82 MW LAU RENUN HYDRO POWER PLANT, NORTH SUMATRA

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Summary:

KBS Certification Services Pvt. Ltd. has been contracted by, “South Pole Carbon Asset Management Ltd.” to undertake independent validation of the renewable crediting period of the project activity with the title “82 MW Lau Renun Hydro Power Plant, North Sumatra” and VCS registry no. 488, with regard to the relevant requirements of VCS Standard Version 3.7.

KBS Certification Services Pvt. Ltd. has performed the validation of the renewable of the crediting period of the project activity with the title “82 MW Lau Renun Hydro Power Plant, North Sumatra” and VCS registry no. 488. An independent and objective review of the project document (revised) and the new project baseline along with the other relevant documents is reviewed against the requirement of the VCS Standard v3.7 and “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” Version 03.0.1.

The report is based on the assessment of the revised project document, revised ex-ante emission reduction calculation sheet, application of standard auditing techniques including but not limited to desk review, follow up actions (e.g., on site visit, electronic (telephonic or e-mail) interviews) and also the review of the applicable approved methodological and relevant tools, guidances and CDM decisions.

In the course of validation, 03 Corrective Action Requests (CAR) and 00 Clarification Request (CL) have been raised. All the CARs and CLs have been closed out successfully.

Hence, KBS requests the renewable of the crediting period of the project activity (VCS ID. 488) “82 MW Lau Renun Hydro Power Plant, North Sumatra”.

Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
CM	Combined Margin
CO_2	Carbon dioxide
DOE	Designated Operational Entity
EB	Executive Board
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
MP	Monitoring Plan
OM	Operating Margin
PA	Project Activity
PD	Project Description
PP	Project proponent
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard

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1 INTRODUCTION

1.1 Objective

South Pole Carbon Asset Management Ltd. has commissioned KBS to perform the validation of request to renew crediting period of the VCS project “82 MW Lau Renun Hydro Power Plant, North Sumatra” (Project Id. 488). The assessment was done with regard to the relevant requirements for VCS Version 3.7.

The purpose of validation is to ensure a thorough, independent assessment of registered VCS project activity submitted for renewal of crediting period against the applicable VCS requirements.

In particular, the validity of project's baseline and regularity surplus are validated in order to confirm the clause no. 3.8.5 of VCS Standard Version 3.7 for the “Renewal of Project Crediting Period”. The validation is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of voluntary emission reduction (VER).

1.2 Scope and Criteria

The assessment was performed in accordance with the requirements of Verified Carbon Standard V3.7 and included an assessment, but not limited to, of following:

1. Demonstration of the regulatory surplus, in reference to the additionality of the project, in accordance with section 4.6.3 of the VCS 3.7
2. Validity of the original baseline scenario reviewing the following:
    a. Evaluation of impact of new relevant national and/or sectoral policies and circumstances on the validity of the baseline scenario.
    b. Assessment of GHG emissions associated with the original baseline scenario using the latest version of the CDM Tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period.
    c. If original baseline scenario is no longer valid, whether the current baseline scenario is established in accordance with the VCS rules.
    d. The project description, containing updated information with respect to the baseline, the estimated GHG emission reductions or removals and the monitoring plan, submitted for validation is based upon the latest approved version of the methodology or its replacement.
3. The updated project description id validated in accordance with the current VCS rules (V3.7).

1.3 Level of Assurance

☒ Reasonable level of assurance

☐ Limited level of assurance

1.4 Summary Description of the Project

The project is a new run-off-river hydropower plant in North Sumatra Province in Indonesia with a daily regulating pond. The project is owned and developed by PT. PLN (Persero), a state-owned electricity company.

The key purpose of the project is to utilize the hydrological resources of the Renun River and another eleven lateral tributaries, thus a renewable source of energy, generating zero emission electricity to be transmitted to the Sumatra grid (hereafter referred to as the grid) through the Sidikalang PLN and Brastagi PLN substations. It will displace fossil-fuel-based power plants and reduce the associated GHG emissions with fossil-fuel-based power plant in Sumatra grid. The project activity contains a highly complex system of tunnels with several intakes enabling low dam height and minimal impact to the environment per electricity output.

The project consists of a main intake, tributary intakes, a waterway, a power station, hydro mechanical works, generating equipments, transmission line and substations, permanent roads, a base camp and an inflow monitoring system.

