Validation Report

of "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" in "Republic of Indonesia"

GLC Report No: 171, Rev. 11

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Validation Report

GLC Report No. 171**, Rev.** 11

Organisational Unit	
Germanischer Lloyd Certification GmbH (GLC), Greenhouse Gas Services	
Client "South Pole Carbon Asset Management Ltd."	Client reference person Alin Pratidina

Summary:

Project Name:	"Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy"	
Project Country:	"Republic of Indonesia"	
Sectoral Scope, Technical Area	CDM Sectoral Scope 1, Technical Area 1.1.5	
Methodology:	ACM0002	
Version:	12.1	
Name:	"Consolidated baseline methodology for grid-connected electricity generation from renewable sources"	
Project Size:	☒ Large Scale	☐ Small Scale
GHG Project:	Geothermal Power Plant, Ulubelu Unit 3-4, Republic of Indonesia	
ER Estimation:	4,072,488 t CO_2eq total	581,784 t CO_2eq per year
Crediting Period:	☐ Fixed (10 years)	☒ Renewable (7years)
Validation opinion:	☒ Positive ☐ Negative	

Project assessed by:	**Assessment reviewed by:**	**Work approved by:**
Markus Weber, Ellen Goel, Stephen Etheridge, Syaiful Hidayat	Jose Emilio Moreno Olaf Pattloch Jun Wang	Jose Emilio Moreno
Date of this revision:	Revision No.	Number of pages
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History of report revisions:

Rev.	Date	**Person** (short sign or name)	**Function**	**Action**
01	2011-12-12	Ellen Goel / Markus Weber	Assessment Team / Assessment team leader	Preparation of Draft Report
02	2011-12-29	Stephen Etheridge	Technical expert (assessment)	Assessment as per assignment
03	2012-01-06	Ellen Goel	Assessment Team	Completion of Table 2-1/ Editorials
04	2012-01-17	JMor / Olaf Pattloch / Jun Wang	Technical Reviewer / Review Expert / Trainee Reviewer	Review with comments
05	2012-01-20	Ellen Goel / Markus Weber	Assessment team / Assessment team leader	Response on TR comments
06	2012-02-06	Ellen Goel	Assessment team	Response on second TR comments
07	2012-02-07	JMor	Final Reviewer / Approver	Final Review and Approval
08	2012-05-04	Ellen Goel	Assessment team	Response on RfR
09	2012-05-13	Jun Wang	Trainee Reviewer	Review with comments
10	2012-05-14	Ellen Goel Markus Weber	Assessment team	Response on TR comments
11	2012-05-14	JMor	Final Reviewer / Approver	Final Review and Approval

Abbreviations

CAR	Corrective Action Request
CAPM	Capital Asset Pricing Model
CDM	Clean Development Mechanism
CDM-EB	CDM Executive Board (the board)
CER	Certified Emission Reduction
CH_4	Methane
CL	Clarification request
CMP	Meeting of the Parties to the Kyoto Protocol
CO_2	Carbon dioxide
CO_2eq	Carbon dioxide equivalent
COP/MOP	The Conference of the Parties to the United Nations Framework Convention on Climate Change serving as the Meeting of the Parties to the Kyoto Protocol
DNA	Designated National Authority
DOE	Designated Operation Entity
EIA	Environmental Impact Assessment
ERPA	Emission Reduction Purchase Agreement
ESC	Energy Sales Contract
FAR	Forward Action Request
GHG	Greenhouse gas
GLC	Germanischer Lloyd Certification GmbH
GSD	Global Stakeholder Consultation
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
ISO	International Standard Organisation
LoA	Letter of Approval
NGO	Non-governmental Organisation
O&M	Operation and maintenance
ODA	Official development assistance
PDD	Project Design Document
PGE	PT. Pertamina Geothermal Energy
PLN	Perusahaan Listrik Negara (National Electricity Company)
PP	Project Participant (s)
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention on Climate Change
WACC	Weighted Average Cost of Capital

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1 INTRODUCTION

"South Pole Carbon Asset Management Ltd." has commissioned Germanischer Lloyd Certification GmbH (GLC) to perform the validation of the "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" in the "Republic of Indonesia" (hereafter called “the project”). This validation report summarizes the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions made by COP/MOP and the CDM Executive Board.

1.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project’s compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of Project Design Document (PDD) and supporting documentation. The PDD and supporting documentation are reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved consolidated baseline and monitoring methodology ACM0002, (version 12.1). The validation was based on the recommendations and guidance of the Validation and Verification Manual /VVM/.
The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design. The validation is not meant to provide any consulting towards the Client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Project Description

The "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" comprises the development of a geothermal power plant in Ulubelu, Lampung Region in the Republic of Indonesia. The project owner is PT. Pertamina Geothermal Energy (PGE) who owns the properties, of the geothermal fields in the specified region. The key purpose of the project is to utilise the geothermal resources of the deeper underground of areas of Ulubelu to generate electricity which will be transmitted to the Sumatera Interconnected grid through the Perusahaan Listrik Negara (PLN) substation. PLN is the National Electricity Company.

In early 2010/A22/ PGE decided to invest in the project activity. From May 2010 onwards wells were drilled/A3/ and construction work started. The power plant construction start is planned for 2012 and the operation start in 2014/B4/.

The project activity involves installation of 2x58 MW turbine generator gross capacity/B4/.
The generated electricity will be sold to Perusahaan Listrik Negara (PLN) under an energy sales contract/A7/.

The project is expected to export an average of 867,240 MWh of net electricity per year– based on a plant load factor of 90%/A2/- with the auxiliary consumption of 2x3 MW/B4/.
This project is intended to reduce CO2 emissions which would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system". The estimated amount of emission reductions over the chosen 7-years "renewable crediting period" are 4,072,488 tCO_2 (acc. to the PDD v.02.4) from 2014 to 2020.

The technical key data is provided in tables 1-1 below:

Table 1-1: Technical Data of the Geothermal Power Plant Generators

Variable	**Value**
Turbine generator capacity (MW)	2 x 58
Net installed capacity (MW)	2 x 55
Auxiliary Loads consumption (MW)	2 x 3
Operating time yearly (hrs)	7884 (8760 x 90%)
Expected annual power generation/ Effective supply to the grid (MWh)	867,240

2 VALIDATION TEAM

A competent team with relevant knowledge and experience in the specific scopes and sectors was appointed by GLC. The appointment of the team takes into account the required scope, technical area and project activity knowledge requirements for validating the project design and the relevant ERs achieved by the project activity.

Table 2-1: Validation team members, qualification and knowledge

	Name	Function [1)]	Sectoral scope specific knowledge	Technical area specific knowledge	Local knowledge	Type of involvement						
						Desk review	On-site visit / interviews	Reporting	Supervision of work	Technical review	Expert input	Approval
☒ Mr. ☐ Ms.	Markus Weber	ATL	X	X		X	X	X	X		X	
☐ Mr. ☒ Ms.	Ellen Goel	A				X	X	X				
☒ Mr. ☐ Ms.	Syaiful Hidayat	E			X	X	X					
☒ Mr. ☐ Ms.	Stephen Etheridge	E	X	X		X		X			X	
☒ Mr. ☐ Ms.	Jose Emilio Moreno	R/FA	X	X						X	X	X
☐ Mr. ☒ Ms.	Jun Wang	TR								X		

	Name	Function [1]	Sectoral scope specific knowledge	Technical area specific knowledge	Local knowledge	Type of involvement						
						Desk review	On-site visit / interviews	Reporting	Supervision of work	Technical review	Expert input	Approval
☒ Mr. ☐ Ms.	Olaf Pattloch	R	X	X						X	X	

1) ATL: Assessment Team Leader; A: Auditor; TA: Trainee auditor, E: Expert; R: Reviewer; TR: Trainee Reviewer; FA: Final Approval

3 METHODOLOGY

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

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

The validation protocol consists of two tables. The different columns in these tables are described in Figure 3-2 and 3-3.

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

The validation consists of the following three phases:
I desk review of the project design documentation and supporting documents
II on-site assessment and follow-up interviews with project stakeholders
III resolution of outstanding issues and the issuance of the final validation report and opinion

The final validation report summarizes the findings after all phases of the validation. The following sections outline each step in a more detailed way.

3.1 Desk Review of the Project Design Documentation and Supporting Documents

The initial version of the PDD (PDD v.01) as well as supporting documents is initially assessed in the context of a desk-review. A complete list of documentation reviewed during the validation is presented in Section 7.

3.2 On-Site Assessment and Follow-Up Interviews with Project Stakeholders

From 12 July 2011 to 15 July 2011, Markus Weber (from GLC's office in Hamburg, Germany), Ellen Goel (from GLC's office in Singapore) and Syaiful Hidayat (from GLC's office in Jarkata, Indonesia) conducted a physical on-site visits to the property Ruang Rapat Kantor PGE Ulubelu, Lampung, Indonesia. Furthermore the validation team conducted an additional document review at the office of PT. Pertamina Geothermal Energy in Jakarta, Indonesia

In the context of the on-site visit, GLC performed visual inspection to the project site, assessment of project related documents provided by the project participants. The members of the validation team also conducted interviews with representatives of project stakeholders in order to confirm selected information and to resolve issues earlier identified during the desk review of documents. The main topics of the interviews and interviewed persons are summarized in the Table 3-1.

Table 3-1: Interviewed persons and interview topics

Name	Organization/Position	Interview Topics
Made Budy Sartono	PGE	- *Project design and adopted technology* - *Demonstration of additionality (including prior CDM consideration)* - *GHG emission reduction calculations* - *Application of the monitoring methodology as well as expected design and application of the monitoring plan* - *Assessment of environmental impacts, environmental licensing and legal compliance* - *Stakeholder consultation process* - *Discussion on Stakeholder comment* - *Project overview, and detailed explanation about the project's relevant technical aspects* - *Project implementation schedule* - *Assessment of environmental impacts, environmental licensing and legal compliance of the project and baseline scenario with applicable regional and national legislation.* - *Status of the development of the Environmental Impact Assessment (EIA) for the proposed project activity* - *Issuance of the Letter of Approval (LoA) for "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" by the DNA of "Republic of Indonesia"* -
Mawardi Agani	PGE	
Gatot S.	PGE	
E. Agune B.	PGE	
Novi Purwano	PGE	
Doddy S. Gunaum	PGE	
M G. Patony	PGE	
Zaldy Arifianto	PGE	
Sonnyndra	PGE	
Reza A.S	PGE	
Ninditta W.R	PGE	
Ibno Arif	PGE	
Ferdian Syan	PGE	
Firman Johannes	PGE	
Sandeep Kanda	South Pole	
Alin Pratidina	South Pole	
Arrie Setiawan	South Pole	

3.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve any outstanding issues which needed to be clarified prior to GLC's positive conclusion on the project design as described in the Project Design Document (PDD) and supporting documentation. In order to ensure transparency, a validation questionnaire was customised for the project, according to the latest Validation and Verification Manual (VVM) /VVM/. This questionnaire shows in transparent manner VVM requirements, source, means and

findings of validation as well as the results from validating the identified criteria. The validation questionnaire serves the following purposes:

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

The validation questionnaire consists of one table with sub-sections. These sections are related to the different topics which have to be validated and checked with respect to the VVM requirements. The completed validation questionnaire for the "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" is enclosed in Annex A to this report. The different columns of this questionnaire are explained in Table 3-2.

Findings established during the validation can either be seen as a non-fulfilment of criteria of the applicable CDM baseline and monitoring methodology, and/or applicable criteria of the CDM or where a risk to the fulfilment of project objectives is identified.
Corrective action requests (CAR) are issued, where:

i) the project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions; or
ii) applicable baseline and monitoring methodology, and/or applicable criteria of the CDM have not been met; or
iii) there is a risk that emission reductions cannot be monitored or calculated or that the project would not be accepted as CDM project activity

A request for clarification (CL) may be used provided information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met or where additional information is needed to fully clarify a particular issue.

The validation questionnaire consists of individual frames for each Corrective action requests (CAR) and request for clarification (CL) raised. The content of each frame is described in the figure below. To guarantee the transparency of the validation process, the concerns raised by GLC and the responses provided by the project proponents are fully documented in Annex A of this report.

Forward Action Requests (FARs) are issued during validation to highlight issues related to project implementation that require review/assessment during the subsequent verification(s) of the project activity. FARs are not related to the CDM requirements for registration

The findings are separately presented in a findings list table which is also attached in Annex A. The different columns of this list are explained in Table 3-3.

The resolution of all raised CAR and CL for the "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" is enclosed in Annex A of this Validation Report.

Table 3-2: Structure of the Validation Questionnaire

CHECKLIST QUESTION / VVM REQUIREMENT	***SOURCE***	***MEANS AND FINDINGS OF VALIDATION***	***Draft Concl..***	***Final Concl.***
Lists CDM requirements which the project should meet. The checklist is organised in several different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	Gives reference to documents where the checklist question or item is from.	The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.	This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR), Clarification request (CL), or Forward Action Request (FAR).	This is either: OK, when the Draft Conclusion is OK or raised CAR/CLs have been successfully closed out; OK, with only FAR remaining; Or: CAR/CLs

Table 3-3: Structure of the Findings List – Resolution of Corrective Action and Clarification Requests

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what is required and why; address the context (e.g. section)*	**Date** *(dd/mm/yyyy)*	**Project Participants Response** *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	**Date** *(dd/mm/yyyy)*	**GLC Assessment** *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	**Date** *(dd/mm/yyyy)*
In this column a finding is described in a clear and transparent manner. It also shall be described which further information is needed or which correction must be applied.	Date of raising the finding.	In this column the PP shall provide a clear statement how to close the finding. This statement shall be sustained with suitable arguments and evidence.	Date of PP response.	In this column GLC shall provide the conclusion of the assessment. The finding can be close here or if the argumentation and/or evidence are not suitable a new line below with the continuation of the finding will be opened.	Date of GLC assess-ment

3.4 Technical Review

Before submission of the final Validation Report, a technical review is carried out by GLC for the whole validation procedure and the draft report during the period from 2012-01-07 to 2012-02-06. The appointed technical reviewer team is competent GHG auditors for the sectoral scope and technical area this project falls under. Each involved reviewer is not directly involved in the validation assessment up to the start of the internal technical review phase of this project.

As a result of the internal technical review process, the validation opinion and the topic specific assessments as prepared by the validation's assessment team leader may be confirmed or revised. Furthermore, reporting improvements might be achieved.

4 VALIDATION FINDINGS

The findings from the desk review of the published PDD (PDD v.01), the site visit, follow-up interviews and review and assessment of supporting documents are summarized here.

The validation criteria (requirements), the means of verification of assessed documentation and assumptions; and the results from validating the identified criteria are all documented in more detail in the validation questionnaire in Annex A of this report. The validation findings relate to the project design as documented and described in the PDD and supporting documentation.

For each case where GLC had identified an issue that needed clarification or that represented a risk to the fulfilment of the project objectives, a CL or a CAR have been issued respectively. All raised CARs and CLs are documented in Annex A. The validation of "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" resulted in fourteen (14) CARs and nine (9) CLs. Upon successful closure of the raised CARs and CLs and based on the on-site findings and the reviewed project documentation; the validation team confirms that there are no remaining non-conformities.

The main changes between the first version of the PDD made available for the validation (PDD version 01 dated 2011-06-03) and the final PDD (PDD version 2.4 dated 2012-02-06) are summarized below:

- *the investment analysis (benchmark analysis) presented in the context of the assessment and demonstration of additionality was corrected*
- *the time table for the demonstration of CDM prior consideration was updated*
- *information about the application of the monitoring methodology and description of the monitoring plan (section B.7 of the PDD) was improved*
- *project starting date was corrected as per applicable guidance of the "Glossary of CDM Terms" /Ref/*
- *ex-ante estimated emission reductions were corrected*
- *minor typing corrections were implemented*

5 VALIDATION REPORTING

5.1 Participation and Approval

Document review and background research is used as means of validation for participation requirements.
The project participants of the proposed project are:

- *PT. Pertamina Geothermal Energy approved by "Republic of Indonesia" DNA, through the Letter of Approval* /HCA/ *of "Republic of Indonesia" dated 2011-11-10.*
- *South Pole Carbon Asset Management Ltd. approved by the Swiss DNA, Federal Office for the Environment (FOEN), through the letter of Approval* /LoA/ *dated 2011-11-28.*

Project participants are listed in a tabular form in section A.3 of the PDD and this information is consistent with the contact details provided in Annex I of the PDD. No entities other than those approved as project participants are included in these sections of the PDD.

The Letter of Approval of the *"Republic of Indonesia"* is received from the project participant, which confirms that:

- *"Republic of Indonesia" is a party to Kyoto Protocol;*
- *The participation PT. Pertamina Geothermal Energy is voluntary;*
- *The project complies with the requirements and contributes to sustainable development of "Republic of Indonesia".*

The Letter of Approval of Switzerland for *South Pole Carbon Asset Management Ltd.* is also received from the project participant, which confirms that:

- *South Pole Carbon Asset Management Ltd. is located in Switzerland which is a party to Kyoto Protocol;*
- *The participation of South Pole Carbon Asset Management Ltd. is voluntary*.

The proposed project can be found in "Republic of Indonesia" DNA's database (http://pasarkarbon.dnpi.go.id/). In this database the status of it is indicated as "approved". The name of project and name of project owner in database are consistent with information in LOA of "Republic of Indonesia" submitted to the DOE. Thus it is confirmed that the "Republic of Indonesia" approval /HCA/ received is authentic.

The authenticity of LOA of Switzerland for *South Pole Carbon Asset Management Ltd.* is confirmed through searching on-line list "Projects approved by this DNA as of Date" on DNA's website (http://www.bafu.admin.ch/emissionshandel/05556/05558/index.html?lang=en). The project can be found in the list and the company name, project name, issued date indicated in it are consistent with the information on Swiss LOA/LoA/ submitted.
The title is consistent between PDD, approval and LoAs and other related documentations.
The project fulfils all relevant requirements.

By reviewing the Modalities of Communication (MoC) document/MoC/ (dated 2012-01-10) signed by both project participants, the validation team was able to confirm that the form is correctly completed.

5.2 Project Design Document

The project assessment confirmed that the latest version of the large scale PDD form, version 3 and its respective guidance, version 07 (EB41, Annex 12), was applied.

5.3 Project Description

Document check, physical inspection, follow-up interview, and background research are used as means of validation for project design.
The project is a geothermal power project and does not involve alteration of existing installation or process/A2/. Project description details are given in Section 1.3 of this report. The technology employed is imported and the project contributes to sustainable development of the host country. No ODA is involved in project financing.
A clear and sufficient description of the project activity is provided in the PDD, covering all relevant aspects. Precise nature of the project activity and the technical aspects of its implementation are presented in an understandable manner. All information regarding project design in the PDD is consistent with the result of on-site inspection and document check.

Further the project history has been clearly described in section B.5 in the PDD and can be summarized as following:

Activity	Date	Source/ Reference
PGE and PLN agreement facilitated by the National Development of Planning Agency (BAPPENAS)	13 July 2009	/A22/
Feasibility Study Report for power plant development (incl. electricity generation and sales to the grid)	Sept 2009	/B4/
Investment decision: PGE Board of Directors and Board of Commissioners agreed to develop Ulubelu II power plant (officially known as Ulubelu Unit 3 and 4) as total project	21 Jan 2010	/A21/
Head of Agreement (HoA) between PGE & PLN	17 Feb 2010	/B5/
Contract for wells drilling works	8 April 2010	/A8/
Project start date: Work order submitted to the drilling company (PDSI) for the first well for the project activity named UBL #18	6 May 2010	/A23/
Construction work, start geothermal wells drilling dedicated for Ulubelu Unit 3 and 4 (UBL # 18)	8 May 2010	/A15/
CDM Prior consideration sent to the Indonesian DNA	30 Aug 2010	/A24b/
Confirmation of CDM prior consideration from the Indonesian DNA	4 Sept 2010	/A24/

CDM prior consideration sent to UNFCCC	16 Sept 2010	/A25/
Environmental Impact Assessment	20 Oct 2010	/D1/
PPA signed with PLN	11 Mar 2011	/A7/
ERPA signed with South Pole Carbon Asset Management Ltd.	March 2011	/B6/
Power plant construction start as per FSR	May 2012	/B4/
Power plant operation start as per FSR/B4/ is 1 Jan 2014 but as per current status (project plan and status report 2012/A3/ it is 21 June 2014.	1 Jan 2014	/B4/

5.4 Baseline and Monitoring Methodology

5.4.1 Applicability of the Selected Methodology to the Project Activity

Through document check and background research it is verified that the project has applied valid versions of an approved CDM baseline and monitoring methodology as well as approved CDM tools: ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1) and "Tool to calculate the emission factor for an electricity system" (version 02.2.1).
The project is a geothermal power project supplying electricity to Sumatera Interconnected grid/A7/ which is dominated by fossil-fuel power plants/B8/ thus the electricity generated by the proposed project displaces electricity generated by fossil-fuel power plants in the grid.
It only contains new renewable-energy unit without any existing facility and does not involve in co-generation, retrofitting or modification/A7/.
The project fulfils all applicability criteria of the above mention methodology and tools.

5.4.2 Project Boundary

As prescribed by the methodology ACM0002 version 12.1, project boundary of the project is identified as the physical, geographical site of the renewable generation source. The project supplies electricity to Sumatera Interconnected grid./B8/
Through document review it is verified that the identified project boundary is in compliance with the methodology and is sufficiently justified.

5.4.3 Baseline Identification

As prescribed by the methodology ACM0002 version 12.1, baseline of the project is identified as:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the 'Tool to calculate the emission factor for an electricity system', Version 2.2.1.

Through document review it is verified that the baseline scenario is identified according to the methodology; and in regard to item 87 of VVM, GLC hereby confirms the following statements:

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

5.4.4 Algorithms / Formulae used to Determine Emission Reductions

The calculation is done as per applied methodology ACM0002 version 12.1 and relevant methodology tool "Tool to calculate the emission factor for an electricity system" version 02.2.1, the "Tool to calculate the project or leakage CO2 emissions from fossil fuel combustion", version 02.
The ER_y of the project activity during the crediting period is the difference between the baseline emission (BE_y) and the sum of project emission (PE_y) and leakage.

Baseline Emission:
As per ACM0002, baseline emission is calculated as net electricity output $EG_{PJ,y}$ multiplied by the emission factor EF.
As per "Tool to calculate the emission factor for an electricity system" (version 02.2.1), the baseline emission factor EF is determined ex-ante and estimated as a combined margin (CM), consisting of the weighted average of operating margin (EF_{OM}) and build margin (EF_{BM}) factors.
By means of checking Email by DNA/B9/ it can be confirmed that DNA confirms on 31.05.2011 that the data available on the DNA website (i.e. data from 2003-2007) is the latest data available.
The Emission Grid Factor has been published on the DNA website using Tool v. 1.1: http://pasarkarbon.dnpi.go.id/web/index.php/dnacdm/cat/6/other-information.html which states that Sumatera grid EF is 0.743 tCO2e/MWh.
The PP re-calculated/B8/ the grid EF by using the same data provided by the DNA (i.e. 2003-2007) and by applying the tool version 02.2.1. The result for Sumatera grid EF is 0.743 tCO2e/MWh which is the same as published by the DNA. Further PP submitted a comparison of Tool v.1.1 and v. 2.2/B9a/ applicable for the calculation of grid EF for Sumatera Grid. It has been assessed that the tool version change does not effect a change in Emission Grid Factor for the Sumatera Grid and the grid EF is 0.743 tCO_2/MWh.
Off-grid power plants are chosen not to be included in the EF calculation.
$EF_{OM,y}$ calculation: Due to the fact that the low-cost/must-run resources constituting less than 50% of the total grid generation/B8/ and that the data for "Dispatch Data Analysis" is not available, the simple OM emission factor calculation method is applied. The OM factor is calculated considering generation sources serving the system (not including the low-cost and must-run power plants) and five years

average data (2003-2007). The $EF_{OM,y}$ is calculated to be 0.906 t CO_2e/MWh and will not be changed during the first crediting period.
$EF_{BM,y}$ calculation: The $EF_{BM,y}$ is calculated to be 0.581 tCO_2e/MWh and will not be changed during the first crediting period.
In accordance with the tool to calculate the emission factor for an electricity system (version 02.2.1), weight factors of $w_{OM} = w_{BM} = 0.5$ have been used and the resultant electricity baseline emission factor EF works out as 0.743 t CO_2e/MWh.
The validation team is convinced of the result of the emission coefficient calculation. It is deemed to be adequate and transparent.

The net electricity output $EG_{PJ,y}$ applies estimated value in FSR, 867,240 MWh. The value is calculated based on the predicted load factor of 90% multiplied with the net installed capacity
$EG_{PJ,y}$ = Estimated annual generation * effective electricity coefficient * (1- plant use factor).
Overall the estimation of net electricity output is assessed as reasonable.
Appendix B "Assessment of financial parameters" contains details of the assessment regarding "net electricity output" $EG_{PJ,y}$.

Project Emission:
The project emissions considered for this project and according the methodology are:

- Fugitive CH4 and CO2 in the non-condensable gases of the produced steam; and
- CO2 emission resulting from combustion of fossil fuel related to the operation of the power plant.

According to the methodology ACM0002, project emissions are calculated as follows:

$PE_y = PE_{FF,y} + PE_{GP,y}$

Where:

PE_y = Project emissions in year y (tCO2e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO2/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to release of non-condensable gases in year y (tCO2e/yr)

As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", following calculation applies for $PE_{FF,y}$:

$$PE_{FF,y} = PE_{FC,j,y} = \sum_i [FC_{i,j,y} \times COEF_{i,y}]$$

Where:

$PE_{FC,j,y}$ = CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr)

$FC_{i,j,y}$ = Quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)

$COEF_{i,y}$ = CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

i = Are the fuel types combusted in process j during year y

Further as per OPTION B of the tool:

$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$

Where:
$NCV_{i,y}$ = weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$ = weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

Moreover, as per the methodology:
$PE_{GP,y} = (w_{steam,CO2,y} + w_{steam,CH4,y} \times GWP_{CH4}) \times M_{steam,y}$

Where:
$w_{steam,CO2,y}$ = Average mass faction of carbon dioxide in the produced steam in year y (tCO_2/t steam)
$w_{steam,CH4,y}$ = Average mass fraction of methane in the produced steam in year y (tCH_4/t steam)
GWP_{CH4} = Global warming potential of methane valid for the relevant commitment period (tCO_2e/tCH_4)
$M_{steam,y}$ = Quantity of steam produced in year y (t steam/yr)

The project emission calculation has been re-calculated and assessed as reasonable:
$PE_{FF,y} = PE_{FC,j,y} = FC_{i,j,y} \times \rho_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}$
$PE_{GP,y} = (w_{steam,CO2,y} + w_{steam,CH4,y} \times GWP_{CH4}) \times M_{steam,y}$

Leakage:
The equipments of the project are not transferred from another activity[/A2/], thus according to methodology leakage is not to be considered.
In conclusion, all values used in the PDD to calculate emission reductions are considered reasonable in the context of the proposed CDM project activity and calculation approach is correct.

5.5 Additionality of the Project Activity

5.5.1 Prior Consideration of the Clean Development Mechanism

The starting date of the project is 2010-05-06, the date when PGE committed to expenditure related to the implementation and construction of the project. Through document check, the validators hereby confirm that 2010-05-06[/A23/] is the earliest date of project construction/implementation/real action in compliance with the latest CDM glossary.
Project start date is prior to the date when the project was published for global stakeholder comments (2011-06-09).
The project start date is after 2008-08-02, thus this is a new project activity according to the categorization in "Guidelines on the Demonstration and Assessment of Prior Consideration of the CDM", Version 04[/EB02/]. Assessment is done in accordance to the specific requirements in above guideline.
Notification letters to Indonesian DNA and to UNFCCC have been received and checked by the validators. The website of UNFCCC is also cross-checked to confirm the authenticity of letters. Through document check and further investigation it is hereby confirmed that:

- Notification of CDM prior consideration sent to EB is 2010-09-16 and on UNFCCC website the Date received is indicated as 2010-10-12.
- Notification of CDM prior consideration sent to DNA was signed by PGE on 2010-08-30 and confirmed by the Indonesian DNA on 2010-09-04.
- Both notification letters submitted to validators are in standard form, containing precise geographical location and a brief description of the proposed project activity.

Both notification letters are within 6 months of project start date and less than 2 years before the date of validation (GSP date is 2011-06-09), thus the prior-consideration of CDM is sufficiently justified, as per EB guidelines and VVM.
Moreover, description of key event timeline regarding CDM application and project implementation is included in PDD Section B.5. to justify the decisive role the CDM plays in the decision to proceed with the project and the continuous actions taken to ensure CDM status after project start. Evidences used to assess this include: CDM board meeting decision dated 2010-01-21/A21/, Emission Reduction Purchase Agreement dated 2011-03/B6/. Finally, PDD of the project was published on 2011-06-09 and on-site validation of DOE was performed from 2011-07-12 – 2011-07-15. CDM activities are continuous with time gap of less than a year.
GLC hereby confirms that the proposed CDM project activity complies with the requirements of the latest version of the Guidance on prior consideration of CDM.

5.5.2 Identification of Alternatives

Realistic alternatives to the proposed project activity are defined in section B.5 of the PDD. The elaboration is in accordance with the methodological tool for the demonstration and assessment of additionality. The DOE considers the alternatives to be credible and complete.

5.5.3 Investment Analysis

The PP uses the investment analysis to demonstrate the additionality. Benchmark analysis has been opted as the most suitable method for carrying out the investment analysis and the same has been found to be the appropriate analysis method.

The project IRR (post-tax) is 15.98% without CDM revenue, lower than the benchmark of 19.67% which is based on WACC calculation further assessed in Annex B of this report. Thus the project scenario is not the most economically feasible without benefits from CER sales.

The validation team further assessed that the post-tax WACC is suitable for the type of financial indicator (post-tax IRR) presented. The WACC has been calculated conservatively and in line with the "Guidance on the Assessment of Investment Analysis" (version 05). It has been assessed that a post-tax WACC is the appropriate benchmark for this project which is further comparable to post-tax WACCs presented in similar registered PDDs such as:
UNFCCC 3028 Kamojang post-tax WACC = 18.15%
(http://cdm.unfccc.int/Projects/DB/RWTUV1255101629.04/view) and
UNFCCC 3193 Wayang Windu WACC = 18.96%
(http://cdm.unfccc.int/Projects/DB/TUEV-SUED1260194062.48/view).

Moreover a 20% post-tax benchmark has been identified for Indonesian Geothermal projects based on international literature. (Source: "An Assessment of Geothermal Resource Risk in Indonesia" by Geotherm Ex. Inc, California, June 2010/S3/). The study has been prepared for the World Bank.

Please find further assessment of the chosen benchmark in Annex B of this Report.

Three parameters are chosen for sensitivity analysis: Investment cost, O & M costs and project revenues. The PP chose the approach to show whether the IRR is still below the benchmark in case of a 10% increase or decrease of Investment Cost, O&M cost and Project Revenues. The approach is in line with EB 62 Annex 5 § 20 and 21 and deemed appropriate in the context of the specific project circumstances. It can be confirmed that all variables constituting more than 20% of either total project costs or total project revenues have been used in the sensitivity analysis. Through discussion of the possibility of their variations (see Annex B "Assessment of Financial Parameters") it is justified that the attainable variation of sensitivity analysis indicators is not likely to make project IRR reach the benchmark.

All parameters used to calculate the IRR without CDM revenue are from Feasibility Study Report (FSR) which is completed in 2009-09-01/B4/. The date of investment decision has been identified to be 2010-01-21 based on the meeting of PGE's Board of Directors and the Board of Commissioners who decided to develop Ulubelu II geothermal power plant/A21/. The investment decision was based on the FSR as indicated earlier.

On the basis of specific local and sectoral expertise, confirmation is provided, by cross-checking or other appropriate manner, that the input values from the FSR are valid and applicable at the time of the investment decision.

Annex B "Assessment of financial parameters" contains details of the assessment of financial parameters used in investment analysis including benchmark input parameters, electricity output, electricity tariff, investment, O&M cost, etc. The assessment covers initial adoption of the values as well as their attainable variations as demonstrated in the sensitivity analysis.

The whole financial calculation has been checked and found to be transparent, correct and reproducible.

The assessment is strictly following annex 5 of EB 62 "Guidelines on the Assessment of Investment Analysis, version 05"/EB06/ and the Validation and Verification Manual, version 01.2 /VVM/.

In light of the request for review received in the context of the request for registration raised by the UNFCCC Registration & Issuance team and submitted to GLC on 2012-04-17, the actions taken to correct the project related documentation and justifications has been consolidated in the below paragraphs.

UNFCCC query:

"1) The DOE is requested to further substantiate the suitability of the benchmark (WACC) considering that the market return is based on data 2003-2009, while the investment horizon of the proposed project is 30 years. In addition, the DOE should further validate the calculation of the beta value, including, the suitability of applying the average market D/E ratio (1.63) to calculate the relevered beta. Please refer to VVM paragraph 112 (a) and (b) and EB 62, Annex 5."

Response of the GLC's validation team for the raised comment:

Paragraphs 112 (a) and (b) from the VVM (EB 55 Annex 1) are reproduced below for reference:

Paragraph 112 (a) and (b):
To confirm the suitability of any benchmark applied in the investment analysis, the DOE shall:

(a) Determine whether the type of benchmark applied is suitable for the type of financial indicator presented.

(b) Ensure that any risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity.

The benchmark chosen for demonstration of the additionality of the project activity through investment analysis is the Weighted Average Cost of Capital (WACC) which is a composite benchmark based on the cost of capital employed for investment in the project activity through a combination of equity and debt[1].

The financial indicator used by the project participant for the investment analysis is a project IRR. Paragraph 12 of EB 62 Annex 5 "Guidelines on the assessment of investment analysis" states that weighted average cost of capital is an appropriate benchmark for a project IRR. Hence, the choice of WACC as a benchmark meets the requirement of paragraph 112 (a) of the VVM version 1.2. This has been elaborated in Annex B of the revised Validation Report.

The cost of debt (Rd) used in the computation of the WACC is the interest rate for Investment loans from Foreign and Joint banks sourced from Indonesia's Central Bank which is regarded as a conservative value for the cost of debt.

The cost of equity is computed by the Capital Asset Pricing Model (CAPM), using publicly available financial data. The CAPM is a widely accepted model by investors to estimate the expected rate of return on equity (cost of equity). The computation of cost of equity (Re) has three distinct components which are as follows:

- The risk free rate (R_f) for investments
- Beta value (β) for the project type
- Market return (R_m) on a well diversified portfolio of stocks invested in the equity markets

GLC confirms that parameters have been sourced from financial input data that is standard in the market. Paragraph 13 of EB 62 Annex 5 "Guidelines on the assessment of investment analysis" requires financial input parameters to be based on parameters that are standard in the market in cases of projects which could be developed by an entity other than the project participant. It has been assessed in Annex B of the Validation Report that the project activity could have been developed by any other entity, as long as this entity had the authorization to do it. This authorization could be transferred from one company to another, as it has been observed in the past (e.g. Kamojang UNFCCC project no. 3028). For this reason GLC confirms that the financial input parameters have been duly derived from publicly available data sources.

[1] Source: Titman Sheridan and Martin John D "Valuation –the art & science of corporate investment decisions" (2007), Boston, MA

Detailed explanation about the computation of the WACC is presented in Annex B of the earlier submitted Validation Report.

Further justification on the suitability of the computed benchmark with regard to the query raised by the UNFCCC Registration & Issuance team is provided in the below paragraphs.

