Validation Opinion
on project design change for the CDM Project Activity

Bujagali Hydropower Project

in

Republic of Uganda

REPORT NO. 01 99791050 77275

Designated Operational Entity (DOE)

TÜV Rheinland (China) Ltd
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I. Project data:

Project title:	Bujagali Hydropower Project	Report No.: 01 997 9105077275
Registration No. / Date:	4217 / 7th October 2011	
Monitoring period:	01/12/2011 - 31/10/2013 including both days	
Methodology:	ACM0002, version 12	Date of current revision: 2014-05-26
Publication of MR:	The monitoring report (version 0.1, 13/11/2013) was published at UNFCCC website on 14/11/2013	
Average emission reductions:	Estimated: Not relevant for this assessment	Verified: Not relevant for this assessment
GHG reducing measure/technology:	Electricity generation by renewable hydro energy resource	

Party	Project participants	Party considered a project participant	Contract party
(Host) Republic of Uganda	Bujagali Energy Limited (Private) Government of Uganda, Ministry of Energy and Mineral Development (Public)	Yes	☒
The Netherlands	Bujagali Energy Limited (Private)	No	☐

II. Verification team:

Verification Team			Role									
Full name	**Affiliation TÜV Rheinland**	**Appointed for Sectoral Scopes (Technical Areas)**	Team leader	Acting Team Leader	Local Expert	Team Member (Auditor)	Technical Expert	Acting Tech. Expert	Trainee Auditor	Technical Reviewer	Expert to TR	Trainee TR
Mr. Norbert Heidelmann[1]	Germany	1.2; 13.1; 13.2; 15.2	X									
Mr. You CUI[2]	Germany	1.2; 13.1	X									
Mr. Yuriy Lozynskyy[2]	Germany	1.2; 7.1; 13.1				X						
Ms. Andrea Nuesse[1]	Germany	N/A							X			
Ms. Cuiping Deng[1]	China	1.2, 5.1, 11.1, 12.1								X		

Verification Phases	Verification Status
☒ Desk Review	☐ Corrective Actions / Clarifications Requested
☒ Follow up interviews	☒ Full Approval and Submission for Approval
☒ Resolution of outstanding issues	☐ Rejected

[1] Final verification team
[2] Original verification team

III. Report:

Final approval	Released	Distribution
☒	By: Mr. Henri Phan	☐ No distribution without permission from the Client or responsible organizational unit
Date: 2014-05-28		☒ Unrestricted distribution

Validation opinion — summary

The verification team of the DOE - TÜV Rheinland (China) Ltd. is assigned by Bujagali Energy Ltd. to perform the assessment of post registration change (project design change) of the CDM project activity "Bujagali Hydropower Project" in Republic of Uganda, as described in the registered PDD (version 2.0, 06/10/2011). The request is to perform the independent and objective assessment on revision of monitoring plan according to CDM VVS version 06.0.

The assessment has been performed as described in the CDM VVS version 06.0 and constitutes the following steps:

- Desk review of relevant project documents
- On-site assessment (05-06/12/2013)
- Validation opinion on project design change

As the project activity has been registered under VVM track, the old information shall be transferred to the new form under VVS track. Herewith, the verification team reviewed all information indicated in the new PDD form /DOC1/ and confirms that all material included in the new form is materially the same as the information in the registered PDD under VVM track.

The verification team confirms that the all changes from the registered PDD after project's implementation are in line with CDM requirement. The verification team therefore accepts the changes and requests for EB approval of project design change from the registered PDD.

2014-05-28 Date	2014-05-26 Date	2014-05-26 Date
Mr. Henri Phan DOE Manager TÜV Rheinland (China) Ltd.	Mrs. Cuiping DENG Technical Reviewer TÜV Rheinland (China) Ltd.	Mr. Norbert Heidelmann Team Leader TÜV Rheinland Energie und Umwelt GmbH

1. Introduction

The verification team of the DOE - TÜV Rheinland (China) Ltd. is assigned by Bujagali Energy Ltd. to perform the assessment of post registration change (project design change) of the CDM project activity "Bujagali Hydropower Project" in Republic of Uganda (hereafter "project activity"). The term "CDM criteria" refers to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. The independent assessment by the DOE is required to confirm that the post registration changes from the registered PDD are in line with CDM criteria. This report summarises assessment of the post registration changes of the registered CDM project activity with respect to CDM VVS requirements.