The powerhouse accommodated two units of a vertical shaft type Francis turbine having an installed capacity of 82 MW. A maximum plant discharge and a gross head are 22.1 m^3 and 467.6 m. The specific technical data of the turbines / generators are listed in Table 1 below:

Table 1 - Technical data of the turbine / generator units (specifications are per unit)

Turbines 1 & 2	Brand	KVAERNER BOVING LIMITED
	Model	Francis vertical shaft
	Rated output	42,000 kW
	Rated head	434.6 m
	Rated speed	750 rpm
	Rated flow	10.42^3/s
	Serial number	6028

Generators 1 & 2	Brand	ELIN
	Model	SSV 290/8 - 176
	Rated output	46,000 kW
	Rated voltage	11,000 +/- 10%
	Rated current	2,414 A
	Rated frequency	50 Hertz
	Rated speed	750
	Rated factor	0.89

Both the units of the project activity have been commissioned in 2006. Unit 1 commissioned on 18 December 2006 and Unit 2 commissioned on 14 August 2006. Validation team has checked the commissioning certificate /13/ for both the units and found OK. PP has considered the start date of the project activity as 14 August 2006 i.e. commissioning of the unit 2 (under section 1.5 of the VCS PD) which is the date on which the project began generating GHG emission

reductions or removals and hence in compliance with the section 3.7 (3.7.1) of VCS_Standard_v3.7 /05/ and hence accepted to the validation team.

The project uses well-established hydroelectric power generation technology for electricity generation. Stringing another circuit of the existing 150 kV double circuit transmission lines, which is being operated between Sidikalang and Brastagi substations, connects the project to the grid. The lengths of the new lines from the power station to each substation are 25 km and 53 km respectively.

The main technical parameters of the proposed project are shown in table below:

Table 2 - Main technical parameters of the proposed project

Parameter	Capacity	Source
Installed capacity (MW)	82	Detail design report 1988
Expected annual power generation (effective supply to the grid) (MWh)	313,500	Detail design report 1988
Water head (m)	467.6	Detail design report 1988
Design flow (m^3/s)	10.1	Detail design report 1988
Capacity Factor (%)	43.64%	Calculated based on detailed design report 1988

No changes, comparing to the registered project design, has been observed, as validated above, in the project description.

2 VALIDATION PROCESS

2.1 Method and Criteria

The validation process was carried out in line with the requirements of VCS Version 3. Standard auditing techniques and KBS's CDM Procedures were also applied during the validation. The validation process included the following processes as described in the subsequent sub-sections.

Duration of Validation:

Validation Contract	17/08/2017
On site verification	28/09/2017
Findings raised	30/09/2017
Draft Validation Report	23/10/2017
Final Validation Report	05/12/2017

2.2 Document Review

Desk review was performed of the revised PD /01/ against the registered and validated VCS PD /02/. The validation report /03/ and the previous verification reports /04/ were also reviewed to validate the renewal of crediting period in accordance with the VCS Standard Version 3.7 /05/. In addition, certain supportive documents, relating the project performance (like PPAs /09/, commissioning certificates /13/, Proof of title /15/ and JMRs /14/) were also reviewed.

The list of document reviewed is included in the Appendix 1: 'References'

2.3 Interviews

The site visit for this validation assessment was undertaken by the members of the assessment team. Summary of on-site activities are mentioned below;

Location	North Sumatra Province, Indonesia (Project Site)
Dates	28/09/2017
Key points discussed	**Name of persons interviewed, Designation, Organization**
Project Document	
Project and Technology Description, Methodology Justification, Validity of Baseline, Monitoring Plan, Project Performance	Nimrot Tambinian, Manager unit, Renun Hydro Power Plant, Robert Hutasoit, Health and Safety, Jongor Simanjuntak, Health and Safety, Angga Pramutti, Health and Safety, PLN, Muhamad Mumir, Operation, PLTA Renun Aron Yudho S, Maintenance, PLTA Renun, Roby V. Manurune, Human Resource, PLTA Renun, Leonardo Sidabalok, Project Manager, South Pole Carbon Asset Management Limited,

2.4 Site Inspections

A site visit is undertaken by members of validation team, involving but not limited to,

- An assessment of the implementation and operation of the VCS project activity as per the revised VCS PD/02/;
- Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the mentioned monitoring plan;
- A cross-check between information provided in the revised PD and data from other sources such as plant log books, inventories, purchase records or similar data sources;
- A check of the monitoring equipments including performance and observations of monitoring practices against the requirements of the registered VCS PD and the selected methodology.