Market return is based on data 2003-2009

For the calculation of the cost of equity to further calculate the WACC benchmark, it is necessary to determine the market rate of return. The project participant has selected the Jakarta Composite Index (JCI) sourced from yahoo finance[2] to calculate the compounded interest rate between Jan 2003 and Dec 2009 for the average market return. This source of data is deemed appropriate, due to following reasons.

As per the internet publications of Aswath Damodaran, a widely known expert in corporate finance, *"there is no index that measures or even comes close to a market portfolio; however, having a large number of companies in the portfolio would give a better estimate than indices that include less"*[3]. The reference from Aswath Damodaran's publication can be taken as guidance for the selection of the market index to compute the market rate of return R_m. The reference quoted above suggests that it is desirable that a large number of companies be included in the portfolio to be able to provide a better estimate of the market rate of return.

As per Indonesia's Stock Exchange website information the Jakarta Composite Index uses all Listed Companies as the constituents for its index calculation. To ensure that JCI reflects fair market condition, Indonesia Stock Exchange has the right to eliminate and or exclude one or several Listed Companies from the calculation of JCI. One of the considerations for this action is if the Listed Company's public shares are owned only by a few shareholders while its market capitalization is relatively high, and as a result the price change of the Listed Company's stock may potentially affect the reasonable fluctuation of the Jakarta Composite Index.[4]

The JCI is therefore unrivalled in terms of providing the most comprehensive view of Indonesia's capital market and is hence deemed the most appropriate market index to compute the value of R_m. Therefore opting for JCI for the determination of market return in the context of Indonesian economy is deemed acceptable.

Although the index value is available from July 1997 till date, still the market return has been taken based on data of 2003-2009 due to the non-representative nature of the data prior to 2003. The data vintage has been chosen to commence in Jan 2003 up to the latest data available at time of investment decision Dec 2009. The investment decision has been identified to be 21 Jan 2010 when the Board of Directors decided to invest in the project activity/A22/ which has been further assessed in Annex B to the Validation Report. By means of financial expertise and local and sectoral knowledge GLC confirms that the dataset starting in Jan 2003 until Dec 2009 is the longest most representative dataset reflecting the

[2] Source: Yahoo Finance http://finance.yahoo.com/q/hp?s=%5EJKSE&a=04&b=1&c=2003&d=03&e=31&f=2010&g=m
[3] Source: Aswath Damodaran "From Risk and Return Models to Hurdle Rates : Estimation Challenges" http://pages.stern.nyu.edu/~adamodar/pdfiles/acf3E/presentations/hurdlerate.pdf
[4] Indonesia Stock Exchange http://www.idx.co.id/Home/Information/ForInvestor/StockMarketIndices/tabid/174/language/en-US/Default.aspx

risks associated with the project type due to following reasons segmented under "stock market crises", "socio-economic and political situation" and "country rating".

Stock market crises: Indonesia has been involved in two successive stock market crises from 1990 onwards. The Indonesian market did not recover from the 1989 crises and went into the subsequent Asian crises in 1996-97[5]. The Asian economic crises (1989/90 and 1997/98) had a major impact on Indonesia's economy leading to currency depreciation, debt crisis and devalued stock markets[6]. The inflation of Indonesia's currency jumped to more than 50 percent with the sharp devaluation of the Rupiah.

After the second Asian economic crisis 1997/98, the recovery that took three years was followed by the global effect of 2001, Sept.11 WTC event in New York, US, and gave even more pressure to Indonesian economy[7].

Bank of Japan's Institute for Monetary and Economic Studies paper by Patel and Sarkar mentioned the 1997 Asian crisis (page 268):

" […] most individual stock markets experience negative post-crisis returns for at least three years […]. "

And for Indonesia, the same paragraph also mentioned:

"However, this is not the case for Asia, where Indonesia and S. Korea have been in crisis longer than the other Asian stock markets […]."

The market situation from 2003 onwards is expected to continue to the current and future condition; annual increase in the Jakarta Composite Index[8] was between 30% – 40% (with the exception of year 2008 global economic meltdown, but subsequently in 2009 period the Jakarta Index raised by a remarkable 96% as the recovery is underway, and the 2010 period market was back to 30% annual increase).

Socio-economic and political situation: Prior to year 2003, Indonesian social, economic, legal and political situation was rather difficult[9]. The central government had become more stable in 2003, and successfully running much better election in 2004. The appointed President was also deemed to be more rationale and accountable, acceptable to the economic market, and presently continuing the second term (2004 and 2009 election[10]).

The Indonesian economic situation underwent turbulent situations throughout the Asian economic crisis in the late 90's.

- President Soeharto fell from power after riots in 1998 after 32 years of dictatorship[11].
- During the following years, governments were exchanged every 1-2 years challenging Indonesia's economic recovery from the Asian economic crises. Soeharto's Vice-President, B J Habibie, took over the presidency until October 1999 when Abdurrahman Wahid (Gus Dur) was elected. After only 21 months in office Wahid was impeached for alleged involvement in financial scandals and replaced by his Vice-President, Megawati

[5] *"Crises in Developed and Emerging Stock Markets"*, Sandeep Patel – J. P. Morgan Securities, Asani Sarkar – The Federal Reserve Bank of New York http://www.imes.boj.or.jp/cbrc/cbrc-13.pdf
[6] Source: Martin Khor "The economic crises in east asia: causes, effects, lessons," Third World Network http://siteresources.worldbank.org/INTPOVERTY/Resources/WDR/malaysia/khor.pdf
[7] Source: LIPI Indonesian Science Agency paper http://elib.pdii.lipi.go.id/katalog/index.php/searchkatalog/downloadDatabyId/2217/2218.pdf
[8] http://finance.yahoo.com/q/hp?s=^JKSE&a=00&b=1&c=1998&d=00&e=31&f=2011&g=m
[9] Source: WTO "Trade Policy Review – Economic environment" http://www.wto.org/english/tratop_e/tpr_e/s117-1_e.doc (page 2 – 4)
[10] http://en.wikipedia.org/wiki/List_of_Presidents_of_Indonesia
[11] Source: BBC "Country profile Indonesia" http://www.bbc.co.uk/news/world-asia-pacific-14921238

Soekarnoputri, (the daughter of Indonesia's first President, Soekarno) in July 2001[12].

- The government made economic advances under the first administration of President Yudhoyono (2004-09), introducing significant reforms in the financial sector, including tax and customs reforms, the use of Treasury bills, and capital market development and supervision[13]. The first ever direct Presidential election of Susilo Bambang Yudhoyono, Megawati's former Coordinating Minister for politics and security, in September 2004 was a promising sign that Indonesia was coming to terms with its new democratic system. Yudhoyono was re-elected in the 2009 Presidential election with 60% of the vote – the first time an Indonesian President has been re-elected in democratic elections.[14]
- Indonesian inflation has fallen back to about 6 percent in 2003 and 2004.[15]

After the end of 32 years long Soeharto regime, new Presidents changed frequently where continuing policy was rather limited (with regard to social, legal, economic and democracy[16]). Moreover, several terrorism acts occurred in some areas, as the central government was considered to be not very strong, with various negative sentiment[17] and discontent to the national leadership.

President Megawati tried to implement various social and economic policies[18] throughout the country, and towards the end of her term in 2003/2004[19]. New political parties to the national election were more regulated (as opposed to the previous five years term when most actions to form political party were instantaneous act taken right after national democratic opportunity was released upon Soeharto replacement).

The new political situation was expected to be more stable, as the government was more open toward economic progress[20] (for the central government to give better impression for staying in power towards the 2004 election).

Country Rating: Indonesian country rating was consistently very low prior to mid-2002. The Indonesian Central Bank's journal "Bulletin Ekonomi Moneter dan Perbankan" mentions on page 96[21]:
"The Fourth phase, the period of economic recovery, improved Indonesia's country risk rating and the trend decline in international interest rates, since mid-2002 […]."

[12] Source: UK Foreign and Commonwealth Office "Country Profile: Indonesia" http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/country-profile/asia-oceania/indonesia/?profile=all
[13] Source: CIA, The World Fact Book "Indonesia" https://www.cia.gov/library/publications/the-world-factbook/geos/id.html
[14] Source: UK Foreign and Commonwealth Office "Country Profile: Indonesia" http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/country-profile/asia-oceania/indonesia/?profile=all
[15] Source: James A. Hanson, The World Bank "Post-Crisis Challenges and Risks in East Asia and Latin America: Where Do They Go From Here.
[16] Source: WTO "Trade Policy Review – Economic environment" http://www.wto.org/english/tratop_e/tpr_e/s117-1_e.doc (page 1, paragraph 2)
[17] Source: LIPI Indonesian Science Agency paper (page 161, footnote 21) "Jakarta Stock Exchange bombing event caused market closure for several days", (page 165 footnote 24) "issue of personnel sweeping to Expatriates to flee Indonesia brought down market transaction volume in 2001" http://elib.pdii.lipi.go.id/katalog/index.php/searchkatalog/downloadDatabyId/2217/2218.pdf
[18] Source: LIPI Indonesian Science Agency paper (page 65 – 68) "Coordinating Ministry for Economy Finance and Industry from 1998 – 2004 post was taken by 4 different man (within two Presidents), the first two were criticizing IMF approach to Indonesian crisis, while the later two were more welcomed by the IMF" http://elib.pdii.lipi.go.id/katalog/index.php/searchkatalog/downloadDatabyId/2224/2225.pdf
[19] Source: WTO "Trade Policy Review – Government report" http://www.wto.org/english/tratop_e/tpr_e/g117_e.doc (page 2, paragraph 5)
[20] Source: WTO "Trade Policy Review – Trade policy regime" http://www.wto.org/english/tratop_e/tpr_e/s117-2_e.doc (page 1, paragraph 2 – 5)
[21] Source: Indonesian Central Bank "Bulletin Ekonomi Moneter Perbankan" http://www.bi.go.id/NR/rdonlyres/8ABE3501-1284-4066-A713-8EB2385B75B0/3011/BEMPJuni2005.zip

This indicated that a difficult economic situation was experienced in several phases, and only after mid-2002 Indonesian situation could improve[22]. Another publication from the Indonesian Central Bank data: Moody, Fitch, Rating & Investment did not show any value / improvement during the Asian economic crisis before 2003, and other rating data gave rather low value (non-investment grade, speculative)[23]. S&P rating was CCC or lower for high risk profile, during period from the Asian crisis 1998 until 2002[24] Specifically, Standard & Poor gave rather poor rating for Indonesia during Asian economic crisis period,

Historical Indonesia Sovereign Rating

Standard & Poor's		Moody's		Fitch		Rating and Investment		Japan Credit Rating Agency	
July 7, 1992	BBB-	March 14, 1994	Baa3	June 1, 1997	BBB-	May 14, 1998	B	October 25, 2002	B
April 18, 1995	BBB	December 21,1997	Ba1	December 23,1997	BB+	September 28, 1999	B-	May 26, 2004	B+
October 10, 1997	BBB-	January 9, 1998	B2	January 8, 1998	BB-	June 8, 2004	B	September 21, 2006	BB-
December 31, 1997	BB+	March 20, 1998	B3	January 21, 1998	B+	July 22, 2005	BB-	September 7, 2007	BB
January 9, 1998	BB	September 30, 2003	B2	March 16, 1998	B-	October 12, 2006	BB-	September 25, 2008	BB*
January 27, 1998	B	May 19, 2006	B1	August 1, 2002	B	October 31, 2007	BB+	February 5, 2009	BB**
March 11, 1998	B-	October 22,2007	Ba3	November 20, 2003	B+	January , 2009	BB+*	July 7, 2009	BB+
May 15, 1998	CCC+	December 23, 2008	Ba3*	January 27, 2005	BB-	October 7, 2009	BB+*	July 13, 2010	BBB-
March 29, 1999	SD	June 11, 2009	Ba3***	February 14, 2008	BB	October 14, 2010	BB+***	August 24, 2011	BBB-*
March 30, 1999	CCC+	September 16, 2009	Ba2	January 21, 2009	BB*	November 14,2011	BB+*		
September 12, 1999	CCC+	June 21, 2010	Ba2***	January 25, 2010	BB+				
October 2, 2000	B-	January 17, 2011	Ba1	February 24, 2011	BB+***				
May 21, 2001	CCC+	January 18, 2012	Baa3	December 15, 2011	BBB-				
November 2, 2001	CCC								
April 23, 2002	SD								
September 5, 2002	CCC+								
May 12, 2003	B-								
October 8, 2003	B								
December 22, 2004	B+								
July 26, 2006	BB-								
November 7, 2008	BB-*								
October 23, 2009	BB-***								
March 12, 2010	BB								
April 8, 2011	BB+								

* rating affirmation
** outlook revised from positive to stable
*** outlook revised from stable to positive
Note: Foreign Currency Long Term Debt

Figure 1 Historical Country Rating for Indonesia from 1992 - 2011

and several times[25] Selective Default (SD) in 1999, 2000 and 2002, depicted in below chart[26].

[22] Source: Indonesian Central Bank "Bulletin Ekonomi Moneter Perbankan" http://www.bi.go.id/NR/rdonlyres/8ABE3501-1284-4066-A713-8EB2385B75B0/3009/ekajian1.pdf
[23] Source: Indonesian Central Bank "Indonesia Sovereign Rating" http://www.bi.go.id/NR/rdonlyres/5432B5CD-7BD1-486B-8103-21B11372902C/25148/HistoricalIndonesiaSovereignRatingJan2013.pdf
[24] Source: Indonesian Central Bank "Indonesia Sovereign Rating" http://www.bi.go.id/web/en/Publikasi/Investor+Relation+Unit/Market+Data+dan+Info/Indonesian+Sovereign+Rating/
[25] Source: NAIC S&P " Sovereign Defaults And Rating Transition Data" http://www.naic.org/documents/committees_e_capad_vos_c1_factor_review_sg_related_docs_sp_sovereign_defaults.pdf
[26] Source: S&P " Sovereign Defaults And Rating Transition Data" http://www.standardandpoors.com/ratings/articles/en/us/?assetID=1245302231824

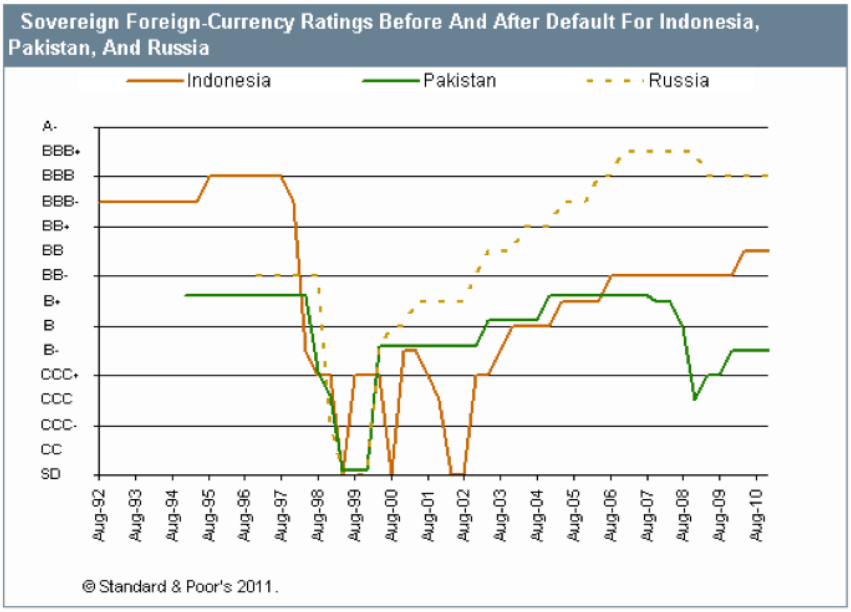

Figure 2 Graph showing Historical Country Rating for Indonesia from 1992 – 2010 with selective default in 1999, 2000 and 2002

Table 2

Sovereign Foreign-Currency Selective Defaults

Country	Selective default date	Emergence date	Time in selective default	Rating one year before selective default	Rating at emergence from selective default
Russia	Jan. 27, 1999	Dec. 8, 2000	22 months	BB-	B-
Pakistan	Jan. 29, 1999	Dec. 21, 1999	11 months	B+	B-
Indonesia	March 30, 1999	March 31, 1999	One day	B-	CCC+
Indonesia	April 17, 2000	Oct. 2, 2000	Six months	CCC+	B-
Argentina	Nov. 6, 2001	June 1, 2005	54 months	BB	B-

Standard & Poor's | **RatingsDirect on the Global Credit Portal** | February 23, 2011 18

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Figure 3 Table (continued in next Figure) showing selective default rating for Indonesia in 1999 and 2000

Default, Transition, and Recovery: Sovereign Defaults And Rating Transition Data, 2010 Update

Table 2

Sovereign Foreign-Currency Selective Defaults (cont.)					
Indonesia	April 23, 2002	Sept. 5, 2002	Four months	B-	CCC+
Paraguay	Feb. 13, 2003	July 26, 2004	18 months	B	B-
Uruguay	May 16, 2003	June 2, 2003	One month	BB-	B-
Grenada	Dec. 30, 2004	Nov. 18, 2005	11 months	BB-	B-
Venezuela	Jan. 18, 2005	March 3, 2005	One month	B-	B
Dominican Republic	Feb. 1, 2005	June 29, 2005	Five months	CCC	B
Belize	Dec. 7, 2006	Feb. 20, 2007	Three months	CCC-	B
Seychelles	Aug. 7, 2008	N/A		B	NR
Ecuador	Dec. 15, 2008	June 15, 2009	Six months	B-	CCC+
Jamaica	Jan. 14, 2010	Feb. 24, 2010	One month	B	B-

N/A—Not applicable. The rating on Seychelles was withdrawn while it was still in default. Sources: Standard & Poor's Sovereign Ratings and "Sovereign Rating And T&C Assessment Histories," updated regularly on RatingsDirect.

Figure 4 Table (continuation of previous figure) showing selective default rating for Indonesia in 2002

In light of the above, though data on Jakarta Composite Index is available for a longer period of more than 12 years from July 1997 – 2009 for the computation of the market return, the data prior 2003 was deliberately not considered as it is probable that due to the impact of the Asian economic crises and the subsequent government instability the market return computation could present a distorted result if 12 years' data were to be considered. Taking the JCI data from 2003 onwards has been found to be a representative and suitable value for the expected market return in the context of Indonesian economy and hence accepted.

Further is should be noted that though the financial analysis for the project activity is computed for 30 years, this refers to the future and only the recent parameters in terms of the market return could be a suitable judging factor to calculate the likelihood of the financial input parameters of the project activity. As outlined in Figure 5 below the Jakarta Composite Index increased continuously from 2004 onwards with a major drop at the 2008 financial crises.

Figure 5 Graph showing the close price adjusted for dividends and splits (Jakarta Composite Index) during July 1997 until May 2012 sourced from yahoo finance

Since the geometric mean of the market return takes into account the start and end value of the selected time period, it may be noted that the market return for future projects is even higher due to the increase of the index. The market situation from 2003 onwards was expected to continue to the current and future condition, annual increase in the Jakarta Composite Index was between 30% – 40% (with the exception of year 2008 global economic meltdown, but subsequently in 2009 period the Jakarta Index raised by a remarkable 96% as the recovery is underway, and the 2010 period market was back to 30% annual increase).

Figure 5 shows a steady increase in the Jakarta Composite Index between Jan 2003 and Jan 2008 emphasizing the fact that the Asian economic crises in 1998 and subsequent political instability had a major impact on Indonesia's economy until beginning of 2003.

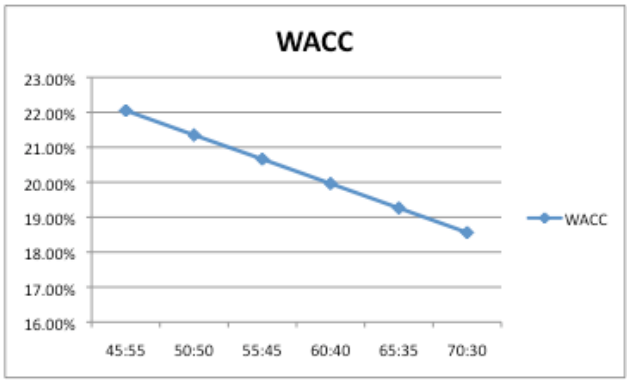
The choice of market index for the calculation of the cost of equity and eventually the WACC benchmark is thus regarded as appropriate and suitable by the validation team, fulfilling the requirement of paragraphs 112 (a) and (b) of the VVM and EB 62 Annex 5.

Suitability of applying the average market D/E ratio (1.63)

As assessed in Annex B of the earlier submitted Validation Report the debt/equity ratio is sourced from Bloomberg Finance/B7/, a credible and reliable source for financial input parameters. The D/E ratio has been calculated as the average of 49 D/E ratios of power companies in Asia during the year 2009.

The computation of the debt to equity ratio (1.63) for this project activity is deemed suitable and conservative. By means of financial expertise and local and sectoral knowledge GLC confirms that the typical debt/equity finance structure observed in the sector of the country (Indonesia) was not available from publicly available data sources. Paragraph 18 of EB 62 Annex 5 "Guidelines on the assessment of

investment analysis" allows using a default value of 50% debt and 50% equity in case the typical debt/equity finance structure observed in the sector of the country is not readily available. However a 50/50 debt to equity ratio would lead to a less conservative result of a higher WACC benchmark. Thus GLC assessed the financial input data sourced from Bloomberg Finance leading to a more conservative result than the default value. Figure 6 shows the relation between D/E ratio and WACC for this project activity.



D/E	WACC
45:55	22.05%
50:50	21.35%
55:45	20.66%
60:40	19.96%
62:38	**19.67%**
65:35	19.26%
70:30	18.56%

Figure 6 Relation between D/E ratio and WACC for this project activity

Although the default 50% debt and 50% equity financing structure could have been applied for this project activity due to the EB 62 Annex 5 paragraph 18, Figure 6 shows that the applied debt to equity ratio of 62% debt to 38% equity (1.63) results in a more conservative benchmark.

Other registered CDM project activities in Indonesia have been assessed and it has been identified that the D/E ratio applied for this project activity is well in the range. Table 1 shows the debt to equity ratio of projects from the power sector in Indonesia sourced from the UNFCCC website. It is thus evident that this project activity's D/E ratio (62:38) is more conservative than registered geothermal CDM projects' debt/equity ratios, i.e. Kamojang and Wayang Windu. Concluding, the comparison as shown in Table 1 supports the argument that the applied debt/equity ratio (62: 38 = 1.63) is suitable for this project activity.

Project no.	Project name	D/E ratio
3028	Kamojang Geothermal	51 : 49
4118	Asahan 1 Hydroelectric Power Plant 2 x 90 MW	51 : 49
3193	Wayang Windu Phase 2 Geothermal Power Project	60 : 40
5773	**this project activity**	**62 : 38**
4106	Parlusan Hydro Electric Power Plant	65 : 35
2346	Kabil II 11.4 MW Gas Fired Project	70 : 30
3518	Jembo II 24 MW Gas Fired Project	70 : 30

Table 1 Comparison of D/E ratios from similar project activities registered under UNFCCC

Further the data vintage of 1 year (2009) used to compute the average of 49 debt/equity ratios in Asian power companies, is deemed appropriate. The above quoted financial publication by Prof. Aswath

Damodaran[27] states: *"Longer estimation period provides more data, but firms change. Shorter periods can be affected more easily by significant firm-specific event that occurred during the period."* GLC identified that the use of D/E ratios sourced from 2009 data is appropriate for this project activity and in accordance with above quoted guidance. When using a longer data vintage it is probable that due to the change of financial structures observed in the sector within Asian emerging countries the computation of the debt/equity ratio could present a distorted result. As per above statement the disadvantage of using a shorter time period is the effect of significant firm-specific events. Since the average of 49 companies' debt to equity ratios has been computed, such firm-specific events might have occurred only in the minority of referenced companies and thus the mentioned effect can be considered compensated and minor. Therefore GLC identified the input values for the calculation of debt to equity ratio suitable, valid and applicable at time of investment decision fulfilling the requirement of paragraph 6 of EB 62 Annex 5.

The debt to equity ratio used in the computation of the relevered beta and thus in the calculation of the WACC benchmark has been consistently used in beta and WACC calculation and is duly derived from publicly available data sources. While the computation of the relevered beta has been assessed in Annex B of the Validation Report and further elaborated in the next paragraph, it can be confirmed that the D/E ratio (1.63) has been consistently applied in CAPM and WACC calculation. GLC confirms that the source of data, Bloomberg finance, is providing data that is standard in the market thus fulfilling the requirement of paragraph 13 of EB 62 Annex 5.

For the sake of transparency and completeness the actual project specific debt/equity ratio has been computed and compared to the market debt/equity ratio. As explained in Annex B to the Validation Report this project activity is financed by a loan from the World Bank. The loan will be received only for the CAPEX of the downstream cost. This leads to a debt ratio of 61% and an equity ratio of 39%. Concluding the applied market debt/equity ratio (1.63) is more conservative than the project specific debt/equity ratio (1.57).

Summarizing, the choice of debt/equity ratio for the calculation of the relevered beta and the WACC benchmark is thus regarded as appropriate and suitable by the validation team, fulfilling the requirement of paragraphs 112 (a) and (b) of the VVM and EB 62 Annex 5.

Calculation of the beta value

As assessed in Annex B to the Validation Report, the unlevered beta is sourced from Bloomberg Finance/B7/. Beta has been calculated as the average over 49 raw betas from power companies in Asian emerging economies during the year 2009. The relevered beta has been used for calculation of cost of equity. The screenshot of Bloomberg Finance/B7/ has been assessed and crosschecked with WACC Excel sheet spreadsheet "beta" and it has been identified that correct values have been used duly derived from publicly available data sources.

The PP explained that the betas from power sector companies in the Indonesia are not available. For this reason PP applied betas of the 'emerging economies' and functionally the 'electricity-generation' sector. PP explained that the applied approach is due to the assumption that the relative risk (to a well diversified efficient portfolio) of the investigated sector is similar across all regions, i.e. a power sector

[27] Source: Aswath Damodaran "From Risk and Return Models to Hurdle Rates : Estimation Challenges" http://pages.stern.nyu.edu/~adamodar/pdfiles/acf3E/presentations/hurdlerate.pdf

investment has similar relative risk in Indonesia and in India for instance). This assumption has been taken in order to estimate the relative risk of a power sector project in a market in which there is no information available about power sector betas. Therefore the validation team accepted to apply betas of the 'emerging economies' and functionally the 'electricity-generation' sector as a most suitable approach which is best to reflect the beta values in the host country.

By means of background research, GLC identified that the use of industry betas of another emerging market is acceptable as per international literature. A study by Morgan Stanley (2010)[28] states that *"those who prefer using local pricing models but are unable to find plausible local betas in the emerging market, can use the industry beta of (a) another EM (emerging market), suspected to have a similar risk-return industry dynamics (and, as long as such beta is available, reliable, and representative); or (b), as we have argued, the beta of the whole EM class."* Thus it is deemed appropriate to compute the average of unlevered betas of power companies in Asian emerging markets.

The data vintage of 1 year (2009) used to compute the average of 49 beta values in Asian power companies, is deemed appropriate. Another publication by above mentioned financial expert, Prof. Aswath Damodaran,[29] states:

"In choosing a time period for beta estimation, it is worth noting the trade off involved. By going back further in time, we get the advantage of having more observations in the regression, but this could be offset by the fact that the firm itself might have changed its characteristics, in terms of business mix and leverage, over that period. Our objective is not to estimate the best beta we can over the last period but to obtain the best beta we can for the future."

GLC identified that the use of a data vintage from 2009 is valid and applicable at time of investment decision, thus suitable for this project activity and in accordance with above quoted guidance. When using a longer data vintage it is probable that due to the rapid change of business mix and leverage observed in the sector of Asian emerging markets the beta computation could present a distorted result. As per above statement the disadvantage of using a shorter time period is the effect of significant firm-specific events. Since the average of 49 companies' beta values has been computed, such firm-specific events might have occurred only in the minority of referenced companies and thus the mentioned effect can be considered compensated and minor. Therefore GLC identified the input values for the calculation of beta suitable, valid and applicable at time of investment decision fulfilling the requirement of paragraph 6 of EB 62 Annex 5.

As explained in Annex B to the Validation Report the computation of the relevered beta has been assessed to be appropriate and in accordance with international finance literature.
The formula:

beta_relevered = beta_unlevered* [1+(1-tax)*(D/E)]

has been applied correctly and can be sourced from Investopedia[30] or the Macabacus website[31].

[28] Source: Morgan Stanley "A journal of Applied Corporate Finance – The beta dilemma in emerging economies" (2010)http://pages.stern.nyu.edu/~adamodar/pdfiles/eqnotes/Pereiroonbetas.pdf
[29] Source: Aswath Damodaran "Estimating Risk Parameters" Stern School of Business http://www.ba.metu.edu.tr/~adil/ba4829/Damodaran-beta.pdf
[30] Source: http://www.investopedia.com/terms/u/unleveredbeta.asp
[31] Source: http://macabacus.com/valuation/dcf/wacc

Moreover GLC assessed in Annex B to the Validation Report that the CAPM has been correctly applied using the levered beta for the computation of cost of equity as per following formula:

Re = Rf + beta_relevered* (Rm - Rf)

A cross-check reference for this formula can be found on the Macabacus website[32].

The applied unlevered beta (0.92) has been compared to various cross-check references and identified to be a conservative estimate. Firstly, betas values of other geothermal companies were observed. The beta values for geothermal companies in US market were taken from the dataset provided by Prof. Aswath Damadoran. It can be seen that unlevered beta values as shown below are higher than the beta value taken for this project.

Company name	2008 unlevered Beta[33]	2009 unlevered Beta[34]
Ormat Technologies	1.396	1.185
Calpine Corp.	N/A	N/A
U.S. Geothermal Inc.	N/A	N/A
NRG Energy	1.197	1.185

Table 2 Geothermal U.S. companies and their beta values from 2008 and 2009 sourced from Stern School of Business

Secondly, the applied beta values of registered CDM grid connected power generation projects in Indonesia have been compared to this project activity's beta. As shown in Table 3 the applied unlevered beta (0.92) is the lowest value compared to unlevered betas within the same sector within the same country. Thus GLC identified the applied beta to be suitable and conservative for this project activity.

Project no.	Project Name	unlevered beta
5773	**this project activity**	**0.92**
3028	Kamojang Geothermal	0.96
4118	Asahan 1 Hydroelectric Power Plant 2 x 90 MW	0.96
3193	Wayang Windu Phase 2 Geothermal Power Project	1.69
3518	Jembo II 24 MW Gas Fired Project	1.72
2346	Kabil II 11.4 MW Gas Fired Project	2.08

Table 3 Comparison of unlevered beta values of registered CDM projects in Indonesia in the power industry to this project activity's beta (0.92)

In light of the above, the chosen beta value has been found to be more conservative and hence acceptable.

Moreover in case a default value for D/E ratio would be applied (50% debt/ 50% equity), the unlevered beta (0.92) could be converted to the relevered beta of 1.54. This leads to a WACC of 21.35%. This is a less conservative benchmark than the actual calculated benchmark (19.67%) for this project with a D/E ratio of 62% debt/ 38% equity.

[32] Source: http://macabacus.com/valuation/dcf/wacc
[33] http://www.stern.nyu.edu/~adamodar/pc/archives/compfirm08.xls
[34] http://www.stern.nyu.edu/~adamodar/pc/archives/compfirm09.xls

Summarizing, the choice of unlevered beta and the computation of relevered beta used to calculate the cost of equity with the CAPM and eventually the WACC benchmark is thus regarded as appropriate and suitable by the validation team, fulfilling the requirement of paragraphs 112 (a) and (b) of the VVM and EB 62 Annex 5.

Finally the WACC of this project activity (19.67%) has been compared to other registered geothermal CDM projects in Indonesia as explained in Section 5.5.3 of the Validation Report. The above cited "Kamojang geothermal" project (Reference no. 3028) uses a post-tax WACC of 18.15%. The above cited Wayang Windu geothermal project (Reference no. 3193 applies a post-tax WACC of 18.96%. Although both WACC values are slightly lower than this project activity's WACC, it should be noted that it is still above the project IRR (15.98%).

Moreover a 20% post-tax benchmark has been recommended for Indonesian geothermal projects based on a study by Geotherm Ex. Inc (2010) "An Assessment of Geothermal Resource Risk in Indonesia"/S3/. This study has been prepared for the World Bank as explained in Section 5.5.3 of the Validation Report.

Conclusion

GLC confirms that the project participant has worked out the benchmark based on the best information available at the time of decision making (Jan 2010).

GLC confirms that the additionality of the project activity has been convincingly established.

In conclusion, even though the vintage periods for the market return, beta and debt/equity ratio are not comparable to the 30 year technical life time of the project activity/ IRR computational time frame, it must also be noted that there are no industry standards or requirements which stipulate any one particular time interval / period and source of data to compute the benchmark. It may be noted that though the financial analysis for the project activity is computed for 30 years, this refers to the future and only the recent parameters in terms of the return on investments could be a suitable judging factor to calculate the likely parameters of the project activity. GLC's validation team has carefully assessed the suitability of data sources and vintages and confirms its opinion that the data and corresponding period used for the said parameters can be considered adequate for the computation of the benchmark.

GLC confirms that the justification provided for the benchmark value computed for the project activity is suitable and appropriate.

5.5.4 Barrier Analysis

The barrier analysis has not been applied for this project.

5.5.5 Common Practice Analysis

The assessment of common practice analysis in accordance with the additionality tool has been done as follows:

(a) *Sub-step 4a: Analysis of other activities similar to the proposed project activity*

As the project activity is located in Indonesia therefore it has been considered as the relevant region. Based on the local and sectoral expertise GLC confirms that taking Indonesia where the project activity is located, as the geographical scope of the common practice analysis is appropriate for the assessment of common practice related to the geothermal power projects

The PP has presented the list of operational geothermal power projects in Indonesia. The GLC validation team was able to verify information about the identified power plants by reviewing the data sources as indicated in the PDD. The GLC validation team has checked information about geothermal projects as provided by the US Embassy in Indonesia through the publication "Indonesia's Geothermal Development"/S1/. This has also been confirmed with the article of "IndoRenergy, Positioning Geothermal" from Petrominer magazine no. 07/July 2009/B24/. Further, the list of power projects connected to the grid was also checked from PT. PLN's National Generation Development Plan year 2010-2019 (http://www.pln.co.id/dataweb/RUPTL/RUPTL%202010-2019.pdf). Based on the checks from the above referred sources, the list of projects is confirmed to be complete.

The assessment of the essential distinguishing criteria between the proposed CDM project activity and other operational geothermal power projects is as follows:

- The Asian financial crisis of 1997-1998 had a major impact on Indonesian geothermal industry. Indonesia's currency dropped from 2,500 per USD to nearly 10,000 IDR per USD. Investors were unable to obtain loans, and there was a lack of new private investors in geothermal energy. Law 22/2001 began the restructuring of the energy industry. This was followed in years 2002 and 2003 by a series of major changes. (An assessment of geothermal resource risk in Indonesia, 2010)/S3/. Projects implemented under a different regulatory framework, i.e., prior to Electricity sector regulation (Electricity Law No 20/2002) and Geothermal Law – no. 27/2003 have been excluded.

- Also projects with size less than 50% of the project activity have been excluded.

These exclusion criteria have been considered reasonable and hence accepted.

- Further, as per the tool, other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis.

