Project design document form
(Version 11.0)

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

BASIC INFORMATION	
Title of the project activity	Xekaman 3 Hydropower Project, Lao PDR
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	1.5
Completion date of the PDD	15/03/2021
Project participants	- Xekaman 3 Power Company Limited (private entity), Power Company, Vietnam - Viet Lao Power Joint Stock Company (private entity), Investor, Vietnam - ecotawa AG (private company), project developer, Switzerland
Host Party	Lao People's Democratic Republic
Applied methodologies and standardized baselines	ACM0002 Version 20.0
Sectoral scopes	Sectoral Scope: 1
Estimated amount of annual average GHG emission reductions	792,824 tCO2eq

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project activity is to build and operate a hydropower plant with an accumulation reservoir located along the Nam Pagnou River (tributary of the Xekaman River) in the South of Laos being around 10km from the Vietnam border (beeline). The project, which is expected to meet the future growing demand for power supply in Vietnam is part of the Vietnam-Lao partnership for energy development.

The project is owned and built by the Xekaman 3 Power Company Limited[1].

The hydropower plant will produce 977.5 GWh per year, with an installed capacity of 250 MW[2]. The Xekaman 3 hydropower plant is a diversion plant. Water from a storage reservoir is directed through tunnel and penstock to the powerhouse. The power scheme has a reservoir area at maximum water level of 5.251km^2. The energy density is thus around 47.6 W/m^2. The electricity produced will be transmitted to Vietnam by a 92 km long 230 kV dual circuit line.

The project will reduce GHG emissions by annually 792,824 tCO_2 by producing electricity with a renewable source thus substituting electricity produced in Vietnam to a large extent by fossil means. Only electricity sold to Vietnam is accounted for. The electricity supplied to Laos will thus not be included in any calculations. Only the combined grid factor Vietnam is taken to determine the Combined Margin.

For Laos this project is of big importance for CDM development. As of Global Stakeholder Consultation starting date Laos had only 1 registered CDM project and no renewable energy project registered[3].

The contribution to sustainable development is:

- Reduced GHG emissions in Vietnam through producing energy with a renewable source.
- Reduced local air pollution, especially particle matter and sulfur dioxide caused by thermal power plants, especially coal plants as used by Vietnam.
- Renewable energy sources and technology is promoted thus diversifying energy sources and securing energy supply for a sustained economic growth of Vietnam.
- Creation of 3,800 additional jobs during construction and 122 permanent jobs during hydropower plant operations[4].

57 households with a around 342 people were affected due to the project[5]. No people were dislocated. Compensation and support have been given to affected people. The project is also being evaluated for WCD (World Commission on Dams) compliance and has realized all respective documentations.

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[1] The Company was granted the Foreign Investment License 002-06/KHDT by the Laotian Committee for Planning and Investment and the Business License 0003/TD-DN (files 7 and 8).

[2] Total production; production to the grid is 1.5% less; see for details and source table 1

[3] The registered project is #930 (energy efficiency at beer brewery); One HPP project was under validation (Xeset 2)

[4] File 17 p.11

[5] File 9, p.24 for relocation ; Affected people with compensation agreements see File 10 p. 17, File 11 p.3, File 12 p.3, File 13 p.3, File 14 p.2, Files 15 and 16

A.2. Location of project activity

The location of the project is in Lao People's Democratic Republic. Therefore under A.4.1.1 only this host is listed

A.2.1. Host Party(ies)

Lao People's Democratic Republic

A.2.2. Region/State/Province etc.