2.5 Resolution of Findings

During the validation of the renewable of the crediting period, the following correction actions (CARs) and clarifications (CLs) have been raised and resolved after satisfactory response from the project participants.

Table 1. CL from this validation

No CL from this validation

~~**CL ID**~~	~~xx~~	~~**Section no.**~~		~~**Date:** DD/MM/YYYY~~
~~**Description of CL**~~				
~~**Project participant response**~~				~~**Date:** DD/MM/YYYY~~
~~**Documentation provided by project participant**~~				
~~**DOE assessment**~~				~~**Date:** DD/MM/YYYY~~

Table 2. CAR from this validation

CAR ID	01	**Section no.**	-	**Date:** 29/09/2017
Description of CAR				
In the section 2.1 of the VCS PD /01/, PP needs to mention the title and reference of the applied methodology along with the applicable tools.				
Project participant response				**Date:** 13/10/2017
In the section 2.1 of the VCS PD has been revised to mention the title and reference of the applied methodology along with the applicable tools.				
Documentation provided by project participant				
171013_Renun_VCS PD_v2_lsa.docx				
DOE assessment				**Date:** 18/10/2017

Corrections have been done in the revised VCS PD and found OK. Hence this CAR is closed.

CAR ID	02	**Section no.**	-	**Date:** 29/09/2017
Description of CAR				
In the section 3.1 of the VCS PD /01/, PP needs to mention the calculation of the combined margin emission factor based on the OM and BM. Further the weightage of the OM & BM shall be in line with the "Tool to calculate the emission factor for an electricity system" (Version 05.0) /11/ for the second crediting period.				
Project participant response				**Date:** 13/10/2017
VCS PD has been revised to mention the calculation of the combined margin emission factor based on the OM and BM. And, further the weightage of the OM & BM has been revised to be in-lined with the "Tool to calculate the emission factor for an electricity system" (Version 05.0) for the second crediting period.				
Documentation provided by project participant				
1. 171013_Renun_VCS PD_v2_lsa.docx 2. 171013_300354_Renun_ER Calculation_lsa_v3.xlsx				
DOE assessment				**Date:** 18/10/2017
Corrections have been done in the revised VCS PD and found OK. As per UNFCCC Methodological tool: Tool to calculate the emission factor for an electricity system v05.0, the following default values should be used for wOM and wBM (for all projects except for wind and solar power generation project activities): wOM = 0.5 and wBM = 0.5 for the first crediting period, and wOM = 0.25 and wBM = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool. PP has selected the option "wOM = 0.25 and wBM = 0.75" which is correct for the project activity for the second crediting period. Hence this CAR is closed.				

CAR ID	03	**Section no.**	-	**Date:** 29/09/2017
Description of CAR				
In the section 3.2 and 3.3 of the VCS PD /01/, PP needs to justify the project emissions and leakage emissions as per the applied methodology /07/.				
Project participant response				**Date:** 13/10/2017
In the section 3.2 and 3.3 of the VCS PD has been revised to justify the project emissions and leakage emissions as per the applied methodology				

Documentation provided by project participant	
171013_Renun_VCS PD_v2_lsa.docx	
DOE assessment	**Date:** 18/10/2017
Corrections have been done in the revised VCS PD /01/ and found OK. Hence this CAR is closed.	

Table 3. FAR from this validation

No FAR raised during this validation.

~~**FAR ID**~~	~~xx~~	~~**Section No.**~~		~~**Date:** DD/MM/YYYY~~
~~**Description of FAR**~~				
~~**Project participant response**~~				~~**Date:** DD/MM/YYYY~~
~~**Documentation provided by project participant**~~				
~~**DOE assessment**~~				~~**Date:** DD/MM/YYYY~~

2.5.1 Forward Action Requests

No FAR (Forward Action Request) is raised during this validation of the renewal crediting period.

3 VALIDATION FINDINGS

3.1 Project Details

Same as in the registered VCS PD /02/ except for the information which have been revised and mentioned below.

- **Project crediting period**: 2nd Crediting period, 10 years from 1 September 2016 until 31 August 2026.

- **Project estimated GHG emission reductions or removals**: 2,700,192 emission reductions credits for the 10 year crediting period and 270,019 tCO2e emission reduction credits per year.

