



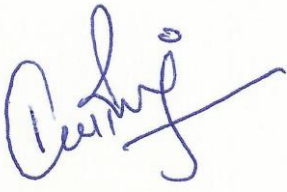
**Validation report form for post-registration changes for  
CDM project activities  
(Version 03.0)**

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

**BASIC INFORMATION**

<b>Title and UNFCCC reference number of the project activity</b>	Grid-connected Solar PV project in Bokhol UNFCCC reference number: 10331
<b>Process track</b>	<input checked="" type="checkbox"/> Prior approval <input type="checkbox"/> Issuance <input type="checkbox"/> Renewal of crediting period
<b>Version number of the validation report</b>	2.0
<b>Completion date of the validation report</b>	09/06/2020
<b>Type(s) of PRCs</b>	<input type="checkbox"/> Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents <sup>1</sup> <input checked="" type="checkbox"/> Corrections <input type="checkbox"/> Changes to the start date of the crediting period <input type="checkbox"/> Inclusion of a monitoring plan <input checked="" type="checkbox"/> Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents <input checked="" type="checkbox"/> Changes to the project design <input type="checkbox"/> Changes specific to afforestation and reforestation project activities
<b>Version number of PDD to which this report applies</b>	2.0
<b>Project participants</b>	Senenergy 2 SAS
<b>Host Party</b>	Republic of Senegal
<b>Applied methodologies and standardized baselines</b>	Methodology: ACM0002 - Grid-connected electricity generation from renewable sources - Version 16.0
<b>Mandatory sectoral scopes</b>	1 : Energy industries (renewable - / non-renewable sources)
<b>Conditional sectoral scopes, if applicable</b>	Not Applicable
<b>Name and UNFCCC reference number of</b>	Earthood Services Private Limited UNFCCC ref.No- E-0066

<sup>1</sup> Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied(selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

the DOE	
Name, position and signature of the approver of the validation report	 Kaviraj Singh Managing Director

**SECTION A. Executive summary**

The project activity involves the generation of electricity through a greenfield solar photovoltaic plant with initially a capacity of 20.03 MW (which was later increased to 24.38 MW<sub>p</sub> and has been assessed as a part of this PRC validation) in Bokhol, department of Dagana, region of Saint Louis, Senegal, covering an overall area of 50 hectares.

The project has aimed to reduce the dependence on fossil fuel-powered power plants by substituting carbon-intensive energy with the inexhaustible and clean solar energy. As per the baseline scenario, "Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants that are fossil fuel fired power plants". The baseline scenario is the same as the scenario existing prior to the implementation of the project activity.

**Scope of validation**

The scope of the services provided by Earthood Services Private Limited for the project is to perform validation of the post registration changes of the PA. The scope of validation is to assess the claims and assumptions made in the revised Project design document (PDD) against the UNFCCC criteria, including but not limited to, CDM PS PA /5/, CDM VVS PA /6/, applied methodology/4/ and other relevant rules and requirements established for CDM project activities.

**Conclusion**

The review of the revised PDD, supporting documentation on-site verification and subsequent follow-up actions have provided ESPL with sufficient evidence to determine the fulfilment of stated criteria.

ESPL has performed the validation of the post registration changes of the CDM PA "Grid-connected Solar PV project in Bokhol" having UNFCCC Ref. Number 10331.

The proposed post registration changes include corrections, changes to the start date of the crediting period, permanent changes to the registered monitoring plan and changes to the project design. In accordance with section 8.4. and Appendix of PS for PA ver. 2.0, prior-approval track is concluded to be a suitable approach for proposed changes. The validation of post registration changes in the revised PDD Version 2.0 /2/ is an independent assessment and is being submitted as a prior approval request to CDM EB as per CDM requirements and procedures. The validation confirms that the proposed post registration changes comply with all the relevant CDM requirements of the applied methodology and all other applicable tools and guidance.

This report is the assessment opinion for all the changes from the registered PDD.

**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/document review	On-site inspection	Interviews	Validation findings
1.	Team Leader	IR	Guleria	Shifali	Central Office	Y	Y	Y	Y
2.	Validator (Trainee)	IR	Sahni	Rahi	Central Office	Y	N	N	Y
3.	Technical Expert (TA 1.2)	IR	Guleria	Shifali	Central Office	Y	Y	Y	Y
4.	Methodology Expert	IR	Garg	Shreya	Central Office	Y	N	N	Y
5.	Local Expert	EI	Diakhate	Namory	Central Office	Y	Y	Y	Y

**B.2. Technical reviewer and approver of the validation report on PRCs**

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	Mahala	Deepika	Central Office
2.	TA expert to TR	IR	Mahala	Deepika	Central Office
3.	Approver	IR	Singh	Kaviraj	Central Office

**SECTION C. Means of validation****C.1. Desk/document review**

A desk review was conducted by the validation team that included

- A review of the data and information presented to verify its completeness;
- A review of the registered monitoring plan, the monitoring methodology including applicable tool(s) and, where applicable, the applied standardized baseline, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions;

A complete list of documents/evidences reviewed is included as Appendix 3.

