Validation report form for renewal of crediting period for CDM project activities

(Version 03.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title and UNFCCC reference number of the project activity	Choloma Hydroelectric Project ID: 9306 TN P-No.: 8003007657 - 19/065
Number and duration of the next crediting period	CP-No.: 2 7 years 01/01/2020 – 31/12/2026
Version number of the validation report	1.1
Completion date of the validation report	21/04/2020
Version number of PDD to which this report applies	6.1
Project participants	Hidroelectrica Choloma, S.A.
Host Party	Guatemala
Applied methodologies and standardized baselines	AMS-I.D: Grid connected renewable electricity generation (Version 18.0) Standardized baselines: N/A
Mandatory sectoral scopes	Scope: 1 / Technical Area: 1.2
Conditional sectoral scopes, if applicable	N/A
Estimated amount of annual average GHG emission reductions or GHG removals by sinks in the next crediting period	14,542 t CO_{2e}
Name and UNFCCC reference number of the DOE	TÜV NORD CERT GmbH; UNFCCC reference number: E-0022
Name, position and signature of the approver of the validation report	Stefan Winter Final Approver

SECTION A. Executive summary

Hidroelectrica Choloma, S.A. has commissioned the TÜV NORD JI/CDM Certification Program to carry out validation of the request for renewal of crediting period (RCP) for the project:

"Choloma Hydroelectric Project"

with regard to the relevant requirements for CDM project activities.

The project has been registered on 28/12/2012 under the UNFCCC registration No. 9306. The PPs have chosen a 7 year crediting period which is now due for renewal. The first crediting period has started on 01/01/2013 and expired on 31/12/2019.
According to EB meeting report of 100 meeting/EBMR/, "Notification of renewal intention from project participants is no longer required, and therefore there is no longer a penalty of "unclaimable period" of CERs for late notification", and "A DOE shall submit a renewal request to the secretariat no earlier than 270 days prior to, but no later than one year after, the expiry of the crediting period, otherwise the renewal is no longer possible for the project activity".
Hence PP selected TÜV NORD to conduct the RCP validation no later than one year after the expiry of the 1st crediting period, which is confirmed as in line with the EB requirement for the RCP.
The objective of this RCP validation is the review by an independent entity whether the project is still compliant with the applicable sections of:

- the CDM project standard/PS/,
- the CDM cycle procedure/RCP/
- the updated applied UNFCCC Methodology AMS-I.D. , Ver. 18 /METH-2/and
- TOOL 11 - Assessment of the validity of the original / current baseline and update of the baseline at the renewal of the crediting period, version 3.0.1.
- TOOL 07 - to calculate the emission factor for an electricity system, version 7.0
- TOOL 20 - Assessment of debundling for small-scale project activities, version 4.0
- TOOL 09 - Determining the baseline efficiency of thermal or electric energy generation systems, version 2.0.

As per the requirements of the CDM Validation and Verification Standard/VVS/ the validation is based on

- the registered and/or latest updated version of the PDD (including revisions of the monitoring plan)/PDD/,
- the updated emission reduction calculation spread sheet /XLS/,
- further supporting documents made available to the validator as well as
- information collected through performing interviews and during the on-site assessment.

Furthermore publicly available information, such as the host country legislation, was considered as far as available and required.

The project reduces GHG emissions due to due to the use of hydroelectric power to generate renewable electricity to be delivered to the national grid of Guatemala.

The project consists of a run of river power plant with capacity of 9.7 MW.

Details of the project location are given in table A-1 below:

Table A-1: Project Location

No.	Project Location
Host Country	Guatemala
Region:	Departament Alta Verapaz
Project address:	County Senahú, around 200 kilometres North-east of Guatemala City
Latitude:	15.41656531
Longitude:	-89.74165110

Basic technical details of the project are summarized in table A-2.

Table - A-2: Technical data of the project activity

Parameter	Unit	Value
Turbine capacity	MW	9.577
Generator capacity	MW	9.7
Gross Head	m	461
Nominal flow	m^3/s	2.5
Water storage tank operation capacity	m^3	20,000
Manufacturer	-	Gilkes

SECTION B. Validation team, technical reviewer and approver

B.1. Validation team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	EI	Quireza	Oliver	TN México	x	x	x	x
2.	Team member	EI	Mitre	Raúl	TN México	x	x	x	x

A.1. Technical reviewer and approver of the validation report for RCP

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Stöhr	Christina	TÜV NORD CERT
2	Approver	IR	Winter	Stefan	TÜV NORD CERT

SECTION C. Means of validation

C.1. Desk/document review

During the desk review all documents initially provided by the client and publicly available documents relevant for the validation were reviewed. The main documents are listed below:

- the last revision of the PDD including the monitoring plan/PDD/,
- the last revision of the validation report/VAL/,
- documentation of previous verifications/VER/
- the monitoring report, including the claimed emission reductions for the project/MR/,
- the emission reduction calculation spreadsheet/XLS/.

Other supporting documents, such as publicly available information on the UNFCCC website and background information were also reviewed.

C.2. On-site inspection

Duration of on-site inspection: 19/08/2019 to 23/08/2019				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Kick off meeting	PP office in Guatemala	19/08/2019	Oliver Quireza Raul Mitre
2.	Plant inspection	Hydroelectric plant site	20/08/2019	Oliver Quireza Raul Mitre
3.	Evidence assessment	Hydroelectric plant site	21/08/2019	Oliver Quireza Raul Mitre
4.	Evidence assessment	Hydroelectric plant site	22/08/2019	Oliver Quireza Raul Mitre
5.	Preparation of the DVR	PP office in Guatemala	23/08/2019	Oliver Quireza Raul Mitre
6.	Findings summary to the client	PP office in Guatemala	23/08/2019	Oliver Quireza Raul Mitre
7.	Closing meeting	PP office in Guatemala	23/08/2019	Oliver Quireza Raul Mitre

C.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Ruiz	Laura	Grupo Secacao	20-08-2019	Environmental	R. Mitre O. Quireza
2.	González	Alaide	Consultant	20-08-2019	Consultant	R. Mitre O. Quireza
3.	Pastor	Amilcar	Candelaria & Choloma	20-08-2019	Plant Management	R. Mitre O. Quireza
4.	Bladimir	Azañon	Candelaria & Choloma	20-08-2019	Operation	R. Mitre O. Quireza

C.4. Sampling approach

Not applicable

C.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Area of validation findings	**No. of CL**	**No. of CAR**	**No. of FAR**
Compliance with PDD form	-	2	-
Application and selection of methodologies and standardized baselines	-	2	-
Validity of original baseline or its update	-	2	-
Estimated emission reductions or net anthropogenic removals	-	2	-
Validity of monitoring plan	-	3	-
Crediting period	-	-	-
Project participants	-	-	-
Post-registration changes	-	-	-
Others (project information)	-	2	-
Total	**-**	**13**	**-**

SECTION D. Validation findings

D.1. Compliance with PDD form

Means of validation	A draft revised PDD was submitted to the validation team by the project participants. By means of the UNFCCC website it has been checked whether the latest applicable PDD template CDM-PDD-FORM has been used. Further it has been checked whether the latest instructions for filling out the PDD template have been followed. Every section has been checked against the respective guidance. The following sources of information have been used in this context: • /PDD/ • /PDD-T/ • /unfccc/	
Findings	☐	The latest reporting template CDM-PDD-FORM as listed on the UNFCCC website has been used for the PDD.
	☐	The latest instructions for filling out the PDD have been followed. No adverse finding has been identified in the course of this validation.
	☒	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
		CAR 01
Conclusion	☐	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☒	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	After correction it is confirmed that the latest PDD template has been used and also the instructions for filling out the PDD have been followed. It is confirmed that the information transferred to the latest version of the PDD form is materially the same as that in the registered PDD.	