Validation team confirms that the description in the project description is accurate, complete, and provides an understanding of the nature of the project. Validation team has validated the updated project description in accordance with VCS rules and found OK. The project details were checked from the on-site visit and also from the document review /01/, /09/, /13/, /14/, /15/. Validation team has checked the information provided in the project description and its adherence with VCS rules and requirements, the applied methodology, all applicable tools and found OK.

3.2 Application of Methodology

3.2.1 Title and Reference

The project uses the VCS board-approved consolidated baseline and monitoring methodology ACM0002 "Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources", version 17.0, 13 May 2016[1] /07/.

This methodology also refers to the latest approved versions of the approved "Tool to calculate the emission factor for an electricity system", version 05.0[2] /11/.

3.2.2 Applicability

In accordance with the para 3.8.5 of the VCS standard V3.7 /05/ and Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period, version 3.0.1 /12/, the VCS PD has been updated using the latest version of the applied methodology i.e. ACM0002 "Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources", version 17.0. The project meets the applicable criteria of the latest version of the applied methodology ACM0002 "Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources", version 17.0. Validation team has checked the PP's justification (In the revised VCS PD /01/) for the applicability criteria of the latest version of the applied methodology and found OK.

3.2.3 Project Boundary

Validation team confirms that the project boundary description in the VCS PD is accurate, complete. Validation team has validated the updated project description in accordance with VCS rules and found OK. The project details were checked from the on-site visit and also from the document review /01/, /07/ and found OK.

[1] https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN
[2] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

3.2.4 Baseline Scenario

Validity of original baseline or its update:

The assessment team reviewed the updated PDD version 04.0 and evaluated whether project participants assess and incorporate the impact of national and/or sectoral policies and circumstances existing at the time of requesting renewal of the crediting period on the current baseline GHG emissions, without reassessing the baseline scenario. Where data and parameters used for determining the original baseline that was determined ex ante (and not monitored during the crediting period) are no longer valid, the assessment team identified whether PP update such data and parameters in accordance with the Methodological Tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" Version 03.0.1 /12/.
The steps from the Methodological Tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" Version 03.0.1 /12/ were applied to assess the continued validity of the baseline and/or to update the baseline at the renewal of a crediting period:

Step 1: Assess the validity of the current baseline for the next crediting period

The validity of the current baseline is assessed in the following sub-steps:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

Validation team confirms that there have been no changes in the relevant national and/or sectoral regulations for large scale hydro projects to generated electricity from run of the river scheme and sell to third party since the previous crediting period. Further confirmation has been made based on the on-site visit and a review of documents:

The national and sectoral policies applicable to the large scale Hydro projects in Indonesia were reviewed by the assessment team /16/. Hence the same baseline as identified in the previous crediting period is still valid for the project. There are no new relevant national and/or sectoral policies and circumstances ever since the project was registered that have an impact on the baseline.

Thus, the baseline identified during the validation is still compliance with the relevant mandatory national and/or sectoral policies. Hence, no need to update the current baseline for the next crediting period.

Step 1.2: Assess the impact of circumstances

This step requires assessment of impact of circumstance existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario.

Since the baseline scenario identified at validation was the consumption of electricity from the existing grid, without the investment of a greenfield hydro plant. An assessment of the changes in market characteristics is required.

The impact on current baseline emissions can be directly assessed based on reviewing current mix of the grid to which the project is connected and exporting electricity. The project activity delivers electricity to the Sumatra Grid in Indonesia. As per latest Sumatra grid data (until year 2015) from the government of Directorate General of Electricity – Ministry of Energy and Mineral Resources (MEMR), the proportions of the total installed capacity of all power plants (MW) versus total installed capacity of hydropower plants with similar hydro installed capacity (as range of 41 MW to 123 MW) is only 15.84% as checked by the validation team from /18/. The market is still dominated by coal power plant and in the last four years, more than 1,700 MW of new coal based power plants have been established. Hence the hydroelectric plants with similar hydro installed capacity in the Sumatra grid is very limited.

Also the project participant has used the grid emission factor calculated by the Indonesia government /10/ latest available at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which considers all the market characteristics/new circumstances as per the requirement of this step. This data is calculated and published by the Indonesia government /10/ and hence accepted by the validation team.

Hence all the changes in the market characteristics have been considered for the current baseline emissions, without reassessing the baseline scenario.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

The baseline is the continuation of the current practice, i.e. the electricity would be supplied by the power grid in the absence of the project activity without the investment of a greenfield hydro plant. It is clear that the power grid as an electricity system would maintain its technical capability for a much longer time than the crediting period of the project activity. The justification provided by the PP is accepted to the validation team.

