



# Validation report form for CDM project activities

(Version 01.0)

Complete this form in accordance with the "Attachment: Instructions for filling out the validation report form for CDM project activities" at the end of this form.

## VALIDATION REPORT

<b>Title of the project activity</b>	Nam Pha Gnai hydropower project
<b>Version number of the validation report</b>	version 2.1
<b>Completion date of the validation report</b>	25/11/2015
<b>Version number of PDD to which this report applies</b>	Version 2.1
<b>Date when PDD was uploaded for global stakeholder consultation</b>	30/09/2014-29/10/2014
<b>Project participant(s)</b>	Nam Pha Gnai Hydropower Co., Ltd. Swiss Carbon Assets Limited
<b>Host Party</b>	Lao PDR
<b>Estimated annual average GHG emission reductions or net removals in the crediting period (tCO<sub>2</sub>e)</b>	62,184tCO <sub>2</sub> /a
<b>Sectoral scope(s) and selected methodology(ies)</b>	1 Energy industries (renewable-/non-renewable sources) ACM0002, version 16 consolidated baseline methodology for grid-connected electricity generation from renewable sources.
<b>Name of DOE</b>	TÜV Rheinland (China) Ltd.
<b>Name, position and signature of the approver of the validation report</b>	Mr. Henri Phan DOE Manager

**SECTION A. Executive summary**

&gt;&gt;

The proposed project is a newly built hydropower project located in Xaysomboun District, Vientiane Province, Lao PDR. The proposed project is designed to be based on the catchment of Nam Ngum River with geographical coordinates of the weir of 19.009331 N, 102.872314 E.

The project is to utilize hydro energy to generate zero carbon emission electricity to regional Grid consisting of Lao and Thai National Grid/37/ which is mainly dominated by fossil fuel power output/22/.

The organization Swiss Carbon Assets Limited has commissioned the DOE TÜV Rheinland (China) Ltd. to perform a validation of the CDM Project Activity “Nam Pha Gnai hydropower project” in Lao PDR (hereafter called “the project”). This report summarizes the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. The term “UNFCCC criteria” refers to Article 12 of the Kyoto Protocol, the CDM modalities and procedures or the simplified modalities and procedures for small-scale CDM project activities (as applicable) and the subsequent decisions by the CDM Executive Board.

**Objective**

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

**Scope**

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the relevant criteria (see above) and decisions by the CDM Executive Board, including the approved baseline and monitoring methodology. The validation team has, based on the recommendations in the Validation and Verification Standard employed (latest version) a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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

By validation as below, TRC concludes that the CDM Project Activity “Nam Pha Gnai hydropower project” in Lao PDR, as described in the PDD (Version 02.1, ), meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board.

**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)	Validation findings
1.	Team Leader	IR	ZHU	Jiang <sup>1</sup>	China	x			x
2.	Team Leader	IR	LIU	Qing	China	x	x	x	x
3	Local Expert	EI	Inpanh		China		x	x	

<sup>1</sup> ZHU is authorized as team leader of the project for replacing audit team including LIU and Yan since 15 July 2015.

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

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	TANG	ZHIANG	China
2	Approver	IR	Henri	Phan	China

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

&gt;&gt;

The documentation reviewed or referenced during the verification was listed in Appendix 3 of the report.

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

Duration of on-site inspection: 29/10/2014 to 31/10/2014				
No.	Activity performed on-site	Site location	Date	Team member
1.	Physically assessment of the hydropower plant including the dam and power house, and local grid transformer substation.	Xaysomboun District, Vientiane Province, Lao PDR	30 <sup>th</sup> October 2014	LIU Qing Inpanh

## C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	- Mr. Phommany - Mr. Khemphone - Mr. Vatthachak		Nam Pha Gnai Hydropower Co., Ltd.  (PP in host country)	30 <sup>th</sup> October 2014	- PP's background - Project implementation - Technical design - Water sources - Public funding - CDM consideration	LIU Qing Inpanh
2	Mr. Hounphanh V		Ministry of Energy and Mines  Department of Energy Management  IPPs Projects Management Division	30 <sup>th</sup> October 2014	- Project approval - Impacts on local economic, social and sustainable development - Preferential policy	LIU Qing Inpanh
3	Mr. Bounthee		National Environmental Bureau (Local authority)	30 <sup>th</sup> October 2014	- Financial subsidy - Environmental impacts - Mitigation measures - Environmental approval	
4	- Ms. Sivay - Mr. Nou		Local farmer	30 <sup>th</sup> October 2014	- Job opportunities - Land compensation - Opinion on the project	LIU Qing Inpanh
5	- Mr. Lu - Mr. Wu	- Yaodong - Chen	Beijing Karbon Energy Consulting Co., Ltd (Consultant)	30 <sup>th</sup> October 2014	- Project design - Baseline identification - ER calculation	LIU Qing Inpanh
6	Ms. Fang	Qun	South Pole Group (Beijing Office)		- Additionality issues - Monitoring plan	

**C.4. Sampling approach**

&gt;&gt;

Not applicable for this proposed project.

**C.5. Clarification requests, corrective action requests and forward action requests raised**

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Global stakeholder consultation			
Approval		1	
Authorization			
Contribution to sustainable development			
Modalities of communication		1	
Project design document			
Description of project activity	1		
Application of selected baseline and monitoring methodology and selected standardized baseline			
- Applicability of methodology and standardized baseline			
- Deviation from methodology			
- Clarification on applicability of methodology, tool and/or standardized baseline			
- Project boundary			
- Establishment and description of baseline scenario			
- Demonstration of additionality	3	2	
- Emission reductions	1		
- Monitoring plan	1		
Duration and crediting period			
Environmental impacts			
Local stakeholder consultation			
Others (please specify)			
<b>Total</b>	<b>6</b>	<b>4</b>	<b>0</b>

**SECTION D. Validation findings****D.1. Global stakeholder consultation**

<b>Means of validation</b>	Checking of UNFCCC website
<b>Findings</b>	n/a
<b>Conclusion</b>	The PDD version 01 of “28/09/2014” was made publicly available on ( <a href="http://cdm.unfccc.int/Projects/Validation/DB/B343AV3L67ROEV5SEAIEKRUFNSJCDW/view.html">http://cdm.unfccc.int/Projects/Validation/DB/B343AV3L67ROEV5SEAIEKRUFNSJCDW/view.html</a> ) from “30/09/2014” to “29/10/2014” in order to invite comments from public stakeholders. The PDD was published prior to commencement of the validation and the validation team has taken a due note on the outcome of its result. No public comments have been received during that period.

**D.2. Approval**

Means of validation	The project participants are Nam Pha Gnai Hydropower Co., Ltd.of Lao PDR and Swiss Carbon Assets Limited of Switzerland.		
	The below table summarizes the project participants and parties involved. The authenticity of the letters of approval has been validated by TÜV Rheinland validation team.		
	These LoA(s) are therefore regarded as valid and meeting the requirements.		
	Project participants	1. Nam Pha Gnai Hydropower Co., Ltd.	2. Swiss Carbon Assets Limited
	Parties involved	Lao PDR (host)	Switzerland
	APPROVAL		

	LoA received	Yes	Yes
	Date of LoA	14/01/2015	21/07/2015
	Reference to document	0177/MONRE	G514-3487
	LoA received from	PP	PP
	Validation of authenticity	LoA of the Project issued by DNA of Switzerland was compared to the LoAs of other projects issued by the same DNA. No inconsistency is found.	LoA of the Project issued by DNA of Switzerland was compared to the LoAs of other projects issued by the same DNA. No inconsistency is found.
	Validity of LoA	Valid	Valid
	PARTICIPATION		
	Party is party to Kyoto Protocol	Yes	Yes
	Voluntary participation	Yes	Yes
	Diversion of official development aid towards host country	N/A	No
	Project contribution to SD	Yes	N/A
	Findings	CAR 1 The LoAs from the DNA of Lao PDR and Switzerland shall be provided to the Validation Team for review.	
	Conclusion	Refer to CAR 1, both of LoAs was provided. The validation team confirms that the information related to the letter of approval as mentioned in the above table is authentic. The entire project participants listed in the tabular form of the PDD have obtained the letter of approval from their respective DNA	

### D.3. Authorization

Means of validation	Same as approval section
Findings	CAR 1 The LoAs from the DNA of Lao PDR and Switzerland shall be provided to the Validation Team for review.
Conclusion	Refer to CAR 1, both of LoAs was provided. The validation team confirms that the information related to the letter of approval as mentioned in the above table is authentic. The entire project participants listed in the tabular form of the PDD have obtained the letter of approval from their respective DNA

### D.4. Contribution to sustainable development

Means of validation	Same as approval section
Findings	CAR 1 The LoAs from the DNA of Lao PDR and Switzerland shall be provided to the Validation Team for review.
Conclusion	Refer to CAR 1, both of LoAs was provided. The host party is Lao PDR and the Annex I country is Switzerland. Both parties fulfil the participation criteria and have approved and authorized the project and the project participants. The DNA from Lao PDR confirms that the project assists in achieving sustainable development.

### D.5. Modalities of communication

Means of validation	Interview with both of PPs and verification of the MoC
Findings	CAR 2 The MoC signed by all project participants shall be provided to the Validation Team for review
Conclusion	Refer to CAR 2, MoC was provided. The MoC between the project participants and the EB has been compiled as per the standardized MoC Form (version 02.1)/5//6/. The validation team is able to confirm that

	the information of the project participants indicated in the MoC is consistent with that in PDD Annex I
--	---

**D.6. Project design document**

<b>Means of validation</b>	The validation team checked the applied PDD for the project against the latest PDD template version 6.0
<b>Findings</b>	n/a
<b>Conclusion</b>	The Project Design Document is based on the currently valid PDD template/11/ and is completed in accordance with the applicable guidance document attached with it

**D.7. Description of project activity**

<b>Means of validation</b>	<p>The validation means of documentation review, on-site observation, stakeholders' interview and background investigation on the internet have been used to ensure the description of the project is accurate and complete.</p> <p>By checking the PPA/37/ and FSR/27/ it is confirmed that, the proposed project is a newly built hydropower project located in Xaysomboun District, Vientiane Province, Lao PDR. The proposed project is designed to be based on the catchment of Nam Ngum River with geographical coordinates of the weir of 19.0093 N, 102.8723 E.</p> <p>The project is to utilize hydro energy to generate zero carbon emission electricity to regional Grid consisting of Lao and Thai National Grid/37/ which is mainly dominated by fossil fuel power output/22/. Three sets of turbine-generator with respectively 7.4MW for two and 4.4MW for one would be installed on site with the total capacity of 19.2MW for the proposed project. The type and main technical characteristics list in the PDD section A.3 is confirmed to be consistent with the technical section in the FSR/27/. The implementation of the proposed project would not result in a new reservoir or increase in the existing reservoir as the proposed project is designed as run-of-river hydropower project by the FSR/27/.</p> <p>As reported in the FSR/27/, the project activity is expected to have an annual electricity output of 130,000MWh for the period from 1st Jan. 2016 to 31st Dec. 2019 and 86,000MWh for the period from 1st Jan. 2020 to 31st Dec. 2040, indicating the PLF of respectively 77.29% and 51.13%. As per power purchase agreement (PPA) indicating electricity connection to regional grid consisting of Lao and Thai national Grid, issued by the grid company/37/, after delivered to the transformer, the electricity generated by the project would be exported to the grid. The exported electricity from the project displaces the power generated by the existing power plants and likely capacity additions in the regional Grid/22/, thereby resulting in an estimated annual average emission reduction of 62,184tCO<sub>2</sub>/a during the first renewable 7-year crediting period.</p> <p>The baseline scenario is the same as the scenario existing prior to the start of the implementation of the project activity. This corresponds to the scenario where electricity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system"/14/.</p> <p>The designed lifetime of the main equipment, i.e. turbine-generator of the project is 25 years, which is determined according to the FSR/27/. Thus, the operational lifetime of the project activity is expected to be 25 years. A renewable 7 year crediting period has been chosen for the project, starting from 01/01/2016 or registration date, whichever is later. The emission reductions are estimated to be average 62,184tCO<sub>2</sub>/a and total 435,291 tCO<sub>2</sub>e over the first 7-year crediting period.</p> <p>The starting date of the project activity is determined by the date when the first construction contract was signed, which was on 29/10/2014 (Equipment Purchase and Construction (EPC) Contract for the project)/38/. Up to the most recent date of the finalizing of the validation report, i.e. 25/11/2015, it is the only contract signed for the project, thus the validation team confirms that the EPC contract signing date of 29/10/2014 can be justified as the project starting date representing the earliest date on which the real action begins.</p> <p>The project will contribute to sustainable development by reducing global emissions of</p>
----------------------------	---

	greenhouse gases and creating employment opportunities for local residents. <table border="1" data-bbox="470 219 1422 387"> <tr> <td data-bbox="470 219 798 286">Starting date of project</td><td data-bbox="798 219 1125 286">Expected project operational lifetime</td><td data-bbox="1125 219 1422 286">Crediting period</td></tr> <tr> <td data-bbox="470 286 798 387">29/10/2014 /38/.</td><td data-bbox="798 286 1125 387">25 years</td><td data-bbox="1125 286 1422 387">First 7 years (from 01/01/2016 to 01/01/2023)</td></tr> </table>	Starting date of project	Expected project operational lifetime	Crediting period	29/10/2014 /38/.	25 years	First 7 years (from 01/01/2016 to 01/01/2023)
Starting date of project	Expected project operational lifetime	Crediting period					
29/10/2014 /38/.	25 years	First 7 years (from 01/01/2016 to 01/01/2023)					
<b>Findings</b>	CL1: Refer to PDD description, 1) For the Physical/Geographical location of the project activity, please clarify whether the coordinates (i.e. 18°59'45"N, 102°51'18"E) mentioned in the section A.2.4 of the PDD is for the project's dam or for the project's power house or for other infrastructure of the project. And relevant evidence shall be provided for check; 2) Figure A.1 in the PDD was not sufficiently clear to show the project physical location, and at least the project located river shall be visible as an object of reference in the map; 3) The project located river addressed in section A.1 of PDD is inconsistent with indicated in FSR; 4) According to PDD form instruction, a list of the facilities, systems and equipment that will be installed are requested to be included in section A.3 of PDD; 5) Please confirm the set number of hydro engine units in Figure B.2 of PDD, which is inconsistent with described in section A.1 of PDD.						
<b>Conclusion</b>	It is verified refer to CL1 that description of the project activity such as location and equipment in the update PDD for the project is as per the latest version of PDD form instruction by UNFCCC.  TÜV Rheinland validation team considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant methodology, tools, forms and guidance at the time of PDD submission for registration.						