D.2. Application and selection of methodologies and standardized baselines

Means of validation	By means of comparison of the PDD with (i) the applied CDM methodology (ii) all applicable CDM Meth tools and (iii) if applicable, a standardized baseline the verification team has checked whether the updated PDD is in compliance with the requirements of the applied methodology/tools/SB. The following sources of information have been used in this context: • /PDD/ • /METH/ • /TOOL/ • /unfccc/			
Findings	☒	The updated PDD is completely in accordance with the approved methodology applicable for the CDM project		
	☒	The breakdown of PDD accordance of the referenced tools is as follows:		
		1	Title (of the tool)	Tool to calculate the emission factor for an electricity system
			Version	7.0
			MP compliance	☒ full compliance ☐ findings have been raised ☐ N/A (for MP)
		2	Title (of the tool)	Assessment of the validity of the original/current baseline und update of the baseline at the renewal of the crediting period
			Version	03.0.1
			MP compliance	☐ full compliance ☒ findings have been raised

				☐ N/A
		3	Title (of the tool)	Tool assessment of debundling for small-scale project activities
			Version	4
			MP compliance	☐ full compliance ☒ findings have been raised ☐ N/A
	☐	The breakdown of PDD accordance of the applicable SB is as follows:		
		1	Title (of SB)	-
			Version	-
			MP compliance	☐ full compliance ☐ findings have been raised ☒ N/A
	☒	In this context the following CARs, CLs, FARs have been raised:		
		CAR 07		
Conclusion	☐	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.		
	☒	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.		
	The updated PDD fully complies with the latest version of the approved methodology and applicable tools. All applicable references in the updated PDD are correct and all applicable tools have been correctly identified.			

D.3. Validity of original baseline or its update

Means of validation	In order to check the validity of the original baseline or its updates the validation team has applied the following stepwise approach: The baseline scenario of the project as per the registered project can be described as follows: *The electricity delivered to the grid by the project activity would have otherwise been generated by the operation of the grid-connected power plants and by the addition of new generation sources into the grid.* As per the project standard this scenario is not subject to re-assessment and is thus deemed to be applicable for the next crediting period. However the baseline itself i.e. the calculation of baseline emissions has been checked regarding the continued validity of underlying assumptions and parameter values. The assessment steps are described in the following subsections: As per tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" the PP has to assess the validity of the baseline. The following steps were reviewed:
Findings	*Step 1: Assess of the validity of the current baseline for the next crediting period* *Step 1.1 Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies:* The baseline of the registered PDD has been assessed to be compliant with the national legislation and policies applicable for the project activity at the time of validation. During the first crediting period the PP has frequently reviewed the legal requirements and policies relevant for the baseline of the project. On the basis of this the PP has arrived at the conclusion that the baseline is still in line with all applicable legislations and policies. The validation team has independently reviewed the host country legislation as well as

current policies, such as

1. National Plan of Energy 2017-2023, MEM, Guatemala
2. Energy National Policy, 2013-2027
3. Statistics in Electricity Production of the Countries of the Central America Integration System), CEPAL, 2015.
1. Constitution of the Republic of Guatemala
2. General Electrical Law, Decree 93-96
3. Regulations of the General Electricity Law, Government Agreement 256-97 and its modifications
4. Regulations of the Wholesale Market Administrator, Government Agreement 299-98 and its modifications
5. National Norm NCC-14 (Commercial Coordination Norm No.14) approved by Resolution No. 307-02 from the AMM on 2000/10/30

On the basis of this analysis the validation team confirms that the baseline is still in compliance with the currently applicable national legislation and other national and/or sectoral policies. Therefore the baseline did not need to be adjusted due to changes in this respect.

Step 1.2 Assess the impact of circumstances:

As the baseline scenario might be affected by changed circumstances, e.g. market conditions, market prices etc. the PP has checked the baseline against such changes that have occurred since validation. This is of special importance if the baseline scenario is the continuation of the pre-project scenario.

In the current case no such changes have been identified by the project participants as

- still no revenues other than from CDM are gained from the project activity and
- thus changed market conditions are not likely to impact the PA.

The validation team has independently checked whether there are changes in circumstances which have an impact on the baseline. No such changes have been identified and thus it is deemed appropriate not to revise the baseline due to changes in circumstances.

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

If the baseline scenario has been identified as the continuation of the pre-project scenario it is necessary to assess whether an investment and/or exchange of the baseline equipment (e.g. due to expiry of the equipment´s lifetime) during the upcoming crediting period is to be deemed the most likely scenario. If so the baseline needs to be updated.

As the project activity consist of a greenfield project no baseline equipment is considered.

Furthermore no other reasons for a possible investment – other than possible legal requirements – have been identified.

Thus the validation team confirms the conclusion that no changes to the baseline are required due to the likeliness of investments in equipment which impacts the baseline.

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

In line with the TOOL07 “Tool to calculate the emission factor for an electricity system”, version 7, the emission factor for the electricity system has to be updated to set a fix ante.

Apart of the EFgrid, y no other parameters were determined ex ante for the 1st CP, but by an editorial error in the registered PDD (version 3.4) appear two parameters available at validation Cap_{BL} and A_{BL} nonetheless such parameters (Cap_{BL} and A_{BL})

are monitored parameters.

Step 2: Assessment of the validity of the data and parameters:

Step 2.1: Update the current baseline

The conclusion provided in page 18 of the updated PDD is correct "there is nor sectoral policies neither specific circumstances" that require to updated the baseline scenario; in line with the evidence provided/BL/,/LAW/ in step 1.1 above the no need to update the baseline is considered.

Step 2.2: Update the current baseline

As provided in Step 1.4 the EFgrid,y has to be updated for the 2nd CP. In line with the TOOL07 "Tool to calculate the emission factor for an electricity system", version 7, the EFgrid,y is fixed for the 2nd CP. The updated PDD has properly described the EFgrid,y update calculation. Details are described in section D.4 of this report.

In the updated PDD the EF is updated and calculated ex-ante to be in line with the methodology, so that the following parameters are fixed ex ante according to the TOOL07:

- ✓ EFgrid,y = EFgrid,CM,y = CO2 emission factor of the grid electricity in year y / Combined Margin CO2 emission factor of the grid electricity in year y
- ✓ $EF_{CO2,m/k,i,y}$ / $EF_{CO2,m,i,y}$ = Average CO2 emission factor of fuel type i used in power unit m or k in year y
- ✓ $EG_{m,y}$ / $EG_{k,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m or k in year y
- ✓ $\eta_{m/k,y}$ / $\eta_{m,y}$ = Average net energy conversion efficiency of power unit m or k in year y

Only the following changes were required:

No.	Parameter	Previous value	Updated value	Reference
1	$EF_{CO2,grid,y}$ / $EF_{grid,CM,y}$	0.518 (ex-ante) But updated yearly	0.398	/XLS/
2	$EF_{CO2,m/k,i,y}$ / $EF_{CO2,m,i,y}$	As per IPCC 2006, Table 1.4, Chapter 1, Vol. 2	Remain the same	As per IPCC 2006, Table 1.4, Chapter 1, Vol. 2
3	$EG_{m,y}$ / $EG_{k,y}$	Data provided by the MMA for each year	Updated for actual years 2016, 2017 and 2018	/XLS/
4	$\eta_{m/k,y}$ / $\eta_{m,y}$	Default values as per Appendix 1 of the TOOL05 ver. 4.0	Default values as per Table 2 of Appendix of TOOL07 ver. 2	TOOL07 ver. 2

The ex-ante EF_{grid} calculation is done based on the latest available information of the AMM which includes years 2016, 2017 and 2018, resulting on with the following values:

Emission Factor	**tCO_2/MWh**
Operating Margin	0.536
Build Margin	0.352
W_{OM}	0.25
W_{BM}	0.75
Combined Margin	**0.398**

These changes have been appropriately considered in the updated PDD.

