

VERIFICATION REPORT

CAPACITY UPGRADE OF GUNUNG SALAK GEOTHERMAL POWER PLANT PROJECT, INDONESIA

FINAL



Document Prepared By (RINA Services S.p.A. (RINA))

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Summary:

RINA Services S.p.A. (RINA), commissioned by South Pole Carbon Asset Management Ltd has verified the greenhouse gas emission reductions reported for the project activity “Capacity Upgrade of Gunung Salak Geothermal Power Plant Project” in Indonesia, VCS project ID 144, for the period 01/04/2014 to 31/03/2016. The verification includes confirming the implementation of the monitoring plan of the registered VCS PD (Project ID 144) and the application of the monitoring methodology as per ACM0002, version 7.0 dated 30/11/2007. A site visit was conducted to verify the data submitted in the monitoring report.

The project activity comprises of a capacity upgrade of Gunung Salak Geothermal Power Plant from 3 x 55 MW to 3 x 60 MW. The additional installed capacity of 15 MW at Gunung Salak Geothermal power plant generates and supplies an average of 213,959 MWh p.a. of electricity to the connected JAMALI Grid. The project is owned and developed by PT. Indonesia Power, a subsidiary company of PT. PLN (Persero), a state--owned electricity company. The proposed project will increase the utilization of renewable energy sources, in this case geothermal energy, by modifying turbines and steam gas ejectors. Steam for the project is provided by Chevron Geothermal Indonesia under an Energy Sales Contract (ESC) between PT. PLN (Persero) Pertamina, a state--owned oil and gas company, and Unocal Geothermal of Indonesia (Though today, Gunung Salak geothermal fields are owned by Chevron Geothermal Indonesia Ltd.).

In conclusion, it is RINA’s opinion that the project activity “Capacity Upgrade of Gunung Salak Geothermal Power Plant Project” in Indonesia, VCS project ID 144, meets all relevant requirements for VCS standard and guidelines and correctly applies the baseline and monitoring methodology ACM0002, “Consolidated methodology for grid-connected electricity generation from renewable sources “, version 7.0 dated 30/11/2007. The monitoring system is in place and the emission reductions are calculated without material misstatement. Hence, RINA is able to certify that the emission reductions from the project during the monitoring period 01/04/2014 to 31/03/2016 amount to 301,933 tCO₂e

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1 INTRODUCTION

1.1 Objective

RINA is commissioned by “South Pole Carbon Asset Management Ltd” to perform an independent verification of its VCS project, “Capacity Upgrade of Gunung Salak Geothermal Power Plant Project” in Indonesia”, already registered under VCS with Project ID.144 for the reported GHG emission reductions for the given monitoring period 01/04/2014 to 31/03/2016. The VCS projects must undergo independent third party verification and certification of emission reductions as the basis for issuance of Voluntary Emission Reductions (VERs/VCUs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The project activity has been implemented and operated as per the project description (PD) and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Monitoring report and other supporting documents are complete;
- The data is recorded and stored as per the monitoring methodology and approved monitoring plan.
- To confirm that the monitoring system is implemented and fully functional to generate Voluntary Emission Reductions (VERs/VCUs) without any double counting, and

To establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The verification scope is:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- 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;
- to verify that reported GHG emission data is sufficiently supported by evidence.

The project is assessed against the requirements of VCS version 3 and related rules and guidance. RINA has, based on the recommendations in the latest version of CDM Validation and Verification Manual, and employed a rule-based approach (as criteria) in the verification, focusing on the identification of significant reporting rules and the reliability of project monitoring.

Verification is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

1.3 Level of Assurance

The draft final verification report before being submitted to the client were subjected to an independent internal technical review to confirm that all verification activities had been completed according to the pertinent RINA instructions, with reasonable level of assurance.

The technical review was performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for VCS and CDM validation and verification.

The verification team and the technical reviewers consist of the following personnel.

Role	Last Name	First Name	Country
Team Leader, Verifier	Menon	Rekha	India
Technical Expert	Augustus	Cyril	India
Technical reviewer	Valoroso	Rita	Italy

1.4 Summary Description of the Project

The project activity comprises of a capacity upgrade of Gunung Salak Geothermal Power Plant from 3 x 55 MW to 3 x 60 MW. The additional installed capacity of 15 MW at Gunung Salak Geothermal power plant generates and supplies an average of 213,959 MWh p.a. of electricity to the connected JAMALI Grid. The project is owned and developed by PT. Indonesia Power, a subsidiary company of PT. PLN (Persero), a state--owned electricity company. The proposed project will increase the utilization of renewable energy sources, in this case geothermal energy, by modifying turbines and steam gas ejectors. Steam for the project is provided by Chevron Geothermal Indonesia under an Energy Sales Contract (ESC) between PT. PLN (Persero) Pertamina, a state--owned oil and gas company, and Unocal Geothermal of Indonesia (Though today, Gunung Salak geothermal fields are owned by Chevron Geothermal Indonesia Ltd.).

The project site is located in Awibengkok--Ratu area of Gunung Salak Geothermal field surrounded by Halimun Salak national park, which is administratively part of Bogor District and Sukabumi District, West Java Province, Indonesia.

The main information of the project is summarized in the table below:

Project Participant(s)	PT. Indonesia Power South Pole Carbon Asset Management Ltd. (as carbon credit buyer)
Project Title	Capacity Upgrade of Gunung Salak Geothermal Power Plant Project
Location of the project	The project site is located in Awibengkok--Ratu area of Gunung Salak Geothermal field surrounded by Halimun Salak national park, which is administratively part of Bogor District and Sukabumi District, West Java Province, Indonesia

Methodology(ies)	ACM0002, version 7.0, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” of 30/11/2007		
Sectoral Scope(s)	01	Technical Area(s)	1.2
Registered PDD	version 07 of 10/07/2009		
Starting date of the crediting period	01/04/2006		
Project’s crediting period	01/04/2006 to 31/03/2016		
Project documentation link	VCS database: http://www.vcsprojectdatabase.org/#/project_details/144		

2 VERIFICATION PROCESS

2.1 Method and Criteria

Verification was conducted using RINA procedures in line with the requirements specified in the VCS Requirements, i.e. VCS Program Guide, VCS Version 3 (v3.5), Requirements Document of 08/10/2013 and VCS Standard, VCS Version 3 (v3.5), Requirements Document of 25/03/2015. The GHG emission reductions are on the basis of the approved Baseline and monitoring methodology “ACM0002”, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, version 7.0 of 30/11/2007.

