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Validation Report

Pakarab Fertilizer Limited

VALIDATION OF THE CDM-PROJECT:

PAKARAB FERTILISER CO-GENERATION POWER PROJECT

REPORT NO. 1173531

15 December, 2009

TÜV SÜD Industrie Service GmbH

Carbon Management Service
Westendstr. 199 - 80686 Munich – GERMANY

Industrie Service

Report No.	Date of first issue	Revision No.	Date of this revision	Certificate No.
1173531	18-09-2008	5	15-12-2009	-

Subject: Validation of a CDM Project

Accredited TÜV SÜD Unit:	**TÜV SÜD Contract Partner:**
TÜV SÜD Industrie Service GmbH Certification Body “climate and energy” Westendstr. 199 80686 Munich Germany	TÜV SÜD Industrie Service GmbH Carbon Management Service Westendstr. 199 80686 Munich Germany
Project Participant: Pakarab Fertilizer Ltd Trust Plaza, 2nd floor, L.M.Q. Road Multan ,Islamic Republic of Pakistan	**Project Site(s):** The project is located about 10km north-east to centre of Multan City on, Khanewal Road, Multan, Islamic Republic of Pakistan. The geographical coordinates of the project activity are Latitude: 30°12′00″N and Longitude: 71°27′00″E.

Project Title: Pakarab Fertiliser Co-generation Power Project

Applied Methodology / Version: AM0014/Version 04 (EB33)	**Scope(s):** 1, 4 **Technical Area(s):** 1, 2 & 4.14

First PDD Version:		**Final PDD version:**	
Date of issuance:	19-05-2008	Date of issuance:	08-12-2009
Version No:	03	Version No:	11
Starting Date of GSP	21-05-2008		

Estimated Annual Emission Reduction: 119,481 tCO2e

Assessment Team Leader:	**Further Assessment Team Members:**
Kröger Nikolaus	Eberhard Rothfuß Khalid Mahmood

Summary of the Validation Opinion:

☒ The review of the project design documentation and the subsequent follow-up interviews have provided TÜV SÜD with sufficient evidence to determine the fulfilment of all stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM. Hence TÜV SÜD will recommend the project for registration by the CDM Executive Board in case letters of approval of all Parties involved will be available before the expiring date of the applied methodology (ies) or the applied methodology version respectively.

☐ The review of the project design documentation and the subsequent follow-up interviews have not provided TÜV SÜD with sufficient evidence to determine the fulfilment of all stated criteria. Hence TÜV SÜD will not recommend the project for registration by the CDM Executive Board and will inform the project participants and the CDM Executive Board on this decision.

Abbreviations

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

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1 INTRODUCTION

1.1 Objective

The validation objective is an independent assessment by a Third Party (Designated Operational Entity = DOE) of a proposed project activity against all defined criteria set for the registration under the Clean Development Mechanism (CDM). Validation is part of the CDM project cycle and will finally result in a conclusion by the executing DOE whether a project activity is valid and should be submitted for registration to the CDM Executive Board (CDM-EB). The ultimate decision on the registration of a proposed project activity rests at the CDM-EB and the Parties involved.

The project activity discussed by this validation report has been submitted under the project title:

Pakarab Fertiliser Co-generation Power Project

1.2 Scope

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

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

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

Once TÜV SÜD receives a first PDD version, it is made publicly available at the UNFCCC webpage and at TÜV SÜD's webpage for starting a 30 day global stakeholder consultation process (GSP). In case of any request a PDD might be revised (under certain conditions the GSP could be repeated) and the final PDD will form the basis for the final evaluation as presented in this report. Information on the first and the final PDD version is presented in page 1.

The only purpose of a validation is its use during the registration process as part of the CDM project cycle. Hence, TÜV SÜD cannot be held liable by any party for decisions made or not made based on the validation opinion, which will go beyond that purpose.

2 METHODOLOGY

The project assessment applies standard auditing techniques to assess the correctness of the information provided by the project participants. The assessment is based on the "Clean Development Mechanism Validation and Verification Manual" version 01. The work starts with appointment of team covering the technical scope(s), sectoral scope(s) and relevant host country experience for evaluating the CDM project activity. Once the project is made available for the stakeholder consultation process, members of the team carry out the desk review, follow-up actions, resolution of issues identified and finally preparation of the validation report. The prepared validation report and other supporting documents then undergo an internal quality control by the CB "climate and energy" before submission to the CDM-EB.

In order to ensure transparency, assumptions are clear and explicitly stated; the background material is clearly referenced. TÜV SÜD developed methodology-specific checklists and protocol customised for the project. The protocol shows, in a transparent manner, criteria (requirements), the discussion of each criterion by the assessment team and the results from validating the identified criteria. The validation protocol serves the following purposes:

It organises, details and clarifies the requirements a CDM project is expected to meet;

It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation and any adjustment made to the project design.

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

The completed validation protocol is enclosed in Annex 1 to this report.

Validation Protocol Table 1: Conformity of Project activity and PDD				
Checklist Topic / Question	**Reference**	**Comments**	**PDD in GSP**	**Final PDD**
The checklist is organised in sections following the arrangement of the applied PDD version. Each section is then further sub-divided. The lowest level constitutes a checklist question / criterion.	*Gives reference to documents where the answer to the checklist question or item is found in case the comment refers to documents other than the PDD.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached. In some cases sub-checklist are applied indicating yes/no decisions on the compliance with the stated criterion. Any **Request** has to be substantiated within this column*	*Conclusions are presented based on the assessment of the first PDD version. This is either acceptable based on evidence provided (☑), or a **Corrective Action Request (CAR)** due to non-compliance with the checklist question (See below). **Clarification Request (CR)** is used when the validation team has identified a need for further clarification. **Forward action request** to highlight issues related to project implementation that require review during the first verification.*	*Conclusions are presented in the same manner based on the assessment of the final PDD version and further documents including assumptions presented in the documentation.*

Validation Protocol Table 2: Resolution of Corrective Action and Clarification Requests			
Clarifications and corrective action requests	**Ref. to table 1**	**Summary of project owner response**	**Validation team conclusion**
If the conclusions from table 1 are either a Corrective Action, a Clarification or a Forward action Request, these should be listed in this section.	*Reference to the checklist question number in Table 1 where the issue 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 discussion on and revision to project documentation together with the validation team's responses and final conclusions. The conclusions should be reflected in Table 1, under "Final PDD".*

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

Validation Protocol Table 3: Unresolved Corrective Action and Clarification Requests		
Clarifications and corrective action requests	**Id. of CAR/CR**	**Explanation of the Conclusion for Denial**
If the final conclusions from table 2 results in a denial the referenced request should be listed in this section.	*Identifier of the Request.*	*This section should present a detail explanation, why the project is finally considered not to be in compliance with a criterion with a clear reference to the requirement which is not complied with.*

2.1 Appointment of the Assessment Team

According to the technical scopes and experiences in the sectoral or national business environment TÜV SÜD has composed a project team in accordance with the appointment rules of the TÜV SÜD certification body "climate and energy". The composition of an assessment team has to be approved by the Certification Body (CB) ensuring that the required skills are covered by the team. The CB TÜV SÜD operates four qualification levels for team members that are assigned by formal appointment rules:

- Assessment Team Leader (ATL)
- Greenhouse Gas Auditor (GHG-A)
- Greenhouse Gas Auditor Trainee (T)
- Experts (E)

It is required that the sectoral scope linked to the methodology has to be covered by the assessment team.

Name	Qualification	Coverage of sectoral scope	Coverage of technical area	Host country experience
Nikolaus Kröger	**ATL**	☑		☑
Eberhard Rothfuß	E	☑	☑	
Khalid Mahmood	A			☑

Nikolaus Kröger is environmental engineer and expert for emissions monitoring and quality assurance at the department "TÜV SÜD Carbon Management Service". He is located in the TÜV SÜD Hamburg office and is also engaged as personally accredited verifier in the EU-ETS serving the Northern German market. Being GHG auditor for sectoral scopes 1, 4, 5, 8, 9, 10, 11, 12, 13 and as-assessment team leader for CDM and JI projects he has already been involved in several CDM/JI activities with a special focus on industrial non-CO2 projects. Constitutive on 13 years experience at the department "Environmental Service" he verified many metallurgical plants, refineries, chemical plants, waste treatment and power plants and process engineering in many types of facilities. One of his former focal points had been implementation and calibration of complex automatic Environment-Data-Systems. Being Regional Manager he heads and coordinates CDM/JI projects in Middle East.

Eberhard Rothfuß is mechanical engineer and expert for power plants, grid systems etc. in general and electricity and heat generation e.g. combined heat and power units in special at the department "TÜV SÜD Industrie Service" and is based in the TÜV SÜD Filderstadt office near Stuttgart. He is also engaged as personally accredited verifier in the EU-ETS serving the Southwest German market. Being an expert he participated already in several JI and CDM project assessments. He assisted Mr Kröger during the on-site inspections by technical review and inspection of the existing plant and technical review of design datas for the new combined heat and power plant.

Khalid Mahmood has an academic background in environmental sciences. He is host country expert for projects in Pakistan at the department "TÜV SÜD Carbon Management Service" and is based in the TÜV SÜD Munich office. Being a GHG-auditor he has received extensive training in the CDM validation processes and participated already in several CDM project assessments as auditor, expert and desk reviewer. He assisted Mr Kröger during the on-site inspections by evaluating documents and data records.

2.2 Review of Documents

A first version of the PDD version 03 was submitted to the DOE in May 2008. The first PDD version submitted by the PP and additional background documents related to the project design and baseline were reviewed to verify the correctness, credibility and interpretation of the presented information, furthermore a cross check between information provided and information from other sources (if available) have been done as initial step of the validation process. A complete list of all documents and proofs reviewed is attached as annex 2 to this report.

2.3 Follow-up Interviews

On 28~29 May 2008 TÜV SÜD performed interviews and physical site inspection with project stakeholders to confirm relevant information and to resolve issues identified in the first document review. The table below provides a list of all persons interviewed in this context.

Name	Organisation

Mr Muhammad Saleem Zafar	PFL Director Operation (Acting)
Mr Abdul Rauf	PFL Unit Manager Utilities, Project Coordinator
Mr Fawad Ahmed Mukhtar	PFL CEO
Mr Talha Sangi	PFL Process Engineer
Mr Asghar Ali khan	PFL Project Manger Co-generation plant
Mr Najaf Ali	PFL Process Engineering
Mr Ijaz Hussain Khan	PFL Senior Production Manager
Mr Pervaiz Iqbal	PFL Electrical & Instrumentation Manager
Mr Majeed Zia	PFL Manager Training and Laboratory

On August 18, 2008 TÜV SÜD performed follow-up interviews in Fichtner GmbH & Co. KG office in Stuttgart, Germany to confirm selected information and to resolve issues identified during the on-site review in Multan, Pakistan. The table below provides a list of all persons interviewed in the context of this visit.

Name	**Organisation**
Mr Johannes Laubach	Fichtner GmbH & Co. KG, Project developer
Mr Panos Konstantin	Fichtner GmbH & Co. KG, Project developer

2.4 Further cross-check

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

2.5 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to resolve the requests for corrective actions and clarifications and any other outstanding issues which needed to be clarified for TÜV SÜD`s conclusion on the project design. The CARs and CRs raised by TÜV SÜD were resolved during communication between the client and TÜV SÜD. To guarantee the transparency of the validation process, the concerns raised and responses that have been given are documented in more detail in the validation protocol in annex 1.

The final PDD version that was submitted in May 2009 serves as the basis for the final assessment presented herewith. Changes are not considered to be significant with respect to the qualification of the project as a CDM project based on the two main objectives of the CDM, i.e. to achieve a reduction of anthropogenic GHG emissions and to contribute to a sustainable development.

2.6 Internal Quality Control

As final step of a validation the final documentation including the validation report and the protocol have to undergo an internal quality control by the CB “climate and energy”, i.e. each report has to be

finally approved either by the head of the CB or the deputy. In case one of these two persons is part of the assessment team approval can only be given by the other one.

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

3 SUMMARY

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

3.1 Approval

The project participants are Pakarab Fertilizer Limited of Islamic Republic of Pakistan and Fichtner GmbH & Co. KG (Consultant) of Germany. The host Party Pakistan and further participant Party Germany meet the requirements to participate in the CDM.

The DNA of the Pakistan has issued a LoA (IRL 10) on 28 January 2008 authorizing Pakarab Fertilizer Limited of Pakistan as a project participant. The DNA of Germany has also issued a LoA (IRL 38) on February 9th, 2009 authorizing Fichtner GmbH & Co. KG as a project participant. TÜV SÜD received these letters from the project participants directly and considers the provided letters as authentic.

The Pakistan LoA has further been double-checked with the CDM project webpage sponsored by the Ministry of Environment, Government of Pakistan (http://cdmpakistan.gov.pk/cdm_prjtapproval4.html) which further confirming the approval of this CDM project.

Furthermore, after checking the provided LoAs, TÜV SÜD confirms that both letters refer to the precise proposed CDM project activity title in line with the title in the PDD “Pakarab Fertiliser Co-generation Power Project”.

Both letters also indicate that each participating Party is a Party to the Kyoto Protocol, and that the participation in the Pakarab Fertiliser Co-generation Power Project project is voluntary. The Pakistan LoA also confirms that the proposed CDM project activity contributes to the sustainable development of Pakistan (host country). Based on the information given in these letters, TÜV SÜD considers the approval as unconditional with respect to these items.

Both LoAs have been issued by the respective Party’s DNA, the Ministry of Environment, Government of Pakistan and Umweltbundesamt - Deutsche Emissionshandelsstelle, respectively.

TÜV SÜD considers the requirements of the VVM (§§ 45-48) to be complied with.

The LoA does not specify a version number of the PDD or validation report. The corresponding references included to LoA, PDD and validation report are consistent.

3.2 Participation

The participants of the project activity have been approved by the corresponding Parties, which is confirmed by the issued LoA.

The means of validation were equivalent to those described in section 3.1 in regard to the approval process of the project activity.

3.3 Project design document

The PDD is compliant with relevant form and guidance as provided by UNFCCC.

The most recent version of the PDD form was used.

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

3.4 Project description

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

PFL is a fertilizer complex producing Nitrogenous and Phosphatic Fertilizer. The complex is not connected to the national electricity grid. Power and steam for the fertilizer processes as well as for common consumers within the PFL area are currently supplied by the captive power plant on-site, without any cogeneration. The existing steam power plant is in a good operational condition. However, its efficiency is low due to the applied technology. Power is generated by condensing steam turbines with low steam parameters and process steam for the factory in a heat-only process resulting in high fuel consumption and high CO_2 emissions. Some moderate increase of the power demand and a stronger increase of the steam demand of the fertiliser complex are expected by PFL for the medium term. In the baseline scenario, electricity is generated by condensing steam turbines and the generation of steam in heat-only mode by the existing plant. In order to meet the additional future demand the installation of an additional new steam boiler will be necessary Therefore PFL are considering replacing the existing captive condensing power plant with a gas turbines and waste heat recovery for steam generation. Primarily the new plant shall completely cover the power and steam demand of the fertiliser complex and the existing power house will be further used as backup and for standby purposes. The proposed project will contribute to the sustainable development in the host country by reducing the local air pollution. The proposed project will also create the employment during the construction and operation phase of the project.