☒	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
	CAR 02, CAR 05, CAR 09

Conclusion	☐	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☒	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	A relevant change in the project is that the emission factor EFgrid,y changed from calculated ex-post to fixed ex-ante for the next crediting period. After the correction requested during the validation it is concluded that the PDD has been updated correctly in line with the respective requirements to the validity original baseline	

D.4. Estimated emission reductions or net anthropogenic removals

Means of validation

For validation of the estimated GHG emission reductions the client has provided the validation team with the following documentation:

- Updated PDD/PDD/
- XLS spreadsheet/XLS/
- Electricity data from the AMM

Further, the validation team has downloaded from the UNFCCC website the applicable version of the CDM methodology and all referenced methodological tools /unfccc/.
The XLS ER calculation has been duly checked. Further it has been checked whether the results have been correctly transferred to the updated PDD for determination of ex-ante ER. The validation team has further checked the updated PDD against the latest version of the applicable methodology incl. the referenced methodological tools for consistency. Special focus was laid on the changes against the previous crediting period.

1) Baseline emissions BEy:

As per applied methodology the ER is calculated as follow:

$$BE_y = EG_{PJ,y} \times EF_{grid,y} \qquad \text{Equation (1)}$$

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{grid,y}$	=	Combined margin CO_2 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" (t CO_2/MWh)

Where the EF is calculated per the (TOOL07) Tool to calculate the emission factor for an electricity system, ver. 7.0.

Step 1. Identification of the relevant electricity systems
The statement of the PP is correct as the National Interconnected System because the scheduling and dispatch is controlled by only one dispatch centre operated by the AMM. As per reviewed references

The Guatemalan NIS is interconnected to the SIEPAC/Grid/ system which interconnect Central America and Mexico electricity systems. Energy exports and imports are coordinated by the Central America Market Operator (Ente Operador Regional, EOR).

Step 2. Inclusion off-grid power plants in the project electricity system
In line with the tool the PP decided to not to include off-grid power plants.

Step 3. Selection of a method to determine the operating margin
As per latest publicly available Guatemalan electricity system information, the statements of the PP are correct:

- Annual data from each power plant on power generation is available.
- The generation of the low/cost/must run resources is greater than the average of the lowest annual system loads.
- Hourly loads of the grid in MW are available under request to the Wholesale

Electricity Market Administrator.

- Low-cost/must-run resources constitute 65% of total grid generation in average of the five most recent years (2014 - 2018), which is above 50%.

So the simple adjusted OM method is correctly chosen.

Step 4. Calculation of Operating Margin emission factor according to the selected method

In line with the tool choices the PP calculates the OM base as per option b) simple adjusted OM, and no off-grid plants are included in the calculation. So the following formula is applied:

$$EF_{grid,OM-adj,y} = (1-\lambda_y) \times \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}}$$

= 0.536 t CO_2/MWh

Where:

$EF_{grid,OM-adj,y}$	=	Simple Adjusted OM CO_2 emission factor in year *y* (tCO_2/MWh)
λ_y		Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year *y*
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EG_{k,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *k* in year *y* (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{EL,k,y}$	=	CO_2 emission factor of power unit *k* in year *y* (tCO_2/MWh)
m	=	All grid power units serving the grid in year *y* except low-cost/must-run power units
k		All low-cost/must-run grid power units serving the grid
y	=	The relevant year as per the data vintage chosen in Step 3

As the power plants of the NIS are not available the default values from Appendix 1 of the tool are applied; the CO2 emission factor for each plant is calculated as follow:

$$EF_{EL,m/k,y} = \frac{EF_{CO2,m/k,i,y} \times 3.6}{\eta_{m/k,y}}$$

$EF_{EL,m/k,y}$	=	CO_2 emission factor of power unit *m/k* in year *y* (tCO_2/MWh)
$EF_{CO2,m/k,i,y}$	=	Average CO_2 emission factor of fuel type *i* used in power unit *m/k* in year *y* (tCO_2/GJ)
$\eta_{m/k,y}$	=	Average net energy conversion efficiency of power unit *m/k* in year *y*
m	=	All grid power units serving the grid in year *y* except low-cost/must-run power units
k		All low-cost/must-run grid power units serving the grid
y	=	The relevant year as per the data vintage chosen in Step 3

According to the Tool, net electricity imports must be considered low-cost/must-run units *k*.

The parameter λ_y (lambda) is defined as follows:

$$\lambda_y = \frac{\text{number of hours low - cost/must - run are on the margin in year y}}{\text{8760 hours per year}}$$

For the Lambda calculation the PP followed the steps described in the tool.
As per the Tool the following formulas are applied in the EF spreadsheet:

$$EG_{Z-L} = (EL_{Z-L} - EL_Z) \times (Z - L) \qquad \text{Equation (2)}$$

Where:

EG_{Z-L}	=	The assumed electricity generation supplied to the grid at the load Z-L (MWh)
EL_{Z-L}	=	Load of the grid at the level of Z-L load(MW)
EG_Z	=	The assumed electricity generation supplied to the grid at the at the lowest annual system load over the year (MWh)
EL_Z	=	The lowest annual system load (MW)

Z	= Number of hours in year *y* (h);
L	= Rank of the recorded load in the sorted list of loads starting from the lowest. For the first step L=0.

Step 5. Calculation of Build Margin emission factor

For the BM calculation the PP chose option 1 where the BM is calculated using the most recent available information.
As per the tool the sample group of power units m is determined through as follow:

1. the identification of the set of five power plants units, excluding the registered CDM power units that started supplying electricity most recently ($SET_{5\text{-units}}$)
2. Determine the annual electricity generation of the NIS excluding the registered CDM projects (AEG_{total}), than identify the set of power plant units that started to supply electricity most recently that comprises 20% of the AEG_{total} and determine the annual electricity generation $AEG_{SET>=20}$.
3. From $AEG_{SET>=20}$ and $SET_{5\text{-units}}$ select the set of power units that comprises the largest annual electricity generation SET_{sample}
4. For this renewal the $SET_{5\text{-units}} = SET_{sample}$

The BM is calculated as follow:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

= 0.352 t CO_2/MWh

Where:

$EF_{grid,BM,y}$	=	BM CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
m	=	Power units included in the BM
y	=	Most recent historical year for which electricity generation data is available

Where:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}}$$

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$	=	Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO_2/GJ)
$\eta_{m,y}$	=	Average net energy conversion efficiency of power unit *m* in year *y*
m	=	Power units included in the BM
y	=	Most recent historical year for which electricity generation data is available

Step 6. Calculation of the combined margin emission factor

CM calculation
As per the Tool, the weights applied for the 2nd CP are as follow:
w_{OM} = 0.25
w_{BM} = 0.75
The calculation is done as follow:

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

= 0.398 tCO2/MWh

Where:

$EF_{grid,CM,y}$	=	CM CO_2 emission factor in year *y* (tCO_2/MWh)
$EF_{grid,OM,y}$	=	OM CO_2 emission factor in year *y* (tCO_2/MWh)
$EF_{grid,BM,y}$	=	BM CO_2 emission factor in year *y* (tCO_2/MWh)
w_{OM}	=	Weighting of OM emissions factor
w_{BM}	=	Weighting of BM emissions factor

2) Project emissions PEy:

As per registred PDD the PEy could be emitted from the reservoirs if the the power density (PD) is less than 10 W/m^2. Where PD is calculated as per ACM002 ver. 19. As follow:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$ Equation (7)

Where:

PD	=	Power density of the project activity (W/m2)
Cap_{PJ}	=	Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL}	=	Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero
A_{PJ}	=	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m2)
A_{BL}	=	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m2). For new reservoirs, this value is zero

The calculation included in the registered PDD was validated and it is correct. PD=2,585.31 W/m^2 which is >10. So as long as the PD condition is mentioned the PEy are 0. The PD is a monitored parameter.