The verification consisted of the following three phases

- Document review;
- On-site assessment including Interviews and Site Inspections;
- Resolution of Any Material Discrepancy and the issuance of the final verification report and certification.

The following sections outline each step in more detail.

2.2 Document Review

The monitoring report (MR), version 1.0 of 27/08/2016 and version 2.0 of 05/10/2016 **/01/**, the emission reduction calculations spreadsheet (160827_Gunung Salak_ER calc ver1_ls.xlsx) version 01 of 27/08/2016 and (161005_Gunung Salak_ER calc ver1.1_ls.xlsx) of version 1.1 of 05/10/2016 **/03/**, were assessed as part of the verification. In addition the registered Project Design Document , version 07 of 10/07/2009 **/02/** in particular the baseline estimations and the monitoring plan for the project were reviewed.

The following table lists the documentation that was reviewed during the verification

/01/	South Pole Carbon Asset Management Ltd: VCS monitoring report for the project activity “Capacity Upgrade of Gunung Salak Geothermal Power Plant Project”, version 1.0 of 27/08/2016
	South Pole Carbon Asset Management Ltd: VCS monitoring report for the project activity

	"Capacity Upgrade of Gunung Salak Geothermal Power Plant Project", version 2.0 of 05/10/2016
/02/	PT Indonesia Power: VCS project description for project activity "Capacity Upgrade of Gunung Salak Geothermal Power Plant Project in Indonesia, version 07 of 10/07/2009
/03/	South Pole Carbon Asset Management Ltd: Emission Reduction spread sheet titled (160827_Gunung Salak_ER calc ver1_ls.xlsx) version 01 of 27/08/2016 South Pole Carbon Asset Management Ltd: Emission Reduction spread sheet titled (161005_Gunung Salak_ER calc ver1.1_ls.xlsx) version 1.1 of 05/10/2016
/04/	VCS: VCS Program Guide, VCS Version 3 (v3.5), Requirements Document of 08/10/2013
/05/	VCS: VCS Standard, VCS Version 3 (v3.5), Requirements Document of 25/03/2015
/06/	CDM Executive Board: Approved consolidated baseline and monitoring methodology "ACM0002", "Consolidated methodology for grid-connected electricity generation from renewable sources", version 7.0 of 30/11/2007
/07/	VCS: Monitoring report form (MONITORING REPORT: VCS Version 3) , version 03.3 dated 08/10/2013
/08/	TÜV NORD CERT GmbH: Validation report (53603008-09/255) for the project activity "Capacity Upgrade of Gunung Salak Geothermal Power Plant Project" dated 14/07/2009.
/09/	VCS: Capacity Upgrade of Gunung Salak Geothermal Power Plant Project http://www.vcsprojectdatabase.org/#/project_details/144 The website is in English language retrieved on 09/09/2016
/10/	Power Purchase Agreements between PERJANJIAN JUAL BELI TENAGA LISTRIK TAHUN 2003 and PT.INDONESIA POWER for all the three units 1,2&3, Nomor 405.PJ/o63/IP/2003 Power Purchase Agreements between PERJANJIAN JUAL BELI TENAGA LISTRIK TAHUN 2003 and PT.INDONESIA POWER for all the three units 1,2&3, Nomor 019.PJ/o63/IP/2008.
/11/	PT. PLN Persero : Monthly Energy generation report issued for the monitoring period from 01/04/2014 to 31/03/2016
/12/	PT. Indonesia Power: Invoice copy of the sales of electricity to PT.PLN PERSERO for the 5 th verification period from 01/04/2014 to 31/03/2016
/13/	Technical specifications of installed equipments
/14/	PT. Indonesia Power: Log book details of the diesel consumption of the monitoring period 01/04/2014 to 31/03/2016
/15/	PT. Geoservices Environmental Laboratories: NCG analysis for period 01/04/2014 to 31/03/2016
/16/	Laboratorium Kalibrasi ,PT PLN Persero: Calibration certificates for Energy meters Unit-1 main meter (PT 0806A119-01): dated 01/06/2012 and 03/06/2014 Unit-2 main meter (PT 0806A118-01): dated 01/06/2012 and 03/06/2014 Unit-3 main meter (MT 1006A500-01): dated 01/06/2012 and 03/06/2014 Unit-1 Back up meter (MT-1009A635-01):dated 20/12/2010 and 05/03/2015 Unit-2 Back up meter (PT-0802A471-01):dated 20/12/2010 and 05/03/2015 Unit-3 Back up meter (PT-0802A475-01):dated 20/12/2010 and 05/03/2015
/17/	PT.Indonesia Power: calibration certificates for steam flow meters. Unit-1: dated 25/07/2013,16/07/2014 and 13/07/2015 Unit-2: dated 25/07/2013,16/07/2014 and 13/07/2015 Unit-3: dated 26/07/2013,16/07/2014 and 14/07/2015