Sekong Province

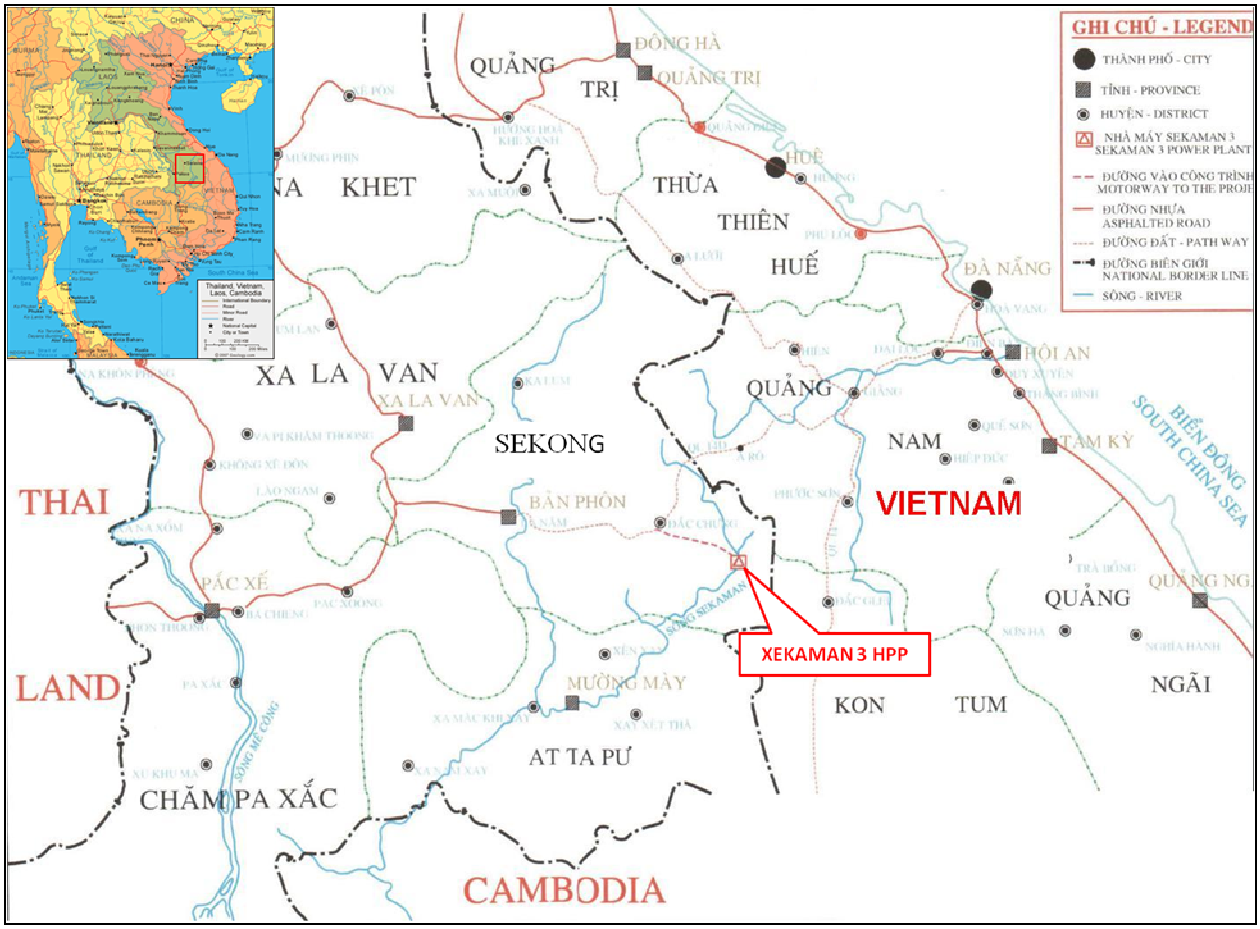
A.2.3. City/Town/Community etc.