Step 1.4: Assessment of the validity of the data and parameters

There are some parameters, which are determined at the start of the first crediting period and not monitored during the first crediting period, are not valid anymore. This update includes grid emission factor and emissions from fossil fuel combustion ($PE_{FF,y}$) as per applied methodology ACM0002 version 17.0. Hence, the data and parameters need to be updated. The justification by the PP is accepted to the validation team.

Step 2: Update the current baseline and the data and parameters

As determined in the step 1.4 above, the fixed parameters have been updated.

Step 2.1: Update the current baseline

The baseline emissions have been updated for the second crediting period, without re-assessing the baseline scenario, based on the latest approved version (Version 17.0) of the applied methodology ACM0002.

The revised PDD provides, the updated baseline emissions for the 2nd crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity i.e., ACM0002, version 17. The revised baseline emissions are calculated in accordance with the relevant sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.

Step 2.2: Update the data and parameters

As the application of step 1.4 shows that there are some parameters, which are determined at the start of the first crediting period and not monitored during the first crediting period, are not valid anymore. PP has updated all applicable data and parameters as given below and found OK.

1. As per para 38 of the applied methodology ACM 0002, version 17.0, for all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected. Hence parameters corresponding to $PE_{FF,y}$ have been updated accordingly and accepted to the validation team.

2. PP has updated the grid emission factor i.e. $EF_{grid,CM,y}$ as per latest available data of the grid emission factor. Validation team has checked the calculation and found correct. The value is correctly applied for the emission reduction calculation.

The latest of weighted average of the Operating Margin emission factor ($EF_{grid,OMsimple,y}$), Build Margin emission factor ($EF_{grid,BM,y}$), and Combined Margin emission factor ($EF_{grid,CM,y}$) of Sumatera grid of year 2015 already determined and calculated[3] according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system", by the Indonesian government under the Directorate General of Electricity - Ministry of Energy and Mineral Resources (MEMR)[4] /10/.

PP has not calculated the Operating Margin emission factor ($EF_{grid,OMsimple,y}$) and Build Margin emission factor ($EF_{grid,BM,y}$) and only mentioned the steps (i.e. under section 3.1 of VCS PD) followed by the Indonesian government as per the understanding from the publicly available documents from indonesian government. For the transparency PP has mentioned the steps.

[3] Based on notification letter number 322/20/DJL.4/2017 dated on February 7th, 2017 from the MEMR.
[4] Based on notification letter number 1515/03/DLT.3/2017 dated on May 30th, 2017 from the MEMR.

Operating Margin emission factor: The Operating Margin emission factors for 2013, 2014 and 2015 are calculated separately and then the three- year average is calculated as a full-generation weighted average of the emission factors. The result of the Operation Margin Emission Factor of Sumatra calculation calculated by the Indonesian government is 0.676 tCO_2e/MWh.

Built Margin emission factor: Build Margin Emission Factor calculated by the Indonesian government is 0.933 tCO2e/MWh.

Combined margin (CM) emission factor: The Baseline Emission Factor is calculated as a Combined Margin, based on the Operating Margin (OM) and Build Margin (BM), using the weighted average (preferred option) of the Operating Margin and Build Margin.

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (4)$$

where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (t CO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (t CO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (per cent)
w_{BM}	=	Weighting of build margin emissions factor (per cent)

PP has directly taken the Operating Margin emission factor ($EF_{grid,OMsimple,y}$), Build Margin emission factor ($EF_{grid,BM,y}$) (calculated by the Indonesian government) to calculate the Combined Margin emission factor ($EF_{grid,CM,y}$) as per the requirement of the tool "Tool to calculate the emission factor for an electricity system" (referred under the applied methodology). As per UNFCCC Methodological tool: Tool to calculate the emission factor for an electricity system v05.0, the following default values should be used for w_{OM} and w_{BM} (for all projects except for wind and solar power generation project activities): w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool. Hence w_{OM} = 0.25 and w_{BM} = 0.75 for the second crediting period is applicable for the project activity While government of Indonesia is using w_{OM} = 0.5 and w_{BM} = 0.5. Hence the Combined Margin emission should be calculated as per UNFCCC Methodological tool i.e. w_{OM} = 0.25 and w_{BM} = 0.75 for the second crediting period. The calculation of the combined margin emission factor is done as per the "Tool to calculate the emission factor for an electricity system" which is referred by the applied methodology i.e. ACM 0002 Version 17 and hence accepted to the validation team.