**C.2. On-site inspection**

Duration of on-site inspection: 12/11/2019				
No.	Activity performed on-site	Site location	Date	Team member
1.	Opening Meeting: introduction, scope and objective of work, roles and responsibilities of audit team, resources required, and timetable of the onsite audit including venue for closing meeting and any concerns from PP	Bokhol, Senegal	12/11/2019	Shifali Guleria Namory Diakhate
2.	Interviews with company representatives about the changes			Shifali Guleria Namory Diakhate
3.	Physical inspection of the site			Shifali Guleria Namory Diakhate
4.	Assessment of new documentation			Shifali Guleria Namory Diakhate
5.	Assessment of ERs calculation			Shifali Guleria Namory Diakhate
6.	Closing Meeting: submission of the audit findings to the client and agreement on the issues raised and agreement on timelines.			Shifali Guleria Namory Diakhate

**C.3. Interviews**

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Sabaly	Thierno	OMEXOM, Bokhol	12/11/2019	Project Activity changes	Shifali Guleria Namory Diakhate
2.	Dunod	Alexandre	AERA Group	12/11/2019	Impact of the changes on the Project Activity	Shifali Guleria Namory Diakhate
3.	Mayr	Sebastian	AERA Group	12/11/2019	Impact of the changes on the Project Activity	Shifali Guleria

**C.4. Sampling approach**

The on-site assessment team conducted interviews with the representatives of the company to develop a comprehensive understanding of the post-registration changes and no sampling approach was followed.

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

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Compliance with PDD form	-	CAR#02	-
Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents	-	-	-
Corrections	-	-	-
Changes to the start date of the crediting period	-	CAR#01	-
Inclusion of a monitoring plan	-	-	-
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents	-	-	-
Changes to the project design	CL#01, CL#02	CAR#01	-
Changes specific to afforestation and reforestation project activities	-	-	-
Others (please specify)	-	-	-
<b>Total</b>	<b>02</b>	<b>02</b>	<b>00</b>

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

<b>Means of validation</b>	The PDD form used is CDM-PDD-FORM version 11.0 /27/. The validation team checked and confirmed that the applied form is the latest PDD form/27/ available on UNFCCC website. It is also assessed and confirmed that all the changes made to the registered PDD/2/ are clearly identifiable in track change mode.
<b>Findings</b>	CAR#02 was raised and resolved.
<b>Conclusion</b>	All the sections of the form were filled as per the guidelines and provide all the relevant details in a transparent manner. The revised PDD /2/ was found to be in compliance with the applicable latest PDD form and the instructions therein. The information transferred to the later valid version of the PDD form/27/ is materially the same as that in the registered PDD/1/ except the items of proposed post registration changes.

**D.2. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents**

<b>Means of validation</b>	NA
<b>Findings</b>	NA
<b>Conclusion</b>	NA

**D.3. Corrections**

Means of validation	The PP has proposed the following corrections in the registered PDD/1/ in accordance with provisions in para 232 of CDM PS for PA ver 2.0/5/. The proposed corrections are summarized below for the revised PDD/2/:	
	Proposed Change	Assessment Opinion
	Replacement of the term “plant” by “project” or “project activity”,	Corrections like the replacement of the words “plant”, “SSA”, PV array” and “LT/MT” in registered PDD/1/ with “project activity”, “Sub-Saharan Africa” “solar PV array field” and “LV/MV” respectively in revised PDD/2/ are introduced to enhance the representation of information in revised PDD/2/. Hence, following
Replacement of the abbreviation “SSA” by “Sub-Saharan Africa”		

	Replacement of the term “PV array” by “solar PV array field”	para 287 of the VVS for PA version 2/6/, the replacement of these terms was identified by the assessment team as a correction.
	Replacement of “LT/MT” (low tension/ medium tension) by “LV/MV” (low voltage/ medium voltage) in section A.3 of the revised PDD/2/	
	Simplification and restructuring of sequence of information provided in section A.3 and B.7.3 of PDD to be more concise (notably description of SCADA/metering system, characteristics of connection lines, standby power systems),	PP has proposed restructuring and simplification of information provided in section A.3 (Technologies and Measures) and B.7.3 (Other elements of monitoring plan). The revisions are related to the SCADA/metering system and characteristics of connection lines. The single line diagram provided under Section A.3 of the revised PDD/2/ gives a more accurate representation of the solar PV plant. All changes in section A.3 and B.7.3 were assessed by the validation team and it was concluded that all changes were either a consequence of project design change assessed in section D.6 of this report, or a result of simplification of information in this section. Although certain texts were removed from these sections (section A.3 and B.7.3), it was confirmed that these omissions were a result of either irrelevance of that data in project activity description or simplification of text for clear understanding or, as already mentioned above, were a consequence of project design change. The changes were identified and assessed, and it was concluded that the additions, omissions and revised information is an accurate reflection and concise representation of the actual information on site. These changes have no impact on applied methodology or registered monitoring plan.
	Clarification of indicated precision of meters provided (for active energy) in section A.3 of the revised PDD/2/	A minor update was made to the indicated precision of the energy meters. New information was provided in brackets ‘active energy’ to clarify that the value provided for precision i.e. $\pm 0.2s$ stands for active energy measurements. The assessment team cross checked the revised information in PDD against technical specifications of energy meters/13/ and was able to confirm that added information is appropriate and consistent. It was concluded that the revised information is a more accurate representation of the actual conditions and it only enhances the data provided in PDD.
	Specification of ‘at least’ two meters to be installed added in section A.3 under title Metering System and under section B.7.1 EGfacility,y parameter table field ‘QA/QC procedures’	In the sections mentioned, phrase ‘at least’ was added before ‘two meters’ to emphasize that at all times during the project activity, at least two meters will be installed at the project site. This update will only ensure that the electricity is metered using at least 2 meters and provisions addition of more meters if needed. Installation of more than two meters at the project site will not lead to any form of overestimation of electricity generated or emission reductions claimed. It will only provide higher precision and additional cross-check for electricity generation data. Therefore, it was concluded that the revised