Dak Chung District

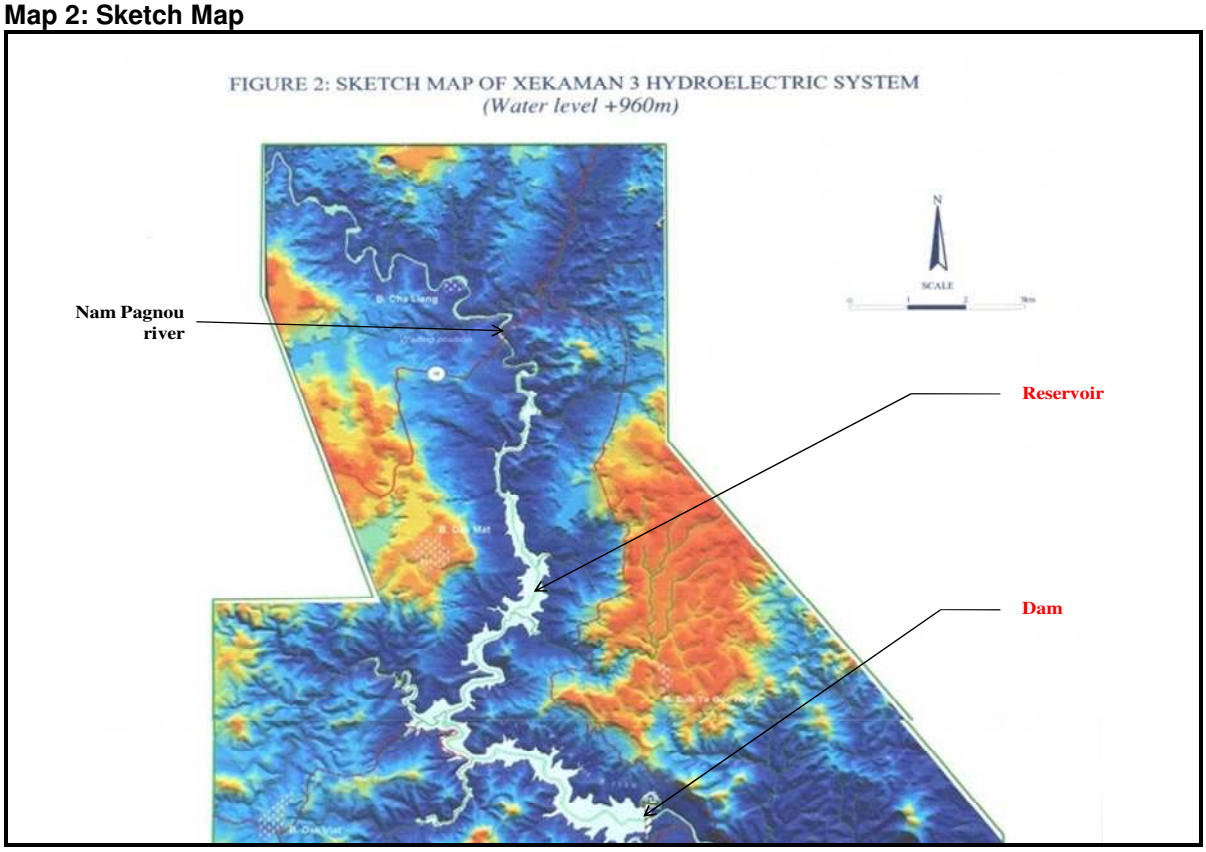
A.2.4. Physical/Geographical location

Power house: Latitude: 15.3756 and Longitude: 107.4064
(equivalent to 15°22'32" N, 107°24'23" E)

Map 1: Project Site



Map 2: Sketch Map



A.3. Technologies/measures

The hydropower plant has two synchronous hydraulic vertical shaft Francis turbines. The total generation capacity is 250 MW. The hydropower plant is based on an accumulation reservoir.

Table 1: Characteristics of the Hydropower Plant

Parameter	Unit	Value	Source
Generation capacity	MW	250	File 6, p.V-12
Maximum rated flow rate	m^3/s	62.3	File 6, p.V-12
Operating hours per year	Hours	3,910	File 6, p.V-12
Average annual power production	MWh	977,500	Calculated
Internal usage of electricity	Percentage	1.5%	File 6, p.V-28
Electricity production for the grid per annum	MWh	962,838	Calculated

The hydropower plant has one reservoir with a concrete faced rock-filled dam. Characteristics of the reservoir are listed in the following table.

