



**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	Candelaria Hydroelectric Project UNFCCC ID: 0604
Number and duration of the next crediting period	CP-No: 3 7 years, 01/01/2021- 31/12/2027
Version number of the validation report	1.2
Completion date of the validation report	11/11/2020
Version number of PDD to which this report applies	13.1
Project participants	Hidroelectrica Candelaria, S.A.
Host Party	Guatemala
Applied methodologies and standardized baselines	AMS-I.D.: Grid connected renewable electricity generation, (ver. 18) 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	10,618 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 Candelaria, 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:

“Candelaria Hydroelectric Project”

with regard to the relevant requirements for CDM project activities.

The project has been registered on 09/11/2006 under the UNFCCC registration No. 0604. The PPs have chosen a 7 year crediting period which is now due for 2nd renewal. .

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^{/PCP/}
- the updated applied UNFCCC Methodology AMS-I.D. (Ver. 18) ^{/METH/} and
- the methodological tool “Tool to calculate the emission factor for an electricity system” (version 07.0)^{/TEF/}
- the methodological tool “Assessment of the validity of the original / current baseline and update of the baseline at the renewal of the crediting period” Version 03.0.1)^{/TVB/}.

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 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 4.318MW.

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

Table A-1: Project Location

No.	Project Location
Host Country	Guatemala
Region:	Department Alta Verapaz
Project location address:	County Senahú
Latitude:	15.38695 N
Longitude:	-89.755010 W

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

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

Parameter	Unit	Value
Manufacturer	-	Gilkes
Turbine capacity	MW	4.456
Power factor	-	0.8
Apparent power	kVA	5,397
Generator capacity	MW	4.318

Parameter	Unit	Value
Gross Head	m	130
Nominal flow	m ³ /s	3.8

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	Oliver	Quireza	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

Duration of on-site inspection: 19/08/2019 to 23/08/2019				
No.	Activity performed on-site	Site location	Date	Team member
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	Oliver Quireza Raul Mitre
2.	González	Alaide	Consultant	20-08-2019	Consultant	Oliver Quireza Raul Mitre
3.	Pastor	Amilcar	Candelaria & Choloma	20-08-2019	Plant Management	Oliver Quireza Raul Mitre
4.	Bladimir	Azañon	Candelaria & Choloma	20-08-2019	Operation	Oliver Quireza Raul Mitre

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	-	-	-
Estimated emission reductions or net anthropogenic removals	-	1	-
Validity of monitoring plan	-	-	-
Crediting period	-	1	1
Project participants	1	-	-
Post-registration changes	-	1	-
ER calculation	-	3	-
Total	1	10	1

SECTION D. Validation findings**D.1. Compliance with PDD form**

Means of validation	<p>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.</p> <p>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.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /PDD/ • /PDD-T/ • /unfccc/ 	
Findings	<input type="checkbox"/>	The latest reporting template CDM-PDD-FORM as listed on the UNFCCC website has been used for the PDD.
	<input type="checkbox"/>	The latest instructions for filling out the PDD have been followed. No adverse finding has been identified in the course of this validation.
	<input checked="" type="checkbox"/>	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context: CAR 01
Conclusion	<input type="checkbox"/>	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.

	<input checked="" type="checkbox"/>	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 corrections the latest reporting template CDM-PDD-FORM as listed on the UNFCCC website has been used for the 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: <ul style="list-style-type: none"> • /PDD/ • /METH/ • /TVB/ • /TEF/ • /unfccc/ 						
Findings	<input checked="" type="checkbox"/>	The updated PDD is completely in accordance with the approved methodology applicable for the CDM project					
	<input checked="" type="checkbox"/>	The breakdown of PDD accordance of the referenced tools is as follows:					
		1	<table border="1"> <tr> <td>Title (of the tool)</td><td>Tool to calculate the emission factor for an electricity system</td></tr> <tr> <td>Version</td><td>7.0</td></tr> <tr> <td>MP compliance</td><td> <input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A (for MP) </td></tr> </table>	Title (of the tool)	Tool to calculate the emission factor for an electricity system	Version	7.0
Title (of the tool)	Tool to calculate the emission factor for an electricity system						
Version	7.0						
MP compliance	<input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A (for MP)						
2	<table border="1"> <tr> <td>Title (of the tool)</td><td>Assessment of the validity of the original/current baseline und update of the baseline at the renewal of the crediting period</td></tr> <tr> <td>Version</td><td>03.0.1</td></tr> <tr> <td>MP compliance</td><td> <input type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A </td></tr> </table>	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	<input type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A
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	<input type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A						
The breakdown of PDD accordance of the applicable SB is as follows:							
1	<table border="1"> <tr> <td>Title (of the SB)</td><td>-</td></tr> <tr> <td>Version</td><td></td></tr> <tr> <td>MP compliance</td><td></td></tr> </table>	Title (of the SB)	-	Version		MP compliance	
Title (of the SB)	-						
Version							
MP compliance							
<input type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised:						
Conclusion	<input checked="" type="checkbox"/>	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.					
	<input type="checkbox"/>	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.					