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

- Review of data and information (see annex 2), cross check the same with other source.
- An on-site visit has been performed and relevant stakeholder and personnel with knowledge of the project were interviewed, in case of doubt further cross checks through additional interviews have been done.
- Finally information related to similar projects or technologies as the CDM project activity have been used to confirm the accuracy and completeness of the project description.

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

Request for Deviation of AM0014 version 4

It is important to clarify here that TÜV SÜD assessment team realised during onsite visit of the proposed project that there were two fuels available, natural gas and low caloric process gas from the fertiliser plant. The Gas turbines were operated with natural gas while the low caloric value gas (process gas) from the fertiliser process will only be used for supplementary firing of the HRSGs.

The applied methodology AM0014 version 4 is only applicable to “Natural gas-based package cogeneration”. Pakarab Fertiliser Limited submitted the Request for Deviation of Methodology AM0014 version 4. The deviation of the methodology was requested for the use of a share of process gas instead of natural gas. Before implementation of the CDM Project Activity, the process gas was used at the ammonia plant furnace as supplementary fuel. This shift was financially favourable due to different taxation of natural gas in Pakistan depending on its final use. However, it is important that this switch of fuels does not have any impact on the overall fuel energy and emission balance.

The Request for Deviation of Methodology AM0014 version 4 was rejected by EB meth panel.

After EB decision client decided that low caloric value gas (process gas) from the fertiliser process will not be used for supplementary firing of the HRSGs. *It is only Natural Gas that will be used in Gas Turbines and as well as in HRSGs. The process gas will be used again at the ammonia plant furnace as supplementary fuel.*

Forward Action Request:

The Verifying DOE shall confirm that the low caloric value gas (process gas) from the fertiliser process is not used for supplementary firing of the HRSGs.

3.5 Baseline and monitoring methodology

3.5.1 Applicability of the selected methodology

Compliance with each applicability condition as listed in the chosen baseline and monitoring methodology AM0014, Version 4 has been demonstrated.

The assessment was carried out for each applicability criteria and included among others the compliance check of the local project setting with the applicability conditions in regard to baseline setting and eligible project measures. This assessment also included the review of secondary sources which sustain that applicability conditions are complied with.

The Methodology specific protocol included to the Annex 1 documents the assessment process, including the steps taken. The results on the compliance check as well as the relevant evidence are explicitly presented in annex 1.

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

3.5.2 Project boundary

The project boundary is the project cogeneration Plant. The project boundary was assessed in the context of physical site inspection, interviews and based on the secondary evidence received on the design of the project.

The most relevant documentation assessed in order to confirm the project boundary are following:

- Pakarab Fertilizer Co-generation Power Project diagram, submitted by Pakarab Fertilizer Ltd on May 29, 2008 (IRL 13)
- Project Implementation Plan (PIP) issued by Pakarab Fertilizer Limited, submitted by Pakarab Fertilizer Ltd on May 29, 2008 (IRL 7).

The same have been validated during the validation process using standard audit techniques, furhter details of any observation are transparently presented in the annex 1.

Hence TÜV SÜD confirms that the identified boundary and the selected sources and gases as documented in the PDD are justified for the project activity.

The project received a Request for Review in October 2009, and the Board agreed to register, subject to satisfactory corrections (see EB 51 para 55):

"(g)" Pakarab Fertiliser Co-generation Power Project" (2687) if the project participant and the DOE (TÜV-SÜD) submit a revised PDD and the corresponding validation report which incorporate the information submitted in response to the request for review regarding the institutional barriers, the equipment lifetime, and the emission of methane and nitrous oxide.

Issue:

PP/DOE are requested to explain why emission of methane and nitrous oxide were neglected.

Response:

In Chapter B3 "description of the sources and gases included in the project boundary," Table 6 the reasons why methane and nitrous oxide emissions were excluded from the project boundary are explained. The project situation compared with the baseline situation will result in an overall reduction in natural gas consumption. As a result of lower natural gas consumption and despite the consideration of respective CH_4/N_2O emission factors for the baseline and project technology, overall methane and nitrous oxide emissions expressed as CO_2 equivalent emissions will be reduced in the project situation compared to the baseline.

It is further discussed in Section B.6 - Emission reductions, why emissions from leaks by the production and distribution of the natural gas are neglected. As there is a reduction of natural gas consumption in the project activity, emissions from production and transportation of the natural gas will be reduced. If the consideration of these emissions is included, it would result in a slightly higher reduction of emissions. Therefore, as a conservative approach, the resulting CO2e emission reductions are neglected.

In response to the issue raised in the Request for Review, the PP has provided a calculation that considers methane and nitrous oxide emission reductions and the approach is described as follows:

Pakarab has no available plant specific data for total quantity of methane and nitrous oxide emissions expressed in tCH_4/a, and tN_2O/a, or emission factors expressed in kgCH4/TJ and kgN2O/TJ, the PP has referred to the Pakistan Energy Yearbook 2008. However, this source of information does not provide any national energy statistics on methane and nitrous oxide emission factors for specific combustion technologies.

Therefore, the PP refers to IPCC 2006 Guidelines for National Greenhouse Gas Inventories, Vol. 2 Energy, and Chapter 2.3.3 for quantifying the additional emission reductions from methane and nitrous oxide which is an acceptable approach according to Methodology AM0014 Version 04.

From the analysis of the choice of activity data it is concluded that the PP should refer to default values for methane and nitrous oxide emission factors as provided by IPCC in absence of any country or plant specific data. Table 1 (Table 2.7 of the PDD) "Industrial source emission factors" summarizes the default values.

Table 1: IPCC default emission factors

Table 2.7 "Industrial source emission factors"		
Basic technology Natural Gas	**CH_4 [kg/TJ energy input)**	**N_2O [kg/TJ energy input]**
Boilers	1	1
Gas-Fired gas Turbines >3MW	4	1

Annex 3h to the PDD "Ex-ante calculation of baseline and project emissions" provides fuel consumption data. The key values are summarized in Table 2.

Table 2: Fuel consumption (natural gas) in the baseline and project

Fuel consumption	Unit	Baseline	Project activity	Fuel reduction
Total	TJ_{NCV}/yr	6,826	4,696	2,130
- of which boilers	TJ_{NCV}/yr	6,826	1,868	
- of which gas turbines	TJ_{NCV}/yr		2,828	

With above activity data and Global Warming Potential for methane = 21 and nitrous oxide = 310 a CO_2e emission reduction from both gases is calculated as 527 tCO2, eq/yr. This amount of emission reductions will not be claimed, which confirms again that the overall calculation of emission reductions as stated in the PDD is conservative. A detailed calculation can be found in the attached Excel spreadsheet that has been cross-checked by the DOE and included as Annex 5.

3.5.3 Baseline identification

In the PDD the following baseline scenario has been defined:

- Use of the existing power plant with 3 boilers and 3 steam turbines;
- Installation of an additional 4th boiler with the same capacity and steam parameters;
- Replacement of the existing 3 boilers and turbines around the year 2020.
- Higher than number-plate efficiencies as conservative assumption (baseline scenario 3 above).

The information presented in the PDD has been validated by a first document review of all the data, further confirmation based on the on-site visit and a final step by cross checking the information with similar relevant projects and/or technologies. The sources referenced in the PDD have been quoted correctly. The information was cross-checked based on verifiable and credible sources, such as:

- Data of the existing (old) power plant for baseline scenario, submitted by Pakarab Fertilizer Ltd on May 29, 2008 (IRL 12).
- Gas turbine expected base and part load performance, submitted by Pakarab Fertilizer Ltd on May 28, 2008 (IRL 15).

For more details of emission reductions and baseline, please check the 3.5.4.1 of validation report.

TÜV SÜD has determined that no reasonable alternative scenario has been excluded. As Pakarab Fertiliser Limited is not connected to the power grid, the baseline is the dedicated fossil fuel power plant. Based on the validated assumptions on calculations TÜV SÜD considers that the identified baseline scenario is reasonable.

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

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

In regard to item 86 of VVM, TÜV SÜD confirms that:

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

The project received a Request for Review in October 2009, and the Board agreed to register, subject to satisfactory corrections (see EB 51 para 55):

"(g)" Pakarab Fertiliser Co-generation Power Project" (2687) if the project participant and the DOE (TÜV-SÜD) submit a revised PDD and the corresponding validation report which incorporate the information submitted in response to the request for review regarding the institutional barriers, the equipment lifetime, and the emission of methane and nitrous oxide.

Issue:

The DOE is requested to justify how it has validated that boilers and turbines should be re-placed by 2020.

Response:

In the description of the baseline scenario, Section B.4, in the PDD is defined as follows:

- Use of the existing power plant with 3 boilers and 3 steam turbines
- Installation of an additional 4th boiler with the same capacity and steam parameters
- Replacement of the existing 3 boilers and turbines around the year 2020
- Higher than number-plate efficiencies as conservative assumptions

As there are no incentives to replace the boilers before the end of their technical lifetime, they will not be replaced until they are no longer operational. In response to the issue, the PP has provided a certificate from DESCON Engineering Limited that has been cross-checked by the DOE which confirms that the equipment can be kept operational until the year 2020. DESCON Engineering Ltd. is a Pakistan based company that manufactures steam boilers and maintains powerhouses and is therefore considered a reliable source to validate the operational capability of the equipment. The document provided by DES-CON (Ref 6) has been provided to the DOE and cross-checked. This certifi-

cate confirms that boilers and turbines were installed and commissioned in 1978 and have been maintained. The end of technical life-time in 2020 has been confirmed in writing.

3.5.4 Algorithm and/or formulae used to determine emission reductions

3.5.4.1 Baseline Emissions

TÜV SÜD has assessed the calculations of project emissions, baseline emissions and leakage and emission reductions. Corresponding calculations were carried out based on calculation spreadsheets. The parameters and equations presented in the PDD and further documentation have been compared with the information and requirements presented in the methodology and respective tools. The equation comparison has been made explicitly following all the formulae presented in the calculation files.

According to the hierarchy for EF_{BF} as set by the applied AM0014, EF_{BF} is determined according to the IPCC 2006 guidelines because no specific value from the National GHG inventory is available. As PFL is not connected to the power grid, the baseline is the dedicated fossil fuel power plant. The consumption of the fuel avoided in the baseline for the supply of electricity is determined in accordance with the methodology AM0014 Version 4 formulae.

The project does not have leakage while the project emissions will be calculated ex-post depending upon the gas consumption. The project emissions correspond to the consumption of the natural gas by the cogeneration system. As a result, the annual emission reductions equal the annual baseline emissions. The assumptions and data used to determine the emission reductions are listed in the PDD and all the sources have been checked and confirmed. Based on the information reviewed it can be confirmed that the sources used are correctly quoted and interpreted in the PDD.
The values presented in the PDD are considered reasonable based on the documentation reviewed, further references and the result of the interviews.
The baseline methodology has been correctly applied following the requirements.
The estimated of the baseline emissions can be confirmed as the same have been replicated by the audit team using the information provided.
Detailed information on the verification of the parameters used in the equations can be found in the annex 1.
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3.5.5 Project emissions

The calculation of the project emissions followed the procedures described in the methodology AM0014 Version 4 (Natural gas-based package cogeneration). Pakarab fertilizer complex is not connected to the national electricity grid. Power and steam for the fertilizer processes as well as for common consumers within the Pakarab Fertilizer area are currently supplied by the captive power plant on-site, without any cogeneration. All calculations of the project emissions were made in a strict correspondence to AM0014 consolidated methodology with complete and transparent description in the final PDD.

3.5.6 Leakage

There are no leakage in the proposed project.

3.5.7 Emission Reductions

In summary, the calculation of the baseline emissions, project emissions and the emission reductions, respectively, can be considered as correct. As per the methodology, the project does not

need to consider leakage. As a result, the annual emission reductions equal the annual baseline emissions minus annual project emissions.

3.6 Additionality

Pakarab Fertiliser Ltd implemented CDM project Catalytic N_2O Abatement Project in the Tail Gas of the Nitric Acid Plant (CDM project number 0557) in the year 2005/06. It was registered on November 05, 2006 as CDM project. So it is obvious that, Pakarab was aware of CDM and its benefits since the initial stage of the project development.
The time line of the project development and implementation has been described in section 3.6.1 of the validation report.

According to AM0014, Version 4 the project developer can demonstrate additionality by selecting one of the following two options.

- Option 1: apply Step 2 of the latest version of the "Tool for demonstration and as assessment of additionality (Investment Analysis)
- Option 2: Methodology-specific process for determination of additionality :

In the proposed project, additionality is demonstrated according to Option 2. The first two tests are applicable to any cogeneration ownership scenario. The third test is specific to the "package co-generation" case where the cogeneration system is owned by a party other than the industry using the heat and electricity from the system. The fourth test is specific to the "package cogeneration" case for the self-owned cogeneration system. In the case of self owned Cogeneration project activities the project activity is additional if all the four additionality tests result in project being assessed as additional, whereas, only the first three tests need be applied in the case of third party ownership.

According to methodology approach, additionality is defined by the following barriers mentioned below.

- Technological barriers to cogeneration in the country
- Institutional barriers to cogeneration in general

The approach use in the PDD has been assessed first based on a document review, where following relevant documents have been reviewed:

On site the additionality has been discussed principally with: Pakarab Fertilizer Limited.

Furthermore some documents have been reviewed on-site (for details see annex 2).

Finally the data, rationales, assumptions, justifications and documentation provided have been checked using local knowledge and sectoral and financial expertise, the same has been cross checked by:

- Pakistan's total installed capacity in 2004 (source: WAPDA-Power System Statistics Twenty Ninth Issue) (IRL 41)

Based on this validation steps we can confirm that the documentation assessed is appropriate for this project.

3.6.1 Prior consideration of the clean development mechanism

Based on the definition within the Glossary of CDM terms (version 4), the starting date of the CDM project activity is July 13, 2007, when Pakarab made the first equipment order for the project implementation. In order to confirm the same the assessment team has reviewed the following documents: The project was seriously considered as a CDM project, when the CDM consulting was signed between Pakarab Fertiliser Ltd and Fichtner GmbH & Co. KG

- Equipment purchase contract was signed on July 13, 2007 (IRL 37)
- CDM consulting services contract was sign on March 21st, 2007 (ILR 39)

Additionally the assessment team cross checked this information with available document at the time of validation.

The starting date of the project activity is determined to be July 13, 2007 (IRL 37) which is before 02 August 2008 and also before the GSP.