		information in PDD only enhances information provided and does not affect emission reduction calculations.
	The CME has proposed correction of the start date of the crediting period (according to §234 (b) of CDM PS for PA, ver. 2.0/5/) from 01/11/2016 to 11/11/2016 in the registered PDD/1/. The start date of the Crediting Period has been postponed by 10 days, as approved by UNFCCC Secretariat on 18/03/2019	<p>According to paragraph 234 of CDM PS for PA, ver. 2.0/5/, the Project Participants are not required to take approval from the Board and shall notify the Secretariat of the changes in case of postponing the start date by up to one year, or by up to two years for a PA hosted by a least developed country.</p> <p>The CME has postponed the start date of the Crediting Period by 10 days i.e., from 01/11/2016 to 11/11/2016 and the change has been approved by the UNFCCC Secretariat on 18/03/2020 which has been checked from the confirmation mail received from the UN/23/. Through this PRC, the same change is now being reflected in the revised PDD and is, therefore, considered an accurate representation of the actual crediting period start date.</p> <p>The change in the start date of the crediting period is below one year and has already been notified to UNFCCC secretariat and therefore, the change has not been marked on page 1 of this validation report for the field 'Type(s) of PRCs' and has been listed as a correction. The assessment team confirms that change made is under the purview of para 234-236 of CDM PS for PA, ver. 2.0/5/.</p>
	<p>The corrections proposed by the PP aim at improving the precision and clarity of the project information conveyed in the revised PDD/2/.</p> <p>The assessment team confirms that the aforementioned corrections are editorial changes made to the project information fixed at the time of registration/1/ and do not impact the values of the registered parameters whatsoever. PP has documented these corrections in the revised PDD transparently and coherently. The revised information is an accurate reflection of actual project information. Therefore, the corrections were found to be in accordance with the paragraphs 287-289 of VVS for PA, ver. 2.0 and were found to be acceptable by the validation team.</p>	
<b>Findings</b>	CAR#01 was raised and resolved.	
<b>Conclusion</b>	<p>The DOE confirms that:</p> <ol style="list-style-type: none"> <li>The corrected information is an accurate reflection of actual project information</li> <li>Corrections made by project participants in the revised PDD/2/ comply with the relevant requirements in paragraph 232 of CDM project standard for project activities/5/</li> </ol> <p>Therefore, the corrections are found to be acceptable.</p>	

**D.4. Changes to the start date of the crediting period**

<b>Means of validation</b>	Not Applicable.
<b>Findings</b>	Not Applicable.
<b>Conclusion</b>	Not Applicable.

**D.5. Inclusion of a monitoring plan**

<b>Means of validation</b>	Not Applicable.
<b>Findings</b>	Not Applicable.
<b>Conclusion</b>	Not Applicable.

**D.6. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents**

Means of validation	<p>PP has proposed permanent changes to the registered monitoring plan in accordance with paragraph 238 and 239 of CDM PS for PA ver. 2.0/5/. The proposed changes are summarized below for the revised PDD/2/:</p> <p><b>Proposed Changes:</b></p> <p>The PP has proposed a permanent change to the registered monitoring plan and has updated the calibration maintenance and testing requirements of the electricity meters. The requirement is given in section B.7.1 of PDD, for QA/QC procedures for monitoring of parameter 'EG<sub>facility,y</sub>'. The revision from the registered PDD/1/ to the revised PDD can be summarized as follows:</p> <p><b>Original Text:</b> <i>A test and calibration of the meters will be carried out after each deviation of more than +/- 0.5% but at least once every 6 months, certified by a third party.</i></p> <p><b>Revised Text:</b> <i>The calibration of meters, including the frequency of calibration, should be done in accordance with national standards or requirements set by the meter supplier or requirements set by the grid operators:</i>  <i>Requirements set by the meter supplier apply. With respect to frequency of calibration, <u>no periodic calibration is required</u> after initial calibration ex works, neither by national standards, nor by the meter supplier, nor by the grid operator.</i></p> <p><i>Regular maintenance and testing in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements:</i>  <i>In absence of a grid code and stipulations of the meter supplier, national requirements apply. <u>As per Senegalese decree 60-415, in normal circumstances, a periodic verification of the meters is performed on an annual basis.</u></i></p> <p><b>DOE Assessment:</b></p> <p>The update in the calibration, maintenance and testing requirements is a permanent change to the registered monitoring plan and the monitoring <i>does not</i> deviate from the applied methodology/4/ or other applied methodological regulatory documents.</p> <p>At the time of this request being submitted, there are 2 meters installed at the project site of make Enerdis, which are used to monitor the electricity generation from the project activity.</p> <p>The PDD has been revised post a clarification from the electricity meter(s) supplier/17/, which states that the installed electricity meters do not require periodic calibration after the initial calibration ex works. Calibration is not a requirement, neither by national standards, nor by the meter supplier, nor by the grid operator.</p> <p>The applied methodology ACM0002, ver. 16.0 states that "All measurements should be conducted with calibrated measurement equipment according to relevant industry standards".</p> <p>Due to the lack of clear industry standards, PP has applied the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" Version 3.0/7/. The QA/QC procedures under data/parameter table 12 of the tool/7/ mention "The electricity meter will be subject to regular maintenance and testing in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements". The revised information in PDD was found to be in line with this tool requirement.</p> <p>In absence of grid-code and stipulations of the meter supplier (as in the case of currently installed meters), instead of calibration (which is not required as per meter manufacturer or national or grid requirements), annual periodic verification of the installed meters will be conducted in accordance with Senegalese decree 60-415 /22/ to ensure that the electricity meters meet all requirements, mainly in terms of precision. The verification will ensure if the meters are in conformity with the decree</p>
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	<p>or need to be refurbished or removed from service.</p> <p>The validation team is able to confirm that this update in the calibration requirements is in compliance with the applied methodology/4/ and other methodological regulatory documents/7,8/ and do not reduce the accuracy of the monitoring compared with the requirements contained in the registered monitoring plan/1/. It is pertinent to note that the accuracy class of the electricity meters remain unchanged from the registered accuracy class, as confirmed by the meter manufacturer specifications/13/.</p> <p>Moreover, the proposed change also does not have any effect on the additionality, scale of the project activity and the conservativeness of GHG calculations.</p> <p>Consequential Change: Since the requirement for calibration is removed from the registered PDD, as discussed above, it has subsequently resulted in changes in section B.7 of the PDD. According to registered PDD section B.7, <i>"it will be required that the difference in the two meter measurements does not exceed <math>\pm 0.5\%</math>. If the difference is higher, the dysfunctional meter will in all cases need to be identified by Senelec and Senergy 2, adjusted or replaced within 48 hours in accordance with manufacturer guidelines. After each deviation of more than <math>\pm 0.5\%</math>, but at least once every 6 months, a test and calibration of the meters will be carried out for each meter, certified by a third party"</i>.</p> <p>However, since the installed meters do not require calibration, the above mentioned requirement is not found to be valid any longer and therefore, this text has been omitted in the revised PDD. In line with national requirements, an annual verification is considered sufficient for the meters, thus not requiring calibration of the meters 'at least every 6 months'.</p>
<b>Findings</b>	CL#01, CL#02, CAR#01 were raised and resolved.
<b>Conclusion</b>	<p>The DOE confirms that:</p> <ol style="list-style-type: none"> <li>The permanent changes or the permanent deviation comply with the relevant requirements in the "CDM project standard for project activities"/5/.</li> <li>The permanent changes comply with the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents, and do not reduce the level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan.</li> <li>The permanent changes do not lead to a reduction in the accuracy of GHG emission reductions or net anthropogenic GHG removals.</li> </ol> <p>The proposed change ensures more clarity and stricter regulation and is therefore found to be appropriate.</p>