/18/	PT.Indonesia Power: Training records provided to the employees on operation and maintenance and data recording and storage.
/19/	PT.Indonesia Power: Log book details of the steam flow for the monitoring period from 01/04/2014 to 31/03/2016
/20/	Three parties SOP for Carbon Credit Monitoring Plan for Capacity Upgrade of Gunung Salak Geothermal Power Plant Project, Indonesia dated 20/10/2009.
/21/	PT. Indonesia Power: Working Instruction: Diesel Generator Operation Diesel Fire Fighting Pump Operation
/22/	TÜV Rheinland (China) Ltd :verification report no 01 997 9105081686, version 02 of 25/11/2014
/23/	P.T.PLN Persero certification services: Operational licence for unit -1 issued on 05/08/2011 , valid until 04/08/2016 Operational licence for unit -2 issued on 07/09/2011 , valid until 06/09/2016 Operational licence for unit -3 issued on 07/09/2011 , valid until 06/09/2016
/24/	Power Purchase Agreement signed between P.T Indonesia Power and P.T.PLN(persero) signed on 04/12/2013
/25/	Hakit (Indonesian Society of Power Generation Professionals): Training certificates of Mr. Ajib, dated 30/05/2013, Mr. Alexander dated 01/10/2012 and Mr. Lisnandar dated 01/10/2012.
/26/	Ministry of energy and mineral resources: grid code of electricity power system of Java-Madura- bali, dated 29/01/2007
/27/	PT.Indonesia Power: Shutdown and start up details of the power plant for the period 01/04/2014 to 31/03/2016
/28/	Emerson Process Management: Steam flow calculation with temperature and pressure
/29/	Emerson Process Management: Steam flow calculation
/30/	PT.Indonesia Power: Shutdown and start up details of the power plant for the period 19/12/2015 to 09/01/2016, dated 12/01/2016
/31/	PT.Indonesia power: Calibration certificates of temperature and pressure meters 1. Temperature meter (main steam temperature LH):Se.no: H7017C04233, dated 22/12/2015 2. Temperature meter (main steam temperature RH):Se.no: H7017B04233, dated 22/12/2015 3. Pressure meter (main steam press):Se.no: 01551549, dated 23/12/2015, dated 23/12/2015 4. Pressure meter (main head press):Se.no:5097002366, dated 23/12/2015, dated 23/12/2015
/32/	Website: http://database.v-c-s.org/rina-spa VCS: List of sectoral scopes RINA S.p.A is accredited Language: English Retrieved on: 27/09/2016

2.3 Interviews

Interviews: The key personnel interviewed and the main topics of the interviews are summarized in the table below:

	Date	Name and Role	Organization	Topic
1	07/09/2016	Mr. Saifudin N (Plant operation chief)	PT. Indonesia Power	Project description, Monitoring plan, ownership of GHG emission reductions, Project Start Date, Commercially Sensitive Information, Other Programs. Monitoring plan & QA/QC procedures. Day to day monitoring, O & M procedures, calibration of energy meter, JMR records etc.
2	07/09/2016	Mr. Wawan Juarsa (Senior supervisor maintainace)		
3	07/09/2016	Mr. Rinduan (Support VCS)		
4	07/09/2016	Mrs. Anna (Emission Reduction expert)		
5	07/09/2016	Mr. Eko (Expert Enviornmental Health and Safety)		
6	07/09/2016	Mr. Leonardo Sidabalok (Project Manager)	South Pole Carbon Asset Management Ltd	VCS documentation, requirments, VER ownership etc.

2.4 Site Inspections

On 07/09/2016, RINA visited the project site in Awibengkok--Ratu area of Gunung Salak Geothermal field Surrounded by Halimun Salak national park, which is administratively part of Bogor District and Sukabumi District, West Java Province of Indonesia to check the technology employed and monitoring arrangement as part of project activity. During the on-site assessment of the project RINA assessed the implementation and operation of the proposed project activity, accessed the installed equipment directly, interviewed key personnel of the plant to confirm the operation information, the commissioning of the units (1, 2 and 3), the GHG Programs undertaken.

2.5 Resolution of Findings

The objective of this phase of the validation is to resolve any outstanding issues which need to be clarified for RINA's positive conclusion on the project description. To guarantee transparency any findings raised regarding to the validation are incorporated in the Appendix A to this report..

2.5.1 Forward Action Requests

Based on the review of registered CDM validation report /08/, and previous verification report /22/ no FAR was raised during the validation or previous verification to be addressed during this verification.

2.6 Eligibility for Validation Activities

RINA is accredited for validating and verifying GHG emission reduction project activities falling under sectoral scope 01 Energy industries (renewable/non-renewable sources) /32/..

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

N/A.

3.2 Methodology Deviations

There is no methodology deviations applied to the project.

3.3 Project Description Deviations

There is no project description deviations applied to the project

3.4 Grouped Project

The verification team confirms that the project is not a grouped project and hence this is not applicable to the project activity.

4 VERIFICATION FINDINGS

The findings of the verification related to the monitoring period from 01/04/2014 to 31/03/2016 as documented and described in the VCS monitoring report version 1.0 of 27/08/2016 and version 2.0 of 05/10/2016 are stated in the following sections. The verification requirements, the means of verification and the results from verifying the identified criteria are documented in more detail in the verification protocol in Appendix A.

4.1 Project Implementation Status

RINA confirms that the project implementation is in line with the description in registered VCS-PD **/02/** by site visit. RINA performed a physical site visit on 07/09/2016 to verify the actual implementation of the project against the description in its registered VCS-PD **/02/** and found that all the units 1, 2 and 3 are in operation and the installed capacity of each unit is 60 MW, which is in line with the registered VCS-DD **/02/**. The capacity of the turbines, generators and DG sets were crosschecked with the nameplates. The model of the electrical generator, steam turbine capacity and the equipment's installed were checked with the technical specification provided by the PP and the same is as per the registered VCS-PD. RINA further checked the operation licences of each unit and noted that the same are valid until August and September 2016, which covers the respective monitoring period **/23/**. The implementations are in line with the description in registered VCS-PD **/02/**. The description in MR **/01/** is also consistent with the actual implementation confirmed as above. Therefore RINA confirmed that there is no material discrepancy between the actual project information and the project description.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

According to the methodology ACM0002, version 7.0, the baseline emissions are calculated as follows:

Baseline Emissions:

$$BE_y = (EG_y - EG_{\text{baseline}}) \times EF_{\text{grid, CM, y}}$$

$$EG_{\text{baseline}} = EG_{\text{historical}}, \text{ until Date}_{\text{Baseline Retrofit}}$$

$$EG_{\text{baseline}} = EG_y, \text{ on / after Date}_{\text{Baseline Retrofit}}$$

Where:

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

EG_y : Electricity supplied by the project activity to the grid (MWh)

EG_{baseline} : Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero.

$EF_{\text{grid, CM, y}}$: 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".

$EG_{\text{historical}}$: Average of historical electricity delivered by the existing facility to the grid (MWh).

$\text{DATE}_{\text{Baseline Retrofit}}$: Point in time when the existing equipment would need to be replaced in the absence of the project activity (date).

The project has taken the emission factor 0.882 tCO₂/MWh for estimation of baseline emission reductions as conservative. The emission factor is calculated in the validated VCS PD according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system, Version 01, 19/10/2007 (EB 35). The same is as per the registered VCS-PD.