1.1 Objective

The assessment is the independent review and ex post determination of both quantitative and qualitative information of the actual implementation and operation of the project activity by DOE towards the registered PDD.

The purpose of this assessment is to have independent third party assessment and to verify that actual implementation and operations of the project activity is as defined by the registered PDD and conclude the respective post registration changes in transparent manner as per CDM VVS and project cycle procedure.

1.2 Scope

The scopes of the assessment are:

- To verify whether the changes is likely to lead to a reduction in the accuracy of calculation of emission reductions;
- To verify whether the information's provided in the registered PDD and monitoring plan comply with that of actual implementation and operations of the project activity and in line with the applied methodology;
- To verify whether the proposed changes result in a less conservative baseline and GHG emission reduction;
- To verify whether the proposed changes would not adversely affect the conclusions of the validation report of the registered PDD with regards to additionality, scale, applicability and compliance;
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.

The assessment shall ensure that reported changes and information's are substantial, complete and accurate with sufficient supportive evidence in order to reach the assessment conclusion.

2. Methodology

The assessment consists of the following four phases:
1. Desk review of all relevant documents;
2. On-site assessment;
3. Validation opinion.

The following sections outline each step in more detail.

2.1 Desk review

The following table outlines the documentation reviewed during the verification:

No.	*Reference Document*
/DOC1/	Registered PDD under VVS track whose material is same as the original PDD under VVM track for registration (version 2.0, 06/10/2011)
/DOC2/	PDD under VVS track highlighted all changes for EB approval (version 2.1, 05/03/2014)
/DOC3/	PDD under VVS track with revisions as clean version version 2.1, 05/03/2014)
/DOC4/	Registered Validation Report (validated by ERM CVS, Report No. 1883.v1)
/DOC5/	Approved monitoring methodology: ACM0002, version 12
/DOC6/	Clean Development Mechanism Validation and Verification Standard (version 06.0)
/DOC7/	Clean Development Mechanism Project Cycle Procedure (version 06.0)
/DOC8/	Clean Development Mechanism Project Standard (version 06.0)
/DOC9/	Signed PPA (2005)
/DOC10/	PPA: Annex A – Development Plan (2005)
/DOC11/	Name plates of generators (photos)

2.2 On-site visit

No.	Date	Name	Organization	Topic
/I1/	05/12/2013	Mr. Francis Mwangi	Technical Manager, Bujagali Energy Ltd	- Information regarding actual implementation of the project activity - Date of commissioning of the power plant
/I2/	05/12/2013	Mr. Edward Onage	Operations Manager, O&M Energy Ltd	
/I3/	06/12/2013	Mr. John Berry	General Manager, Bujagali Energy Ltd	- Background of project development and implementation - Power Purchase Agreement - Installed capacity of power plant and reason for project design change
/I4/	05-06/12/ 2013	Mr. Bamshad Houshyani	Climate Focus B.V.	- Timeline of change to registered PDD

2.3 Internal quality control

The final assessment report underwent a technical review by a qualified independent reviewer before requesting issuance of the project activity. The technical review was performed by a technical reviewer qualified in accordance with TÜV Rheinland's qualification scheme for CDM validation and verification that meets the criteria of EB guidelines for qualification.

2.4 Verification Team

Before the assessment begins, members of the verification team are ensured to cover the technical area(s), sectoral scope(s) and relevant host country experience including local language ability for evaluating the CDM project activity. The qualification of the team is as per the criteria defined by the CDM EB guidelines for qualification.