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: <i>"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</i>
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	<p><i>new generation sources into the grid.”</i></p> <p>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.</p> <p>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:</p> <p>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:</p>
Findings	<p><u><i>Step 1: Assess of the validity of the current baseline for the next crediting period</i></u></p> <p><u><i>Step 1.1 Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies:</i></u></p> <p>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.</p> <p>The validation team has independently reviewed the host country legislation as well as current policies, such as</p> <ol style="list-style-type: none"> 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 <p>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.</p> <p><u><i>Step 1.2 Assess the impact of circumstances:</i></u></p> <p>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.</p> <p>As the electricity sells is the main income of the project, the electricity spot prices were reviewed as follow:</p> <p>Registered PDD year 2004: 53.2 USD/MWh First crediting year of the project 2007: 89.6 USD/MWh First crediting year of the 2nd CP - 2014: 103.6 USD/MWh Actual price (at PDD submission) - 2019: 63.2 USD/MWh</p> <p>The updated PDD provided a detailed graph that shows the electricity prices through the whole CP. The data in the graph was cross checked by the VT versus the official information from the AMM to confirm its correctness.</p> <p>Even though the prices have been above the prices used at validation stage, it is also observed that the price oscillates very fast and in the last years a downward trends is very clear. This situation represent a very high risk to the project activity . So it is confirmed a downwards long term trend and very high oscillation in prices which increase the project risk.</p>

Furthermore the international presence of project developers stated by the PP which make market more competitive and difficult can be confirmed by the official information from the Ministry of Energy and Mines from Guatemala.

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 fix ante.

Apart of the $EF_{grid,CM,y}$ no other parameters were determined ex ante for the 3rd CP.

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 $EF_{grid,CM,y}$ has to be updated for the 3rd CP. In line with the TOOL07 "Tool to calculate the emission factor for an electricity system", version 7, the $EF_{grid,CM,y}$ is fixed for the 3rd CP. The updated PDD has properly described the $EF_{grid,CM,y}$ 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:

$EF_{CO2,grid,y} / EF_{grid,CM,y}$ = 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:			
	Parameter	Previous value	Updated value	
	$EF_{CO_2,grid,y} / EF_{grid,CM,y}$	0.4833	0.415	
		Reference		
	$EF_{CO_2,m/k,i,y} / EF_{CO_2,m,i,y}$	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
	$EG_{m,y} / EG_{k,y}$	Data provided by the MMA for each year	Updated for actual years 2016, 2017, 2018	/XLS/
	$\eta_{m/k,y} / \eta_{m,y}$	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
These changes have been appropriately considered in the updated PDD.				
Conclusion	<input checked="" type="checkbox"/>	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:		
		CAR 11		
	<input type="checkbox"/>	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.		
	<input checked="" type="checkbox"/>	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 validity of the baseline, including the the calculation of baseline emissions has been checked regarding the continued validity of underlying assumptions and parameter values. After corrections is was concluded that the baseline assessment is done as per tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period". However, with regards to the applicable GWP FAR 1 needs to be addressed at issuance stage. All other data and parameters determined ex-ante are still valid.				

D.4. Estimated emission reductions or net anthropogenic removals

Means of validation	<p>For validation of the estimated GHG emission reductions the client has provided the validation team with the following documentation:</p> <ul style="list-style-type: none"> - Updated PDD/PDD/ - XLS spreadsheet^{/XLS/} - Original electricity data from the AMM <p>Further, the validation team has downloaded from the UNFCCC website the applicable version of the CDM methodology and all referenced methodological tools ^{/unfccc/}.</p> <p>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.</p> <p>(1) Baseline emissions, BE_y</p> <p>According to the applied methodology, baseline emissions include only CO₂ emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.</p> <p>Hence:</p>
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$$BE_y = EG_{PJ,y} \times EF_{grid,y}$$

Equation (1)

Where:

- BE_y = Baseline emissions in year y (t CO₂)
- $EG_{PJ,y}$ = 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 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" (t CO₂/MWh)

Calculation of $EG_{grid,CM,y}$

$EF_{grid,CM,y}$ is calculated in line with the "Tool to calculate the emission factor for an electricity system" (version 07.0) ^{/TEFL/}. The following steps are applied:

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 has been chosen correctly.

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

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:

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

$$= 0.536 \text{ t CO}_2/\text{MWh}$$

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:

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

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:

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

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 for the third CP is the same as the one calculated for the 2nd CP. The BM from previous CP was reviewed to confirm the correctness.