The original of the documentation presented has been reviewed and cross checked based on interviews with Mr Abdul Rauf (PFL Unit Manager Utilities, Project Coordinator), hence the document can be considered appropriate to confirm the prior consideration. Additionally in order to confirm that the PPs have taken real actions to continue the activity as CDM, following timeline has been reviewed against the respective documents presented in the table below:

Timeline	Activity	Auditor conclusion
10/2006 – 12/2006	Preparation of tendering documents by Fichtner	
March 21, 2007	Contract signature on CDM services *Early CDM Consideration*	PP explanation are confirmed by IRL 11
Since 03/2007	Development of CDM documentation	
June 7, 2007	Local Stakeholder Consultation Meeting	PP explanation are confirmed by IRL 20
July 13, 2007	Order of gas turbines (1st quipment purchasing contract = starting date of the CDM project activity)	PP explanation are confirmed by IRL 37
January 28, 2008	Letter of host-country by Government of Pakistan	PP explanation are confirmed by IRL 10
Since 01/2008	Start of construction	PP explanation are confirmed by IRL 40
28-29/05/2008	Validation of Pakarab Fertilizer project	PP explanation are confirmed by IRL 5
May 21st, 2008	Start of GSP	
May 29th, 2008	Onsite validation of the project	

February 9th, 2009	LoA Germany	PP explanation are confirmed by IRL 38

Hence the project complies with the requirements to demonstrate the prior consideration of the CDM.

3.6.2 Identifications of alternatives

The output of the project is electric energy and steam. In PDD of the proposed project, the alternative baseline scenarios are discussed in detail.

Alternative baseline scenarios are as fallows.

1. Industrial plant continues to operate with equipment replacement as needed with no change in equipment efficiency (The frozen-efficiency scenario).
2. Industrial plant continues to operate with improved efficiency new equipment at the time of equipment replacement using a less carbon intensive fuel.
3. Industrial plant upgrades the thermal energy generating equipment and therefore increases the efficiency of boiler(s) immediately.
4. The heat and or electricity demand of the industrial plant is reduced through improvements in end-use efficiency.
5. Installation of a cogeneration system owned by the industrial plant (The proposed project activity) without CDM.
6. Installation of a package cogeneration system owned by a company other than the industrial.
7. Installation of a cogeneration system by a third party.

It is possible that in the short- and medium-term the current plant will continue to be operated with the existing equipment. And equipment will be replaced only when it will achieve the end of its technical lifetime (baseline scenario).

The list of alternatives to supply the outputs mentioned above, which is presented in the PDD includes the project activity undertaken without being registered as CDM project. The rest of the alternatives presented do include all plausible scenarios taking into account the local and sectoral situations for the outputs mentioned. Hence the list of alternatives is considered to be complete.

3.6.3 Investment analysis

The PPs did not use the investment analysis to demonstrate the additionality.

3.6.4 Barrier analysis

The project participants used the barrier analysis in order to demonstrate the additionality of the project. The presented barriers are:

- Technological barriers to Cogeneration in the country
- Institutional barriers to Cogeneration

3.6.4.1 Project face technological barriers to cogeneration

According to the WAPDA-Power System Statistics Twenty Ninth issue, the total installed cogen capacity in Pakistan in 2004 was 276.53 MW in 22 premises which is 2.2 % of the total installed thermal power of 12,567 MW. This 2.2% is far below the 5 % threshold mentione in Applied menthodology AM0014. The total installed cogeneration capacity in Pakistan is far below the threshold of 500 MW. Therefore, cogeneration faces technological barriers in Pakistan.

According to Pakistan's total installed capacity in 2004 (source: WAPDA-Power System Statistics Twenty Ninth Issue) was;

- Hydropower: 6,493 MW (33.2 %)
- Thermal power: 12,567 MW (64.4 %)
- Nuclear power: 462 MW (2.4 %)
- Total: 19,522 MW (100 %)

The assessment team checked first if any barrier has a clear impact on the financial returns which can be expressed with reasonable certainty in monetary terms. The final PDD does include only barriers without such impact on the financial returns.

The technological barrier has been assessed against "WAPDA-Power System Statistics Twenty Ninth" Issue. The result of this assessment shows clearly that the barrier presented in the PDD can be considered real.

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

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3.6.4.2 Project face institutional barriers to cogeneration

The project developer applied the *additionality test 2B of the Applied Methodology AM0014*. Energy service companies (ESCOs) did not install package cogeneration systems at energy users' locations in Pakistan. A recent report on ESCOs worldwide (An Assessment of on Energy Service Companies (ESCOs) Worldwide, World Energy Council/Central European University in March 2007) does not make any reference to Pakistan. In a very recent report for India (Accredited Energy Service Companies (ESCOs), Bureau of Energy Efficiency, Ministry of Power, Government of India, November 2008), it is mentioned that of 17 ESCOs accredited by ICRA Limited (formerly Investment Information and Credit Rating Agency of India Limited) for India, just one is also active in Pakistan. However, this ESCO does not operate any cogeneration plant in Pakistan. Therefore package cogeneration faces institutional barrier in Pakistan.

The project developer applied the additionality test 2C according to Applied Methodology AM0014. This test also describe in detail that Pakistan faces the institutional barrier.

Taken into account the description of the validation of the barriers presented above, the assessment team can confirm with reasonable certainty that the barriers and credible and correctly presented to demonstrate the additionality of the project.
In conclusion, it can be said that cogeneration faces technological and institutional barriers in Pakistan.

The project received a Request for Review in October 2009, and the Board agreed to register, subject to satisfactory corrections (see EB 51 para 55):

"(g)" Pakarab Fertiliser Co-generation Power Project" (2687) if the project participant and the DOE (TÜV-SÜD) submit a revised PDD and the corresponding validation report which incorporate the information submitted in response to the request for review regarding the institutional barriers, the equipment lifetime, and the emission of methane and nitrous oxide.

Issue:

The DOE is requested to justify how it has validated the institutional barriers.

Response:

The institutional barrier analysis as per AM0014 Version 04 has been conducted for the project activity around three sub-tests:

- 2A: Assessment of the co-generation technology in respect of receiving preferential tariffs, financing, and/or fiscal benefits compared to other generators;
- 2B: Assessment of the level of installation of co-generation plants by ESCOs (Energy Service Companies), and
- 2C: Assessment of the level of installation of co-generation plants by industrial energy users.

Institutional barrier 2A:
Regarding proof for institutional barrier 2A, an official and signed, written confirmation has been provided from the tax advisor, A.F. Ferguson & Co., confirming that in Pakistan no fiscal benefits exist for the cogeneration project. The letter has been reviewed and cross-checked by the DOE (RfR 1).

On 15/10/2009, the DOE conducted a phone interview with Mr. Usman Malik (Consultant Energy Projects Pakistan acting as local expert for Fichtner) to support the statement that preferential tariffs are not given for cogeneration plants in Pakistan. The information discussed during the phone interview is also supported by the schedule of fees notification from the Oil and Gas Regulatory Authority, Islamabad for 2008 and 2009 (RfR 2 and 3, respectively). The documents have been provided to the DOE and cross-checked. As evidenced in the schedule of fees, Pakarab Fertilizers Ltd. is charged a comparable fee, Rs 102.01/MMBTU (2009), to other fertilizer companies for natural gas feedstock. This value does not change based on the efficiency of the technology implemented, i.e. conventional steam boilers or gas turbines with heat recovery steam generators. The tariff for Pakarab Fertilizer Ltd. for natural gas used for the generation of electricity is equivalent to the fee for captive power plants, Rs. 324.30/MMBTU (2009). Furthermore, captive power plants are subject to a higher tariff than Independent Power Producers which are charged Rs. 281.88/MMBTU. This further confirms that the cogenerator does not receive preferential tariffs and the tariff is actually higher than the sale price for Independent Power Producers.

In conclusion, and by supporting evidences References (RfR) 1-3, the answer to the first question of Test 2A, "does cogenerator receive preferential tariffs, financing, and/or fiscal benefits compared to other generators?" is no.

In regards to the second question of Institutional Barrier test 2A, there are no economic penalties faced by the cogenerator when the system is down and therefore the answer to the second question of the test is "no." Based on this information, institutional barrier test 2A is inconclusive.

Institutional barrier 2B: The barrier test 2B explicitly asks for ESCOs (Energy Service Companies) and the level of cogeneration plants these companies have so far implemented in the project area. In absence of any clear definition of ESCO in AM0014 a commonly and internationally used definition of ESCO (Energy Service Companies) is adapted from the National Association of Energy Service Companies, weblink: http://www.naesco.org/resources/esco.htm

According to NAESCO "An ESCO, or Energy Service Company, is a business that develops, installs, and arranges financing for projects designed to improve the energy efficiency and maintenance costs for facilities over a seven to twenty year time period. ESCOs generally act as project developers for a wide range of tasks and assume the technical and performance risk associated with the project. Typically, they offer the following services:

- *develop, design, and arrange financing for energy efficiency projects;*
- *install and maintain the energy efficient equipment involved;*
- *measure, monitor, and verify the project's energy savings; and*
- *Assume the risk that the project will save the amount of energy guaranteed.*

These services are bundled into the project's cost and are repaid through the dollar savings generated."
In the PDD, the following references are quoted and are used for this analysis, namely:

- "An Assessment of Energy Service Companies (ESCOs) Worldwide" published by the World Energy Council / Central European University; March 2007. This document has been provided to the DOE during Validation and cross-checked. (RfR 4)
- "Accredited Energy Service Companies (ESCOs)" published by Bureau of Energy Efficiency, Ministry of Power, Government of India, November 2008. This document has been provided to the DOE during Validation and cross-checked. (RfR 5)

“An Assessment of Energy Service Companies Worldwide “(Ref 4) does not provide any mention of ESCOs in Pakistan.

“Accredited Energy Service Companies” (RfR 5) mentions that of 17 ESCOs accredited by ICRA Limited (formerly Investment Information and Credit Rating Agency of India Limited) in India, just one is also active in Pakistan. It is the company called Seetech Solutions Pvt. Ltd. The grading of the company de-notes good ability to carry out energy efficiency audits and implement energy saving project. No mention is given that this company is active also in co-generation power generation planning, implementation, financing etc. Furthermore, the scope of business of this company does not entirely fit the above quoted definition of ESCO as provided by NAESCO. This company only provides a few activities from the possible scope of activities ESCOs typically perform. Therefore, it is concluded from the analysis of “Accredited Energy Service Companies (ESCOs)” that there are no active ESCOs operating in Pakistan that have co-generation plants operating.

Furthermore, a phone consultation was held between Mrs Simone Ullrich (Fichtner - CDM Consultant acting for Pakarab) and Mr Usman Malik (Consultant Energy Projects Pakistan acting as local expert for Fichtner) regarding ESCOs on 2009-10-12. In this phone conversation, Mr Malik confirmed to Mrs Ullrich that the concept of ESCO as typically operating in European countries is non-existent in Pakistan. This confirms again that the institutional barrier test 2B as completed in the PDD is valid and according to this test; co-generation projects face institutional Barrier B.

Institutional barrier 2C:
This sub-test investigates the level of co-generation plant diffusion in Pakistan. The UDI World Electric Power Plants Data Base (WEPP, Copyright © 2007, Platts, a division of the McGraw-Hill Companies Inc.) has been cited in the PDD as source to analyze this barrier. On basis of the information as provided in the PDD Annexes, the Validation Report was formulated and it was concluded that institutional barrier test 2C was successfully fulfilled. The analysis showed that the diffusion of co-generation plants in Pakistan resulted in a 0.2% share of installed capacity of cogeneration plants compared to overall installed thermal power plants in Pakistan. This share is far below the 5% benchmark criteria as contained in the test.

In the present PDD the calculations were done as follows: The UDI World Electric Power Plants Data Base (WEPP, Copyright © 2007, Platts, a division of The McGraw-Hill Companies, Inc.) has been used by the PP and a cluster of all cogeneration plants was formed, which include all operating and planned facilities. The total installed capacity was calculated as 343.03 MW of which 276.53MW represents the operating plants. From this cluster the share of market diffusion was calculated.

Motivated by the present request for review, the PP reviewed the data base again. This analysis resulted in slightly different figures. The applied methodology is explained below:

The original UDI database © 2007 was used to generate the cluster of all cogeneration plants in Pakistan. In contrast to the original process, only operating plants were considered now and not plants in planning status. With this approach, the database provides a total of 24 plants (with 52 units) and a total co-gen generation capacity of 282.03 MW. In contrast to the Annex 3i of the PDD one additional plant was identified, namely WAH CANTT FACTORY, this runs a 5.5 MW ST/S (Steam turbine with steam send out).

With this dataset the PP then checked again the first condition of the 2C institutional barrier test: "Have industrial energy users installed package co-generation systems at their site locations or at any of their associated companies (Mother, sister, daughter) in the same country? The answer to the question is still "YES" as in the PDD as there are industrial co-generation users in chemical, sugar, textile and other sectors.

Then the PP checked again the second condition of 2C institutional barrier test: "Have industrial energy users conducted at least 20 recent installations in the country or a number of installations representing 5% of total installed thermal capacity in the country?" In absence of a clear definition of "recent" and "installations" in the methodology the PP defined "recent" as the latest 10 years" and "installations" as the "plants". The cluster of cogeneration plants in the period 1998 - 2007 includes therefore 5 plants with an overall installed capacity of 71.85 MW. For specification of the plants it can be referred to Annex 3i, plant 2 (with units 2a-b), 4, 7 (with units 7a-c), 8 (with units 8a-b), and 19, which provides the year of commissioning. The first criteria is therefore fulfilled because there have only been 5 recent installations (plants) which is less than 20 installations (plants) as stated in Methodology AM0014.

The PP then compared the total installed capacity of cogeneration plants with the installed thermal generating capacity in Pakistan. The total thermal generating capacity in Pakistan was also determined from the above mentioned source. In order to determine the sample group only those plants marked with "operating status" have been selected same as for the selection of co-generation plants. In addition, all plants running on renewable fuels (e.g. biomass, bagasse) were eliminated from the generic data base. The total thermal generation capacity for all operating plants is determined at 20,282.12 MW. The 282.03 MW operating co-generation thus represents only 1.39 % of

total thermal generation. This result is far below the 5% benchmark set in the institutional barrier 2C test.
It is concluded that, the final assessment of the project additionality remains valid and confirms the statement made in the Validation Report. It can be confirmed that the project faces institutional barriers as per 2C test and that in general the project can demonstrate additionality through institutional barrier analysis.

3.6.5 Common practice analysis

It has been mentioned in earlier section that the proposed project faces the technological and institutional barriers.

According to Water And Power Development Authority , the cogeneration capacity in Pakistan in 2004 was 276.53MW which is 2.2% of the installed thermal power of installed Cogeneration Capacity in of 12,567 MW, below the 5 % threshold of AM0014.

- Pakistan's total installed capacity in 2004 (source: WAPDA-Power System Statistics Twenty Ninth Issue) (IRL 41)

Hence it can be confirmed that the proposed CDM activity is not a common practice in the defined region.

3.7 Monitoring plan

The monitoring plan presented in the PDD complies with the requirement of the methodology. The assessment team has checked all the parameters presented in the monitoring plan against the requirements of the methodology; no deviations relevant for the project activity have been found in the plan.
The procedures have been revised by the assessment team through document review and interviews with the relevant personnel; this information together with a physical inspection allows the assessment team to confirm that the proposed monitoring plan is feasible within the project design.