Verification Team			Role									
Full name	**Affiliation TÜV Rheinland**	**Appointed for Sectoral Scopes (Technical Areas)**	Team leader	Acting Team Leader	Local Expert	Team Member (Auditor)	Technical Expert	Acting Tech. Expert	Trainee Auditor	Technical Reviewer	Expert to TR	Trainee TR
Mr. Norbert Heidelmann[3]	Germany	1.2; 13.1; 13.2; 15.2	X									
Mr. You CUI[4]	Germany	1.2; 13.1	X									
Mr. Yuriy Lozynskyy[4]	Germany	1.2; 7.1; 13.1				X						

[3] Final verification team
[4] Original verification team

Ms. Andrea Nuesse[3]	Germany	N/A							X			
:Ms. Cuiping Deng[3]	China	1.2, 5.1,11.1, 12.1								X		

3. Changes to the project design of a registered CDM project

Affected Changes	Analysis of the assessment team
Changes in effective output capacity due to increased installed capacity	The verification team confirms a change in installed capacity from 250 MW to 263.5 MW. This has been confirmed by means of on-site observation.
Changes in effective output capacity due to increased number of units / installation of units with lower capacity / installed units with less advanced technology than that described in the PDD	N/A
Addition of components or extension of technology	N/A
Removal or addition of site / increase in the project boundary	N/A
Actual operational parameters which are within the control of the project participants differing from the expected parameters	N/A
Any consequential changes to the baseline methodology – including changing or adding another baseline methodology or	N/A
Any consequential changes by applying a baseline scenario that is more appropriate as a result of the proposed or actual modification to the project activity.	N/A

The verification team summarizes the post registration changes between registered PDD and actual project activity in tables below:

Description in the registered PDD	Permanent changes to the registered PDD based on the actual project activity with DOE assessment and reason of acceptance
Installed capacity of the project activity The registered PDD (/DOC1/) describes the project activity as "…generat[ing] electricity through five vertical Kaplan turbine generator units with an installed capacity of 50 MW each (total capacity of 250 MW)…".	Based on technical specifications indicated on the nameplate of turbine-generator set, the verification team cross-checked the output capacity of each turbine-generator and determined it to be 52.7 MW (= 9500 V * 3768 A * 0.85 * √3). In total, 5 units have been installed. Therefore, total installed capacity is calculated as 263.5 MW (/DOC3/).

Description in the registered PDD	Permanent changes to the registered PDD based on the actual project activity with DOE assessment and reason of acceptance
	Assessment by the verification team: The verification team considers the compliance of the additional 13.5 MW (5 x 2.7 MW) capacity of project activity with the requirements of the respective standard and methodology and all corresponding information in the PDD have been appropriately amended.
When was the changes occurred (after registration / prior to registration)	The contracted capacity stated in Annex A of the Power Purchase Agreement (/DOC10/) is 250 MW. The project was registered on 07/10/2011. The change occurred during the physical installation of the generator turbines in 2012. Hence, the change were not known during the validation process and occurred after the project registration.
Reason for these changes taking place	The reasons for the change were not connected to nor did the impact the overall operation/ability of the project activity to deliver emission reductions as stated in the PDD. The contracted capacity stated in Annex A of the Power Purchase Agreement (/DOC10/is 250 MW. This is the amount that the PO has guaranteed to be able to supply to the grid at optimal water level after transformation losses. As confirmed in an interview with the plant general manager (/I3/), the PO is only compensated for a maximum of 250 MW, as agreed in the PPA. However, to ensure the PO to fulfil their requirements, the actual installed capacity is slightly higher at 263.5 MW as was observed by the verification team on site (/DOC11/).
How does the changes impact on the overall operation/ability of the project activity to deliver emission reduction as stated in the registered PDD	During the on-site assessment, the verification team could observe proper operation and function of overall project activity. Negative impact on overall operation and ability of project activity to deliver emission reduction caused by this change was not observed by the verification team.

3.1 Impact on additionality of the project activity

The additionality of the project activity was not proven on the basis of the installed capacity. In the registered PDD (/DOC1/) barrier analysis was applied to demonstrate additionality. The increased installed capacity has no impact on any scenario of barrier analysis. In this

case only barriers have been claimed to demonstrate additionality and these barriers are still valid under the new circumstances. Therefore, additionality was not impacted of the change in installed capacity. Furthermore, the PO has no financial gain from providing more electricity than can be generated from 250 MW as this is the maximum contracted capacity and any amount beyond this will not be compensated.

Thus, verification team confirms that the change in installed capacity from 250 MW to 263.5 MW has no impact on the additionality of the project activity.

3.2 Impact on the scale and boundary of the project activity

The registered project activity is 250 MW which is large scale defined under CDM. The actual installed capacity is 263.5 MW which is still in the same category.