CM calculation

As per the Tool, the weights applied for the 2nd and 3rd CP are as follow:

$$W_{OM} = 0.25$$

$$W_{BM} = 0.75$$

The calculation is done as follow:

	$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$ <p>Where:</p> $EF_{grid,CM,y} = \text{CM CO}_2 \text{ emission factor in year } y \text{ (tCO}_2\text{/MWh)}$ $EF_{grid,OM,y} = \text{OM CO}_2 \text{ emission factor in year } y \text{ (tCO}_2\text{/MWh)}$ $EF_{grid,BM,y} = \text{BM CO}_2 \text{ emission factor in year } y \text{ (tCO}_2\text{/MWh)}$ $w_{OM} = \text{Weighting of OM emissions factor}$ $w_{BM} = \text{Weighting of BM emissions factor}$ $EF_{grid,CM,y} = 0.536 \text{ tCO}_2\text{e/MWh} \times 0.25 + 0.375 \text{ tCO}_2\text{e/MWh} \times 0.75$ $= 0.415 \text{ tCO}_2\text{e/MWh}$ <p>(2) Project emissions, PE_y</p> <p>As per the applied methodology^{METH/}, PE_y = 0 for hydroelectric projects without reservoir.</p> <p>(3) Leakage emissions, LE_y</p> <p>As per applied methodology^{METH/}, no leakage is to be considered. The power equipment was not transferred from another activity. LE_y = 0.</p> <p>(4) Emission reductions, ER_y</p> <p>As per applied methodology the ER is calculated as follow:</p> $ER_y = BE_y - PE_y - LE_y$ $= BE_y$ $= EG_{BL,y} \times EF_{grid,CM,y}$ $= 25,586 \text{ MWh} \times 0.415 \text{ tCO}_2\text{e/MWh}$ $= 10,618 \text{ tCO}_2$ <p>Where:</p> <p>ER_y Emission reductions in year y</p> <p>BE_y Baseline emissions in year y</p> <p>PE_y Project emissions in year y</p> <p>LE_y Leakage emissions in year y</p> <p>The estimated amount of GHG emission reductions of the project is 74,326 tCO₂e during the third crediting period (7 years) from 01/01/2021 to 31/12/2027, resulting in estimated average annual emission reductions of 10,618 tCO₂e.</p>				
Findings	<table border="1"> <tr> <td><input type="checkbox"/></td> <td>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.</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context: CAR 02</td> </tr> </table>	<input type="checkbox"/>	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 3 rd crediting period is deemed plausible and conservative.	<input checked="" type="checkbox"/>	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context: CAR 02
<input type="checkbox"/>	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 3 rd crediting period is deemed plausible and conservative.				
<input checked="" type="checkbox"/>	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context: CAR 02				
Conclusion	<table border="1"> <tr> <td><input type="checkbox"/></td> <td>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.</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>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.</td> </tr> </table> <p>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 ER 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 have been checked, they are traceable and consistent. The estimation of emission reductions for the 3rd crediting period is deemed plausible and conservative.</p>	<input type="checkbox"/>	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.	<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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.				
<input checked="" type="checkbox"/>	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.				

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
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	<p>changes. Further, changes due to editorial updates of the applicable templates have been checked.</p> <p>In detail all parameters, ex-ante values and applicable formulae have been checked to determine the required changes for the next crediting period.</p> <p>Besides, based on conducted site-visit and interviews with related personnel the validation team has assessed the feasibility of the required changes.</p> <p>Monitored Parameters</p> <p>In line with the methodology, solely the following parameter, is to be monitored:</p> <p>EG_{BL,y} Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y</p> <p>The following section was updated:</p> <p>Section B.7.3 was updated because the electricity meters were replaced and the software used to manage the data of the old meters is not used anymore. The updated PDD describes the reporting/invoicing procedure according to the actual procedure implemented in the power plant^{PROC/}, which includes periodic verification of the meters as per Commercial coordination Nom 14 (NCC-14) clause 14.12, hourly and daily recording procedure including the SCADA data cross check, monthly readings procedure which includes the cross check with AMM personnel for approval and yearly data collection procedure.</p> <p>No other changes in the monitoring plan are planned for the next CP.</p> <p>The ex-ante parameters update is assessed in section D.3 of this report.</p>				
Findings	<table border="1"> <tr> <td><input checked="" type="checkbox"/></td><td> <p>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.</p> <p>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</p> <ul style="list-style-type: none"> - 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. </td></tr> <tr> <td><input type="checkbox"/></td><td> <p>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:</p> <p>-</p> </td></tr> </table>	<input checked="" type="checkbox"/>	<p>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.</p> <p>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</p> <ul style="list-style-type: none"> - 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. 	<input type="checkbox"/>	<p>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:</p> <p>-</p>
<input checked="" type="checkbox"/>	<p>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.</p> <p>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</p> <ul style="list-style-type: none"> - 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. 				
<input type="checkbox"/>	<p>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:</p> <p>-</p>				
Conclusion	<table border="1"> <tr> <td><input checked="" type="checkbox"/></td><td>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.</td></tr> <tr> <td><input type="checkbox"/></td><td>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.</td></tr> </table> <p>The monitoring plan of the updated PDD is fully in line with the methodological changes including the applicable methodological tools.</p>	<input checked="" type="checkbox"/>	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.	<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	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.				
<input type="checkbox"/>	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.				