1. **Cogeneration system heat output (CAHO)** will be metered continuously. steam flow sensor (compact orifice mass flow meter), steam pressure sensor, steam temperature sensor, and condensate flow meter, condensate pressure sensor, condensate temperature sensor will be used to measure the heat output. It will be determined by appropriate metering devices of the heat content of the steam minus the heat content of the returned condensate and minus the heat content of the makeup water to balance the condensate losses. Sensors and meters will be checked monthly by the plant manager. Data will be collected monthly and will be stored electronically and on papers.
2. **Cogeneration system electricity output (CEO)** will be metered by electricity meter continuously. The net electric energy supplied to the fertilizer complex excluding own electricity consumption of the cogen power plant will be metered and recorded. Sensors and meters will be checked monthly by the plant manager. Data will be collected monthly and will be stored electronically and on papers.
3. **Natural gas consumption of cogen plant (V_{NG})** will be metered by gas meters (Compact Orifice Mass Flow meter) continuously. The natural gas consumption of both the gas turbines and the supplementary firing of the HRSGs of the cogen power plant will be metered and recorded. Sensors and meters will be checked monthly by the plant manager. Data will be collected monthly and will be stored electronically and on papers.

4. **Natural gas Calorific values (NCVNG, GCVNG)** will be measured by monthly invoices by gas supplier. Regular monthly records and cross checks by plant manager; monthly data will be collected and stored both electronically and on paper.
5. **Fate of electricity generated by baseline dedicated power plant** will be metered in case when it will be used otherwise it is used as backup purpose.

The Unit Manager (Utilities) consolidates the data on monthly basis, and cross-checks them against sales invoices from gas suppliers. The consolidated information will be summarized into a monthly report, checked and signed by the Site General Manager.

Hence it is expected that he PPs will be able to implement the monitoring plan and the emission reductions achieved can be reported ex-post and verified.

3.8 Sustainable development

The LoA of the Host country clearly present a statement that the project contributes to the sustainable development of the host Party.

3.9 Local stakeholder consultation

The relevant local stakeholders have been invited via News papers (Daily Jang Multan, Daily Pakistan Multan, Daily Nawa-I-Waqt Multan and daily Ausaf Multan). The evidence of these invitations is IRL 20. The assessment team has review the documentation in order to validate the inclusion of relevant stakeholders and using the local expertise can confirmed that the communication method used to invite the stakeholders can be considered appropriate. The summary of comments presented in the PDD has been cross checked with the documentation of the stakeholder consultation and it is found to be complete.

The relevant comments presented by the local stakeholders have been taken due account by the PP, the same has been cross check with the information obtained during the interviews.

Hence the local stakeholder consultation has been adequately performed according to the CDM requirements.

3.10 Environmental impacts

The project participants undertake the Initial Environmental Examination. The assessment team made a document review of the information presented. The IRL 17 (Initial Environment Examination (IEE), issued by Environment Protection Department, Government of the Punjab, Lahore on October 02, 2007) confirms the correctness of the approach used by the PPs. Hence the PPs followed the requirements of the host country regarding the environmental impacts.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

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

The following table presents all key information on this process:

webpage: http://www.netinform.net/KE/Wegweiser/Guide2_3.aspx?ID=4450&Ebene1_ID=26&Ebene2_ID=1369&mode=0	
Starting date of the global stakeholder consultation process: May 21, 2008	
Comment submitted by: None	**Issues raised:** -
Response by TÜV SÜD: -	

Industrie Service

5 VALIDATION OPINION

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

Pakarab Fertiliser Co-generation Power Project

The review of the project design documentation and the subsequent follow-up interviews have provided TÜV SÜD with sufficient evidence to determine the fulfilment of stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM. Hence TÜV SÜD will recommend the project for registration by the CDM Executive Board.

The review of the project design documentation, the subsequent follow-up interviews and the further cross check of references have provided TÜV SÜD with sufficient evidence to determine the fulfilment of stated criteria in the protocol. In our opinion, the project meets all relevant UNFCCC requirements for the CDM. Hence TÜV SÜD will recommend the project for registration by the CDM Executive Board.

An analysis as provided by the applied methodology demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity. Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions as specified within the final PDD version.

The validation is based on the information made available to us and the engagement conditions detailed in this report. The validation has been performed following the VVM requirements. The only purpose of this report is its use during the registration process as part of the CDM project cycle. Hence, TÜV SÜD can not be held liable by any party for decisions made or not made based on the validation opinion, which will go beyond that purpose.

Munich, 15 December 2009

Head of Certification Body “climate and energy”
TÜV SÜD Industrie Service GmbH

Hamburg, 15 December 2009

Assessment Team Leader

Industrie Service

Annex 1: Validation Protocol

CHECKLIST TOPIC / QUESTION		Ref.	COMMENTS	PDD in GSP	Final PDD
A. General description of project activity					
A.1. Title of the project activity					
A.1.1.	Does the used project title clearly enable to identify the unique CDM activity?	2, 3, 4, 5	Yes, it does. The project "Pakarab Fertilizers Co-generation Power Project" clearly represent the unique CDM activity	☑	☑
A.1.2.	Are there any indication concerning the revision number and the date of the revision?	2, 3, 4, 5, 7	Yes, they are. The PDD in GSP is version 03 submitted on May 19, 2008.	☑	☑
A.1.3.	Is this consistent with the time line of the project's history?	2, 3, 4, 5, 7	Yes, it is. The PDD shows the consistency with the time line of the project history.	☑	☑
A.2. Description of the project activity					
A.2.1.	Is the description delivering a transparent overview of the project activities?	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	The description of the project activity is clear. It is owned by PFL, Pakistan and other party is Fichtner GmbH &Co.KG, Germany. PFL is building a new highly energy efficient co-generation plant. All electricity and heat will be consumed by PFL. It's important to point at that it's not a retrofitting but a replacement with new GT and HRSG. **Clarification Request CR1:** It is necessary to update in PDD the context of retrofitting to replacement.	**CR1**	☑
A.2.2.	What proofs are available demonstrating that the project description is in compliance with the actual situation or planning?	2, 3, 4, 5, 7, 12, 13,	The Project Implementation Plan had been submitted to the TÜV SÜD assessment team during the on-site visit. The start of the project activity (start of crediting period) is reasonable on January 2009. Unforeseen technical delays e.g. force major are not taken into account. However the PDD is discussing two options about	**CAR1**	☑

CHECKLIST TOPIC / QUESTION		Ref.	COMMENTS	PDD in GSP	Final PDD
		14, 15, 16	technical plant configuration of the cogeneration plant. These are the option of two or three gas turbines / Heat recovery steam generator (HRSG) as mentioned in table 2 of the PDD. **Corrective Action Request CAR1:** During on-site visit PFL stated the option with three units will be implemented but with another gas turbine manufacturer. It is necessary to update the PDD with the selected technical specification of gas turbines and HRSG for the cogeneration plant.		
A.2.3.	Is the information provided by these proofs consistent with the information provided by the PDD?	2, 3, 4, 5	Yes, it is. The information provided by the PIP is consistent with the information provided by the PDD.	☑	☑
A.2.4.	Is all information presented consistent with details provided by further chapters of the PDD?	2, 3, 4, 5	Yes, it is. All information is consistent with details provided by further chapters of the PDD.	☑	☑
A.2.5.	Is project activity covers the aspects of sustainable development?	2, 3, 4, 5	The PDD does not show sustainable development aspects in A.2. **Corrective Action Request CAR2:** It is necessary to add explanations how the project the requirements any sustainable development aspects.	**CAR2**	☑
A.3. Project participants					
A.3.1.	Is the form required for the indication of project participants correctly applied?	2, 3, 4, 5, 26, 27	Yes, it is. The form required for the indication of project participants is correctly applied.	☑	☑

CHECKLIST TOPIC / QUESTION		Ref.	COMMENTS	PDD in GSP	Final PDD
A.3.2.	Is the participation of the listed entities or Parties confirmed by each one of them?	2, 3, 4, 5, 26, 27	Yes, it is, but the written confirmation had not been available during on-site mission. **Clarification Request CR2**: It is necessary to show a confirmation about participation of the listed entities or Parties confirmed by each one of them.	**CR2**	☑
A.3.3.	Is all information on participants / Parties provided in consistency with details provided by further chapters of the PDD (in particular annex 1)?	2, 3, 4, 5	Yes, it is. The information is mainly consistent.	☑	☑
A.4. Technical description of the project activity					
A.4.1.	*Location of the project activity*				
A.4.1.1.	Does the information provided on the location of the project activity allow for a clear identification of the site(s)?	2, 3, 4, 5	Yes, it is. The information provided on the location of the project activity allow for a clear identification of the site.	☑	☑
A.4.1.2.	How is it ensured and/or demonstrated, that the project proponents can implement the project at this site (ownership, licenses, contracts etc.)?	2, 3, 4, 5	Yes it is. PFL submitted to the assessment team a NEPRA (National Electric Power Regulatory Authority) document regarding to use of electricity generation charges. Special permits for cogeneration plant construction are not required as in this case construction works will replace an old existing plant.	☑	☑
A.4.2.	*Category(ies) of project activity*				
A.4.2.1.	To which category(ies) does the project activity belonging to? Is the category correctly identified and indicated?	2, 3, 4, 5	The project activity belongs to sectoral scope 1 and 4. Energy industries(renewable/non-renewable sources) and 4 (manufacturing industries).It has been written in PDD in section A.4.2	☑	☑
A.4.3.	*Technology to be employed by the project activity*				

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
A.4.3.1. Does the technical design of the project activity reflect current good practices?	2, 3, 4, 5	Yes, it does. The technical design of the project activity reflect current good practices	☑	☑
A.4.3.2. Does the description of the technology to be applied provide sufficient and transparent input/ information to evaluate its impact on the greenhouse gas balance?	2, 3, 4, 5	Yes, it does. A new high efficiency cogeneration power plant with three new gas turbines and three new HRSC will be installed replacing the old power plant. The electricity and steam will be used only by the PFL complex.	☑	☑
A.4.3.3. Does the implementation of the project activity require any technology transfer from annex-I-countries to the host country (ies)?	2, 3, 4, 5	Yes, it does. The implementation of the project activity requires technology transfer from annex-I-countries to the host country.	☑	☑
A.4.3.4. Is the technology implemented by the project activity environmentally safe?	2, 3, 4, 5	Yes, It is. The technology implemented by the project activity is environmentally safe.	☑	☑
A.4.3.5. Is the information provided in compliance with actual situation or planning?	2, 3, 4, 5, 7, 7, 12, 13, 14, 15, 16	Yes, it is. The information provided in compliance with actual situation or planning. This had been confirmed to the assessment team during an on-site inspection at the cogeneration building ground.	☑	☑
A.4.3.6. Does the project use state of the art technology and / or does the technology result in a significantly better performance than any commonly used technologies in the	2, 3, 4, 5, 7, 12,	Yes, it does. The project use state of the art technology and result in a significantly better performance than any commonly used technologies in the host country.	☑	☑

CHECKLIST TOPIC / QUESTION		Ref.	COMMENTS	PDD in GSP	Final PDD
	host country?	13, 14, 15, 16			
A.4.3.7.	Is the project technology likely to be substituted by other or more efficient technologies within the project period?	2, 3, 4, 5	No, The project technology will not be substituted by other or more efficient technology within the project period.	☑	☑
A.4.3.8.	Does the project require extensive initial training and maintenance efforts in order to be carried out as scheduled during the project period?	2, 3, 4, 5, 24, 25	Yes, it does. The project requires extensive training initially and maintenance efforts during the whole operation in order to be carried out as scheduled during the project period. PFL submitted excerpt of training specification with technology providers.	☑	☑
A.4.3.9.	Is information available on the demand and requirements for training and maintenance?	2, 3, 4, 5, 24, 25	Yes, it is. PFL submitted fully fitting information on the demand and requirements for training and maintenance.	☑	☑
A.4.3.10.	Is a schedule available for the implementation of the project and are there any risks for delays?	2, 3, 4, 5, 7	Yes, a schedule is available for the implementation of the project activity. At the moment of the on-site mission there are no risks of obvious delays to view of the assessment team.	☑	☑
A.4.4.	*Estimated amount of emission reductions over the chosen crediting period*				
A.4.4.1.	Is the form required for the indication of projected emission reductions correctly applied?	2, 3, 4, 5	Yes, it is. The required form is correctly applied and the PDD shows that the project activity will result in a fuel reduction of 1.845TJ per year and the emission reduction of 107,723 t CO_{2e} per year. **Clarification Request CR3:** It is necessary to line the annual average over the crediting period	**CR3**	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		of estimated reductions for the period 2009-2015 before the total estimated reductions (Total maximum crediting period of 21 years) 2009-2030.		
A.4.4.2. Are the figures provided consistent with other data presented in the PDD?	2, 3, 4, 5	Yes, the figures are consistent in PDD.	☑	☑
A.4.5. Public funding of the project activity				
A.4.5.1. Is the information provided on public funding provided in compliance with the actual situation or planning as available by the project participants?	2, 3, 4, 5, 28	Yes, it is. The information provided on public funding is in compliance with the actual situation or planning. PFL submitted to TÜV SÜD team a statement about exclusion of any public funding within this specific project activity.	☑	☑
A.4.5.2. Is all information provided consistent with the details given in remaining chapters of the PDD (in particular annex 2)?	2, 3, 4, 5, 28	Yes, it is. All available information in PDD is consistent with other chapter of the PDD.	☑	☑
B. Application of a baseline and monitoring methodology				
B.1. Title and reference of the approved baseline and monitoring methodology				
B.1.1.1. Are reference number, version number, and title of the baseline and monitoring methodology clearly indicated?	2, 3, 4, 5	Yes, they are. The PDD apply the baseline and monitoring methodology AM0014, version 4 (EB33 decision)." Natural gas based package cogeneration" reference it has been mentioned in chapter B.1	☑	☑
B.1.1.2. Is the applied version the most recent one and / or is this version still applicable?	2, 3, 4, 5	Yes, it is. The applied versions is the recent one	☑	☑
B.2. Justification of the choice of the methodology and why it is applicable to the project activity				
B.2.1.1. Is the applied methodology considered the		Yes, it is.	☑	☑