## D.8. Application of selected baseline and monitoring methodology and selected standardized baseline

### D.8.1. Applicability of methodology and standardized baseline

<b>Means of validation</b>	Approved baseline and monitoring methodology ACM0002, version 16 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" has been applied for the proposed project activity. The validation team determined the applicability of methodology ACM0002, version 16 as follows: <table border="1" data-bbox="470 1482 1437 2076"> <tr> <th data-bbox="470 1482 890 1583">Applicability criteria of the methodology ACM0002, version 16</th><th data-bbox="890 1482 1023 1583">Criteria fulfilled</th><th data-bbox="1023 1482 1437 1583">Determination by the validation team</th></tr> <tr> <td data-bbox="470 1583 890 2076">           This methodology is applicable to grid-connected renewable power generation project activities that:            (a) Install a Greenfield power plant ; (b)            Involve a capacity addition to (an) existing plant(s) ; (c) Involve a retrofit of (an) existing operating plants/units ; (d)            Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e)            Involve a replacement of (an) existing plant(s)/unit(s).         </td><td data-bbox="890 1583 1023 2076"> <input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No         </td><td data-bbox="1023 1583 1437 2076">           The proposed project is a Greenfield 19.2 MW hydro power plant, which is confirmed by means of documentation review /27//28//29//30/ and physical observation during the on-site assessment. The electricity generated by the project would be supplied to the regional grid consisting of Lao and Thai national grid in terms of Power Purchasing Agreement between the power owner and the grid company/37/, thus this application condition is met.         </td></tr> </table>	Applicability criteria of the methodology ACM0002, version 16	Criteria fulfilled	Determination by the validation team	This methodology is applicable to grid-connected renewable power generation project activities that: (a) Install a Greenfield power plant ; (b) Involve a capacity addition to (an) existing plant(s) ; (c) Involve a retrofit of (an) existing operating plants/units ; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The proposed project is a Greenfield 19.2 MW hydro power plant, which is confirmed by means of documentation review /27//28//29//30/ and physical observation during the on-site assessment. The electricity generated by the project would be supplied to the regional grid consisting of Lao and Thai national grid in terms of Power Purchasing Agreement between the power owner and the grid company/37/, thus this application condition is met.
Applicability criteria of the methodology ACM0002, version 16	Criteria fulfilled	Determination by the validation team					
This methodology is applicable to grid-connected renewable power generation project activities that: (a) Install a Greenfield power plant ; (b) Involve a capacity addition to (an) existing plant(s) ; (c) Involve a retrofit of (an) existing operating plants/units ; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The proposed project is a Greenfield 19.2 MW hydro power plant, which is confirmed by means of documentation review /27//28//29//30/ and physical observation during the on-site assessment. The electricity generated by the project would be supplied to the regional grid consisting of Lao and Thai national grid in terms of Power Purchasing Agreement between the power owner and the grid company/37/, thus this application condition is met.					



	<p>The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p>The project activity involves installation of a run-of-river hydropower plant with 3 units of hydro turbine-generators, without reservoir, which has been confirmed by the FSR and the approval of the FSR/27//28/. Thus, this application condition is met.</p>
	<p>In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects): the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<p>This condition is not applicable since the project activity is newly built hydropower plant, which is confirmed by means of documentation review /27//28//29//30/ and physical observation &amp; interviews during the onsite assessment.</p>
	<p>In case of hydro power plants, one of the following conditions shall apply<sup>2</sup>:</p> <p>(a) The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or</p> <p>(b) The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, calculated using equation (3), is greater than 4 W/m<sup>2</sup>; or</p> <p>(c) The project activity results in new single or multiple reservoirs and the power density of each</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p>The project is a 19.2MW Greenfield run-of-river hydropower project which is confirmed by means of documentation review /27//28//29//30/ and physical observation. According to the FSR/27/, the implementation of the proposed project would not result in a new reservoir or increase in the existing reservoir, thus this application condition (a) is met.</p>

2

Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the volume of an existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

	<p>reservoir, calculated using equation (3), is greater than 4 W/m<sup>2</sup></p> <p>(d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m<sup>2</sup>, all of the following conditions shall apply:</p> <p>(i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m<sup>2</sup>;</p> <p>(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;</p> <p>(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m<sup>2</sup> shall be:</p> <p>a. Lower than or equal to 15 MW; and</p> <p>b. Less than 10 per cent of the total installed capacity of integrated hydro power project.</p>		
--	---	--	--

	<p>In the case of integrated hydro power projects, project proponent shall:</p> <ul style="list-style-type: none"> <li>■ Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or</li> <li>■ Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<p>This condition is not applicable since the project activity is a single hydropower plant which is confirmed by means of documentation review /27//28//29//30/ and physical observation, thus this application condition is met.</p>
	<p>The methodology is not applicable to the following:</p> <ul style="list-style-type: none"> <li>■ Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;</li> <li>■ Biomass fired power plants/units;</li> </ul>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p>The project activity is greenfield hydropower plant, without switching from fossil fuels to renewable energy sources at the site of the project activity. It is not a biomass fired power plants/units. It is confirmed by the verification team by means of documentation review /27//28//29//30/ and physical observation during the onsite assessment.</p>
	<p>In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<p>This condition is not applicable since the project activity is newly built hydropower plant, which is confirmed by means of documentation review /27//28//29//30/ and physical observation &amp; interviews during the onsite assessment.</p>

	as usual maintenance.		
<b>Findings</b>	n/a		
<b>Conclusion</b>	<p>During the on-site assessment, no fossil fuel-fired power generation facility was observed at the project site. In addition, according to the FSR/27/ of the project and confirmed by the project participant during the on-site interview /i/, the project would not involve installation of the fossil fuel based power generating units for operation of the project. Thus, emission sources, not addressed by the applied methodology and expected to contribute more than 1% of the overall expected average annual emission reductions, have not been identified.</p> <p>The assessment of applicability conditions of the project is compliance with the applicability criteria of the methodology ACM0002, version 16 as documented in the PDD part B and annex 3.</p>		

**D.8.2. Deviation from methodology**

<b>Means of validation</b>	n/a
<b>Findings</b>	n/a
<b>Conclusion</b>	n/a

**D.8.3. Clarification on applicability of methodology, tool and/or standardized baseline**

<b>Means of validation</b>	n/a
<b>Findings</b>	n/a
<b>Conclusion</b>	n/a

**D.8.4. Project boundary**

<b>Means of validation</b>	<p>The project boundary was assessed considering information gathered from the physical site inspection, interviews, and document evidence received on the design of the project.</p> <p>The project boundary is clearly defined as the project site and the grid electricity system boundary, which is defined as the regional Grid consisting of Lao and Thai National Grid according to the “Tool to calculate the emission factor for an electricity system” version 4.0/14/.</p> <p>The regional grid consisting of Lao and Thai national grid as defined as the project electricity system<sup>3</sup> is demonstrated as following:</p> <p>1) According to the Tool for EF calculation/14/, no transmission constraints can be considered if any one of the following criteria is met:</p> <p>a) In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of less than five per cent between the two electricity systems during 60 per cent or more of the hours of the year;</p> <p>b) The transmission line is operated at 90 per cent or less of its rated capacity at least during 90 per cent of the hours of the year.</p> <p>It is verified by on site interview with local energy administration representative/ii/ that the load of the transmission lines between Lao Power Grid and Thailand Power Grid is far below 50% of its rated capacity during all the year, the electricity system does not have significant transmission constraints.</p> <p>2) for the regional grid as international interconnection (<i>i.e.</i> transmission line is between different countries and the project electricity system covers national grids of interconnected countries), it is furthermore verified that it has no significant transmission constraints as following:</p> <p>It is demonstrated by reviewing of the MOU signed between Lao government and</p>
----------------------------	--

<sup>3</sup> Grid/project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints;

	<p>Thailand government/40/ that,through the interconnection between the two countries, Lao power grid could sold the surplus energy to Thailand, and the deficits of Lao demand in rush hours can be covered by imports.</p> <p>Therefore it is considered that there are no transmission constraints between Lao national grid and Thai national grid.</p> <p>The Thailand grid is therefore considered as a part of the project electricity system due to non-existence of significant transmission constraint as demonstrated above as the Thailand grid and Lao grid are interconnected by several international transmission lines. Therefore it is reasonable to identify the Lao Power Grid and Thailand Power Grid as an electricity system for the project, and it complies with the applied methodology and tool. The defined project boundary is in line with ACM0002 (version 16.0)/12/.</p> <p>According to the methodologyACM0002, version 16, the spatial extent of the project boundary comprises the project power plant and all power plants connected to the electricity system<sup>4</sup>. The project activity supplies power to the regional Grid consisting of Lao and Thai National Grid, hence all power plants connected physically to the regional Grid consisting of Lao and Thai National Grid is also within the project boundary according to the “Tool to calculate the emission factor for an electricity system”/14/.</p> <p>The identified boundary and the selected sinks and sources of greenhouse gases have been justified for the project activity in the PDD according to the applied methodology.</p> <table><tr><th>Emissions</th><th>GHGs involved</th><th>Description</th></tr><tr><td>Baseline emissions</td><td>CO<sub>2</sub></td><td>CO<sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that are connected to the regional Grid consisting of Lao and Thai National Grid are displaced due to the project activity</td></tr><tr><td>Project emissions</td><td>N/A</td><td>Neglected as per ACM0002, version 16, as the project emission due to reservoir is demonstrated in section D8.7 below. In addition, no supplementary fossil fuel is required for power generation of the project as per the on-site physical observation /i/ and documentation review.</td></tr><tr><td>Leakage</td><td>N/A</td><td>No leakage emissions are considered as per ACM0002, version 16</td></tr></table>	Emissions	GHGs involved	Description	Baseline emissions	CO <sub>2</sub>	CO <sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that are connected to the regional Grid consisting of Lao and Thai National Grid are displaced due to the project activity	Project emissions	N/A	Neglected as per ACM0002, version 16, as the project emission due to reservoir is demonstrated in section D8.7 below. In addition, no supplementary fossil fuel is required for power generation of the project as per the on-site physical observation /i/ and documentation review.	Leakage	N/A	No leakage emissions are considered as per ACM0002, version 16
Emissions	GHGs involved	Description											
Baseline emissions	CO <sub>2</sub>	CO <sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that are connected to the regional Grid consisting of Lao and Thai National Grid are displaced due to the project activity											
Project emissions	N/A	Neglected as per ACM0002, version 16, as the project emission due to reservoir is demonstrated in section D8.7 below. In addition, no supplementary fossil fuel is required for power generation of the project as per the on-site physical observation /i/ and documentation review.											
Leakage	N/A	No leakage emissions are considered as per ACM0002, version 16											
Findings	n/a												
Conclusion	<p>In summary, the project boundary was correctly identified in accordance with the methodologyACM0002, version 16. All greenhouse gas emissions occurring within the proposed project activity boundary as a result of the implementation of the proposed CDM project activity have been appropriately addressed in the PDD.</p> <p>The identified project boundary and selected sources of emissions are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, with respect to the methodology applied.</p>												

<sup>4</sup> Refer to the latest approved version of the “Tool to calculate the emission factor for an electricity system” for definition of an electricity system