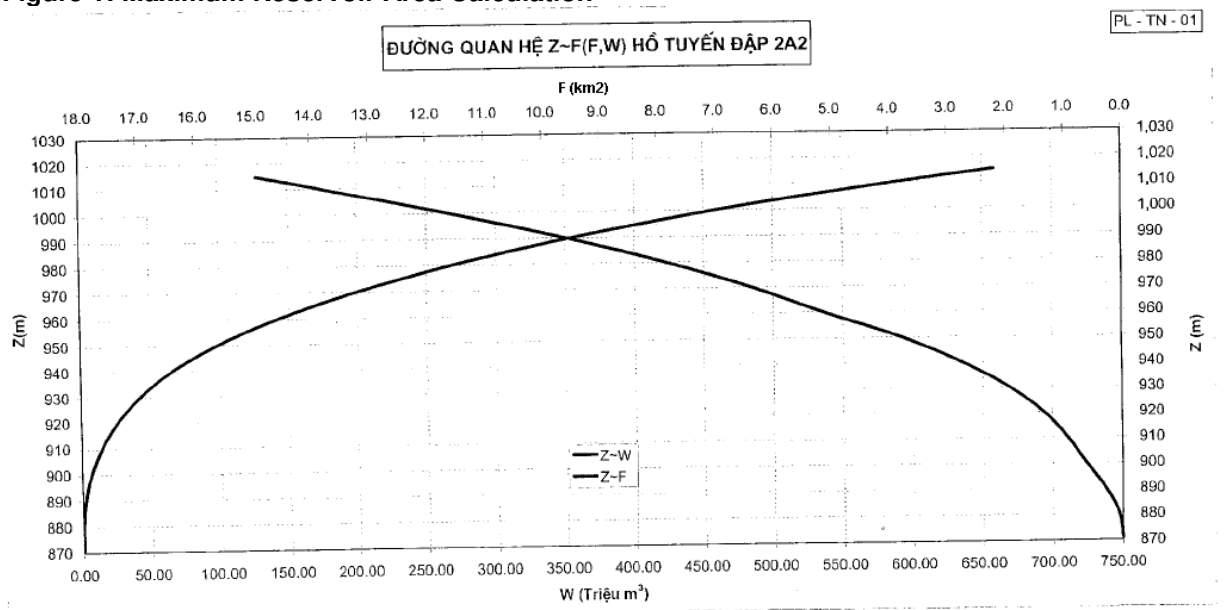
Table 2: Characteristics of the Reservoir

Parameter	Unit	Value
Reservoir level at normal water level	meter	960
Reservoir level at dead water level	meter	925
Reservoir level at surcharge water level (check flood)	meter	964
Reservoir area at normal water level	km^2	5.13
Reservoir area at maximum water level	km^2	5.251
Power density	W/m^2	47.6
Total volume of reservoir	million m^3	141.5
Useful volume of reservoir	million m^3	108.5
Length of dam crest	meter	540
Maximum height of dam	meter	101.5

Source: Reservoir data except reservoir area at maximum water level File 18, p.1; reservoir area at maximum water level File 19, p.I; dam data File 19, p.II

The reservoir area was calculated basing on the function F=F(Z) which is showed in following figure based on topographical survey map[6].

Figure 1: Maximum Reservoir Area Calculation



Z (m)	871	875	880	885	890	895	900	905	910	915	920	925	930	935	940
F(km2)	0.00	0.01	0.06	0.18	0.29	0.43	0.62	0.77	0.94	1.14	1.35	1.59	1.94	2.30	2.75
W (Triệu m3)	0.00	0.02	0.21	0.80	1.97	3.77	6.40	9.87	14.14	19.35	25.58	32.95	41.77	52.38	65.00
Z (m)	945	950	955	960	965	970	975	980	985	990	995	1000	1005	1010	1015
F(km2)	3.21	3.78	4.37	5.13	5.61	6.36	6.81	7.77	8.58	9.58	10.58	11.62	12.67	13.81	14.93
W (Triệu m3)	79.90	97.39	117.75	141.49	168.34	198.27	231.21	267.67	308.55	353.96	404.37	459.87	520.58	586.77	658.62