CHECKLIST TOPIC / QUESTION		Ref.	COMMENTS	PDD in GSP	Final PDD
most appropriate one?			The PDD shows that the proposed methodology is correct one.		
Integrate the required amount of sub-checklists on the applicability criteria as given by the applied methodology and comment on at least every line answered with "No"					
B.2.2.	Criterion 1: Natural gas based cogeneration system operated by a third party or self-owned by the industrial user that consumes the project heat and electricity	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Applicability checklist / Yes / No Criterion discussed in the PDD? Yes Compliance provable? Yes Compliance verified? Yes Yes, criterion 1 is fulfilled. The natural gas based cogeneration system is self-owned PFL which is the only industrial user that consumes the project heat and electricity,	☑	☑
B.2.3.	Criterion 2: The cogeneration system provides all or a part of the electricity and heat demand of the consuming heat facility.	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Applicability checklist / Yes / No Criterion discussed in the PDD? Yes Compliance provable? Yes Compliance verified? Yes Yes, criterion 2 is fulfilled. The cogeneration system provides all or a part of the electricity and heat demand of the consuming heat facility at PFL complex.	☑	☑
B.2.4.	Criterion 3: No excess electricity is supplied to the power grid and no excess heat from the cogeneration system is provided to another user	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Applicability checklist / Yes / No Criterion discussed in the PDD? Yes Compliance provable? Yes Compliance verified? Yes Yes, criterion 3 is fulfilled. No excess electricity is supplied to the power grid and no excess heat from the cogeneration system is provided to another user.	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
B.3. Description of the sources and gases included in the project boundary				
Integrate the required amount of sub-checklists for sources and gases as given by the methodology applied and comment on at least every line answered with "No"				
B.3.1. Source: Emissions from combustion Gas (es): CO_2; CH_4, N_2O Type: Baseline Emissions	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Boundary checklist / Yes / No Source and gas (es) discussed in the PDD? Yes Inclusion / exclusion justified? Yes Explanation / Justification sufficient? Yes Consistency with monitoring plan? Yes For simplification baseline emissions of CH4 and N2O are excluded.	☑	☑
B.3.2. Source: : Emissions during production of baseline fuel Gas(es): CH_4 Type: Baseline Emissions	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Boundary checklist / Yes / No Source and gas(es) discussed in the PDD? N/A Inclusion / exclusion justified? N/A Explanation / Justification sufficient? N/A Consistency with monitoring plan? N/A Not applicable because for simplification CH4 in the fuel production is not considered.	☑	☑
B.3.3. Source: Emissions due to grid electricity consumption Gas (es): CO_2 Type: Baseline Emissions	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Boundary checklist / Yes / No Source and gas(es) discussed in the PDD? N/A Inclusion / exclusion justified? N/A Explanation / Justification sufficient? N(A Consistency with monitoring plan? N/A Emissions due to grid electricity consumption are not applicable	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		as PFL is not connected to the national grid.		
B.3.4. Source: : Emissions from combustion Gas(es): CO_2;, CH_4, N_2O Type: Project Emissions	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Boundary checklist / Yes / No Source and gas(es) discussed in the PDD? Yes Inclusion / exclusion justified? Yes Explanation / Justification sufficient? Yes Consistency with monitoring plan? Yes For simplification project emissions of CH4 and N2O are excluded.	☑	☑
B.3.5. Source: : Natural gas production incl. pipeline leakage Gas(es): CH_4 Type: Project Emissions	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Boundary checklist / Yes / No Source and gas(es) discussed in the PDD? Yes Inclusion / exclusion justified? Yes Explanation / Justification sufficient? Yes Consistency with monitoring plan? N/A Not applicable, because for simplification CH4 in natural gas production incl. pipeline leakage is not considered.	☑	☑
B.3.6. Do the spatial and technological boundaries as verified on-site comply with the discussion provided by / indication included to the PDD?	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Yes, it does. The spatial and technological boundaries as verified on-site comply with the discussion provided by the PDD. The project boundary includes the new cogeneration plant and excludes the old existing power plant.	☑	☑
B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario				
Integrate questions concerning the determination of the additionality as provided by the methodology applied or insert the module provided when				

CHECKLIST TOPIC / QUESTION		Ref.	COMMENTS	PDD in GSP	Final PDD
applying the "additionality tool"					
B.4.1.	Have all technically feasible baseline scenario alternatives to the project activity been identified and discussed by the PDD? Why can this list be considered as being complete?	2, 3, 4, 5	Yes, they have. All likely baseline scenarios are identified in B.4 of the PDD. Each of the seven alternative scenarios provided by the methodology is discussed.	☑	☑
B.4.2.	In case there are more than one credible alternative: Has the baseline scenario that results in the lowest baseline emissions been used as the most likely baseline scenario?	2, 3, 4, 5	Baseline scenarios #1, #2 and #3 are possible. Baseline scenario #3 is conservative because it results in the lowest CO2 emissions. Baseline scenarios 5 to 7 all include cogeneration technology that faces the technological and institutional barriers as indicated in section B.5. They are therefore not the baseline. .	☑	☑
B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):					
According to AM 0014 additionality can be demonstrated by applying step 2 of the "additionality tool" (investment analysis) or be determined as provided by the methodology.					
B.5.1.	Which of the options of determining additionality has been chosen?	2, 3, 4, 5	Option 2 is correctively applied in PDD.	☑	☑
The following questions should be completed if option two, methodology-specific demonstration of additionality, has been applied. If it has not been applied, please delete.					
B.5.2.	Is it transparently demonstrated and evidenced that cogeneration has a low market share in the country (less than 10 % of the economic potential or installed cogeneration capacity ≤ 5 % of thermal generating capacity and ≤500 MW and installed number ≤ 25)?	2, 3, 4, 5	Yes, it is transparently demonstrated that cogeneration has a low market share in Pakistan (less than 10 % of the economic potential or installed cogeneration capacity ≤ 5 % of thermal generating capacity and ≤ 500 MW and installed number ≤ 25). It is clearly identified that this project activity has less than the 5% of thermal generation capacity in host country. According to official IEA statistics, the installed cogeneration capacity in Pakistan is zero as shown by the following source	☑	☑

CHECKLIST TOPIC / QUESTION		Ref.	COMMENTS	PDD in GSP	Final PDD
			www.iea.org/Textbase/stats/balancetable.asp?COUNTRY_CODE=PK). However nonetheless according to the WEPP database, Pakistan's installed cogeneration capacity in 2004 was around 276 MW in 22 premises (see also compilation in Annex 3). The UDI World Electric Power Plants Data Base (WEPP, Copyright © 2007, Platts, a division of The McGraw-Hill Companies, Inc.) is a global inventory of electric power generating units.		
B.5.3.	Is a complete list of institutional barriers developed that prevent the installation of co-generation systems?	2, 3, 4, 5	Yes, it is. A complete list of institutional barriers that prevent the installation of co-generation systems is developed. For further information refer to section B.5 of PDD in GSP.	☑	☑
B.5.4.	Is transparent and documented evidence provided on the existence and significance of these barriers?	2, 3, 4, 5	Yes, a transparent and documented evidence provided on the existence and significance of these barriers. For further information refer to section B.5 of PDD in GSP	☑	☑
B.5.5.	Is it demonstrated that the ESCO has no experience in the installation of a cogeneration system at the location of a separate user?	2, 3, 4, 5	Yes, it is demonstrated by the UDI World electric Power Plants Data base that no ESCO has experience in the installation of a cogeneration system in Pakistan. For further information refer to Annex 3 of PDD in GSP.	☑	☑
B.5.6.	If the ESCO already installed cogeneration systems at energy user's location: Have ESCOs generally conducted less than 20 recent installations in the country or a number representing less than 5 % of the total installed thermal generating capacity	2, 3, 4, 5	Yes, It is confirmed by the UDI World electric Power Plants Data base that the ESCOs generally conducted less than 20 recent installations in Pakistan and a number representing less than 5 % of the total installed thermal generating capacity. For further information refer to Annex 3 of PDD in GSP.	☑	☑
B.5.7.	In case of self-owned cogeneration system: Is it demonstrated that the industrial	2, 3, 4, 5	Yes, it is obvious that PFL which is the self-owner of the cogeneration system has no experience in the installation of a cogenera-	☑	☑

CHECKLIST TOPIC / QUESTION		Ref.	COMMENTS	PDD in GSP	Final PDD
	energy user has no experience in the installation of a cogeneration system?		tion system because it's the first one at PFL.		
B.5.8.	If the industrial energy user already installed cogeneration systems at their site locations or at any of their associated companies: Have industrial energy users conducted less than 20 recent installations in the country or a number representing less than 5 % of the total installed thermal generating capacity	2, 3, 4, 5	Not applicable because PFL - the industrial energy user - installed no cogeneration systems at their site locations in Multan/Pakistan or at any of their associated companies.	☑	☑
The following questions should be completed if step 2 of the additionality tool (option 1) has been applied. If it has not been applied, please delete					
B.5.9.	Is the investment analysis method identified appropriately (step 2a)?	2, 3, 4, 5	N/A Not applicable	☑	☑
B.5.10.	In case of Option I (simple cost analysis): Is it demonstrated that the activity produces no economic benefits other than CDM income?	2, 3, 4, 5	N/A Not applicable	☑	☑
B.5.11.	In case of Option II (investment comparison analysis): Is the most suitable financial indicator clearly identified (IRR, NPV, cost benefit ratio, or (levelized) unit cost)?	2, 3, 4, 5	N/A Not applicable	☑	☑
B.5.12.	In case of Option III (benchmark analysis): Is the most suitable financial indicator clearly identified (IRR, NPV, cost benefit ratio, or (levelized) unit cost)?	2, 3, 4, 5	N/A Not applicable	☑	☑
B.5.13.	In case of Option II or Option III: Is the	2, 3,	N/A	☑	☑

	CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
	calculation of financial figures for this indicator correctly done for all alternatives and the project activity?	4, 5	Not applicable		
B.5.14.	In case of Option II or Option III: Is a sensitivity analysis included with reasonable variations in the critical assumptions?	2, 3, 4, 5	N/A Not applicable	☑	☑
B.5.15.	In case of Option II or Option III: Is the analysis presented in a transparent manner including publicly available proofs for the utilized data?	2, 3, 4, 5	N/A Not applicable	☑	☑
B.6. Emissions reductions					
B.6.1.	*Explanation of methodological choices*				
B.6.1.1.	Is it explained how the procedures provided in the methodology are applied by the proposed project activity?	2, 3, 4, 5	Yes, it is. In the PDD the emission reduction by the project activity is calculated as the difference between baseline emissions from old power plant and project emissions from new cogeneration plant.	☑	☑
B.6.1.2.	Is every selection of options offered by the methodology correctly justified and is this justification in line with the situation verified on-site?	2, 3, 4, 5	Yes, it is. Every selection of options is correctly justified and is this justification in line with the situation verified on-site.	☑	☑
B.6.1.3.	Are the formulae required for the determination of project emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?	2, 3, 4, 5, 31, 32, 33	Yes, they are. The formulae are correctly presented. Project emissions are those associated with natural gas and process gas consumption by the cogeneration system. For the ex-post monitoring, project emissions are calculated as product of the annual natural gas energy (AEC_{NG}) and its emission factor (EF_{NG}) and the annual process gas energy (AEC_{PG}) and its emission factor (EF_{PG}): **Carbon dioxide emissions from natural gas combustion in the co-**	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		generation system, PE_{CS} (tonne CO_2/year): (4.1) $PE_{CS}* = AEC_{NG} \times EF_{NG} + AEC_{PG} \times EF_{PG}$ (tCO_2 / yr) All abbreviations are according to the ground laying methodology.		
B.6.1.4. Are the formulae required for the determination of baseline emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?	2, 3, 4, 5, 31, 32, 33	Yes, they are. The actual baseline fuel consumption for heat supply ($ABEC_{BF, th}$) is determined ex-post by monitoring of cogeneration heat output (CAHO) and multiplication with the fuel rate for heat (FR_{th}) of the existing power station. **Annual baseline fuel consumption for heat supply $ABEC_{BF}$ (TJ/yr)** (3.1) $ABEC_{BF,th} = \frac{CAHO}{e_b} = CAHO \times FR_{th}$ (TJ / yr) The emission factor for baseline fuel (EF_{BF}) will be determined according to the IPCC 2006 guidelines. Baseline CO_2 emissions from combustion of baseline fuel for heat supply (BE_{th}) is determined by multiplication of actual baseline fuel consumption for heat supply ($ABEC_{BF, th}$) with the CO_2 emission factor of the fuel used to generate heat ($EF_{BF, th}$). **Baseline CO_2 emissions from combustion of baseline fuel for heat supply, BE_{th} (tonnes CO_2/yr):** (3.3) $BE_{th} = ABEC_{BF} \times EF_{BF}$ Because PFL is not connected to the power grid, the baseline is the dedicated fossil fuel power plant. The consumption of the fuel avoided in the baseline for the supply of electricity is determined in accordance with the following formulae:	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		$BE_{elec}\left(tonneCO_2 / year\right) = \frac{CEO \times BEF_{elec}}{10^3}$ (3.11) The TÜV SÜD assessment team noted that PFL has no connection to the Pakistani grid. Because PFL is dedicated only to its own old single power plant the requirements of the AM0014 version 04 could be simplified. Formula 3.12 is not applicable and formula 3.11 is simplified to formula 3.11b as plausible demonstrated in the current PDD in GSP. The specific CO_2 emission factor of the fossil fuel power generation source delivering electricity to the consuming facility $SEF_{i,n}$ is determined as follows: **Electricity displaced, that would have to be generated through dedicated fossil fuel power plant - Baseline carbon dioxide emissions for electricity supplied, $BE_{elec\ fossil\ fuel}$ (tonnes CO_2/year)** (3.11c) $SEF_i\left(kgCO_2 / MWh\right) = FR_{elec} \times EF_{BF}$ All abbreviations are according to the ground laying methodology.		
B.6.1.5. Are the formulae required for the determination of leakage emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?	2, 3, 4, 5	Yes, they are. The major potential leakage might be pipeline leaks associated with the gas consumption of the cogeneration system, however this is already considered in the AM0014 within the baseline and project emissions. As the project activity will reduce the natural gas demand, it will also reduce the emissions of CH_4 and N_2O. However, for simplification these emission reductions are not further considered. The calculated total emission reductions are therefore conservative.	☑	☑
B.6.1.6. Are the formulae required for the determination of emission reductions correctly presented?	2, 3, 4, 5	Yes, they are. All formulae required for the determination of emission reductions are correctly presented.	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		The Emission reductions are calculated as the difference between the baseline and the project emissions on annual basis. Fuel consumption, electricity and heat production of the cogeneration system are metered and monitored (see also Section B7.2). $ER = BE_{total} - PE_{total}$ All abbreviations are according to the ground laying methodology.		
B.6.2. *Data and parameters that are available at validation*				
B.6.2.1. Is the list of parameters presented in chapter B.6.2 considered to be complete with regard to the requirements of the applied methodology?	2, 3, 4, 5, 7, 12, 13, 14, 15, 16, 31, 32, 33	Yes, the list is quite complete. - Thermal efficiency or heat rate for steam generation in heat-only mode (baseline) - Electric efficiency or heat rate for electricity generation in condensing mode with existing steam turbines (baseline) - CO_2 emission factor for natural gas (EF_{NG}) **Clarification Request CR4:** It is necessary to write the full justification for parameter electric efficiency or heat rate for electricity generation in condensing mode with existing steam turbines (baseline).	**CR4**	☑
Integrate the required amount of sub-checklists for parameters not to be monitored but remaining fixed throughout the crediting period and available at validation. Comment on any line answered with "No"				
B.6.2.2. Parameter Title: Industrial boiler efficiency	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Data Checklist / Yes / No Title in line with methodology? Yes Data unit correctly expressed? No Appropriate description of parameter? Yes Source clearly referenced? Yes Correct value provided? No Has this value been verified? No	**CAR3** **CAR4** **CAR5**	☑ ☑ ☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		Choice of data correctly justified? — No Measurement method correctly described? — No **Corrective Action Request CAR3:** It is necessary to correct the wrong used unit from % (electric efficiency boiler e_b), GJ_{NCV}/MWh_{elec} into % (thermal efficiency boiler e_{th}) GJ_{NCV}/GJ_{th} **Corrective Action Request CAR4:** During the on-site inspection of the boilers #1-#3 of the existing power plant it evolved that the boiler efficiency needs further clarification. It is necessary to justify the efficiency of the boilers and to add hard proofs e.g. calculations or manufacturer's design datas. Regarding to the results of the justification of the efficiency research the estimations of baseline emissions has to be updated. **Corrective Action Request CAR5:** It is necessary to update figure 6 in numbers in values and consistency. Regarding to the updated values of figure the estimations of baseline emissions has to be updated.		
B.6.2.3. Parameter Title: EF CO2 emission factor for each fuel used to generate heat in the baseline (kg CO2/TJ; lower heating value basis)	2, 3, 4, 5, 7, 12, 13, 14, 15, 16	Data Checklist — Yes / No Title in line with methodology? — Yes Data unit correctly expressed? — Yes Appropriate description of parameter? — Yes Source clearly referenced? — No Correct value provided? — No Has this value been verified? — No Choice of data correctly justified? — Yes	**CR5** **CR6**	☑ ☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		Measurement method correctly described? — Yes PFL uses the IPCC2006 default value for EF_{NG} **Clarification Request CR5:** It is necessary to point out a clear statement about availability of Pakistan national GHG inventory. If a national GHG inventory with a specific emission factor for natural gas is available, the national EF_{NG} has to be used. **Clarification Request CR6:** In PDD table 3 are shown specific composition data for natural gas. Nonetheless PFL took the default value for natural gas of IPCC2006. In this case it's necessary to delete the specific data.		
B.6.2.4. Parameter Title: MEF Emission factor for CH_4 emissions from the baseline fuel combustion (kg CH_4/TJ, lower heating value basis)	2, 3, 4, 5	Data Checklist — Yes / No Title in line with methodology? — N/A Data unit correctly expressed? — N/A Appropriate description of parameter? — N/A Source clearly referenced? — N/A Correct value provided? — N/A Has this value been verified? — N/A Choice of data correctly justified? — N/A Measurement method correctly described? — N/A N/A Not applicable	☑	☑
B.6.2.5. Parameter Title: GWP (CH4) Global Warming Potential of methane, (tCO_{2e}/tCH_4)	2, 3, 4, 5	Data Checklist — Yes / No Title in line with methodology? — N/A Data unit correctly expressed? — N/A	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided? N/A Has this value been verified? N/A Choice of data correctly justified? N/A Measurement method correctly described? N/A N/A Not applicable		
B.6.2.6. Parameter Title: NEF Emission factor for N_2O emissions from the baseline fuel combustion (kg N_2O/TJ, lower heating value basis)	2, 3, 4, 5	Data Checklist / Yes / No Title in line with methodology? N/A Data unit correctly expressed? N/A Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided? N/A Has this value been verified? N/A Choice of data correctly justified? N/A Measurement method correctly described? N/A N/A Not applicable	☑	☑