**D.8.5. Establishment and description of baseline scenario**

<b>Means of validation</b>	The validation team confirms that the proposed project activity meets the above requirement. Therefore, the baseline scenario as prescribed in the ACM0002, version 16 is applicable to the proposed project activity.		
	The approved baseline methodology applicable to the project explicit criteria - implicit criteria (e.g. available scenarios, applicability of formulas for BE/PE/LE calculations)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The selected ACM0002, version 16 is demonstrated to be applicable to the project in the section D8.1 above.
	PDD includes all assumptions and data used by project participants	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The PDD includes all assumptions and data in accordance with ACM0002, version 16/12/and the “Tool to calculate the emission factor for an electricity system” /14/
	All the references and documents used are correctly quoted and conservatively interpreted in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The baseline scenario is prescribed as per the applied methodology, ACM0002, version 16/12/.
	All relevant policies / regulations considered are listed in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The baseline scenario is prescribed as per the applied methodology,.
	Identified potential baseline scenarios reasonably represent what would/could occur in the absence of the proposed project activity	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The baseline scenario is prescribed as per the applied methodology,.
	The baseline scenario selection is appropriate and determined according to the methodology	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The baseline scenario of the project is appropriately selected in accordance with the selected methodologyACM0002, version 16.
The approved methodology used is applicable to the identified baseline scenario	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The selected ACM0002, version 16 is applicable to the identified baseline scenario in the PDD.	
<b>Findings</b>	n/a		
<b>Conclusion</b>	<p>As the project activity is the installation of a Greenfield grid-connected hydropower plant, it has been determined that the baseline scenario is described in the applied methodology ACM0002, version 16 as following:</p> <p>Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system” /14/.</p> <p>The approved baseline methodology has been correctly applied to identify a realistic and credible baseline scenario, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.</p> <p>All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline</p>		

scenario are correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

#### D.8.6. Demonstration of additionality

Means of validation	<p>The project applies the “Tool for demonstration and assessment of additionality” version 07.0.0/13/ to demonstrate additionality.</p> <p><b>CDM consideration</b></p> <p>The starting date of the project activity is determined by the date when the first construction contract was signed, which was on 29/10/2014 (EPC Contract for the project)/38/. It is confirmed by the validation team to be the earliest of the dates at which the implementation or construction or real action of the project activity in accordance with the latest CDM glossary/17/ since it is the only contract signed for the project up to the most recent date of the finalizing of the validation report, i.e. 25/11/2015. The starting date of the project activity is after 02/08/2008 and after the PDD published for global stakeholder consultation (30/09/2014). The validation team confirms that the starting date is the first real action that was taken where the PP committed to expenditure according to the CDM glossary of terms/17/. In order to corroborate this information, the validation team has reviewed the following documents:</p>																					
	<table><tr><th>Timeline</th><th>Milestone</th><th>Determination by the validation team</th></tr><tr><td>March 2013</td><td>FSR finalized</td><td>The FSR/27/</td></tr><tr><td>19/04/2013</td><td>FSR was approved</td><td>The Approval of the FSR/28/</td></tr><tr><td>11/09/2013</td><td>Board decision is made</td><td>Board decision of Development of the proposed project according to CDM/33/</td></tr><tr><td>08/08/2014</td><td>ERPA is Signed for Carbon Asset Development</td><td>ERPA/36/</td></tr><tr><td>30/09/2014</td><td>GSP started</td><td>Validation started <a href="http://cdm.unfccc.int/Projects/Validation/DB/B343AV3L67ROEV5SEAIEKRU/FNSJCDW/view.html">http://cdm.unfccc.int/Projects/Validation/DB/B343AV3L67ROEV5SEAIEKRU/FNSJCDW/view.html</a></td></tr><tr><td>29/10/2014</td><td>Project start date- Equipment Purchase and Construction Contract signing date</td><td>EPC Contract for the project/38/</td></tr></table>	Timeline	Milestone	Determination by the validation team	March 2013	FSR finalized	The FSR/27/	19/04/2013	FSR was approved	The Approval of the FSR/28/	11/09/2013	Board decision is made	Board decision of Development of the proposed project according to CDM/33/	08/08/2014	ERPA is Signed for Carbon Asset Development	ERPA/36/	30/09/2014	GSP started	Validation started <a href="http://cdm.unfccc.int/Projects/Validation/DB/B343AV3L67ROEV5SEAIEKRU/FNSJCDW/view.html">http://cdm.unfccc.int/Projects/Validation/DB/B343AV3L67ROEV5SEAIEKRU/FNSJCDW/view.html</a>	29/10/2014	Project start date- Equipment Purchase and Construction Contract signing date	EPC Contract for the project/38/
	Timeline	Milestone	Determination by the validation team																			
	March 2013	FSR finalized	The FSR/27/																			
	19/04/2013	FSR was approved	The Approval of the FSR/28/																			
	11/09/2013	Board decision is made	Board decision of Development of the proposed project according to CDM/33/																			
	08/08/2014	ERPA is Signed for Carbon Asset Development	ERPA/36/																			
	30/09/2014	GSP started	Validation started <a href="http://cdm.unfccc.int/Projects/Validation/DB/B343AV3L67ROEV5SEAIEKRU/FNSJCDW/view.html">http://cdm.unfccc.int/Projects/Validation/DB/B343AV3L67ROEV5SEAIEKRU/FNSJCDW/view.html</a>																			
	29/10/2014	Project start date- Equipment Purchase and Construction Contract signing date	EPC Contract for the project/38/																			
	<p>Otherwise the PP submitted one standardized CDM notification form of the project to Lao PDR DNA (i.e. Ministry of Natural Resources and Environment) on 10 Oct. 2013/34/ and one standardized prior consideration of the CDM form to UNFCCC secretariat on 10 Oct. 2013/35/ respectively, both of which contain the precise geographical location and a brief description of the proposed project activity and were made within six months of the project activity start date (i.e. 29/10/2014)/38/.</p>																					
<p>Thus the validation team confirmed that the CDM was seriously considered in the decision to implement the project activity as per the requirements for prior consideration of the CDM/15/ contained in the VVS/7/, CDM Project Standard/8/ and the CDM Project Cycle Procedure/9/.</p>																						
<table><tr><th>Starting date of project</th><th>Justification of and evidences (references) on the starting date of project</th><th>Date of CDM consideration</th></tr><tr><td>29/10/2014</td><td>EPC Contract for the project/38/</td><td>11/09/2013 Board decision is made 30/09/2014 Validation started</td></tr></table>	Starting date of project	Justification of and evidences (references) on the starting date of project	Date of CDM consideration	29/10/2014	EPC Contract for the project/38/	11/09/2013 Board decision is made 30/09/2014 Validation started																
Starting date of project	Justification of and evidences (references) on the starting date of project	Date of CDM consideration																				
29/10/2014	EPC Contract for the project/38/	11/09/2013 Board decision is made 30/09/2014 Validation started																				

**Alternatives**

The applied methodology ACM0002, version 16 has prescribed the baseline scenario for the Greenfield project, i.e. “the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid”. As per the VVS/7/, it is considered appropriate that no further analysis is required in the PDD.

**Investment analysis**

The Investment Analysis has been assessed for compliance with the “Methodological Tool: Investment Analysis”, Version 06/16/.

**Choice of approach**

The PP uses the investment analysis to demonstrate the additionality. A benchmark analysis (Option III of Step 2 of the Tool for the demonstration and assessment of additionality) is selected for conducting the investment analysis, where the selection is considered by the validation team to be appropriate in consideration that, other than the CDM revenue, the project would generate revenue through the sales of electricity and the baseline scenario to the proposed project is not a similar investment project, so the simple cost analysis(option I) as well as investment comparison analysis (option II) is not appropriate.

**Benchmark analysis**

Benchmark analysis was selected as the analysis method. Project IRR was selected as the indicator, and benchmark was set to 15.46% (post-tax) based on the maturity rate of the 3-month US Treasury bill plus the Risk premium on lending in Lao PDR as per additionality tool para 38(a).

The average value of the 3-Month US Treasury Constant Maturity Rate/42/ for 20 years from 13/08/1994 to 12/08/2014 (before the project starting date) was selected as a risk free rate which is 2.78%. The data “Risk premium on lending (prime rate minus Treasury bill rate; %)/43/ provided by World Bank for 5 years from 2006 to 2010 was selected as a national risk premium of Lao PDR, which is 12.68%. Because the data from world bank is not available publicly for Lao PDR since 2011, the 12.68% for risk premium on lending is considered as reasonable. Therefore the benchmark was calculated as the sum of these two indicators as 15.46% as per the “Tool for the Demonstration and Assessment of Additionality (Version 7.0.0)” para.38 (a), and “Methodological tool: investment analysis” (EB85 Annex 12) para.16.

The validation team discusses the government bond as following:

Since US dollar is the world’s reserve currency, average short term (3-month) U.S. Treasury Constant Maturity Rate from 1994 to 2014 (20 years before project start date) is chosen as the Government bond rates (risk free rate) to be used in benchmark calculation. Compare with the long term bonds, the short term treasury rate is usefully be chosen as the risk-free rate ([http://en.wikipedia.org/wiki/Riskfree\\_interest\\_rate](http://en.wikipedia.org/wiki/Riskfree_interest_rate) ). Thus validation team considers by comparing them that the short term rate is lower compare with the long term rate, the choice is conservative. The 20 years average value is more convincing and reduces the short term uncertainty and violation of the market. The Treasury Constant Maturity Rate data are sourced from Board of Governors of the Federal Reserve System (publicly available on internet). It is confirmed that 2.78% indicated in the PDD is the correct average 3-Month Treasury Constant Maturity Rate in this period. The 2.78% for average 3- Month Treasury Constant Maturity Rate in US dollar is more representative and conservative.

The validation team discusses the risk premium as following:

According to the World Bank website for Risk premium on lending (prime rate minus treasury bill rate, %), “Risk premium on lending is the interest rate charged by banks on loans to prime private sector customers minus the “risk free” treasury bill interest rate at which short term government securities are issued or traded in the market”, and that of Lao PDR from 2006 to 2010 (which is latest available publicly till now) are 11.70%, 10.10%, 11.70%, 15.30% and 14.60% respectively/43/. The validation team concludes it is assessed appropriate to apply the



average of the recent years which make the value more convincing and reduces the short term uncertainty and violation of the market. 12.68% as “a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data” added upon Government bond rates. The FSR has been the basis of the decision to proceed with the investment in the project. The FSR was compiled by an authorized third-party institute under the requirement of the project owner to see the feasibility of the project in March 2013 and was approved by Department of Electricity of Ministry of Energy and Mines of Lao PDR on 19 April 2013/28/. As the project had a lower return of IRR, and facing the difficulties of loan application, the construction did not start until 29/10/2014/38/.

All the input parameters used in the financial analysis of the project are sourced from the FSR/27/. Given that no financial commitment has been made at the time of validation, it is unlikely in the context of the project that the input values would have materially changed to affect the additionality negatively.

The input parameters used in the investment comparison analysis are verified as follows.

Parameter:	Total investment cost
Value applied for the IRR calculation:	44.63 million USD
Source of the value:	FSR/27/ and the Approval of FSR/28/
Consistency of the value:	The total investment cost of 44.63 million USD applied in the investment analysis is fully consistent with the FSR and the Approval of FSR
Justification by the validation team according to §113 of VVM: ( cross checking and comparison as applicable)	<p><u>Cross Check with Actual Cost</u></p> <p>The validation team checked the contract prices of EPC contract/38/ and confirms that the total contract price is 42 million USD which is more than the static investment cost of 41.8 million USD estimated in the FSR.</p> <p>As the total investment is approved by the local government and the contract price as actual investment cost is more than the total static investment cost estimated in the FSR, thus validation team is able to confirm that total investment applied is appropriate.</p>

Parameter:	Annual Net Power Supply
Value applied for the IRR calculation:	130,000 MWh for the time from the operation start date to 2020 86,000MWh for the time after 2020
Source of the value:	FSR/27/ and the Approval of FSR/28/
Consistency of the value:	The Annual Net Power Supply of 130,000 MWh for the time from the operation start date to 2020 and 86,000MWh for the time after 2020 applied in the investment analysis is fully consistent with the FSR and the Approval of FSR

	<p>Justification by the validation team according to §113 of VVM: ( cross checking and comparison as applicable)</p>	<p><u>Cross Check with similar Registered Project/44/</u></p> <p>Validation team has cross-checked with the registered PDDs and CER spreadsheet of hydropower projects in Lao PDR (UNFCCC reference)/44/ and found that the electricity generation and plant load factor (PLF) are as follow:</p> <table border="1"> <thead> <tr> <th>Reference number</th><th>Net power generation (GWh/y)/gross power generation (GWh/y)</th><th>PLF (rate of gross generation) %</th></tr> </thead> <tbody> <tr> <td>Project</td><td>Average output 130 before 2020 86 after 2020 Average 93.04</td><td>77.29 before 2020 51.13 after 2020 Average 55.32</td></tr> <tr> <td>5583</td><td>977.5</td><td>44.63</td></tr> <tr> <td>6120</td><td>435</td><td>49.65</td></tr> <tr> <td>9038</td><td>507</td><td>48.23</td></tr> <tr> <td>9881</td><td>153</td><td>39.69</td></tr> <tr> <td>10068</td><td>248.6</td><td>46.52</td></tr> <tr> <td>5258</td><td>309</td><td>46.41</td></tr> </tbody> </table> <p>The gross electricity output for the project is estimated as 130,000MWh annually before 2020 and 86,000MWh annually when the so-called Nam Ngum 3 hydropower project located in the upstream of the proposed project with installed capacity of 440MWh is expected to be operated in 2020 as designed by FSR and the plant load factor is respectively 77.29% and 51.13%,. The plant load factor (PLF) was derived from option b of EB48, Annex 11, §3, i.e. it was determined by a third party that was contracted by the project participants/27//28/. It is confirmed by the validation team that the PLFs for the project is highest ones in the range of 39.69% to 49.65% of similar registered hydro power projects in Lao PDR as listed in the table above. Even considering the average PLF of the proposed prproject, the average PLF of 55.32% is highest one among the similar registered hydropower projects in Lao PDR listed above. The validation team thus concluded that the PLF of respectively 77.29% and 51.13% is appropriate as they are considered conservative.</p> <p>Thus, it can be confirmed by the validation team that net power supply applied is appropriate.</p>	Reference number	Net power generation (GWh/y)/gross power generation (GWh/y)	PLF (rate of gross generation) %	Project	Average output 130 before 2020 86 after 2020 Average 93.04	77.29 before 2020 51.13 after 2020 Average 55.32	5583	977.5	44.63	6120	435	49.65	9038	507	48.23	9881	153	39.69	10068	248.6	46.52	5258	309	46.41
Reference number	Net power generation (GWh/y)/gross power generation (GWh/y)	PLF (rate of gross generation) %																								
Project	Average output 130 before 2020 86 after 2020 Average 93.04	77.29 before 2020 51.13 after 2020 Average 55.32																								
5583	977.5	44.63																								
6120	435	49.65																								
9038	507	48.23																								
9881	153	39.69																								
10068	248.6	46.52																								
5258	309	46.41																								