Baseline emissions= **410,095** tCO₂e

Project Emissions:

a) Fugitive carbon dioxide and methane emissions due to release of non--condensable gases from the produced steam (PES_y); and

$$PE_y = PES_y + PEFF_y$$

$$a) \quad PES_y = (W_{main,CO_2} + W_{main,CH_4} \times GWP_{CH_4}) M_{s,y}$$

PE_y: Project emissions in year y (tCO₂/yr)

PES_y: Project emissions of carbon dioxide and methane due to the release of non-- condensable gases from the steam produced in the geothermal power plant in year y (tCO₂/yr)

PEFF_y: Project emissions from combustion of fossil fuels related to the operation of the geothermal power plant in year y (tCO₂/yr)

W_{main,CO₂}: Average mass fraction of carbon dioxide in the produced steam (non-- dimensional)

W_{main,CH₄}: Average mass fraction of methane gas in the produced steam (non-- dimensional)

GWP_{CH₄}: Global warming potential of methane valid for the relevant commitment period (tCO₂/tCH₄).

b) Carbon dioxide emissions from fossil fuel combustion (PEFF_y)

As referred to the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" v.01, project emissions coming from fossil fuel combustion is calculated as following:

$$PEFF_y = PE_{FC,j,y} = FC_{i,j,y} \times COEF_{i,y}$$

$$COEF_{i,y} = NCV_{i,y} \times EFCO_{2,i,y}$$

Where:

PEFF_y Project emissions from combustion of fossil fuels related to the operation of the geothermal power plant in year y (tCO₂/yr)

PE_{FC,j,y} CO₂ emissions from fossil fuel combustion in process 'j' during the year 'y' (tCO₂ e/year). This parameter shall be calculated as per the latest version of the Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion,

where 'j' stands for the processes required for the operation of the geothermal power plant.

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

COEF_{j,y} CO₂ emissions coefficient of fuel type 'i' in year 'y' (t CO₂ e/mass or volume unit)

NCV_{i,y} Weighted average net calorific value of the fuel type 'i' in year 'y' (GJ/mass or volume)

EFCO_{2,i,y} Weighted average CO₂ emission factor of fuel type 'i' in year 'y' (t CO₂/GJ)

Project emissions = **108,162** tCO₂e

Leakage:

Leakage emissions as described in the ACM0002 v.07 is 0 for retrofit project as following:

$$LE_y = 0$$

Where:

LE_y Leakage emissions in year y (tCO₂/yr)

The total emission Reductions for this monitoring period is = **301,933** tCO₂e

The following parameters were available at validation as per the registered VCS-PD /02/ and the validation report /08/:

DATA/PARAMETER	Source of data	Reported value for the project period	Assessment/Observation
EF _{OM,y} is the Average operating margin CO ₂ emission factor of power plant connected to the JAMALI electricity grid in 3 recent years available data, calculated using simple OM method for each year in which the project generation occurs. During the crediting period, this factor is calculated based on ex--ante emissions by using year 2004, 2005 and 2006 data. (EF _{OM,y})	PLN	0.829 tCO ₂ /MWh	The verification team has verified the value from the registered VCS-DD/02/ and validation report /08/ and found to be correct and consistent. Hence accepted.
EF _{BM,y} is the build margin CO ₂ emission factor of power plants in the sample group 'm' connected to the JAMALI electricity grid in year 'y'. During the crediting period, this factor is calculated based on ex--ante emissions by using year 2006 data. (EF _{BM,y})	PLN	0.936 tCO ₂ /MWh	The verification team has verified the value from the registered VCS-PD/02/ and validation report /08/ and found to be correct and consistent. Hence accepted.
EF _{CM,y} is the combined margin CO ₂ emission factor of power plants connected to the JAMALI electricity grid in year 'y', calculated ex--ante based on the 50% weighted average of EF _{OM,y} and EF _{BM,y} (EF _{CM,y})	PLN	0.882 tCO ₂ /MWh	The verification team has verified the value from the registered VCS-PD/02/ and validation report /08/ and found to be correct and consistent. Hence accepted.
EG _{historical} Average net electricity delivered to the grid before the project activity until DATE _{BaselineRetrofit}	Project Owner-revenue meter (electricity sales)	1,205,161 MWh	The verification team has verified the value from the registered VCS-PD/02/ and validation report /08/ and found to be correct and consistent. Hence accepted.
DATE _{BaselineRetrofit} Point in time when the existing equipment would need to be replaced in the absence of the project activity	The Government Regulation No. 59 year 2007 on Geothermal Activities for 30 years average technical lifetime.	Unit-1: 12/03/2024 Unit-2 :12/06/2024 Unit-3: 16/07/2027	The verification team has verified the value from the registered VCS-PD/02/ and validation report /08/ and found to be correct and consistent. Hence accepted.
GWP _{CH4} Global warming potential of methane, valid for the relevant	IPCC	21	The verification team has verified the value from the

commitment period in tCO ₂ /tCH ₄			registered VCS-PD/02/ and validation report /08/ and found to be correct and consistent. Hence accepted.
ρ_i Density of diesel fuel in kg/m ³	Pertamina diesel fuel specification	0.815 kg/litre = 815 kg/m ³	The verification team has verified the value from the registered VCS-PD/02/ and validation report /08/ and found to be correct and consistent. Hence accepted.

Data and parameters monitored ex-post:

The following parameters are monitored :

Data/Parameter	M _{s,y}			
Data Unit	Tonnes			
Description	Quantity of steam produced during the year 'y'			
Source of data to be used	Project Owner--main steam line flow meter /19/			
Value of monitored parameter for the monitoring period	Steam produced during year y (tonnes/yr)			
		01/04/2014 to 31/12/2014	01/01/2015 to 31/12/2015	01/01/2016 to 31/03/2016
	Unit-1	3,030,609.50	3,855,693.80	868,015.00
	Unit-2	2,887,450.30	3,594,520.20	936,114.40
	Unit-3	2,696,728.50	3,556,581.00	950,350.10
	Total	8,614,788.30	11,006,795.00	2,754,479.50
	RINA verified the quantity of steam from the three units with the hourly log sheets recorded by the PP /19/. The same was found to be consistent with the ER spread sheets /03/.			