Table 3: Turbine Specifications

Parameter	Specification
Producer	Va Tech Hydro GmbH, Austria; Manufacturing in Austria and China
Type	Synchronous hydraulic turbine of Francis type, vertical shaft (set)
Number of units	2
Characteristics	Power rating: 127.551 MW each Qmax: 31.1 m^3/s Guaranteed turbine efficiency: ηaverage 94.95%

Source: File 21, p.3

Table 4: Generator Specifications

Parameter	Specification
Producer	Va Tech Hydro GmbH, Austria; Manufacturing in Austria, China and India
Type	Synchronous generator of vertical shaft, bracket type, three-phase (set) Three-phase dry-type excitation transformer, natural cooling of air convection
Number of units	2
Characteristics	Power rating: 125 MW each 15.75kV

Source: File 21, p.4

Various power transformers fabricated by Huapeng, China including 7 units of single-phased two-winding power transformers with no-load voltage regulators of 51.5 MVA, 50 Hz each[7].

[6] File 20, Hydraulic annex, PL – TN – 01

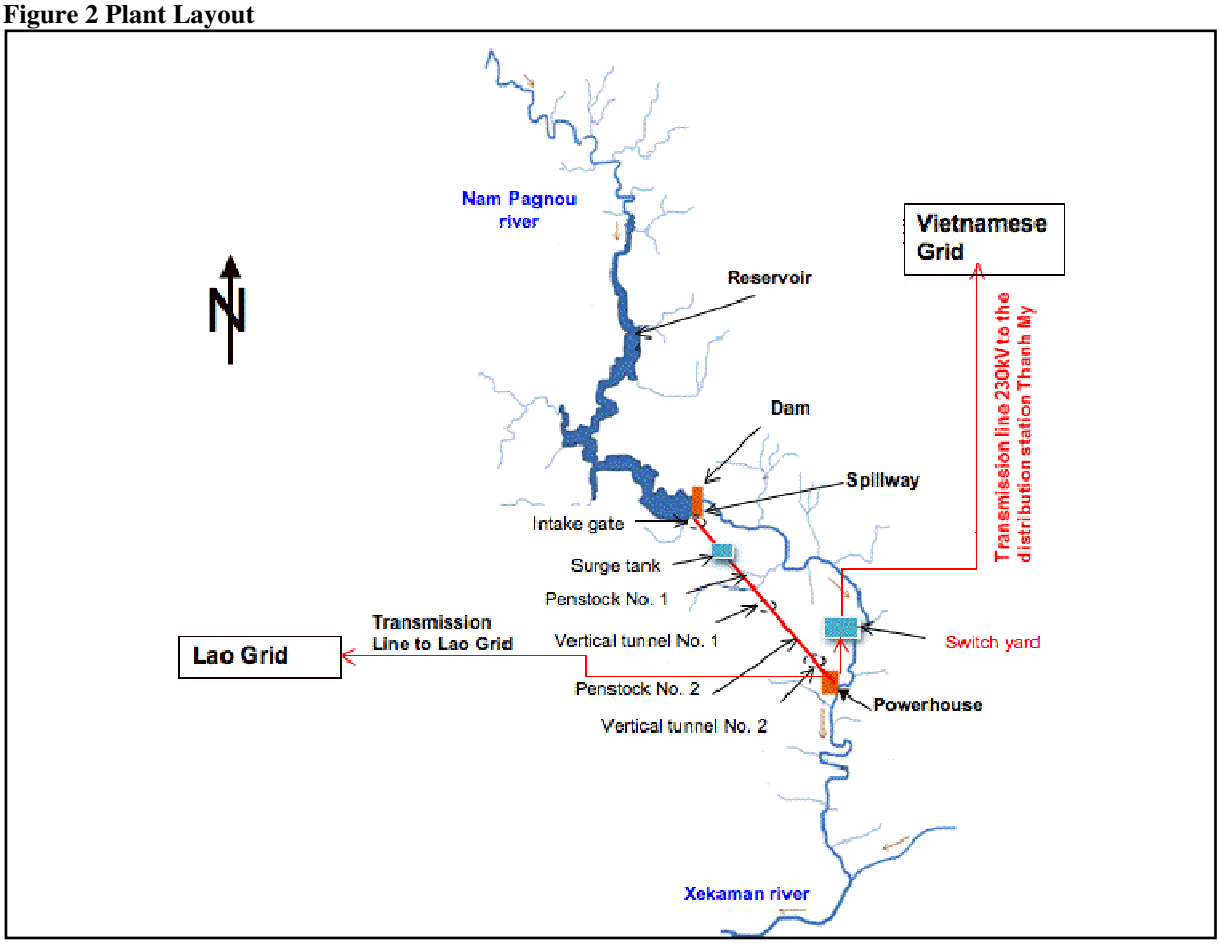
[7] File 21, p.5

The transmission line connects to the Vietnam national grid through a 230 kV dual circuit line with a length of 92 km. The voltage supplied for the Vietnamese national grid is 230 kV, and for Laos the charge is 115 kV[8].

Generators and turbines are imported from Austria, India and China. They therefore contribute to the sustainable development aspect of the project via technology transfer.

Figure 2 shows a general plant layout.

Figure 2 Plant Layout



A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Lao People's Democratic Republic (host)	Xekaman 3 Power Company Limited (private entity)	No
Socialist Republic of Vietnam (host)	Viet Lao Power Joint Stock Company (private entity)	No
Switzerland	ecotawa AG (private entity)	No

A.5. Public funding of project activity