D.6. Crediting period

Means of validation	<p>The project has been registered on 09/11/2006 under the UNFCCC registration No. 0604. The PP has chosen a 7-year crediting period, which the second crediting period started from 01/01/2020 and will expire on 31/12/2020.</p> <p>PP selected TÜV NORD to conduct the RCP validation no earlier than 270 days prior to, but no later than one year after the expiry of the 2nd crediting period, which is confirmed as in line with the EB requirement for the RCP.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /PDD/ • /unfccc/
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Findings	<input checked="" type="checkbox"/>	As the respective requirements are met, the project's 3rd crediting period may start immediately after the expiration of the 2nd, given that all other applicable criteria are met. It is further confirmed that the start date (01/01/2021) and the length of the crediting period (7 years) are in compliance with the project standard. However, as the 3rd crediting period starts after the end of the 2nd commitment period of the Kyoto Protocol additional guidance from CMP is required to calculate and process CERs at issuance stage.
	<input checked="" type="checkbox"/>	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context: FAR 1: Currently, guidance from CMP is not available on esp. 2 issues for calculation and processing of CERs post 2020: a) Applicable Global Warming Potential for N2O b) Technical modalities of CER issuance (e.g. serial numbers) At issuance stage it has to be ensured that corresponding CMP guidance and related EB decisions are available and duly considered.
Conclusion	<input checked="" type="checkbox"/>	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.
	<input type="checkbox"/>	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 31/12/2020 the request can be done from 05/04/2020 up to 31/12/2021. However, a FAR has been raised on issues for which CMP guidance is currently pending. This FAR shall be addressed at issuance stage.

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	<input type="checkbox"/>	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/} .
	<input checked="" type="checkbox"/>	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
		CL 01
Conclusion	<input type="checkbox"/>	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.
	<input checked="" type="checkbox"/>	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 PP Ecoinvest Carbon S.A. is not active anymore, nonetheless the evidence provided by the PP Hidroelectrica Candelaria S.A. shows that the PP has proceed as per §177 (a) of the CDM-PS, the PP made this better endeavour to contact Ecoinvest Carbon S.A. representatives, as no response was received then the administrative withdrawal is requested. Hidroelectrica Candelaria S.A. as only remaining active PP requested the withdraw of Ecoinvest Carbon S.A. . The change is confirmed by the MOC and communications submitted to the UNFCCC on 30/06/2020 and the email sent to the Ecoinvest Carbon S.A. and the Swiss DNA on 15/10/2019.

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

Hidroelectrica Candelaria, S.A. has commissioned the TÜV NORD JI/CDM Certification Program to re-validate the project "Candelaria 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 10,618 tCO_{2e}/year are most likely to be achieved within the third 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 currently applicable for the renewal of the crediting period.

However, as guidance from CMP on application of GWP and processing of CERs for post 2020 issuances is currently pending, a respective FAR has been raised. This FAR has to be appropriately addressed at issuance stage before CERs from the 3rd CP can be issued.

Queretaro, 11/11/2020



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

Appendix 1. Abbreviations

Abbreviations	Full texts
AGER	Association of Generators by Renewable Energy (<i>Asociacion de Generadores con Energia Renovable</i>)
AMM	Wholesale Market Administrator (<i>Administrador del Mercado Mayorista</i>)
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
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



Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JUCDM 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



Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JUCDM 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

082_001-VA060-F20_2018-08-09_rev8.doc

082_001-VA060-F20_rev3 / 2012-10-25

337_001-VA060-F20_2018-08-17_rev5.doc

082_001-VA060-F20_rev3 / 2012-10-25



Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JUCDM 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_001-VA060-F20_2020-04-08_rev6

