</h2>		
Family name	KIM	Date of Birth	27/07/1969
Given name	Young-Jun	Sex	Male
Organization	KEMCO	Phone No.	+82-31-260-4882
Position	Manager	Fax No.	+82-31-260-4886
Address	1157, Pungdukchun-2-dong, Yongin, Gyeonggi, 448-994, Republic of Korea		E-mail youngk@kemco.or.kr
Title	Proposed Title		Qualification
	Full-time Validator/verifier		<input checked="" type="checkbox"/>
Sectoral Scope	Proposed Sectoral Scope		Qualification
	1. Energy industries (renewable - / non-renewable sources)	1.1 Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	<input checked="" type="checkbox"/>
		1-2 Energy generation from renewable energy sources	<input checked="" type="checkbox"/>
	3. Energy demand	3.1 Energy demand	<input checked="" type="checkbox"/>
	9. Metal production	9.1 Metal production	<input checked="" type="checkbox"/>
Work experience			
* Please describe every employment you have had			
From	to	Details of Duties	
1994-05	1998-12	Demand side management on industry and Building sector, DSM Department, KEMCO - Investigation on electric power savings potential in industries and buildings - Investigation on propagation of motor control system	
1999-01	2001-12	Process Consulting Department, KEMCO	
2002-01	2003-12	Demand side management on industry and Building sector, Direct Load Control Team, KEMCO - Finding electric loads possible to cut in emergent situation - Construction of national load management system	
2004-01	2009-12	Process Consulting Department, KEMCO	
2010-01	present	GHG Certification Office, KEMCO	

 KEMCO	5 Personal History		
Family name	PARK	Date of Birth	28/05/1974
Given name	Jin Young	Sex	Female
Organization	KEMCO	Phone No.	+82-31-260-4890
Position	Manager	Fax No.	+82-31-260-4886
Address	1157, Pungdukchun-2-dong, Yongin, Gyeonggi, 448-994, Republic of Korea		E-mail jin@kemco.or.kr
Title	Proposed Title		Qualification
	Full-time Validator/verifier		<input checked="" type="checkbox"/>
Sectoral Scope	Proposed Sectoral Scope		Qualification
	1. Energy industries (renewable - / non-renewable sources)	1-2 Energy generation from renewable energy sources	<input checked="" type="checkbox"/>
	13. Waste handling and disposal	13-1 Waste handling and disposal	<input checked="" type="checkbox"/>
Work experience			
* Please describe every employment you have had			
From	to	Details of Duties	
2000-03-01	2009-01-20	Supporting National Climate Change Policy, Climatic Change Mitigation Department, KEMCO	
2009-01-21	present	Conducting validation and verification of GHG reduction projects, GHG Certification Office, KEMCO	

 KEMCO	6 Personal History		
Family name	HAN	Date of Birth	23/06/1971
Given name	Seung-Ho	Sex	Male
Organization	KEMCO	Phone No.	+82-31-260-4883
Position	Manager	Fax No.	+82-31-260-4886
Address	1157, Pungdukchun-2-dong, Yongin, Gyeonggi, 448-994, Republic of Korea		E-mail shhan@kemco.or.kr
Title	Proposed Title		Qualification
	Lead Full-time Validator/verifier		<input checked="" type="checkbox"/>
Sectoral Scope	Proposed Sectoral Scope		Qualification
	1. Energy industries (renewable - / non-renewable sources)	1-2 Energy generation from renewable energy sources	<input checked="" type="checkbox"/>
	13 Waste handling and disposal	13-2 Animal waste management	<input checked="" type="checkbox"/>
	14. Afforestation and reforestation	14-1 Forestry	<input checked="" type="checkbox"/>
	15. Agriculture	15-2 Animal waste management	<input checked="" type="checkbox"/>
Work experience			
* Please describe every employment you have had			
From	to	Details of Duties	
2000-03-01	2006-01-22	Supporting National Climate Change Policy, Climatic Change Mitigation Department, KEMCO	
2006-01-23	Present	Conducting validation and verification of GHG reduction projects, GHG Certification Office, KEMCO	