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td>B.6.2.7. Parameter Title:
GWP(N_2O)
Global Warming Potential of nitrous oxide, (tCO_{2e}/tN_2O)</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable</td><td>☑</td><td>☑</td></tr>
<tr><td>B.6.2.8. Parameter Title:
NCV
net calorific value of natural gas (GJ/t)</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable because the natural gas and the process gas consumption of the project activity both are metered in integrated measurement devices showing their results in energy units.</td><td>☑</td><td>☑</td></tr>
</table>

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td>B.6.2.9. Parameter Title:
δ_{NG}
density of natural gas (kg/m³)</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable because the natural gas consumption of the project activity is metered in an integrated measurement device.</td><td>☑</td><td>☑</td></tr>
<tr><td>B.6.2.10. Parameter Title:
CO_2 emission factor of natural gas (kg CO_2/TJ, lower heating value basis)
and additional
CO_2 emission factor of process gas - used for supplementary firing of the HRSG - (kg CO_2/TJ, lower heating value basis)</td><td>2, 3, 4, 5, 7, 12, 13, 14, 15, 16</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>No</td></tr><tr><td>Correct value provided?</td><td>No</td></tr><tr><td>Has this value been verified?</td><td>No</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr></table>Please refer to CR5 and CR6 in B.6.2.3 for natural gas usage.

<u>Clarification Request CR5:</u>
It is necessary to point out a clear statement about availability of Pakistan national GHG inventory. If a national GHG inventory with</td><td>CR5
CR6</td><td>☑
☑</td></tr>
</table>

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td></td><td></td><td>a specific emission factor for natural gas is available, the national EF_{NG} has to be used.
<u>Clarification Request CR6:</u>
In PDD table 3 are shown specific composition data for natural gas. Nonetheless PFL took the default value for natural gas of IPCC2006. In this case it’s necessary to delete the specific data
----
For process gas – used for supplementary firing of the HRSG - the following is relevant:

<table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Choice of data correctly justified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr></table>As stated by PFL a gas analyser will be installed for analysis of composition of process gas.</td><td></td><td></td></tr>
<tr><td>B.6.2.11. Parameter Title:
Methane emission factor for natural gas combustion (kg CH_4/TJ, lower heating value basis)</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr></table></td><td>☑</td><td>☑</td></tr>
</table>

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td></td><td></td><td><table><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable</td><td></td><td></td></tr>
<tr><td>B.6.2.12. Parameter Title:
Nitrous oxide emission factor for natural gas combustion (kg N_2O/TJ, lower heating value basis)</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable</td><td>☑</td><td>☑</td></tr>
<tr><td>B.6.2.13. Parameter Title:
MLR
Methane leakage rate in NG production, transport and distribution</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A</td><td>☑</td><td>☑</td></tr>
</table>

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td></td><td></td><td>Not applicable</td><td></td><td></td></tr>
<tr><td>B.6.2.14. Parameter Title:
BEF_{elec}
Baseline CO2 emission factor for grid electricity</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable</td><td>☑</td><td>☑</td></tr>
<tr><td colspan="5">The following questions B.6.2.15 – B.6.2.23 should be completed if BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002):</td></tr>
<tr><td>B.6.2.15. Parameter Title:
Operating margin (OM) emission factor of the grid</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.</td><td>☑</td><td>☑</td></tr>
</table>

<table>
<tr><th>CHECKLIST TOPIC / QUESTION</th><th>Ref.</th><th>COMMENTS</th><th>PDD in GSP</th><th>Final PDD</th></tr>
<tr><td>B.6.2.16. Parameter Title:
Build margin (BM) emission factor of the grid</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.</td><td>☑</td><td>☑</td></tr>
<tr><td>B.6.2.17. Parameter Title:
Fuel consumption of each power source</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Choice of data correctly justified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>N/A
Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.</td><td>☑</td><td>☑</td></tr>
<tr><td>B.6.2.18. Parameter Title:
NCV of each fuel</td><td>2, 3, 4, 5</td><td><table><tr><th>Data Checklist</th><th>Yes / No</th></tr></table></td><td>☑</td><td>☑</td></tr>
</table>

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		Title in line with methodology? N/A Data unit correctly expressed? N/A Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided? N/A Has this value been verified? N/A Choice of data correctly justified? N/A Measurement method correctly described? N/A N/A Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.		
B.6.2.19. Parameter Title: Emission coefficient of each fuel	2, 3, 4, 5	Data Checklist / Yes / No Title in line with methodology? N/A Data unit correctly expressed? N/A Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided? N/A Has this value been verified? N/A Choice of data correctly justified? N/A Measurement method correctly described? N/A N/A Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.	☑	☑
B.6.2.20. Parameter Title: Electricity generation of each power source	2, 3, 4, 5	Data Checklist / Yes / No Title in line with methodology? N/A Data unit correctly expressed? N/A	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided? N/A Has this value been verified? N/A Choice of data correctly justified? N/A Measurement method correctly described? N/A N/A Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.		
B.6.2.21. Parameter Title: Fraction of time with low costs /must run plant at the margin (for simple adjusted OM only)	2, 3, 4, 5	Data Checklist / Yes / No Title in line with methodology? N/A Data unit correctly expressed? N/A Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided? N/A Has this value been verified? N/A Choice of data correctly justified? N/A Measurement method correctly described? N/A N/A Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.	☑	☑
B.6.2.22. Parameter Title: Electricity imports	2, 3, 4, 5	Data Checklist / Yes / No Title in line with methodology? N/A Data unit correctly expressed? N/A Appropriate description of parameter? N/A Source clearly referenced? N/A	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
		Correct value provided? N/A Has this value been verified? N/A Choice of data correctly justified? N/A Measurement method correctly described? N/A N/A Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.		
B.6.2.23. Parameter Title: CO_2 emission factor for net electricity imports	2, 3, 4, 5	Data Checklist / Yes / No Title in line with methodology? N/A Data unit correctly expressed? N/A Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided? N/A Has this value been verified? N/A Choice of data correctly justified? N/A Measurement method correctly described? N/A N/A Not applicable because BEF_{elec} is not calculated ex-ante according to AMS I.D. and/or ACM 0002.	☑	☑
B.6.3. Ex-ante calculation of emission reductions				
B.6.3.1. Is the projection based on the same procedures as used for future monitoring?	2, 3, 4, 5	Yes, it is. The projection is based on the same procedures as used for future monitoring.	☑	☑
B.6.3.2. Are the GHG calculations documented in a complete and transparent manner?	2, 3, 4, 5, 31, 32,	Yes, they are. The GHG calculations are documented in a complete and transparent manner.	☑	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
	33			
B.6.3.3. Is the data provided in this section consistent with data as presented in other chapters of the PDD?	2, 3, 4, 5	Yes, it is. The data provided in this section are consistent with data as presented in other chapters of the PDD.	☑	☑
B.6.4. Summary of the ex-ante estimation of emission reductions				
B.6.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	2, 3, 4, 5	Yes, it will. The project will reduce the GHG emissions than the baseline scenario	☑	☑
B.6.4.2. Is the form/table required for the indication of projected emission reductions correctly applied?	2, 3, 4, 5	Yes, it is. The table is complete	☑	☑
B.6.4.3. Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting period?	2, 3, 4, 5, 7, 31, 32, 33	Yes, it is. The projection is in line with the envisioned time schedule for the project's implementation and the indicated crediting period. Please refer to A.4.3.5	☑	☑
B.6.4.4. Is the data provided in this section in consistency with data as presented in other chapters of the PDD?	2, 3, 4, 5	Yes, it is. The data provided in this section are in consistency with data as presented in other chapters of the PDD.	☑	☑
B.7. Application of the monitoring methodology and description of the monitoring plan				
B.7.1. Data and parameters monitored				
B.7.1.1. Is the list of parameters presented in chapter B.7.1 considered to be complete with regard to the requirements of the applied methodology?	2, 3, 4, 5, 7, 12, 13, 14,	According to the monitoring methodology, monitoring involves the following: - The fuel consumption (natural gas and low-calorific process gas) at the cogeneration system - Heat production at the cogeneration system - Electricity production at the cogeneration system	**CAR6**	☑

CHECKLIST TOPIC / QUESTION	Ref.	COMMENTS	PDD in GSP	Final PDD
	15, 16, 31, 32, 33	- Fate of the electricity displaced by the project activity since the project activity displaces electricity from a fossil fuel based dedicated power plant Note: Regarding to the AM0014 and the here discussed natural gas use the list of parameters is fitting as follows. Nonetheless PFL introduced the new parameter of process gas as aforementioned earlier above. The emission factor for process gas EF_{PG} based on its chemical composition is not listed. **Corrective Action Request CAR6:** It is necessary to add the parameters EF_{PG} to the list of data and parameters monitored.		
Integrate the required amount of sub-checklists for monitoring parameter and comment on any line answered with "No"				

<table>
<tr>
<td>B.7.1.2. Parameter Title:
Natural gas consumption
and additional
Process gas consumption</td>
<td>2, 3, 4, 5, 7, 12, 13, 14, 15, 16, 31, 32, 33</td>
<td>
<u>Natural gas consumption</u>
<table>
<tr><th>Monitoring Checklist</th><th>Yes / No</th></tr>
<tr><td>Title in line with methodology?</td><td>Yes</td></tr>
<tr><td>Data unit correctly expressed?</td><td>Yes</td></tr>
<tr><td>Appropriate description of parameter?</td><td>Yes</td></tr>
<tr><td>Source clearly referenced?</td><td>Yes</td></tr>
<tr><td>Correct value provided for estimation?</td><td>Yes</td></tr>
<tr><td>Has this value been verified?</td><td>Yes</td></tr>
<tr><td>Measurement method correctly described?</td><td>Yes</td></tr>
<tr><td>Correct reference to standards?</td><td>Yes</td></tr>
<tr><td>Indication of accuracy provided?</td><td>Yes</td></tr>
<tr><td>QA/QC procedures described?</td><td>Yes</td></tr>
<tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr>
</table>
This value has to be verified by the later verifying entity.

Note: The natural gas consumption is <u>not the only</u> source of fuel. It is important also to measure the process gas consumption. Therefore the parameter list is extended with the parameter process gas consumption.