#### D.7. Changes to the project design

<b>Means of validation</b>	<b>Proposed Changes:</b> Increase in rated capacity of specified in the registered PDD, from 20.03 MW(p) to 24.38 MW(p)		
	<b>Assessment of the proposed change:</b> The project activity deviated from the originally planned installation of 20.03 MW(p) power plant in registered PDD/1/ to 24.38 MW(p) total installed capacity. Major changes in the project activity since registration have been summarized in the table below:		
	<b>Data on Solar Panels</b>	<b>Data at the time of registration</b>	<b>Updated data in revised PDD</b>
	Installed capacity	260 Wp	265 Wp
	No. of solar panels	77,040	92,016
	Total rated capacity	20.03 MWp	24.38 MWp
	As evident from the table above, the project activity also deviated from the originally planned wattage of solar panels to be installed in the registered PDD at the time of implementation. Due to unavailability of 260 Wp solar modules as mentioned in the registered PDD, the actual purchase was made for solar panels with a capacity of 265 Wp each, as checked on-site and through plant details in SCADA system. This change was found to be in accordance with para 241(e) of PS for PA, which		

includes changes in the technologies that result in the same technologies as in the originally registered technologies. Here, although there is a change in the wattage of equipment (solar modules), the technology remains the same and there is no change in the kind of output, kind of equipment or conversion process. The wattage of solar panels was also checked on-site and it was ensured that all installed solar panels are of capacity 265 Wp. The solar panels were installed in two phases.

	Phase I	Phase II
Number of solar modules installed	77,040	14,976
Number of Inverters installed	9	1
Number of transformers installed	9	1
Capacity installed during each phase	20.03 MW(p)	4.35 MW(p)
Date of commissioning	11/11/2016	06/10/2019
Total rated capacity at the end of each phase	20.03 MW(p)	24.38 MW(p)

For phase 1<sup>st</sup>, a total of 77,040 solar panels were installed as confirmed from older electricity generation data and technical data report from Omexom dated 19/01/2018 /19/. As part of 2<sup>nd</sup> phase later, additional solar modules were bought in 2019, which was confirmed from Omexom Monthly Report for September, 2019 /12/. A new inverter and a transformer were also installed consequentially, as demonstrated in the table above, due to an increase in solar module capacity and electricity generation.

The total number of solar panels at project site at the end of phase 2<sup>nd</sup> and their make were cross-checked during the on-site visit through information provided on SCADA system and other plant documents. It could be confirmed that the 92,016 solar modules installed were of model HSL602/14/.

From the Omexom report of September 2019/12/, purchase of a new inverter and transformer and their make was also confirmed. The plant has a total of 10 inverters and 10 transformers of same make and model, which was cross-checked during the on-site visit. The addition of one inverter and one transformer as part of phase II is considered a consequential change of new solar modules installed.

During the on-site visit, through physical observations, interviews with plant staff and through the study of phase 1<sup>st</sup> and phase 2<sup>nd</sup> plant diagrams, it was satisfactorily concluded that both the phases are part of the same project activity.

The revised rated capacity of the project activity is 24.38 MWp, as appropriately demonstrated in the PDD and emission reduction sheet /3/. The change in capacity was proposed after an amendment was made to the Power Purchase Agreement signed between the PP and Senegalese grid on 10/04/2017 /11/. According to this PPA amendment, all reference to "20MWp" appearing in the original contract were removed and replaced with "20MW". Both original PPA/25/ and PPA amendment/11/ were checked by the assessment team and this information was verified.

Since, rated (DC) capacity values are typically higher than the AC capacity values depending on the efficiency of the inverters and losses in the system, PP decided to increase the solar power plant capacity such that ~20 MW electricity could be generated and requirement of the grid agreed in the agreement could be delivered. Therefore, the revised rated capacity of the project activity is 24.38 MWp.

Since the change to this registered CDM project activity is an increase in the rated capacity specified in registered PDD, the change is found to be in accordance with para 241(a) of PS for PA/5/. The scale of the project activity has not changed (the original capacity and increased capacity are both >15MW and therefore, qualify as large-scale activity according to para 119(a) of PS for PA/5/).