By means of on-site assessment, the verification team is able to confirm that neither geographical nor physical boundary was affected by the project design change.

3.3 Impact on the applicability and application of approved baseline methodology under which the project activity has been registered

The only change on applicability assessment in the registered PDD according to ACM0002, version 12 was power density of hydropower project. Due to capacity increasing, the new power density works out to be 67.9 W/m^2 which is still larger than 4 W/m^2. No further impact was found.

Therefore, this change doesn't affect any applicability and application of ACM0002, version 12.

3.4 Impact on the compliance of the monitoring plan with the applied monitoring methodology

The verification team confirms all changes to the project design contained in the revised PDD proposed by the project participants are in compliance with the applied monitoring methodology and underlying tools compared with the requirements contained in the registered monitoring plan.

3.5 Impact on the level of accuracy of the monitoring

The monitoring plan has been implemented as per registered PDD (/DOC1/). Therefore, the level of accuracy of the monitoring has not been affected,

3.6 Findings from the previous verification reports

☐ The verification team confirms that the findings from previous verification reports, if any, have been taken into consideration.

☒ The verification team confirms that no findings from previous verification reports have been taken into consideration.

Reason: This is the first verification for the project with monitoring period 01/12/2011 - 31/10/2013. Hence, this criterion is not applicable.

4. Conclusion of the verification team

These post registration changes have been assessed against all relevant requirements of CDM VVS (version 06.0).

The verification team hence confirms that the changes to the project activity do not raise any concerns with regard to scale, applicability and application of the approved baseline methodology and compliance of the monitoring plan with the monitoring methodology. Concern with regard to additionality has been further assessed by the verification team demonstrating valid additionality under new circumstance.

The minor changes as assessed above have also been contained in the revised PDD. They are in compliance with the applied methodology and do not reduce the level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan. They are also unlikely to lead to a reduction in the accuracy of the calculation of emission reductions.

Appendix A

CERTIFICATES OF COMPETENCE

Qualification

Heidelmann, Norbert /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.: (AuditorenRegNr)			
Appointed: (Zugelassen)	☒ ja	Qualification Level: (Qualifikationsstufe)	Lead Auditor
External: (Externer)	☐ ja	Add. reviewer: (Zusätzlicher Prüfer)	☐ yes
EAC Scopes: (EAC Branchen)	CDM 01 - Energy industries (renewable - / non-renewable sources) CDM 13 - Waste handling and disposal CDM 15 - Agriculture		
Add. qualification: (zus. Qualifikation)			
First Appointment: (Erstberufung)	03.05.2010	Valid to: (Gültig bis)	01.05.2016

Remarks:	Appointment valid for TA 1.2, 13.1, 13.2, 15.2
Languages:	German English

Qualification

Nuesse, Andrea /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed: (Zugelassen)	☒ ja	Qualification Level: (Qualifikationsstufe)	Trainee
External: (Externer)	☐ ja	Add. reviewer: (Zusätzlicher Prüfer)	☐ yes
EAC Scopes: (EAC Branchen)			
Add. qualification: (zus. Qualifikation)			
First Appointment: (Erstberufung)	29/01/2014	Valid to: (Gültig bis)	28/01/2017

Remarks:

Languages: English
German

Qualification

Cui, You /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed: (Zugelassen)	☒ ja	Qualification Level: (Qualifikationsstufe)	Lead Auditor
External: (Externer)	☐ ja	Add. reviewer: (Zusätzlicher Prüfer)	☒ yes
EAC Scopes: (EAC Branchen)	CDM 01 - Energy industries (renewable - / non-renewable sources) CDM 13 - Waste handling and disposal		
Add. qualification: (zus. Qualifikation)			
First Appointment: (Erstberufung)	04.09.2009	Valid to: (Gültig bis)	02.08.2015