Based on the above criteria the assessment is as follows:

Power Plant	Commencement Date	Capacity (MW)	Exclusion criteria
Kamojang Unit I, II, III	Unit 1: 1982 Unit 2,3: 1988	140 MW	• Regulatory
Kamojang Unit IV	Dec 2007	1 x 60 MW	• Registered CDM project UNFCCC no. 3028
Salak Phase 1	1994 (2 units) and 1997 (1 unit)	3 x 60 MW	• Regulatory
Salak Phase 2	1997	3 x 66.7 MW	• Regulatory
Darajat Phase 1	1994	55 MW	• Regulatory
Darajat Phase 2	1999	90 MW	• Regulatory
Darajat Phase 3	2007	117 MW	• Registered CDM project UNFCCC no.0673
Dieng Unit 1	July 1998	1 x 60 MW	• Regulatory
Wayang Windu Phase 1	2000	1 x 110 MW	• Regulatory
Wayang Windu Phase 2	2009	117 MW	• Registered CDM project UNFCCC no. 3193
Sibayak Unit 1	2000	2 MW	• Regulatory • Not connected to grid • Size
Sibayak Unit 2 & 3	2008	11.3 MW	• Size • CDM project under validation
Lahendong Unit 1	2001	20 MW	• Regulatory • Size
Lahendong Unit 2	2007	20 MW	• Size • Registered CDM project UNFCCC no. 2876
Lahendong Unit 3	2008	20 MW	• Size • CDM project (LoA received, prior CDM consideration submitted)
Ulumbu	2011	2 x 3 MW	• Size • CDM project (Prior CDM consideration submitted)

On the basis of the analysis, it could be confirmed that there is no activity similar to the proposed project activity in the defined region.

(b) *Sub-step 4b: Discussion of any similar Options that are occurring:*

Based on the above step it could be confirmed that there is no similar option that is occurring.
In light of the above, it can be confirmed that the proposed CDM activity is not a common practice in the defined region. Thus the common practice analysis complements the investment analysis.

In light of the above investment analysis and common practice analysis, based on submitted documentation, argumentation and further cross checks from publicly available sources the project activity has been validated as an additional project.

5.6 Monitoring Plan

Document check, background research and follow-up interview are used as means of validation for monitoring plan.

ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 12.1)

Measurement of net electricity export will be done through a revenue meter connected to a digital control system and recorded continuously (owned by project owner PGE) and an on-site (backup) meter (owned by Grid Company PLN). The revenue and cross-check meter will be located at the interconnection point of Ulubelu II geothermal power plant.
The recording of meters will be performed jointly by the grid company and project owner.
Meters will be calibrated according to regulations and procedures of the state power industry "Standard Operation Procedures"/E9/.
Backup procedures in case of meter failure are well described in PDD.

Measurement of quantity of steam produced in year y will be conducted on a continuous basis with a venturi flow meter. At the same time temperature and pressure will be measured as required by the methodology. The meters will be calibrated according to manufacturer's standard. The monitoring arrangements for the parameter $M_{steam,y}$ have been described sufficiently in the PDD.

Measurement of average mass fraction of carbon dioxide/methane in the produced steam in year y will be conducted through sampling. The NCG data will be taken from sampling as prescribed in the methodology. The monitoring arrangements for the parameters $w_{steam,CO2,y}$ and $w_{steam,CH4,y}$ are deemed sufficient and have been appropriately described in the PDD.

Measurement for quantity of fuel combusted in diesel gensets is recorded monthly because fuel will only be used in emergencies when the power plant is not operational and the grid is not available. The monitoring arrangements for the parameter $FC_{i,j,y}$ are deemed sufficient and have been appropriately described in the PDD.

Through document check and interview it is verified that the monitoring plan described in PDD provides sufficient information, is in compliance with the methodology and all the monitoring arrangements are feasible within the project design and project participant's competence.

General description of the monitoring plan has thus been elaborated in the PDD. The monitoring plan is to be implemented to enable subsequent verification of emission reductions. The application of the monitoring methodology is transparent and GLC considers the project participants able to implement the monitoring plan.

5.7 Stakeholder Consultation

Based on the on-site validation investigation, relevant local stakeholders have been invited to comment on the project, during a Local Stakeholder Meeting arranged on 2011-05-03 prior to the publication of the PDD on the UNFCCC website which is in line with EB 55 Annex 1 §128/VVM/. By means of comparing the MoM of the LSC with the description in Section E.1 and E.2 and by means of onsite visit it can be confirmed that the PP has taken due account of any comment received and described this process in the PDD section E.2. The validation team confirms that the LSC is adequate and has been presented in line with EB 55 Annex 1 §129.

Further the stakeholder comments to the provincial EIA commission/D5/ have been submitted to the DOE. It could be confirmed that stakeholder comments have been taken into account by the PP because the revised EIA integrated mitigation measures for any negative environmental impacts.

By means of checking EIA it could be confirmed that PPs have undertaken an analysis of environmental impacts in line with host Party's requirements. The assessment is in line with VVM para 131-133.

Germanischer Lloyd Certification GmbH published the project documents on UNFCCC's website (http://cdm.unfccc.int/Projects/Validation/DB/K2YWZ6K33VULS6IW681SA4WLPHFHGT/view.html for webhosting) on 2011-06-09 and invited comments within the period from 2011-06-09 till 2011-07-08 by Parties, stakeholders and non-governmental organisations. The following comment has been received:

Comment 1:
It is evident from the PDD that the values are consistent and it is definitely forged and cooked up values to show a non CDM project as a CDM project. What is this? DoE to check the Detailed Project Report and Feasibility Report which is submitted to the other agencies and Banks by Project owner and ensure that the values match with the DPR/FR submitted to DoE also. After careful study of PDD it is found that DPR/FR is in different versions made and submitted with different purposes to different agencies which is totally unacceptable, illegal and unethical. PP/Consultant may show some undertaking letter from bank manager to DoE stating that both DPR's are same. These kinds of letters should not be accepted and entertained by DoE. While collecting the DPR/FR from banks and other agencies, all DPR/FR pages should be counter signed by Banks and other agencies so that the real DPR/FR given to other parties by the PP/Consultant is same as the one submitted to DOE. In this particular project there is clear cut evidence that DPR/FR values are changed/ fabricated mischievously and intentionally. This must be probed fully. DOE must take a written undertaking from the PP/Consultant about the list of parties to whom this DPR/FR is submitted and for what purposes. Then DOE should cross check with all the parties and confirm that the same DPR/FR is submitted to all the parties correctly without any changes. DOE must not accept any reports and undertakings from PP/Consultant. DOE must make independent evaluation and use totally different parties without informing the PP or Consultant to cross check the facts. DOE to write to the party who prepared the DPR/FR which is submitted to the banks and other agencies and the same is verified against the one submitted to the DOE by PP/Consultant. This project is a fabricated and fake CDM project and must be rejected by the DOE right away. DOE should not support this kind of projects otherwise CDM EB should suspend this DOE for at least one year.

Submitted by: zhong zhou li

One comment has been received from Mr. Zhong Zhou Li. The validation team has contacted this stakeholder to clarify the very general comment which has been submitted for various other projects, too. The validation team was unable to get a reply to this comment.

To deal with the comment discussions were made with projects participants during on-site visit and the comment received has been considered by the PP's and the validation team.

The comment has been assessed and identified that the major concern of the stakeholder is that the FSR provided to DOE is not in line with information provided to banks and other entities. The validation team has assessed the input parameters for the investment calculation based on background research and therefore concludes that the stakeholder's concern is firstly not project specific and secondly not supported by evidence.

5.8 Environmental Impacts

In the Republic of Indonesia, Environmental Impacts Assessment is required for geothermal projects according to the Environmental Ministry Decree no 8 and 11 from 2006. The EIA report of the project has been approved by local government /D2/. According to EIA, the environment impact of the project is significant to the environment, specifically on the construction and operational stage. The project would also impact the environment positively such as physical/chemical, biological, and economical. Expected negative impacts could be mitigated with various applied technology. The analysis of the environmental impacts of the project activity is sufficiently described in PDD.

By means of checking EIA it could be confirmed that PPs have undertaken an analysis of environmental impacts in line with host Party's requirements. The assessment is in line with VVM para 131-133.

6 VALIDATION OPINION

Germanischer Lloyd Certification GmbH has performed a validation of "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" in "Republic of Indonesia". The validation was performed on the basis of UNFCCC criteria and host country criteria, as well as criteria given to provide consistent project operations, monitoring and reporting.
The review of the project design documentation and the subsequent follow-up interviews have provided Germanischer Lloyd Certification GmbH with sufficient evidence to determine the fulfilment of stated criteria. In our opinion, the project meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria. The project will hence be recommended by Germanischer Lloyd Certification GmbH for registration.

The project applies ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.1). The methodology has been correctly applied and the assumptions made for the selected baseline scenario are sound. By displacing fossil fuel-based electricity with electricity generated from a renewable source, the project results in reductions of 581,784 t CO2eq emissions per year that are real, measurable and give long-term benefits to the mitigation of climate change.
Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions.
It is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are additional to any that would occur in the absence of the project activity.
An Environmental Impact Assessment has been assessed as per applicable regulation and was approved by the local government/D2/. A global and local stakeholder consultation was conducted.

In summary, it is GLC’s opinion that "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" in "Republic of Indonesia", as described in the revised PDD version 02.4 meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.1). Hence, GLC will request the registration of the "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" as a CDM project activity.

Hamburg, 2012-05-14

Assessment Team Leader

7 REFERENCES

The following table outlines the documentation reviewed during the validation:

/#/	Author: Title, version, date of issue
/A1/	Power Plant Process Flow Diagram (file name: "A1 Ulubelu_Power plant process flow diagram.pdf")
/A2/	Administrative and Technical Proposal for 2x55MW Ulubelu Unit 3 & 4 Geothermal IPP project (file name: "A2 Ulubelu_Technical specification as sent to PLN.pdf") dated Oct. 2010
/A3/	Project implementation schedule (File name: "A3 Ulubelu_Project plan and status.pdf") dated 2010
/A4/	Commissioning Certificate of wells UBL-18 – UBL 22, UBL 25 which serves as confirmation of well drilling end date (File name: "A4 Ulubelu_Commissioning certificate.pdf")
/A5/	Ulubelu well drawings and technical specifications of UBL-18, UBL-20,21,23, 25, 26, H3 (File name: "A5 Ulubelu_wells drawings and technical specification.pdf")
/A7/	Energy Sales contract between PGE and PLN (Bahasa Indonesia) (File name: "A7 Ulubelu_ESC with PLN.pdf") dated 11 March 2011 Energy Sales contract between PGE and PLN (English translation) (File name: A7 Ulubelu_ESC with PLN_ENG translation.pdf) dated 11 March 2011
/A8/	Ulubelu well drilling contract and its addendum incl. translation into English (File name: "A8 Ulubelu_wells drilling contract.pdf" and "A8 Ulubelu_wells drilling contract addendum_23 March 2011.pdf") dated 8 April 2010
/A9/	Risk free rate Source (File name: "A9 Government bond rate used in the IRR calc.pdf")
/A10/	Results of wells testing for already drilled wells (horizontal or vertical test to know potential capacity) for well #22 and well # 24 Cluster G. File name: "A10 Ulubelu_Steam wells testing.pdf")
/A10a/	Site plan of wells in Clusters from onsite visit (file name: "Site plan of wells in clusters.pdf")
/A11/	Concession area permit (Bahasa Indonesia) Concession area permit (English translation) File name: "A11 Ulubelu_Ministerial decree for concession area.pdf"
/A12/	Land acquisition contract (File name: "A12 Ulubelu_Land purchase contract for Cluster E, F and G")
/A13/	Permit to build power plant – (Bahasa Indonesia) Permit to build power plant – (English translation) (File name: "A13 Ulubelu_Principle recommendation permit from Tanggamus Regent.pdf")
/A14/	Actual cost of drilled wells for Ulubelu Unit 3 & 4 (File name: "A14_Ulubelu_Wells drilling cost.pdf") dated 19 August 2011
/A15/	Number of already drilled wells (file name: "A15 Ulubelu_List of drilled wells.pdf) Number of already drilled wells (file name: "Ulubelu_List of drilled wells incl unit identification.pdf") "), wells #18 - #30 belong to Unit 3&4 dated 2011
/A16/	Power point presentation presented during onsite visit by PGE (File name: "A16 Ulubelu_PGE presentation_1208111.pdf") dated 12 July 2011
/A17/	Evidence for claimed 120 litres p.a. of diesel consumption in the PDD (File name: "A17 Ulubelu clarify emergency diesel genset english.pdf") dated 18 November 2011

/A20/	Explanation of 10,000 MW crash program (File name: "A20 Indonesia Renewable Energy Assessment (FINAL) paper about 10'000 MW crash program.pdf" and "A20 New approaches to electricity governance paper about 10'000 MW crash program.pdf")
/A21/	Board decision to build power plant (File name: "A21 Ulubelu_BOD and BOC MoM.pdf") dated 21 Jan 2010
/A22/	MoM between PGE and PLN that PGE builds power plant for Ulubelu II (Bahasa Indonesia) MoM between PGE and PLN of Indonesia that PGE builds power plant for Ulubelu II (English translation) (File name: "A22 MoM between PGE and PLN.pdf) dated 13 July 2009
/A23/	Work Order of well #18 under HOA 2010 (File name: "A23 Ulubelu_Work Order for UBL #18.pdf") dated 6 May 2010
/A24/	Indonesian DNA confirms receipt of CDM Prior Consideration Form (File name: "A24 Ulubelu_Confirmation of prior consideration from DNA.pdf") dated 4 Sept 2010
/A24b/	Prior Consideration sent to DNA by PGE (File name: "A24b_Prior Consideration DNA.pdf") dated 30 Aug 2010
/A25/	Prior Consideration to UNFCCC (File name: "A25 Ulubelu_Prior consideration E-mail sent to UNFCCC.pdf") dated 16 Sept 2010
/B2/	Power Generation Cost (File name: "B2 Indonesia Power – Generation costs.pdf") dated 2002
/B3/	Cost of geothermal power and factors that affect it Subir K. Sanyal dated 2004
/B4/	Feasibility Study Report (Bahasa Indonesia and English translation) File name: "B4 Ulubelu FSR.pdf" dated Sept 2009
/B5/	Head of Agreement between PGE and PLN 2010 (Bahasa Indonesia) Head of Agreement between PGE and PLN 2010 (English translation) File name: "B5 Ulubelu HoA energy sales_2010.pdf" dated 17 Feb 2010
/B6/	ERPA contract between PP and CDM consultant (file name: B6 Ulubelu_ERPA between SP and PGE.pdf") dated March 2011
/B7/	Screenshot from Bloomberg Finance regarding beta and D/E (File name: B7 Ulubelu_Bloomberg screenshot) dated 16 Nov 2011
/B8/	Grid emission factor calculation and supporting documents (fiel name: "B8 Ulubelu_111111_Baseline EF Sumatera 2008 Final_with ToolV2.2.1.xls")
/B9/	Grid EF confirmation by DNA (File name: "B9 Sumatera grid confirmation from DNA.pdf") dated 31 May 2011
/B9a/	Comparison of Tool to calculate the Emission Factor for an electricity System v. 01.1 and v. 02.2. (File name: "B10_comparison Tool grid EF version.doc")
/B10/	Justification of input parameters for WACC calculation (File name: "B10 Justifications PGE WACC parameters rev.doc")
/B11/	Paper published on RE in ASEAN countries (File name: "B11 Renewable Energy in ASEAN paper.pdf") dated 2003
/B12/	Tax applicable for PGE (File name: "B12 Presidential Decree No. 49 issued in 1991 regarding tax for geothermal utilization.pdf") dated 1991
/B12a/	Geothermal Tax Law: Presidential Decree 76/2000 (file name:"tax_Decree of President No. 76 Year 2000 article 25.pdf") dated 2000
/B12b/	Geothermal Tax Law: Presidential Decree 59/2007 (file name: "tax_geothermal tax law 59_2007.pdf") dated 2007
/B13/	Geothermal utilization (File name: "B13 Law No. 27 issued in 2003 regarding Geothermal utilization.pdf") dated 2003

/B14/	Geothermal utilization and tax (File name: "B14 Ministry of Finance Decree No. 35_PMK.011_2010 issued in 2010 regarding tax mechanism for geothermal utilization.pdf") dated 2010
/B15/	Geothermal tax explanation (File name: "B15 Explanation about Tax imposed to geothermal power plant owner.pdf") dated 2010
/B16/	Source for Cost of debt from Central Bank of Indonesia website (File name: "B16 Ulubelu_Cost of debt_USD Invesment loan rate_TABLE_1_27.xls")
/B17/	ERPA Email Communication regarding Date of Signature ("B17 Ulubelu_E-mail communication regarding final ERPA.pdf")
/B18/	Tax law no. 36/2008 regarding depreciation value (File name: "B18 Ulubelu_Income tax law no. 36 issued in 2008_regarding depreciation value.pdf") dated 2008
/B19/	Geothermal Heat and power article by Energy Technology System Analysis Program (File name: "B19 Ulubelu_Geothermal heat and power paper.pdf") dated May 2010
/B20/	Explanation of Market return formula "Geometric Mean" (File name: "B20 Ulubelu_Market return formulae_Geometric Mean Return.pdf")
/B21/	Geothermal in Indonesia: Government Regulations and Power Utilities , Opportunities and Challenges of its Development (File name: "B21 Ulubelu_Geothermal in Indonesia paper_Suryadarma.pdf") dated 2010
/B22/	Indonesia's Geothermal Development by INAGA (File name: "B22 Ulubelu_US Embassy Report_Indonesia's geothermal development_Enclosure 4 paper.pdf")
/B23/	Market Study: Geothermal Power in Indonesia. Potential, Development and Perspectives by German Federal Ministry of Economics and Technology (File name: "B23 Ulubelu_Market Study_Geothermal sector in Indonesia paper.pdf") dated 30 Sept 2008
/B24/	Cover story "IndoRenergy, Positioning Geothermal" from Petrominer magazine No.07 dated 20 July 2009
/B25/	PLN's RUPTL (PLN's Electricity Provision Plan) 2009 – 2018 page 53-54
/B26/	Meter specification as per Sumatera grid code (File name: "Meter specification as per Sumatera grid code _ Ministry of Energy and Mineral Resources No 37 issued in 2008") dated 2008
/B27/	Official letter from the Department of Energy and Mineral Resource, Republic of Indonesia providing confirmation on Geothermal Power Plants Data dated 13 October 2009
/B28/	Article "World Geothermal Power Generation 2001-2005" by International Geothermal Development http://www.geothermal.org/articles/worldpower05.pdf
/B29/	Ulubelu Metering Plan (File name: "B29 Ulubelu_Metering plan.pdf")
/B30/	Diesel Density by Pertamina (File name: "B30 Ulubelu_Pertamina diesel density specification.pdf")
/B31/	Geothermal Energy for Electric Power – A REPP Issue Brief http://www.repp.org/articles/static/1/binaries/Geothermal_Issue_Brief.pdf dated December 2003
/B32/	PGE confirms that amount of debt is downstream cost (Ulubelu power plant investment loan.pdf)
/D1/	EIA for the proposed project (file name: "D1 Ulubelu_EIA.pdf ") (Bahasa Indonesia) Incl. Risk analysis matrix including mitigation measures (English translation) dated 20 Oct 2010
/D2/	EIA approval letter (Bahasa Indonesia) EIA approval letter (English translation) "D2 Ulubelu_EIA approval.pdf"

/D5/	Letter No. 84/KOMDAL/II.04/2010 "D5 Ulubelu_Letter No. 84_KOMDAL.pdf" dated 2010
/D6/	Divisi Panas Bumi, Pertamina (File name: "D6 Kesiapan Data Potensi Panas Bumi Indonesia dalam Mendukung Penyiapan Wilayah Kerja.pdf") dated June 1999
/E1/	Minutes of meeting and list of comments and actions taken regarding LSC "E1 Ulubelu_MoM SC.pdf" dated 3 May 2011
/E2/	List of participants of Local Stakeholder Consultation Meeting "E2 Ulubelu_SC attendance list.pdf" dated 03 May 2011
/E3/	Local Stakeholder documentation during EIA process (File name: "E3 Ulubelu_SC documentation during EIA process.pdf")
/E6/	PGE confirms receiving loan from worldbank (File name: "E6 Ulubelu_PGE confirmation letter about World Bank loan.pdf") dated 06 Oct 2011
/E7/	Emission Reduction Calculation from PGE Kamojang (File name: „E7 Ulubelu_PGE Kamojang CDM Summary –Mei 2011_template.xlsx")
/E8/	Organisation structure (file name: "E8 Ulubelu_Project organization structure.pdf")
/E9/	Standing Operation Procedure of Metering System Kamojang Unit IV, Pertamina dated Oct. 2007
/E10/	Internal Audit Documentation (File name: "E10 B003-SMP-D00457-05-S0(TKO PELATIHAN) revisi SDM 2008.doc" "E10 B012-SMP-D00457-05-S0 (TKO Audit Internal) rev.2.mei 2008.doc" and "E10 B013-SMP-D00457-05-S0 (TKO Kajian Manajemen).MEI 2008doc.doc") dated 2008
/E11/	Attendance sheet during site visit (file name: "E11 Ulubelu_Site visit attendance list.pdf") dated 12-15 July 2011
/E12/	PGE's deed of establishment (File name: "E12 Ulubelu_PGE deed of establishment.pdf")
/ACM2/	CDM-EB 58: Approved Consolidated Baseline and Monitoring Methodology ACM0002 – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", (version 12.1.0)
/EB01/	CDM EB: Glossary of CDM Terms (Version 05).
/EB02/	CDM EB: Guidelines on the demonstration and assessment of prior consideration of the CDM (version 4), EB 62 Report Annex 13
/EB03/	CDM-EB: Tool to calculate the emission factor for an electricity system, version 2.1
/EB04/	CDM-EB: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 02
/EB05/	CDM-EB: Tool for the demonstration and assessment of additionality, version 5.2
/EB06/	CDM-EB: Guidance on the Assessment of Investment Analysis, version 05
/EB07/	CDM-EB: Guidelines for Completing the Project Design Document (CDM-PDD) and the Proposed new baseline and monitoring methodologies (CDM-NM). Version 7.
/EB08/	CDM-EB: Tool to calculate baseline, project and/or leakage emissions from electricity consumption. Version 2
/EB09/	CDM-EB: Clarification on elements of a written approval EB 16 Annex 6
/EB10/	CDM-EB: CDM-PDD – Project Design Document form Version 03
/EB11/	CDM-EB: F-CDM-MOC – Modalities of Communication form Version 01.3
/HCA/	Host Country Approval (HCA) for the "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" of the DNA of the Republic of Indonesia (File name: "A26 Ulubelu_Indonesian LoA.pdf") dated 10 Nov 2011
/IPCC/	IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual. 2006.

/ISO1/	ISO 14064-2:2006 – Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements
/ISO2/	ISO 14064-3:2006 – Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
/LoA/	Letter of Approval (LoA) for the "Project Ulubelu Unit 3 – 4 PT. Pertamina Geothermal Energy" of the DNA of Switzerland (File name: "A27 LoA_CH_PGE-Ulubelu.pdf") dated 28 Nov 2011
/MOC/	/ PP: Completed modalities of communication (MoC), dated 10 Jan 2012
/PDD/	Project Design Document (PDD), version 1, 2011-06-03 Project Design Document (PDD), version 2, 2011-08-10 Project Design Document (PDD), version 2.1, 2011-11-18 Project Design Document (PDD), version 2.2, 2011-12-06 Project Design Document (PDD), version 2.3, 2012-01-19 Project Design Document 8PDD), version 2.4, 2012-02-06
/S1/	Background Search: Indonesia's Geothermal Development, the Indonesian Geothermal Association (INAGA), Jakarta
/S2/	Recalculation of Investment Cost based on publicly available international literature (File name: "S2_ Recalculation of Investment Costs acc to subir sanya.xls")
/S3/	Evaluation of Geothermal Ressource Risks in Indonesia, World Bank 2010 (File name: "S3_REPORT_Risk_Mitigation_Options_Indonesia.pdf") dated 2010
/S4/	Ministerial Decree No. 76/2000 (File name: "S4_Decree of President No. 76 Year 2000 article 25.pdf") dated 2000
/S5/	Ministerial Decree NO. 59/2007 (File name: "S5_geothermal tax law 59_2007.pdf") dated 2007
/VVM/	CDM EB 55 Annex 1: Validation and Verification Manual (version 01.2)
/XLS/	Spreadsheet with investment analysis and emission reductions calculations (file name: Ulubelu ER - IRR calculation fin.xls), version 01, 2011-06-07 Spreadsheet with WACC calculation (file name: _WACC PGE 2009 fin.xls), version 1, 2011-06-07 Spreadsheet with WACC and ER calculation (file name: "110810_Ulubelu ER - IRR - WACC calculation fin_rev2.xls"), version 2, 2011-08-11 Spreadsheet with WACC and ER calculation (file name: "111118_Ulubelu ER - IRR - WACC calculation fin_rev2.1.xls"), version 02.1, 2011-11-23 Spreadsheet with WACC and ER calculation (file name: "111205_Ulubelu ER - IRR - WACC calculation fin_rev2.2.xls") version 02.2, 2011-12-06 Spreadsheet with WACC and ER calculation (file name: "120119_Ulubelu ER - IRR - WACC calculation fin_rev2-3 as.xls") version 02.3, 2012-01-19 Spreadsheet with WACC and ER calculation (file name: "120206_Ulubelu ER - IRR - WACC calculation fin_rev2-4.xls") version 02.4, 2012-02-06

Persons interviewed:
List of persons interviewed as part of the validation, or persons contributed with other information that are not included in the documents listed above are listed in Section 3.2.

ANNEX A: VALIDATION QUESTIONNAIRE AND RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS (FINDINGS'S LIST)

Validation Questionnaire

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
1. APPROVAL				
1.1. Please indicate all project participant (PPs) involved in the CDM project and define the host and the investor Country.		MoV: PDD v.01 dated 03.06.2011/PDD/ and WACC and ER Excel Sheet version 1/XLS/ PP 1: PT. Pertamina Geothermal Energy PP 2: South Pole Carbon Asset Management Ltd. Host country: Republic of Indonesia Investor country: Switzerland	OK	OK
1.2. Have the DNA of each Party indicated as being involved provided a written letter of approval? *(This letter has to confirm the following issues)*	VVM 45	Host country: No Investor country: No CAR 1 has been raised.	~~CAR 1~~	OK
1.2.1. Is every Party a Party to the Kyoto Protocol?	VVM 45 a	Host country: Yes Investor country: Yes	OK	OK
1.2.2. Is the participation voluntary?	VVM 45 b	Host country: see 1.2 Investor country: see 1.2	~~CAR 1~~	OK
1.2.3. Does the letter of approval by the DNA of the host Party confirm the contribution of the proposed CDM project activity to the sustainable development of the host party/country? *(Please specify how this requirement was validated e.g. interview with relevant authority and review of the original document)*	VVM 45 c + 125	see 1.2	~~CAR 1~~	OK
1.2.4. Will the project create other environmental or social benefits than GHG emission reductions?		By means of checking the website of the Indonesian DNA (http://pasarkarbon.dnpi.go.id/web/index.php/dnacdm/cat/5/	OK	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		sustainable-development-criteria-.html) it was identified that 4 sustainable development criteria defined by the National Commission on Climate Change are listed i.e contribution to social, economic, environmental and technology sustainability. The PDD Section A.2 addresses all four criteria. This is, inter alia, employment opportunities of local people and diversification of energy sources in Indonesia.		
1.2.5. Is the project title and the version tag of the currently validated PDD identical with the one mentioned in the LoA(s)? *In case a LoA refers to a specific PDD version, the LoA has to be renewed if the PDD version was updated during the validation.*	VVM 45 d	see 1.2	~~CAR 1~~	OK
1.2.6. Is the project title of the proposed CDM activity submitted to the UNFCCC for registration in every document correct?		The project title is: "Project Ulubelu Unit 3-4 PT. Pertamina Geothermal Energy". This title has been used consistently in the PDD/PDD/ and on the UNFCCC website (http://cdm.unfccc.int/Projects/Validation/DB/K2YWZ6K33VULS6IW681SA4WLPHFHGT/view.html) for webhosting The prior consideration note (http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html) is titled "Ulubelu Unit 3&4 Geothermal Project).	OK	OK
1.3. Are the letters of approval of the DNAs authentic for the proposed CDM project activity? *Please indicate how this has been verified (e.g. review of the original document and interview with the DNA,*	VVM 47	see 1.2	~~CAR 1~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
was the letter submitted by the DNA directly)				
1.4. Was the letter submitted by the project participants or by the DNA directly?		see 1.2	~~CAR 1~~	OK
2. PARTICIPATION				
2.1. Are the PPs listed in a tabular form in section A.3 of the PDD?	VVM 52	The PPs are listed in a tabular form in Section A.3.	OK	OK
2.2. Is the listed information in the table consistent with the contact details provided in Annex I of the PDD?	VVM 52	The PPs "PT. Pertamina Geothermal Energy" and "South Pole Carbon Asset Management Ltd." are listed consistently in Section A.3 and Annex 1.	OK	OK
2.3. Has the participation of each PP been approved by at least one party involved, either in a letter of approval or in a separate letter?	VVM 52	see 1.2	~~CAR 1~~	OK
2.4. Please review whether any other entities other than those approved as PPs are included in these sections of the PDD. Only actual PPs should be listed here.	VVM 52	see 1.2	~~CAR 1~~	OK
3. PROJECT DESIGN DOCUMENT (PDD)				

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
3.1. Was the PDD prepared in accordance with the latest template and guidance from the EB? *Please refer also to* http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs/index.html	VVM 55	The PDD used the latest template LSC-PDD Version 03, 28.Juli 2006 (http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs/PDD_form04_v03_2.pdf) and applied correctly the guidelines for completing LSC-PDD released in EB 41 Annex 12 Version 7 (http://cdm.unfccc.int/Reference/Guidclarif/pdd/PDD_guid04.pdf)	OK	OK
3.2. Is the PDD in accordance with the applicable CDM requirements for completing PDDs and is the PDD duly completed? *Please refer also to* http://cdm.unfccc.int/Reference/Guidclarif/pdd/index.html	VVM 56	The PDD is duly completed as per the guidelines for completing LSC-PDD released in EB 41 Annex 12 Version 7 (http://cdm.unfccc.int/Reference/Guidclarif/pdd/PDD_guid04.pdf)	OK	OK
4. PROJECT DESCRIPTION				
4.1. Does the PDD contain a clear description of the project activity that provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation? *Please specify and provide a brief description.*	VVM 58	The PDD v.01 is not consistent with the use of the term installed capacity. During onsite visit it was identified that 2x58MW is the installed capacity. 6MW is used for internal consumption and remaining 110MW is the remaining capacity which is used to calculate electricity sales. CAR 2 has been raised. The PDD v.01 describes the number of wells planned to be drilled which is not consistent with the Feasibility Study nor with the information received during interviews with the PP at the onsite visit. CAR 3 has been raised.	~~CAR 2, CAR 3, CAR 4~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		The project boundary was not clearly described in PDD v.01 because Figure 1 did not indicate where Project Emissions occur and whether the wells belong into the project boundary. CAR 4 has been raised.		
4.2. Does the information provided on the location of the project activity allow for a clear identification of the site(s)? Coordinates should be given in both possible formats: Decimal degree format as: Lat: 31.125833 Lon: 30.125833 Degrees Minutes Seconds format as: Lat: 31° 07'33" N Lon: 30° 07' 33"E		YES, it is clearly mentioned in the PDD that the project is located in the Republic of Indonesia and the coordinates are: Latitude: -5.30500° Longitude: 104.57841°	OK	OK
4.3. How is it ensured and/or demonstrated that the PPs are entitled to implement the project at this site (ownership, licenses, contracts etc.)?		The ownership of PGE being able to drill in the Ulubelu Area has been confirmed by the Principle Recommendation permit from Tanggamus Regent/A13/ which states: "Geothermal exploration activities Ulubelu District of Tanggamus has been conducted since 1999 and Pertamina has obtained location license from District of South Lampung in 1994. Therefore, District of Tanggamus hereby give location principle recommendation license for Ulubelu geothermal project to continue its exploration activities." Further Land purchase permits for Cluster E, F and G have been submitted to DOE/A12/ and it was identified that PGE reserves the right to drill wells and build a power plant.	OK	OK
4.4. Is the required form for the indication of projected emission reductions correctly applied (please refer to		Yes, the form has been correctly used and Emission Reductions are indicated in Section A.4.4.	OK	OK

QUESTION / VVM REQUIREMENT		Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
	section A.4.4. (for large scale (LSC)) or A.4.3. (for small scale (SSC)) in the PDD)?				
4.5.	Are the figures provided consistent with other data presented in the PDD?		The figures provided in Section A.4.4. are consistent with Section B.6.4.	OK	OK
4.6.	Is public funding from an Annex I country used by the project?		During onsite visit the PP mentioned that a loan from the World Bank is used for this project. Clarification was requested whether the loan leads to diversion of ODA. CL 8 has been raised.	~~CL 8~~	OK
4.7.	If public funding is granted was a written confirmation from the relevant Annex I country DNA provided with the content that such funding does not result in a diversion of official development assistance (ODA)?		see 4.6	~~CL 8~~	OK
4.8.	Is the information concerning the diversion of ODA provided in Section A.4.5. (for LSC) or A.4.4. (for SCC) of the PDD consistent with Annex 2?		See 4.6	~~CL 8~~	OK
4.9.	Is the assumed crediting time clearly defined and reasonable (either renewable: 3 x max. 7 years or fixed: once max. 10 years)?		The crediting period is renewable and the first crediting period is 7 years long.	OK	OK
4.10.	Please specify whether the current project is realized in existing facilities or utilizes existing equipment (brownfield), as well if it falls within one of the following categories for which a physical site inspection is mandatory and indicate the date of the site visit: ➢ Large scale projects (LSC) ➢ Non-bundled SSC projects with emission reductions exceeding 15,000 tonnes per year;	VVM 60	Site visit was performed from 12-15. July 2011. Technical expert for geology has been onsite. Wells could be visited. Power plant is not built yet.	OK	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
➢ Bundled SSC projects, each with emission reductions not exceeding 15,000 tonnes per year; in such case the number of physical site visits may however be based on sampling, if the sampling size is appropriately justified through statistical analysis.				
4.11. In case a site inspection has been conducted, does the description in the PDD reflect the proposed CDM activity?		During onsite visit it was identified that 2x58MW is the installed capacity. 6MW is used for internal consumption and remaining 110MW is the remaining capacity which is used to calculate electricity sales. CAR 2 has been raised. The PDD v.01 describes the number of wells planned to be drilled which is not consistent with the Feasibility Study nor with the information received during interviews with the PP at the onsite visit. CAR 3 has been raised. During onsite visit it was identified that several additional decisions regarding implementation of a CDM project were taken e.g. Board Decision to build the power plant which was not mentioned in PDD v.01. CAR 5 has been raised. During interviews with the PP the date of the Investment Decision and the project start has been discussed. CL 3 has been raised.	~~CAR 2~~ ~~CAR 3~~ ~~CAR 5~~ ~~CL3~~	OK
4.12. In case it is decided that no site visit should be conducted, were designs or feasibility study reports (FSR) available for review? If yes, is the project description consistent with them? If none of these documents was available, please conduct a comparison analysis to equivalent projects (i.e. project type, applied methodology, location,..) ?	VVM 62	n/a	n/A	n/a