	Parameter:	Tariff		
	Value applied for the IRR calculation:	0.06495 USD/KWh		
	Source of the value:	FSR/27//28/		
	Consistency of the value:	The tariff of 0.06495 USD/KWh applied in the investment analysis is fully consistent with the FSR		
	Justification by the validation team according to §113 of VVM: ( cross checking and comparison as applicable)	The actual tariff is fixed by the PPA/37/.		
		Cross Check with Registered Project/44/		
		UNFCCC	Tariff (VAT incl.)	
		Reference number	USD/kWh	
		Project	0.06495	
		5583	0.04	
6120		0.0468		
9038	0.0459			
9881	0.06			
10068	0.05221			
5258	0.04-0.045			
<p>The in-grid tariff for the project is estimated as 0.06495 USD/kWh (VAT incl.) as per the FSR. It is confirmed by the validation team that the in-grid tariff for the project is higher than the range of 0.04 USD/kWh (VAT incl.) to 0.06 USD/kWh (VAT incl.) of similar registered hydro power projects in Lao PDR as listed in the table above. The validation team thus concluded that the in-grid tariff of 0.06495 USD/kWh (VAT incl.) is appropriate as per conservativeness principles.</p> <p>The validation team thus concluded that the in-grid tariff of 0.06495 USD/KWh is appropriate.</p>				
Parameter:	O&M Cost			
Value applied for the IRR calculation:	Annual average O&M cost for IRR calculation is 815,235 USD which consists with item shown on the Table below,			
	Basic parameters	Unit	Value	Annual Amount Million USD
	Installed capacity	MW	19.2	---
	Material fee	USD/kW	0.50	0.009600

		Staff	Person	15	---	
		Salary and welfare	USD/person	5000	0.075000	
		Repairing fee rate (accounts for static investment)	%	1.5	0.627000	
		Concession resource utilization fee (accounts for sales income)	%	1	0.084435	
		Other fee (for environmental protection and watershed management)	USD/kW	1	0.019200	
		Annual O&M Cost	Million USD	---	0.815235	
	Source of the value:	FSR/27//28/				
	Consistency of the value:	The O&M cost including these assumption applied in the investment analysis is fully consistent with the approved FSR				
	Justification by the validation team according to §113 of VVM: ( cross checking and comparison as applicable)	<u>Cross Check with similar Registered Project/44/</u>				
		Reference number		Rate of O&M cost from total investment cost		
		%				
Project		1.83				
5583		1.5				
6120		1.9				
9038		1.2				
9881		1.99				
10068		0.7				
5258		0.09				
<p>The ratio of annual O&amp;M cost/Total investment cost is 1.83% for the proposed project, which falls into the range of (0.09% to 1.99%) of the registered projects list above.</p> <p>Thus, it can be confirmed by the validation team that O&amp;M Cost applied is appropriate.</p>						
Parameter:	Depreciation					

	Value applied for the IRR calculation:	20 years for building and structures 5 years for equipment
	Source of the value:	FSR/27//28/
	Consistency of the value:	The depreciation of 20 years for building and structures and 5 years for equipment respectively applied in the investment analysis is fully consistent with the approved FSR
	Justification by the validation team according to §113 of VVM: ( cross checking and comparison as applicable)	Depreciation period is calculated based on approved FSR as follows: -Depreciation period for buildings and structures is 20 years, with annual depreciation rate 5%; -Depreciation period for devices is 5 years, with annual depreciation rate 20%. According to Tax Law of Lao PDR/45/, depreciation period of “Equipment or sets of tools used for professional purposes or certain works” as 5 years with 20% annual depreciation rate and that of “Structures used for industrial purposes” as 20 years with 5% annual depreciation rate. Therefore the depreciation period applied in the investment decision is in line with the local laws. Thus, the validation team considers the depreciation period applied is appropriately quoted.
	Parameter:	Tax
	Value applied for the IRR calculation:	Income tax of 15% for the net taxable income Business turnover tax of 5% for gross operating revenue Minimum tax of 0.25% for gross operating revenue excluding business turnover tax
	Source of the value:	FSR/27//28/
	Consistency of the value:	The income tax of 15% and Business turnover tax of 5% and Minimum tax of 0.25% respectively applied in the investment analysis is fully consistent with the approved FSR
	Justification by the validation team according to §113 of VVM: ( cross checking and comparison as applicable)	Tax applied is calculated based on approved FSR as follows: - Income tax of 15% for the net taxable income; - Business turnover tax of 5% for gross operating revenue; - Minimum tax of 0.25% for gross operating revenue excluding business turnover tax. According to Tax Law of Lao PDR/45/, - Income tax is 15% for for domestic production and importation/sales of goods. - business turnover tax for production of “electricity and electric power generators”, is 5% both for domestic production and importation/sales of goods. -the minimum tax [refers to] a direct tax, which is a minimum obligation of business persons and

freelancers who pay profit tax based on the advanced or ordinary accounting system and who have declared a loss or have a profit under a certain level as provided in the law.

The rate of the minimum tax shall be 0.25% of the annual total business income excluding business turnover tax, for all types of domestic manufacturing activities.

Therefore the tax applied in the investment decision is in line with the local laws.

Thus, the validation team considers the tax applied is appropriately quoted.

#### Calculation and conclusion

The IRR calculations provided and transparently calculated in the spread sheet/20/ has been checked for the accuracy and reproducibility of the calculations. The assumptions and calculations were verified and found to be correct. Pre-tax project IRR over 25 years was calculated, giving a percentage return of 10.99% which improves to 15.66% when CDM revenues are included. In addition, the input values in the PDD/2/ have been confirmed to be consistent with the financial analysis calculation/20/.

Thus, it is demonstrated that the project activity is only likely to occur with CDM revenues.

#### Sensitivity analysis

According to the “Methodological tool: investment analysis” (version 06)/16/, only variables including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets.

A sensitivity analysis was carried out for parameters contributing more than 20% to revenues or costs in order to check the robustness of the financial analysis, which includes the annual electricity generation, total investment costs, electricity tariff and O&M costs. The variations necessary to reach the benchmark were determined and the likelihood for the project IRR to cross the benchmark was discussed. Validation team was able to verify that the project IRR will touch the benchmark only if the below mentioned parameters change by values as mentioned below:

Input value	Variation	Validation team's opinion
Total Investment cost	If the total investment decreases by 22.37%, the IRR reaches the benchmark.	The validation team checked the contract prices of EPC contract/38/ and confirms that the total contract price is 42 million USD which is more than the static investment cost of 41.8 million USD estimated in the FSR/27//28/. The total investment decreased by 22.37% is thus considered as impossible for the project.
O&M Cost	If the O&M cost decreases by 245.32%, the IRR reaches the benchmark.	The O&M cost reduced by 245.32% is not feasible.
Electricity tariff	If the electricity tariff increases by 31.18%, the IRR reaches the benchmark.	It is noted that the electricity tariff of 0.06495 USD/kWh applied in investment decision is derived from FSR and determined by the agreement signed between the project owner and the grid company/37/. According to the ‘Power Purchase Agreement’, the actual electricity tariff is 0.06495 USD/kWh is fixed for the project's operation period

		(25 years), thus electricity tariff increased by 31.18% is unlikely to occur.
Power generation amount	If the annual electricity supply to the grid increases by 31.18%, the IRR crosses the benchmark.	It is noted that the estimation of the power generation amount used at the time of investment decision is derived from the approved FSR prepared by an independent specialist entity/27//28/. Where the operation hours were calculated based on a 19-year hydro data (1987-2006). Since the data is computed based on years of historic data, it does not lead to electricity increase every year. Thus the validation team confirms that the operation hours were impossible to exceed the 31.18% range.

The validation team thus confirms that the sensitivity analysis is in accordance with the “Tool for demonstration and assessment of additionality” version 07.0.0”/13/ and “Methodological tool: investment analysis” version 06/16/. All input parameters used for sensitive analysis constitute more than 20% of either total project costs or total project revenues. The justifications provided by the PP with the variations of these parameters are been analyzed, clarified and accepted by the DOE.

**Barrier analysis**  
Barrier analysis was not applied for this project.

**Common practice analysis**  
A common practice analysis was carried out in accordance with the “Tool for the demonstration and assessment of additionality”, version 07.0.0/13/ and Methodological tool: common practice, version 03.1/19/.

As demonstrated before, the project is a greenfield hydropower plant which utilize the renewable hydro resource to produce electricity/27//37/, thus it falls into the scope of Type (b) of paragraph 2 in the Methodological tool: common practice/19/, i.e. switch of technology with or without change of energy source (energy efficiency improvements, power generation based on renewable energy).

Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. The following steps are used for common practice analysis

**Step 1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity**  
The installed capacity of the project is 19.2 MW. Thus, the ±50% range is 9.6 MW to 28.8 MW. An analysis on capacity range of ±50% (between 9.6 MW and 28.8 MW), have been done on the power plants that are up and running in Lao PDR.

**Step 2: identify similar projects (both CDM and non-CDM)**  
The geographical scope of the common practice is the host country of Lao PDR. According to paragraph 44 in the *Tool for the demonstration and assessment of additionality* (Version 07 / 29/, other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included the following analysis.

Similar projects are all hydropower plants in Lao PDR within the capacity of 9.6 MW to 28.8 MW which have started commercial operation before the publishing date of the propose project for GSC dated 30 Sep, 2014 as the start date of the propose project dated 29 Oct. 2014 is later than the publishing date for GSC as per Methodological tool: common practice/19/.

According to the *EDL Annual Report 2010 and Electric Power Plants in Laos/46/*, similar projects are available as follows:

No.	Power plant	If CDM or not	Installed	Commissioning
-----	-------------	---------------	-----------	---------------

		name		capacity MW	year
	1	Xe Namnoy 1	Yes	14.8	2013
	<p><b>Step 3: Within the projects identified in Step 2, identify those that neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number <math>N_{all}</math>.</b></p> <p>Therefore, <math>N_{all}=0</math></p> <p><b>Step 4: Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number <math>N_{diff}</math>.</b></p> <p>As mentioned in Step 3, there is no project identified, thus <math>N_{diff}=0</math>.</p> <p><b>Step 5: Calculate factor <math>F=1- N_{diff}/N_{all}</math> representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.</b></p> <p>As <math>N_{diff}=0</math>, there is no <math>F=1- N_{diff}/N_{all}</math>; Due to <math>N_{all}=N_{diff}=0</math>, <math>N_{all} - N_{diff} =0&lt;3</math>.</p> <p>Since <math>N_{all} - N_{diff} =0&lt;3</math>, as per the “Methodological tool: common practice/19/”, it can be concluded that the project is not a common practice and the project is additional.</p>				
<b>Findings</b>	<p>CAR3: Please specify the project activity starting date with the relevant documents in section C of PDD, and also clarify the project implementation timeline in section B.5 of PDD.</p> <p>CAR4: The project IRR indicated in section Sub-step 2c of PDD is inconsistent with indicated in IRR spreadsheet. Moreover, please provide the relevant evidence on investment parameters for cross check.</p> <p>CL2: Refer to sensitivity analysis, please determine the variations to reach benchmark and clarify the likelihood under what conditions.</p> <p>CL3: Please assess the common practice against the latest guidelines on common practice.</p> <p>CL4: Please clarify whether or not the PP has notified the DNA of host country regarding the commencement of the project activity as a new CDM project activity. The relevant evidence is to be provided for check.</p>				
<b>Conclusion</b>	<p>Refer CARs and CLs as above, it is responded satisfactorily as detailed in the below Appendix 4 of the report.</p> <p>The CDM was seriously considered by the PP. The evidences were transparently reviewed by the validation team and considered to be effective. Investment analysis and sensitivity analysis clearly demonstrate that the proposed project activity is financially unattractive. Common practice analysis was carried out showing that the proposed project activity is financially unattractive. Therefore, the proposed project activity is not business-as-usual, i.e. the proposed project activity is additional.</p>				

#### D.8.7. Emission reductions

<b>Means of validation</b>	<p>The validation team has assessed the calculations of baseline emissions and emission reductions. Corresponding calculations have been carried out based on calculation spread sheet/21/. The parameters and equations presented in the PDD, as well as other applicable documents, have been compared with the information and requirements presented in the methodology and respective tools. An equation comparison has been made to ensure consistency between all the formulae presented in the calculation files and in the PDD, methodology, and tools.</p> <p>The assumptions and data used to determine the emission reductions are listed in the PDD and all the sources have been checked. Based on the information reviewed it is confirmed that the sources used are correctly quoted and interpreted in the PDD.</p>
----------------------------	--



The values presented in the PDD are considered reasonable based on the documentation and references reviewed and the results of the interviews.