Therefore using the approach above, the ex-ante emission factor ($EF_{grid,CM,y}$) for Sumatra Grid will be:

$$EF_{grid,CM,y} = (EF_{grid,OM,y} \times w_{OM}) + (EF_{grid,BM,y} \times w_{BM})$$

$$= (0.676 \times 0.25) + (0.933 \times 0.75)$$

$$= 0.869\ tCO_2/MWh \text{ (Fixed ex-ante for the second crediting period)}$$

Validation team confirms that PP has correctly calculated the combined margin emission factor as per applied methodology /07/ and the tool /11/.

The revised VCS PD (version 04, dated 24/11/2017) /01/ applying the latest version of the applied methodology ACM0002 "Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources", version 17.0, found in line with paragraph 3.8.5 (2) of VCS standard V3.7 /05/.

The baseline scenario for the project activity has been updated in accordance with the paragraph 3.8.5 (2) "Renewal of Project Crediting Period" of VCS Standard: VCS Version 3.7 /05/.

Validity of the baseline has been correctly assessed and the parameters are updated as per the Methodological Tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" Version 03.0.1 in the PDD submitted for the renewal of crediting period.

3.2.5 *Additionality*

Referring to the VCS Standard version V3.7 para 3.8.5, the additionality of the project was assessed for the regulatory surplus. The national and sectoral policies applicable to the large scale Hydro projects in Indonesia were reviewed by the assessment team /16/ and the assessment team is in the opinion that the project continues to be voluntary**.**

3.2.6 *Quantification of GHG Emission Reductions and Removals*

The Ex-ante calculation of the emission reduction has been checked by the validation team and found in compliance with the applied methodology. Validation team has found that PP has correctly calculated the ex-ante emission reduction which is in compliance with the applied methodology. The baseline emission, project emission and the leakage calculations have been checked by the validation team and found in compliance with the applied methodology /07/ and applicable tool /11/ and hence accepted by the validation team.

3.2.7 Methodology Deviations

There are no deviations found from the applied methodology (ACM 0002, Version 17.0).

3.2.8 Monitoring Plan

The implemented monitoring plan was validated against the requirements of the applied methodology (ACM 0002, Version 17.0) and found in compliance with updated version.

It may be noted, the applied monitoring methodology (ACM 0002, Version 17.0) requires the monitoring of the "Quantity of net electricity generation supplied by the project plant/unit to the grid in year y ($EG_{facility,y}$)". In the context of the project activity it is represented as the parameter "Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y ($EG_{PJ,y}$)" which is being monitored in the project activity as per the requirements of the applied methodology. The parameters (Ex-post and

Ex-ante) have been updated as per the requirement of the latest version of the applied methodology /07/ and applicable tool /11/ and found OK.

3.3 Non-Permanence Risk Analysis

Not Applicable to the project activity.

4 SAFEGUARDS

4.1 No Net Harm

The project activity has no potential negative environment and social-economic impacts. Assessment team confirms it based on its on-site visit, document review and local & sectoral expertise.

4.2 Environmental Impact

According to the decree of the Ministry of Environment No. 17/2001, all hydroelectric power plants with a dam height of ≥ 15 meters, or flooded area of ≥ 200 ha or installed capacity of ≥ 50 MW need to undertake an Environmental Impact Assessment (EIA). The Renun Hydroelectric Power Plant project has an installed capacity of total 82 MW electricity in total and requires an EIA.

An EIA has been developed for this project and was completed on 2 June 1986 and approved by the Ministry of Energy and Mining in 1991. Where impacts of the project were identified, mitigation measures were suggested and defined. Hence validation team confirmed that the PP has done the environment impact assessment as per the government requirements and approved by the Ministry of Energy and Mining in 1991.

4.3 Local Stakeholder Consultation

A stakeholder consultation meeting was held in the village hall of Pegagan Julu IV on August 24, 2005. Validation team confirms that PP has met the requirement of the local stakeholder consultation and hence accepted to the validation team.

4.4 Public Comments

This is not a new project activity hence this section is not applicable.