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
4.13. If no physical site inspection was undertaken how the project description was assessed for appropriateness and what is the outcome?	VVM 62	n/a	n/a	n/a
4.14. In case the CDM project activity involves the alteration of an existing installation or process are the differences between the project activity and the pre-project situation clearly defined in the project description?	VVM 63	n/a	n/a	n/a
4.15. Are the CDM project activity process flow charts, illustrative descriptions or comparable documents available and do they contribute to a better understanding of the project activity?		A process flow chart/A1/ has been submitted to DOE. During onsite visit it was inspected whether Ulubelu Unit 3&4 is not a capacity addition. CL 2 has been raised.	~~CL 2~~	OK
5. APPLICABILITY OF BASELINE AND MONITORING METHODOLOGY				
5.1. Does the PDD clearly state the latest and valid version of the methodology (ies) and the tools? Is the methodology or any tool correctly quoted? *(Please compare the methodology or any tools applied with the actual text of the applicable version of the methodology or tools and review whether e.g. the most current version was applied, all elements were considered, etc.).*	VVM 70	No, Methodology date is not correct. CAR 14 (4) has been raised. Moreover, "Tool to calculate emission factor for electr. System" is outdated. PDD v.01 indicates that v.2.1 has been applied. The new version of the" tool to calc. emission factor for electr. System" came into effect on 3 June 2011. As per EB 61 para 24 the DOEs may upload not later than 3 February 2012 (24:00 GMT) for registration the project design documents (PDDs) of project activities in which the previous version of an approved methodology or an approved tool has been applied. It has been identified that the Emission Grid Factor has been published by the DNA. Further clarification was requested with CL 6.	~~CAR 14~~ ~~CL 6~~	OK
5.2. Please list all applicability criteria of the approved methodology or any other tool or other methodology component referred to therein.	VVM 71	1. This methodology is applicable to grid-connected renewable power generation project activities that (a) install	OK.	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s). 2. The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit. 3. In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 11 to calculate the parameter EGPJ,y) : the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;		
5.3. Please review and assess whether the project activity meets these criteria. *(Please clearly describe the steps taken to assess the information provided by the PDD against these criteria,*	VVM 71	1. (a) is applicable as confirmed during site visit. However CL 2 has been raised to identify whether the project activity is a capacity addition. 2. A geothermal power plant is planned and wells already	~~CL 2~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
e.g. validating the documentation referred to in the PDD and by verifying that its content is correctly quoted and interpreted in the PDD)		drilled as confirmed onsite. Therefore the project activity is the installation of a geothermal power plant. 3. A new power plant will be installed as confirmed onsite. However it must be ensured that no capacity addition to Ulubelu I occurs. CL 2 has been raised.		
5.4. Please check whether comparable information is available from other sources and if yes cross check with the PDD in order to assess the applicability of the methodology.	VVM 71	During onsite visit it has been identified that the project activity will be installed at Ulubelu site where no renewable power plant was operated prior to the implementation of the project activity. Further Ulubelu Situation map /A10a/ has been assessed to identify the geothermal wells which have been drilled and are planned to be drilled. By means of interviews with the PP, it can be confirmed that the project activity is the installation of a grid-connected geothermal power plant which was further crosschecked with the Feasibility Study/B4/. The process flow diagram/A1/ has been assessed to identify whether the project activity is a capacity addition to Ulubelu Unit 1 and 2. CL 2 has been raised. Moreover other geothermal CDM projects have been assessed e.g. Kamojang (UNFCCC project no. 3028 http://cdm.unfccc.int/Projects/DB/RWTUV1255101629.04/view), Darajat III (UNFCCC project no. 0673 http://cdm.unfccc.int/Projects/DB/KPMG1159285050.32/view) and Wayang Windu II (UNFCCC project no. 3193 http://cdm.unfccc.int/Projects/DB/TUEV-SUED1260194062.48/view)	~~CL 2~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		And it was identified that the methodology ACM0002 is applicable to this project activity.		
5.5. Is the project activity expected to result in emissions other than those allowed by the methodology?	VVM 71	No, the project activity is not expected to result in emissions other than those allowed by the methodology.	OK	OK
5.6. Is the project activity a SSC project activity? *(If not please continue with question 5.12., if yes please answer also the specific SSC questions 5.7. to 5.12.)*		The project activity is a large-scale project. Hence these questions are not applicable.	n/a	n/a
5.7. Does the project activity qualify within the thresholds of the three possible types of SSC project activities? Does it include more than one component; for example, a type III methane recovery component activity and a type I electricity component activity?	VVM 135	n/a	n/a	n/a
5.8. Does the project activity conforms to one of the approved SSC categories and applies the relevant tool or methodology? Are the SSC methodologies applied in conjunction with the general guidance to the methodologies, which provides guidance on equipment capacity, equipment performance, sampling and other monitoring-related issues?	VVM 135	n/a	n/a	n/a
5.9. Is the project activity not a de-bundled component of a LSC project, in accordance with the rules defined in appendix C of the simplified modalities and procedures for SSC CDM project activities?	VVM 135	n/a	n/a	n/a
5.10. Is an assessment of the environmental impacts of the proposed CDM project activity required by the host	VVM 135	n/a	n/a	n/a

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
Party? If so, is the EIA available and in compliance with the regulations? *Please specify how this requirement has been verified (e.g. review of local regulations, interviews with local authorities).*				
5.11. Please indicate if the proposed SSC project activity meets the requirements of the simplified modalities and procedures for SSC CDM project activities?	VVM 134	n/a	n/a	n/a
5.12. Final conclusion: Based on the assessment of 5.1. to 5.11. are the baseline and monitoring methodologies selected by the PP in compliance with the methodologies previously approved by the EB?	VVM 65	The validation team confirms that the baseline and monitoring methodology selected by the PP complies with the methodologies previously approved by the CDM EB. Further the validation team confirms that the selected methodology is applicable to the project activity and it has been assessed in Question 5.3 a and b whether the PP has correctly applied the selected methodology.	~~CL 2~~	OK
6. PROJECT BOUNDARY				
6.1. Please describe the project boundary of the selected baseline methodology.		The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that this CDM project power plant is connected to. Further the boundary includes all GHG gases listed in Table 1 of ACM 0002. As per PDD v.01 GHG and emission sources like CO2 and CH4 from the steam have been estimated ex ante to be zero and have not been included in Figure 1. CAR 4 and CAR 12 have been raised.	~~CAR 4~~ ~~CAR 12~~	OK

<table>
<tr><th>QUESTION / VVM REQUIREMENT</th><th>Source</th><th>MEANS AND FINDING OF VALIDATION</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td>6.2. Is the delineation of the project boundary in the PDD correct and does it meet the requirements of the selected baseline methodology?
(Please indicate how this requirement has been assessed, e.g. based on comparison of PDD and physical settings during the onsite visit)</td><td>VVM 78</td><td>By means of comparing PDD v.01 with ACM0002 it has been identified that Figure 1 of PDD v.01 does not include the wells in the boundary although CH4 and CO2 emissions from non-condensable gases contained in geothermal steam shall be included as per ACM0002. CAR 4 has been raised.
During onsite visit the geothermal wells which will supply geothermal steam to Ulubelu Unit 3 and 4 have been visited. The power plant process flow diagram/A1/ and Feasibility Study/B4/ have been assessed and it was identified that the project boundary described by the PP (after CAR 4 is closed) meets the requirements of the methodology.</td><td>~~CAR 4~~</td><td>OK</td></tr>
<tr><td>6.3. Have all sources and GHGs required by the methodology been included within the project boundary?
(Please list the sources and GHG’s and confirm for each that they are included)</td><td>VVM 79</td><td>Following sources have been included/excluded:
<table><tr><th></th><th>Source</th><th>Gas</th><th>As per ACM 2</th><th>Correctly incl./excl as per PDD</th></tr><tr><td>BL</td><td>CO2 emissions</td><td>CO2</td><td>Incl.</td><td>☒</td></tr></table></td><td>~~CAR 4~~</td><td>OK</td></tr>
</table>

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		<table><tr><td></td><td>activity</td><td></td><td></td><td></td></tr><tr><td>PA</td><td>Fugitive emissions of CH4 and CO2 from non.condensable gases contained in geothermal steam</td><td>CO2 CH4 N2O</td><td>Incl. Incl. Excl.</td><td>☒ ☒ ☒</td></tr><tr><td>PA</td><td>CO2 emissions from combustion of fossil fuels required to operate the geothermal power plant</td><td>CO2 CH4 N20</td><td>Incl. Excl. Excl.</td><td>☒ ☒ ☒</td></tr></table> By means of onsite visit and crosschecking PDD v.01 Section B.3 with the methodology it can be confirmed that all sources and GHGs required by the methodology have been included within the project boundary. However Figure 1 of PDD v.01 does not include the wells in the project boundary. CAR 4 has been raised.		
6.4. Is a flow diagram included in the PDD which provides a clear understanding of all sources and GHG?		By means of checking PDD v.01 it was identified that the flow diagram is not providing a clear understanding of the project nor indicating all sources of GHGs. CAR 4 has been raised.	~~CAR 4~~	OK
6.5. Does the methodology allow PPs to choose whether a	VVM	Methodology says clearly which sources shall be included.	OK	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
source or gas is to be included within the project boundary? *Please indicate the gases.*	79	The same have been included correctly as per PDD v.01.		
6.6. How was this choice been justified by the PP and is the justification reasonable? *(Please list the justification for each choice, present a comment whether it seems reasonable and provide information how the assessment was conducted e.g. assessment of supporting documentation, etc.)*	VVM 79	The methodology does not allow the PP to choose whether a source or gas is to be included within the project boundary. Hence this question is not applicable.	OK	OK
7. BASELINE IDENTIFICATION				
7.1. Are there any procedures in the methodology to identify the most reasonable baseline scenario? *(Please list them and review whether they were applied correctly)*	VVM 81	As per methodology, in case project activity is installation of a new grid-connected renewable power plant, the baseline scenario is: Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculation described in the "Tool to calculate the emission factor for an electricity system". The PP correctly applied the baseline scenario given by the methodology. However it must be justified whether or not the project activity is a capacity addition. CL 2 has been raised.	~~CL 2~~	OK
7.2. Does the applied methodology require the use of tools to establish the baseline scenario? *(If yes please list them and review whether they were*	VVM 82	No, the applied methodology does not require the use of a tool to establish the baseline scenario.	n/a	n/a

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
applied correctly)		The applied methodology states the baseline scenario in case of installation of new grid-connected renewable power plants or capacity addition to existing grid-connected renewable power plants. Therefore this question is not applicable.		
7.3. In case of any inconsistencies between the methodology and a tool please note that the guidance of the methodology supersedes the tool and review whether the PP has correctly applied this principle correctly.	VVM 82	n/a	n/a	n/a
7.4. If the methodology requires to consider several alternative scenarios to identify the most reasonable baseline scenario which were considered by the PP?	VVM 83	The methodology provides a description of the baseline scenario for installation of new grid-connected renewable power plants.	OK	OK
7.5. Are the scenarios considered reasonable and justified? Please indicate how this requirement has been assessed. (following 7.4)	VVM 83	As per PDD v.01 other realistic and credible alternatives are considered to investigate the baseline. The first alternative is the proposed project activity without CDM financing, the second is the continuation of current situation, the third is construction of a thermal power plant and fourth is construction of renewable power generation. All scenarios are properly explained: Alternative 3 can be excluded because a thermal power plant would lead to higher emissions and due to conservativeness the alternative with the lowest emissions shall be selected for comparison. Alternative 4 leads to technical barriers because PGE does not have any competencies in construction and operating other renewable power plants. Hence, the no action scenario (2) is compared to the	OK	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		proposed project activity without CDM financing (1).		
7.6. Were any reasonable alternative scenarios excluded? If so please list them and validate why they are excluded. (following 7.4)	VVM 83	All reasonable alternatives were included in the investigation of the baseline.	OK	OK
7.7. Please describe how the validation of baseline scenario determination is done and describe the findings, with details of the assessments regarding the reasonableness, correctness and appropriateness of: a) assumptions, calculations and rationales used for determining the baseline scenario; b) documents and sources quoted and interpreted in PDD for baseline determination; c) information provided in the PDD for baseline determination, compared to information from other verifiable and credible sources, such as local expert opinion if available.	VVM 84	By means of onsite visit it can be confirmed that the PP is planning to build a new grid-connected geothermal power plant. This plan was further evidenced with the power plant process flow diagram/A1/ and Feasibility study/B4/. The baseline scenario is given by the methodology in this case. However, the PP shall justify whether this project is a capacity addition. CL 2 has been raised. Further as per PDD v.01 Section B.5 the PP compared the IRR of the project activity without CDM with the IRR in case PGE sells steam to PLN. CL1 was raised to identify whether the scenario of selling steam to PLN, i.e. PGE would extract and operate the wells and PGE would build the power plant, is an alternative baseline scenario. However the validation team identified that as per EB 39 Annex 10 substep 1a only those alternative scenarios shall be considered which deliver outputs or services with comparable quality, properties and application areas. Hence the option that PGE sells team to PLN is not a realistic and credible alternative scenario to the proposed CDM project activity and shall therefore not be considered.	~~CL 1~~ ~~CL 2~~	OK
7.8. Have all applicable CDM requirements been taken into account in the identification of the baseline scenario for	VVM 85	During onsite visit it has been identified that a 10,000 MW acceleration program has been initiated by the	~~CAR 10~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
the proposed CDM project activity (including "relevant national and/or sectoral policies and circumstances"; e+/e- rule)? *(Please list the considered requirements and comment respectively and refer to EB 53 Annex 32 before answering the question)*		government. Further Clarification has been requested in CAR 10. By means of background research it has been identified that the 10,000 MW acceleration program falls under the E-policies and it was implemented after Nov. 2001. Hence as per EB 22 Annex 3 this policy does not need to be taken into account. Further this policy does not effect the baseline which is given by the methodology. Further it has been assessed based on local and sectoral knowledge that due to the presidential directive no. 45/1991 PGE being a daughter company of Pertamina is allowed to build and operate power plants and sell electricity to PLN/S1/. Based on local expertise it can be confirmed that the alternatives are in compliance with all mandatory applicable legal and regulatory requirements. The Validation team confirms that all applicable CDM requirements have been taken into account in the identification of the baseline scenario for the proposed CDM project including relevant national and/or sectoral policies and circumstances.		
7.9. Does the PDD contain a description of the technology that would be employed in the absence of the CDM project activity?	VVM 86	The identified baseline scenario is the continuation of current situation, i.e. electricity will continue to be generated by the existing generation mix operating in the grid, with capacity additions as planned.	OK	OK
7.10. In case the grid-factor was applied ex-ante to determine the baseline emissions and/or the project emission, please review whether this emission factor is		The Grid EF for Sumatera grid is published at the website of the DNA: (http://pasarkarbon.dnpi.go.id/web/index.php/dnacdm/cat/6/	~~CL 6~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
still valid.		other-information.html). The calculation of the grid EF has been provided in Annex 2 of PDD v.01 and was submitted as excel file/B8/. It has been identified that the DNA calculation refers to tool v.1.1. Clarification was requested whether this data is the latest available. CL 6 has been raised.		
7.11. Final conclusion: Does the PDD provide a verifiable description of the identified baseline scenario? (*Please provide and specify a statement)*	VVM 86	The validation team confirms that all assumptions and data used by the PP are listed in the PDD including their references and sources; All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD; Assumptions and data used in the identification of the baseline scenario are properly justified, supported by evidence and can be deemed reasonable; Relevant national and/or sectoral policies and circumstances are considered and liested in the PDD; The 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.	OK	OK
8. ALGORITHMS AND/OR FORMULAE USED TO DETERMINE EMISSION REDUCTIONS				
8.1. What are the parameters applied in the PDD to determine emission reductions? Are all the required ex-ante parameters and equations	VVM 89	As per methodology ACM0002, following *project emissions* need to be considered for this project: $PE_y = PE_{FF,y} + PE_{GP,y}$	~~CL 2~~ ~~CAR 11~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
included in the PDD as required by the applied methodology?		Where: PE_y = Project emissions in year y (tCO2e/yr) $PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO2/yr) $PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to release of non-condensable gases in year y (tCO2e/yr) As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", following calculation applies for $PE_{FF,y}$: $PE_{FF,y} = PE_{FC,j,y} = \sum_i [\mathbf{FC_{i,j,y}} \times COEF_{i,y}]$ Where: $PE_{FC,j,y}$ = CO2 emissions from fossil fuel combustion in process j during the year y (tCO2/yr) $FC_{i,j,y}$ = Quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr) $COEF_{i,y}$ = CO2 emission coefficient of fuel type i in year y (tCO2/mass or volume unit) i = Are the fuel types combusted in process j during year y Further as per OPTION B of the tool: $COEF_{i,y} = \mathbf{NCV_{i,y}} \times \mathbf{EF_{CO2,i,y}}$ Where: $NCV_{i,y}$ = weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit) $EF_{CO2,i,y}$ = weighted average CO2 emission factor of fuel	~~CAR 12~~	

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		type i in year y (tCO2/GJ) Moreover, as per the methodology: $PE_{GP,y} = (\mathbf{w_{steam,CO2,y}} + \mathbf{w_{steam,CH4,y}} \times \mathbf{GWP_{CH4}}) \times \mathbf{M_{steam,y}}$ Where: $w_{steam,CO2,y}$ = Average mass faction of carbon dioxide in the produced steam in year y (tCO2/t steam) $w_{steam,CH4,y}$ = Average mass fraction of methane in the produced steam in year y (tCH4/t steam) GWP_{CH4} = Global warming potential of methane valid for the relevant commitment period (tCO2e/tCH4) $M_{steam,y}$ = Qantity of steam produced in year y (t steam/yr) **Assessment of PDD v.01 vs. methodology and applicable tools:** **$FC_{i,j,y}$** has been listed in Section B.7.1 of PDD v.01 which is in line with the applicable tool. **$NCV_{i,y}$** has been listed in Section B.6.2 of PDD v.01 which is correct since the value is fixed ex-ante. As per the tool the value can be sourced from IPCC default values and is therefore fixed ex-ante. **$EF_{CO2,i,y}$** has been listed in Section B.6.2 of PDD v.01 01 which is correct since the value is fixed ex-ante. As per the tool the value can be sourced from IPCC default values. However the parameter has not been listed consistently w.r.t Section B.6.1. CAR 11 has been raised. **$w_{steam,CO2,y}$** has been listed in Section B.7.1 of PDD v.01		

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		which is in line with the methodology. However the parameter has been wrongly stated in Section B.6.3. CAR 11 has been raised. $\mathbf{w}_{steam,CH4,y}$ has been listed in Section B.7.1 of PDD v.01 which is in line with the methodology. However the parameter has been wrongly stated in Section B.6.3. CAR 11 has been raised. $\mathbf{GWP}_{CH4}$ has been listed in Section B.6.2 of PDD v.01 which is in line with the methodology. $\mathbf{M}_{steam,y}$ has been listed in Section B.7.1 of PDD v.01 which is in line with the methodology. --- As per methodology, following *baseline emissions* need to be considered for this project: $BE_y = EG_{PJ,y} \times \mathbf{EF}_{grid,CM,y}$ Where: BE_y = Baseline emissions in year y (tCO2/yr) $EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr) $EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO2/MWh)		

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		For *Greenfield renewable energy* power plants such as this projects following calculation is valid as per methodology: (Assumption is made that CL 2 can be closed). $EG_{PJ,y}$ = **$EG_{facility,y}$** Where: $EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr) **Assessment of PDD v.01 vs. methodology and applicable tools:** **$EF_{grid,CM,y}$** has been listed in Section B.6.2 of PDD v.01 which is correct since it is calculated ex-ante and published by the Indonesian DNA. **$EG_{facility,y}$** has been listed in Section B.7.1 of PDD v.01 which is in line with the methodology. --- As per the methodology the leakage of the proposed project is not considered. $L_y = 0$ As per the methodology the Emission Reductions are calculated as follows: $ER_y = BE_y - PE_y - L_y$		

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		The formulae have been correctly stated in the PDD v.01 with minor inconsistencies regarding the description, suffixes and use of abbreviations. In general the formulae have been correctly stated to calculate Emission Reductions.		
8.2. Is an Excel file with a detailed emission reduction calculation in a reproducible format (i.e. indicating the formulae applied and properly linked) provided by the PPs?		The Excel sheet with investment analysis and emission reductions calculations (file name: Ulubelu ER - IRR calculation fin.xls), version 01, 2011-06-07 has been provided by the PP. The formulae for project emissions have been properly stated on the spreadsheet "Proj Emissions". The calculation is reproducible and cells are unprotected. However, the source for $M_{steam,y}$, $w_{steam,CO2,y}$, $w_{steam,CH4,y}$ and $FC_{i,j,y}$ is not clearly referenced or justified. CAR 8 has been raised. The formulae for Baseline Emissions have not been indicated in the Excel sheet. CAR 8 has been raised. References are not clearly indicated in the Excel sheet e.g. for Plant Load factor. CAR 4 has been raised.	~~CAR 8~~ ~~CAR 4~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
8.3. Have the parameters in the PDD in comparison with those in the selected approved methodology been correctly applied? Please complete the following table for each parameter. *(Please apply the table for each parameter listed in 8.1; tables can be copied and pasted or deleted, according to the number of parameters.* *For each parameter, below the table please specify how each requirement was validated, with list of any other data sources used to verify the data and parameters used in the equations)*		<table><tr><th>Parameter Checklist</th><th>Yes / No</th></tr><tr><td colspan="2">$FC_{i,j,y}$ = Quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)</td></tr><tr><td>Parameter **$FC_{i,j,y}$**</td><td>Yes</td></tr><tr><td>Title in line with methodology?</td><td>Yes</td></tr><tr><td>Data unit correctly expressed?</td><td>No</td></tr><tr><td>Appropriate description of parameter?</td><td>No</td></tr><tr><td>If ex-ante determined, are data sources and assumptions appropriate and calculations correct?</td><td>n/a</td></tr><tr><td>If monitored, is the estimation reasonable?</td><td>Yes</td></tr></table> The PDD v.01 has been crosschecked with the methodology and "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion". It was identified that Data unit as per PDD v.01 is litres/yr. The measurement can be converted in tonnes using a monitored fuel density. As per PDD v.01 the fuel density is fixed ex ante which is correct since regional or national default values can be applied as per the tool. The validation team assessed that this unit conversion is appropriate and in line with the tool. The parameter description is not in line with the tool. The estimated value shall be further justified. Monitoring and QA/QC procedure is not in line with the tool. CAR 12 (2+5)	~~CAR 11~~ ~~CAR 12~~ ~~CL 6~~	OK

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		has been raised Further it is not clear whether the data will be archived electronically and be kept at least for 2 years after the end of the last crediting period as per the tool. CAR 12 (3) has been raised. In the PDD v.01 it is described that the diesel generation set is used to provide auxiliary electricity consumption. During onsite visit it was confirmed that generator will only be used in emergency cases. Further evidences should be provided how often the genset will be operated to control its function. Corresponding sections in the PDD should be revised. CAR 12 was raised.		

Parameter Checklist	Yes / No
Weighted average density of fuel type iI in year y	
Parameter $\rho_{i,y}$	yes
Title in line with methodology?	yes
Data unit correctly expressed?	yes
Appropriate description of parameter?	yes
If ex-ante determined, are data sources and	No

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.

assumptions appropriate and calculations correct?	
If monitored, is the estimation reasonable?	n/a

The PDD v.01 has been crosschecked with the tool mentioned above. The parameter is listed in Section B.6.2 which is correct since a default value can be used as per the tool.. The source provided is not accessible. CAR 11 has been raised.

Parameter Checklist	Yes / No
Net calorific value of fuel type i in year y	
Parameter $NCV_{i,y}$	yes
Title in line with methodology?	Yes
Data unit correctly expressed?	Yes
Appropriate description of parameter?	yes
If ex-ante determined, are data sources and assumptions appropriate and calculations correct?	yes
If monitored, is the estimation reasonable?	n/a

The PDD v.01 has been crosschecked with the tool and with the IPCC Guidelines on National GHG Inventories Table 1.2 of Chapter 1 of Vol. 2 (Energy) from 2006/IPCC/. The parameter is listed in Section B.6.2 of PDD v.01 which is correct since the value is fixed ex-ante and sourced from IPCC report which is in line

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		with the tool. The parameter description is in line with the tool. The value indicated in the IPCC guidelines for diesel oil is 43 TJ/Gg which is 0.043 GJ/kg. The value stated in the PDD v.01 has been crosschecked with the IPCC report/IPCC/ and identified to be correct.		

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.

Parameter Checklist	Yes / No
Weighted average CO2 emission factor of fuel type I in year y	
Parameter $EF_{CO2,i,y}$	Yes
Title in line with methodology?	Yes
Data unit correctly expressed?	Yes
Appropriate description of parameter?	Yes
If ex-ante determined, are data sources and assumptions appropriate and calculations correct?	yes
If monitored, is the estimation reasonable?	n/a

The PDD v.01 has been crosschecked with the tool and with the IPCC Guidelines on National GHG Inventories Table 1.4 of Chapter 1 of Vol. 2 (Energy) from 2006. The parameter is listed in Section B.6.2 of PDD v.01 which is correct since the value is sourced from IPCC report which is in line with the tool. The parameter description is in line with the tool. The value indicated in the IPCC guidelines for diesel oil is 74100 $kgCO_2/TJ$ which is 0.0741 tCO_2/GJ.
The value stated in the PDD v.01 has been crosschecked with the IPCC report/IPCC/ and identified to be correct.

Parameter Checklist	Yes /

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.

Average mass fraction of carbon dioxide in the produced steam in year y	
Parameter $w_{steam,CO2,y}$	yes
Title in line with methodology?	yes
Data unit correctly expressed?	yes
Appropriate description of parameter?	No
If ex-ante determined, are data sources and assumptions appropriate and calculations correct?	n/a
If monitored, is the estimation reasonable?	no

The PDD has been crosschecked with the methodology. The parameter is listed in Section B.7.1 which is in line with methodology. The parameter description is not in line with the methodology.

Further justification for the estimated value has been requested.
CAR 12 has been raised.

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.

Parameter Checklist	Yes / No
Parameter $w_{steam,CH4,y}$	yes
Title in line with methodology?	yes
Data unit correctly expressed?	Yes
Appropriate description of parameter?	No
If ex-ante determined, are data sources and assumptions appropriate and calculations correct?	n/a
If monitored, is the estimation reasonable?	no

The PDD has been crosschecked with the methodology. The parameter is listed in Section B.7.1 which is in line with methodology. The parameter description is not in line with the methodology.

Further justification for the estimated value was requested. CAR 12 has been raised.

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.

Parameter Checklist	Yes / No
Parameter GWP_{CH4}	yes
Title in line with methodology?	yes
Data unit correctly expressed?	yes
Appropriate description of parameter?	yes
If ex-ante determined, are data sources and assumptions appropriate and calculations correct?	yes
If monitored, is the estimation reasonable?	n/a

The PDD has been crosschecked with the methodology. The parameter is listed in Section B.6.2 which is in line with methodology. The parameter title and description is in line with the methodology.

OK.

Parameter Checklist	Yes / No
Parameter $M_{steam,y}$	Yes
Title in line with methodology?	yes
Data unit correctly expressed?	No

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.
		<table><tr><td>Appropriate description of parameter?</td><td>No</td></tr><tr><td>If ex-ante determined, are data sources and assumptions appropriate and calculations correct?</td><td>n/a</td></tr><tr><td>If monitored, is the estimation reasonable?</td><td>no</td></tr></table> The PDD has been crosschecked with the methodology. The parameter is listed in Section B.7.1 which is in line with methodology. The parameter and monitoring description is not in line with the methodology. The ex-ante value is not consistent with Feasibility study/B4/ hence justification for the estimated value was requested. CAR 12 has been raised.		

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.

Parameter Checklist	Yes / No
Parameter $EF_{grid,CM,y}$	Yes
Title in line with methodology?	yes
Data unit correctly expressed?	Yes
Appropriate description of parameter?	yes
If ex-ante determined, are data sources and assumptions appropriate and calculations correct?	yes
If monitored, is the estimation reasonable?	n/a

The PDD has been crosschecked with the methodology and the tool to calculate the emission factor for an electricity system. The parameter is listed in Section B.6.2 of PDD v.01 which is correct since the value is fixed ex-ante which is in line with the methodology. The parameter description is in line with the methodology. The value indicated is in line with the publications of the DNA website for the Sumatera grid (http://pasarkarbon.dnpi.go.id/web/index.php/dnacdm/cat/6/other-information.html.)
Calculation in Annex 3 of PDD have been checked and assessed to be ok. However, PP shall clarify which tool has been used. CL 6 has been raised.

QUESTION / VVM REQUIREMENT	Source	MEANS AND FINDING OF VALIDATION	Draft Concl.	Final Concl.

Parameter Checklist	Yes / No
Parameter $EG_{facility,y}$	yes
Title in line with methodology?	no
Data unit correctly expressed?	No
Appropriate description of parameter?	No
If ex-ante determined, are data sources and assumptions appropriate and calculations correct?	n/a
If monitored, is the estimation reasonable?	yes

The PDD has been crosschecked with the methodology. The parameter is listed in Section B.7.1 of PDD v.01 which is in line with the methodology. The parameter title and description is not in line with the methodology. The value indicated is consistent with the values applied in the PDD and ER calculation. It shall be clarified where meter is located to measure net electricity as required by the methodology.
CAR 12 has been raised.

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
8.4. In case the methodology provides the selection of different options for equations or parameters, has an adequate justification been provided and were the correct equations and parameters used in accordance with the methodology?	VVM 90	The methodology provides the selection of different option concerning the type of power plant (e.g. geothermal, hydro etc.). All formulas applicable for geothermal power plants have been correctly used. For the Baseline Emissions Option (a) was chosen which relates to Greenfield projects. By means of onsite visit and desktop review it can be confirmed that the project is Greenfield. However CL 2 has been raised. Formulae for the Greenfield scenario were correctly applied.	~~CL 2~~	OK
8.5. Are the formulae required for the determination of leakage emissions correctly presented, enabling a complete identification of parameter to be used and / or monitored?		As per the methodology Leakage is 0.	OK	OK
8.6. Please review and recalculate any equations and indicate whether the calculations are correct. Please provide findings.		The calculation for $\mathbf{EG_{PJ,y}}$ has been checked and assessed to be correct: $\mathbf{EG_{PJ,y}}$ = $EG_{facility,y}$ = (Installed Capacity –Aux Capacity) x Plant Load Factor x 365d/yr x 24hr/d = (2x58 MW-6MW) x 90% x 8760 hr/yr = 867,240 MWh/yr By means of checking the technical description for the power plant[/A2/] it was identified that the gross power output is 2x58 MW and the net power output is 2x55 MW. CAR 2 has been raised to further explain this issue. The value for $\mathbf{EF_{grid;CM,,y}}$ has been published by the Indonesian DNA for Sumatera Grid i.e. 0.743 tCO2/MWh Summarizing the Baseline Emission calculation was checked and assessed to be ok:	~~CAR 2~~ ~~CL 6~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		BE_y = $EG_{PJ,y}$ x $EF_{grid;CM,,y}$ = 867,240 MWh/yr x 0.743 tCO2/MWh = 644,359.32 tCO2/yr However CL 6 has been raised to further justify the validity of the grid EF. The calculation for the Project Emission from combustion of fossil fuel $PE_{FF,y}$ has been checked and assessed to be ok: $PE_{FF,y}$ = $PE_{FC,j,y}$ = $FC_{i,j,y}$ x $\rho_{i,y}$ x $NCV_{i,y}$ x $EF_{CO2,i,y}$ = 1000 l/yr x 0.84 kg/l x 0.043 GJ/kg x 0.074 tCO2/GJ = 2.67288 tCO2/yr However values need to be justified. CAR 12 has been raised. The calculation for the Project Emission due to the release of non-condensable gases from the steam $PE_{GP,y}$ has been checked and assessed to be ok: $PE_{GP,y}$ = ($w_{steam,CO2,y}$ + $w_{steam,CH4,y}$ x GWP_{CH4}) x $M_{steam,y}$ = (0.005tCO2/t steam + 0 tCH4/t steam x 21 tCO2/tCH4) x 6,000,000 t steam/yr = 30,000 tCO2/yr However values need to be justified and are subject to change. CAR 12 has been raised. Summarizing the Project Emission calculation was checked and assessed to be ok: PE_y = $PE_{FF,y}$ + $PE_{GP,y}$ = 2.67288 + 30,000 = 30,002.67 tCO2/yr However values need to be justified. CAR 12 has been		

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		raised. The calculation for Emission Reduction was checked and assessed to be ok: $ER_y = BE_y - PE_y$ = 644,359.32 tCO2/yr - 30,002.67 tCO2/yr = 614,356.65 tCO2/yr However values need to be justified. CAR 12 has been raised.		
9. ADDITIONALITY OF TH PROJECT ACTIVITY				
9.1. If required by methodology, check whether the latest version of the additionality tool is applied and confirm whether all steps are correctly applied (onwards from Step 2/3; step 1 see section 7).	VVM 95	As per PDD v.01 the "Tool for demonstration and assessment of additionality" v.05.2 has been used and it was identified that v. 05.2 is the latest tool available at time of Validation start (GSC started 09.06.2011). The UNFCCC website (http://cdm.unfccc.int/Reference/tools/index.html) Has been checked and indentified that the latest version available is v. 05.2.1 released on 11.08.2011. Since the v. 5.2.1 has been released after Validation start and only minor changes have been amended, it is deemed appropriate to use and refer to v.05.2. The additionality tool step 2 (Investment analysis) has been correctly applied by the PP. Additionality is proven by means of determining that the proposed project activity is not economically or financially feasible without the revenue from the sale of certified emissions reductions (CERs). Further Sub-step 2a Option III (benchmark analysis) is chosen and has been justified appropriately. Sub-step 2b Option III (Apply benchmark analysis) has	~~CAR 9~~ ~~CAR 10~~ ~~CL 1~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		been correctly used and the assessment of the calculation of the benchmark is provided in question 9.7.7. Further Sub-step 2c (Calculation and comparison of financial indicators) has been correctly applied by the PP. The post-tax project IRR has been compared to the post-tax WACC. The assessment on the IRR calculation is provided in question 9.7.4. However CL 1 has been raised because the PP included a comparison of the project activity without CDM with the scenario when PGE sells steam to PLN. Since the later scenario is not a realistic and credible alternative to the project activity, it shall not be compared in this Section. CL 1 has been raised. Sub-step 2d (sensitivity analysis) has been applied. However justifications were not sufficient. CAR 9 has been raised. Step 3 (Barrier Analysis) has not been applied which is appropriate according to the tool. Step 4 (Common Practise Analysis) has been applied but needed revision. CAR 10 has been raised.		
9.2. Please describe how the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by the PP to support the demonstration of additionality is assessed and validated, e.g. using local knowledge, sectoral and financial expertise and considering other sources of information for cross checks.	VVM 95	Please refer to Annex B "Assessment of Financial Parameters"	~~CAR 6~~ ~~CAR 8~~	OK
9.3. Are any tools and documents provided by the EB to	VVM	As per PDD v.01 the "Tool for demonstration and	~~CAR 6~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
demonstrate the additionality of the proposed CDM project activities relevant and have they been correctly considered and applied? *(Please list and specify the findings)*	96	assessment of additionality" and the "Guidance on the assessment of investment analysis" have been used. It has been assessed in Annex B whether the tools and documents provided by the EB have been correctly applied.	~~CAR 8~~	
9.4. Are any specific complementary or alternative requirements included in the approved CDM methodology and have they been correctly considered and applied? Please list and specify the findings.	VVM 96	Please refer to 9.3.	~~CAR 6~~ ~~CAR 8~~	OK
9.5. ***Prior consideration of the clean development mechanisms (EB 49 Annex 22)***				
9.5.1. Is the start date of the project activity, reported in the PDD, in accordance with the latest version of the *"Glossary of CDM terms"*? http://cdm.unfccc.int/Reference/glossary.html	VVM 99	The start date of the project activity as per PDD v.01 is 07.05.2010 when the first well has been drilled. During onsite visit it has been identified that contracts for construction work have been signed around April 2010. Evidence is pending. Project start date shall be in line with EB 41 §67. CAR 5 has been raised.	~~CAR 5~~	OK
9.5.2. Is the project activity, in accordance with the guidance from the EB, a new project activity (project activities with start date at or after 02 August 2008) or an existing project activity (project activities with starting date before 02 August 2008)?	VVM 100	This project activity is a new project activity with a start date after 2.8.2008.	OK	OK
9.5.3. In case there is a new project activity (start date at or after 02 August 2008) and for which PDD has not been published for global stakeholder consultation or a new methodology is proposed to the EB before the project activity start date, please ensure by means of confirmation from the UNFCCC secretariat that the PP had informed the host Party DNA and the UNFCCC	VVM 101, EB 48 Annex 62	As per PDD v.01 the prior notification has been published at the UNFCCC website on 12.10.2010. This date could be confirmed by means of crosschecking with the website (http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html). However the PP submitted a copy of the F-CDM Prior Consideration Form dated 25.08.2010/A26/. Clarification was requested under CAR 5. Since the start	~~CAR 5~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
secretariat by submitting the standardized form F-CDM-prior consideration within 6 months of project start date. *(Please document the result of the query)*		date is not clear at this point in time assessment on whether prior consideration has been sent within 6 weeks after project start will be assessed in CAR 5. As per PDD v. 01 Section B.5 prior consideration to DNA is not indicated. However the Indonesian DNA published the notification on 14.7.2011 and uploaded the F-CDM Prior Consideration dated 25.8.2010 http://pasarkarbon.dnpi.go.id/web/index.php/komnasmpb/cat/4/database/2.html Further clarification was requested in CAR 5. Since the start date is not clear at this point in time assessment on whether prior consideration has been sent within 6 weeks after project start will be assessed in CAR 5.		
9.5.4. If there is an existing project activity (project activities with start date before 02 August 2008) for which the start date is prior to the date of publication of the PDD for global stakeholder consultation please verify through document review that PP's prior consideration: Please assess the fulfilment of following requirements: ➢ Evidence that must indicate that awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, other PP, to undertake the project as a proposed CDM project activity.	VVM 102	The project is a new project. N/A.	n/a	n/a