The baseline methodology has been applied correctly according to requirements.

The estimate of the baseline emissions are considered correct as the calculations have been reproduced by the validation team with the attainment of the same results. The algorithms for the determination of the baseline, project, and leakage are discussed in the following sections.

#### Baseline emissions

The calculation of the baseline emissions follows the procedures described in the methodology ACM0002, version 16. The regional grid consisting of Thailand Power Grid and the Lao Power Grid is considered to be the project boundary.

As per the methodology, the baseline emissions for the year y shall be determined as follows:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:

$BE_y$  = Baseline emissions in year y (tCO<sub>2</sub>/yr)

$EG_{PJ,y}$  = 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/yr)

$EF_{grid,CM,y}$  = Combined margin CO<sub>2</sub> emission factor for grid connected power generation in year y calculated using the Tool to calculate the emission factor for an electricity system, version 4.0 /14/(tCO<sub>2</sub>/MWh)

According to baseline methodology ACM0002, for Greenfield renewable energy power plants:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$  is 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/yr).

$EG_{facility,y}$  is quantity of net electricity generation supplied by the project plant to the grid in year y (MWh/yr).

Based on the formula applied, the audit team confirms that the data has been calculated correctly.

According to the “Tool to calculate the emission factor for an electricity system”, Version 4.0/14/, the combine grid emission factor for the project as of 0.5595 tCO<sub>2</sub>e/MWh was assessed as follows:

1) The electricity generated by the project would be supplied to the Lao National Grid; In accordance with the delineation of the project activity system published by the DNA of Lao PDR, i.e. Calculation for the emission factor for electricity generation in Lao PDR, 2010/22/, there are no significant transmission constrains between Lao Power Grid and Thailand Power Grid. Thus, the regional power grid consisting Lao Power Grid and Thailand Power Grid is identified as the project electricity system of the project, as per the “Tool to calculate the emission factor for an electricity system” /13/. Besides, following the delineation of the connected electricity systems published by the DNA of Lao PDR/22/, the connected electricity system is identified as Malaysia, China and Vietnam Power Grids, which is further confirmed by checking the EDL Annual Report/23/, Electricity Statistics Annual Report/24/ and Thailand Electric Power Yearbook/25/. For the purpose of determining the operating margin emission factor, 0t CO<sub>2</sub>/MWh has been conservatively taken to determine the CO<sub>2</sub> emission factor for net electricity imports from a connected electricity system;

2) In the Calculation for the emission factor for electricity generation in Lao PDR, 2010/22/,

Option I, i.e. only grid power plants are included in the calculation, is chosen to calculate the operating margin and build margin emission factor;

3) The calculation of the Operating Margin (OM) in the PDD is assessed as follows:

- the average OM emission factor calculation method is appropriately selected;
- a 3-year generation-weighted average, based on the most recent available date at the time of commencement of validation (i.e. 30/09/2014), is properly used. Those applied data are derived from the EDL Annual Report 2009, 2010 and 2012 of Lao PDR/23/, Electricity Statistic Annual Report 2008 to 2010 of Lao PDR/24/, Electricity Statistic Annual Report 2008 to 2010 of Thailand/25/ and 2006 IPCC Guidelines for National Greenhouse Gas Inventories/10/;
- the Option B is properly selected for calculation of the average OM since the necessary data for Option A is not publicly available;
- the calculation of the OM is correctly conducted using the Equation (7) stipulated in the "Tool to calculate the emission factor for an electricity system" (Version 04.0)/14/. The data and parameters used are appropriately derived from the data sources/10//23//24//25/.

As a result, the validation team confirmed that the OM emission factor calculated as 0.5595tCO<sub>2</sub>e/MWh in the PDD fully complies with the Tool to calculate the emission factor for an electricity system/14/.

4) The calculation of the Build Margin (BM) in the PDD is assessed as follows:

- As a LDC country/41/ with an international project system, it is difficult to obtain the information for all units in both Lao Power Grid and Thailand Power Grid (e.g. power generation data, commissioning date and fuel consumption), which is deemed acceptable following the Guideline 7 of Guidelines for objective demonstration and assessment of barriers, i.e. "For projects in Least developed Countries, less stringency is needed with regards to data availability in the actual demonstration of barrier, as compared to the projects in other countries";
  - Conservatively, in the PDD/2/, the DNA of Lao PDR applied 0tCO<sub>2</sub>e/MWh as the BM emission factor when it considers the weighting of the BM emission factor as zero.
- 5) The validation team confirmed that the Combined Margin (CM) is calculated based on the simplified CM methodology (Option b) correctly as follows:
- Lao PDR where the project is located, is a LDC, as referenced in the List of Least Developed Countries issued by the Development Policy and Analysis Division of the UN secretariat/41/;
  - The date requirements for the application of Step 5: Calculate the build margin emission factor cannot be met, as discussed in item 4);
  - Following the calculation conditions for simplified CM,  $w_{BM}=0$  and  $w_{OM}=1$  are correctly applied in the PDD/2/.

In conclusion, the validation can confirm that the CM of the project is appropriately calculated as

0.5595tCO<sub>2</sub>e/MWh in the PDD based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation (i.e. 30/09/2014).

#### Project Emissions

As per the methodology ACM0002, version 16, project emissions include emissions due to (1) project emissions from fossil fuel consumption; (2) project emissions from the operation of geothermal power plants due to the release of non-condensable gases; and (3) project emissions from water reservoirs of hydro power plants.

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

$PE_y$  = Project emissions in year y (tCO<sub>2</sub>e/yr)

$PE_{FF,y}$  = Project emissions from fossil fuel consumption in year y (tCO<sub>2</sub>/yr)

$PE_{GP,y}$  = Project emissions from the operation of geothermal power plants due to the

	<p>release of non-condensable gases in year y (tCO<sub>2</sub>e/yr)  <math>PE_{HP,y}</math> = Project emissions from water reservoirs of hydro power plants in year y (tCO<sub>2</sub>e/yr)</p> <p>No fossil fuels are consumed due to the project activity. Hence  <math>PE_{FF,y} = 0</math>          This project is not a geothermal project activity. Hence  <math>PE_{GP,y} = 0</math>          As verified above in Section 3.3.1, the project has no reservoir. Hence  <math>PE_{HP,y} = 0</math>          Therefore the project emissions of the project is zero, i.e. <math>PE_y = 0</math> tCO<sub>2</sub>e.</p> <p>Leakage          No leakage emission is considered as indicated by the applied methodology.</p> <p>Emission Reduction          Emission reductions are calculated as follows:  <math>ER_y = BE_y - PE_y - L_y = (130,000 \times 0.5595 \times 4 + 86,000 \times 0.5595 \times 3) / 7 - 0 - 0 = 62,184 \text{ tCO}_2\text{e}</math></p>															
<b>Findings</b>	CL5: Please further clarify if the data source from 2010 to calculate EF is still available.															
<b>Conclusion</b>	<p>Refer CL5 as above, it is responded satisfactorily as detailed in the below Appendix 4 of the report.</p> <p>In summary, the calculation of emission reductions was correctly demonstrated by the PP according to the methodology ACM0002, version 16/12/ and its tool “Tool to calculate the emission factor for an electricity system” Version 4.0/14/. The table below summaries validation team’s determination of emission reduction:</p> <table border="1" data-bbox="448 1115 1444 2085"> <tr> <td data-bbox="448 1115 837 1350">All assumptions made for estimating GHG are listed in the PDD</td><td data-bbox="837 1115 962 1350"> <input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No         </td><td data-bbox="962 1115 1444 1350">All the assumptions made for estimating GHG emission have been confirmed listed in the PDD Section B.6. The main assumptions are in line with project situation in FSR/27/, the methodology/12/ and Emission factor of Lao National Grid/22/</td></tr> <tr> <td data-bbox="448 1350 837 1552">All data used by project participants are listed in the PDD</td><td data-bbox="837 1350 962 1552"> <input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No         </td><td data-bbox="962 1350 1444 1552">All data used by the project participants have been confirmed listed in the PDD according to the FSR of the project/27/, Tool to calculate the emission factor for an electricity system/14/ and relevant host country DNA’s data/22/.</td></tr> <tr> <td data-bbox="448 1552 837 1686">Their references and sources are also listed in the PDD</td><td data-bbox="837 1552 962 1686"> <input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No         </td><td data-bbox="962 1552 1444 1686">The references and sources have been confirmed listed in the PDD Section B.6 and Appendix 4 Baseline Information.</td></tr> <tr> <td data-bbox="448 1686 837 1955">Formulas, parameters, values are complete, accurate, transparent and conservative</td><td data-bbox="837 1686 962 1955"> <input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No         </td><td data-bbox="962 1686 1444 1955">Formulas, parameters, values have been confirmed completely, accurately, transparently and conservatively documented in the PDD Section B.6 and Appendix 4 Baseline Information according to the FSR/27/ of the project, the Tool to calculate the emission factor for an electricity system/14/.</td></tr> <tr> <td data-bbox="448 1955 837 2085">All the references and documents used are correctly quoted and conservatively interpreted in the PDD</td><td data-bbox="837 1955 962 2085"> <input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No         </td><td data-bbox="962 1955 1444 2085">Formulas, parameters, values have been confirmed completely, accurately, transparently and conservatively documented in the PDD Section B.6</td></tr> </table>	All assumptions made for estimating GHG are listed in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	All the assumptions made for estimating GHG emission have been confirmed listed in the PDD Section B.6. The main assumptions are in line with project situation in FSR/27/, the methodology/12/ and Emission factor of Lao National Grid/22/	All data used by project participants are listed in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	All data used by the project participants have been confirmed listed in the PDD according to the FSR of the project/27/, Tool to calculate the emission factor for an electricity system/14/ and relevant host country DNA’s data/22/.	Their references and sources are also listed in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The references and sources have been confirmed listed in the PDD Section B.6 and Appendix 4 Baseline Information.	Formulas, parameters, values are complete, accurate, transparent and conservative	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Formulas, parameters, values have been confirmed completely, accurately, transparently and conservatively documented in the PDD Section B.6 and Appendix 4 Baseline Information according to the FSR/27/ of the project, the Tool to calculate the emission factor for an electricity system/14/.	All the references and documents used are correctly quoted and conservatively interpreted in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Formulas, parameters, values have been confirmed completely, accurately, transparently and conservatively documented in the PDD Section B.6
All assumptions made for estimating GHG are listed in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	All the assumptions made for estimating GHG emission have been confirmed listed in the PDD Section B.6. The main assumptions are in line with project situation in FSR/27/, the methodology/12/ and Emission factor of Lao National Grid/22/														
All data used by project participants are listed in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	All data used by the project participants have been confirmed listed in the PDD according to the FSR of the project/27/, Tool to calculate the emission factor for an electricity system/14/ and relevant host country DNA’s data/22/.														
Their references and sources are also listed in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The references and sources have been confirmed listed in the PDD Section B.6 and Appendix 4 Baseline Information.														
Formulas, parameters, values are complete, accurate, transparent and conservative	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Formulas, parameters, values have been confirmed completely, accurately, transparently and conservatively documented in the PDD Section B.6 and Appendix 4 Baseline Information according to the FSR/27/ of the project, the Tool to calculate the emission factor for an electricity system/14/.														
All the references and documents used are correctly quoted and conservatively interpreted in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Formulas, parameters, values have been confirmed completely, accurately, transparently and conservatively documented in the PDD Section B.6														

		and Appendix 4 Baseline Information according to the FSR/27/ of the project, the Tool to calculate the emission factor for an electricity system/14/.
Methodology has been applied correctly to calculate project emissions, baseline emissions, leakage emissions and emission reductions	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	The methodology has been correctly applied to calculate project emissions, baseline emissions, leakage emissions and emission reductions. Please also see above descriptions in this section.
All the emissions of baseline emissions can be replicated using information provided in the PDD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	All the emissions of baseline emissions can be replicated by multiplying the annual net electricity output to the grid by the CO <sub>2</sub> emission factor of (i.e. 0.5595tCO <sub>2</sub> /MWh). The baseline emissions calculation is thus calculated as 62,184tCO <sub>2</sub> /a

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average ex-ante estimation of emission reduction conservatively calculated to be 62,184tCO<sub>2</sub>/a for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable and conservative in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