Reservoir	Area of the reservoir (m²)	Power density calculation	Power density (w/m²)
Secampana I	137.21	(9.7 X 10⁶ W – 0 W) / (137.21 m² – 0 m²)	70,694.56
Secampana II	145.01	(9.7 X 10⁶ W – 0 W) / (145.01 m² – 0 m²)	66,891.94
Secampanita	85.95	(9.7 X 10⁶ W – 0 W) / (85.95 m² – 0 m²)	112,856.31
Caquipec	43.93	(9.7 X 10⁶ W – 0 W) / (43.93 m² – 0 m²)	220,805.83
Golondrinas	115.2	(9.7 X 10⁶ W – 0 W) / (115.20 m² – 0 m²)	84,201.39
Choloma	397.23	(9.7 X 10⁶ W – 0 W) / (397.23 m² – 0 m²)	24,419.10
Reservoir-tank	2827.44	(9.7 X 10⁶ W – 0 W) / (2827.44 m² – 0 m²)	3,430.67
Power plant	**3751.97**	**(9.7 X 10⁶ W – 0 W) / (3751.97 m² – 0 m²)**	**2,585.31**

3) Leakage emissions LEy:

For the case of leakage emissions, in line with methodology AMS-I.D. as the power equipment was not transferred from another activity the LEy= 0.

4) Emission reductions ERy:

ER_y = BE_y- PE_y
= BE_y- 0
= BE_y
= 14,542 tCO2

Where:

ER_y	=	Emission reductions in year *y* (tCO_2)
BE_y	=	Baseline emissions in year *y* (tCO_2)
PE_y	=	Project emissions in year *y* (tCO_2)
LE_y	=	Leakage emissions in year *y* (tCO_2)

the provided ER calculation spreadsheet was validated and it is correct. The following tables shoe the calculation of BEy and ERy.

Variable	$EG_{PJ,facility,y}$	$Ef_{grid,y}$	BE_y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	Emission factor	Baseline emissions
Unit	MWh	$t CO_2/MWh$	$t CO_2$
Definition	A	B	A*B
2020	36,538	0.398	14,542
2021	36,538	0.398	14,542
2022	36,538	0.398	14,542
2023	36,538	0.398	14,542
2024	36,538	0.398	14,542
2025	36,538	0.398	14,542
2026	36,538	0.398	14,542

Year	Baseline emissions ($t CO_2e$)	Project emissions ($t CO_2e$)	Leakage ($t CO_2e$)	Emission reductions ($t CO_2e$)
Definition	*B*	*A= 0 because power density > 10 W/m²*	*C*	*A - B - C*
2020	14,542	0	0	14,542
2021	14,542	0	0	14,542
2022	14,542	0	0	14,542
2023	14,542	0	0	14,542
2024	14,542	0	0	14,542
2025	14,542	0	0	14,542
2026	14,542	0	0	14,542
Total		**0**	**0**	**101,795**

The estimated amount of GHG emission reductions of the project is 101,195 tCO2e during the second crediting period (7 years) from 01/01/2020 to 31/12/2026, resulting in estimated average annual emission reductions of 14,542 tCO2e.
The ER calculation sheet has been duly checked. Further it has been checked whether the results have been correctly transferred to the updated PDD for determination of ex-ante ER. The validation team has further checked the updated PDD against the latest version of the applicable methodology incl. the referenced methodological tools for consistency. Special focus was laid on the changes against the previous crediting period.

Findings	☐	The calculation of ERs is done as per the applied methodology (AMS-I.D.). The calculation in the Excel spreadsheet and the corresponding calculation tables in the PDD have been checked and no mistakes have been identified. The estimation of emission reductions for the 3rd crediting period is deemed plausible and conservative.
	☒	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
		CAR 10, CAR 11, CAR 13
Conclusion	☐	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☒	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	All changes due to the upgraded methodology and the re-assessment of the baseline have been considered appropriately and in line with the CDM PS. The ERs calculation is done as per the applied methodology (AMS-I.D.). The calculation in the Excel spreadsheet and the corresponding calculation tables in the PDD are consistent and traceable and no mistakes have been identified. The estimation of emission reductions for the 2nd crediting period is deemed plausible and conservative.	

D.5. Validity of monitoring plan

Means of validation	The validation team has checked the monitoring plan of the updated PDD against the required changes due to the update of the baseline and other methodological changes. Further, changes due to editorial updates of the applicable templates have been checked. In detail all parameters, ex-ante values and applicable formulae have been checked to determine the required changes for the next crediting period. Besides, based on conducted site-visit and interviews with related personnel the validation team has assessed the feasibility of the required changes. **Monitoring** The PDD describes the responsibilities and procedures for monitoring, records keeping, quality check and details on parameters monitoring and calibration of measurement equipment. No major change against the registered PDD has been done because no changes are expected in the monitoring procedure. The VV reviewed the parameters against the new version of the applied methodology (AMS-I.D version 18) In line with the methodology and registered PDD the following parameters are to be monitored: 1. $EG_{facility,y}$ = Quantity of net electricity supplied to the grid in year y. The only change in this parameter is the abbreviation (before: EG_y) 2. Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity. No change in this parameter is expected. The parameter is still in compliance with the latest version of the methodology ACM0002 version 19. 3. A_{PJ} = area of the multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2) No change in this parameter is expected. The parameter is still in compliance with the latest version of the methodology ACM0002 version 19. … The following changes are applicable to the MP: The following parameters are excluded in the updated MP because the EF will be calculated only ex ante in line with the methodology: 1. $EF_{grid,CM,y}$ = CO2 emission factor of the grid electricity in year y 2. $EG_{m,y}$ / $EG_{k,y}$ = Net quantity of electricity generated by power plant/unit year y 3. $EF_{CO2,m/k,i,y}$ = CO2 emission factor of fuel type i used in generating units m or k 4. $\eta_{m/k,y}$ / $\eta_{m,y}$ = Average net energy conversion efficiency of power unit m or k in year y The ex-ante parameters update is assessed in section D.3 of this report.	
Findings	☐	Although the monitoring plan in the PDD has been revised to comply with the latest applicable version of the monitoring methodology (AMS-I.D ver.18). No changes have occurred. The validation team has duly assessed all the required changes due to the upgraded methodological requirements and the re-assessment of the baseline. The validation team has concluded that - all necessary changes have been appropriately reflected in the updated PDD, - the monitoring plan in the updated PDD is in compliance with the applied monitoring methodology, - the monitoring arrangements described in the updated PDD can be implemented and are feasible within the project design.
	☒	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
		CAR 04, CAR 10, CAR 11

Conclusion	☐	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☒	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	After correction it is concluded that the monitoring plan of the updated PDD is fully in line with the applied methodology including the applicable methodological tools. The monitoring arrangements described in the updated PDD can be implemented and are feasible within the project design.	

D.6. Crediting period

Means of validation	The validation team has checked that the validation process of the RCP takes place in the specified timeframe from 270 days before the expiry of the CP up to one year after the CP expiry. So, as the 2nd CP ends on 31/12/2019 the request can be done from **05/04/2019** up to **31/12/2020.**	
Findings	☒	As the respective requirements are met, the project´s 3rd crediting period may start immediately after the expiration of the 2nd one, given that all other applicable criteria are met. It is further confirmed that the start date (01/01/2020) and the length of the crediting period (7 years) are in compliance with the project standard.
	☐	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
Conclusion	☒	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☐	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	As per UNFCCC Project Cycle Procedure the time period to request the renewal of the crediting period starts 270 days before the expiry of the CP, so, as the 2nd CP ends on 31/12/2019 the request can be done from **05/04/2019** up to **31/12/2020**.	

D.7. Project participants

Means of validation	The validation team has checked the revised PDD/PDD/ and the UNFCCC website/unfccc/ esp. the latest version of the Modalities of Communication/MOC/ to check whether the listed project participants have duly been authorized and if communication requirements are met.	
Findings	☒	The names of the project participants as listed in the revised PDD (sections A.4. and appendix 1) are consistent with those listed on the dedicated UNFCCC project website as well as in the last version of the modalities of communication/MOC/.
	☐	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
Conclusion	☒	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☐	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	The names of the project participants as listed in the revised PDD (sections A.4. and appendix 1) are consistent with those listed on the dedicated UNFCCC project website as well as in the last version of the modalities of communication/MOC/	

D.8. Post-registration changes

Type of post-registration changes (PRCs)	Confirmation (Y/N)	Validation report for PRCs	
		Version	Completion date
Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline	N	-	-
Corrections	N	-	-
Inclusion of a monitoring plan to a registered project activity	N	-	-
Permanent changes from registered monitoring plan, monitoring methodology or standardized baseline	N	-	-
Changes to the project design of a registered project activity	N	-	-
Types of changes specific to afforestation and reforestation project activities	N	-	-

SECTION E. Internal quality control

Before the submission of the final VAL RCP report a technical review of the whole validation procedure was carried out. The technical reviewers are competent GHG auditors being appointed for the scope this project falls under. The technical reviewers are not considered to be part of the validation team and thus not involved in the decision making process up to the technical review.
As a result of the technical review process the validation opinion and the topic specific assessments as prepared by the validation team leader may have been confirmed or revised. Furthermore reporting improvements might have been achieved.
After the successful technical review an overall (esp. procedural) assessment of the complete validation has been carried out by a senior assessor located in the accredited premises of TÜV NORD.
After this step the submission for requesting the renewal of crediting period is conducted.