Monitoring equipment	Steam flow meter	Se.No	Calibration dates	Calibration entity	Does it cover the MP
	Unit #1	H400C50109D	25/07/2013,16/07/2014 and 13/07/2015	P.T.Indonesia Power	Yes /17/
	Unit #2	1594052708	25/07/2013,16/07/2014 and 13/07/2015	P.T.Indonesia Power	Yes /17/
	Unit #3	D404420109D	26/07/2013,16/07/2014 and 14/07/2015	P.T.Indonesia Power	Yes /17/
Noted that the calibration of steam flow meters was performed by personnel from P.T.Indonesia Power. RINA checked the credibility of the peronnel performing such calibration and noted that the three personnel are trained from Hakit (Indonesian Society of Power Genration Professionals) /25/ and the same was accepted by RINA.					
Accuracy of the monitoring equipment	0.25%				
Measuring/Reading/Recording frequency	In accordance with registered PD, the parameter is monitored continuously. The readings are recorded hourly and the values are aggregated annually.				
Calculation method (if applicable)	Noted that for the period from 19/12/2015 to 31/03/2016, the steam, flow meter of unit-1 was removed due to replacement of steam pipeline of unit-1 and the meter was not put back on 08/01/2016 , when the steam line for unit-1 was back in operation /30/. During this period (09/01/2016 to 31/03/2016) for unit -1 the steam flow was calculated by using Emerson Process Management's software. First, the software take inputs from the pressure and temperature transmitters, then calculates the inputs, and then generate output value of the steam flow. The same was checked from the specification document of Emerson Process Management /29/. RINA further checked the calibration certificates of inlet and outlet temperature meters as well as pressure meters and the same was found to be in order /31/.				
Calibration					
Calibration frequency/interval	Once in a year and the same was also confirmed from the previous verification report /22/				
Is the calibration interval in line with the monitoring plan of the PD?					

Data/Parameter	$W_{\text{main,CH}_4}$
Data Unit	t CO ₂ /t steam
Description	Average mass fraction of methane in the produced steam (non-dimensional)
Source of data to be used	The Non-Condensable Gases (NCG) data taken from steam sampling
Value of monitored parameter for the monitoring period	As mentioned in the MR RINA verified the values provided in the ER sheets with the NCG analysis reports /15/ and the same is found to be consistent. The NCG sampling and analysis is performed every 4 months by P.T.Geoservices as per the methodology requirements ACM0002, version 07 /06/.
Monitoring equipment	Gas analysis using Gas Chromatography performed by external laboratory. Non-condensable gases sampling are carried out at the steam field-power plant interface using ASTM Standard Practice E1675 for Sampling 2-Phase Geothermal Fluid for Purposes of Chemical Analysis (as applicable to sampling phase steam only) as prescribed in the Monitoring Methodology ACM0002 version 07 /06/.
Accuracy of the monitoring equipment	N/A
Measuring/Reading/Recording frequency	Recorded and reported once in every 4 months.
Calculation method (if applicable)	N/A
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	N/A

Data/Parameter	$W_{\text{main,CO}_2}$
Data Unit	t CO ₂ /t steam
Description	Average mass fraction of carbon dioxide in the produced steam (non-dimensional)
Source of data to be used	The Non-Condensable Gases (NCG) data taken from steam Sampling /15/
Value of monitored parameter for the monitoring period	As mentioned in the MR RINA verified the values provided in the ER sheets with the NCG analysis reports /15/ and the same is found to be consistent. The NCG sampling and analysis is performed every 4 months by Geoservices Ltd as per the methodology requirements ACM0002, version 07 /06/.
Monitoring equipment	Gas analysis using Gas Chromatography performed by external laboratory. Non-condensable gases sampling are carried out at the steam field-power plant interface using ASTM Standard Practice E1675 for Sampling 2-Phase Geothermal Fluid for Purposes of Chemical Analysis (as applicable to sampling phase steam only) as prescribed in the Monitoring Methodology ACM0002 version 07 /06/.
Accuracy of the monitoring equipment	N/A
Measuring/Reading/Recording frequency	Recorded and reported once in every 4 months.
Calculation method (if applicable)	N/A
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	N/A

Data/Parameter	EG _y																																				
Data Unit	MWh																																				
Description	Net electricity delivered to the grid by the project activity																																				
Source of data to be used	Project Owner--PLN revenue meter (electricity sales) /11/																																				
Value of monitored parameter for the monitoring period	2,876,154.73 RINA verified the values provided in the ER sheets with the hourly readings recorded in the form of electronic files. This was also checked with the monthly generation readings signed by all parties (P.T.Indonesia power, Chevron Geothermal Salak, PT.PLN Persero and Pertamina Geothermal Energy) /11/ and further cross checked with electricity sale invoice /12/. The same was found to be consistent.																																				
Monitoring equipment	<table><tr><td>Revenue meter</td><td>Se.No</td><td>Calibration dates</td><td>Calibration entity</td><td>Does it cover the MP</td></tr><tr><td rowspan="2">Unit #1</td><td>MT-1009A635-01 (PLN owned back--up meter)</td><td>20/12/2010 and 05/03/2015</td><td>P.T.PLN Persero (accredited govt lab)</td><td>Yes /16/</td></tr><tr><td>PT 0806A119-01 (main meter)</td><td>01/06/2012 and 03/06/2014</td><td>P.T.PLN Persero</td><td>No /16/</td></tr><tr><td rowspan="2">Unit #2</td><td>PT-0802A471-01 (PLN owned Back up meter)</td><td>20/12/2010 and 05/03/2015</td><td>P.T.PLN Persero</td><td>Yes /16/</td></tr><tr><td>PT 0806A118-01 (main meter)</td><td>01/06/2012 and 03/06/2014</td><td>P.T.PLN Persero</td><td>No /16/</td></tr><tr><td rowspan="2">Unit #3</td><td>PT-0802A475-01 (PLN owned back up meter)</td><td>20/12/2010 and 05/03/2015</td><td>P.T.PLN Persero</td><td>Yes /16/</td></tr><tr><td>MT 1006A500-01 (main meter)</td><td>01/06/2012 and 03/06/2014</td><td>P.T.PLN Persero</td><td>No /16/</td></tr></table> Noted that the calibration frequency of PLN owned back up meters is once in 5 years /26/ and the revenue meters are once in a year as per the PPA /24/. It is observed that there had been a delay in calibration of revenue meters by 2 days. The PP has calculated the error for the same and it is reflected in ER calculations /03/.					Revenue meter	Se.No	Calibration dates	Calibration entity	Does it cover the MP	Unit #1	MT-1009A635-01 (PLN owned back--up meter)	20/12/2010 and 05/03/2015	P.T.PLN Persero (accredited govt lab)	Yes /16/	PT 0806A119-01 (main meter)	01/06/2012 and 03/06/2014	P.T.PLN Persero	No /16/	Unit #2	PT-0802A471-01 (PLN owned Back up meter)	20/12/2010 and 05/03/2015	P.T.PLN Persero	Yes /16/	PT 0806A118-01 (main meter)	01/06/2012 and 03/06/2014	P.T.PLN Persero	No /16/	Unit #3	PT-0802A475-01 (PLN owned back up meter)	20/12/2010 and 05/03/2015	P.T.PLN Persero	Yes /16/	MT 1006A500-01 (main meter)	01/06/2012 and 03/06/2014	P.T.PLN Persero	No /16/
Revenue meter	Se.No	Calibration dates	Calibration entity	Does it cover the MP																																	
Unit #1	MT-1009A635-01 (PLN owned back--up meter)	20/12/2010 and 05/03/2015	P.T.PLN Persero (accredited govt lab)	Yes /16/																																	
	PT 0806A119-01 (main meter)	01/06/2012 and 03/06/2014	P.T.PLN Persero	No /16/																																	
Unit #2	PT-0802A471-01 (PLN owned Back up meter)	20/12/2010 and 05/03/2015	P.T.PLN Persero	Yes /16/																																	
	PT 0806A118-01 (main meter)	01/06/2012 and 03/06/2014	P.T.PLN Persero	No /16/																																	
Unit #3	PT-0802A475-01 (PLN owned back up meter)	20/12/2010 and 05/03/2015	P.T.PLN Persero	Yes /16/																																	
	MT 1006A500-01 (main meter)	01/06/2012 and 03/06/2014	P.T.PLN Persero	No /16/																																	
Accuracy of the monitoring equipment	0.2																																				