### D.8.8. Monitoring plan

<b>Means of validation</b>	<b>Parameters determined ex-ante</b>		
	The following parameters are determined ex-ante and verified by the validation team:		
	The baseline emission factor of the project is reported to be determined ex-ante and would remain fixed during the renewable first 7 year crediting period in the PDD, which is calculated as a combined margin (CM), consisting of the combination of OM and BM emission coefficient. The parameters applied in the calculation were validated by the validation team and discussed in the Section D8.7 above.		
	The validation team confirms that all relevant parameters have been sufficiently considered and the values of the parameters are real, measureable and conservative.		
	<b>Parameters monitored ex-post</b>		
	According to the approved methodology ACM0002, version 16, the following parameters will be monitored:		
	<b>Sl. No.</b>	<b>Parameters</b>	<b>Description</b>
	1	EG <sub>facility,y</sub>	Quantity of net electricity generation supplied by Nam Pha Gnai hydropower project to the grid in year y
	2	EG <sub>output,y</sub>	Quantity of electricity generated by Nam Pha Gnai hydropower project to the grid in year y
	3	EG <sub>input,y</sub>	Quantity of electricity imported from the grid by Nam Pha Gnai hydropower project in year y
	4	Cap <sub>PJ</sub>	Installed capacity of Nam Pha Gnai hydropower project after the implementation of project activity

	<p><b>Management system and quality assurance</b></p> <p>The monitoring plan presented in the PDD complies with the requirements of the applicable methodology. The validation team has verified all parameters in the monitoring plan against the requirements of the methodology and no deviations have been found.</p> <p>The management system and quality assurance procedures have been reviewed by the validation team through document review and interviews with the project participant/i/. The project participant would train all the monitoring staffs are trained against with related requirement; the training plan is saved and verified/39/.</p> <p>The monitoring plan outlines in the PDD includes:</p> <ul style="list-style-type: none"> <li>-Monitoring Organization</li> <li>-Monitoring Equipment and Installation</li> <li>-Calibration &amp; Maintenance Procedures</li> <li>-Error Handling Procedure and Corrective Actions</li> <li>-Data Management</li> <li>-Training</li> </ul> <p>The electricity exported and imported by the project will be continuously measured by the meters and it would be monthly reported. Calibrations of the meters will be carried out by a qualified third party annually. Cross-check measurements include the comparison with the records for electricity sales records.</p>
<b>Findings</b>	CL6: Refer to 'Measurement methods and procedures' in section B.7.1 of PDD, please specify the accuracy of the measurement, and the measurement methods and procedures against PDD form instruction.
<b>Conclusion</b>	<p>Refer CL6 as above, it is responded satisfactorily as detailed in the below Appendix 4 of the report.</p> <p>In summary, the validation team is convinced of compliance of the monitoring plan with the requirements of the monitoring methodology of ACM0002, version 16. During the on-site assessment, the validation team interviewed the PP that the monitoring arrangements described in the monitoring plan are feasible within the project design. The emission reductions resulting from the proposed CDM project activity can be reported ex post and verified.</p> <p>In conclusion, the validation team confirms that the requirements in the applied methodology ACM0002, version 16 are met.</p> <p>The project monitoring plan is in compliance with the monitoring methodology ACM0002, version 16.</p> <p>It is DOE's opinion that the project participant is able to implement the monitoring plan.</p>

#### D.9. Duration and crediting period

<b>Means of validation</b>	Review of the PDD/2/
<b>Findings</b>	n/a
<b>Conclusion</b>	A renewable 7 year crediting period has been chosen for the project, starting from 01/01/2016 or registration date, whichever is later.

#### D.10. Environmental impacts

<b>Means of validation</b>	An analysis of environmental impacts has been conducted by Somsanouk (SSN) Consultant Co., Ltd in form of Environment Impact Assessment Report/29/. The validation team has reviewed the documentation of the presented information. The Approval of Environment Impact Assessment Report of Nam Pha Gnai hydropower project/30/ confirms the correctness of the approach used by the PPs. Also, the environment impacts have been described in Section D.1 of the PDD. According to the
----------------------------	--

	Environment Impact Assessment Report/29/, no significant environmental impacts are expected if the PPs would have followed the requirements of the host country with regards to addressing environmental impacts.
<b>Findings</b>	n/a
<b>Conclusion</b>	The validation team concludes that the environmental impact by the project activity is been assessed by the project participant and the same is stated in the PDD. To confirm the impact associated with the project proponent, the validation team has physically inspected during the on-site visit and also through conducting the relevant stakeholders. It is validation team's opinion that the project activity does not cause the adverse environmental impacts which is confirmed from the local official expertise/iii/.

#### D.11. Local stakeholder consultation

<b>Means of validation</b>	The local stakeholder survey was carried out in September 2014/32/. Project participant introduced to the validation team that at start of the stakeholder interview, the local stakeholders were informed by means of the interpretation by the investigator. Totally 50 questionnaires were distributed and collected/32/.  The survey results and statistics analysis are presented in section E.1 and E.2 of the PDD. The survey demonstrates that the local community is supportive to the project. The implementation of the project could benefit the local in aspects of ecological environment protection and economic development.
<b>Findings</b>	n/a
<b>Conclusion</b>	The validation team considers the local stakeholder consultation carried out adequately. The project participant has taken due account of all comments received by the stakeholders and its summary is described in the PDD adequately.

#### SECTION E. Internal quality control

>>

The final validation report has undergone a technical review by a qualified independent reviewer before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with TÜV Rheinland's qualification scheme for CDM validation and verification that meets the criteria of EB guidelines for qualification.

#### SECTION F. Validation opinion

>>

The validation team assigned by the DOE (TÜV Rheinland (China) Ltd.), here after called TRC, has been assigned by "Swiss Carbon Assets Limited" to perform the validation of their project "Nam Pha Gnai hydropower project". The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism. The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against CDM Validation and Verification Standard (Version 07.0), Kyoto Protocol requirements, CDM Executive Board/UNFCCC rules.

The report is based on the assessment of the project design document undertaken through stakeholder consultations, application of standard auditing techniques including but not limited to document reviews, site visit, and stakeholder interviews, review of the applicable methodology and its underlying formulae and calculations.

##### Validation methodology and process

The validation has been performed as described in the VVS version 09.0 and constitutes the following steps:

- Publication of the PDD on the UNFCCC website (30/09/2014-29/10/2014)
- Desk review of the PDD and the relevant documents
- On-site assessment (30/10/2014)
- Issuance of Validation Report

##### Validation criteria

The following CDM requirements have been considered:

- Article 12 of the Kyoto Protocol,
- Modalities and procedures for CDM (Marrakech Accords)
- Subsequent decisions by the COP/MOP and CDM Executive Board
- Host country criteria
- Criteria given to provide for consistent project operations, monitoring and reporting.

The host party is Lao PDR and the Annex I country is Switzerland. Both parties fulfil the participation criteria and have approved and authorized the project and the project participants. The DNA from Lao PDR confirms that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology ACM0002, version 16 ,”consolidated baseline methodology for grid-connected electricity generation from renewable sources.”.

The project results in reductions of CO2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards “Lao PDR”.

The monitoring plan provides for the monitoring of the project’s emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is TRC’s opinion that the project participants are able to implement the monitoring plan.

By displacing fossil fuel based grid power generation with renewable hydro energy, the project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

The total emission reductions from the project are estimated to be 435,291 tCO2e over a 7 year renewable crediting period, averaging 62,184tCO2/a annually. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given the underlying assumptions do not alter.

The validation protocol describes a total of 10 findings which include:

- (4) Corrective Action Requests (CARs);
- (6) Clarification Requests (CLs);
- (0) Forward Action Requests (FARs); and all findings have been closed satisfactorily.

TRC concludes that the CDM Project Activity “Nam Pha Gnai hydropower project” in Lao PDR, as described in the PDD (Version 2.1), meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board.

The selected baseline and monitoring methodologies (ACM0002, version 16) are applicable to the project and correctly applied. The TRC therefore requests the registration of the project as a CDM project activity with UNFCCC.

ZHU Jiang (Team Leader)



TÜV Rheinland (China) Ltd.  
Beijing, 2015-12-24

Mr. Henri Phan (DOE Manager)



TÜV Rheinland (China) Ltd.  
Beijing, 2015-12-28

## Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
BE	Baseline Emissions
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification Request
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
EB	Executive Board
ER	Emission Reduction
FSR	Feasibility Study Report
GHG	Greenhouse Gas
GSC	Global Stakeholder Consultation
I	Interview
IPCC	Intergovernmental Panel on Climate Change
kW	Kilo Watt
kWh	Kilo Watt Hours
LoA	Letter of Approval
MoV	Means of Validation
NGO	Non-governmental Organization
ODA	Official Development Assistance
OM	Operating Margin
OSV	On-site Visit
PDD	Project Design Document
t	Tonne
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
TRC	TÜV Rheinland (China) Ltd.
EPC contract	Equipment Purchase and Construction Contract

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



## Qualification

Zhu, Jiang /

### Emission Trading

#### United Nations Framework Convention on Climate Change

Auditor No.:

(AuditorenRegNr)

Appointed:  
(Zugelassen)

☒ ja

Qualification Level: Lead Auditor  
(Qualifikationsstufe)

External:  
(Externer)

☐ ja

Add. reviewer: ☒ yes  
(Zusätzlicher Prüfer)

EAC Scopes:  
(EAC Branchen)

CDM 01 – Energy industries (renewable – / non-renewable sources)  
CDM 04 – Manufacturing industries

Add. qualification:  
(zus. Qualifikation)

First Appointment: 03/07/2015  
(Erstberufung)

Valid to: 02/07/2018  
(Gültig bis)

Remarks: CDM 01: valid for TA 1.1, 1.2  
CDM 04: valid for TA 4.2 – Other WHR and Fuel Switch  
+ Part Time TR

Languages: Chinese  
English

### Experience Exchange

Date	Location	Remarks	Accredita
2011-06-18	Beijing	Beijing CDM Seminar-EB61/62	United Nations Framework Convention
2010-12-21	Beijing	GC CDM Auditor Experience Exchange, Beijing, 2010-12-21to23	
United Nations Framework Convention on Climate Change			

### Monitoring

Latest Monitoring:  
(letzte Beurteilung)

Next  
Monitoring:  
(nächste  
Beurteilung)

Remarks:

[View / Edit Monitoring](#)

## History of scope allocation

Date: 2009-03-08  
Change: EAC CDM added  
By: Manfred Brinkmann  
Reason:

### History

Created:	03/20/2008 01:56:52 PM	Daxun Li/Bj/Chn/TUV
Modified:	03/16/2015 02:46:52 PM	Henri Phan/Chn/TUV
	09/28/2012 11:52:16 AM	Praveen Urs/Chn/TUV
	09/28/2012 11:27:35 AM	Daxun Li/Chn/TUV
	03/12/2012 03:05:17 PM	
	03/07/2012 02:06:06 PM	
	01/13/2011 03:24:11 PM	ZE9
	01/13/2011 03:22:23 PM	ZE9
	11/10/2010 06:24:28 PM	ZE9
	11/10/2010 06:23:35 PM	ZE9
	03/20/2008 01:57:07 PM	

### Export to ICMS

Last Export:

## Qualification

LIU, QING /

### Emission Trading

#### United Nations Framework Convention on Climate Change

Auditor No.:

(AuditorenRegNr)

Appointed:  
(Zugelassen)

☒ ja

Qualification Level: Lead Auditor  
(Qualifikationsstufe)

External:  
(Externer)

☐ ja

Add. reviewer: ☒ yes  
(Zusätzlicher Prüfer)

EAC Scopes:  
(EAC Branchen)

CDM 01 - Energy industries (renewable - / non-renewable sources)  
CDM 08 - Mining/Mineral production  
CDM 10 - Fugitive emissions from fuels (solid; oil and gas)

Add. qualification:  
(zus. Qualifikation)

First Appointment: 08/05/2014  
(Erstberufung)

Valid to: 07/05/2017  
(Gültig bis)

Remarks: Valid for TA 1.2, 8.2/10.2

Languages: Chinese  
English

### Experience Exchange

Date	Location	Remarks	Accredita
2011-06-18	Beijing	Beijing CDM Seminar-EB61/62	United Nations Framework Convention

### Monitoring

Latest Monitoring:  
(letzte Beurteilung)

Next  
Monitoring:  
(nächste  
Beurteilung)

Remarks:

### History of scope allocation

Date: 2011-05-09

Change: EAC CDM, CDM, CDM added  
By: Manfred Brinkmann  
Reason: Valid for TA 1.2, 8.2/10.2

## History

Created:	04/25/2011 03:35:53 PM	Qing Liu/Bj/Chn/TUV
Modified:	05/27/2014 04:31:18 PM	Henri Phan/Chn/TUV
	05/27/2014 03:30:39 PM	Qing Liu/Chn/TUV
	05/27/2014 01:22:34 PM	Qing Liu/Chn/TUV
	03/25/2013 07:42:31 PM	
	03/25/2013 05:29:31 PM	
	03/25/2013 04:20:59 PM	
	03/25/2013 12:22:24 PM	
	04/19/2012 09:43:11 AM	
	05/09/2011 11:56:09 AM	ZE9
	04/25/2011 03:36:07 PM	

## Export to ICMS

Last Export:

Qualification
Inpanh DOUANGPHOUTHA

## Emission Trading

### United Nations Framework Convention on Climate change

Appointed:	<input checked="" type="checkbox"/>		
		Qualification level:	Local Expert
External:	<input checked="" type="checkbox"/>		
Scopes:			

Scope:	
Languages:	Laotian
Legal requirements	<input checked="" type="checkbox"/>

### Validity:

First Appointment	22 October 2014	Valid To:	21 October 2017
-------------------	-----------------	-----------	-----------------

### Approved By:

Mr. Henri Phan	
----------------	---

### History of Scope Allocation:

Date:	
Change:	
By:	
Reason:	

## Qualification

Tang, Walter /

## Emission Trading

### United Nations Framework Convention on Climate Change

Auditor No.:

(AuditorenRegNr)

Appointed:  
(Zugelassen)

☒ ja

Qualification Level: Lead Auditor  
(Qualifikationsstufe)

External:  
(Externer)

☐ ja

Add. reviewer:  
(Zusätzlicher Prüfer)

☒ yes

EAC Scopes:  
(EAC Branchen)

CDM 01 - Energy industries (renewable - / non-renewable sources)  
CDM 02 - Energy distribution  
CDM 03 - Energy demand  
CDM 13 - Waste handling and disposal  
CDM 04 - Manufacturing industries

Add. qualification:  
(zus. Qualifikation)

First Appointment: 09/12/2015  
(Erstberufung)

Valid to:  
(Gültig bis)

09/11/2018

Remarks:

Appointed for TA 1.1, 1.2, 2.1, 3.1, 4.1 TA 13.1 based on  
EB 75-A03 Transitional Provisions

Languages:

Chinese simplified  
English

## Experience Exchange

Date

Location

Remarks

Accredita

## Monitoring

Latest Monitoring:  
(letzte Beurteilung)

Next  
Monitoring:  
(nächste  
Beurteilung)

Remarks:

## History of scope allocation

Date:	2012-02-13
Change:	EAC CDM added
By:	Praveen Urs
Reason:	
Date:	2012-02-13
Change:	EAC CDM, CDM, CDM, CDM added
By:	Praveen Urs
Reason:	

## History

Created:	12/06/2011 05:00:51 PM	Walter Tang/Chn/TUV
Modified:	09/14/2015 10:22:39 AM	Henri Phan/Chn/TUV
	09/14/2015 09:57:51 AM	Henri Phan/Chn/TUV
	09/14/2015 09:57:11 AM	Henri Phan/Chn/TUV
	09/14/2015 09:55:43 AM	
	09/02/2015 09:44:54 AM	
	08/31/2015 02:18:33 PM	
	04/10/2015 05:49:40 PM	
	04/09/2015 03:05:33 PM	
	04/09/2015 02:57:28 PM	
	04/01/2015 11:06:02 AM	
	04/01/2015 11:04:55 AM	
	04/01/2015 11:02:57 AM	
	08/01/2014 11:43:45 AM	
	07/03/2014 04:09:13 PM	
	11/01/2013 02:50:03 PM	
	07/06/2012 04:47:48 PM	
	07/02/2012 03:08:57 PM	
	07/02/2012 03:08:48 PM	
	05/15/2012 03:30:46 PM	
	02/13/2012 08:00:10 PM	
	12/06/2011 05:01:30 PM	

## Export to ICMS

Last Export:

## Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
/1/	PP	PDD [initially published], Version 01	Date: 28/09/2014	PP
/2/	PP	PDD [final version], Version 02.1,	Date 03/11/2015	PP
/3/	Lao PDR, DNA (Ministry of Natural Resources and Environment of Lao PDR),	Host Country Approval / Letter of Approval: reference number:0177/MONRE	Date: 14/01/2015	PP
/4/	Switzerland, DNA (The Federal Office for the Environment)	Annex I party Letter or Approval:, reference number: G514-3487	Date: 21/07/2015	PP
/5/	PP	Modalities of Communication for Nam Pha Gnai hydropower project	date 08/08/2014	PP
/6/	CDM Executive Board,	Modalities of Communication Form (F-CDM-MOC) version 02.1,	dated 16/03/2012	Other
/7/	CDM Executive Board	CDM Validation and Verification Standard (Version 9.0),	dated 20/02/2015	Other
/8/	CDM Executive Board	CDM Project Standard, version 09.0.	dated 20/02/2015	Other
/9/	CDM Executive Board	CDM Project Cycle Procedure, version 09.0	dated 20/02/2015	Other
/10/	IPCC	IPCC 2006 Guidelines for National Greenhouse Gas Inventories.		Other
/11/	CDM Executive Board	CDM-PDD - Project Design Document form, Version 6.0	dated 09/03/2015	Other
/12/	CDM Executive Board	Approved consolidated baseline and monitoring methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, version 16.0	dated 28/11/2014	Other
/13/	CDM Executive Board	Tool for the demonstration and assessment of additionality, Version 07.0.0	dated 23/11/2012	Other
/14/	CDM Executive Board	Tool to calculate the emission factor for an electricity system, Version 4.0	dated 04/10/2013	Other
/15/	CDM Executive Board	Guidelines on the demonstration and assessment of prior consideration of the CDM, Version 04	dated 15/07/2011	Other
/16/	CDM Executive Board	Methodological tool: investment analysis, Version 06	dated 24/07/2015	Other
/17/	CDM	Glossary of CDM terms, Version 07	dated 23/11/2012	Other



	Executive Board			
/18/	CDM Executive Board	Guidelines for the Reporting and Validation of Plant Load Factors, version 01	dated 17/07/2009	Other
/19/	CDM Executive Board	Methodological tool: common practice, version 03.1,	dated 03/06/2015	Other
/20/	PP	IRR Calculation Spreadsheet		PP
/21/	PP	Emission Reduction Calculation Spread Sheet		PP
/22/	Laos DNA	Calculation for the emission factor for electricity generation in Lao PDR, 2010		PP
/23/	Electricite du Laos	EDL Annual Report 2009, 2010 and 2012		PP
/24/	Electricity Generating Authority of Thailand	Electricity Statistic Annual Report 2008 to 2010		PP
/25/	Ministry of Energy, Thailand	Electric Power in Thailand 2008 to 2010		PP
/26/		Enterprise Registration Certificate of Nam Pha Gnai Hydropower Co., Ltd.,	dated 06/08/2012	PP
/27/	Arne Winther Anderson,	Feasibility Study Report of Nam Pha Gnai hydropower project,	March 2013	PP
/28/	Department of Electricity of Ministry of Energy and Mines of Lao PDR,	Approval of Feasibility Study Report of Nam Pha Gnai hydropower project, No. 057	19 April 2013.	PP
/29/	Somsanouk (SSN) Consultant Co., Ltd.,	Environment Impact Assessment Report of Nam Pha Gnai hydropower project	August 2012	PP
/30/	Ministry of Natural Resource and Environment of Lao PDR,	Approval of Environment Impact Assessment Report of Nam Pha Gnai hydropower project, No. 1542	2 August 2012.	PP
/31/	Electricite Du Laos ,	Project layout drawing of Nam Pha Gnai hydropower project		PP
/32/	Nam Pha Gnai Hydropower Co., Ltd.	Questionnaire survey records,	December 2013.	PP
/33/	Nam Pha Gnai Hydropower Co., Ltd.	Project Investment Decision and Carbon revenue consideration,	11th September 2013.	PP
/34/	Lao PDR DNA	Official email regarding confirmation of CDM Notification Form to Lao PDR DNA on 10/10/2013	dated 15/12/2014	PP
/35/	UNFCCC	Prior Consideration of the CDM Form to EB on 10/10/2013 confirmed from official website of UNFCCC		Other
/36/	Nam Pha Gnai Hydropower Co., Ltd. and	Emission Reduction Purchase Agreement	Dated 08/08/2014	PP

	Swiss Carbon Assets Limited			
/37/	Electricite Du Laos and Nam Pha Gnai Hydropower Co., Ltd.	Power Purchase Agreement	December 2013	PP
/38/	Nam Pha Gnai Hydropower Co., Ltd. and VOITH Hydro Private Limited,	Project EPC contract.	29 October 2014	PP
/39/	Nam Pha Gnai Hydropower Co., Ltd. and Beijing Karbon Energy Consulting Co., Ltd,	CDM Monitoring Training manual	November 2014.	PP
/40/	Lao government and Thailand government,	Memorandum of Understanding (MOU) for intergrid electricity exchange signed between Lao government and Thailand government,	dated 22 December 2007	PP
/41/		List of Least Developed Countries issued by the Development Policy and Analysis Division of the UN secretariat, via link <a href="https://www.un.org/en/development/desa/policy/cdp/ldc_info.shtml">https://www.un.org/en/development/desa/policy/cdp/ldc_info.shtml</a>		Other
/42/		3-Month US Treasury Constant Maturity Rate <a href="http://research.stlouisfed.org/fred2/series/DGS3MO?cid=47">http://research.stlouisfed.org/fred2/series/DGS3MO?cid=47</a>		Other
/43/		Risk premium on lending (prime rate minus Treasury bill rate; %) (World Bank) <a href="http://data.worldbank.org/indicator/FR.INR.RISK">http://data.worldbank.org/indicator/FR.INR.RISK</a>		Other
/44/		CDM Projects Reference List: Project 5258: <a href="http://cdm.unfccc.int/Projects/DB/BVQI1316699433.82/view">http://cdm.unfccc.int/Projects/DB/BVQI1316699433.82/view</a> Project 5583: <a href="http://cdm.unfccc.int/Projects/DB/SQS1324398658.36/view">http://cdm.unfccc.int/Projects/DB/SQS1324398658.36/view</a> Project 6120: <a href="http://cdm.unfccc.int/Projects/DB/Germanischer1335441117.9/view">http://cdm.unfccc.int/Projects/DB/Germanischer1335441117.9/view</a> Project 9038: <a href="http://cdm.unfccc.int/Projects/DB/CEC1356084291.13/view">http://cdm.unfccc.int/Projects/DB/CEC1356084291.13/view</a> Project 9881: <a href="http://cdm.unfccc.int/Projects/DB/JACO1391045293.61/view">http://cdm.unfccc.int/Projects/DB/JACO1391045293.61/view</a> Project 10068: <a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1416304791.38/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1416304791.38/view</a>		Other
/45/		Tax related evidence: Lao PDR government: Tax Law <a href="http://www.na.gov.la/index.php?option=com_content&amp;view=article&amp;id=75&amp;Itemid=117&amp;lang=en">http://www.na.gov.la/index.php?option=com_content&amp;view=article&amp;id=75&amp;Itemid=117&amp;lang=en</a>	19/05/2005	Other
/46/	Electricite du Laos	Electric Power Plants in Laos	Published in Jul, 2011	PP

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

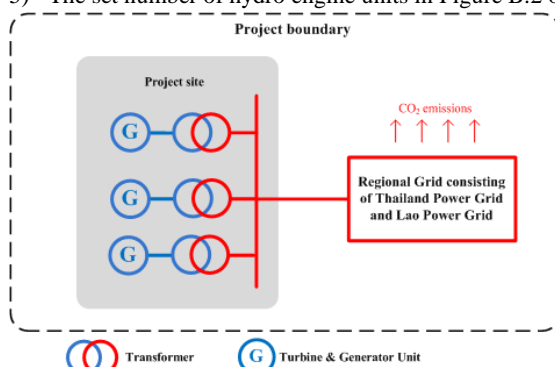
**Table 1. CL from this validation**

CL ID	01	Section no.	D7	Date:	12/01/2015
Description of CL					
<p>Refer to PDD description,</p> <p>1) For the Physical/Geographical location of the project activity, please clarify whether the coordinates (i.e. 18 59'45"N, 102 51'18"E) mentioned in the section A.2.4 of the PDD is for the project's dam or for the project's power house or for other infrastructure of the project. And relevant evidence shall be provided for check;</p> <p>2) Figure A.1 in the PDD was not sufficiently clear to show the project physical location, and at least the project located river shall be visible as an object of reference in the map;</p> <p>3) The project located river addressed in section A.1 of PDD is inconsistent with indicated in FSR; 4) According to PDD form instruction, a list of the facilities, systems and equipment that will be installed are requested to be included in section A.3 of PDD;</p> <p>5) Please confirm the set number of hydro engine units in Figure B.2 of PDD, which is inconsistent with described in section A.1 of PDD.</p>					
Project participant response					Date:
					05/11/2015

- 1) According to the PPA, the coordinates for the weir are 19.009331 N, 102.872314 E. The PPA was provided to DOE to crosscheck.
- 2) The map was update to clear show the project location.
- 3) The description of the project location was corrected according to the FSR.
- 4) The description of the project facilities were added in the A.3 of PDD. The parameters for the main equipment as follows:

	Unit	Value	
Turbines:			
Type	-	Horizontal Francis Turbine	
Installed Capacity	MW	7.4	4.4
Number	-	2	1
Water head	m	117.85	117.85
Rotation Speed	rpm	750	1,000
Contractor	-	Voith Hydro Private Limited	
Generators:			
Type	-	Horizontal Synchronous Generator (Cylindrical Rotor Type)	
Installed Capacity	MW	7.4	4.4
Number	-	2	1
Voltage	kV	6.3	6.3
Frequency	HZ	50	50
Power Factor	-	0.85	0.85
Contractor	-	Voith Hydro Private Limited	

- 5) The set number of hydro engine units in Figure B.2 of PDD was corrected.