There is no Official Development Assistance in this project and the project will not receive any public funding from Parties included in Annex I[9].

[8] File 22 p.8

[9] File 23

A.6. History of project activity

1. We confirm that:
(a) The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA);

(b) The proposed CDM project activity is not a project activity that has been deregistered.

2. We declare that neither 2a nor 2b is correct.

A.7. Debundling

Not applicable

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

1a) Methodology
ACM0002 Version 20: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".

1b) Tools
- "Tool to calculate the emission factor for an electricity system" (Version 07.0.0)
- "Tool for the demonstration and assessment of additionality" Version 07.0.0

2) For more information about the methodology and tool:
https://cdm.unfccc.int/filestorage/A/G/0/AG07ZJQ3EXD42LT5YV9HR16M8KINPO/EB105_repan03_ACM0002.pdf?t=T2h8cXB5cDUxfDBkV_Tv0at14MxLa9DaXDpa

B.2. Applicability of methodologies and standardized baselines

The proposed project is a grid-connected renewable power generation project activity that installs a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant) applicable to ACM0002. The applicability conditions of the methodology are related with the project in table 5.

Table 5: Applicability Conditions and Project Situation

	Applicability condition according to Version 20.0 of ACM0002	Project situation	Applicability criterion met?
1	The methodology is applicable to grid-connected renewable energy power generation project activities that: a) Install a Greenfield power plant; b) Involve a capacitiy 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)	The project is the installation of a new grid connected renewable hydro power plant with an accumulation reservoir on a site where no renewable power plant was operated prior to the implementation of the project activity.	Yes