Since this PA is large scale and increase in capacity is in control of the PP, therefore, in line with para 241(a) (i) a.:

"CERs may be claimed up to an amount calculated based on the increased capacity by 20 per cent of the capacity specified in the originally registered PDD".

Accordingly, emission reduction calculation sheet provided was assessed by the

assessment team and it was confirmed that estimated CERs from the power plant are calculated for electricity generation capacity up to 20% increase from installed capacity validated at the time of registration i.e. 20.03 MWp. Thus, the estimated CERs from project activity are calculated as 25,666 tCO<sub>2</sub>e per annum.

**Impact on additionality:** The additionality of the project activity at the time of registration was demonstrated using para 30 (b) of applied methodology ACM0002 ver.16. According to this clause, if the total installed capacity of the technology (in this case solar power plants) in the host country is less than or equal to 50 MW at the time of PDD submission, then that specific technology is considered in the positive list which is automatically additional. At the time of registration, there was only one '2 MW' capacity solar PV plant in the host country, Senegal, which resulted in project activity being considered automatically additional.

However, more solar power plants have been installed in Senegal since registration of this project activity. The power plants which initially resulted in Senegal reaching solar PV installed capacity of 50 MW (not including the current project activity) are listed in the table below with their commissioning dates. The commissioning dates were checked from various sources, including country data from Regulatory Commission of Electricity Sector/24/:

Name of Plant	Capacity (MW)	Date of commissioning
CICAD SENELEC	2 MW	2014
Malicounda Solaria Kima solar PV	22 MW	11/2016
Synergy PV SA in Méouane (Theis)	29.5 MW	28/07/2017

It is evident from this table that the host country reached its 50 MW capacity for solar PV plants on 28/07/2017, when a Synergy PV SA power plant was commissioned. Even if the current project activity's initially installed capacity (20.03 MW, which was commissioned in 2016) is added to this list, 50 MW capacity in Senegal was still only reached on 28/07/2017 after commissioning of Synergy PV SA in Méouane (Theis).

As discussed earlier, the amendment in PPA of the current project activity was done by the national grid (Senelec) on 10/04/2017. After this amendment was signed, the decision to increase installed capacity in the current project activity was taken by the Board of Greenwish Africa on 31/05/2017 /26/. Greenwish Africa is the investment company which financially supports the project activity, as already established at the time of registration and detailed in the registered PDD.

The decision taken at Board meeting was checked by assessment team from meeting minutes/26/ and the date of decision taken was confirmed. It could be confirmed that date of decision for extension of the project activity (31/05/2017) was before the date when Senegal reached 50 MW capacity of solar PV installations (28/07/2017). Thus, additionality of the project activity was not found to be affected by its increase in capacity.

Following additional points were noted regarding the changes to project activity:

1. According to the revised PPA/11/, "the inverters will be clipped so that the power injected into the grid cannot exceed 20MW". The agreement goes on to clarify that if despite everything, a power greater than 20MW is injected into the network, the surplus will not be paid by the grid, which will be evident from the invoices generated for electricity generation. Overall, this amendment allows an output of up to 20MW from power plant to be injected to the national grid.
2. The rated capacity of the project activity is 24.38 MWp. However, rated (DC) capacity values are typically higher than the AC capacity values, depending on efficiency of the inverters and losses in the system.
3. The power plant consists of 10 'APS 2000' inverters, as checked during the on-site visit and also cross checked from plant diagram/10/ and plant technical reports /12,19/. Each of these inverters has rated AC power of 1,950 kW or 1.95 MW/9/, as confirmed during the on-site visit and cross checked from project technical documents/12,19/. This implies that the power plant has a total inverter capacity of 19.5 MW(e).

Therefore, owing to all reasons given above, consideration of ~20 MW AC

	<p>generation from this 24.38 MW(p) plant has been found acceptable.</p> <p><b>Consequential Changes to PDD:</b></p> <p>Pertaining to the design changes introduced in the project activity, some corresponding changes were introduced in the revised PDD, majorly section A.3. These changes are discussed below:</p> <ol style="list-style-type: none"> <li>1. Revision of capacity of solar power plant: Wherever applicable in the revised PDD, the number of solar modules installed and rated capacity of these solar modules and of the power plant were revised in line with proposed design changes to the project activity.</li> <li>2. Revision of electricity generation and emission reduction data: The revised emission reduction sheet was reviewed and found to be appropriately revised in line with new installations of solar panels in second phase. Calculation of estimated electricity generation and emission reductions are appropriate and in line with methodology requirements. The updated ER sheet data has been consistently reported in sections A.3, B.6.3, B.6.4 and B.7.1 of revised PDD.</li> <li>3. Plant load factor calculation revision: Based on the updated values of electricity generation and rated capacity, plant load factor calculations were updated in section A.3 of revised PDD. However, it must be noted that the overall plant load factor is still maintained at the same value as registered PDD i.e. 19.30%</li> <li>4. Revision of layout diagrams: In the revised PDD, Figure 3, Figure 4, Figure 5 and Figure 8 were added/ updated to demonstrate the actual installations at the plant site. All these updates are cross checked by validation team through plant site documentations and through physical observations and interviews conducted during the on-site visit. The plant diagrams which were displayed at the site were consistent with layout diagrams reported in the revised PDD/2/. Therefore, the diagrams were found to be an accurate description of the project activity.</li> </ol> <p>During the assessment, it was checked and confirmed that although number of solar modules installed at the project site have increased from the estimated quantity at the time of registration, the physical project boundary has not changed and no new sources of leakages have been identified. This information was cross-checked from project layout diagrams/10/, physical observations (on site diagrams and layouts) and interviews conducted during on-site visit. Therefore, no additional Environment Impact Assessment was needed for this extension.</p> <p>The validation team could thus confirm that the change in project design has no impact on the additionality, scale and monitoring plan determined for the project activity. The changes also do not affect the applicability of applied methodologies and other tools.</p>
<b>Findings</b>	CL#02 was raised and resolved.
<b>Conclusion</b>	<p>The validation team confirms that</p> <ol style="list-style-type: none"> <li>a. The permanent changes to project design complies with the relevant requirements in the "CDM project standard for project activities"/5/.</li> <li>b. The permanent changes to project design document accurately reflect implementation, operation and monitoring of the modified CDM project activity.</li> <li>c. The permanent changes are in compliance with the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents, and do not reduce the level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan. There are no impacts on the monitoring plan.</li> <li>d. The permanent changes do not lead to change in project boundary and introduction of associated leakages</li> <li>e. The scale of project activity is not impacted by the permanent changes</li> <li>f. The additionality of the project activity is not impacted by the permanent changes</li> <li>g. The permanent changes do not lead to a reduction in the accuracy of GHG emission reductions or net anthropogenic GHG removals.</li> </ol>