SECTION F. Validation opinion

Hidroelectrcia Choloma, S.A. has commissioned the TÜV NORD JI/CDM Certification Program to re-validate the project:

"Choloma Hydroelectric Project"

for the purpose of renewal of the crediting period. The validation is based on the relevant UNFCCC requirements.

The review of the updated project design documentation and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews have provided TÜV NORD JI/CDM Certification Program with sufficient evidence to validate the fulfilment of the stated criteria applicable for RCP.
In detail the conclusions can be summarized as follows:
The current baseline of the project is in line with the national and/or sectoral policies and circumstances at the time of requesting renewal of crediting period.
The monitoring plan is transparent and adequate and in line with the applicable monitoring methodology (AMS-I.D ver. 18).
The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 101,795 tCO_{2e} are most likely to be achieved within the second renewable crediting period of 7 years.
The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all criteria applicable for the renewal of the crediting period.

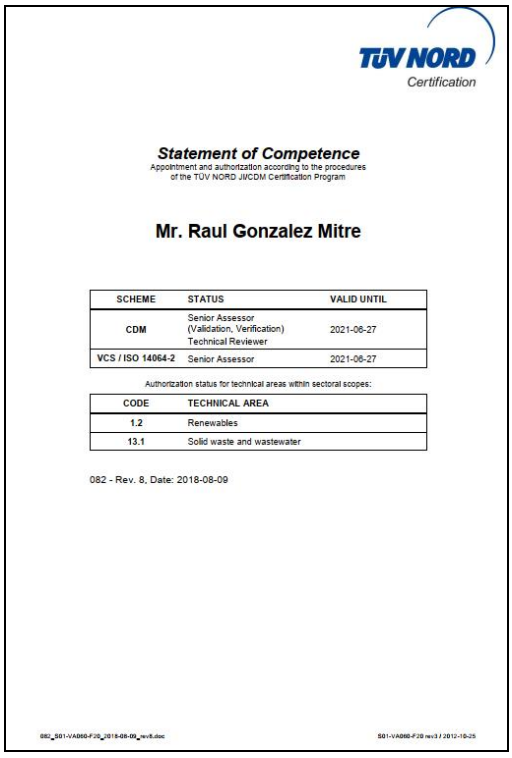
Queretaro, 21/04/2020

Oliver Quireza
Validation Team Leader
TÜV NORD JI/CDM Certification Program

Appendix 1. Abbreviations

Abbreviations	Full texts
AGER	Association of Generators by Renewable Energy *(Asociacion de Generadores con Energia Renovable)*
AMM	Wholesale Market Administrator *(Administrator del Mercado Mayorista*)
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO_2	Carbon dioxide
CO_{2eq}	Carbon dioxide equivalent
CL	Clarification Request
DValR	Draft Validation Report
ER	Emission Reduction
EF	Emission Factor of the electricity grid
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IM	Interview Memo
INSIVUMEH	National Institute of Seismology, Volcanology, Meteorology and Hydrology (From Guatemala)
MARN	Ministry of Environment and Natural Resources of Guatemala
MEM	Ministry of Energy and Mines of Guatemala
MP	Monitoring Plan
MR	Monitoring Report
PA	Project Activity
PDD	Project Design Document
PP	Project Participant
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VT	Validation/ Verification Team
VVS	Validation and Verification Standard
XLS	Emission Reduction Calculation Spread Sheet

Appendix 2. Competence of team members and technical reviewers



TÜV NORD Certification

Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

Mr. Raul Gonzalez Mitre

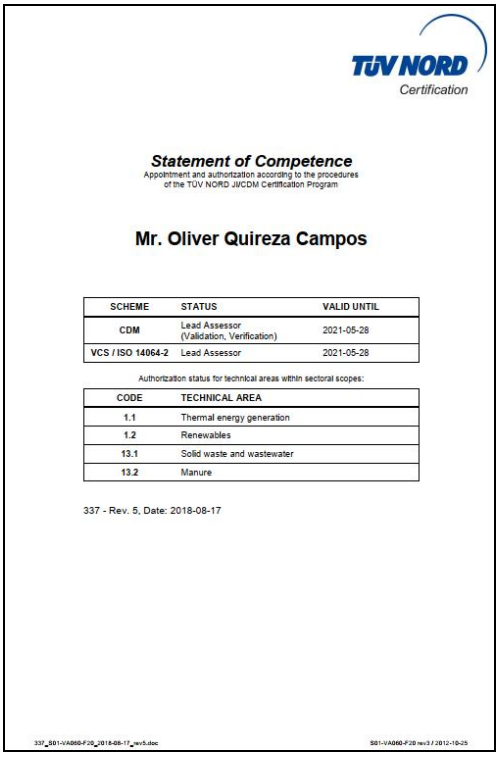
SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2021-06-27
VCS / ISO 14064-2	Senior Assessor	2021-06-27

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.2	Renewables
13.1	Solid waste and wastewater

082 - Rev. 8, Date: 2018-08-09

082_S01-VA060-F20_2018-08-09_rev8.doc S01-VA060-F20 rev3 / 2012-10-25



TÜV NORD Certification

Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

Mr. Oliver Quireza Campos

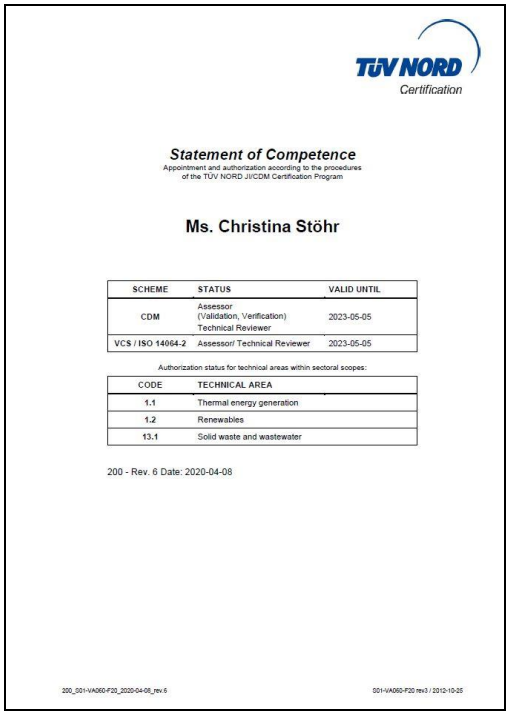
SCHEME	STATUS	VALID UNTIL
CDM	Lead Assessor (Validation, Verification)	2021-05-28
VCS / ISO 14064-2	Lead Assessor	2021-05-28

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.1	Thermal energy generation
1.2	Renewables
13.1	Solid waste and wastewater
13.2	Manure

337 - Rev. 5, Date: 2018-08-17

337_S01-VA060-F20_2018-08-17_rev5.doc S01-VA060-F20 rev3 / 2012-10-25



TÜV NORD Certification

Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

Ms. Christina Stöhr

SCHEME	STATUS	VALID UNTIL
CDM	Assessor (Validation, Verification) Technical Reviewer	2023-05-05
VCS / ISO 14064-2	Assessor/ Technical Reviewer	2023-05-05

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.1	Thermal energy generation
1.2	Renewables
13.1	Solid waste and wastewater