082_001-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 23/08/2006	https://cdm.unfccc.int/Projects/DB/DNV-CUK1158743330.88/view?cp=1	UNFCCC
2.	PP	/MOC/	<ul style="list-style-type: none"> Modalities of Communication Updated MOC form, from 09/06/2020 Email to UNFCCC, 30/06/2020, requestion the PP change 	https://cdm.unfccc.int/Projects/DB/DNV-CUK1158743330.88/view?cp=1	UNFCCC
3.	PP	/PDD/	RCP Project Design document "Candelaria Hydroelectric Project" <ul style="list-style-type: none"> Version 11, dated 09/08/2019 Version 12, dated 20/11/2019 Version 13, dated 18/05/2020 Version 13.1, dated 30/07/2020 	N/A	PP
4.	PP	/PDD-Reg/	Registered Project Design Document named "Candelaria Hydroelectric Project" (Version No. 10, dated 27/12/2013)	https://cdm.unfccc.int/Projects/DB/AENOR1356628448.64/view	UNFCCC
5.	PP	/XLS/	Emission reduction calculation spreadsheet <ul style="list-style-type: none"> Version 1, 09/08/2019 Version 2, 19/05/2020 EF calculation spreadsheet versions: <ul style="list-style-type: none"> Version 1: 19/08/2019 Version 2: 20/11/2019 Version 3: 19/05/2020 	N/A	PP
6.	DOE	/CPM/	TÜV NORD JI / CDM Certification Program Manual (incl. procedures and forms)	N/A	TNC
7.	IPCC	/IPCC/	<ul style="list-style-type: none"> 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/	IPCC
8.	UNFCCC	/KP/	Kyoto Protocol (1997)	https://unfccc.int/kyoto_protocol	UNFCCC
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/	AMS-I.D ver.17- Grid Connected renewable electricity generation AMS-I.D ver.18- Grid Connected renewable electricity generation	https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFXQQOFQQH4SBK	UNFCCC
11.	UNFCCC	/PCP/	CDM project cycle procedure, version 2.0	https://cdm.unfccc.int/Reference/Standards/index.html	UNFCCC
12.	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	https://cdm.unfccc.int/Reference/PDDs_Forms/index.html	UNFCCC
13.	UNFCCC	/PS/	CDM project standard, version 2.0		UNFCCC
14.	UNFCCC	/TVB/	Methodological Tool: "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" version 03.0.1	https://cdm.unfccc.int/methodologies/PAmethologies/tools/am-tool-11-v1.pdf/history_view	UNFCCC
15.	UNFCCC	/TEF/	Tool to calculate the emission factor for an electricity system" (version 07.0)	https://cdm.unfccc.int/methodologies/PAmethologies/tools/am-tool-07-v1.1.pdf/history_view	UNFCCC

No	Author	Reference	Title	References to the document	Provider
16.	UNFCCC	/TOOL09/	TOOL09 -Determining the baseline efficiency of thermal or electric energy generation systems, version 2.0	https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf/history_view	UNFCCC
17.	UNFCCC	/VAL/	Validation Report for CDM project "Candelaria Hydroelectric Project" version 2, dated 11/11/2013	N/A	UNFCCC
18.	UNFCCC	/VVS/	CDM Validation and Verification Standard, Version 2.0	https://cdm.unfccc.int/methodologies/SSCmethodologies/approved	UNFCCC
19.	SEVERAL	/LAW/	<ol style="list-style-type: none"> 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	
20.	MEM Guatemala	/BL/	National Plan of Energy 2017-2023, MEM, Guatemala	https://www.mem.gob.gt/wp-content/uploads/2017/11/Plan-nacional-de-energia.pdf	
21.	PP	/PROC/	<ol style="list-style-type: none"> 1. Operational Procedures 2. PR-AIC-002 – Invoicing Procedure SECACAO Group 	N/A	PP
22.	CNEE MARN	/LIC/	<ul style="list-style-type: none"> • 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 2010/07/02 (without validity) • Environmental License Num. 01543-2015/DIGARN given by MARN on 17-05-2015 and valid till 24-02-2017. 	N/A	PP
23.	PP	/L-B/	Operational Logbook	N/A	PP
24.	General Electric	/Meter/	<ul style="list-style-type: none"> - 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
25.	General Electric	/Meter/	<ul style="list-style-type: none"> • 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
26.	Schneider	/NEW_meter/	<ul style="list-style-type: none"> • 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	01	Section no.	Appendix 1	Date: 21/08/2019
Description of CAR (1st round)				
The PP Ecoinvest Carbon SA has been deleted in the updated PDD, nonetheless it still appears in the UNFCCC website. Clarification is requested				
Project participant response				Date: 19/09/2019
The Withdraw of Ecoinvest Carbon, SA as a project participant was submitted as per Modalities of Communication guidelines on August 26, 2019.				
Documentation provided by project participant				
PDD v.5				
DOE assessment				Date: 28/10/2019
The change related to the withdrawal of the PP Ecoinvest Carbon S.A. is also confirmed by the MoC signed and submitted to the UNFCCC. The finding is closed				