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
➢ Reliable evidence from PPs that must indicate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this should include, inter alia, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat.				
9.6. ***Identification of alternatives***				
9.6.1. Does the PDD identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the applied approved methodology prescribes the baseline scenario and no further analysis is required?	VVM 105	The applied methodology prescribes the baseline scenario. The PDD v.01 lists 2 Alternatives under Sub-step 1a: Alternative 1: proposed project activity without CDM Alternative 2: continuation of current situation By means of local and sectoral expertise it can be confirmed that these alternatives are in compliance with all applicable legal and regulatory requirements in the republic of Indonesia. Further the validation team considers the listed alternatives to be credible and complete.	OK	OK
9.6.2. Does the list of alternatives given in the PDD ensures that:	VVM 106	See 9.6.1	OK	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
➢ The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity? ➢ The list contains all plausible alternatives which can be considered to be viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity? ➢ The alternatives comply with all applicable and enforced legislation?				
9.6.3. In case the PDD argues that specific laws are not enforced in the country or region: Is evidence available concerning that statement?		n/a	n/a	n/a
9.7. ***Investment Analysis***				
9.7.1. Has the investment analysis been used to demonstrate the additionality of the proposed CDM project? *(If not please continue with question 9.8)*	VVM 108	Yes, investment analysis has been used to demonstrate additionality and the approach of proving that the proposed CDM project activity would not be economically or financially feasible without the revenue from the sale of certified emission reduction has been used.	OK	OK
9.7.2. Which approach is chosen for investment analysis of the proposed CDM project activity and is it appropriate? a. The proposed CDM project activity would produce no financial or economic benefits other than CDM-related income, and there is at least one alternative which is less costly than the proposed CDM project activity (simple cost analysis); b. The proposed CDM project activity is less economically or financially attractive than at least		Approach c is chosen and it is deemed appropriate due to: • the project activity would produce electricity sales which does not comply with approach a. as per the additionality tool; • the alternative to the project activity does not make an investment to supply the same (or substitute) which does not comply with approach b. as per EB 62 Annex 5. • The alternative to the project activity is the supply of	OK	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
one other credible and realistic alternative (comparison analysis); c. The financial returns of the proposed CDM project activity would be insufficient to justify the required investment (benchmark analysis). *Describe why the selected analysis approach is appropriate under consideration of potential revenues and costs, potential project alternatives and potential available benchmark values.*		electricity from a grid which is not to be considered an investment and a benchmark approach is considered appropriate as per EB 62 Annex 5.		
9.7.3. Is an Excel file with detailed calculation of investment analysis indicators available? Are all formulas used in the analysis readable and all relevant cells viewable and unprotected?		An IRR calculation sheet has been provided (file name: Ulubelu ER - IRR calculation fin.xls), version 01, 2011-06-07/XLS/ by the PP. Formulas used are readable and all relevant cells are viewable and unprotected. It has been identified that the total investment cost is not in line with Feasibility study. Since date of investment decision was not clear and has been debated during onsite visit an assessment of the appropriateness of values of for IRR calculation can be done only after CAR 5 and CAR 8 are closed. Please see Annex B of the Validation Report for further assessment of the parameters.	~~CAR 5~~ ~~CAR 8~~	OK
9.7.4. Please describe how the accuracy of financial calculations carried out for any investment analysis is validated: ➢ Are all input values used valid and applicable at the time of investment decision by the PP according to the available evidence and expertise in relevant	VVM 110	Please see 9.7.3 and refer to Annex B of the Validation Report. To crosscheck the value for total investment the published paper by Subir K. Sanyal, Stanford University California/B3/ has been assessed. Please refer to Annex B of Validation	~~CAR 3~~ ~~CAR 5~~ ~~CAR 8~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
accounting practices (such as feasibility reports, public announcements and annual financial reports related to the proposed CDM project activity and the PPs), with crosschecks against third-party or publicly available sources, such as invoices or price indices? ➢ Are the computations carried out and documented by the PPs correct?		Report. Comparing O&M cost one has to include make up well cost into O&M cost. Over a period of 30 years, yearly make up well costs amount to: 68,630,000/30 = 2,287,667 USD/yr. Total O&M as per FS incl. make up wells would be: 8,800,000 + 2,287,667 = 11,087,667 USD/yr. /B4/ This is more conservative than 15,192,361 USD/yr estimated from international literature for the same installed capacity. /B3/ Further the data of well testing and their potential steam output has been assessed. As per Result of steam testing of already drilled wells/A10/ the following was identified: • Well #22 of Cluster G Ulubelu Unit 3&4 has a potential capacity of 2.06 MW. The test is dated 2011-06-12. • Well #24 of Cluster G Ulubelu Unit 3&4 has a potential capacity of 0.00 MW. The test is dated 2011-06-14. As per the FS, the project owner estimated to reach a total capacity of 110 MW. For each 1 MW of generation, 7 - 8 tons of steam per hour is needed. The total necessity of steam is 770-880 t steam per hour. With a capacity factor of 90%, the total amount of steam available per year shall be: 7700 tons of steam/h x 24 h/d x 365 d/yr x 0.9 = 6,071,000 tons of steam per year. Moreover page 17 of FSR estimates with a total number of 12 production wells + 2 exploration wells + 3 injection		

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		wells. Conservatively calculated, we could assume that exploration wells are also used to produce steam for the power plant, hence 14 wells produce steam and shall reach a total capacity of 118 MW. This results in a total capacity per well of 8.28 MW per well. This estimation is in line with p. 18 of FSR which states that estimated production capacity per well varies between 7.5-12.5 MW/well. International literature estimates 5-7 MW per well/S3/. Hence the applied estimation of 8.28 MW capacity per well as per FS is a conservative approach to estimate Investment Cost and therefore deemed to be appropriate. Each production well is estimated to cost 4 million USD/B4/, an exploration well costs 4.5 million USD as per p.17 of FSR. This data was crosschecked by means of interviews with financial and technical staff of PGE confirming that one well costs between 4-7 Million USD. Hence, the construction of wells (excl. injection wells) is estimated to cost: 57 million USD. During onsite visit it was identified that 13 wells are already drilled or will be drilled in near future/A15/ , 5 prod wells are planned, 1 injection well has been drilled and 2 more inj. wells will be drilled. Hence the estimation as per FS matches the real case scenario: 14 prod wells + 3 inj. wells. However the statement in the PDD v.01 regarding number of wells is not correct. CAR 3 has been raised.		
9.7.5. In cases where the PPs rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed project activities, describe the	VVM 112	The FSR is dated Sept. 2009/B4/ and the investment decision has been evidenced by means of a Board of	~~CL 3~~ ~~CAR 9~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
means to validate the following requirements: ➢ The FSR has been the basis of the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short for the DOE to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially changed; ➢ The values used in the PDD and associated annexes are fully consistent with the FSR, and where inconsistencies occur the DOE should validate the appropriateness of the values; ➢ On the basis of its specific local and sectoral expertise, confirmation is provided, by crosschecking or other appropriate manner, that the input values from the FSR are valid and applicable at the time of the investment decision.		Director meeting and the underlying Minutes of Meeting/A22/ dated 21.01.2010. The FS has been the basis of the decision making which is further discussed in CL 3. The period of 3 month in between the FS and Investment decision is deemed sufficiently short to confirm that it is unlikely to the underlying project activity that the input values would have materially changed. Values are discussed in CAR 9 and further in Annex B of the Validation Report.	~~CL 5~~ ~~CAR 8~~	
9.7.6. Are the type of benchmark (if applicable) chosen (local commercial lending rates or weighted average costs of capital for project IRR; required/expected returns on equity for equity IRR) and the type of financial indicator calculated (e.g. project IRR, equity IRR, etc.) suitable to each other?		The chosen benchmark is the WACC which is deemed appropriate because a WACC is used when the project can be developed by an entity other than the project participant. Since PLN or other entities under a Joint Operating Contract with Pertamina are allowed to build and operate geothermal power plants (see Presidential Directive 45/ 1991/S1/), the WACC is the right benchmark. An internal company benchmark or expected returns should only be applied in cases where there is only one possible project developer. This is not the case. Further a post-tax benchmark has been applied. According to EB 62 Annex 5	~~CL 5~~ ~~CAR 8~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		actual interest payable shall be taken into account in the calculation of income tax. CL 5 has been raised. Moreover it has been assessed whether the calculated IRR is suitable to this benchmark. The IRR is a post-tax project IRR. Whether inflation e.g. price and cost escalations are taken into account is discussed in CAR 8.		
9.7.7. In case the project activity could also be developed by an entity other than the PP, is the benchmark based on publicly available data sources which can be clearly validated? *(Such data sources may include local lending and borrowing rates ,equity indices, or benchmarks determined by relevant national authorities. The DOE's validation of such benchmarks shall also include its opinion of the suitability of the benchmark applied in the context of the underlying project activity)*		The Excel files "_WACC PGE 2009 fin.xls" was provided by the PP. The calculations for WACC has been correctly applied: WACC = [E/(E+D)]*Re + [D/(E+D)]*Rd*(1-Tax) Where: E = Total market value of firm's equity D = Total market value of firm's debt Re = required return on equity or cost of equity Rd = interest rate or cost of debt Tax = corporate tax rate --- For this project the **dept-to-equity ratio** was calculated as the average of more than 40 companies of the energy industry in South East Asia. Referencing and justification for the data taken from 2009 is pending as per CAR 6. As per PDD v.01 the D/E ratio is 1.57 resulting in a D/(E+D) ratio of 61.12% and a E/(E+D) ratio of 38.88%. The calculations for D/(E+D) resp. E(E+D) are reproducible, however values need further justification. --- Concerning the return on equity or cost of equity **(Re)**, the	~~CAR 6~~ ~~CL 4~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		PP chose to use the Capital Asset Pricing Model (CAPM). Following formula applies as per standard corporate Finance literature: Re = Rf + [ß x (Rm – Rf)] Where: Rf = risk-free rate of interest such as interest arising from government bonds ß = (beta) sensitivity of the expected excess asset returns to the expected excess market returns Rm = Expected return of the market --- As per PDD v.01 and supporting documents the risk-free rate **Rf** is 10.5%. This data was crosschecked with the official website (Bank of Indonesia). The government bond rate with a maturity date in 15 Juli 2030 which is the latest maturity date available is 10.5%. It is deemed appropriate because the project start date is April 2010 and the project lifetime is 30 years. Hence the rate with a maturity in 2040 could be taken but is not available on official websites. The risk-free rate of 10.5% is deemed valid and appropriate at time of Investment Decision. However, PP shall clarify when this data was extracted from the website of Bank of Indonesia. CAR 6 was raised. --- The beta **ß** was calculated based on the average unlevered beta of companies of the energy industry in South East Asia. Referencing and justification for the data taken from the year 2009 is pending as per CAR 6. For the relevered		

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		beta following calculation was used which was crosschecked with standard finance literature: Relevered beta = unlevered beta x [1 + ((1-Tax) x D/E ratio))] The result is 1.88. The calculation is reproducible, cells are viewable and unprotected and formulas are correctly indicated and applied in the PDD v.01 and WACC calculation sheet. --- The expected return of the market **Rm** is calculated as following: Rm_1 = A/B Where: A = "Jakarta Composite Index - Close price adjusted for dividends and splits" from April 2010 B = "Jakarta Composite Index - Close price adjusted for dividends and splits" from Mai 2003. The geometric mean is calculated as follows: Rm =Rm_1^(1/7)-1 However the PP shall justify whether a longer time period shall be applied in the context of having a 30 year investment. Otherwise PP shall ensure that data from seven full years is taken e.g. 01.04.2003 – 31.03.2010 so that the geometrical mean can be calculated correctly. Since time of investment decision is pending, PP shall make sure that all input values were valid and applicable at the time of investment decision which is addressed in CAR		

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		6. --- With above values the cost of equity **Re** can be calculated as 45.59% as per PDD v.01. Calculation is reproducible and correctly cited in PDD v.01. The cells in the WACC calc sheet are viewable and unprotected. However, the data source needs to be clearly indicated and justified. CAR 6 was raised. --- The interest rate or cost of debt **Rd** (5.86%) was sourced from the Central Bank of Indonesia statistic webpage. Sourcing and referencing is not clear. It shall be indicated from which year and time period the data was sourced. CAR 6 was raised. http://www.bi.go.id/seki/tabel/TABEL1_27.pdf --- The geothermal tax rate (**Tax)** of 34% is applied which is sourced from the Presidential Decree No. 49 of 1991. During desktop review and background research the Validation team identified that a more recent Geothermal law was introduced in 2000 and 2003 which considers different tax rates. CL 4 was raised. During onsite visit the PP explained and showed evidence that due to the Presidential Decree No. 76 of 2000 and the government regulation No. 59 of 2007 all concessions signed before 2000 will use the tax rate which was applicable at that time (34%). Since PGE had their concession to extract steam before 2000, the geothermal		

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		tax rate as per the presidential decree No. 49 of 1991 applies. This information was confirmed by our local expert. -------- Summarizing the WACC has been calculated as per PDD v.01 and Excel sheet v.01: WACC = 38.88%*45.59% + 61.12%*5.86%*(1-34%) = 20.08% The formula has been correctly stated in the PDD v.01 and in the supporting documents. Formulas are viewable and unprotected. However CAR 6 was raised to confirm that data and values are valid and applicable at time of investment decision.		
9.7.8. In cases that internal company benchmarks/expected returns are applied, is it verified that there is only one possible project developer and, either the internal company benchmarks/expected returns have been used for similar projects with similar risks developed by the same company or, if the company is brand new, have been used for similar projects in the same sector in the country/region?		n/a	n/a	n/a
9.7.9. Are the risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity?		Yes, the risk premium is the Expected Return of the Market reduced by the Risk Free rate. Rp = Rm – Rf Where: Rp = Risk Premium Rm = Expected return of the market Rf = risk-free rate of interest such as interest arising from	~~CAR 6~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		government bonds The risk premium has been applied appropriately. However CAR 6 has been raised to identify sources of Rm and Rf.		
9.7.10. Is it reasonable to assume that no investment would be made at a rate of return lower than the benchmark? (*For example, assessing previous investment decisions by the PPs involved and determining whether the same benchmark has been applied or if there are verifiable circumstances that have led to a change in the benchmark)*		Other CDM geothermal projects, their benchmarks and IRRs have been assessed: e.g. Kamojang (UNFCCC project no. 3028 http://cdm.unfccc.int/Projects/DB/RWTUV1255101629.04/view), WACC = 18.15%; IRR = 16.04% and Wayang Windu II (UNFCCC project no. 3193 http://cdm.unfccc.int/Projects/DB/TUEV-SUED1260194062.48/view) WACC = 18.96%; IRR = 17.62% The above figures underline the assumption that geothermal projects in Indonesia are not beneficial without CDM. Please see the Common Practise analysis for further assessment.	OK	OK
9.7.11. If a fair value for the project assets in the end of the assessment period is included, assess whether it is calculated in accordance with the local accounting regulations where available or international best practice. *(State the accounting regulations applied for calculating the fair value for the project assets in the*	EB 62 Annex 5	The project start date is to be clarified in CAR 5 and CL 3. The first well supplying steam to Ulubelu Unit 3-4 (#18) has been drilled on 8.5.2010/A15/.	~~CAR 5~~ ~~CL 3~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
end of the assessment period and describe why these are applicable under the project specific circumstances. Describe potential mismatches between regulations and the approach applied for calculating the fair value)				
9.7.12. Does the financial indicator calculation include adding back of the depreciation and other non-cash related items to taxable profits?	EB 62 Annex 5	The IRR has been calculated in line with EB 62 Annex 5. Depreciation has been subtracted from EBITDA so that tax can be calculated on that. Depreciation has been added back to net profits.	OK	OK
9.7.13. In case of project activities for which implementation ceases after the commencement and where implementation is recommenced due to consideration of the CDM, does the investment analysis reflect the economic decision making context at point of the decision to recommence the project?	EB 62 Annex 5	n/a	n/a	n/A
9.7.14. If project IRR is chosen: Are the costs of financing expenditures (loan repayments and interests) excluded from the calculation of project IRR?	EB 62 Annex 5	Yes, the costs of financing expenditures are excluded. The calculation is in line with EB 62 Annex 5.	OK	OK
9.7.15. If project IRR is chosen and a post-tax benchmark is applied, is the actual interest payable taken into account in the calculation of income tax, with an reasonable interest rate?	EB 62 Annex 5	As per PDD v.01 the actual interest payable has not been taken into account. CL 5 has been raised.	~~CL 5~~	OK
9.7.16. If equity IRR is chosen: Is the part of the investment costs which is financed by equity considered as net cash outflow? Is the part of investment costs which is financed by debt excluded in net cash outflow?	EB 62 Annex 5	n/a	n/a	n/a
9.7.17. Are the results of variation of variables that constitute more than 20% of either total project costs or total	EB 62	The sensitivity analysis has been provided in Section B.5 of	~~CAR 9~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
project revenues clearly presented in PDD and reproducible with spreadsheet? Are the ranges of variation (eg. 10%) deemed appropriate in the context of the specific project circumstances?	Annex 5	PDD v.01. The PP has chosen the approach to show how much the variable must increase or decrease so that the IRR reached the benchmark. However justification why the Investment Cost cannot decrease by that calculated amount is not sufficient. CAR 9 has been raised.		
9.7.18. Overall, is the investment analysis in accordance with the latest version of the *"Guidelines on the Assessment of Investment Analysis"* as provided by the (EB 62 Annex 5) and other relevant guidance including the latest guidelines on plant load factors "guidelines for the reporting and validation of plant load factors"?	VVM 110	The investment analysis is in principle in line with EB 62 Annex 5. However few CARs and CLs have been raised as outlined above.	~~CAR 5~~ ~~CAR 9~~ ~~CL 5~~	OK
9.8. ***Barrier Analysis***				
9.8.1. Has the barrier analysis been used to demonstrate the additionality of the proposed CDM project? *(If not please continue with question 9.9)*		No, the barrier analysis has not been used.	OK	OK
9.8.2. What barriers are identified and described in PDD to demonstrate additionality?		n/a	n/a	n/a
9.8.3. Does any issue considered in the barrier analysis have a clear direct impact on the financial returns of the project activity and thus shall be assessed by investment analysis? *(Please note that such issues are defined in this context as those issues whose impacts can be expressed in monetary terms with reasonable certainty. But this does not refer to:* ➢ *Risk related barriers, for example risk of technical failure, that could have negative effects on financial performance, or*	VVM 116	n/a	n/a	n/a

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
➢ *Barriers related to the unavailability of sources of finance for the project activity.)*				
9.8.4. To asses the barrier analysis apply the following two-step process: *a.* Please assess whether the barriers are real: Please assess the available evidence and/or undertake interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether the barriers listed in the PDD exist. *(Review that existence of barriers is substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics. If existence of a barrier is substantiated only by the opinions of the PPs, this shall not be considered to be adequately substantiated. To demonstrate that a barrier is real it has to be supported by sufficient evidence on the basis of sectoral or local expertise)* b. Do the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives? *(Please note, that not all barriers present an insurmountable hurdle to a project activity being implemented. By applying local and sectoral expertise to judge whether a barrier or set of barriers would prevent the implementation of the proposed CDM project activity and would not equally prevent implementation of at least one of*	VVM 117	n/a	n/a	n/a

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
the possible alternatives, in particular the identified baseline scenario)				
9.8.5. Is it sufficiently demonstrated that CDM alleviates the identified barriers that prevent the proposed project activity from occurring?		n/a	n/a	n/a
9.8.6. Overall, is the barrier analysis in compliance with the latest version of *"Guidelines for objective demonstration and assessment of barriers (EB50, Annex 13)"*?		n/a	n/a	n/a
9.9. ***Common Practise Analysis***				
9.9.1. Is common practice required by the methodology applied by the proposed project activity to demonstrate additionality? *(If not please continue with question 10)*		Yes, the common practise analysis is required by the methodology. It has been provided in Section B.5 of PDD v.01. However sources and references are not clear. CAR 10 has been raised.	~~CAR 10~~	OK
9.9.2. Is the proposed project activity first-of-its-kind? If so, please specify how this statement is substantiated.	VVM 119	No, it is not first-of-its kind.	n/a	n/a
9.9.3. In case the project activity is not first of its kind, is the geographical scope (e.g. the defined region) of the common practice analysis appropriate for the assessment of common practise related to the project activity's technology or industry type? Please consider that for certain technologies the relevant region for assessment will be local and for others it may be transnational / global. If a region other than the entire host country is chosen, please assess the explanation why this region is more appropriate. *(Please specify how the geographical scope of the*	VVM 119	As per PDD v.01 the PP chose Indonesia as geographical scope for the common practice analysis. As the project activity is located in Indonesia therefore it has been considered as the relevant region. Based on the local and sectoral expertise GLC confirms that taking Indonesia where the project activity is located, as the geographical scope of the common practice analysis is appropriate for the assessment of common practice related to the geothermal power projects However CAR 10 has been raised because the analysis is not using clear references.	~~CAR 10~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
common practice analysis has been validated)				
9.9.4. Was an assessment concerning the existence of other similar projects undertaken? Does this include official sources and was local and industry expertise used to determine to what extent similar and operational projects (e.g., using similar technology or practice), other than CDM project activities, exist in the defined region? *(Please specify the findings and indicate how the findings were validated e.g. review of the relevant resources listed above)*	VVM 119	The PP has presented a list of operational geothermal power projects in Indonesia. The GLC validation team was able to verify information about the identified power plants by reviewing the data sources as indicated in the PDD. However CAR 10 has been raised because sources were not clearly referenced. The GLC validation team has checked information about geothermal projects as provided by the US Embassy in Indonesia through the publication "Indonesia's Geothermal Development"/S1/. This has also been confirmed with the article of "IndoRenergy, Positioning Geothermal" from Petrominer magazine no. 07/July 2009/B24/. Further, the list of power projects connected to the grid was also checked from PT. PLN's National Generation Development Plan year 2010-2019 (http://www.pln.co.id/dataweb/RUPTL/RUPTL%202010-2019.pdf) and deemed appropriate.	~~CAR 10~~	OK
9.9.5. If similar and operational projects, other than CDM project activities, are already "widely observed and commonly carried out" in the defined region, what are essential distinctions between the proposed CDM project activity and the other similar activities? *(Please specify how the essential distinctions between the proposed CDM project activity and any similar projects that are widely observed and commonly carried out were assessed)*	VVM 119	Projects implemented under a different regulatory framework, i.e., prior to Electricity sector regulation (Electricity Law No 20/2002) and Geothermal Energy – no. 27/2003 have been excluded. Also projects with size less than 50% of the project activity have been excluded. These exclusion criteria's have been considered reasonable. Further, as per the tool, other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis.	~~CAR 10~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		The essential distinctions between the proposed CDM project activity and other operational geothermal power projects have been assessed and found to be appropriate. On the basis of the assessment, it is confirmed that there is no activity similar to the proposed project activity in the defined region. However CAR 10 has been raised because references are not clear		
9.9.6. Final Conclusion: Based on the assessment of questions 9.1. to 9.9.5. is the proposed project activity additional?		On the basis of the analysis, it could be confirmed that there is no activity similar to the proposed project activity in the defined region. However CAR 10 has been raised because references are not clear	~~CAR 10~~	OK
10. MONITORING PLAN				
10.1. Does the PDD include a monitoring plan?	VVM 122	Yes, as per PDD v.01 a monitoring plan has been included in the documentation. During onsite visit it was further crosschecked whether the PP has a clear understanding of how monitoring and operation of the CDM project will take place. It was identified that in general the monitoring plan is based on the monitoring methodology.	OK	OK
10.2. Does the monitoring plan comply with the approved methodology? *(Please verify that all necessary parameters are included, clearly described and that the means of monitoring described in the plan complies with the requirements of the methodology)*	VVM 123	Several parameter monitoring descriptions are not in line with methodology. CAR 12 has been raised. Further Figure 3 of PDD v.01 is not complete. CAR 12 has been raised.	~~CAR 12~~	OK
10.3. Are the monitoring arrangements described in the monitoring plan feasible within the project design?	VVM 123	As per PDD v.01 it has been clearly described how the Monitoring Organisation is set up incl. definition of roles	OK	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
(Please check by review of the documents, interviews with relevant personnel, project plans and any physical site inspection of the proposed CDM project activity this requirement and document the findings)		and responsibilities and how information is passed to the CDM consultant. Further the Monitoring equipment and installation, metering of geothermal steam flow and Lab test sampling procedure have been defined. The data recording procedure states that data will be archived for the crediting period plus two years after the end of crediting period in the with the methodology and tool. The document management is described sufficiently. Based on interview during on-site visit it can be confirmed that the monitoring arrangements described in the monitoring plan are feasible within the project design.		
10.4. Are the means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified?	VVM 123	The description of QA/QC procedures for monitoring parameters is not in line with the methodology. CAR 12 has been raised.	~~CAR 12~~	OK
10.5. Final Conclusion: Based on the assessment of the requirements 10.1 to 10.4 is the monitoring plan in accordance with the applied monitoring methodology?		Whether the MP is in line with methodology, will be assessed with CAR 12.	~~CAR 12~~	OK
11. LOCAL STAKEHOLDER CONSULTATION				
11.1. Were relevant stakeholders invited by the PPs to comment on the proposed CDM project activity prior to the publication of the PDD on the UNFCCC website?	VVM 128	As per PDD v.01 the LSC has been conducted on 3.5.2011. Annex 4 of MoM/E1/ shows a copy of the Invitation Letter dated 28.04.2011 which is prior publication of the PDD on the UNFCCC website (9.6.2011) and therefore in line with VVM para 128. The attendance list have been checked/E2/ and identified that relevant stakeholders have been invited and 24 local	OK	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
		stakeholders have attended the LSC.		
11.2. 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?		There is no special country requirement to conduct a LSC. This has been confirmed by our local expert.	OK	OK
11.3. Have appropriate media been used to invite comments by local stakeholders?	VVM 129	The invitation letter has been published in a public area as evidenced with picture /E1/.	OK	OK
11.4. Is the summary of the received comments complete? *(Please specify how this requirement was verified)*	VVM 129	Comments by local stakeholders have been invited in line with VVM para 129(a)./E1/ The MoM/E1/ has been assessed and the comments and answers were listed in the PDD v.01. However the comments were not all translated into English. CAR 13 has been raised.	~~CAR 13~~	OK
11.5. Have the PPs taken due account of any comments received and have they described this process in the PDD?	VVM 129	Since English translation of Comments is insufficient, CAR 13 has been raised. Further PP is requested to clarify how due account of any comments received has been taken.	~~CAR 13~~ ~~CL 7~~	OK
12. ENVIRONMENTAL IMPACTS				
12.1. Have the PPs submitted an analysis of environmental impacts of the project activity? Is such an Environmental Impact Assessment (EIA) mandatory by national legislation? *Please specify how this requirement was validated (e.g. document review, interview with local authorities, and review of local regulations).*	VVM 131	The PP has submitted an EIA to DOE/D1/. The EIA has been approved by the Lampung Provincial Environmental Agency under the registration number: 89/KOMDAL-KPTS/II.04/X/2010. The EIA has to be conducted for Geothermal power plants greater than 55 MW as per Env.Min.Decree no. 8 and 11 2006.	OK	OK
12.2. Were transboundary environmental impacts identified in the analysis?		An English translation of the mitigation measures of the environmental impact assessment has been requested by the DOE. CL 7 has been raised.	~~CL 7~~	OK

QUESTION / VVM REQUIREMENT	Source	Means and finding of validation	Draft Concl.	Final Concl.
12.3. Will the project create any adverse environmental effects?		See 12.2	~~CL 7~~	OK
12.4. Have the identified environmental impacts been addressed in the project design sufficiently?		See 12.2	~~CL 7~~	OK
12.5. Does the project comply with environmental legislation in the host country?	VVM 135	The EIA has been approved and PGE is allowed to build a power plant/D1/.	OK	OK

Resolution of Corrective Action and Clarification Requests including list of Forward Action Requests

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response ***This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence***	GLC Assessment ***The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.***	Final Conclusion (OK or NOT OK)
CAR 1 (22/07/2011) The letters of approval of all involved parties are pending (Republic of Indonesia, Switzerland).	**11/08/2011 (1st Round)** Host country approval from Indonesian DNA will be submitted as soon as it is available. Buyer country approval from Swiss DNA will be submitted as soon as it is available.	**23/08/2011 (1st Round)** **NOT OK,** LoAs are pending. CAR is not closed.	-
CAR 1 (continued)	**18/11/2011 (2nd Round)** Host country approval from Indonesia is being submitted. While buyer country approval is still under process and will be submitted as soon as it is available.	**03/12/2011 (2nd Round)** **NOT OK,** Host Country approval/A26/ has been checked. The Indonesian DNA confirmed that the Party is a Party to the Kyoto Protocol, participation is voluntary and the project contributes to sustainable development. The project title has been indicated in line with the PDD being submitted for registration. It can be confirmed that HCA is unconditional w.r.t. EB 55 Annex 1 para 45. **OK.** Letter of Approval from Swiss DNA is pending. **NOT OK.** CAR is not closed.	-
CAR 1 (continued)	**05/12/2011 (3rd Round)** Buyer Country Approval from Switzerland is being submitted.	**06/12/2011 (3rd Round)** **OK** Letter of Approval from Swiss DNA has been submitted to DOE/A27/ and has been assessed to be unconditional w.r.t. EB 55 Annex 1 para 45.	**OK**

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
		CAR is closed.	
CAR 2 (22/07/2011) During onsite visit it was identified that 2x58MW is the installed capacity. 6MW is used for internal consumption and remaining 110MW is the remaining capacity which is used to calculate electricity sales. Wording and figures for these capacities have not been used consistently, explanation is pending.	**11/08/2011 (1st Round)** As per Technical Specification provided to PLN (relevant document: A2) page D-25, Ulubelu II will have gross power output of 2x58 MW of which 2x55 MW considered as net installed capacity as described in page D-3 of Technical Specification sent to PLN. Throughout the PDD, 2x55 MW will be referred to and used consistently, thus PDD has been revised; explanation has been added to accommodate such values.	**23/08/2011 (1st Round)** **OK,** The revised PDD v.02 has been checked and information was crosschecked with the technical specifications of the equipment for the power plant/A2/ indicating that 2 x 58 MW is the gross power output and 2 x 55 MW is the net power output. This information has been used consistently in the PDD v.02. CAR is closed.	**OK**
CAR 3 (22/07/2011) During onsite visit it was identified that the number of wells as planned by PGE is not in line with description in Section A.2 of PDD v.01.	**11/08/2011 (1st Round)** Within the project activity, there is a probability of different number of wells to be drilled to fulfil 2x55 MW net installed capacity in the future. Number of wells to be drilled depends upon each well production and its steam quality. As an example, currently, PGE has revised number of injection wells for Ulubelu II from 3 wells to 6 wells due to high concentration of brine coming from the wells. The PDD has been revised accordingly.	**23/08/2011 (1st Round)** **NOT OK,** • PDD v.02 has been checked and it was identified that the information w.r.t the number of wells planned to be drilled is not included in the PDD v.02. **OK.** • The Investment cost forecast as per the Feasibility study report states that 12 production wells, 2 exploration wells and 3 injection wells shall be constructed. PDD v.01 states 16 production wells and 5 injection wells shall be constructed. However it is not clear why the PP responded that PGE revised the number of injection wells from 3 wells to 6 wells. **NOT OK.** CAR is not closed.	**-**

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
CAR 3 (continued…)	**18/11/2011 (2nd Round)** There has been an editorial mistake in defining number of wells for Ulubelu II project, as there might be variability of drilled number of wells, which depends upon steam quality or production needs. The PDD has been revised accordingly.	**03/12/2011 (2nd Round)** **OK.** PDD v.02.1 has been assessed: During onsite visit it has been identified that 13 wells are already drilled or will be drilled in near future/A15/, 5 prod wells are planned, 1 injection well has been drilled and 2 more inj. wells will be drilled. During interviews with PGE it has been identified that the number of wells to be drilled can change and mostly increases during the project lifetime due to dry holes. The data of well testing and their potential steam output has been assessed. As per result of steam testing of already drilled wells/A10/ the following was identified: • Well #22 of Cluster G Ulubelu Unit 3&4 has a potential capacity of 2.06 MW. The test is dated 2011-06-12. • Well #24 of Cluster G Ulubelu Unit 3&4 has a potential capacity of 0.00 MW. The test is dated 2011-06-14. Due to the above described situation it is deemed appropriate to leave out the information on the number of drilled wells since it is subject to change during the project lifetime. **OK.** CAR is closed.	**OK**
CAR 4 (22/07/2011) In section A.4.3 of PDD v.01 following findings were identified: 1. Figure 1 does not include all sources	**11/08/2011 (1st Round)** Following revisions have been made in Section A.4.3. of PDD: 1. All sources of GHGs under the control of the project activity have been included.	**23/08/2011 (1st Round)** **NOT OK. Point 1-3 is closed. Point 4 not closed.** Figure 2 of PDD v.02 has been checked and the information was verified during onsite visit and by crosschecking the	-