	The proposed changes are an accurate representation of implementation at project site and are therefore found to be appropriate.
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#### **D.8. Changes specific to afforestation and reforestation project activities**

<b>Means of validation</b>	Not Applicable.
<b>Findings</b>	Not Applicable.
<b>Conclusion</b>	Not Applicable.

#### **SECTION E. Internal quality control**

The draft validation report prepared by validation team is reviewed by an independent technical review team (one or more members) to confirm if the internal procedures established and implemented by Earthood Services Private Limited were duly complied with and whether such opinion/conclusion were reached in an objective manner that complies with the applicable CDM rules/requirements. The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scopes the project activity / PoA falls into. All team members of technical review team were independent of the validation team.

During the technical review process, additional findings may be identified or the closed-out findings may be opened, which needs to be satisfactorily resolved by validation team before the validation report/opinion is finalized. The independent technical reviewer may either approve the report as such or reject/return the same in such case providing the comments/findings/issues that needs to be resolved by the validation team.

The decision taken by the Technical Reviewer is final and is authorized by the Managing Director on behalf of Earthood Services Private Limited.

#### **SECTION F. Validation opinion**

Earthood Services Private Limited (ESPL) has performed the validation of the post registration changes of the PA 10331: "Grid-connected Solar PV project in Bokhol".

The DOE has applied all the objectives, approaches and means of validation as per applicable version of CDM VVS for PA/6/ while validating the post-registration changes. ESPL issues a positive opinion to the proposed PRC since the changes/modifications fulfils the requirements of relevant CDM rules and requirements. Thus, ESPL would like to submit a request for approval of the changes under prior-approval track in accordance with CDM project cycle procedure for project activities, version 02.0/28/.

The PP has used updated version of PDD/2/, thus updating the applicable sections for the PA in-line with the latest version of the PDD form. ESPL, after a thorough review, confirms that the information transferred to the new form is materially the same as that contained in revised approved PDD/1/. Furthermore, in accordance with section 8.4. and Appendix of PS for PA ver. 2.0, prior-approval track is concluded to be a suitable approach for proposed changes.

The validation was performed on the basis of rules and requirements defined by UNFCCC for the CDM project activities. The review of the revised PDD, version 2.0/2/, supporting documentation, on-site verification and subsequent follow-up actions have provided ESPL with sufficient evidence to determine the fulfilment of stated criteria.

## Appendix 1. Abbreviations

Abbreviations	Full texts
AC	Alternating Current
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM PCP	Clean Development Mechanism Project Cycle Procedure
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	Clean Development Mechanism Validation and Verification Standard
CER	Certified Emission Reduction
CL	Clarification Request
CPA	Component Project Activity
CP	Crediting period
DC	Direct Current
DOE	Designated Operational Entity
DNA	Designated National Authority
EB	Executive Board
ESPL	Earthood Services Private Limited
EPC	Engineering Procurement Construction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
IPCC	Intergovernmental Panel on Climate Change
PoA	Programme of Activity
PoA-DD	Programme of Activity Design Document
PP	Project Participant
PRC	Post Registration Change
RMP	Registered monitoring plan
TA	Technical Area (with in Sectoral Scope)
TR	Technical Reviewer
UNFCCC	United Nations Framework Convention on Climate Change

## Appendix 2. Competence of team members and technical reviewers

Competence Statement	
<b>Name</b>	Shifali Guleria
<b>Education</b>	M.Sc. (Environmental Studies and Resource Management), TERI University
<b>Experience</b>	1+ year
<b>Field</b>	Climate Change
Approved Roles	
<b>Team Leader</b>	YES
<b>Validator</b>	YES
<b>Verifier</b>	YES
<b>Methodology Expert</b>	YES (AMS-I.A., AMS-II.G., AMS-III.A.V.)
<b>Local expert</b>	YES
<b>Financial Expert</b>	NO
<b>Technical Reviewer</b>	NO

<b>TA Expert</b>	YES (1.2, 3.1)		
<b>Reviewed by</b>	Shreya Garg (Quality Manager)	<b>Date</b>	14/01/2020
<b>Approved by</b>	Anshika Gupta (Technical Manager)	<b>Date</b>	14/01/2020

Competence Statement			
<b>Name</b>	Shreya Garg		
<b>Country</b>	India		
<b>Education</b>	M.Sc. (Climate Science & Policy), TERI University		
<b>Experience</b>	6 Years +		
<b>Field</b>	Climate Change		
Approved Roles			
<b>Team Leader</b>	YES		
<b>Validator</b>	YES		
<b>Verifier</b>	YES		
<b>Methodology Expert</b>	AMS.I.A., AMS.I.C., AMS.I.D., AMS.I.F., AMS.II.D., AMS.II.G., AMS.II.J., AMS.III.AV., ACM0002, ACM0012		
<b>Local expert</b>	YES (India)		
<b>Financial Expert</b>	NO		
<b>Technical Reviewer</b>	YES		
<b>TA Expert</b>	YES (TA 1.2, TA 3.1)		
<b>Reviewed by</b>	Abhishek Mahawar	<b>Date</b>	01/03/2018
<b>Approved by</b>	Ashok Gautam	<b>Date</b>	01/03/2018