200 - Rev. 6 Date: 2020-04-08

200_S01-VA060-F20_2020-04-08_rev.6 S01-VA060-F20 rev3 / 2012-10-25

Appendix 3. Documents reviewed or referenced

No	Author	Reference	Title	References to the document	Provider
1.	PP	/LOA/	Letter of Approval from DNA of Guatemala, dated 23/03/2011	https://cdm.unfccc.int/filestorage/u/r/48DBE7Y6TG139XMK0HOZ5CAVQLRIPS.pdf/Letter%20of%20National%20Approval.pdf?t=Uk98cHc2a2NsfDBN1wpt25LbaZlEWFJ6GmJ3	UNFCCC
2.	PP	/MOC/	Modalities of Communication	https://cdm.unfccc.int/Projects/DB/AENOR1356628448.64/view	UNFCCC
3.	PP	/PDD/	RCP Project Design document "Choloma Hydroelectric Project" - (Version No. 4, dated 08/08/2019) - (Version No. 5, dated 15/01/2020) - (version No. 6, dated 19/03/2020) - (version No. 6.1, dated 15/04/2020)	N/A	PP
4.	PP	/PDD-Reg/	Registered Project Design Document named "Choloma Hydroelectric Project" (Version No. 3.4, dated 05/12/2012)	https://cdm.unfccc.int/Projects/DB/AENOR1356628448.64/view	UNFCCC
5.	PP	/XLS/	-Grid Emission Factor 2016-2018 - version 1, 08/08/2019 - version 2, 15/01/2020 -Emission reduction calculation spreadsheet - version 1, 08/08/2019 - version 2, 02/02/2020	N/A	PP
6.	DOE	/CPM/	TÜV NORD JI / CDM Certification Program Manual (incl. procedures and forms)	N/A	PP
7.	IPCC	/IPCC/	• IPCC Good Practice Guidance & Uncertainty Management in National Greenhouse Gas Inventories, 2000 • Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual	https://www.ipcc-nggip.iges.or.jp/public/gp/english/	PP
8.	UNFCCC	/KP/	Kyoto Protocol (1997)	https://unfccc.int/kyoto_protocol	PP
9.	UNFCCC	/MA/	Decision 3/CMP. 1 (Marrakesh – Accords & Annex to decision (17/CP.7))	https://unfccc.int/decisions?search2=marrakesh	UNFCCC
10.	UNFCCC	/METH-1/	AMS-I.D ver.17- Grid Connected renewable electricity generation	https://cdm.unfccc.int/methodologies/SSCmethodologies/approved	UNFCCC
11.	UNFCCC	/METH-2/	AMS-I.D ver.18- Grid Connected renewable electricity generation	https://cdm.unfccc.int/methodologies/SSCmethodologies/approved	UNFCCC
12.	UNFCCC	/PCP/	CDM project cycle procedure, version 2.0	N/A	UNFCCC

No	Author	Reference	Title	References to the document	Provider
13.	UNFCCC	/PDD-T/	Project Design Document Form (CDM-PDD-FORM) - Version 11.0 including Attachment: Instructions for filling out the project design document form for CDM project activities	N/A	UNFCCC
14.	UNFCCC	/PS/	CDM project standard, version 2.0	N/A	UNFCCC
15.	UNFCCC	/VAL/	Validation Report for CDM project “Choloma Hydroelectric Project” version 2, dated 27/12/2012, by AENOR	https://cdm.unfccc.int/Projects/DB/AENOR1356628448.64/view	UNFCCC
16.	UNFCCC	/VVS/	CDM Validation and Verification Standard, Version 2.0	N/A	PP
17.	SEVERAL	/LAW/	1. Constitution of the Republic of Guatemala 2. General Electrical Law, Decree 93-96 3. General Electricity Law, Government Agreement 256-97 and its modifications 4. Administrator, Government Agreement 299-98 and its modifications 5. National Norm NCC-14 (Commercial Coordination Norm No.14) approved by Resolution No. 307-02 from the AMM on 2000/10/30.	N/A	other
18.	MEM Guatemala	/BL/	-National Plan of Energy 2017-2023, MEM, Guatemala -Ministry of Energy and Mines, Política Nacional de Energía (Energy National Policy), page 38. http://www.mem.gob.gt/wp-content/uploads/2013/02/PE2013-2027.pdf -CEPAL, Estadísticas de la producción de electricidad de los países del Sistema de Integración Centroamericana (Statistics in Electricity Production of the Countries of the Central America Integration System), page 36. 2015.	https://www.mem.gob.gt/wp-content/uploads/2017/11/Plan-nacional-de-energia.pdf http://www.mem.gob.gt/wp-content/uploads/2013/02/PE2013-2027.pdf	other
19.	-AMM -Operator entity Central America	/Grid/	-AMM: -Operator entity Central America: -SIEPAC	https://www.amm.org.gt/portal/?page_id=17 http://www.enteoperador.org/Contexto.jsp http://www.ecpamericas.org/initiatives/?id=70	other
20.	PP	/PROC/	Operational Procedures	N/A	PP
21.	CNEE	/LIC/	• Authorization to participate in the Energy Wholesale Market permit given by legal resolution No. CNEE-240-2008 given by the National Commission of Electricity Energy (CNEE) on	N/A	PP

No	Author	Reference	Title	References to the document	Provider
	MARN		2010/07/02 (without validity) • Environmental License Num. 01543-2015/DIGARN given by MARN on 17-05-2015 and valid till 24-02-2017.		
22.	General Electric	/Meter/	- Features and Application / Encompass Electronic Meter / Num. GEH-7285A. - GE kV2c Encompass Electronic Meter / Product Description, Operating instructions, Maintenance Instructions, Upgrading, Site analysis Guides and Diagrams. Num. GEH-7285.	N/A	PP
23.	General Electric	/Meter/	• Features and Application / Encompass Electronic Meter / Num. GEH-7285A. • GE kV2c Encompass Electronic Meter / Product Description, Operating instructions, Maintenance Instructions, Upgrading, Site analysis Guides and Diagrams. Num. GEH-7285.	N/A	PP
24.	Schneider	/NEW_meter/	• ION 8650 series Technical Datasheet. Reference Num. PLSED310027EN	N/A	PP

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 3. 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 4. CAR from this validation

CAR ID	01	**Section no.**	Front page /Appendix 3	**Date:** 22/08/2019
Description of CAR (1st round)				
Front page 1. PDD completion date is incorrect 2. The type of project has to be included in the sectoral scope line 3. Ex ante calculation has to be included in Appendix 4 (no 3)				
Project participant response				**Date:** 22/08/2019
1. The completion date is corrected in the table of basic information 2. The explanation of the type of project is included 3. Ex ante calculation is included in Appendix 4 and deleted from Appendix 3.				
Documentation provided by project participant				
PDD v.5				
DOE assessment				**Date:** 19/08/2019
1. The PDD completion date is correct 2. The type of project is correctly included in front page, which is in line with the actual technical project information. The Ex ante calculation included in Appendix 4 has been checked by downloading the original electricity system information from the Wholesale Electricity Market, and cross check it against the information applied in the EF calculation spreadsheet, the steps followed for the calculation were reviewed versus the steps as per the Tool to calculate the emission factor for an electricity system. The correctness of the calculation was also checked. Further detail of the validation process is in sections D3 and D4 … The finding is closed				

CAR ID	02	**Section no.**	B.6.2	**Date:** 22/08/2019
Description of CAR (1st round)				
Parameters related to the EF calculation described in the TOOL07 have not been included in section B.6.2.				
Project participant response				**Date:** 09/09/2019
The following parameters are included in section B.6.2 of the updated PDD: 4. $EF_{CO2,y}$ = CO2 emission factor of the grid electricity in in years 2016, 2017 and 2018. 5. $EG_{m,y}$ / $EG_{k,y}$ = Net quantity of electricity generated by power plant/unit in years 2016, 2017 and 2017. 6. $EF_{CO2,m/k,i,y}$ = CO2 emission factor of fuel type i used in generating units m or k 7. $\eta_{m/k,y}$ / $\eta_{m,y}$ = Average net energy conversion efficiency of power unit m or k in in years 2016, 2017 and 2017.				
Documentation provided by project participant				
PDD v.5				
DOE assessment				**Date:** 29/10/2019