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
of GHGs under the control of the project participants that are significant and reasonably attributable to the project. 2. The occurrence of project emissions is not illustrated clearly. 3. The location of meters is missing 4. A detailed list of equipment and systems that will be installed during the project activity is missing in the technical description.	2. Clear illustration of project emissions has been included. 3. Location of meters has been included. 4. List of major equipment to be installed has been included. As on date, specific technical description of equipment is still in the planning design phase.	information with the process flow diagram/A1/ and technical specifications/A2/. **1.** It has been identified that all sources of GHGs under the control of the PPs that are significant and reasonably attributable to the project have been included in the project boundary. **OK.** **2.** Project emissions from diesel genset and potential emissions from the well have been included. **OK.** **3.** The location of the revenue meter has been included. **OK.** **4.** The list of equipment in Table 1 of PDD v.02 has been checked and identified that the reference given for the Plant load factor and net power output is not in line with EB 62 Annex 5 § 6 . Since the net power output is used for calculation of IRR, the values must be applicable at time of investment decision. The PDD v.02 refers to the PPA which was signed after the Time of investment decision. References are not appropriate. **NOT OK**: CAR is not closed.	
CAR 4 (continued…)	**18/11/2011 (2nd Round)** Reference for plant load factor and net power output has been revised. This has been sourced from Feasibility Study Report, a document that is available at the time of investment decision.	**03/12/2011 (2nd Round)** **OK.** 1. – 2. – 3. – 4. The list of equipment in Table 1 of PDD v.02.1 has been crosschecked with the references indicated in the	**OK**

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
		table (i.e Feasibility Study/B4/, Technical Specifications/A2/). It has been identified that all references are appropriate and clearly indicated, especially net installed capacity and plant load factor which are used to calculate Emission Reductions are sourced from FS which was the most recent value available at time of investment decision. **OK**. CAR is closed.	
CAR 5 (22/07/2011) Following finding was identified for Table 4 of Section B.5. of PDD v.01: During onsite visit it was identified that several additional decisions regarding implementation of a CDM project were taken e.g. Board Decision to build the power plant. A detailed historical timeline is pending and a clear description of time of investment decision and project start date is missing. Date of prior notification to UNFCCC and DNA is not clear. References have not been provided for each event. The meaning of "Head of Agreement" is not clear.	**11/08/2011 (1st Round)** Following detailed historical timeline related to Ulubelu II have been added in Table 4 of Section B.5. of PDD: 1. PGE and PLN agreement on geothermal development in Indonesia facilitated by National Development of Planning Agency 2. PGE Board Director Minutes of Meeting where PGE decided to build Ulubelu II 3. Drilling contract for wells UBL #18 onwards 4. Prior consideration sent to the Indonesian DNA and UNFCCC Referring to above situation, PPs define the investment date when PGE Board of Directors and Boards of Commissioners discussed and decided to build Ulubelu II in the beginning of 2010. While for the project start date, as per CDM Glossary v5 that is the earliest date at which either the	**23/08/2011 (1st Round)** **NOT OK. Point 1-3;8-9 is closed. Point 4-7;10-12 not closed.** PDD v.02 has been assessed: **1.** By means of checking document /A23/ it has been identified that PLN agreed with PGE on a business development scheme of geothermal projects such as Ulubelu Unit 3+4. The MoM states that PGE can sell electricity to PLN for this project. It is signed by both parties on 13.07.2009. **OK.** **2.** By means of checking Board of Directors' MoM/A22/ it has been identified that 21.01.2010 is the date when the Board of PGE decided to invest in this project. This was crosschecked with interviews during onsite visit. **OK.** **3.** HoA dated 17.2.2010/B5/ has been checked. It states that ",[PGE and PLN] agree to make and sign this Agreement that governs the principle provisions and conditions to be used as basic guideline." Each geothermal project (in this case Ulubelu Unit 3&4) will have a separate contract. Hence, the validation	-

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
	implementation or construction or real action of a project activity, thus time when PGE conducted the first well drilling that is dedicated for Ulubelu II, which is UBL #18 is chosen as the project start date. In addition to that, Head of Agreement (HoA) is an agreement between PGE and PLN before both parties entered into power purchase agreement or steam sales contract. The HoA covers all geothermal projects and fields that will be developed by PGE and PLN without any penalty if both parties are not able to comply with such agreement.	team identified that the HoA is not the project start date. The explanation by the PP regarding HoA is deemed to be appropriate and in line with EB 47 § 71. **OK.** **4**. The contracts of wells drilling work are pending. **NOT OK.** **5.** PGE's Excel sheet regarding each well's construction start and end date/A15/ has been checked. By means of interviews during onsite visit it has been identified that well #18 has been the first well drilled to supply steam to Ulubelu Unit 3&4. The drilling started on 8.5.2010 which is correctly stated in the PDD v.02. However it is not clear why 8.5.2010 is chosen as project start date instead of 8.4.2010 when construction work contracts have been signed. According to EB 41 § 67 "the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity".. **NOT OK.** **6.** The prior consideration sent to the Indonesian DNA has been published on the website of the Indonesian DNA on 14.07.2011. The Form F-Prior Consideration is dated 25.08.2010/A24b/. The information in the PDD v.02 is not in line with the information on the website. It is not clear when the DNA has been informed about this project. **NOT OK.** **7.** The prior consideration submission to UNFCCC has been checked/A25/. Due to the email sent by PGE to UNFCCC/A25/, it	

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		has been identified that PPs sent their intention to seek registration under CDM on 16.09.2010/A26/. PP attached the F-CDM Prior Consideration dated 25.08.2010/A26/. Due to incompleteness of the attached form PP received an email from UNFCCC on 29.09.2010 with the request to correct the form. The consideration has been published on the UNFCCC website on 12.10.2010. Hence the first intension to seek CDM status has been sent on 16.9.2010 which is correctly stated in the PDD v.02. However the project start date is not yet defined and therefore it cannot be assessed yet whether the UNFCCC has been informed within 6 month upon project start. **NOT OK.** **8.** EIA approval dated 20.10.2010 has been checked/D2/. Information in PDD v.02 is correctly stated. **OK.** **9.** Power Purchase Agreement/A7/ has been checked. It has been identified that the information in the PDD v.02 is correct. **OK.** **10.** The source for the power plant construction start has not been indicated. **NOT OK.** **11.** As per HoA/B5/ it has been identified that operation start date is 2013. PDD v.02 states operation start date is 2014. The source of operation start date is not clear. **NOT OK.** **12.** The Emission Reduction Purchase Agreement has been submitted to the DOE/B6/ with the note that it has been signed in March 2010. However the date on the document is 2011. **NOT OK.** CAR is not closed.	

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CAR 5 (continued…)	**18/11/2011 (2nd Round)** 4. Contract for Ulubelu II wells drilling work is being submitted. 5. Wells drilling work contract signed on 8 April 2010 is an umbrella contract that covers 7 wells drilling. This umbrella contract describes that drilling work will only be started as soon as work order issued by PGE as referred to clause 4.3 of drilling work contract page 6. Thus, before work order issued, drilling company could not start to drill. In the end, they could not invoice anything to PGE as referred to clause 5.1 of drilling work contract page 6. With above explanation and also considering the project start date definition which is the earliest date at which either the implementation or construction or real action of a project activity, the appropriate project start date of Ulubelu II is when the work order is submitted to the drilling company that is 6 May 2010 and not when the wells drilling contract was signed. Work order for UBL #18 and wells drilling contract is being submitted as references. 6. DNA has been informed by PGE through mail. Confirmation of early consideration receipt from the Indonesian DNA is being submitted. 10. The source for the power plant construction start	**03/12/2011 (2nd Round)** **NOT OK. Point 1-3; 8-12 closed. Point 4-7 not closed.** 1. – 2. – 3. – 4. Project Start date: Drilling Contract and its addendum/A8/ have been submitted to DOE. However documents are in bahasa indonesia. As per EB 48 Annex 60 all documents must be in English or contain a full translation of relevant sections into English. Project start date cannot be identified yet. **NOT OK.** 5. Refer to point 4. **NOT OK.** 6. CDM prior consideration to Indonesian DNA: It has been identified that 04.09.2010 is the date when the Indonesian DNA confirmed the receipt of prior consideration of CDM for Ulubelu Unit 3 & 4/A24/. The date and source has been clearly indicated in PDD v.02.1 Section B.5. PGE has sent a letter dated 30.08.2010 to the DNA with the attached F-Prior-Consideration dated 25.08.2010/24b/. Since the start date is not defined yet, the validation team cannot assess yet whether the DNA has been informed within 6 month upon project start in line with EB 55 Annex 1 para 101. **NOT OK.** 7. CDM prior consideration to Indonesian UNFCCC: Since project start date is not defined yet, it cannot be assessed	-

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	is FSR page 8. 11. As per FSR page 8, operation start for Ulubelu II is beginning of 2014, when both unit #3 and #4 are in operation. 12. This was an editorial mistake. As per ERPA documentation given to DOE, ERPA was signed in March 2011. This ERPA signing date can be confirmed by E-mail communication given to DOE between PGE and South Pole.	whether UNFCCC has been informed within 6 months upon project start. **NOT OK.** 8. – 9. – 10. The source for construction start has been correctly indicated. The date is in line with FS. **OK.** 11. The source for construction start has been correctly indicated. The date is in line with FS. **OK.** 12. The date of signing ERPA has been correctly indicated in PDD v.02.1. **OK.** CAR is not closed.	
CAR 5 (continued…)	**05/12/2011 (3rd Round)** Drilling contract and its addendum with English translation is being submitted. As per drilling contract clause 4.3, drilling work would only start as soon as PGE submits signed Work Order to drilling contractor. While the drilling contract will become invalid as per 1 April 2011 if no work order is submitted by PGE as per clause 3.2 and 4.3. In addition to that, in sanctions and penalties section (clause 10), there are no sanctions or fines for PGE if PGE does not submit any Work Order to the drilling contractor, then the drilling contract will become void.	**06/12/2011 (3rd Round)** **OK.** PDD v.02.2 has been assessed: It has been correctly indicated in the project history that 08.04.2010 is the date when the framework contract has been signed/A8/. Further it has been correctly indicated in Table 4 of PDD v.02.2 and C.1.1. that the project start date is the first work order signed on 06.05.2010/A23/ . This date has been assessed to be the earliest date on which the project participant has committed to expenditures related to the implementation and construction of the project activity. It has been identified that the Indonesian DNA and UNFCCC have been informed within 6 months upon project start date in	**OK**

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		line with EB 55 Annex 1 para 101. CAR is closed.	
CAR 6 (22/07/2011) Following findings were identified w.r.t benchmark calculation: 1. Date of investment decision is not clear. Therefore it is not clear whether input values are valid and applicable at time of investment decision. 2. Values for calculation of WACC are not clearly referenced in the PDD. 3. Justification whether latest input values at time of investment decision have been applied for calculation of WACC is pending. 4. Calculation for cost of equity is not reproducible. 5. Justification why other registered CDM projects have lower benchmarks: e.g. Kamojang WACC = 18.15%; Wayang Windu WACC=18.96% is pending.	**11/08/2011 (1st Round)** 1. Inputs used in the investment analysis are valid and appropriate taking into account investment date on 21 January 2010. The IRR calculation has been revised as per chosen investment date. 2. Clear references have been added in the WACC calculation and also PDD. 3. Latest input values at the time of investment have been applied for WACC calculation. 4. Calculation for cost equity has been checked and now it should be reproducible. 5. It is to be noted that the benchmark being calculated is a function of the data available (cost of debt, market return etc.) at the time of investment decision and the approach adopted. Other referred registered CDM projects are planned much earlier than Ulubelu II wherein the benchmark has been calculated with different approach based on the data-set available at their respective investment decision dates. Thereby leading to different values. Nevertheless, it could still be noted that the IRR	**23/08/2011 (1st Round)** **NOT OK. Point 1-2;4-5 is closed. Point 3 not closed.** The revised IRR cum WACC calculation spreadsheet v.02 has been assessed: **1.** The date of investment decision indicated on the WACC spreadsheet is 21-Jan-2010 which is in line with the Board decision dated 21.01.2010/A22/. **OK.** **2.** • The source for cost of debt was identified through table of USD investment rates/B16/ sourced from the website of Indonesia's central bank. The value is based on parameters that are standard in the market. **OK.** • The source for beta and D/E ratio is pending. **3.** Justification for input parameters is pending: • The source for cost of debt is taken from an investment loan from a commercial bank/B16/, it is not clear why an investment loan from a commercial bank has been taken instead of an investment loan from a foreign bank which has a lower interest. • For Risk free rate: It is not clear why PP decided to chose the maturity date of the government bond to be 2030. • The calculation for the market return has not been	-

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	is still below these benchmark as well.	justified. The calculation: market return = "Close price adjusted for dividends and splits Dec'09"/"Close price adjusted for dividends and splits Jan'03"^(1/7)-1" is not clear. Further it is not clear why a time period of 7 years has been chosen. • it is not clear why the values for Electricity generation Beta and D/E ratio have been derived from the year 2009 only. **NOT OK.** **4.** Calculation for cost of equity has been checked and identified to be reproducible. **OK.** **5.** As per EB 62 Annex 5 § 13, WACC calculation is based on parameters that are standard in the market. For this project it is suitable to use parameters that are standard in the market instead of company specific benchmarks which are used in situations where there is only one possible project developer. For this project it has been identified that all parameters used for benchmark calculation are publicly available market data. The justification for the selection of values of these parameters is requested in CAR 6 § 3. If it can be confirmed that latest data available at time of investment decision has been used for benchmark calculation, it can be understood that the benchmark of this project (2010) differs from those already registered projects (2008 etc). Moreover a 20% post-tax benchmark has been identified for Indonesian Geothermal projects based on international literature. "The internal rate of return (IRR) hurdle rate of higher	

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		than 20% is seen as necessary to attract investors to Indonesia.“ (Source: “An Assessment of Geothermal Resource Risk in Indonesia” by Geotherm Ex. Inc, California, June 2010/S3/). The study has been prepared for the World Bank. **OK.** CAR is not closed.	
CAR 6 (continued…)	**18/11/2011 (2nd Round)** Source of beta and D/E are being submitted. 3. Justification for following values are described below: • For conservativeness, cost of debt value is taken from “Foreign and Joint Bank” (Indonesian Central Bank statistics), which has lower interest rate. • Risk free rate value is taken from long-term government bond FR0050.This bond is the most appropriate Indonesian government bond that corresponds to the start date and the expected lifetime of the proposed project activity. In addition to that, this bond rate was available at the time of investment decision as it was first published in August 2009. • Market return is calculated based on the Jakarta Composite Index (JCI). The information on the stock movement of the JCI was extracted from	**03/12/2011 (2nd Round)** **OK.** PDD v.02.1 and Excel Sheet v.02.1 (File name: 111118_Ulubelu ER - IRR - WACC calculation fin_rev2.1.xls) have been assessed. 1. – 2. – 3. • The source for cost of debt was identified through table of USD investment rates/B16/ sourced from the website of Indonesia’s central bank. The value is based on parameters that are standard in the market and sourced from an Investment Loan from a Foreign Bank dated Dec 2009 prior Inv. Dec. **OK.** • The source for the risk free rate/B8a/ has been identified to be standard in the market. It is sourced from the Indonesian Government Bond Rate with a maturity date in August 2030 which can be found on the website of the Bank of Indonesia. The value was valid and applicable at	**OK**

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	yahoo finance. The compounded return for the market is calculated over a time period of seven years (January 2003 – December 2009), which is the longest dataset to give representative figure to the current and future market. "Close price adjusted for dividends and splits Dec'09"/"Close price adjusted for dividends and splits Jan'03"^(1/7)-1" is a geometric mean formulae to calculate market return of Indonesian stock exchange. 2009 data for calculating electricity generation beta and D/E Ratio was taken from taken from Asia region, power sector, where data is complete. This value is a representative value, since typical business dynamics on different years might pose significant changes to company situation that often made diverse business activities. Hence longer data period would have less certainty to the specific business sector, i.e. energy generation.	time of Investment Decision/B8a/. **OK.** • The average market return is sourced from the Jakarta Composite Index (JKSE) and has been calculated as the compounded interest rate between Jan 2003 and Dec 2010. The longest most representative data vintage reflecting the risks associated with the project type to the current and future market to determine the market return has been used. It is deemed appropriate. The references in the PDD v.02.1 and WACC sheet v.02.1 are clearly indicated. Further assessment has been provided in Annex B to this report. **OK.** • Beta is sourced from Bloomberg Finance/B7/. Beta has been calculated as the average over 49 Raw betas from power companies in Asia during the year 2009. The relevered beta has been used for calculation of cost of equity. The screenshot of Bloomberg Finance/B7/ has been assessed and crosschecked with Excel sheet v. 02.1 spreadsheet "beta". The value for beta has been correctly indicated in PDD v.02.1, it is based on values that are standard in the market and publicly available. The input value is latest available at time of investment decision. Further assessment has been provided in Annex B to this report. **OK.** • D/E ratio is sourced from Bloomberg Finance/B7/. D/E ratio has been calculated as the average of 49 D/E ratios of power companies in Asia during the year 2009. The	

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		value has been correctly indicated in PDD v.02.1. It is based on values that are standard in the market and most recent available at time of investment decision. Further assessment has been provided in Annex B to this report. **OK.** 4. – 5. – CAR is closed.	
CAR 7 (22/07/2011) As per EB 48 Annex 60 all documents must be in English or contain a full translation of relevant sections into English. However the Feasibility Study was provided in Indonesian and the English summary does not translate all relevant sections.	**11/08/2011 (1st Round)** Full English translation of FSR (relevant document: B4) is being submitted.	**23/08/2011 (1st Round)** **OK,** The FSR has been checked. The English translation of important sections has been crosschecked by the validation team's local expert. It is in line with EB 48 Annex 60. CAR is closed.	**OK**
CAR 8 (22/07/2011) Following findings were identified w.r.t IRR calculation: 1. It is not clear on what basis and on which assumptions the total investment of 276 Mill USD as per PDD v.01 was estimated. Moreover the value indicated in the PDD v01 for total investment is	**11/08/2011 (1st Round)** 1. The discrepancy of total investment in the FSR page 15 and IRR calculation was because operating cost of the power plant and steam field development was included in the IRR calculation, which are 4,125,000 USD and 1,650,000 USD as part of total investment. Both values have been deleted in the revised IRR calculation and PDD. After revision, total	**23/08/2011 (1st Round)** **NOT OK. Point 1-4 not closed.** The revised IRR cum WACC calculation spreadsheet v.02 has been assessed: **1.** The Investment cost on the spreadsheet "summary" and "IRR – without CDM" is not in line with FS as referenced. Moreover Investment cost indicated in Table 4 of PDD v.02 is not in line with Inv. Cost as per Table 6 of PDD v.02. **NOT OK.**	**-**

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not in line with FS as referenced. 2. Date of investment decision is not clear. Therefore it is not clear whether input values are valid and applicable at time of investment decision. 3. References for input values are not clear. 4. It is not clear why the operational lifetime is 30 years as stated in PDD v.01.	investment of Ulubelu II is 271,850,000 USD, which is similar to total investment in the FSR. 2. Input values in the IRR calc have been appropriately used and applicable with the project because all values have been taken from FSR that was available before the investment date. 3. All inputs in the IRR calc has been clearly referenced to official document of PGE or other external appropriate documentation. 4. Operational lifetime of 30 years is appropriate considering the project is geothermal power plant that could be operated until 30 years with proper maintenance.	**2.** Input values have been checked and it can be confirmed that the Investment analysis is based on the FSR dated Sept. 2009. Investment decision was 21.01.10. Following values are not clear: • Justification whether an electricity price escalation of 0% is reasonable is pending. **NOT OK.** • The input value "O&M" from Spreadsheet "Summary" is in line with FS. However, it is not clear whether the values mentioned in Spreadsheet "Summary" in cell F85-F88 have an impact on the Investment analysis. **NOT OK.** • The input value "cost for make-up wells" is not in line with FS. **NOT OK.** **3**. Following references are not clear on the spreadsheet "Summary": • The reference for Depreciation is not clear. **NOT OK.** • The project operation start date (2014) could not be verified. The FSR states commissioning and commercial operation in 2013 and p.19 of FSR indicates the first revenue in year 2013. **NOT OK.** • The reference for CO2 value(0.5%) and CH4 (0%) in the geothermal steam is stated "Kamojang geothermal registered project". Reference is not appropriate and not clear. **NOT OK.** • The reference for diesel fuel consumption (5000 liters) is	

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		stated "Kamojang geothermal registered project". It is not clear on which basis the value has been estimated. **NOT OK.** • Evidence for diesel fuel density is pending and the reference to Pertamina's website as indicated in the PDD v.02 is not accessible. **NOT OK.** • Reference in PDD v.02 for project lifetime is not clear. **NOT OK.** **4.** Reference is not clear and therefore Assessment of this point is not possible at this stage. **NOT OK.** CAR is not closed.	
CAR 8 (continued…)	**18/11/2011 (2nd Round)** a. As per FSR page 15, total investment cost for Ulubelu II is USD 271,850,000, which include investment from 2009 until 2013. However, in the ER-IRR-WACC calculation, the minor pre-project expenses related to incurred in 2009 corresponding to payment of fees for feasibility studies or preliminary surveys amounting to USD 900,000 have been excluded as a conservative approach from CDM perspective. Currently, total investment cost for Ulubelu II is USD 270,950,000. b. There was no escalation on electricity price nor	**03/12/2011 (2nd Round)** **NOT OK. Point 1+4 closed. Point 2-3 not closed.** PDD v.02.1 and Excel Sheet v.02.1 have been assessed: **1.** The investment cost (270.95 million USD) have been sourced from Feasibility Study/B4/ . The original amount has been reduced by 900,000 USD due to conservativeness. The value has been crosschecked by means of background research/B2//B3/ and identified to be appropriate/S1//S2//S3/. It is valid and applicable at time of investment decision. Please see further assessment in Annex B of Validation Report. The value has been correctly indicated in PDD v.02.1 Table 4 and Table 6 and Excel Sheet v. 02.1. **OK**	-

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	O&M expense. On the contrary, the electricity price as per PPA is significantly lower than the value taken in the FSR and also the O&M cost would be higher owing to the higher make up wells cost as evidence higher drilling cost (please also refer CAR 9). c. Values mentioned in the "Summary" excel sheet are upstream operation cost, power plant operation cost and total operation cost per MWh, which are taken from FSR. These operation cost per MWh does not have any impact in the IRR calculation because they are shown only to give an overview of operation cost per MWh for Ulubelu II project. While total operating cost used in the IRR calculation is total operating cost USD 8,800,000 per year, which is also coming from FSR. d. The input value "cost for make-up wells" has been revised as per FSR page 19. e. Depreciation value is as per Income Tax Law No. 36 that is issued in 2008 page 18. This reference has been added in the ER-IRR-WACC calculation and PDD. f. The project operation start date has been changed to 1 January 2014, when Ulubelu II (unit #3 and #4) starts its commercial operation.	2. • It has been identified that PP did not include electricity price escalation nor O&M cost escalation. As per FS Electricity price escalation is 0%. This is valid and applicable at time of Investment decision. Further it has been identified that the PPA which came into force after Investment decision indicates an electricity sales price of 75.3 USD/MWh/A7/ instead of 90 USD/MWh/B4/ which has been used for IRR calculation. Hence the calculation of IRR is deemed conservative. **OK.** • Annual operating cost is sourced from Feasibility study and includes O&M for geothermal wells and power plant (i.e. upstream and downstream). The value (8.8 million USD/yr) has been crosschecked with O&M costs available from international literature/S1//S3/ and identified to be conservative/S2/. Please see further assessment in Annex B of Validation Report. The value has been correctly indicated in PDD v.02.1 and Excel sheet v.02.1. **OK** • The calculation of "cost for make-up wells" as per Excel sheet v. 02.1 has been compared with FS. In year 2 and 4 12.25 million USD have been indicated although FS does not indicate this cost in year 4. **NOT OK.** **3.** • Depreciation is calculated on total investment cost of wells and power plant. The value (5%) is indicated in PDD v.02.1 and Excel sheet v.02.1. However the FSR	

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	g. Reference for CO_2, CH_4 and diesel fuel consumption values have been revised in the PDD and ER-IRR-WACC calculation as per Monitoring Report of the registered Kamojang geothermal project, which is operated by PGE. h. Evidence for diesel fuel density is being submitted. i. Project lifetime reference, which is FSR page 12, has been added in the PDD and ER-IRR-WACC calculation.	estimates a depreciation rate of 5% on downstream investment cost and 10% on upstream investment cost. This has not applied in the Depreciation calculation. Further it is not clear whether depreciation shall be calculated only on the CAPEX amount of the total investment cost and whether the residual value has been considered. **NOT OK.** • Operation start date (2014) has been correctly indicated in PDD v.02.1 and Excel sheet v.02.1 and is in line with FS. **OK.** • The parameter CO2 value(0.89467023%) and CH4 (0.00097278%) in the geothermal steam is sourced from Monitoring Report of registered Kamojang Geothermal Project that is operated by PGE (http://cdm.unfccc.int/Projects/DB/RWTUV1255101629.04/view) . The Monitoring report has been checked and identified that the values are reasonable ex-ante estimations due to similar project design. **OK.** • Ex-ante estimation of "diesel fuel used for electricity generation" is sourced from Monitoring Report of registered Kamojang Geothermal Project that is operated by PGE (http://cdm.unfccc.int/Projects/DB/RWTUV1255101629.04/view) . The Monitoring report has been checked and identified that the amount 120 litres per year is reasonable ex-ante estimation due to similar project design.	

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		Furthermore confirmation by PGE/A17/ has been assessed stating that capacity of emergency diesel genset for Lumut Balai Unit 1 & 2 will be similar to Kamojang IV power plant which is same for Ulubelu Unit 3&4. The source is deemed appropriate. **OK.** • The parameter "diesel fuel density" has been correctly referenced and has been crosschecked with Pertaminas' fuel specifications/B30/. The value is valid and applicable at time of investment decision. **OK.** **4.** The project lifetime of 30 years has been sourced from Feasibility Study/B4/ and crosschecked with PPA/A7/ Clause 3.2.1. which states that PGE has to supply electricity to PLN for a period of 30 years. The value is therefore deemed appropriate for a Geothermal power plant by means of local and sectoral expertise. **OK.** CAR is not closed.	
CAR 8 (continued…)	**05/12/2011 (3rd Round)** This has been an editorial mistake. Cost of make up well in year 4 has been deleted in the WACC-IRR-ER calculation v2.2 as per FSR document. Accordingly, PDD has also been revised. Depreciation value has been revised as per FSR. Calculation has been revised accordingly.	**06/12/2011 (3rd Round)** **OK.** The calculation of "cost for make-up wells" as per Excel sheet v. 02.2 has been compared with FS. It has been identified that calculation is correct and in line with FS. Please see further assessment in Annex B of Validation Report. The depreciation value has been revised and applied in the calculation of income tax in line with FSR. The value has been	**OK**

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		crosschecked with Indonesian tax law no. 36/2008[/B18/] and identified to be appropriate. Annex B of the Validation Report contains further assessment of depreciation and the residual value of make-up wells. CAR is closed.	
CAR 9 (22/07/2011) In the sensitivity analysis justification is pending why Investment costs are unlikely to decrease.	**11/08/2011 (1st Round)** Investment cost is unlikely to decrease because of increased prices of raw material and fuel globally. Further justification of the unlikely decrease in total investment is owing to the fact that average cost of wells drilling activity at Ulubelu geothermal field is much higher that is …. USD than PGE cost assumption defined in the FS, which is 4 Mill USD per well.	**23/08/2011 (1st Round)** **NOT OK** The response to this CAR is not complete. Justification is pending whether similar projects have higher or lower specific Investment cost (e.g. in US$/MW upstream and downstream). CAR is not closed.	-
CAR 9 (continued…)	**18/11/2011 (2nd Round)** Based on PGE actual data, average cost of already drilled wells is 4.3 Mill/USD, which is higher than FSR assumption. In addition to that, Ulubelu II investment cost per kW is much more lower compare to other geothermal projects in Indonesia that consider both upstream and downstream activity. Ulubelu II cost is 2,471 USD/kW, while Rantau Dedap, Gunung Rajabasa and Liki Pinangawan Muaralaboh are between 2,900 to 3,500 USD/kW. As another justification, International Energy Agency study shows that an indicative	**03/12/2011 (2nd Round)** **OK.** PDD v.02.1 Section B.5 has been revised appropriately. By means of background research[/S2/], it has been identified that the estimated total investment cost are rather conservative in terms of IRR calculation. The value for total investment of geothermal power plants as per the published paper by Subir K. Sanyal, Stanford University California[/B3/] has been assessed. Based on a formula to estimate total investment cost for both (geothermal well drilling and installation of power plant), the CAPEX for a 2x58MW geothermal power plant	**OK**

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	average cost for geothermal power plant is 4,000 USD/kW. Thus, a decrease in investment for Ulubelu II project is unlikely to happen.	project would be 247,368,944 USD/S2/. Further assessment is provided in Annex B of the Validation Report. CAR is closed.	
CAR 10 (22/07/2011) The common practice analysis is not clear for the following reasons 1. References are not clear. 2. It is not clear whether the geothermal projects in Sibayak and Ulubelu I need to be included in the analysis. 3. During onsite visit PP mentioned that a 10,000 MW program was initiated by the government to further promote geothermal energy. Further information is pending.	**11/08/2011 (1st Round)** 1. References stated in the PDD have been revised and made clearer to show that geothermal project activity is not yet a common practice in Indonesia. 2. As the common practice analysis should only cover the activities that are operational and are of similar scale to the proposed project activity all the projects which are not operational and not similar have not been considered in the analysis. Both Sibayak and Ulubelu I are not included in the common practice analysis because Sibayak is a small scale geothermal power plant only 11.3 MW, which is not similar in scale with Ulubelu II, while Ulubelu I is currently under construction stage. Moreover, Sibayak has also been excluded as it has been published on the UNFCCC website for global stakeholder consultation as part of the validation process (http://cdm.unfccc.int/Projects/Validation/DB/O2CE1RL2JNZWXYHS7BRF66PQXYNKJ0/view.html)	**23/08/2011 (1st Round)** **NOT OK. Point 3 closed. Point 1-2 not closed.** PDD v.02 has been assessed: **1.** References: • Footnote 17,18 and 19 is not accessible. **NOT OK.** • The percentage of geothermal installed capacity installed vs. potential (0.06%) is not correct. **NOT OK.** • References w.r.t Table 9 (e.g. Footnote 20,21,23, 25-28, 31,33) are not correct. Footnote 22 is not accessible. **NOT OK.** **2.** The entire host country has been chosen for common practise analysis which is assessed to be appropriate. By means of assessing Sibayak and Ulubelu I stage, it has been identified in line with EB 55 Annex 1 § 119ff that both projects do not need to be considered in the Common practise analysis. This is due to the significant smaller project in Sibayak and the still under construction stage of Ulubelu I. However the link indicated in the response of this CAR refers to Wayang Windu instead of Sibayak. **NOT OK.** **3.** As per EB 22 Annex 3 para 7 National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-	-

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	3. 10,000 MW acceleration/crash program is a government program to add electricity supply in Indonesia. 1st acceleration program are mostly coal power plant development while 2nd acceleration program are utilized renewable resources including geothermal. However, this 10,000 MW acceleration program only gives policy incentives for investors to build geothermal power plant in Indonesia. These E-policies have not been included in the analysis as these have come up after 11 November 2001.	intensive technologies that have been implemented since 11 November 2001 do not need to be taken into account in developing a baseline scenario. Further the report of the U.S Department of Commerce/A21/ has been assessed which explains: "In response to the fiscal challenges imposed by the country's energy subsidies, the government announced a "Crash Program" to produce 20,000 megawatts (MW) of additional energy in 2004. Phase I of the program was confined to coal-fired electricity that was sourced primarily from China. Phase II includes a preference for renewable energy production and includes a guarantee for "off-take" PPAs by PLN." The Crash Program was introduced in late 2005/A21/ which is clearly after Nov. 2011. Hence it does not need to be taken into account for this project validation. **OK.** CAR is not closed.	
CAR 10 (continued…)	**18/11/2011 (2nd Round)** 1. References: All footnotes and missing references in Step 4 Common Practice Analysis have been revised accordingly. In addition to that, copy of references is being submitted to avoid future weblink inaccessible issue. 2. Link for Sibayak project, which is under validation stage written in the response of this CAR has been corrected. During EB 63, the Guidelines on Common Practice has not been explicitly mentioned to be used as refer	**03/12/2011 (2nd Round)** **OK.** PDD v.02.1 has been assessed: **1.** References and Footnotes of Section B.5. Common Practise Analysis have been assessed and identified to be applicable and accessible. The percentage of geothermal capacity vs. potential has been corrected appropriately. **OK.** 2. The link to Sibayak has been corrected appropriately. **OK.** 3. –	**OK**

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
	to the additionality tool. In addition to that, the guidelines has not been indicated in the additionality tool such as other guidelines e.g. investment analysis guidelines. Thus, the guidelines has not been included in the common practice analysis of this Ulubelu II geothermal project.	It has been clarified during a DOE call that PPs do not need to take into account the Guideline for Common Practise Analysis for projects under validation. By means of local and sectoral expertise the validation team identified that the Common Practise Analysis as per PDD v.02.1 is complete and in line with EB 55 Annex 1 para 119-121. CAR is closed.	
CAR 11 (22/07/2011) Following findings were identified w.r.t Section B.6: 1. In Section B.6.1 of PDD v.01 description of parameters is not in line with methodology. 2. On p. 20 of PDD v.01 reference for the applied tool is outdated. 3. List of parameter not monitored is not in line with EB 41 Annex 11 and methodology. Input parameters such as $NCV_{i,y}$, density of diesel fuel, $EF_{CO2,I,y}$, $EF_{Grid,CM,y}$ are considered as parameters monitored as per the methodology. 4. In section B.6.3 "$w_{main,co2}$" is not consistent with Section B.7.	**11/08/2011 (1st Round)** 1. Section B.6.1 of PDD has been revised to be inline with the methodology. 2. Tools version in section B.1 of PDD has been revised to follow the latest tools available. 3. List of parameter not monitored in section B.6.2 of PDD has been revised to be inline with the methodology. 4. Section B.6.3 and B.7 of PDD have been revised to be in-line with the methodology.	**23/08/2011 (1st Round)** **NOT OK. Point 3 closed. Point 1,2+4 not closed.** The PDD v.02 has been assessed: **1.** • Description of parameter $EF_{CO2,I,y}$ is not correct. **NOT OK.** • It is not clear whether $EF_{grid,CM,y}$ is calculated using the latest version of the tool. **NOT OK.** **2.** Please refer to CL 6 for discussion of version of "Tool to calculate the emission factor for an electricity grid". **NOT OK.** **3.** Parameters listed in Section B.6.2 of PDD v.02 are all parameters fixed ex-ante and therefore not monitored. The list is in line with methodology and tool. **OK.** **4.** In section B.6.3 value for $FC_{i,j,y}$ is not correct. **NOT OK.** CAR is not closed.	-