Table 4. CAR from this validation

CAR ID	01	Section no.	template /B.1	Date: 19/08/2019
Description of CAR (1st round)				
The latest PDD template has not been used				
Project participant response				Date: 19/09/2019
Version 11 of the Project design document form was used.				
Documentation provided by project participant				
PDD v.5				
DOE assessment				Date: 28/10/2019
The applied PDD template was correctly used. The PDD has been checked against the UNFCCC website. The finding is closed				

CAR ID	02	Section no.	Appendix 7	Date: 20/08/2019
Description of CAR (1st round)				
The approved PRCs descriptions have not been described in Appendix 7 as per PDD guideline				
Project participant response				Date: 19/09/2019
The approved PRC-0604-001 description was included in Appendix 7 as per PDD guideline.				
Documentation provided by project participant				
PDD v.5 Modalities of Communication guidelines on August 26, 2019				
DOE assessment				Date: 28/10/2019
The PRCs have been described correctly Appendix 7 of the PDD version 12. The change related to the withdrawal of the PP Ecoinvest Carbon S.A. is also confirmed by the MoC signed and submitted to the UNFCCC. The finding is closed				

CAR ID	03	Section no.	B.6.2 /XLS	Date: 22/08/2019
Description of CAR (1st round)				
<ol style="list-style-type: none"> 1. Reference of $\eta_{m/k,y}$ / $\eta_{m,y}$ default values applied in the calculation is not clearly updated. Section B.6.2 mentions Tool version 4 and the spreadsheet/Assumptions mentions Annex 1. Correction is requested. 2. Annex 1 reference throughout the whole EF spreadsheet has to be revised. 3. TOOL07 references in cells C15/C16 have to be updated as per new TOOL07 				

4. Columns B in sheets OM (2016, 2017, 2018) have to be revised to include only the operation start year, instead of the full dates in set of plants m.	
Project participant response	Date: 19/09/2019
<ol style="list-style-type: none"> 1. The correct reference is the Appendix of the tool 9 "Determining the baseline efficiency of thermal or electric energy generation systems". This reference is updated in the PDD and spreadsheet for EF calculation. $\eta_{m/k,y} / \eta_{m,y}$ default values included in sheet Assumptions is updated as per TOOL09 ver. 2. 2. Annex 1 reference throughout the whole EF spreadsheet is revised and corrected using the Appendix of the Tool 09 Version 02.0. 3. Annex 1 reference throughout the whole EF spreadsheet is revised and corrected using the Appendix of the Tool 09 Version 02.0. 4. Columns B in sheets OM (2016, 2017, 2018) were revised to include only the operation start year, instead of the full dates. <p>The finding is closed</p>	
Documentation provided by project participant	
PDD v.5 EF calculation-Candelaria 3th crediting period-V2	
DOE assessment	Date: 28/10/2019
<ol style="list-style-type: none"> 1. The reference of $\eta_{m/k,y} / \eta_{m,y}$ default values has been correctly indicated in section B.6.2 of the PDD and correctly referenced in EF calculation spreadsheet. The updated $\eta_{m/k,y} / \eta_{m,y}$ default values applied in spreadsheet are in line with the applicable TOOL09 ver. 2. 2. Applicable appendix from the Tool 09 Version 02.0 has been correctly referenced throughout the EF spreadsheet. 3. Applicable appendix from the Tool 09 Version 02.0 has been correctly referenced throughout the EF spreadsheet. 4. Column B in sheets OM (2016, 2017, 2018) for set of plants m, has been corrected so that the calculation is fully traceable and applied formulas are correct. <p>The finding is closed</p>	

CAR ID	04	Section no.	A	Date: 18/12/2019
Description of CAR (1st round)				
<ol style="list-style-type: none"> 1. Footnote 2, page 5: isn't there a more up to date value? This one refers to crediting period 1, which is several years ago. 2. Section A.1: as per guideline to fill the PDD, the following is requested: "Indicate the small-scale project type..." 3. Section A.3: as per guideline to fill the PDD, the following is requested: "the age and average lifetime of the equipment..." 4. Section B.1.: as per guideline to fill the PDD, the following is requested: "Refer to the UNFCCC CDM website for the exact reference of approved methodologies, methodological tools..." 				
Project participant response				Date: 18/05/20
<ol style="list-style-type: none"> 1. Candelaria's output average was updated to Candelaria's historical average from 2007 to 2018, as registered https://www.amm.org.gt/portal/?page_id=145. This new value (25,586 MWh) was updated in the following sections: <ul style="list-style-type: none"> • Section A.1 • Section A.3 • Section B.6.3 • Section B.7.1 • Appendix 4 • Emissions reductions calculation-Candelaria 3th crediting period.xls • Consequently, the annual value of emission reductions estimated for the project activity was updated to 10,618 tCO₂e in the following sections: <ul style="list-style-type: none"> ○ First page ○ Section A.1 ○ Section B.6.4 ○ Emissions reductions calculation-Candelaria 3th crediting period.xls 2. The small-scale project type was included in Section A.1. 3. Age and average lifetime of equipment were included in section A3. 4. UNFCCC CDM website links of the approved methodologies and methodological tools were referenced as Section B.1 footnotes. 				
Documentation provided by project participant				
PDD v.13				