Competence Statement			
<b>Name</b>	Deepika Mahala		
<b>Country</b>	India		
<b>Education</b>	M. Sc. (Environmental Management), GGSIP University B.Sc. Hons. (Chemistry), Sri Venkateshwar College, DU		
<b>Experience</b>	3 Years +		
<b>Field</b>	Climate Change		
Approved Roles			
<b>Team Leader</b>	YES		
<b>Validator</b>	YES		
<b>Verifier</b>	YES		
<b>Methodology Expert</b>	ACM0002, AMS.I.D., AMS.I.A, AMS.III.AV, AMS.II.G		
<b>Local expert</b>	YES (India)		
<b>Financial Expert</b>	NO		
<b>Technical Reviewer</b>	YES		
<b>TA Expert</b>	YES (TA 1.2 & TA 3.1)		
<b>Reviewed by</b>	Shreya Garg	<b>Date</b>	14/09/2018
<b>Approved by</b>	Anshika Gupta	<b>Date</b>	14/09/2018

Competence Statement			
<b>Name</b>	Rahi Sahni		
<b>Education</b>	M.Sc Environment Science and Technology, Bharati Vidyapeeth University, Pune		
<b>Experience</b>	4 months		
<b>Field</b>	Climate Change and Environment		
Approved Roles			
<b>Team Leader</b>	NO		
<b>Validator</b>	NO		
<b>Verifier</b>	NO		
<b>Methodology Expert</b>	NO		
<b>Local expert</b>	NO		
<b>Financial Expert</b>	NO		
<b>Technical Reviewer</b>	NO		
<b>TA Expert</b>	NO		
<b>Trainee</b>	Validator/Verifier		
<b>Reviewed by</b>	Shreya Garg	<b>Date</b>	01/10/2019
<b>Approved by</b>	Anshika Gupta	<b>Date</b>	03/10/2019

Competence Statement			
<b>Name</b>	Namory Diakhate		
<b>Education</b>	Masters in English Studies		
<b>Experience</b>	3+ years		
<b>Field</b>	Environmental Studies, English Studies		
Approved Roles			
<b>Team Leader</b>	No		
<b>Validator</b>	No		
<b>Verifier</b>	No		
<b>Methodology Expert</b>	No		
<b>Local expert</b>	Yes (Senegal)		
<b>Financial Expert</b>	No		
<b>Technical Reviewer</b>	No		
<b>TA Expert</b>	No		
<b>Reviewed by</b>	Shreya Garg	<b>Date</b>	13/12/2018
<b>Approved by</b>	Anshika Gupta	<b>Date</b>	13/12/2018

### Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	Senergy	Registered approved CDM PDD	Version: 1.4;	Others



			Dated: 01/12/2016	
2	Senenergy	Revised PDD	Version 2.0; Dated: 25/05/2020	PP
3	Senenergy	Revised ex-ante ER sheet	Version: 2.0; Dated: 25/05/2020	PP
4	UNFCCC	ACM0002: Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources	Version 16.0	Others
5	UNFCCC	CDM project standard for project activities	Version 2.0	Others
6	UNFCCC	CDM validation and verification standard for project activities	Version 2.0	Others
7	UNFCCC	Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	Version 03.0	Others
8	UNFCCC	Tool 07: Tool to calculate emission factor for an electricity system	Version 05.0	Others
9	WSTECH	Inverter Technical specifications – APS2000	-	Others
10	Senenergy	Extended plant layout	-	PP
11	Senenergy	PPA Senenergy Signed amendment	Dated: 10/04/2017	PP
12	OMEXOM	Bokhol Extension Monthly Report	-	PP
13	ENERDIS	Multi-energy meter guidelines and specifications	-	PP
14	Hanwha Solar	HSL 60 S POLY solar modules specifications	-	PP
15	CHAUVIN ARNOUX	Declaration of Conformity	15/10/2018	PP
16	Ministry of Environment and Development, Senegal	Environment Impact Assessment Reports (Vol 1 and Vol 2)	-	PP
17	Senenergy	Email clarification from the meter supplier regarding no calibration requirements	20/09/2018	PP
18	Senenergy	Meteorological data	-	PP
19	OMEXOM	Schedule and Scope of work, technical specifications	19/01/2018	PP
20	Senenergy	Annex F of PPA	-	PP
21	Senenergy	Annex G of PPA	09/09/2016	PP
22	Ministry of Finance, Senegal	N°60-415 M.C.I. Decree	-	PP
23	UNFCCC Secretariat	CDM Confirmation for change in start date of crediting period	18/03/2019	PP
24	Republic of Senegal	Regulatory Commission of Electricity Sector: Country data on renewable energy power plants	-	Others
25	Senenergy	Original PPA signed	22/08/2016	PP
26	Greenwish Africa	Minutes of Meeting (for investment decision)	31/05/2017	
27	UNFCCC	CDM-PDD-FORM	Version 11.0	Others
28	UNFCCC	CDM project cycle procedure for project activities	Version 2.0	Others

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

Table 1. CLs from this validation

CL ID	01	Section no.	D.7.	Date : 16/12/2019
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<b>Description of CL</b>	
According to PPA signed with Senelec, inverters will be clipped so that power injected into grid can't exceed 20MW and surplus will not be paid by Senelec. PP is requested to clarify if a new PPA was signed after capacity addition.	
<b>Project participant response</b>	<b>Date :</b> 24/02/2020
The 20 MW in the existing PPA is referring to MWp. A complementary agreement between Senelec and PP has thus been signed in this respect clarifying the issue and allowing to produce 20 MW corresponding to a capacity addition of 4.35024 MWp.	
<b>Documentation provided by project participant</b>	
<i>Agreement between Senelec and PP.</i>	
<b>DOE assessment</b>	<b>Date:</b> 02/03/2020
The agreement was checked, and the information provided in the PDD was found to be consistent with the PPA amendment. The finding is closed.	