Measuring/Reading/Recording frequency	Measurement of electricity is continuous , the reading are recorded hourly, daily and reported annually. Also the monthly readings are recorded.
Calculation method (if applicable)	N/A
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	Please refer above.

Data/Parameter	EG _{imp}						
Data Unit	MWh						
Description	Electricity imported from the grid						
Source of data to be used	Project Owner--PLN revenue meter (electricity sales) /11/						
Value of monitored parameter for the monitoring period	865.45 RINA verified the values provided in the ER sheets with the hourly readings recorded in the form of electronic files. This was also checked with the monthly generation readings signed by all parties (P.T.Indonesia power, Chevron Geothermal Salak, PT.PLN Persero and Pertamina Geothermal Energy) /11/ and further cross checked with electricity sale invoice /12/. The same was found to be consistent.						
Monitoring equipment	Revenue meter	Se.No	Calibration dates		Calibration entity	Does it cover the MP	
	Unit #1	MT-1009A635-01 (PLN owned back-up meter)	20/12/2010 and 05/03/2015		P.T.PLN Persero	Yes /16/	
		PT 0806A119-01 (main meter)	01/06/2012 and 03/06/2014		P.T.PLN Persero	No /16/	
	Unit #2	PT-0802A471-01 (PLN owned Back up meter)	20/12/2010 and 05/03/2015		P.T.PLN Persero	Yes /16/	
		PT 0806A118-01 (main meter)	01/06/2012 and 03/06/2014		P.T.PLN Persero	No /16/	
	Unit #3	PT-0802A475-01 (PLN owned back up meter)	20/12/2010 and 05/03/2015		P.T.PLN Persero	Yes /16/	
		MT 1006A500-01 (main meter)	01/06/2012 and 03/06/2014		P.T.PLN Persero	No /16/	
	Noted that the calibration frequency of PLN owned back up meters is once in 5 years /26/ and the revenue meters are once in a two years as per the PPA /24/. It is observed that there had been a delay in calibration of revenue meters by 2 days. The PP has calculated the error for the same and it is reflected in ER calculations /03/.						
	Accuracy of the monitoring equipment	0.2					
	Measuring/Reading/Recording	Measurement of electricity is continuous , the reading are					

frequency	recorded hourly, daily and reported annually. Also the monthly readings are recorded.
Calculation method (if applicable)	The net electricity exported to the grid is the difference of the electricity export and electricity import by the project activity, which is measured and calculated
Calibration	
Calibration frequency/interval Is the calibration interval in line with the monitoring plan of the PD?	Please refer above.

Data/Parameter	FC _{i,y}
Data Unit	Litres/year
Description	Amount of diesel fuel used in the geothermal power plant operation
Source of data to be used	Project Owner--diesel fuel operational logbook /14/
Value of monitored parameter for the monitoring period	145,050.88 RINA verified the values of diesel genset usage hours and power plant shut down hours provided in the ER spread sheets with the genset operational log books for the respective MP /14/ and the plant shut down and start up reports /27/. The same was found to be consistent.
Monitoring equipment	N/A
Accuracy of the monitoring equipment	N/A
Measuring/Reading/Recording frequency	Recorded monthly
Calculation method (if applicable)	Fuel consumption is calculated from power shutdown records (hours) and/or diesel usage by using emergency diesel genset 400 kVA/320 kWh technical specification incl. its fuel consumption specification (0.260—it depends on each diesel genset), resulted in litres then converted to tonnes using fuel specific density or scientifically proven fuel densities. Following is formulae to calculate fuel consumption: $FC_{i,y} = \text{Total shutdown time(hours)} \times \text{Energy (kWh)} \times \text{specific fuelconsumption (0.260)}$ The same was used in ER calculations and accepted by RINA /03/.
Calibration	
Calibration frequency/interval	N/A
Is the calibration interval in line with the monitoring plan of the PD?	