#### Documentation provided by project participant

PPA between local grid company and project owner/37/

#### DOE assessment

Date: 25/11/2015

It is verified that description of the project activity such as location and equipment in the update PDD for the project is as per the latest version of PDD form instruction by UNFCCC.

This CL is closed.

CL ID	02	Section no.	D8.6	Date:	12/01/2015
<b>Description of CL</b>					
Refer to sensitivity analysis, please determine the variations to reach benchmark and clarify the likelihood under what conditions.					
<b>Project participant response</b>					Date: 05/11/2015

The critical point analysis was added in the B.5 of the PDD.

When the project IRR is equal to the benchmark value, the fixed asset investment or O&M costs need to be decreased by 22.37%, and 245.32% respectively, or electricity tariff or power supplied amount need to be increased by 31.18% and 31.18% respectively. These are cases that are unlikely to occur.

- **Regarding to the fixed asset investment**  
The case of a decrease in fixed asset investment by 22.37% is unlikely to occur. According to the signed main contracts, the actual fixed asset investment accounted for 100.48% of the total static investment estimated in the FSR, thus it is not impossible for the statistic investment to decrease by 22.37%.
- **Regarding to the O&M cost**  
It can be seen that even the annual O&M cost decreased to 0, the project IRR is still below the benchmark.
- **Regarding to the electricity tariff**  
As for the electricity tariff, if it increased by 31.18% the project IRR would be equal to benchmark. The electricity tariff (0.06495 USD/kWh) used at the time of investment decision is derived from FSR. The electricity tariff in Lao PDR has been determined mainly by negotiation with the grid company. According to 'Power Purchase Agreement' signed with EdL, the actual electricity tariff is 0.06495 USD/kWh in the project's operation period (25 years), thus electricity tariff increased by 31.18% is unlikely to occur.
- **Regarding to the power supplied amount**  
When the power supplied amount is increased by 31.18%, the project IRR can reach the benchmark. According to the FSR, the annual electricity was estimated and calculated by the chartered specialists based on a long series hydrology data. Therefore the annual electricity output will not be changed so much. Furthermore, the annual operation hour of the project is 6,770 hrs, power supplied increased by 31.18% is unlikely to occur.

**Documentation provided by project participant**  
PPA/37/, FSR/27/ and EPC contract/38/

**DOE assessment** **Date:** 25/11/2015

It is verified that assessment of sensitivity analysis in the update PDD for the project is as per the latest version of additionality Tool by UNFCCC.  
This CL is closed.

<b>CL ID</b>	03	<b>Section no.</b>	D8.6	<b>Date:</b> 12/01/2015
<b>Description of CL</b>				
Please assess the common practice against the latest guidelines on common practice.				
<b>Project participant response</b>				<b>Date:</b> 05/11/2015

The latest guideline was applied in common practice analysis. The analysis as follows:

**Step 1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.**

The installed capacity of Nam Pha Gnai Hydropower Project is 19.2MW, the projects with capacity  $\pm 50\%$  of the project (9.6~28.8 MW) are considered as similar size.

**Step 2: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:**

- The projects are located in the applicable geographical area;
- The projects apply the same measure as the proposed project activity;
- The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
- The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
- The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
- The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of the proposed project activity, whichever is earlier for the project activity.

Considering the status of the project activity, the projects fulfil the following conditions are identified as the similar projects:

- The regulatory policies, investment environment and hydrology conditions are different by countries, therefore, Lao PDR where the project located is selected as the applicable area for common practice.
- According to the definition of the Measure in “*Guidelines On Common Practice*” (version 02), there are four types of measures. As the project is a hydropower power project based on renewable energy, thus the project’s measure belongs to **Measure (b)** “*Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies (example: energy efficiency improvements, power generation based on renewable energy).*” Thus, the projects apply measure (b) are selected as the similar projects.
- As a hydropower project, the energy source and feedstock is hydro, thus the projects using hydro selected as the similar projects.
- As a hydropower project, the output is electricity, thus the electricity plants are selected as the similar projects.
- As presented in Step 1, the Projects with installed capacity of 9.6~28.8MW are selected as the similar projects.
- As shown in Section B.5, The starting date of the project is 29 Oct, 2014, and the date to publish for global stakeholder consultation is 30 Sep, 2014, the earlier date is 30 Sep, 2014, thus the projects which started commercial operation before 30 Sep, 2014 are selected for further analysis.

In conclusion, the hydropower projects in Lao PDR with installed capacity of 9.6~28.8MW which start commercial operation before 30 Sep, 2014 are identified as the similar projects.

According to EDL Annual Report 2010 and Electric Power Plants in Laos, there are 1 project was observed.

Project name	Capacity MW	Commissioning year	CDM application
Xe Namnoy 1	14.8	2013	Yes

**Step 3: Within the projects identified in Step 2, identify those that neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number  $N_{all}$ .**

As mentioned in the above Table, there are one project identified in Step 2. The identified Xe Namnoy 1 Hydropower project is a registered CDM project. According to the criteria provided by the “*Guidelines On Common Practice*”, the parameter  $N_{all}$  is 0.

**Step 4: Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number  $N_{diff}$ .**

As mentioned in Step 3, there is no project identified, thus  $N_{diff}=0$ .

**Step 4: Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number  $N_{diff}$ .**

As mentioned in Step 3, there is no project identified, thus  $N_{diff}=0$ .

**Step 5: Calculate factor  $F=1- N_{diff}/N_{all}$  representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.**

As  $N_{diff}=0$ , there is no  $F=1- N_{diff}/N_{all}$ ; Due to  $N_{all}=N_{diff}=0$ ,  $N_{all} - N_{diff} = 0 < 3$ .

Since  $N_{all} - N_{diff} = 0 < 3$ , as per the “Guidelines On Common Practice”, it can be concluded that the project is not a common practice and the project is additional.

**Documentation provided by project participant**

Electric Power Plants in Laos issued by Electricite du Laos/46/

**DOE assessment**

**Date:** 25/11/2015

It is verified that assessment of common practice in the update PDD for the project is as per the latest version of common practice analysis requirement by UNFCCC.

This CL is closed.

<b>CL ID</b>	04	<b>Section no.</b>	D8.6	<b>Date:</b> 12/01/2015
<b>Description of CL</b>				
Please clarify whether or not the PP has notified the DNA of host country regarding the commencement of the project activity as a new CDM project activity. The relevant evidence is to be provided for check.				
<b>Project participant response</b>				<b>Date:</b> 05/11/2015
The project has notified the Lao DNA on 10 Oct, 2013 which was confirmed by Lao DNA Officer by email. The evidence was provided to DOE for crosscheck.				
<b>Documentation provided by project participant</b>				
Official email regarding confirmation of CDM Notification Form to Lao PDR DNA/34/				
<b>DOE assessment</b>				<b>Date:</b> 25/11/2015
It is checked with the evidence provided and confirmed that the project participants have notified Lao DNA as host country of commencement of the project activity on 10 Oct. 2013 before the start date of the project dated 29 Oct. 2014.				
This CL is closed.				

<b>CL ID</b>	05	<b>Section no.</b>	D8.7	<b>Date:</b> 12/01/2015
<b>Description of CL</b>				
Please further clarify if the data source from 2010 to calculate EF is still available.				
<b>Project participant response</b>				<b>Date:</b> 05/11/2015
The baseline emission factor(EF) for Lao grid was sourced from the “Calculation for the emission factor for electricity generation in Lao PDR, 2010” published by Lao DNA in 06/09/2014, in which it mentioned that the project electricity system is identified as regional grid consisting of Lao Power Grid and Thailand Power Grid, and the data source to calculate the EF includes “Study of emission factor for an electricity system in Thailand 2010“, “EDL Annual Report 2009, 2010”, “EGAT Annual report 2010”, and “Electric Power in Thailand 2008, 2009, 2010”.				
Due to the Thailand DNA did not update the data source to calculate the EF since 2010, the data published by Lao DNA is the latest at the starting date of GSC. Then the EF is still applicable.				
<b>Documentation provided by project participant</b>				
Calculation for the emission factor for electricity generation in Lao PDR, 2010/22/				
<b>DOE assessment</b>				<b>Date:</b> 25/11/2015
It is checked with the evidence provided and confirmed that the data sources from 2010 published by Lao DNA is latest available at the time of GSC of the project.				
This CL is closed.				

<b>CL ID</b>	06	<b>Section no.</b>	D8.8	<b>Date:</b> 12/01/2015
<b>Description of CL</b>				

Refer to 'Measurement methods and procedures' in section B.7.1 of PDD, please specify the accuracy of the measurement, and the measurement methods and procedures against PDD form instruction.	
<b>Project participant response</b>	<b>Date:</b> 05/11/2015
The accuracy of meters, measurement methods and procedures are described in the updated PDD.	
<b>Documentation provided by project participant</b>	
n/a	
<b>DOE assessment</b>	<b>Date:</b> 25/11/2015
It is verified that the accuracy of meters, measurement methods and procedures are described in the updated PDD. This CL is closed.	

Table 2. CAR from this validation

<b>CAR ID</b>	01	<b>Section no.</b>	D2, D3, D4	<b>Date:</b> 12/01/2015
<b>Description of CAR</b>				
The LoAs from the DNA of <b>Error! Reference source not found.</b> and <b>Error! Reference source not found.</b> shall be provided to the Validation Team for review.				
<b>Project participant response</b>				<b>Date:</b> 05/11/2015
The LoA from Lao DNA has been provided and the LoA from DNA of <b>Error! Reference source not found.</b> is provided.				
<b>Documentation provided by project participant</b>				
LoAs issued by two Parties/3//4/.				
<b>DOE assessment</b>				<b>Date:</b> 25/11/2015
The LoAs of both Parties are received. This CL is closed.				

<b>CAR ID</b>	02	<b>Section no.</b>	D5	<b>Date:</b> 12/01/2015
<b>Description of CAR</b>				
The MoC signed by all project participants shall be provided to the Validation Team for review.				
<b>Project participant response</b>				<b>Date:</b> 05/11/2015
The MoC signed by all project participants was provided.				
<b>Documentation provided by project participant</b>				
MoC signed by two PPs/5/				
<b>DOE assessment</b>				<b>Date:</b> 25/11/2015
The MoC is received. This CL is closed.				

<b>CAR ID</b>	03	<b>Section no.</b>	D8.6	<b>Date:</b> 12/01/2015
<b>Description of CAR</b>				
Please specify the project activity starting date with the relevant documents in section C of PDD, and also clarify the project implementation timeline in section B.5 of PDD.				
<b>Project participant response</b>				<b>Date:</b> 05/11/2015



The first real action of the project was signed the Project Construction Contract on Oct, 29 2014. The contract includes pre-construction works, equipment purchase and installation was provided.  
The project implementation timeline was also clarified in Section B.5 of PDD.

Milestone	Data
EIA finished	Aug, 2012
EIA Approval	2 Aug, 2012
FSR finished	Mar. 2013
FSR Approval	19 Apr, 2013
Invest Decision of the Project owner	11 Sep, 2013
Submitted the Prior CDM consideration to Lao DNA	10 Oct, 2013
The Prior CDM consideration to EB confirmed by UNFCCC secretariat	10 Oct, 2013
Power Purchase Agreement	26 Dec, 2013
Signed ERPA	8 Aug, 2014
PDD published for global stakeholder consultation	30 Sep, 2014
<b>Project Construction Contract (Starting date)</b>	<b>29 Oct, 2014</b>
Got Lao LoA	14 Jan, 2015

#### Documentation provided by project participant

EIA/29/, FSR/27/, investment decision document/33/, two document for notifying host DNA and UNFCCC/34//35/, PPA, EPC contract/38/ and LoA from host country/3/.

**DOE assessment** **Date:** 25/11/2015

It is verified by means of the evidences provided by PP and other ways that description of the project implementation and decision in the update PDD for the project is as per the latest version of CDM glossary and PDD form instruction requirement by UNFCCC.  
This CAR is closed.

<b>CAR ID</b>	04	<b>Section no.</b>	D8.6	<b>Date:</b> 12/01/2015
<b>Description of CAR</b>				
The project IRR indicated in section Sub-step 2c of PDD is inconsistent with indicated in IRR spreadsheet. Moreover, please provide the relevant evidence on investment parameters for cross check.				
<b>Project participant response</b>				<b>Date:</b> 05/11/2015
The IRR in PDD was corrected according to the IRR spreadsheet. The Parameters to calculate IRR were all derived from FSR and was approved by Lao government. The FSR and FSR Approval were provided for crosscheck.				
<b>Documentation provided by project participant</b>				
FSR and FSR approval/27//28/				
<b>DOE assessment</b>				<b>Date:</b> 25/11/2015
It is verified by means of the evidences provided by PP and other ways that assessment of investment analysis in the update PDD and IRR spreadsheet for the project is as per the latest version of investment analysis requirement by UNFCCC. This CAR is closed.				

**Table 3. FAR from this validation**

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

-----

**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Registration Keywords: project activities, validation report		