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CAR 11 (continued…)	**18/11/2011 (2nd Round)** 1. Description of $EF_{CO2,I,y}$ and $FC_{i,j,y}$ has been corrected in the revised PDD. 2. – 3. – 4. Value for $FC_{i,j,y}$ has been revised as per Kamojang IV actual data used in the project first verification. As discussed during site visit, the Indonesian DNA published Sumatera EF grid value ($EF_{grid,CM,y}$),which was calculated using Tool to calculate the emission factor for an electricity system version 1.1. However, for this proposed project activity, PPs re-calculated the Sumatera EF grid ($EF_{grid,CM,y}$) as per latest Tool version 2.2.1 by using available data extracted from the Indonesian DNA Sumatera EF grid calculation because these data is the latest available data as confirmed by an E-mail confirmation dated on 31 May 2011.	**03/12/2011 (2nd Round)** **OK.** The PDD v.02.1 has been assessed: **1.** The description of parameters has been corrected appropriately in Section B.6.1 and is in line with the methodology. **OK.** **2.** Please refer to CL 6 for discussion of version of "Tool to calculate the emission factor for an electricity grid". **OK.** **3. –** **4.** The calculation for Project Emissions has been checked and identified to be clear and reproducible. **OK.** CAR is closed.	**OK**
CAR 12 (22/07/2011) Following findings were identified w.r.t Section B.7: 1. List of parameters is not complete. 2. Description of parameters monitored is not in line with	**11/08/2011 (1st Round)** 1. List of parameters in Section B.7 of PDD has been revised to be inline with the methodology. 2. Description of parameters monitored has been revised to be inline with the methodology. 3. Information that parameters monitored will be	**23/08/2011 (1st Round)** **NOT OK. Point 1+3 is closed. Point 2;4-6 not closed.** PDD v.02 has been assessed: **1.** The parameters listed in Section B.7 of PDD v.01 are complete and in line with the methodology and tool. **OK.** **2.**	**-**

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methodology and with EB 41 Annex 11. 3. It is not clear whether parameters monitored will be archived electronically and be kept at least for 2 years after the end of the last crediting period as per EB 41 Annex 11. 4. Source for $w_{steam,CO2}$ and $w_{steam,CH4}$ =0% as per PDD v.01 is not clearly referenced. 5. It is not clear on which basis the estimation for diesel fuel consumption $FC_{i,y}$ has been taken. 6. Figure 3 of PDD v.01 is not in line with technical description in Section A.2. e.g. Diesel Fuel Flow meter, cooling system is missing.	archived electronically and kept at least 2 years after the end of the last crediting period has been added in section B.7.2 of PDD under Data Recording Procedure. 4. Source for $w_{steam,CO2}$ and $w_{steam,CH4}$ has been added in section B.7.1 of PDD and IRR calculation. Both values are referred to registered Kamojang Geothermal project, which is operated by PGE. 5. Estimation of diesel fuel is taken from registered Kamojang Geothermal Project, which is operated by PGE. 6. Figure 3 in the PDD has been revised to be inline with project boundary in section A.4.3 of PDD.	• Description of parameter $M_{steam,y}$ is not in line with methodology. It is not clear whether steam properties such as temperature and pressure will be measured. **NOT OK.** • Monitoring frequency for $EG_{facility,y}$ is not clear. **NOT OK.** • It is not clear whether Emission Reductions will be accounted in case of failure of the "Project Developer – PLN revenue meter" or whether the crosscheck meter is used as a backup meter. **NOT OK.** • Further PDD v.02 states that "electricity measurements will be taken in accordance with ESC and SOP". Meaning of ESC and SOP is not clear. **NOT OK.** • Description of parameter $FC_{i,j,y}$ is not in line with the tool. Letters i and j are not explained in Section B.7. **NOT OK.** **3.** The information on data archiving has been added in Section B.7. of PDD v.02. It is assessed to be in line with the tool and methodology. **OK.** **4.** Evidence is pending on which basis $w_{steam,CO2}$ and $w_{steam,CH4}$ have been used for Kamojang, e.g. testing reports etc. **NOT OK.** **5.** Evidence is pending whether Kamojang is using the same number of diesel gensets and why diesel consumption is 5000	

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		litres per year. **NOT OK.** **6.** The addressed figure in Section B.7 of PDD.v.02 is in line with the monitoring Plan description. However it is not in line with Figure 2 of PDD v.02 because the injection wells are missing. **NOT OK.** CAR is not closed.	
CAR 12 (continued…)	**18/11/2011 (2nd Round)** • Description of parameter $M_{steam,y}$ has been revised to include pressure and temperature of steam measurement. • Monitoring frequency for $EG_{facility,y}$ has been revised to include monthly recording statement as refer to methodology. Statement "As per PPA the meter reading will be jointly recorded by PGE and PLN at the beginning of every month" has been deleted to avoid misunderstanding. • A cross-check meter will be used as a back-up meter in the case of revenue meter failure. QA/QC related to revenue meter will also be applied to the back-up meter. Additional statement of this back-up meter has been added in the revised PDD version 2.1. • Standard Operating Procedure (SOPs) mentioned is a more specific document that governs both PGE and PLN in electricity	**03/12/2011 (2nd Round)** **OK.** PDD v.02.1 has been assessed: **1.** – **2.** Descriptions of parameters have been crosschecked with methodology and EB 41 Annex 11 and identified to be in line. **OK.** **3.** – 4. The 1st Monitoring Report of CDM Project 3028 has been reviewed. Since Kamojang geothermal project is also operated by PGE, the validation team assessed that values taken for $w_{steam,CO2}$ and $w_{steam,CH4}$ are appropriate and clearly referenced.. **OK.** 5. As per PDD v.02.1 Section B.7.1 ex-ante estimation of "diesel fuel used for electricity generation" is sourced from Monitoring Report of registered Kamojang Geothermal Project that is operated by PGE (http://cdm.unfccc.int/Projects/DB/RWTUV1255101629.04/view) . The Monitoring report has been checked and	**OK**

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	measurement process especially its technical part. While PPA is an agreement between PGE and PLN that describes general terms of electricity purchase between PGE and PLN. Therefore, PPA is a general document to be referred by both parties to prepare the SOPs. • Description of parameter $FC_{i,j,y}$ has been revised in section B.7 of PDD. • Values for both $w_{steam,CO2}$ and $w_{steam,CH4}$ are referred to Monitoring Report of the registered Kamojang project. These values are applied because Kamojang project is owned and operated by PGE. • Diesel gen-set will be used during emergency. Number of diesel gen-set will be similar to registered Kamojang project, while for values of diesel fuel used will be also referred to Kamojang registered project, which is 120 litres per year. This value is stated in the Monitoring Report of the registered Kamojang project. • Figure 4 in the section B.7.2 of PDD has been revised to include re-injection well to be similar with Figure 2 in the section A.4.3 of PDD.	identified that the amount 120 litres per year is a reasonable ex-ante estimation due to similar project design. Furthermore confirmation by PGE[/A17/] has been assessed stating that capacity of emergency diesel genset for Lumut Balai Unit 1 & 2 will be similar to Kamojang IV power plant. **OK.** 6. The addressed figure in Section B.7 of PDD.v.02.1 is in line with the monitoring Plan description and with Figure 2 in Section A.4.3. **OK.** CAR is closed.	
CAR 13 (22/07/2011) The stakeholder comments are not	**11/08/2011 (1st Round)** The stakeholder comments have been translated	**23/08/2011 (1st Round)** **OK,**	**OK**

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
translated into English.	into English and are being submitted.	By means of checking PDD v.02 it has been identified that all stakeholder comments are clear and translated in English. By means of checking the attendance list/E2/ it could be verified that the LSC has been arranged on 3.5.2011 prior the publication of the PDD on the UNFCCC website which is in line with EB 55 Annex 1 §128. By means of comparing the MoM of the LSC with the description in Section E.1 and E.2 and by means of onsite visit it can be confirmed that the PP has taken due account of any comment received and described this process in the PDD. The validation team confirms that the LSC is in line with EB 55 Annex 1 §129. CAR is closed.	
CAR 14 (22/07/2011) **Editorials:** 1. Throughout the entire PDD wording for PPA and ESC is not consistent. 2. As per EB 55 Annex 1 para 51 the name of PP is not consistent in the project documentation. 3. Section A.4.3. Sentence "Electricity .. is sold to.. meter" is not clear. 4. In Section B.1. of PDD v.01 the date of implementation of applied	**11/08/2011 (1st Round)** 1. To avoid confusion, wording ESC has been changed into PPA throughout the entire PDD. 2. PDD has been consistently used throughout the entire PDD. 3. Sentence "Electricity .. is sold to.. meter" in section A.4.3 has been rephrased to avoid misinterpretation. 4. Date of implementation of the methodology in section B.1 of PDD has been revised. 5. Soft copy of footnote 5 that is Table "Suppliers and Manufacturers" is being submitted to DOE to avoid inaccessible or broken link issue.	**23/08/2011 (1st Round)** **OK,** 1. By means of checking PDD v.02 it was identified that PP used the word PPA consistently in the PDD. 2. By means of checking PDD v.02 it can be confirmed that the name of the PPs are consistently used throughout the PDD. 3. The addressed sentence has been revised and is clear in the PDD v.02. 4. The date of implementation of the methodology as per PDD v.02 is in line with methodology. 5. The source of the addressed footnote has been submitted to the DOE. The supporting document/B11/ matches the	**OK**

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methodology version 12.1 is not in line with EB 58 Annex 7. 5. As per EB 48 Annex 60 all documents must be complete. However Section B.5 of PDD v.01 Footnote 5 is not accessible. 6. On p. 15 of PDD v.01 sentence "Price of raw material and fuel globally which results in upward price pressure from equipment." Is not clear. 7. On p.38 of PDD v.01 footnote 33 is not clear.	6. "Price of raw material and fuel globally which results in upward price pressure from equipment" sentence has been rephrased to give clearer argument. 7. Footnote 33 of PDD v.01 has been deleted to avoid confusion.	statement of Section B.5 of PDD v.02. 6. By means of checking PDD v.02 it has been identified that the sentence has been revised and is clear. 7. By means of checking Annex 3 of PDD v.02 it has been identified that the footnote has been removed. It is in line with EB 48 Annex 60. CAR is closed.	
CL 1 (22/07/2011) As per Section B.5 of PDD v.01 Table 8 and 9 PP compares the IRR of the project without CDM with the IRR in case PGE sells steam to PLN. It is not clear whether this alternative is a potential baseline scenario.	**11/08/2011 (1st Round)** As per the methodology, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following: *"Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".* In the event of steam sales by PGE to PLN, the	**23/08/2011 (1st Round)** **OK** By means of checking PDD v.02 it has been identified that comparison of steam selling and electricity selling to PLN has been removed. As per EB 39 Annex 10 Substep 1a only those alternative scenarios to the project activity shall be considered which deliver outputs or services with comparable quality, properties and application areas. The option that PGE sells steam to PLN is not a realistic and credible alternative scenario to the proposed CDM project activity, hence it shall not be considered. CL is closed.	**OK**

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	power plant could be developed by PLN. As, Ulubelu II is considered as the installation of a new-grid connected renewable power plant, thus steam sales selling alternative could not be considered as baseline scenario. With such consideration, the IRR calculation of steam sales alternative has been deleted from section B.5 of PDD.		
CL 2 (22/07/2011) Justification is pending why the project is not a capacity addition, a modification or retrofit of existing electricity generation facilities.	**11/08/2011 (1st Round)** As per the methodology, capacity addition means an increase in the installed power generation capacity of an existing power plant through: (i) the installation of a new power plant beside the existing power plant/units, or (ii) the installation of new power units, additional to the existing power plant/units. Ulubelu II is not considered as capacity addition because there are no existing operating power plants before the project activity operated by PGE. It is also to be noted that Ulubelu I (unit 1 & 2) belongs to PLN, it could not be referred as existing power plant because both these power plants (Ulubelu I and Ulubelu II) will have separate steam wells and headers, which means there will not be any inter-connection except their adjacent location at the Ulubelu geothermal field.	**23/08/2011 (1st Round)** **OK** During onsite visit it has been identified that Ulubelu I (unit 1 and 2) is still under construction by PLN. Further is has been crosschecked on the UNFCCC website that PLN sent the prior consideration for Ulubelu Unit 1-2 dated 24.03.2010. Hence, it can be confirmed that the project owner of Ulubelu I (unit 1 and 2) is PLN instead of PGE. Further the Process Flow diagram/A1/ has been checked and it was identified that Unit 3 & 4 have a separate steam header. By means of interviews during onsite visit, PP confirmed that Ulubelu I and Ulubelu II are two separated projects. Ulubelu II (Unit 3 & 4) does not receive steam from wells supplying steam to Ulubelu I. Moreover wells supplying steam to Ulubelu II do not supply steam to Ulubelu I at the same time. Therefore Ulubelu II is not a capacity addition as defined in the methodology. CL is closed.	**OK**
CL 3 (22/07/2011)	**11/08/2011 (1st Round)** The project start date is determined by referring to	**23/08/2011 (1st Round)**	**-**

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
The project start date and the time of investment decision have not been clearly defined and justified.	CDM Glossary v.5, which defines that the earliest date at which either the implementation or construction or real action of a project activity begins should be chosen. With regard to Ulubelu II, the earliest date when real action took place is the date when PGE drilled 1st well dedicated for Ulubelu II that is UBL #18. While the investment decision date is determined when PGE Board of Directors decided to build Ulubelu II the beginning of 2010 as soon as feasibility study (FS) for Ulubelu II was finalized. The chosen date is in accordance with Guidelines on The Assessment of Investment Analysis v.5 para 6.	**NOT OK,** Regarding project start date, please see CAR 5: The PGE's Excel sheet regarding each well's construction start and end date/A15/ has been checked. By means of interviews during onsite visit it has been identified that well #18 has been the first well drilled to supply steam to Ulubelu Unit 3&4. The drilling started on 8.5.2010 which is correctly stated in the PDD v.02. However it is not clear why 8.5.2010 is chosen as project start date instead of 8.4.2010 when construction work contracts have been signed. According to EB 41 § 67 "the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/ operation services required for the project activity". Project start date as per PDD v.02 is not in line with EB 41 § 67. Regarding Investment decision start date it has been assessed in CAR 5 that 21.1.2010 is correctly indicated as Investment decision start date. CL is not closed.	
CL 3 (continued…)	**18/11/2011 (2nd Round)** Wells drilling work contract signed on 8 April 2010 is an umbrella contract that covers 7 wells drilling. This	**03/12/2011 (2nd Round)** **NOT OK**	**-**

Description of Finding (CAR, CL, FAR) *Describe the finding in a transparent manner i.e. state clearly what required and why; address the context (e.g. section)*	Project Participants Response *This section shall be filled by the PP. The finding shall be addressed with suitable arguments and evidence*	GLC Assessment *The assessment shall include how the finding is closed i.e. how it is found that the response is assessed to be appropriate and meeting the specific requirement of the finding. In case the response is not satisfactory, additional response and DOE assessments (#2, #3, etc.) shall be sought.*	Final Conclusion (OK or NOT OK)
	umbrella contract describes that drilling work will only be started as soon as work order issued by PGE as referred to clause 4.3 of drilling work contract page 6. Thus, before work order issued, drilling company could not start to drill. In the end, they could not invoice anything to PGE as referred to clause 5.1 of drilling work contract page 6. With above explanation and also considering the project start date definition which is the earliest date at which either the implementation or construction or real action of a project activity, the appropriate project start date of Ulubelu II is when the work order is submitted to the drilling company that is 6 May 2010 not when the wells drilling contract signed. Work order for UBL #18 and wells drilling contract is being submitted as references.	Project Start date: Drilling Contract and its addendum/A8/ have been submitted to DOE. However documents are in bahasa indonesia. As per EB 48 Annex 60 all documents must be in English or contain a full translation of relevant sections into English. Project start date cannot be identified yet. **NOT OK.** **CL is not closed.**	
CL 3 (continued…)	**05/12/2011 (3rd Round)** Please refer to CAR 5 explanation, the project start date has been referred to the Work Order signing date as per clause 4.3 while there is no penalties or sanctions for PGE if they do not proceed with the Work Order submission until the drilling contract is invalid up to 1 April 2011. Therefore, the project start date refers to 6 May 2010 when PGE signed and submitted work order to drilling contractor.	**06/12/2011 (3rd Round)** **OK** PDD v.02.2 has been assessed: The work order for well #18/A23/ and the drilling work framework contract/A8/ have been assessed. It has been correctly indicated in Section C.1.1. of PDD v.02.2 that the project start date is the first work order signed on 06.05.2010/A23/ . This date has been assessed to be the earliest date on which the project participant has committed to expenditures related to the implementation and construction of the project activity.	**OK**

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		CL is closed.	
CL 4 (22/07/2011) It is not clear why the geothermal tax rate of 34% is applicable for this project. As per Section B.5. Table 5 of PDD v.01 the Geothermal tax rate (34%) is based on a presidential decree no. 49 / 1991. Clarification is pending whether a more recent regulation e.g Law No. 17 of 2000 or Law 27/2003 is applicable for Investment Analysis.	**11/08/2011 (1st Round)** Geothermal development in Indonesia is divided into 2 periods, which are a) before and b) after the Geothermal Law No. 27 enacted on 22 October 2003. As stated in the Geothermal law clause 41, all geothermal resource development contracts that are given before the Geothermal law turned into effect will still be valid until the contract ends. Ulubelu geothermal field concession where Ulubelu II is located has been given to Pertamina holding (parent company of PGE) since 1990 as per Mining and Energy Ministerial Decree of no. 1521 K/034/M.PE/1990. Thus, Presidential Decree No. 49 issued in 1991 is still valid for Ulubelu II tax consideration.	**23/08/2011 (1st Round)** **OK** The geothermal tax rate (Tax) of 34% is applied which is sourced from the Presidential Decree No. 49 of 1991/B12/. During onsite visit the PP explained and showed evidence that due to the Presidential Decree No. 76 of 2000 and the government regulation No. 59 of 2007 all concessions signed before 2000 will use the tax rate which was applicable at that time (34%). Since PGE had their concession to extract steam before 2000, the geothermal tax rate as per the presidential decree No. 49 of 1991 applies. Further law 27/2003/B13/ has been checked and it could be confirmed that explanation provided by the PP is correct. This information was confirmed by our local expert. CL is closed.	**OK**
CL 5 (22/07/2011) Actual interest payable has not been taken into account although a post-tax benchmark has been applied.	**11/08/2011 (1st Round)** A post-tax benchmark has been applied for the analysis. As a simplified approach, no loan interest payments have been used in the income tax calculations.	**23/08/2011 (1st Round)** **NOT OK** The IRR calculation as per PDD v.02 is not in line with EB 62 Annex 5 para 11 stating that actual interest payable shall be considered for calculation of income tax. If actual interest payable is not considered, tax is higher, the Cashflow will be smaller and therefore the IRR is smaller. A conservative approach is pending. CL is not closed.	-

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CL 5 (continued…)	**18/11/2011 (2nd Round)** Loan interest payment has been included in the revised Ulubelu WACC IRR calculation. In addition to that, PDD section B.5 substep 2c has been revised accordingly.	**03/12/2011 (2nd Round)** **OK.** PDD v.02.1 and Excelsheet v. 02.1 have been assessed: The spreadsheet "Loan rate = cost of debt 3.98%" has been assessed and identified that actual interest payable has been correctly calculated and taken into account in the tax calculation as per spread sheet "IRR without CDM". The calculation is in line with EB 62 Annex 5 para 11. **OK.** The value for actual interest payable has been correctly indicated in PDD v.02.1 Table 6. **OK.** CL is closed.	**OK**
CL 6 (22/07/2011) It is not clear whether the data from the DNA used as source of the grid emission factor is the latest data available at the time of commencement of validation (June 2011).	**11/08/2011 (1st Round)** EF grid data provided by the Indonesian DNA is currently the latest available data at the time of commencement of validation. This justification was given by the Indonesian DNA in the form of E-mail, which is being submitted. Further, the grid emission factor could also be checked from the IGES website (http://www.iges.or.jp/en/cdm/report_grid.html) or Indonesian DNA website (http://pasarkarbon.dnpi.go.id/web/index.php/dnacdm/cat/6/other-information.html).	**23/08/2011 (1st Round)** **NOT OK** The copy of the email from the Indonesian DNA[/B9/] dated 31.5.2011 has been checked. It can be confirmed that the Grid emission factor published on IGES and on the DNA website from Jan 2009 (i.e. 0.743 tCO2 eq./MWh combined margin EF for the Sumatera grid) is the latest published. However the date when the email has been issued from the DNA is missing. It can only be seen that it was forwarded internally on 31.5.2011. It is not clear whether the calculation of EF is based on "Tool to calculate the emission factor for an electricity system" version 2.2 as stated in PDD v.02 Section B.1. Since version 2.2. came in effect in June 2011 but the DNA published the Grid EF in	**-**

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		Jan 2009, it is not evident whether the Grid EF is calculated based on version 2.1 or 2.2. Further it is stated in Section B.6.1 of PDD v.02 that the DNA used the tool v.02.1. CL is not closed.	
CL 6 (continued…)	**18/11/2011 (2nd Round)** Date of E-mail confirmation from the Indonesian DNA that Sumatera EF grid published on 19 January 2009 is the latest available data is 31 May 2011. A copy of E-mail confirmation that is showing such date is being submitted (relevant document: B9). Sumatera EF grid published by the Indonesian DNA was calculated using "Tool to calculate the emission factor for an electricity system" version 1.1 (relevant document: B8). While in this project, version 2.2.1 of "Tool to calculate the emission factor for an electricity system" is being used to calculate Sumatera EF grid by using all data coming Sumatera EF grid calculation published by the Indonesian DNA. Inconsistencies related to which version of "Tool to calculate the emission factor for an electricity system" is used in the PDD have been revised accordingly to accommodate the latest version of the Tool, which is version 2.2.1.	**03/12/2011 (2nd Round)** **OK.** PDD v.02.1 and Grid EF calculation/B8/ have been assessed: It has been identified that PDD v.02.1 refers consistently to The "Tool to calculate the emission factor for an electricity system" v.02.2.1 which is the latest tool available. By means of checking Email by DNA/B9/ it can be confirmed that DNA confirms on 31.05.2011 that the data available on the DNA website (i.e. data from 2003-2007) is the latest data available. The Emission Grid Factor has been published on the DNA website using Tool v. 1.1: http://pasarkarbon.dnpi.go.id/web/index.php/dnacdm/cat/6/other-information.html which states that Sumatera grid EF is 0.743 tCO2e/MWh. The PP re-calculated/B8/ the grid EF by using the same data provided by the DNA (i.e. 2003-2007) and by applying the tool version 02.2.1. The result for Sumatera grid EF is 0.743 tCO2e/MWh which is the same as published by the DNA. Further PP submitted a comparison of Tool v.1.1 and v. 2.2/B9a/ applicable for the calculation of grid EF for Sumatera Grid. It	**OK**

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		has been assessed that the tool version 2.2 does not effect a change in Emission Grid Factor for the Sumatera Grid and therefore the grid EF is 0.743 tCO2/MWh. CL is closed.	
CL 7 (22/07/2011) In Section D it is not clear how PP has taken due account of any comments received. Moreover it is not clear whether mitigation measures have been considered for negative environmental impacts.	**11/08/2011 (1st Round)** Before EIA approved by the Provincial Environmental Agency of Lampung, PGE together with EIA consultant must present EIA result to the Provincial Environmental Agency of Lampung, which describes about possible Ulubelu II development impacts and also mitigation measures especially for negative environmental impacts. Comments received during the EIA result presentation are compiled and summarised in the letter No. 84/KOMDAL/II.04/IX/2010 from the Environmental Impact Assessment Commission (Komisi AMDAL) of Lampung Province to PGE. After that, PGE assisted by EIA consultant revised EIA report by taking into account comments received from EIA commission and ensure full mitigation measures have been included for the negative environmental impacts. EIA report including matrices of negative environmental impacts and their mitigation measures are being submitted. In addition to that, a semester report of environmental assessment is prepared and reported to the	**23/08/2011 (1st Round)** **NOT OK** As per the Environmental Ministry Decree no 8 and 11 from 2006, an EIA must be established for this kind of project. PP submitted the EIA/D1/ and EIA approval/D2/. Further the stakeholder comments to the provincial EIA commission/D5/ have been submitted to the DOE. It could be confirmed by the Assessment's team local expert that stakeholder comments have been taken into account by the PP because the revised EIA integrated mitigation measures for any negative environmental impacts. However an English translation of the Risk analysis matrix including mitigation measures of the EIA is pending. CL is not closed.	-

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	Provincial Environmental Agency of Lampung to ensure PGE's compliance with the approved EIA report.		
CL 7 (continued…)	**18/11/2011 (2nd Round)** English translation of Risk analysis matrix including mitigation measures of the EIA is being submitted.	**03/12/2011 (2nd Round)** **OK.** A full English translation of the EIA/D1/ has been provided to DOE. By means of checking EIA it can be confirmed that PPs have undertaken an analysis of environmental impacts in line with host Party's requirements. The assessment is in line with EB 55 Annex 1 para 131-133. CL is closed.	**OK**
CL 8 (23/08/2011) In Section A.4.5 PDD v.02 PP has added that a loan from the World Bank is used for this project. However a detailed description of the type of loan and whether the loan results in diversion of ODA is pending.	**18/11/2011 (2nd Round)** As confirmed by PGE through an official letter signed by its representative, loan from World Bank will be utilized in the Ulubelu II project development, which does not involve any public funding from Parties included in Annex I of the UNFCCC, thus no diversion of ODA involved (relevant document: E6).	**03/12/2011 (2nd Round)** **OK.** A confirmation of no diversion of ODA/E6/ has been received from PGE. Mr. Muchsin Masdjuk as representative of PT. PGE confirms that Project Ulubelu 3 – 4 PT. Pertamina Geothermal Energy will get a loan from World bank, thus the project does not involve any public funding from Parties included in Annex I of the UNFCCC/E6/. Information regarding this loan has been indicated in the PDD v.02.1 Section A.4.5 and Annex 2. A weblink has been provided in the PDD v.02.1. Information on the website (http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/0,,contentMDK:22970142~menuPK:176751~pagePK:64020865~piPK:149114~theSitePK:244381,00.html) has	**OK**

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		been checked. It has been identified that this loan does not lead to diversion of ODA. CL is closed.	
CL 9 (23/08/2011) In Section A.3 of PDD v.02 PP has changed the type of entity for PGE. PDD v.01 stated "public entity" whereas PDD v.02 states "private entity".	**18/11/2011 (2nd Round)** PT. Pertamina Geothermal Energy is a private entity because it is not a state-owned company. PT. PGE is owned by PT. Pertamina (Persero) and PT. Pertamina Dana Ventura as shown in the PGE deed of establishment (relevant document: E12). In Indonesia, a state-owned company should have the Government of Indonesia, which is represented by Ministry of Finance or Ministry of State-Owned Companies, as its full or main shareholder. Thus, PT. PGE does not belong to become a public entity, as it is not owned by the Government of Indonesia.	**03/12/2011 (2nd Round)** **OK.** By means of assessing PGE's deed of establishment/E12/ it has been identified that PGE's stakeholders are PT. Pertamina (Persero) and PT. Pertamina Dana Ventura. By means of local and sectoral expertise it is deemed appropriate to indicate PGE as private entity in PDD v.02.1 Section A.3. **OK.** CL is closed.	**OK**

ANNEX B: ASSESSMENT OF FINANCIAL PARAMETERS

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
Installed Capacity	2x58 (gross) 2x55 (net)	MW	/A2/, /B4/	/A7/	The total installed capacity of the proposed project is 2x58 MW. This could be verified by means of assessing the technical description of the power plant/A2/. According to information provided by the project owner during site visit it is expected to utilize 2x3 MW for internal load purposes. The remaining 2x55 MW are used for electricity supply. The net installed capacity is derived from the feasibility study report/B4/. It is the basis for the net electricity generation determination. Further the power purchase agreement has also been carefully checked by the validation team and the information provided could be taken to verify the 2x55 MW capacity.
Net electricity generation	867,240	MWh	/A2/, /B4/	/B31/, /A7/	The net generation has been sourced from Feasibility Study/B4. The net generation has also been crosschecked based on the agreement provided in the power purchase agreement/A7/. It is a product of net capacity (2x55 MW), the hours per year (8760 h) and the load factor of 90 %. It could be verified that this is in compliance with the agreement. Technical literature has been used to cross-check the value and it could be confirmed that the load factor for geothermal power plants is typically 90 %/B31/ (http://www.repp.org/articles/static/1/binaries/Geothermal_Issue_Brief.pdf). The calculation of net electricity has been assessed and deemed appropriate: $\mathbf{EG}_{PJ,y}$ = $EG_{facility,y}$ = (Installed Capacity –Aux Capacity) x Plant Load Factor x 365d/yr x 24hr/d = (2x58 MW-6MW) x 90% x 8760 hr/yr = 867,240 MWh/yr
Total Investment	270.95	Million USD	/B2//B4/	/B1/,/B31/, /S3/	The total investment has been sourced from FSR/B4/. This value (270.95 Mio USD) includes the cost for upstream and downstream CAPEX and development cost estimated to occur after the starting date of the project activity. It does not include the cost for purchasing the land and building roads (900,000 USD has been deducted from original total investment as per FSR) which has been addressed in CAR 8 nb.

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					01 and assessed to be appropriate due to conservativeness. The value has been crosschecked with publicly available report "Geothermal Energy for Electric Power – A REPP Issue Brief, December 2003"/B31/ stating that upstream and downstream investment costs per kW for geothermal projects range between 1150 USD/kW to 3000 USD/kW including upstream costs. Although these values are based on a 2003 report nevertheless the investment cost of the project activity estimated as 2336 USD/kW is clearly seen to be falling within the range. Another recent report "An Assessment of Geothermal Resource Risk in Indonesia" by Geotherm Ex. Inc, California, June 2010/S3/ has been used to crosscheck the initial investment. The report states an initial investment cost for upstream and downstream between 2000 – 3000 USD/kW. Hence the specific initial investment is in this range, too. Moreover, similar geothermal projects and their investment cost have been assessed: 1. Olkaria III Phase 2 Geothermal Expansion Project in Kenya = 117.6 million USD = 2450 USD/kW (registered project 2975) http://cdm.unfccc.int/Projects/DB/RWTUV1252941041.99/view 2. Rantau Dedap (PDD under validation) = 755.61 million USD = 3,434 USD/kW http://cdm.unfccc.int/Projects/Validation/DB/KLFI1FEFBAI39NTVTY2GAB0F7AODZ4/view.html 3. Gunung Rajabasa (PDD under Validation) = 657.12 million USD = 2,986 USD/kW http://cdm.unfccc.int/Projects/Validation/DB/VFB91YBBHSJHDSQP7P8EKD9CC6FK75/view.html

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					4. Liki Pinangawan Muaralaboh (PDD under validation) = 790.4 million USD = 3,592 USD/kW http://cdm.unfccc.int/Projects/Validation/DB/BSBA7OIEMD12DICFOHA5HHQUDB6WNL/view.html Although it could be noted that costs will vary considerably depending on the size, geography, etc., nevertheless, the project investment cost could be assessed as plausible. In light of the above checks and cross-checks the total investment cost could be deemed acceptable Further the actual drilling cost for Ulubelu Unit 3 & 4 have been provided to DOE/A14/. It has been identified that 12 wells have already been drilled to date with an average drilling cost of 4.35 Million USD/ well. The FSR estimated that in total 17 wells need to be drilled at an average cost of 4 Million USD/ well. Hence the FSR is deemed conservative since the actual cost of wells is higher than the estimation in the FSR. Concluding the total investment cost (270.95 Million USD) has been crosschecked by means of background research/B31//S3/ and identified to be appropriate. It is valid and applicable at time of investment decision. The value has been correctly indicated in PDD Table 4 and Table 6 and IRR Excel Sheet.
Electricity Tariff	90	USD/MWh	/B4/	/A7/,/B11/	PGE estimated its IRR with an electricity sales price of 90 USD/MWh (i.e. 9 US cents/kWh)/B4/ sourced from FSR. The investment analysis is using this tariff in line with FSR. However after date of investment decision negotiation between PGE and PLN resulted in an electricity price of 7.53 US cents/kWh as confirmed through the PPA/A7/. The actual tariff is clearly below the estimated tariff. Therefore the validation team concludes that the estimated tariff of 9 US cents/kWh is conservative and valid and applicable at time of investment decision.

<table>
<tr><th>Parameter</th><th>Value applied</th><th>Unit</th><th>Source</th><th>Source for crosscheck</th><th>Means and Finding of Validation</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>For the sake of crosschecking this tariff with other geothermal projects, following electricity tariffs offered by PLN have been identified. The table below is a summary of original electricity prices negotiated by PLN as per PPA[/B11/]:
<table>
<tr><th>Power plant</th><th>Selling price (US cents/kWh)</th></tr>
<tr><td>Bedugul, Bali</td><td>7.15</td></tr>
<tr><td>Cibuni, West Java</td><td>6.90</td></tr>
<tr><td>Daradjat, West Java</td><td>6.95</td></tr>
<tr><td>Dieng, West Java</td><td>9.81</td></tr>
<tr><td>Kamojang, West Java</td><td>7.03</td></tr>
<tr><td>Karaha Bodas, West Java</td><td>8.46</td></tr>
<tr><td>Patuha, West Java</td><td>7.25</td></tr>
<tr><td>Salak Units 4,5 and 6</td><td>8.46</td></tr>
<tr><td>Sibayak, North Sumatra</td><td>7.10</td></tr>
<tr><td>Wayang Windhu, West Java</td><td>8.39</td></tr>
</table>
The above listed projects use electricity tariffs ranging from 6.9 US cents/kWh to 9.81 US cents/kWh with an average electricity tariff of 7.75 US cents/kWh. This project activity calculates its IRR with an electricity tariff of 9 US cents/kWh which is deemed conservative as per above analysis.</td></tr>
<tr><td>Annual O&M</td><td>8.8</td><td>Million</td><td>/B4/</td><td>/B2/,/B3/,/S2/</td><td>The PP calculates the IRR with an O&M cost of 8.8 Million USD per year for both</td></tr>
</table>

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
cost		USD/year			upstream and downstream O&M cost. This value has been sourced from FS/B4/. The value (8.8 Mio USD/yr) is the sum of 3.3 Mio USD for upstream O&M and 5.5 Mio USD for downstream O&M. The published paper by Subir K. Sanyal, Stanford University California, 2004/B3/ estimates O&M cost for both upstream and downstream, which amounts to 15,192,361 USD/yr for a 2x58 MW plant. (this estimate includes costs of make up wells) For the sake of comparing O&M cost as per FS (8.8 Million USD/yr) with O&M cost as per Subir K. Sanyal (15.2 USD/yr)/s2//B3/, one has to include make up well cost into O&M cost of FS. Over a period of 30 years, yearly make up well costs amount to: 68,630,000/30 = 2,287,667 USD/yr as per FSR/B4/. Total O&M as per FS including make up wells would be: 8,800,000 + 2,287,667 = 11,087,667 USD/yr. /S2/ This is more conservative than 15,192,361 USD/yr estimated from international literature. /B3/ Furthermore the specific O&M cost of this project/B4/ (i.e. 8.8 Million USD/867,240 MWh = 10.15 USD/MWh) has been compared with specific O&M cost for upstream and downstream available from national literature. As per PT. Indonesia Power (2002) operational cost for a geothermal power plant are 8.93 USD/MWh/B2/. This cross-check value is very close to the estimated specific O&M cost of this project. Although the crosscheck has been made based on 2002 and 2004 reports, the O&M cost are deemed appropriate as these cost are likely to increase over period of time. The value (8.8 Million USD) has been assessed to be appropriate and is valid and applicable at time of investment decision.