EG_{baseline} : 1,205,162.03 MWh, is taken as per 5--years historical data recorded by PT. Indonesia Power between 1999--2004 for Unit 3 and 2000--2005 for Units 1 and 2 before the project activity. The data is already validated and verified during the validation stage /08/.

$$EG_{baseline} = EG_{historical, until DATE_{Baseline Retrofit}}$$

$$EG_{baseline} = EG_{y, on / after DATE_{Baseline Retrofit}}$$

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

As discussed in the above section the quantity of steam for all the three units is measured by means of calibrated meters. The values were cross checked with the hourly records of log books /19/. Average mass fraction of carbon dioxide and methane in the produced steam (non-dimensional) is checked with NCG analysis reports, recorded every 4 months by accredited third party lab /15/. Quantity of net electricity generation supplied by the project plant/unit to the grid is measured with the help of revenue meters. Every month representatives from PT.PLN Persero's take the reading of the main meter in the presence of representatives from Chevron and PT. Indonesia Power. The monthly electricity production reports present the net electricity export to grid /11/. Base on the monthly readings invoice is raised by PP /12/. The verification team has cross checked monthly electricity sale invoices against the net export and found to be in order. Further the diesel consumption was checked against the records of power plant shutdown hours and diesel gen set usage hours/14/.

During the site visit it was checked that all the monitored data is archived both physically as well as in electronic format. All records needed for monitoring are archived in line with the requirements of the registered monitoring plan. Combined margin CO₂ emission factor for grid connected power generation in year y is taken as 0.882 tCO₂/MWh for the JAMALI Grid, Indonesia has been rightly applied in this monitoring period. The verification team has verified the value with registered VCS-PD and found to be correct and consistent /02/.

4.4 Non-Permanence Risk Analysis

N/A

5 VERIFICATION CONCLUSION

RINA Service Spa (RINA) has performed verification of the emission reductions reported for the project activity “Capacity Upgrade of Gunung Salak Geothermal Power Plant Project”, in Indonesia with VCS project ID, for the period 01/04/2014 to 31/03/2016 with regard to the relevant requirements for VCS and CDM activities.

The project participants of the “Capacity Upgrade of Gunung Salak Geothermal Power Plant Project” project are responsible for:

- The preparation of greenhouses gas emissions data and the reported greenhouse gas emission reductions from the project on the basis set out in the monitoring plan contained in the registered project design document revision 07 of 10/07/2009.
- The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of greenhouse gas emission reductions of the project

It is the responsibility of RINA to express an independent verification opinion about the project's conformity with the requirements of VCSA and on the reported greenhouse gas emission reductions from the project.

Based on documented evidence and corroborated by an on-site assessment RINA can confirm that:

- the project has been implemented and operated as per the registered VCS-PD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable CDM and VCS requirements;
- the monitoring is in place as per the applied baseline and monitoring methodology;
- the monitoring complies with the monitoring plan in the registered VCS-PD;
- the monitoring plan in the registered VCS-PD is as per the applied baseline and monitoring methodology.

It is RINA's opinion that the GHG emission reduction stated in the monitoring report version 2.0 of 05/10/2016 for the “Capacity Upgrade of Gunung Salak Geothermal Power Plant Project” project in Indonesia for the period 01/04/2014 to 31/03/2016 are fairly stated. The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology ACM0002, “Consolidated methodology for grid-connected electricity generation from renewable sources” version 7.0 of 30/11/2007 and the monitoring plan contained in the registered VCS-PD.

Hence RINA is able to certify that the emission reductions from the project during the monitoring period 01/04/2014 to 31/03/2016 as follows:

01/04/2014 to 31/12/2014: 114, 381.00 tCO₂e

01/01/2015 to 31/12/2015: 150, 586.00 tCO₂e

01/01/2016 to 31/03/2016: 36, 966.00 tCO₂e

Total: 301,933 tCO₂e

APPENDIX A: <RESOLUTION TABLE>
TABLE 1 RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

Corrective action and/ or clarification requests	Reference to report	Response by project participants	Verification Conclusion
CL1 1. PP is requested to provide the latest version of PPA signed and also translate the relevant pages of the amendment. 2. Kindly provide the English version of operational licences for all the three units.	4.1	1. The latest version of PPA signed and also translate the relevant pages of the amendment have been provided (Please refer to pages cover, 1, 2, 6 and 24). 2. The operational licenses (power plant operation worthiness certificates / Sertifikat Laik Operasi) for all the three units have been provided in the English version.	1. The ammended Power purchase agreement for the year 2013-2017 between P.T Indonesia Power and P.T.PLN(persero) signed on 04/12/2013 checked and the same is accepted. 2. Operation worthiness certificate issued by P.T.PLN Persero certification services for all the 3 units checked. Noted that unit-1 is valid untill04/08/2016, unit-2 is valid untill 06/09/2016 and unit-3 untill 06/09/2016. Based on the above mentioned points CL 1 is closed.
CL 2 1. PP is requested to provide the regulation, which states that the meter calibration for PLN backup meters is once in 5 years.	4.2	1. The regulation (Grid Code Jamali from Minister of Energy and Mineral Resources), which states that the meter calibration for PLN backup meters is once in 5 years has been provided (completed with English translation for relevant pages. Please refer to pages 1, 2, and	1. RINA checked the grid code of electricity power system of Java-Madura-bali , issued by ministry of energy and mineral resources., dated 29/01/2007. The documents states that the calibration of the equipment has to be done once in every 5 years. The same was accepted.

Corrective action and/ or clarification requests	Reference to report	Response by project participants	Verification Conclusion
2. During the site visit it was noted that the steam flow meter of unit 1 was removed. PP is requested to justify on why and when was it removed. Please support the same with evidences.		103) 2. The clarification to justify why the steam flow meter of Unit 1 was removed is due to the maintenance program of Simple Inspection (SI) and DCS retrofit in Unit 1 that was started on Dec 19th, 2015 at 01.14 AM local time and finished on Jan 9th, 2016 at 08.03 PM local time (Unit 1 totally shutdown). There were some works carried out concurrently with the SI of Unit 1, and of one of the work was replacement of the main steam pipe in Unit 1, where the steamflow meter Unit 1 was installed in the main steam pipe, hence the steamflow meter must be uninstalled/removed. The supporting evidence related of shutdown report has been provided.	2. Yes, RINA completely accepts the justification provided by the PP. RINA checked the shut down and start report for unit-1, dated 12/01/2016, and confirms that from 19/12/2015 there was a replacement in main steam pipeline and thus the steam flow meter of unit 1 was removed. The unit was back in operation from 09/01/2016. However, the meter is not yet put back. The justification provided by PP is accepted.
3. PP is requested to provide the SE.Nos of the steam flow meters in the calibration certificates and also provide the specifications of the steam flow meter used in the project activity.		3. The SE.Nos of the steam flow meters in the calibration certificates and the specifications of the steam flow meter used in the project activity have been provided in attached the revised Monitoring Report version 2.0 dated on 03/10/2016.	3. Yes, the se.no of the flow meters and the specifications of the steam flow meter was provided. The same was crossed checked during the site visit and found to be in order.
			4. checked the training