Remarks:	Valid for TA 1.2, 13.1 + Part Time TR
Languages:	Chinese English German

Qualification

Lozynskyy, Yuriy /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.: (AuditorenRegNr)			
Appointed: (Zugelassen)	☒ ja	Qualification Level: (Qualifikationsstufe)	Lead Auditor
External: (Externer)	☐ ja	Add. reviewer: (Zusätzlicher Prüfer)	☐ yes
EAC Scopes: (EAC Branchen)	CDM 13 - Waste handling and disposal CDM 01 - Energy industries (renewable - / non-renewable sources) CDM 07 - Transport		
Add. qualification: (zus. Qualifikation)	JI		
First Appointment: (Erstberufung)	08.11.2010	Valid to: (Gültig bis)	06.11.2016

Remarks:	Valid for TA 1.2, 13.1, 7.1
Languages:	German Russian Ukrainian English Polish

Experience Exchange

Date	Location	Remarks	Accreditation(s)
2011-03-22	Cologne	Experience Exchange Cologne 2011	United Nations Framework Convention (Change

Monitoring

Latest Monitoring: (letzte Beurteilung)	Next Monitoring: (nächste Beurteilung)

Remarks:

View / Edit Monitoring

History of scope allocation

Date:	2012-06-25
Change:	EAC CDM added
By:	Praveen Urs
Reason:	

Date:	2011-11-07
Change:	Non-EAC JI added
By:	Manfred Brinkmann
Reason:	

Date:	2011-04-08
Change:	EAC CDM added
By:	Manfred Brinkmann
Reason:	Valid for TA 1.2, 13.1

Date:	2010-11-11
Change:	EAC CDM added
By:	Manfred Brinkmann
Reason:	

History

Created:	15.06.2010 12:22:48	Yuriy Lozynskyy/TEU/DE/TUEV
Modified:	04.01.2013 14:50:39	Klaus-Dieter Fritsch/TRC/DE/TUEV
	25.06.2012 14:45:19 ZE8	Manfred Brinkmann/Jpn/TUV
	25.06.2012 14:44:32 ZE8	Manfred Brinkmann/Jpn/TUV
	07.11.2011 22:06:18 ZE9	Manfred Brinkmann/Jpn/TUV
	07.11.2011 22:05:19 ZE9	Manfred Brinkmann/Jpn/TUV
	08.04.2011 13:24:15 ZE9	Manfred Brinkmann/Jpn/TUV
	08.04.2011 13:23:16 ZE9	Manfred Brinkmann/Jpn/TUV
	08.04.2011 13:21:34 ZE9	Manfred Brinkmann/Jpn/TUV
	08.04.2011 13:21:23 ZE9	Manfred Brinkmann/Jpn/TUV
	08.04.2011 13:21:08 ZE9	Manfred Brinkmann/Jpn/TUV
	04.02.2011 14:23:43 ZE9	Manfred Brinkmann/Jpn/TUV
	04.02.2011 14:22:31 ZE9	Manfred Brinkmann/Jpn/TUV
	04.02.2011 14:22:19 ZE9	Yuriy Lozynskyy/TEU/DE/TUEV
	11.11.2010 05:22:13 ZE9	
	15.06.2010 12:23:50	

Export to ICMS

Last Export:	04.01.2013 14:50:39	Klaus-Dieter Fritsch/TRC/DE/TUEV

Qualification

Deng, Cuiping /

Emission Trading
United Nations Framework Convention on Climate Change

Auditor No.:
(AuditorenRegNr)

Appointed: (Zugelassen)	☒ ja	Qualification Level: (Qualifikationsstufe)	Lead Auditor
External: (Externer)	☐ ja	Add. reviewer: (Zusätzlicher Prüfer)	☒ yes
EAC Scopes: (EAC Branchen)	CDM 01 - Energy industries (renewable - / non-renewable sources) CDM 05 - Chemical industry CDM 11 - Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride CDM 12 - Solvents use		
Add. qualification: (zus. Qualifikation)			
First Appointment: (Erstberufung)	2013/09/10	Valid to: (Gültig bis)	2016/08/08

Remarks: Appointed as Technical Reviewer for TA 1.2 TA 5.1, 11.1, 12.1

Languages:

Experience Exchange

Date	Location	Remarks	Accredita
2010-12-21	Beijing	GC CDM Auditor Experience Exchange, Beijing, 2010-12-21to23 United Nations Framework Convention on Climate Change	

Monitoring

Latest Monitoring:
(letzte Beurteilung)

Next Monitoring:
(nächste Beurteilung)

Remarks:

History of scope allocation