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
Cost of Make-up wells	12.25 (in year 2, 15, 27); 15.94 (in year 9, 21)	Mio USD	/B4/	/A14/ UNFCCC no. 2022 UNFCCC no. 2876 UNFCCC no. 3028 UNFCCC no. 3193	The cost of Make-up wells has been sourced from FSR/B4/. As per FSR one make up well costs apx. 4 mio USD. Therefore 3 make-up wells are estimated to be drilled in (each) year 2, 15 and 27 and 4 make-up wells will be drilled in (each) year 9 and 21. This is deemed reasonable due to following reasons: 1.) The average drilling cost is 4 Mio. USD per make-up well as per FSR/B4/. This value has been crosschecked with the actual drilling cost for the wells which have already been drilled to supply steam for Ulubelu Unit 3 & 4/A14/. The actual average drilling cost is 4.35 Million USD/ well. The difference of the drilling cost per well in year 2/15/27 (12.25 Mio USD/3 wells = 4.08 Mio USD/well) and 9/21 (15.94 Mio USD/4 wells = 3.985 Mio USD/well) is deemed to be owing to the rig mobilization and de-mobilization. Therefore it is considered reasonable 2.) Regardless of resource studies, it can take several years of production from a field before the reservoir performance can be gauged and there is always a risk of an unexpected decline in the capacity of the respective geothermal wells. (UNFCCC no. 2022: http://cdm.unfccc.int/Projects/DB/DNV-CUK1218173149.57/view) 3.) Often after wells are drilled, geothermal steam production is not guaranteed. For example, for the Kamojang Geothermal project, 16 wells have been drilled, yet only 11 wells are useable in the production stage. (UNFCCC no. 3028: http://cdm.unfccc.int/Projects/DB/RWTUV1255101629.04/view). For Lahendong-I only 7 out of 9 wells drilled were productive. (UNFCCC no. 2876: http://cdm.unfccc.int/Projects/DB/TUEVSUED1249404911.81/view) 4.) The number of wells (17 wells in 30 years) has been crosschecked with the registered project Wayang-Windu UNFCCC no. 3193 which estimated that 2 make up wells are required to replace the depleted wells every 3 years. This leads to 20 wells in 30 years (http://cdm.unfccc.int/Projects/DB/TUEV-SUED1260194062.48/view). Therefore it is deemed reasonable that the number of make-up wells as per FSR is 3 or 4 wells every 6-7 years.

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					The cost of make-up wells is deemed appropriate and valid and applicable at time of investment decision.
Geothermal Tax rate	34%	-	/B12/,/B4/	/S4/, /S5/, /B13/, /B15/	The geothermal tax rate (Tax) of 34% is applied which is sourced from the Presidential Decree No. 49 of 1991/B12/. CL 4 has been raised to identify whether the law from 1991 is still applicable. During onsite visit the PP explained and showed evidence that due to the Presidential Decree No. 76 of 2000/S4/ and the government regulation No. 59 of 2007/S5/ all concessions signed before 2000 will use the tax rate which was applicable at that time (34%). Since PGE had their concession to extract steam before 2000, the geothermal tax rate as per the presidential decree No. 49 of 1991/B12/ applies. Further law 27/2003/B13/ has been checked and it could be confirmed that explanation provided by the PP is correct. This information was confirmed by our local expert.
Project lifetime	30	years	/B4/	/A7/	The project lifetime of 30 years has been sourced from Feasibility Study/B4/. It has been crosschecked with PPA/A7/ Clause 3.2.1. which states that PGE shall supply electricity to PLN for a period of 30 years. The value is therefore deemed appropriate for a Geothermal power plant by means of local and sectoral expertise and valid and applicable at time of investment decision. CAR 8 nb. 4 has been raised to further justify the lifetime and it has been successfully closed.
Depreciation	5% (downstream), 10% (upstream incl. make up wells)	-	/B4/	/B18/	The value for depreciation (5% resp. 10%) is sourced from FSR and has been identified to be in accordance to the Indonesian tax law no. 36/2008/B18/. Depreciation of 10% is calculated on the capital cost of upstream costs (i.e. wells) including make-up wells over a period of 10 years straight-line according to FSR. Depreciation of 5% is calculated on capital cost of downstream cost (i.e. power plant) over a period of 20 years straight-line according to FSR. The depreciation has been incorporated in the tax calculation in line with the Investment Guidelines. The value

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					(5% resp. 10%) is correctly indicated in PDD and Excel sheet. This straight line depreciation is in accordance to international accounting principles. The value is applicable and valid at time of investment decision.
Annual interest payment on loan	3.98%	-	/B16/		The source for "annual interest payment on loan" was identified through table of USD investment rates/B16/ sourced from the website of Indonesia's central bank. The value is applicable to Investment loans from Foreign and Joint banks applicable in December 2009. The value is based on parameters that are standard in the market and the source has been identified to be appropriate. The value is valid and applicable at time of investment decision. The calculation of actual interest payable for calculation of income tax has been assessed and identified to be correct after CL 5 has been closed. It has been further clarified that the amount of loan from the wordbank will be received only for the downstream cost. This has been confirmed by PGE/B32/.
Residual value	10,169,000	USD	calculated		The value for the residual value for the last two make up wells to be drilled in year 21 and year 27 have been correctly calculated and presented in the WACC Excel sheet. Since these make-up wells will be depreciated over a period of 10 years, the residual values at the end of the assessment period is 15,940,000 – 9*10%*15,940,000 = 1,594,000 USD for well Y21 and 12,250,000 – 3*10%*12,250,000 = 8,575,000 for well Y27. This sums up to 10,169,000 USD as fair value at the end of the assessment period. The calculation has been correctly presented in the WACC Excel sheet and appropriately included in the calculation of IRR. The calculation is in line with EB 62 Annex 5 Para 4.
Cost of debt	3.98%	-	/B16/	/B10/	The source for "cost of debt" was identified through table of USD investment rates/B16/ sourced from the website of Indonesia's central bank. The value is applicable to Investment loans from Foreign and Joint banks applicable in December 2009. As per Indonesia's central bank/B16/ this type of loan has the lowest interest payment compared to e.g. a loan from a commercial bank or state bank and is therefore deemed most conservative. The value is based on parameters

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					that are standard in the market and source has been identified to be appropriate. The value is valid and applicable at time of investment decision. CAR 5 nb. 2 has been raised to further justify the value and could successfully be closed.
Risk free rate in Indonesia	10.5%	-	/A9/	/B10/	The risk free rate/A9/ has been sourced from a long-term Indonesian Government Bond with a maturity date in August 2030 which can be found on the website of the Bank of Indonesia (http://www.idx.co.id/Bonds/Government/BondListed/tabid/263/lang/en-US/language/en- US/Default.aspx). The maturity date is deemed appropriate considering a project life time of 30 years. The value was valid and applicable at time of Investment Decision/A9/. CAR 6 nb. 3 has been raised to further justify the value and could successfully be closed.
Market return	29.76%	-	http://finance.yahoo.com/q/hp?s=%5EJKSE&a=04&b=1&c=2003&d=03&e=31&f=2010&g=m)		The average market return is sourced from the Jakarta Composite Index (JCI) and has been calculated as the compounded interest rate between Jan 2003 and Dec 2009. (http://finance.yahoo.com/q/hp?s=%5EJKSE&a=04&b=1&c=2003&d=03&e=31&f=2010&g=m) The information on the stock movement of the JCI was extracted from yahoo finance. The compounded return for the market is calculated over a time period of seven years (January 2003 – December 2009, the longest most representative dataset reflecting the risks associated with the project type to the current and future market) to determine the market return. Although the index value is available from July 1997 till date, still the market return has been taken based on data of 2003-2009 due to the non-representative nature of the data prior to 2003. The data vintage has been chosen to commence in Jan 2003 up to the latest data available at time of investment decision Dec 2009. The investment decision has been identified to be 21 Jan 2010 when the Board of Directors decided to invest in the project activity/A22/. By means of financial expertise and local and sectoral knowledge GLC confirms that the dataset starting in Jan 2003

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					until Dec 2009 is the longest most representative dataset reflecting the risks associated with the project type due to following reasons segmented under "stock market crises", "socio-economic and political situation" and "country rating". Stock market crises: Indonesia has been involved in two successive stock market crises from 1990 onwards. The Indonesian market did not recover from the 1989 crises and went into the subsequent Asian crises in 1996-97[35]. The Asian economic crises (1989/90 and 1997/98) had a major impact on Indonesia's economy leading to currency depreciation, debt crisis and devalued stock markets[36]. The inflation of Indonesia's currency jumped to more than 50 percent with the sharp devaluation of the Rupiah. After the second Asian economic crisis 1997/98, the recovery that took three years was followed by the global effect of 2001, Sept.11 WTC event in New York, US, and gave even more pressure to Indonesian economy[37]. Bank of Japan's Institute for Monetary and Economic Studies paper by Patel and Sarkar mentioned the 1997 Asian crisis (page 268): *" […] most individual stock markets experience negative post-crisis returns for at least three years […]. "* And for Indonesia, the same paragraph also mentioned: *"However, this is not the case for Asia, where Indonesia and S. Korea have been in crisis longer than the other Asian stock markets […]."* The market situation from 2003 onwards is expected to continue to the current and future condition; annual increase in the Jakarta Composite Index[38] was between 30%

[35] *"Crises in Developed and Emerging Stock Markets"*, Sandeep Patel – J. P. Morgan Securities, Asani Sarkar – The Federal Reserve Bank of New York http://www.imes.boj.or.jp/cbrc/cbrc-13.pdf
[36] Source: Martin Khor "The economic crises in east asia: causes, effects, lessons," Third World Network http://siteresources.worldbank.org/INTPOVERTY/Resources/WDR/malaysia/khor.pdf
[37] Source: LIPI Indonesian Science Agency paper http://elib.pdii.lipi.go.id/katalog/index.php/searchkatalog/downloadDatabyId/2217/2218.pdf
[38] http://finance.yahoo.com/q/hp?s=^JKSE&a=00&b=1&c=1998&d=00&e=31&f=2011&g=m

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					– 40% (with the exception of year 2008 global economic meltdown, but subsequently in 2009 period the Jakarta Index raised by a remarkable 96% as the recovery is underway, and the 2010 period market was back to 30% annual increase). Socio-economic and political situation: Prior to year 2003, Indonesian social, economic, legal and political situation was rather difficult[39]. The central government had become more stable in 2003, and successfully running much better election in 2004. The appointed President was also deemed to be more rationale and accountable, acceptable to the economic market, and presently continuing the second term (2004 and 2009 election[40]). The Indonesian economic situation underwent turbulent situations throughout the Asian economic crisis in the late 90's. - President Soeharto fell from power after riots in 1998 after 32 years of dictatorship[41].

[39] Source: WTO "Trade Policy Review – Economic environment" http://www.wto.org/english/tratop_e/tpr_e/s117-1_e.doc (page 2 – 4)
[40] http://en.wikipedia.org/wiki/List_of_Presidents_of_Indonesia
[41] Source: BBC "Country profile Indonesia" http://www.bbc.co.uk/news/world-asia-pacific-14921238
[42] Source: UK Foreign and Commonwealth Office "Country Profile: Indonesia" http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/country-profile/asia-oceania/indonesia/?profile=all
[43] Source: CIA, The World Fact Book "Indonesia" https://www.cia.gov/library/publications/the-world-factbook/geos/id.html
[44] Source: UK Foreign and Commonwealth Office "Country Profile: Indonesia" http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/country-profile/asia-oceania/indonesia/?profile=all
[45] Source: James A. Hanson, The World Bank "Post-Crisis Challenges and Risks in East Asia and Latin America: Where Do They Go From Here.
[46] Source: WTO "Trade Policy Review – Economic environment" http://www.wto.org/english/tratop_e/tpr_e/s117-1_e.doc (page 1, paragraph 2)
[47] Source: LIPI Indonesian Science Agency paper (page 161, footnote 21) "Jakarta Stock Exchange bombing event caused market closure for several days", (page 165 footnote 24) "issue of personnel sweeping to Expatriates to flee Indonesia brought down market transaction volume in 2001" http://elib.pdii.lipi.go.id/katalog/index.php/searchkatalog/downloadDatabyId/2217/2218.pdf
[48] Source: LIPI Indonesian Science Agency paper (page 65 – 68) "Coordinating Ministry for Economy Finance and Industry from 1998 – 2004 post was taken by 4 different man (within two Presidents), the first two were criticizing IMF approach to Indonesian crisis, while the later two were more welcomed by the IMF" http://elib.pdii.lipi.go.id/katalog/index.php/searchkatalog/downloadDatabyId/2224/2225.pdf
[49] Source: WTO "Trade Policy Review – Government report" http://www.wto.org/english/tratop_e/tpr_e/g117_e.doc (page 2, paragraph 5)
[50] Source: WTO "Trade Policy Review – Trade policy regime" http://www.wto.org/english/tratop_e/tpr_e/s117-2_e.doc (page 1, paragraph 2 – 5)
[51] Source: Indonesian Central Bank "Bulletin Ekonomi Moneter Perbankan" http://www.bi.go.id/NR/rdonlyres/8ABE3501-1284-4066-A713-8EB2385B75B0/3011/BEMPJuni2005.zip
[52] Source: Indonesian Central Bank "Bulletin Ekonomi Moneter Perbankan" http://www.bi.go.id/NR/rdonlyres/8ABE3501-1284-4066-A713-8EB2385B75B0/3009/ekajian1.pdf
[53] Source: Indonesian Central Bank "Indonesia Sovereign Rating" http://www.bi.go.id/NR/rdonlyres/5432B5CD-7BD1-486B-8103-21B11372902C/25148/HistoricalIndonesiaSovereignRatingJan2013.pdf
[54] Source: Indonesian Central Bank "Indonesia Sovereign Rating" http://www.bi.go.id/web/en/Publikasi/Investor+Relation+Unit/Market+Data+dan+Info/Indonesian+Sovereign+Rating/
[55] Source: NAIC S&P " Sovereign Defaults And Rating Transition Data" http://www.naic.org/documents/committees_e_capad_vos_c1_factor_review_sg_related_docs_sp_sovereign_defaults.pdf

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					- During the following years, governments were exchanged every 1-2 years challenging Indonesia's economic recovery from the Asian economic crises. Soeharto's Vice-President, B J Habibie, took over the presidency until October 1999 when Abdurrahman Wahid (Gus Dur) was elected. After only 21 months in office Wahid was impeached for alleged involvement in financial scandals and replaced by his Vice-President, Megawati Soekarnoputri, (the daughter of Indonesia's first President, Soekarno) in July 2001[42]. - The government made economic advances under the first administration of President Yudhoyono (2004-09), introducing significant reforms in the financial sector, including tax and customs reforms, the use of Treasury bills, and capital market development and supervision[43]. The first ever direct Presidential election of Susilo Bambang Yudhoyono, Megawati's former Coordinating Minister for politics and security, in September 2004 was a promising sign that Indonesia was coming to terms with its new democratic system. Yudhoyono was re-elected in the 2009 Presidential election with 60% of the vote – the first time an Indonesian President has been re-elected in democratic elections.[44] - Indonesian inflation has fallen back to about 6 percent in 2003 and 2004.[45] After the end of 32 years long Soeharto regime, new Presidents changed frequently where continuing policy was rather limited (with regard to social, legal, economic and democracy[46]). Moreover, several terrorism acts occurred in some areas, as the central government was considered to be not very strong, with various negative sentiment[47] and discontent to the national leadership. President Megawati tried to implement various social and economic policies[48] throughout the country, and towards the end of her term in 2003/2004[49]. New political

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					parties to the national election were more regulated (as opposed to the previous five years term when most actions to form political party were instantaneous act taken right after national democratic opportunity was released upon Soeharto replacement). The new political situation was expected to be more stable, as the government was more open toward economic progress[50] (for the central government to give better impression for staying in power towards the 2004 election). Country Rating: Indonesian country rating was consistently very low prior to mid-2002. The Indonesian Central Bank's journal "Bulletin Ekonomi Moneter dan Perbankan" mentions on page 96[51]: *"The Fourth phase, the period of economic recovery, improved Indonesia's country risk rating and the trend decline in international interest rates, since mid-2002 […]."* This indicated that a difficult economic situation was experienced in several phases, and only after mid-2002 Indonesian situation could improve[52]. Another publication from the Indonesian Central Bank data: Moody, Fitch, Rating & Investment did not show any value / improvement during the Asian economic crisis before 2003, and other rating data gave rather low value (non-investment grade, speculative)[53]. S&P rating was CCC or lower for high risk profile, during period from the Asian crisis 1998 until 2002[54] Specifically, Standard & Poor gave rather poor rating for Indonesia during Asian economic crisis period, and several times[55] Selective Default (SD) in 1999, 2000 and 2002. In light of the above, though data on Jakarta Composite Index is available for a longer period of more than 12 years from July 1997 – 2009 for the computation of the market return, the data prior 2003 was deliberately not considered as it is probable that due to the impact of the Asian economic crises and the subsequent government instability the market return computation could present a distorted result if 12 years' data were

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					to be considered. Taking the JCI data from 2003 onwards has been found to be a representative and suitable value for the expected market return in the context of Indonesian economy and hence accepted. Since the geometric mean of the market return takes into account the start and end value of the selected time period, it may be noted that the market return for future projects is even higher due to the increase of the index. The market situation from 2003 onwards was expected to continue to the current and future condition, annual increase in the Jakarta Composite Index was between 30% – 40% (with the exception of year 2008 global economic meltdown, but subsequently in 2009 period the Jakarta Index raised by a remarkable 96% as the recovery is underway, and the 2010 period market was back to 30% annual increase). Thus the choice of market index for the calculation of the cost of equity and eventually the WACC benchmark is thus regarded as appropriate and suitable by the validation team, fulfilling the requirement of paragraphs 112 (a) and (b) of the VVM and EB 62 Annex 5. Detailed assessment can be found in Chapter 5.5.3 of this Validation Report. The references in the PDD and WACC sheet are clearly indicated and deemed appropriate. The value is valid and applicable at time of investment decision. The calculation is deemed correct due to following standard interest calculation/ formula: $K_n = K_0 \times (1+ p/100)^n$ where K_n = End value; K_0 = Start value; p = interest (Average Market Return); n = number of years

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					This leads to: p/100 = (K_n / K_0)^1/7 - 1 CAR 6 nb. 3 has been raised to further justify the value and could successfully be closed.
Beta	0.9249 (unlevered beta) 1.92 (relevered)	-	/B7/	/B10/	The unlevered beta is sourced from Bloomberg Finance/B7/. Beta has been calculated as the average of 49 raw betas from power companies in Asian emerging economies during the year 2009. The relevered beta has been used for calculation of cost of equity. The screenshot of Bloomberg Finance/B7/ has been assessed and crosschecked with WACC Excel sheet spreadsheet "beta". The PP explained that the betas from power sector companies in the Indonesia are not available. For this reason PP applied Betas of the 'emerging economies' and functionally the 'electricity-generation' sector. PP explained that the applied approach is due to the assumption that the relative risk (to a well diversified efficient portfolio) of the investigated sector is similar across all regions, i.e. a power sector investment has similar relative risk in Indonesia and in India for instance). This assumption has been taken in order to estimate the relative risk of a power sector project in a market in which there is no information available about power sector betas. Therefore the validation team accepted to apply Betas of the 'emerging economies' and functionally the 'electricity-generation' sector as a most suitable approach which is best to reflect the Beta values in the host country. By means of background research, GLC identified that the use of industry betas of another emerging market is acceptable as per international literature. A study by Morgan Stanley (2010)[56] states that "those who prefer using local pricing models but are unable to find plausible local betas in the emerging market, can use the industry beta of (a) another EM (emerging market), suspected to have a similar risk-return industry dynamics (and, as long as such beta is available, reliable, and representative); or (b), as we have argued, the beta of the whole EM class." Thus it is

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					deemed appropriate to compute the average of unlevered betas of power companies in Asian emerging markets. The data vintage of 1 year (2009) used to compute the average of 49 beta values in Asian power companies, is deemed appropriate. Another publication by above mentioned financial expert, Aswath Damodaran,[57] states: "In choosing a time period for beta estimation, it is worth noting the trade off involved. By going back further in time, we get the advantage of having more observations in the regression, but this could be offset by the fact that the firm itself might have changed its characteristics, in terms of business mix and leverage, over that period. Our objective is not to estimate the best beta we can over the last period but to obtain the best beta we can for the future." GLC identified that the use of a data vintage from 2009 is valid and applicable at time of investment decision (Jan 2010), thus suitable for this project activity and in accordance with above quoted guidance. When using a longer data vintage it is probable that due to the rapid change of business mix and leverage observed in the sector of Asian emerging markets the beta computation could present a distorted result. As per above statement the disadvantage of using a shorter time period is the effect of significant firm-specific events. Since the average of 49 companies' beta values has been computed, such firm-specific events might have occurred only in the minority of referenced companies and thus the mentioned effect can be considered compensated and minor. Therefore GLC identified the input values for the calculation of beta suitable, valid and applicable at time of investment decision fulfilling the requirement of paragraph 6 of EB 62 Annex 5. The formula: beta_relevered = beta_unlevered* [1+(1-tax)*(D/E)]

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					has been applied correctly and can be sourced from Investopedia[58] or the Macabacus website[59]. The applied unlevered beta (0.92) has been compared to various cross-check references and identified to be a conservative estimate. Firstly the beta values of other geothermal companies were observed. The beta values for geothermal companies in US market were taken from the dataset provided by Prof. Aswath Damadoran. It can be seen that unlevered beta values as shown below are higher than the beta value taken for this project.

Company name	2008 unlevered Beta[60]	2009 unlevered Beta[61]
Ormat Technologies	1.396	1.185
Calpine Corp.	N/A	N/A
U.S. Geothermal Inc.	N/A	N/A
NRG Energy	1.197	1.185

Finally, the applied beta values of registered CDM grid connected power generation projects in Indonesia have been compared to this project activity's beta. As shown in the table below the applied unlevered beta (0.92) is the lowest value compared to unlevered betas within the same sector within the same country. Thus GLC identified the applied beta to be suitable and conservative for this project activity.

UNFCCC Project no.	Project Name	unlevered beta
3028	Kamojang Geothermal	0.96
4118	Asahan 1 Hydroelectric Power Plant 2 x 90 MW	0.96

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					3518 Jembo II 24 MW Gas Fired Project 1.72 2346 Kabil II 11.4 MW Gas Fired Project 2.08 In light of the above, the chosen beta value has been found to be more conservative and hence acceptable. Moreover in case a default value for D/E ratio would be applied (50% debt/ 50% equity), the unlevered beta (0.92) could be converted to the relevered beta of 1.54. This leads to a WACC of 21.35%. This is a less conservative benchmark than the actual calculated benchmark (19.67%) for this project with a D/E ratio of 62% debt/ 38% equity. Summarizing, the choice of unlevered beta and the computation of relevered beta used to calculate the cost of equity with the CAPM and eventually the WACC benchmark is thus regarded as appropriate and suitable by the validation team, fulfilling the requirement of paragraphs 112 (a) and (b) of the VVM and EB 62 Annex 5. Detailed assessment can be found in Chapter 5.5.3 of the Validation Report. The value for beta has been correctly indicated in PDD, it is based on values that are standard in the market and publicly available. The input value is latest available at time of investment decision. CAR 6 nb. 3 has been raised to further justify the value and could successfully be closed.
D/E ratio	1.63	-	/B7/	/B10/	D/E ratio is sourced from Bloomberg Finance/B7/. D/E ratio has been calculated as the average of 49 D/E ratios of power companies in Asia during the year 2009. The assumed value is in line with the average debt ratios of the companies considered

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					within the Beta analysis and for this reason deemed to be duly elaborated. The value has been correctly indicated in PDD. It is based on values that are standard in the market and most recent available at time of investment decision. It has been further identified that this value is more conservative than the default value 50/50 as per EB 62 Annex 5. The computation of the debt to equity ratio (1.63) for this project activity is deemed suitable and conservative. By means of financial expertise and local and sectoral knowledge GLC confirms that the typical debt/equity finance structure observed in the sector of the country (Indonesia) was not available from publicly available data sources. Paragraph 18 of EB 62 Annex 5 "Guidelines on the assessment of investment analysis" allows using a default value of 50% debt and 50% equity in case the typical debt/equity finance structure observed in the sector of the country is not readily available. However a 50/50 debt to equity ratio would lead to a less conservative result of a higher WACC benchmark. Thus GLC assessed the financial input data sourced from Bloomberg Finance leading to a more conservative result than the default value. Figure 6 in Chapter 5.5.3 of this report shows the relation between D/E ratio and WACC for this project activity. Although the default 50% debt and 50% equity financing structure could have been applied for this project activity due to the EB 62 Annex 5 paragraph 18, Figure 6 shows that the applied debt to equity ratio of 62% debt to 38% equity (1.63) results in a more conservative benchmark. Other registered CDM project activities in Indonesia have been assessed and it has been identified that the D/E ratio applied for this project activity is well in the range. The below table shows the debt to equity ratio of projects from the power sector in Indonesia sourced from the UNFCCC website. It is thus evident that this project activity's D/E ratio (62 :38) is more conservative than registered geothermal CDM projects' debt/equity ratios, i.e. Kamojang and Wayang Windu. Concluding, the

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation

comparison as shown in the table below supports the argument that the applied debt/equity ratio (1.63) is suitable for this project activity.

Project no.	Project Name	D/E ratio
3028	Kamojang Geothermal	51 : 49
4118	Asahan 1 Hydroelectric Power Plant 2 x 90 MW	51 : 49
3193	Wayang Windu Phase 2 Geothermal Power Project	60 : 40
5773	**this project activity**	**62 : 38**
4106	Parluasan Hydro Electric Power Plant	65 : 35
2346	Kabil II 11.4 MW Gas Fired Project	70 : 30
3518	Jembo II 24 MW Gas Fired Project	70 : 30

Further the data vintage of 1 year (2009) used to compute the average of 49 debt/equity ratios in Asian power companies, is deemed appropriate. The financial publication by Aswath Damodaran[62] states: “Longer estimation period provides more data, but firms change. Shorter periods can be affected more easily by significant firm-specific event that occurred during the period.” GLC identified that the use of D/E ratios sourced from 2009 data is appropriate for this project activity and in accordance with above quoted guidance. When using a longer data vintage it is probable that due to the change of financial structures observed in the sector within Asian emerging countries the computation of the debt/equity ratio could present a distorted result. As per above statement the disadvantage of using a shorter time period is the effect of significant firm-specific events. Since the average of 49 companies’ debt to equity ratios has been computed, such firm-specific events might have occurred only in the minority of referenced companies and thus the mentioned effect can be considered compensated and minor. Therefore GLC identified the input values for the calculation of debt to equity ratio suitable, valid and applicable at time of investment decision fulfilling the requirement of paragraph 6 of EB 62 Annex 5.

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					The debt to equity ratio used in the computation of the relevered beta and thus in the calculation of the WACC benchmark has been consistently used in beta and WACC calculation and is duly derived from publicly available data sources. Summarizing, the choice of debt/equity ratio for the calculation of the relevered beta and the WACC benchmark is thus regarded as appropriate and suitable by the validation team, fulfilling the requirement of paragraphs 112 (a) and (b) of the VVM and EB 62 Annex 5. Detailed assessment can be found in Chapter 5.5.3. of the Validation Report.
WACC	19.67%	-	/XLS/	/B10/	As per the Annex 58 Guidelines on the Assessment of Investment Analysis (version 05) paragraph 12, Weighted Average Costs of Capital (WACC) is an appropriate benchmark for a project IRR. In cases of projects which could be developed by an entity other than the PP, the benchmark should be based on parameters that are standard in the market. The project activity could have been developed by any other entity, as long as this entity had the authorization to do it. This authorization can be transferred from one company to another, as it has been observed in the past. (e.g. Kamojang UNFCCC no. 3028) . For this reason the benchmark has been duly derived from publicly available data sources. The benchmark (WACC) has been derived based on the publicly data sources which have been clearly validated by GLC. The formula applied for calculation WACC is correct. The calculation has been reproduced by the validation team and the computed value could be proved. The following formulae has been correctly applied in the calculation of post-tax WACC and correctly indicated in Excel sheet/XLS/ and PDD: Post-tax WACC = E/V*Re + D/V*Rd*(1-tax)

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					with V=D+E Where D = debt E= equity Re = cost of equity Rd = cost of debt Re = Rf + beta_relevered* (Rm - Rf) A cross-check reference for this formula can be found on the Macabacus website[63]. Where Rf = risk free rate Rm = market return beta_relevered = beta_unlevered* [1+(1-tax)*(D/E)] A cross-check reference can be sourced from Investopedia[64] or the Macabacus website[65]. The elaborated value is also in line with computed post-tax weighted average costs of capital (post-tax WACC) within other CDM projects in Indonesia which were recently registered. CAR 6 nb. 5 has been raised to identify similar projects' WACC and comparison to this projects WACC. The CAR could successfully be closed. Please refer to Kamojang WACC = 18.15%, Wayang Windu WACC = 18.96%. The validation team assessed that a post-tax WACC is the appropriate benchmark for this kind of project and has been correctly calculated. The calculation is conservative (e.g. w.r.t D/E ratio) and comparable with similar projects' benchmarks.

Parameter	Value applied	Unit	Source	Source for crosscheck	Means and Finding of Validation
					The approach is fully in line with the CDM regulation in terms of comparability with project IRR.

ANNEX C: CERTIFICATES OF COMPETENCE

Certificate

Name : Mr. Markus Weber (Dipl.)
Certificate No. : 001

This document certifies that Mr. Markus Weber, citizen of Germany, is assigned as CDM assessment team leader, validator/verifier and expert by Germanischer Lloyd Certification GmbH.

Mr. Markus Weber fulfils GLC's competence requirements to validate and verify CDM projects within the following sectoral scopes and technical areas.

CDM Sectoral Scope (SS) and Technical Area (TA)		Validity date:
SS 1:	**Energy Industries (renewable / non-renewable sources)**	
	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	
	TA 1.2: Energy generation from renewable energy sources	2011-09-09
SS 2:	**Energy Distribution**	
	TA 2.1: Electricity distribution	
	TA 2.2: Heat distribution	
SS 3:	**Energy Demand**	
	TA 3.1: Energy demand	
SS 7:	**Transport**	
	TA 7.1: Transport	
SS 10:	**Fugitive Emissions from Fuels**	
	TA 10.1: Mining and mineral processes (excluding those included in TA 10.2)	
	TA 10.2: Oil and gas industry, coal mine methane recovery and use	
SS 13:	**Waste Handling and Disposal**	
	TA 13.1: Waste handling and disposal	2008-12-15
	TA 13.2: Animal waste management	

Hamburg 2011-09-09
Date

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Date: 2011-04-27; Tris

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Certificate

Name : Mrs. Ellen Goel (Dipl. Wi-Ing.)
Certificate No. : 041

This document certifies that Mrs. Ellen Goel, citizen of Germany, is assigned as CDM validator/verifier and financial expert by Germanischer Lloyd Certification GmbH.

Mrs. Ellen Goel fulfils GLC's competence requirements to validate and verify CDM projects within the following sectoral scopes and technical areas.

CDM Sectoral Scope (SS) and Technical Area (TA)		Validity date:
SS 1:	**Energy Industries (renewable / non-renewable sources)**	
	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	
	TA 1.2: Energy generation from renewable energy sources	
SS 2:	**Energy Distribution**	
	TA 2.1: Electricity distribution	
	TA 2.2: Heat distribution	
SS 3:	**Energy Demand**	
	TA 3.1: Energy demand	
SS 7:	**Transport**	
	TA 7.1: Transport	
SS 10:	**Fugitive Emissions from Fuels**	
	TA 10.1: Mining and mineral processes (excluding those included in TA 10.2)	
	TA 10.2: Oil and gas industry, coal mine methane recovery and use	
SS 13:	**Waste Handling and Disposal**	
	TA 13.1: Waste handling and disposal	
	TA 13.2: Animal waste management	

Mrs. Ellen Goel fulfils GLC's competence requirements to validate financial analysis of CDM project activities. Validity date: 2011-07-14

Hamburg 2011-08-26
Date

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Certificate

Name : Mr. Stephen Etheridge (Ph. D.)
Certificate No. : 031

This document certifies that Mr. Stephen Etheridge, citizen of UK and with experience in the region of Thailand, is assigned as expert by Germanischer Lloyd Certification GmbH.

Mr. Stephen Etheridge fulfils GLC's competence requirements to validate and verify CDM projects within the following sectoral scopes and technical areas.

CDM Sectoral Scope (SS) and Technical Area (TA)		Validity date:
SS 1:	**Energy Industries (renewable / non-renewable sources)**	
	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	2010-11-22
	TA 1.2: Energy generation from renewable energy sources	
SS 2:	**Energy Distribution**	
	TA 2.1: Electricity distribution	
	TA 2.2: Heat distribution	
SS 3:	**Energy Demand**	
	TA 3.1: Energy demand	
SS 7:	**Transport**	
	TA 7.1: Transport	
SS 10:	**Fugitive Emissions from Fuels**	
	TA 10.1: Mining and mineral processes (excluding those included in TA 10.2)	
	TA 10.2: Oil and gas industry, coal mine methane recovery and use	
SS 13:	**Waste Handling and Disposal**	
	TA 13.1: Waste handling and disposal	2010-11-22
	TA 13.2: Animal waste management	

Hamburg 2011-03-17
Date

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Certificate

Name : Mr. José Emilio Moreno (Dipl.-Ing.)
Certificate No. : 016

This document certifies that Mr. José Emilio Moreno, citizen of Spain, is assigned as CDM assessment team leader, validator/verifier and expert by Germanischer Lloyd Certification GmbH.

Mr. José Emilio Moreno fulfils GLC's competence requirements to validate and verify CDM projects within the following sectoral scopes and technical areas.

CDM Sectoral Scope (SS) and Technical Area (TA)		Validity date:
SS 1:	**Energy Industries (renewable / non-renewable sources)**	
	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	2010-09-25
	TA 1.2: Energy generation from renewable energy sources	2010-10-22
SS 2:	**Energy Distribution**	
	TA 2.1: Electricity distribution	
	TA 2.2: Heat distribution	
SS 3:	**Energy Demand**	
	TA 3.1: Energy demand	2011-03-20
SS 7:	**Transport**	
	TA 7.1: Transport	
SS 10:	**Fugitive Emissions from Fuels**	
	TA 10.1: Mining and mineral processes (excluding those included in TA 10.2)	
	TA 10.2: Oil and gas industry, coal mine methane recovery and use	
SS 13:	**Waste Handling and Disposal**	
	TA 13.1: Waste handling and disposal	
	TA 13.2: Animal waste management	

Hamburg 2011-03-20
Date

GLC Management

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Date: 2011-04-27; Tris

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Certificate

Name : Mr. Olaf Pattloch
Certificate No. : 50

This document certifies that Mr. Olaf Pattloch, citizen of Germany with experience in Germany, is assigned as expert by Germanischer Lloyd Certification GmbH.

Mr. fulfils GLC's competence requirements to validate and verify CDM projects within the following sectoral scopes and technical areas.

CDM Sectoral Scope (SS) and Technical Area (TA)		Validity date:
SS 1:	**Energy Industries (renewable / non-renewable sources)**	
TA 1.1:	Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	2012-01-04
TA 1.2:	Energy generation from renewable energy sources	
SS 2:	**Energy Distribution**	
TA 2.1:	Electricity distribution	
TA 2.2:	Heat distribution	
SS 3:	**Energy Demand**	
TA 3.1:	Energy demand	
SS 7:	**Transport**	
TA 7.1:	Transport	
SS 10:	**Fugitive Emissions from Fuels**	
TA 10.1:	Mining and mineral processes (excluding those included in TA 10.2)	
TA 10.2:	Oil and gas industry, coal mine methane recovery and use	
SS 13:	**Waste Handling and Disposal**	
TA 13.1:	Waste handling and disposal	
TA 13.2:	Animal waste management	

Hamburg 2012-01-06
Date

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