<u>Process gas consumption</u>
<table>
<tr><th>Monitoring Checklist</th><th>Yes / No</th></tr>
<tr><td>Title in line with methodology?</td><td>Yes</td></tr>
<tr><td>Data unit correctly expressed?</td><td>Yes</td></tr>
<tr><td>Appropriate description of parameter?</td><td>Yes</td></tr>
<tr><td>Source clearly referenced?</td><td>Yes</td></tr>
<tr><td>Correct value provided for estimation?</td><td>Yes</td></tr>
<tr><td>Has this value been verified?</td><td>Yes</td></tr>
<tr><td>Measurement method correctly described?</td><td>Yes</td></tr>
</table>
</td>
<td>☑</td>
<td>☑</td>
</tr>
</table>

		<table><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table>This value has to be verified by the later verifying entity.		
B.7.1.3. Parameter Title: Cogeneration electricity supplied to industrial plant	2, 3, 4, 5, 7, 12, 13, 14, 15, 16, 31, 32, 33	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Yes</td></tr></table>This value has to be verified by the later verifying entity.	☑	☑
B.7.1.4. Parameter Title: Cogeneration heat supplied to industrial plant	2, 3, 4, 5, 7, 12, 13, 14, 15, 16, 31, 32, 33	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>Yes</td></tr><tr><td>Appropriate description of parameter?</td><td>Yes</td></tr><tr><td>Source clearly referenced?</td><td>Yes</td></tr><tr><td>Correct value provided for estimation?</td><td>Yes</td></tr><tr><td>Has this value been verified?</td><td>Yes</td></tr><tr><td>Measurement method correctly described?</td><td>Yes</td></tr><tr><td>Correct reference to standards?</td><td>Yes</td></tr><tr><td>Indication of accuracy provided?</td><td>Yes</td></tr><tr><td>QA/QC procedures described?</td><td>Yes</td></tr></table>	☑	☑

		QA/QC procedures appropriate? | Yes This value has to be verified by the later verifying entity.		
B.7.1.5. Parameter Title: Operating hours	2, 3, 4, 5	Monitoring Checklist | Yes / No Title in line with methodology? | N/A Data unit correctly expressed? | N/A Appropriate description of parameter? | N/A Source clearly referenced? | N/A Correct value provided for estimation? | N/A Has this value been verified? | N/A Measurement method correctly described? | N/A Correct reference to standards? | N/A Indication of accuracy provided? | N/A QA/QC procedures described? | N/A QA/QC procedures appropriate? | N/A N/A Not applicable because the heat and electric quantities produced by the project activity are directly measured.	☑	☑
The following questions should be completed if BEF_{elec} is calculated ex-post according to AMS I.D. and/or ACM 0002):				
B.7.1.6. Parameter Title: Emission factor of the grid	2, 3, 4, 5	Monitoring Checklist | Yes / No Title in line with methodology? | N/A Data unit correctly expressed? | N/A Appropriate description of parameter? | N/A Source clearly referenced? | N/A Correct value provided for estimation? | N/A Has this value been verified? | N/A Measurement method correctly described? | N/A Correct reference to standards? | N/A Indication of accuracy provided? | N/A	☑	☑

		QA/QC procedures described? N/A QA/QC procedures appropriate? N/A N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.		
B.7.1.7. Parameter Title: Operating margin (OM) emission factor of the grid	2, 3, 4, 5	Monitoring Checklist / Yes / No Title in line with methodology? N/A Data unit correctly expressed? N/A Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided for estimation? N/A Has this value been verified? N/A Measurement method correctly described? N/A Correct reference to standards? N/A Indication of accuracy provided? N/A QA/QC procedures described? N/A QA/QC procedures appropriate? N/A N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.	☑	☑
B.7.1.8. Parameter Title: Build margin (BM) emission factor of the grid	2, 3, 4, 5	Monitoring Checklist / Yes / No Title in line with methodology? N/A Data unit correctly expressed? N/A Appropriate description of parameter? N/A Source clearly referenced? N/A Correct value provided for estimation? N/A Has this value been verified? N/A Measurement method correctly described? N/A Correct reference to standards? N/A	☑	☑

		<table><tr><td>Indication of accuracy provided?</td><td>N/A</td></tr><tr><td>QA/QC procedures described?</td><td>N/A</td></tr><tr><td>QA/QC procedures appropriate?</td><td>N/A</td></tr></table> N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.		
B.7.1.9. Parameter Title: Fuel consumption of each power source	2, 3, 4, 5,	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided for estimation?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr><tr><td>Correct reference to standards?</td><td>N/A</td></tr><tr><td>Indication of accuracy provided?</td><td>N/A</td></tr><tr><td>QA/QC procedures described?</td><td>N/A</td></tr><tr><td>QA/QC procedures appropriate?</td><td>N/A</td></tr></table> N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.	☑	☑
B.7.1.10. Parameter Title: Emission coefficient of each fuel	2, 3, 4, 5	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided for estimation?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr></table>	☑	☑

		<table><tr><td>Correct reference to standards?</td><td>N/A</td></tr><tr><td>Indication of accuracy provided?</td><td>N/A</td></tr><tr><td>QA/QC procedures described?</td><td>N/A</td></tr><tr><td>QA/QC procedures appropriate?</td><td>N/A</td></tr></table> N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.		
B.7.1.11. Parameter Title: Electricity generation of each power source	2, 3, 4, 5,	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided for estimation?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr><tr><td>Correct reference to standards?</td><td>N/A</td></tr><tr><td>Indication of accuracy provided?</td><td>N/A</td></tr><tr><td>QA/QC procedures described?</td><td>N/A</td></tr><tr><td>QA/QC procedures appropriate?</td><td>N/A</td></tr></table> N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.	☑	☑
B.7.1.12. Parameter Title: Fraction of time with low costs /must run plant at the margin (for simple adjusted OM only)	2, 3, 4, 5	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided for estimation?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr></table>	☑	

		<table><tr><td>Measurement method correctly described?</td><td>N/A</td></tr><tr><td>Correct reference to standards?</td><td>N/A</td></tr><tr><td>Indication of accuracy provided?</td><td>N/A</td></tr><tr><td>QA/QC procedures described?</td><td>N/A</td></tr><tr><td>QA/QC procedures appropriate?</td><td>N/A</td></tr></table> N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.		
B.7.1.13. Parameter Title: Electricity imports	2, 3, 4, 5	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided for estimation?</td><td>N/A</td></tr><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr><tr><td>Correct reference to standards?</td><td>N/A</td></tr><tr><td>Indication of accuracy provided?</td><td>N/A</td></tr><tr><td>QA/QC procedures described?</td><td>N/A</td></tr><tr><td>QA/QC procedures appropriate?</td><td>N/A</td></tr></table> N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.	☑	☑
B.7.1.14. Parameter Title: CO_2 emission factor for net electricity imports	2, 3, 4, 5	<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>N/A</td></tr><tr><td>Data unit correctly expressed?</td><td>N/A</td></tr><tr><td>Appropriate description of parameter?</td><td>N/A</td></tr><tr><td>Source clearly referenced?</td><td>N/A</td></tr><tr><td>Correct value provided for estimation?</td><td>N/A</td></tr></table>	☑	☑

		<table><tr><td>Has this value been verified?</td><td>N/A</td></tr><tr><td>Measurement method correctly described?</td><td>N/A</td></tr><tr><td>Correct reference to standards?</td><td>N/A</td></tr><tr><td>Indication of accuracy provided?</td><td>N/A</td></tr><tr><td>QA/QC procedures described?</td><td>N/A</td></tr><tr><td>QA/QC procedures appropriate?</td><td>N/A</td></tr></table> N/A Not applicable because BEF_{elec} is calculated ex-ante according to AMS I.D. and/or ACM 0002.		
B.7.2.	*Description of the monitoring plan*			
B.7.2.1.	Is the operational and management structure clearly described and in compliance with the envisoned situation?	2, 3, 4, 5	Yes, it is. Project monitoring is planned to be undertaken under supervision of the cogeneration plant manager. The operational data will be directly recorded and collected at the project owner's head quarter. A unique set of data management tools will be implemented throughout the project lifecycle. On-site assessment (collection, time/date stamped data), task tracking, auditing tools will be developed in order to ensure accurate, consistent and complete data gathering and project implementation.	☑	☑
B.7.2.2.	Are responsibilities and institutional arrangements for data collection and archiving clearly provided?	2, 3, 4, 5	Yes, it is. The monitoring will be under supervision of cogeneration plant manager. At the end of each calendar year, the project owner compiles data received and arranges the preparation of the Monitoring Report to be sent to the Verifier DOE. During the writing of the monitoring report consistency of data will be checked. Metering equipment is controlled regularly by the responsible technician. Each year the project owner together with the individual site technicians will sign off and verify data as described in the templates for data monitoring. For data monitoring the project owner will develop standardised templates that will be used for monitoring	☑	☑

			emission reductions.		
B.7.2.3.	Does the monitoring plan provide current good monitoring practice?	2, 3, 4, 5	The monitoring plan provides current good monitoring practice. Nonetheless no information is given if data will be collected daily or monthly. **Clarification request CR7:** It is necessary to provide information about the increment of data collection e.g. if the data will be collected daily or monthly.	**CR7**	☑
B.7.2.4.	If applicable: Does annex 4 provide useful information enabling a better understanding of the envisoned monitoring provisions?	2, 3, 4, 5	Annex 4 shows that project owner is responsible.	☑	☑
B.8. Date of completion of the application of the baseline study and monitoring methodology an the name of the responsible person(s)/entity(ies)					
B.8.1.1.	Is there any indication of a date when the baseline was determined?	2, 3, 4, 5	Yes, there is. The baseline was determined to June 03, 2007. The fundaments of the baseline estimation are the efficiency of heat generation, the efficiency of electricity generation and the emission factor EF_{NG} for natural gas.	☑	☑
B.8.1.2.	Is this consistent with the time line of the PDD history?	2, 3, 4, 5	Yes, it is. Is this consistent with the time line of the PDD history	☑	☑
B.8.1.3.	Is the information on the person(s) / entity(ies) responsible for the application of the baseline and monitoring methodology provided consistent with the actual situation?	2, 3, 4, 5	Yes, it is. The information on the persons responsible for the application of the baseline and monitoring methodology are consistent with the actual situation.	☑	☑
B.8.1.4.	Is information provided whether this person / entity is also considered a project	2, 3, 4, 5	Yes, it is. Information whether this person / entity are also considered a pro-	☑	☑

	participant?		ject participant are provided.		
C. Duration of the project activity / crediting period					
C.1. Duration of the project activity					
C.1.1.	Are the project's starting date and operational lifetime clearly defined and reasonable?	2, 3, 4, 5	Yes, they are. The anticipated start of construction is July 01, 2007. The start of crediting period is January 01, 2009.	☑	☑
C.2. Choice of the crediting period and related information					
C.2.1.	Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max. 10 years)?	2, 3, 4, 5	Yes, it is. The project will use renewable crediting period of 3x 7 years.	☑	☑
D. Environmental impacts					
D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts					
D.1.1.	Has the analysis of the environmental impacts of the project activity been sufficiently described?	2, 3, 4, 5, 17, 18	Yes, it has. The project is likely to have no negative impact on environment. **<u>Clarification Request CR8:</u>** In figure 11 the legend for electricity and steam has to be the other way around. It is necessary to correct the legend in figure 11.	**CR8**	☑
D.1.2.	Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, has an EIA been approved?	2, 3, 4, 5, 17, 18	Yes, there are. The Pakistan Environmental Protection Act was enacted in 1997 to provide for protection, conservation, rehabilitation and improvement of the environment. It is the basic legislative tool empowering the government to frame regulations for the protection of the environment. For new development projects, the Section 12 of	☑	☑

			the Act directs that an Initial Environmental Examination, or where the project is likely to cause an adverse environmental effect, an environmental impact assessment be filed with the Environmental Protection Agency (Pak-EPA) for review and approval prior to project construction. The Pak-EPA issued an Environmental Assessment Guideline package in 1997 which included both general and sectoral guidelines. The EIA/IEE regulations were issued in the year 2000 regarding the environmental assessment procedures giving a firm legal status to IEE and EIA. The category of projects for which an IEE or EIA is mandatory has been issued in the Regulations. For further details please refer to D.1 of the PDD in GSP.		
D.1.3.	Will the project create any adverse environmental effects?	2, 3, 4, 5, 17, 18	No, the project does not have any adverse effect on environment.	☑	☑
D.1.4.	Were transboundary environmental impacts identified in the analysis?	2, 3, 4, 5, 17, 18	No, project does not have any transboundary impact.	☑	☑
D.2.	**If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party**				
D.2.1.	Have the identified environmental impacts been addressed in the project design sufficiently?	2, 3, 4, 5, 17, 18	Yes, the PDD clearly shows the most relevant environmental impacts. PFL will keep negative impacts during the construction and operating phases as low as reasonably possible. Also, contractors during the construction time will be obliged to minimize environmental impacts.	☑	☑
D.2.2.	Does the project comply with environmental legislation in the host country?	2, 3, 4, 5, 17,	Yes, the project complies with environmental legislation in Pakistan.	☑	☑

		18			
E. Stakeholders' comments					
E.1. Brief description how comments by local stakeholders have been invited and compiled					
E.1.1.	Have relevant stakeholders been consulted?	2, 3, 4, 5, 19, 20, 21, 22	Yes, they have. The PDD shows that stakeholder consultation was held at PFL on June 07, 2007 with participation of local community and newspaper.	☑	☑
E.1.2.	Have appropriate media been used to invite comments by local stakeholders?	2, 3, 4, 5, 19, 20, 21, 22	Yes, they have. The invitation was made by newspaper	☑	☑
E.1.3.	If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	2, 3, 4, 5, 19, 20, 21, 22	Yes, they have. The stakeholder consultation process has been carried out in accordance with Pakistan regulations and laws.	☑	☑
E.1.4.	Is the undertaken stakeholder process that was carried out described in a complete and transparent manner?	2, 3, 4, 5, 19, 20, 21, 22	Yes, the undertaken stakeholder process was complete and transparent.	☑	☑
E.2. Summary of the comments received					
E.2.1.	Is a summary of the received stakeholder	2, 3,	Yes, PDD shows the stakeholder comments summary	☑	☑

	comments provided?	4, 5, 21, 22			
E.3. Report on how due account was taken of any comments received					
E.3.1.	Has due account been taken of any stakeholder comments received?	2, 3, 4, 5, 21, 22	Yes, PDD shows description of these projects	☑	☑
F. Annexes 1 – 4					
F.1. Annex 1: Contact Information					
F.1.1.	Is the information provided consistent with the one given under section A.3?	2, 3, 4, 5	Yes, information is same as it was in A.3	☑	☑
F.1.2.	Is the information on all private participants and directly involved Parties presented?	2, 3, 4, 5	Yes, PDD shows correct information about participants.	☑	☑
F.2. Annex 2: Information regarding public funding					
F.2.1.	Is the information provided on the inclusion of public funding (if any) in consistency with the actual situation presented by the project participants?	2, 3, 4, 5, 28	PDD shows that no public funding is used in this project. PFL submitted to TÜV SÜD a statement that there is no public funding.	☑	☑
F.2.2.	If necessary: Is an affirmation available that any such funding from Annex-I-countries does not result in a diversion of ODA?	2, 3, 4, 5, 28	N/A Not applicable	☑	☑
F.3. Annex 3: Baseline information					
F.3.1.	If additional background information on baseline data is provided: Is this information consistent with data presented by	2, 3, 4, 5	The data provide in PDD is consistent.	☑	☑

	other sections of the PDD?				
F.3.2.	Is the data provided verifiable? Has sufficient evidence been provided to the validation team?	2, 3, 4, 5	Yes, all provided data are verifable. Please refer for further details to the validator's information reference list (IRL)	☑	☑
F.3.3.	Does the additional information substantiate / support statements given in other sections of the PDD?	2, 3, 4, 5	Yes, it does.	☑	☑
F.4. Annex 4: Monitoring information					
F.4.1.	If additional background information on monitoring is provided: Is this information consistent with data presented in other sections of the PDD?	2, 3, 4, 5	No, it is not **Corrective Action Request CAR7:** It is necessary to complete the contact details in table A4-1 of Annex 4.	**CAR7**	☑
F.4.2.	Is the information provided verifiable? Has sufficient evidence been provided to the validation team?	2, 3, 4, 5	Please refer to CAR7 in F.4.2	**CAR7**	☑
F.4.3.	Do the additional information and / or documented procedures substantiate / support statements given in other sections of the PDD?	2, 3, 4, 5	Please refer to CAR7 in F.4.2	**CAR7**	☑