DOE assessment	Date: 19/05/2020
1. The updated value is in line with the latest available information of the Guatemalan public utility 2. The indicated small scale project type is in line with the simplified modalities for small scale projects 3. In line with the PDD guideline the age and average lifetime of the project equipment has been provided. 4. The provided exact reference of the <i>approved methodologies, methodological tools is correct.</i> The finding is closed	

CAR ID	05	Section no.	B.2	Date: 18/12/2019
Description of CAR (1st round)				
1. meth applicability point 3: the stated points (a) to... - are not in line with the latest version of AMS-I.D. 2. meth applicability points 1 to ... - are not complete, as per latest version of AMS-I.D. 3. as per guideline to fill the PDD, please apply the " <i>Additional specific instructions for small-scale project activities:...</i> "				
Project participant response				Date: 18/05/2020
1. The stated points in meth applicability point 3 were adjusted with the latest version of AMS-I.D. 2. Meth applicability points 1 to 11 were completed as per latest version of AMS-I.D. 3. Applicable " <i>Additional specific instructions for small-scale project activities</i> " as per guidelines to fill the PDD were included in section B2.				
Documentation provided by project participant				
PDD v.13				
DOE assessment				Date: 19/05/2020
1. The provided point 3 is in line with the latest version of the AMS-I.D. 2. The provided point 1 is in line with the latest version of the AMS-I.D. 4. " <i>Additional specific instructions for small-scale project activities:...</i> " have been properly included. The finding is closed				

CAR ID	06	Section no.	B.4	Date: 18/12/2019
Description of CAR (1st round)				
Step 1.4: "This parameter should be updated for the second crediting period" However PP is applying for the third CP.				
Project participant response				Date: 18/05/2020
The number of the crediting period was corrected in Step 1.4.				
Documentation provided by project participant				
PDD v.13				
DOE assessment				Date: 19/05/2020
The third crediting period has been properly indicated. The finding is closed				

CAR ID	07	Section no.	B.6.1	Date: 18/12/2019
Description of CAR (1st round)				
1. step 1: it is not clear which option from the applied tool is used. 2. Step 4: it is not clear which approach from the tool is applied to calculate $EF_{OM,y}$ 3. Step 6: Please add the relevant data. 4. Formula (6): the abbreviations differ from the meth and formula (1)				
Project participant response				Date: 18/05/2020
1. Step 1: A remark of choosing Option 2 was included. 2. Step 4: It was indicated that Approach 2 is used to calculate $EF_{OM,y}$ 3. Main data for the calculation were included in step 6. A reference was also included to find further data on Appendix 4. 4. All equations and abbreviations included in section B.6.1. were adjusted as per meth. and tool.				
Documentation provided by project participant				
PDD v.13				
DOE assessment				Date: 19/05/2020
1. The indicated option 2 is in appropriate considering the available public information 2. The approach 2 is appropriate considering the available public information 3. The relevant data is provided in appendix 4 of the PDD 4. The abbreviations are in line with the formulas in the applied methodology The finding is closed				

CAR ID	08	Section no.	B	Date: 18/12/2019
Description of CAR (1st round)				
1. Section B.6.3. : the abbreviations differ from the meth and formula (1) 2. Section B.7.1: the parameter abbreviation differs from the meth.				
Project participant response				Date: 18/05/20
1. Baseline emissions formula and abbreviations in Section B.6.3 were adjusted as per Section B.6.1 and tool. 2. Parameter abbreviation in Section B.7.1 was corrected.				
Documentation provided by project participant				
PDD v.13				
DOE assessment				Date: 19/05/2020
The abbreviations are in line with the formulas in the applied methodology. The finding is closed				

CAR ID	09	Section no.	EF xls file	Date: 18/12/2019
Description of CAR (1st round)				
Sheet OM ex-ante 1. Cell A7 states EFgrid, OM simple- however it is the adjusted OM value. 2. Row 8: the values of EGy include grid imports – a reference is requested, how to calculate EGy in this case. 3. The presented values are missing units.				
Project participant response				Date: 18/05/2020
1. Cell A7 was corrected 2. It was indicated in row 14, as a reference from row 8, that net electricity imports must be considered low-cost/must-run units k, as detailed by the Tool. 3. Units were included in column A				
Documentation provided by project participant				
EF calculation-Candelaria 3th crediting period- 2016-2018				
DOE assessment				Date: 19/05/2020
1. The corrected OM is in line with the actual OM adjusted 2. The provided clarification note is correct and in line with the methodological tool 3. All data provided in the spread sheets include the proper units.				
The finding is closed				