Corrective action and/ or clarification requests	Reference to report	Response by project participants	Verification Conclusion
4. Kindly provide the certificates of the personnel trained in calibrating the steam flowmeters in particular with respective monitoring period. 5. PP is further requested to clarify on , how the steam flow was calculated when the meter was removed. PP is further requested to provide the calibration certificates of other indicators , incase used in calculation of steam flow.		4. The certificates of the personnel trained (Certificate of Competency) in calibrating the steam flowmeters in particular with respective monitoring period have been provided. 5. The steam flow was calculated by using Emerson Process Management's software when the meter was removed. First, the software take inputs from the pressure and temperature transmitters, then calculates the inputs, and then generate output value of the steamflow. The calculation process has been provided in the attached file Emerson Process Management_Main Steam Flow Calculation.pdf. The calibration certificates of other indicators (pressure and temperature transmitters) have been provided.	certificates of personnel trained to perform steam flow meter calibration. The Following personnel were involve: 1.Ajin Kusnidar 2.Richard Alexander 3. Rendi Lisnandar Noted that all the above were authorized to perform calibration in the respective MP. 5. Noted that for the period from 19/12/2015 to 31/03/2016, the steam, flow meter was removed due to replacement of steam pipeline and the meter was not put back on 08/01/2016 , when the steam line for unit-1 was back in operation /30/. During this period (09/01/2016 to 31/03/2016) for unit -1 the steam flow was calculated by using Emerson Process Management's software. First, the software take inputs from the pressure and temperature transmitters, then calculates the inputs, and then generate output value of the steam flow. The same was checked from the specification document of Emerson Process Management /29/. RINA further checked the calibration certificates of inlet and outlet temperature meters as well as pressure meters and the same was found to be in order /31/. CL2 is closed.

CERTIFICATO DI QUALIFICA PER GLI SCHEMI VOLONTARI* QUALIFICATION CERTIFICATE FOR VOLUNTARY SCHEMES*

Si attesta che il sig./sig.ra:
We declare that Mr/Mrs/Ms:

Rekha Menon

è qualificato come:
is qualified as:

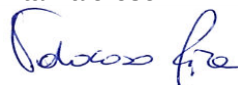
TEC, VAL, VER, TL, ITRP

per le seguenti aree tecniche:
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.2	Renewables	1
2.1	Electricity distribution	2
13.1	Solid waste and wastewater	13
13.2	Manure	13
14.1	Afforestation and reforestation	14

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	19/07/2016	First issue with new template (this certificate is linked to CDM qualification)

Responsabile di schema
Scheme Leader
Rita Valoroso



*SCHEMI VOLONTARI/ VOLUNTARY SCHEMES: ACR American Carbon Registry, CCB The Climate, Community & Biodiversity Alliance, GS Gold Standard, JI Joint Implementation, SCS Social Carbon Standard, VCS Verified Carbon Standard.

TEC: Technical expert; VAL: Validator; VER: Verifier; TL: Team leader; FIN EXP: Financial Expert; ITRP: Independent technical reviewer

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UNFCCC	quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM <i>as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects</i>
VCSA	per condurre la Validazione e la Verifica di Progetti VCS <i>to carry out Validation and Verification of VCS Projects</i>
GS Foundation	per condurre la Validazione e la Verifica di Progetti GS <i>to carry out Validation and Verification of GS Projects</i>
Ecologica Institute	per condurre la Validazione e la Verifica di rapporti SCS <i>to carry out Validation and Verification of SCS Reports</i>
American Carbon Registry ACR	per condurre la Validazione e la Verifica di Progetti ACR <i>to carry out Validation and Verification of ACR projects</i>
The Climate, Community & Biodiversity Alliance CCB	per condurre la Validazione e la Verifica di Progetti co-benefit CCB <i>to carry out Validation and Verification of co-benefit CCB projects</i>

CERTIFICATO DI QUALIFICA PER GLI SCHEMI VOLONTARI* QUALIFICATION CERTIFICATE FOR VOLUNTARY SCHEMES*

Si attesta che il sig./sig.ra:
We declare that Mr/Mrs/Ms:

Cyril Augustus Arokiasamy Amalorpavanathan

è qualificato come:
is qualified as:

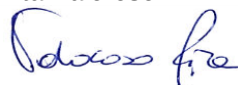
TEC, VAL, VER, TL

per le seguenti aree tecniche:
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.1	Thermal energy generation	1
1.2	Renewables	1
3.1	Energy Demand	3
5.1	Chemical industry	5
13.1	Solid Waste and wastewater	13

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	19/07/2016	First issue with new template (this certificate is linked to CDM qualification)

Responsabile di schema
Scheme Leader
Rita Valoroso



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CERTIFICATO DI QUALIFICA PER GLI SCHEMI VOLONTARI* QUALIFICATION CERTIFICATE FOR VOLUNTARY SCHEMES*

Si attesta che il sig./sig.ra:
We declare that Mr/Mrs/Ms:

Rita Valoroso

è qualificato come:
is qualified as:

TEC, VAL, VER, TL, ITRP

per le seguenti aree tecniche:
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.2	Renewables	1
3.1	Energy demand	3
13.1	Solid waste and wastewater	13

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	19/07/2016	First issue with new template (this certificate is linked to CDM qualification)

Responsabile QPT
Head of QPT
Laura Severino



*SCHEMI VOLONTARI/ VOLUNTARY SCHEMES: ACR American Carbon Registry, CCB The Climate, Community & Biodiversity Alliance, GS Gold Standard, JI Joint Implementation, SCS Social Carbon Standard, VCS Verified Carbon Standard.

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