1. Included parameter $EF_{grid, y}$ is in line with the applicable TOOL07 and the applied values is correct and consistent with the EF calculation spreadsheet.
2. Included parameter $EG_{m,y}$ / $EG_{k,y}$ is in line with the applicable TOOL07, the actual values are correctly calculates in EF spreadsheet and correctly included in appendix 3 of the PDD.
3. Included parameter $EF_{CO2,m/k,i,y}$ is in line with the applicable TOOL07 and the applied values are in line with the TOOL07 guidance.
4. Included parameter $\eta_{m/k,y}$ / $\eta_{m,y}$ is in line with the applicable TOOL07 and the applied values in the EF calculation are taken from TOOL09 in line with the TOOL07 guidance.
   The finding is closed

CAR ID	03	**Section no.**	B.7.1	**Date:** 22/08/2019

Description of CAR (1st round)

In section B.7.1 the Parameters to be monitored have not been updated according to the actual monitoring situation. The following parameters are not part of the updated MP:

1. $EF_{CO2,y}$ = CO2 emission factor of the grid electricity in year y
2. $EG_{m,y}$ / $EG_{k,y}$ = Net quantity of electricity generated by power plant/unit year y
3. $EF_{CO2,m/k,i,y}$ = CO2 emission factor of fuel type i used in generating units m or k
4. $\eta_{m/k,y}$ / $\eta_{m,y}$ = Average net energy conversion efficiency of power unit m or k in year y

Project participant response **Date:** 09/09/2019

These parameters are fixed ex-ante, therefore are not monitored and eliminated from these section.

Documentation provided by project participant

PDD v.5

DOE assessment **Date:** 29/10/2019

The parameters not monitored are correctly relocated in the section of parameters fixed ex ante. The PDD has been checked against the applied methodology and tools.
The finding is closed

CAR ID	04	**Section no.**	Appendix 3	**Date:** 23/08/2019

Description of CAR (1st round)

1. Information sources Table in Appendix 3 have to be located in Appendix 4
2. Referred TOOL ver. 2.2.1 is not updated
3. Year 2010 mentioned in Step 5 page 65 is incorrect

In Table in Appendix 3

4. The variable EGm,2010 has to be updated for the 3 years used for the EF.
5. Source reference to Variable η_m has to be updated as per the latest TOOL version
6. Description of variable $EF_{EL,m,y}$ is incorrect

Project participant response **Date:** 09/09/2019

1. The tables in Appendix 3 are moved to Appendix 4.
2. The number of the "Tool to calculate the emission factor for an electricity system" is updated.
3. The year 2010 is corrected to 2016-2018.

Table in Appendix 3 is moved to

4. The variable $EF_{m,2010}$ is updated to $EF_{m,2016-2018}$.
5. Source reference to Variable η_m has to be updated as per Tool 9.
6. Description of variable $EF_{EL,m,y}$ is corrected in appendix 4.

Documentation provided by project participant

PDD v.5

DOE assessment **Date:** 29/10/2019

1. Information tables have been correctly included in Appendix 4 of the PDD
2. Version of the Tool to calculate the emission factor for an electricity system has been correctly updated
3. EF parameters period has been corrected (2016-2018) as per actual situation. This has been checked by downloading the original electricity system information from the Wholesale Electricity Market, and cross check it against the information applied in the EF calculation spreadsheet
4. The corrected EF parameters has been updated $EF_{,2016-2018}$ in line with the latest version of the applied Tool to calculate the emission factor for an electricity system (TOOL09)
5. Parameter η_m has been correctly updated as per applicable TOOL09
6. Parameter $EF_{EL,m,y}$ has been correctly updated in appendix 4. This has been checked by downloading the original electricity system information from the Wholesale Electricity Market, and cross check it against the information applied in the EF calculation spreadsheet. The finding is closed

CAR ID	05	Secti on no.	B.6.1	Date: 23/08/2019
Description of CAR (1st round)				
1. Table 6 in page 29 wasn't updated as per TOOL09 ver.2 2. Annex I mentioned is incorrect, revision though out the whole document has to be done 3. Annex 3 referred in page 30 is incorrect, revision though out the whole document has to be done 4. Referred methodology AMS-I.D version 17 in page 31 is incorrect, revision though out the whole document has to be done. 5. Referred methodology AMC0002 version 13 in page 31 is incorrect, revision though out the whole document has to be done				
Project participant response				**Date:** 09/09/2019
1. Table 6 in page 29 was updated as per TOOL09 ver.2 2. Annex I is changed by the correct reference (Appendix of Tool 09) though out the whole document. 3. The reference Annex 3 is substituted by Appendix 4 though out the whole document. 4. Referred methodology AMS-I.D version 17 is corrected in the updated PDD by AMS-I.D version 18. 5. The correct version of methodology AMC0002 is updated in the PPD. The version used is number 19.				
Documentation provided by project participant				
PDD v.5				
DOE assessment				**Date:** 19/08/2019
1. Table 6 in page 29 has been updated as per TOOL09 2. Mentioned Annex I has been deleted throughout the whole document 3. Annex 3 referred in page 30 has been corrected. Corrected appendix 4 has been checked by downloading the original electricity system information from the Wholesale Electricity Market, and cross check it against the information applied in the EF calculation spreadsheet. 4. Version of methodology AMS-I.D has been revised throughout the whole document. The applied methodology AMS-I.D is version 18. 5. Version of methodology AMC0002 has been corrected. The corrected version is 19. The finding is closed				

CAR ID	06	Section no.	C.3.2	Date: 23/08/2019
Description of CAR (1st round)				
The start date of the CP is not in line with the one on the UNFCCC website				
Project participant response				**Date:** 09/09/2019
The start date of the crediting period is corrected				
Documentation provided by project participant				
PDD v.5				
DOE assessment				**Date:** 29/10/2019
The corrected start of the CP is in line with the one on the UNFCCC website. The PDD has been checked against the UN-project website. The finding is closed				

CAR ID	07	Section no.	First Page /A	Date: 06/02/2020
Description of CAR (1st round)				
1. First Page – the stated emission reductions are missing a unit. 2. A.2 – please state precisely in which country the project is. 3. A.7 - not the latest applicable de-bundling tool was applied – which is TOOL 20, version 4. Please follow the step-wise approach §9 a-d.				
Project participant response				**Date:** 19/03/2020
1. First page: Emission reductions units were included. 2. Section A.2.: Guatemala was included in "Location of project activity" paragraph. 3. Section A.7. Latest applicable de-bundling tool was applied. Step-wise approach §9 a-d of the tool was followed.				
Documentation provided by project participant				
PDD v.6				
DOE assessment				**Date:** 26/03/2020

1. The ER units are correct
2. The host county has been properly included
3. Step wise approach has been described in section A7 to confirm the project is not a debundled component of a large project.

The finding is closed

CAR ID	08	Section no.	B	Date: 06/02/2020

Description of CAR (1st round)

Section B.2. :

1. the applicability criteria from AMS-I.D. are not quite detailed. Please add §8-11 of the meth and apply them to the project.
2. Additionally, as per guideline to fill the PDD, the following is requested in this section: *Demonstrate that the project activity qualifies as Type I…*

Project participant response **Date:** 19/03/2020

1. Missing applicability criteria form AMS-I.D. were included in Section B2.
2. Demonstration that the project activity qualifies as Type I, in accordance with applicable provisions on small-scale project type and eligibility in the project standard, was included in Section B2.

Documentation provided by project participant

PDD v.6

DOE assessment **Date:** 26/03/2020

1. All criteria §8-11 of the methodology applicability have been described correctly in section B.2
2. The demonstration of additionality if the project is in lie with the guideline to fill the PDD.