CAR ID	10	Section no.	ER xls file	Date: 18/12/2019																																																							
Description of CAR (1st round)																																																											
ER calculation sheet: The crediting period is not correct, rows 8 and 29 surplus as the correct period goes from 2021 to 2027. Table B.6.4 in PDD also has to be corrected.																																																											
B.6.4. Summary of ex ante estimates of emission reductions																																																											
<table border="1"> <thead> <tr> <th>Year</th> <th>Baseline emissions (tCO₂e)</th> <th>Project emissions (tCO₂e)</th> <th>Leakage (tCO₂e)</th> <th>Emission reductions (tCO₂e)</th> </tr> </thead> <tbody> <tr><td>2021</td><td>10,132</td><td>0</td><td>0</td><td>10,132</td></tr> <tr><td>2022</td><td>10,132</td><td>0</td><td>0</td><td>10,132</td></tr> <tr><td>2023</td><td>10,132</td><td>0</td><td>0</td><td>10,132</td></tr> <tr><td>2024</td><td>10,132</td><td>0</td><td>0</td><td>10,132</td></tr> <tr><td>2025</td><td>10,132</td><td>0</td><td>0</td><td>10,132</td></tr> <tr><td>2026</td><td>10,132</td><td>0</td><td>0</td><td>10,132</td></tr> <tr><td>2027</td><td>10,132</td><td>0</td><td>0</td><td>10,132</td></tr> <tr> <td>Total</td> <td>10,132</td> <td>0</td> <td>0</td> <td>10,132</td> </tr> <tr> <td>Total number of crediting years</td> <td colspan="4">7</td> </tr> <tr> <td>Annual average over the crediting period</td> <td>10,132</td> <td>0</td> <td>0</td> <td>10,132</td> </tr> </tbody> </table>					Year	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions (tCO ₂ e)	2021	10,132	0	0	10,132	2022	10,132	0	0	10,132	2023	10,132	0	0	10,132	2024	10,132	0	0	10,132	2025	10,132	0	0	10,132	2026	10,132	0	0	10,132	2027	10,132	0	0	10,132	Total	10,132	0	0	10,132	Total number of crediting years	7				Annual average over the crediting period	10,132	0	0	10,132
Year	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions (tCO ₂ e)																																																							
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Project participant response				Date: 25/04/20																																																							
ER calculation spreadsheet and table B.6.4 were corrected.																																																											
Documentation provided by project participant																																																											
PDD v.13																																																											
ER calculation – Candelaria – 3rd crediting.xls																																																											
DOE assessment				Date: 19/05/2020																																																							
The years of the CP have been properly corrected in both the PDD and spreadsheet The finding is closed																																																											

CAR ID	11	Section no.	Step 1.2 p	Date: 07/07/2020
Description of CAR (1st round)				
Step 1.2 page 12 PDD The impact of the actual electricity price is very important for the project activity, nonetheless it has not been assessed in step 1.2 "assess the impact of circumstances" as per TOOL 11 Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period.				
Project participant response				Date: 30/07/2020
It was included in section 1.2 „Assess the impact of circumstances“ an assessment about current electricity prices, that continues being a risk for the project activity.				
Documentation provided by project participant				
PDD v 13.1				
DOE assessment				Date: 10/08/2020
the PP provided an assessment on the electricity price which is the more relevant variable that could be modified, impacting the baseline of the project. The VT cross checked the electricity prices information and market situation of the electric sector in Guatemala against the official sources of information such as the AMM and the Ministry of Mines and Energy and it can be confirmed that the electricity prices oscillate rapidly which represent a real risk to the project. It is observed that at the beginning of the crediting period the prices had upward trend for some year, nonetheless a downward trend is observed during the last years. So it can be confirmed that the actual impact of circumstances of the project don't change the original baseline of the project. The finding is closed				

Table 5. FAR from this validation

FAR ID	01	Section no.	General	Date: 11/11/2020
Description of FAR				
Currently, guidance from CMP is not available on esp. 2 issues for calculation and processing of CERs post 2020. At issuance stage, it has to be ensured that corresponding CMP guidance and related EB decisions are available and duly considered. Especially:				
<ol style="list-style-type: none"> 1. The PP has to apply any GWP value(s) that may be adopted by the CMP for the period from 1 January 2021 in its monitoring reports for any emission reductions achieved by the project activity in that period; and 2. The PP has to update its project design document in accordance with any requirements of the CMP guidance. 3. The PP has to duly consider the technical modalities of CER issuance (e.g. serial numbers) 				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY
Conclusion Tick the appropriate checkbox				
<input checked="" type="checkbox"/> To be checked during the next periodic verification				

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: <ul style="list-style-type: none">• 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