<b>CL ID</b>	02	<b>Section No.</b>	D.7.	<b>Date :</b> 23/03/2020
<b>Description of CL</b>				
<p>The registered PDD and validation report both mention 260 Wp as the peak wattage of solar panels to be installed on site. These documents also mention the total number of solar panels to be installed on project site were 77,040.</p> <p>However, the revised proposed PDD states (and it was observed on-site) that solar panels with 265 Wp wattage were installed at the project activity site. PP is requested to clarify the reason for change in initially determined specifications at the time of registration of project activity.</p> <p>PP shall also provide supporting documents for purchase/commissioning of phase I solar panels which provides information regarding wattage and number of solar panels installed initially.</p>				
<b>Project participant response</b>				<b>Date :</b> 17/04/2020
<p>Appendix 7 has been amended to provide for the reasons of the change:</p> <p>"Minimal change in preference in terms of configuration of DC panel capacity &amp; number of panels (technical &amp; cost) during project planning."</p> <p>Wattage is of initial panel is as observed during onsite visit (nameplate on solar panels). Number of initial phase I solar panels is as per subcontractor's single line provided showing initial number of solar panels installed.</p> <p>In addition, PP submits import and custom's documents of shipping indicating the model with capacity (HSL60P6-PC-1-<b>265</b>) and number of panels (75,712) imported. The slight difference between number of panels imported and installed is due to some spare panels in case of failure.</p>				
<b>Documentation provided by project participant</b>				
<i>DMC PANNEAUX SOLAIRES 2016.pdf</i> <i>TITRE D'EXO 2016 CI 0687.pdf</i>				
<b>DOE assessment</b>				<b>Date:</b> 24/04/2020
The documents provided by PP were checked and the clarification provided by the PP was found to be justifiable. The information provided in appendix 7 was supported by the documentation provided. The finding is now closed.				

Table 2. CARs from this validation

<b>CAR ID</b>	01	<b>Section no.</b>	D.4. and D.7.	<b>Date :</b> 16/12/2019
<b>Description of CAR</b>				
<ol style="list-style-type: none"> <li>The total number of solar panels at the project site is <b>92,016</b> and number of solar panels in phase II is <b>16,416</b> as per extended layout provided by PP. However, the number of total and phase II solar modules mentioned in PDD and used for calculation in ER sheet are 92,006 and 16,406 respectively. PP shall address this inconsistency observed between the provided documents.</li> <li>As stated in appendix 7 of revised PDD, "<b>postponement of start date of project activity from 01/11/2016 to 11/11/2016</b>" is a correction. However, the start date of project activity as per PDD is 02/02/2016, which was not found to be revised in the revised PDD.</li> </ol>				
<b>Project participant response</b>				<b>Date :</b> 24/02/2020

1. It is clarified that that total number of solar panels at the project site is 92,016 and number of solar panels in phase II is 16,416 as per extended layout provided by PP. The PDD is revised accordingly.
2. It is clarified that 02/02/2016 is the start date of the project activity as per para 85 of PA standard. 11/11/2016 is the start of operation and start date of the crediting period as per para. 88 of PA standard.

<b>Documentation provided by project participant</b>	
Revised PDD.	
<b>DOE assessment</b>	<b>Date:</b> 02/03/2020
<ol style="list-style-type: none"> <li>1. The revised number of solar panels in PDD version 2.0 and corresponding ER sheet was found to be appropriate and in line with evidence submitted. This finding is closed.</li> <li>2. The revised crediting period dates are found to be appropriate and in line with notification which was given to UN by PP. Finding is closed.</li> </ol>	

<b>CAR ID</b>	02	<b>Section No.</b>	D.1.	<b>Date :</b> 02/03/2020
<b>Description of CAR</b>				
<ol style="list-style-type: none"> <li>1. Section A.5. and A.6. of revised PDD ver 2.0 both refer to "Public funding of project activity. This is not in line with section numbers and titles given in "CDM-PDD-FORM" version 11.0.</li> <li>2. Appendix 1 of revised PDD ver 2.0 includes two tables, out of which second table is not in line with CDM-PDD-FORM version 11.0.</li> </ol>				
<b>Project participant response</b>				<b>Date :</b> 24/02/2020
<ol style="list-style-type: none"> <li>1. The titles have been corrected in line with the template instructions.</li> <li>2. Appendix 1 has been changed as per comment.</li> </ol>				
<b>Documentation provided by project participant</b>				
Revised PDD				
<b>DOE assessment</b>				<b>Date:</b> 23/03/2020
The changes were found appropriate and have been accepted. The finding is closed.				

Table 3. FARs from this validation

<b>FAR ID</b>	xx	<b>Section no.</b>	xx	<b>Date:</b> DD/MM/YYYY
<b>Description of FAR</b>				
XX				
<b>Project participant response</b>				<b>Date:</b> DD/MM/YYYY
XX				
<b>Documentation provided by project participant</b>				
XX				
<b>DOE assessment</b>				<b>Date:</b> DD/MM/YYYY
XX				

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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"><li>• Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN);</li><li>• Make editorial improvements.</li></ul>
02.0	31 October 2017	Revision to align with the requirements in 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: Registration Keywords: post-registration change, project activities, validation report		