The finding is closed

CAR ID	09	Section no.	B	Date: 06/02/2020

Description of CAR (1st round)

1. Section B.4, page 16 ff: please elaborate the assessment of the validity of the current baseline – apply the steps from the tool – step by step, in detail. Up to now the assessments are not clear.
2. As per §280 PS 2.0: "*For renewal of crediting period of a registered CDM project activity, the project participants are not required to reassess the additionality of the project activity nor update the section of the PDD relating to additionality."* A sentence in this regard would be reasonable in the PDD.

Project participant response **Date:** 19/03/2020

1. Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period was completed and adjusted considering aspects indicated in every step.
2. Reference on paragraph 280 of the project standard was included in Section B5.

Documentation provided by project participant

PDD v.6

DOE assessment **Date:** 13/04/2020

1. Step 2.2: Please add at least a sentence where this update is done, in the PDD. This issue remains open
2. Section B.5 of the PDD clearly states that the project participants are not required to reassess the additionality of the project activity nor update the section of the PDD relating to additionality. This issue is closed

Project participant response **Date:** 15/04/2020

1. Step 2.2, it was indicated that the emission factor of the grid was updated for the second crediting period, in that PDD version. See Section B.6.1

Documentation provided by project participant

PDD v.6.1

DOE assessment **Date:** 20/04/2020

1. The provided step wise assessment of the current baseline validity is in clear and in line as per methodological tool "*Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period". See pages 17-18 of PDD.*

The finding is closed

CAR ID	10	Section no.	B.6.1	Date: 06/02/2020

Description of CAR (1st round)

B.6.1

1. step 3: the selection of the method to determine the OM is not clear. From the first bullet point - the conclusion of Dispatch data analysis OM seems reasonable. Please elaborate and substantiate your choice.
2. Step 5: "*For the second crediting period, the build margin emission factor should be updated based on*

the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE." This would mean data until 2019 would be reasonable instead of until 2018.

3. Page 30: it is not clear that or if $A_{Tank} = A_{PJ}$.
4. The formula to calculate BEy differs from the one in the applied methodology.

Project participant response | **Date:** 19/03/2020

1. Step 3: The description of the method selected to the determine the OM was modified.
2. Step 5: By the time the PDD was sent to the DOE to request the renewal of the crediting period (August 2019) the most recent information available on units already built was 2018 data.
3. Page 30: A_{Tank} was modified to A_{PJ}
4. The formula to calculate BEy was corrected as per AMS-I.D (version 18.0)

Documentation provided by project participant

PDD v.6

DOE assessment | **Date:** 26/03/2020

1. The OM method is clearly substantiated, so the selection is correct.
2. The VT confirm that the most recent available information to calculate the BM at the time of the PDD submission to the DOE was 2018.
3. Area of the single or multiple reservoirs has clearly indicated as A_{PJ} in line with method ACM0002 version 19.
4. The formula to calculate BEy is in line with the applied method AMS-I.D (version 18.0)

The finding is closed

CAR ID	11	**Section no.**	B	**Date:** 06/02/2020

Description of CAR (1st round)

Section B.6.2:

1. parameter: emission factor of the grid electricity in year y – the parameter abbreviation differs from the applied methodology.

Section B.6.3:

2. Parameter: emission factor of the grid electricity in year y – the parameter abbreviation differs from the applied methodology. Please be consistent.
3. Parameter: net electricity generation supplied by the project plant/unit to the grid – the parameter abbreviation differs from the applied methodology. Please be consistent.

Section B.7.1: Parameter: quantity of net electricity supplied to the grid

4. the parameter abbreviation differs from the applied methodology. Please be consistent.
5. Monitoring frequency: annually – does not seem correct. Under measurement method - monthly – is mentioned.

Project participant response | **Date:** 19/03/2020

Section B.6.2:

1. Parameter emission factor of the grid electricity in year y was corrected as per AMS-I.D (version 18.0)

Section B.6.3:

2. Parameter emission factor of the grid electricity in year y was corrected as per AMS-I.D (version 18.0)
3. Parameter net electricity generation supplied by the project plant/unit to the grid was corrected as per AMS-I.D (version 18.0)

Section B.7.1:

4. Parameter quantity of net electricity supplied to the grid was corrected as per AMS-I.D (version 18.0)
5. Monitoring frequency was modified from annually to monthly.

Documentation provided by project participant

PDD v.6

DOE assessment | **Date:** 26/03/2020

1. In section B.6.2 the abbreviation of emission factor of the grid electricity in year y is in line with the applied methodology
2. In section B.6.3 the abbreviation of emission factor of the grid electricity in year y is in line with the applied methodology
3. Abbreviation of parameter net electricity generation supplied by the project plant/unit to the grid is in line with the applied methodology
4. As above
5. Monitoring frequency monthly is in line with the operation and commercial procedures of the power plant.

The finding is closed

CAR ID	12	Section no.	Template	Date: 06/02/2020
Description of CAR (1st round)				
Latest template of PDD (version 11) has not been used.				
Project participant response				**Date:** 19/03/2020
Latest template of PDD (11.0) was used.				
Documentation provided by project participant				
PDD v.6				
DOE assessment				**Date:** 26/03/2020
Latest template of PDD (version 11) has been used. The finding is closed				

CAR ID	13	Section no.	XLS	Date: 06/02/2020
Description of CAR (1st round)				
ER 1. Cell B4+5: net electricity supplied by the project activity to the grid – the parameter abbreviation and the description differ from the applied methodology. 2. Cell C4: the parameter abbreviation differs from the applied methodology.				
Project participant response				**Date:** 19/03/2020
1. Parameter abbreviation and description in cells B4 and B5 were corrected as per AMS-I.D. 2. Parameter abbreviation in cell C4 was corrected as per applied methodology.				
Documentation provided by project participant				
PDD v.6				
DOE assessment				**Date:** 26/03/2020
1. Abbreviation of parameter net electricity generation supplied by the project plant/unit to the grid is in line with the applied methodology 2. Abbreviation of parameter net electricity generation supplied by the project plant/unit to the grid is in line with the applied methodology The finding is closed				

CAR ID	14	Section no.	A, B	Date: 13/04/2020
Description of CAR (1st round)				
Section A1. As per guideline to fill the PDD, the following is requested in this section: *1. estimates of annual average and total GHG emission reductions for the chosen crediting period* *2.* besides the sentence "The project activity avoids the emission to the atmosphere of approximately **18,926 tons of CO_2 per** year,…." Is inconsistent to the ERy value on page one. 3. *Indicate the small-scale project type (Type I, Type II and/or Type III) applicable to the project activity in accordance with the project standard.* Section B.1 4. the tools applicable version are missing.				
Project participant response				**Date:** 15/04/2020
Section A1 1. The estimates of annual average and total GHG emission reductions for the chosen crediting period were included in section A1. 2. The sentence ""The project activity avoids the emission to the atmosphere of approximately 18,926 tons of CO2 per year,…." was corrected with the ERy updated value. 3. The small-scale project type (Type I) as per project standard was indicated in Section A1. Section B.1 4. Tools applicable versions were included in section B.1.				
Documentation provided by project participant				
PDD v.6.1				
DOE assessment				**Date:** 21/04/2020
1. The GHG emissions included in section A.1 are in line with the calculation in the ER calculation spreadsheet 2. The ER values in section A.1 and throughout the whole PDD are consistent 3. The project scale and type is correctly stated in section A1. 4. The tools to calculate the emission factor for an electricity system (version 7.0) and Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (version 3.0.1) are correctly stated in section B1 The finding is closed				

Table 5. FAR from 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~~

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Document information

Version	*Date*	*Description*
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM validation and verification standard for project activities" (CDM-EB93-A05-STAN) and version 02.0 of the "CDM project cycle procedure for project activities" (CDM-EB93-A06-PROC); • Make editorial improvements.
02.0	31 October 2017	Revision to align with the requirements of the "CDM validation and verification standard for project activities" (version 01.0).
01.0	23 March 2015	Initial publication.

Decision Class: Regulatory
Document Type: Form
Business Function: Renewal of crediting period
Keywords: crediting period, project activities, validation report