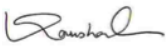
5 VALIDATION CONCLUSION

The project activity “82 MW Lau Renun Hydro Power Plant, North Sumatra” VCS Registry no. 488 as described in project document version 04, dated 24/11/2017 meets the requirements of the renewal of the crediting period as stated in the para 3.8.5 of the VCS Standard V3.7 /05/ and Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period, version 3.0.1 /12/. The applied methodology is also the latest (ACM0002, version 17.0/07/) in accordance with the procedure for renewal. The project activity

meets all the criteria and the conditions to generate verified emission reductions (VERs) for the requested crediting period i.e. 1 September 2016 until 31 August 2026.

Validation team confirms that project complies with the validation criteria for projects set out in VCS Version 3, and includes any qualifications or limitations. Further the project is likely to achieve estimated GHG emission reduction or removals.

Location: Faridabad
Date: 15/12/2017



Authorized Signatory: Kaushal Goyal
Designation: Managing Director
KBS Certification Services Pvt. Ltd.

APPENDIX 1: REFERNCE DOCUMENTS

S. No	Document Name	
/1/	/1.1/	VCS – PD Version 01, dated 25/08/2017
	/1.2/	VCS – PD Version 04, dated 24/11/2017
/2/	Registered VCS PD, version 03 dated 06/11/2009	
/3/	Validation Report (Validation report no. 2009 IQ ME 142) dated 24/09/2010	
/4/	Previous verification reports	
/5/	VCS Standard Version 3.7	
/6/	VCS Program Guide Version 3.7	
/7/	Approved methodology, ACM0002 "Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources", version 17.0	
/8/	Audit plan sent to the PP for the site inspection.	
/9/	Signed Power Purchase Agreement (PPA)	
/10/	2015_Sumatera Grid Emission Factor Ex-ante_Ex-post (OM_BM_CM)	
/11/	"Tool to calculate the emission factor for an electricity system", Version 05	
/12/	Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period, version 3.0.1	
/13/	Commissioning certificates	
/14/	Joint meter reading reports	
/15/	Proof of Title: The contract agreement	
/16/	http://www.irena.org/DocumentDownloads/Publications/IRENA_REmap_Indonesia_report_2017.pdf PLN's Electricity Supply Business Plan (*RUPTL* PT. PLN (Persero)) year 2017-2026. Decree of Ministry of Energy and Mineral Resources No. 1415 K/20/MEM/2017 dated on 29 March 2017 concerning Ratification of PT. PLN (Persero)'s Electricity Supply Business Plan Year 2017 – 2026. https://djk.esdm.go.id/pdf/RUPTL/RUPTL%20PLN%202017-2026.pdf (accessed, 2017).	
/17/	VCS Web site: www.v-c-s.org http://v-c-s.org/program-documents	
/18/	Directorate General of Electricity - Ministry of Energy and Mineral Resources (MEMR), based on notification letter number 322/20/DJL.4/2017 dated on February 7th, 2017	

APPENDIX 2: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

Personnel Name:		**Chetan Swaroop Sharma**	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☒
Technical Reviewer	☒	Local Expert (India)	☒
Area(s) of Technical Expertise			
Sectoral Scope		**Technical Area**	

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
Energy Demand	TA 3.1. Energy demand
Waste handling and disposal	TA 13.1. Solid waste and wastewater TA 13.2. Manure
Approved by (Manager C & T)	Sanjay Kandari
Approval date:	01/05/2017

Personnel Name:		**Yenni Sembiring**	
Qualified to work as:			
Team Leader	☐	Technical Expert	☐
Validator/Verifier	☐	Financial Expert	☐
Technical Reviewer	☐	Local Expert (Indonesia)	☒
Area(s) of Technical Expertise			
Sectoral Scope		**Technical Area**	
Not applicable		Not applicable	
Approved by (Manager C & T)		Gagandeep Kakkar	
Approval date:		31/12/2014	

Personnel Name:		**Rohit Badaya**	
Qualified to work as:			
Team Leader	☒	Technical Expert	☒
Validator/Verifier	☒	Financial Expert	☒
Technical Reviewer	☒	Local Expert (India)	☒
Area(s) of Technical Expertise			
Sectoral Scope		**Technical Area**	
Energy industries (renewable/non-renewable sources)		TA 1.2: Energy generation from renewable energy sources	
		TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	
Energy demand		TA 3.1. Energy Demand	
Waste Handling and Disposal		TA 13.1 Waste Handling and Disposal TA 13.2 Manure	
Approval date:		16/10/2017	