Table 2 Resolution of Corrective Action and Clarification Requests

Clarifications and corrective action requests by validation team	Ref. to table 1	Summary of project owner response	Validation team conclusion
Corrective Action Request CAR1: During on-site visit PFL stated the option with three units will be implemented but with another gas turbine manufacturer. It is necessary to update the PDD with the selected technical specification of gas turbines and HRSG for the cogeneration plant.	A.2.2.	Changes of the PDD: 1) Figure 3 updated 2) Section A.4.3., para after Figure 3: "For cogeneration of power and steam with the required parameter of 40 bar/400 °C, a plant with three gas turbines and three upstream heat recovery steam generators (HRSG) is implemented as project activity. Several units are chosen for redundancy purposes. From several gas turbine types which are offered in the market, the one according to Table 2 has been selected for implementation for the project activity." 3) Table 2 changed according to selected gas turbine type 4) section A.4.3., para after Figure 3: "At the annual average temperature of 25 °C the selected gas turbines can meet also the expected maximum power demand of 25 MW (3 x 9.7 MW = 29.1 MW). As the average power demand of the fertiliser complex is about 22 MW the gas turbines will have to be operated at part load during most of the time; the consequence will be a lower efficiency. A simplified heat flow diagram of the cogeneration plant for operation at annual average conditions (25°C) and net power output (22.2 MW) is shown in Figure 4. This is in order to ob-	All the relevant information has been added in the updated PDD. The issue is settled. ☑

		tain realistic output taking into account the part load operation. In pure cogeneration mode the plant can generate 55.8 t/h process steam. In order to meet the average demand of 150 t/h, the HRSGs are equipped with supplementary firing (SF)." 5) Figure 5 updated	
Corrective Action Request CAR2: It is necessary to add explanations how the project the requirements any sustainable development aspects.	A.2.5.	Additional para in PDD, end of section A.2.: "The proposed project activity also contributes to sustainable development by • reduction of local air pollutant emissions • transfer of modern gas turbine cogeneration technology • creation of employment during construction and operation • further additional measures by Pakarab (outside of the direct project boundaries) o filtration plant in chemical complex o development of children park o construction of community school (Please refer to section D.1.)"	The PP explained in a transparent and plausible way how the project fulfils requirements of sustainable development. The issue is settled. ☑
Corrective Action Request CAR3: It is necessary to correct the wrong used unit from % (electric efficiency boiler e_b), GJ_{NCV}/MWh_{elec} into % (thermal efficiency boiler e_{th}) GJ_{NCV}/GJ_{th}	B.6.2.2.	PDD section 6.2., 1st box, 2nd line updated as follows: "% (thermal efficiency boiler e_b), GJ_{NCV}/GJ_{th} (heat rate boiler FR_{th})"	The correct units have been applied in the updated PDD. The issue is settled. ☑
Corrective Action Request CAR4: During the on-site inspection of the boilers #1-#3 of the existing power plant it evolved that the boiler efficiency needs further clarifi-	B.6.2.2.	Changes of the PDD: 1) Figure 6 updated with 91% boiler efficiency 2) Section B.4., 3rd para after Figure 6: "They are in good technical condition with calculated boiler	The boilers efficiency has been corrected and relevant figures and tables has been revised.

cation. It is necessary to justify the efficiency of the boilers and to add hard proofs e.g. calculations or manufacturer's design datas. Regarding to the results of the justification of the efficiency research the estimations of baseline emissions has to be updated.		efficiency of 90.5% based on actually measured flue gas parameters and fuel composition." 3) Section B.4., 4th para after Figure 6: "Nevertheless, as conservative approach according to the selected baseline scenario 3 above, a thermal efficiency of 91% as annual average for heat production is chosen." 4) Table 6 updated with 91% boiler efficiency, and adjusted electric capacity to real condensing temperature 5) Table 7 updated with 91% boiler efficiency, and adjusted electric capacity to real condensing temperature 6) updated under equation (3.1) 7) Updated in first box of section B.6.2. 8) emission reductions updated in Tables 4 and 9 as well as in the text of the PDD	The issue is settled. ☑
Corrective Action Request CAR5: It is necessary to update figure 6 in numbers in values and consistency. Regarding to the updated values of figure the estimations of baseline emissions has to be updated.	B.6.2.2.	see actions for CAR5	This issue is settled. Please refer to validation team's conclusion in CAR5. The issue is settled. ☑
Corrective Action Request CAR6: It is necessary to add the parameters EF_{PG} to the list of data and parameters monitored.	B.7.1.1.	Has been added at beginning of section B.7.1: "- The process gas emission factor".	The parameters EF_{PG} was add to the list of data and parameters monitored. The issue is settled ☑

Corrective Action Request CAR7: It is necessary to complete the contact details in table A4-1 of Annex 4	F.4.1.	table A4-1 of Annex 4 updated	The contact details had been completed. The issue is settled. ☑
-	-	-	-
Clarification Request CR1: It is necessary to update in PDD the context of retrofitting to replacement.	A.2.1	Change of wording PDD section A.2., last para: "Therefore PFL are considering to replace the existing captive condensing power plant by with a new highly energy efficient co-generation plant."	The PDD have been up-dated. The issue is settled. ☑
Clarification Request CR2: It is necessary to show a confirmation about participation of the listed entities or Parties confirmed by each one of them.	A.2.3.	PFL provided letter to Fichtner, and Fichtner provided letter to PFL confirming mutually the project participa-tion to each other.	The relevant evidences have been delivered to DOE. The issue is settled. ☑
Clarification Request CR3: It is necessary to line the annual average over the crediting period of estimated reduc-tions for the period 2009-2015 before the total estimated reductions (Total maximum crediting period of 21 years) 2009-2030	A.4.4.1	Table 9 updated respectively	The table 9 of the PDD has been updated. The issue is settled. ☑
Clarification Request CR4: It is necessary to write the full justification for parameter Electric efficiency or heat rate for electricity generation in condensing mode with existing steam turbines (baseline).	B.6.2.1	Has been added to 2nd box of Section B.6.2.	The relevant information has been added in the The issue is settled. ☑
Note: This CR5 is requested 2 times. **Clarification Request CR5:** It is necessary to point out a clear statement	B.6.3.3 B.6.2.10	Explanation has been added to 3rd box of Section B.6.2.	The information about the Pakistan national GHG inven-tory has been added in the

about availability of Pakistan national GHG inventory. If a national GHG inventory with a specific emission factor for natural gas is available, the national EF_{NG} has to be used.			relevant section of the PDD. The issue is settled. ☑
Note: This CR6 is requested 2 times. **Clarification Request CR6:** In PDD table 3 are shown specific composition data for natural gas. Nonetheless PFL took the default value for natural gas of IPCC2006. In this case it's necessary to delete the specific data.	B.6.3.3. B.6.2.10	An emission factor of 56.17 t CO_2/TJ has been calculated for the chemical composition of the fuel. For natural gas, the IPCC 2006 value of 56.1 t CO_2/TJ is chosen for conservativeness and compliance with AM0014, see also section B.6.2 of the PDD.	Information about the emission factor of natural gas has been added. The issue is settled. ☑
Clarification request CR7: It is necessary to provide information about the increment of data collection e.g. if the data will be collected daily or monthly	B.7.2.3.	The following clarification has been added to section B.7.2.: "Data will be collected in daily intervals, starting from 0 am until 24pm."	Monitoring data will be collected daily. The issue is settled. ☑
Clarification Request CR8: In figure 11 the legend for electricity and steam has to be the other way around. It is necessary to correct the legend in figure 11.	D.1.1.	Legend of Figure 11 corrected accordingly.	The figure 11 has been updated in the PDD. The issue is settled. ☑
Forward Action Request FAR1: It is requested to verifier that please makes ensure that the low caloric value gas (process gas) from the fertiliser process is not used for supplementary firing of the HRSGs.			

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

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

Industrie Service

Annex 2: Information Reference List

Reference No.	Document or Type of Information
1	UNFCCC homepage http://www.unfccc.int including the CDM section cdm.unfccc.int
2	Approved methodology AM0014 / Version 04 (EB33 decision)
3	Tool for the demonstration and assessment of additionality / Version 03
4	Project Design Document for CDM project "Pakarab Fertilizer Co-generation Power Project" Version 03, dated May 19, 2008 as available http://ji.unfccc.int/CDM_Projects/DB
5	On-site interviews conducted on May 28~29, 2008 at the project site in Pakarab Fertilizer Ltd, Multan, Pakistan by auditing team of TÜV SÜD Validation team: Mr Nikolaus Kröger — TÜV SÜD, assessment team leader (on-site mission) Mr Eberhard Rothfuß — TÜV SÜD, ghg auditor, cogeneration expert (on-site mission) Mr Khalid Mahmood — TÜV SÜD, ghg auditor trainee, host country expert (on-site mission) Interviewed persons in Multan, Pakistan: Mr Muhammad Saleem Zafar — PFL Director Operation (Acting) Mr Abdul Rauf — PFL Unit Manager Utilities, Project Coordinator Mr Fawad Ahmed Mukthar — PFL CEO Mr Talha Sangi — PFL Process Engineer Mr Asghar Alikhan — PFL Project Manger Co-generation plant Mr Najaf Ali — PFL Process Engineering Mr Ijaz Hussain Khan — PFL Senior Production Manager Mr Pervaiz Iqbal — PFL Electrical & Instrumentation Manager Mr Majeed Zia — PFL Manager Training and Laboratory Mr Johannes Laubach — Fichtner GmbH & Co. KG, Project developer Follow-up interviews conducted on August 18, 2008 in Fichtner GmbH & Co. KG office in Stuttgart, Germany by auditing team of TÜV SÜD

Reference No.	Document or Type of Information
	Validation team: Mr Eberhard Rothfuß TÜV SÜD, ghg auditor, cogeneration expert (on-site mission) Interviewed persons in Stuttgart, Germany: Mr Johannes Laubach Fichtner GmbH & Co. KG, Project developer Mr Panos Konstantin Fichtner GmbH & Co. KG, Project developer
6	Pakarab Fertilizer Ltd homepage http://www.fatima-group.com/Fertilizer_pakarab_company_profile.html
7	Project Implementation Plan (PIP) issued by Pakarab Fertilizer Limited, submitted by Pakarab Fertilizer Ltd on May 29, 2008
8	Presentation of project from Project Manager Pakarab Fertilizer Ltd, Multan, Pakistan, during on-site visit May 28, 2008
9	Presentation of project from Project developer Fichtner GmbH & Co. KG, Germany, during on-site visit May 28, 2008.
10	Letter of approval (LoA), issued by the Government of Pakistan, Ministry of Environment (Designated National Authority of Pakistan), submitted on January 28, 2008
11	Modalities of Communication (MoC), submitted by Pakarab Fertilizer Ltd on September 11, 2008
12	Data of the existing (old) power plant for baseline scenario, submitted by Pakarab Fertilizer Ltd on May 29, 2008
13	Pakarab Fertilizer Co-generation Power Project diagram, submitted by Pakarab Fertilizer Ltd on May 29, 2008
14	Specification of new power plant (New Gas Turbines and Heat Recovery Steam Generator), issued by the technology provider company, submitted by Pakarab Fertilizer Ltd on May 29, 2008
15	Gas turbine expected base and part load performance, submitted by Pakarab Fertilizer Ltd on May 28, 2008
16	Revised guarantee data of optimized HRSG-system, submitted by Pakarab Fertilizer Ltd on May 28, 2008
17	Decision on Initial Environment Examination (IEE), issued by Environment Protection Department, Government of the Punjab, Lahore on October 02, 2007, submitted by Pakarab Fertilizer Ltd on May 28, 2008
18	Environmental Impact assessment of Pakarab Fertilizer Co-generation Power Project, issued by Ministry of Environment of Pakistan, submitted by Pakarab Fertilizer Ltd on May 28, 2008
19	List of Participants of Public stakeholder process, issued and submitted by Pakarab Fertilizer Ltd on May 29, 2008
20	Notice on taking Pakarab Fertilizer Co-generation Power Project CDM project stakeholders meeting, issued by newspapers Daily Jang, Daily Pakistan, Daily Nawa-I-Waqt, Daily Ausaf Multan dated June, 2007, submitted by Pakarab Fertilizer Ltd on May 29, 2008

Reference No.	Document or Type of Information
21	Pakarab Fertilizer Co-generation Power Project stakeholder questionnaire, issued by stakeholder and Pakarab Fertilizer Ltd, dated June 7, 2007, submitted by Pakarab Fertilizer Ltd on May 29, 2008
22	Participant lists of on-site interviews, signed on June 28~29, 2008
23	Official IEA statistics, Pakistan's installed cogeneration power plant data, submitted by Pakarab Fertilizer Ltd on May 29, 2008
24	Training reference for Heavy Duty Gas Turbines (Operation & Maintenance course 5 days for 10 persons), issued January 2007 submitted by Pakarab Fertilizer Ltd on May 30, 2008.
25	Training reference for Heat Recovery Steam Generators HRSG, issued August 15, 2007, submitted by Pakarab Fertilizer Ltd on May 30, 2008
26	Participation confirmation letter from Pakarab Fertilizer Ltd, submitted by Pakarab Fertilizer Ltd on May 30, 2008
27	Participation confirmation letter from Fichtner GmbH & Co KG, Germany, submitted by Pakarab Fertilizer Ltd on May 30, 2008
28	Declaration of Public Funding in PFL CDM Cogeneration Power Project, submitted by Pakarab Fertilizer Ltd on May 30, 2008
29	Pakistan Initial National Communication on Climate Change November 2003, submitted by Government of Islamic Republic of Pakistan Ministry of Environment, submitted by Fichtner on June 24, 2008
30	Pakistan : Preliminary National Greenhouse Gas Inventory by BAHADAR KHAN, DR. M.ANWAR BAIG, Institute of Environmental Science and Engineering (IESE), National University of Sciences & Technology (NUST), Tamizud-Road, Rawalpindi, Pakistan submitted by Fichtner on June 24, 2008
31	Excel calculation FICHT-4091569-v3-Temp_&_Pressure.XLS, submitted by Fichtner on June 24, 2008
32	Excel calculation FICHT-4337314-v1-CombustionCalculations.XLS, submitted by Fichtner on August 18, 2008
33	Excel calculation FICHT-4487717-v1-Combustion.PDF, submitted by Fichtner on August 18, 2008
34	IPCC 2000 Good Practice Guidance and Uncertainty Management
35	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
36	Final PDD of CDM project "Pakarab Fertilizer Co-generation Power Project" Version 07, dated May 18, 2009
37	Order of gas turbines 1st Equipment purchasing contract dated July 13th, 2007
38	Letter of approval (LoA), issued by the Government of Germany dated February 9th, 2009
39	CDM consulting services contract was sign dated March 21st, 2007 *Early CDM Consideration Document* *The project was seriously considered as a CDM project when the CDM consulting contract was signed.*
40	Start of construction

Reference No.	Document or Type of Information
41	Pakistan's total installed capacity in 2004 (source: WAPDA-Power System Statistics Twenty Ninth Issue)

Reference No.	Document or Type of Information	Document date
RfR 1	PFL; Multan, Pakistan Co-Generation Power Plant – Fiscal Benefits	2009-10-12
RfR 2	An Assessment of Energy Service Companies (ESCOs) Worldwide	2007-03
RfR 3	Accredited Energy Service Companies (ESCOs)	2008-11
RfR 4	Boiler and Turbine Technical Assessment Certificate	2009-10-13
RfR 5	Calculation for Issue 3 – excel calculation file	2009-10-12