2	a) The methodology is applicable under the following conditions: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;	The project activity involves the installation of a new hydropower plant	Yes
	b) 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.	The project activity was to install a new hydropower plant	Not applicable
3	In case of hydro power plants, one of the following conditions shall apply:		
	a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or	The project activity was to install a new hydropower plant	Not applicable
	(b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 W/m2; or	The project activity was to install a new hydropower plant	Not applicable
	(c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m2; or	The project activity resulted in a new reservoir, with a power denisity of 47.6 W/m^2; which is greater than 4 W/m^2	Yes
	(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 (7), is lower than or equal to 4 W/m2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	The project activity resulted in a single new reservoir, with a power denisity of 47.6 W/m^2; which is greater than 4 W/m^2	Not applicable
4	In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream	The project activity is the installation of new hydropower plant with a single reservoir.	Not applicable

	power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) 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 of five years prior to the implementation of the CDM project activity.		
5	The methodology is not applicable to: (a) 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; (b) Biomass fired power plants/units.	It is a renewable energy project with ho fuel-swith involved. The project is a new hydropower project without any biomass fired units.	Yes Yes
6	In the case of retrofits, rehabilitations, 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, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project activity is the installation of a new hydropower plant	Not applicable

All applicability criteria are thus met.

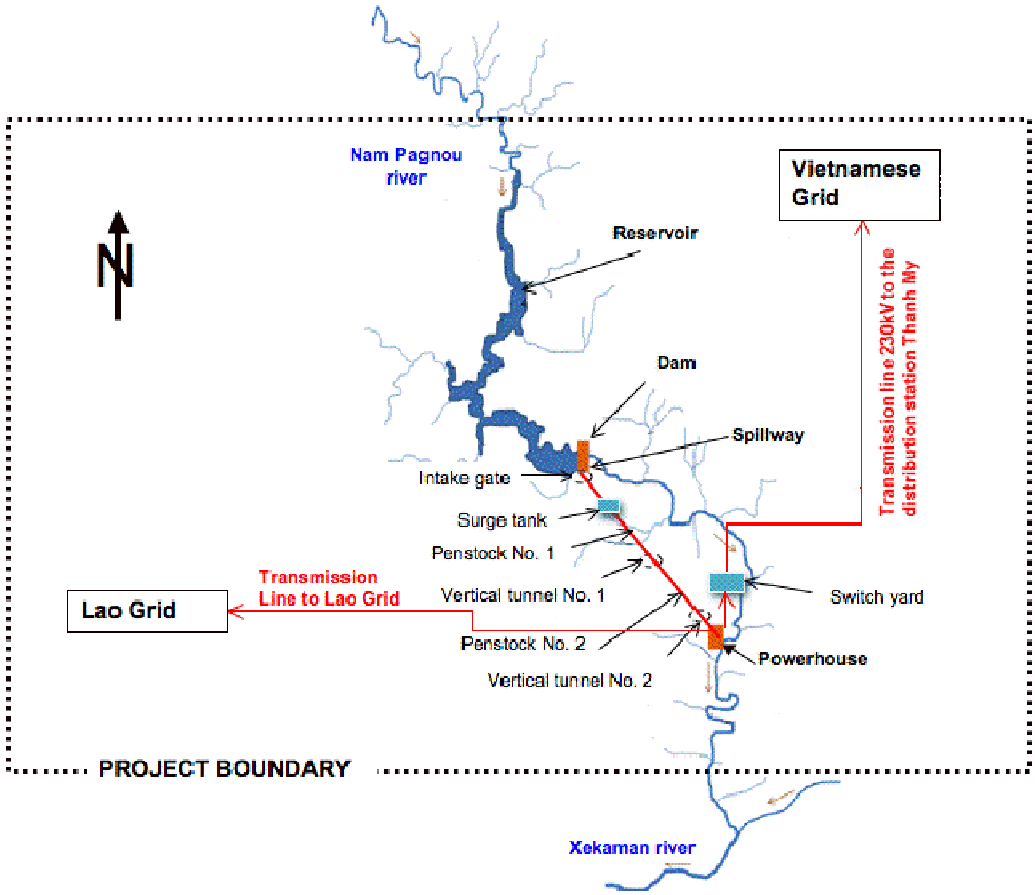
B.3. Project boundary, sources and greenhouse gases (GHGs)

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 6.

Table 6: Emissions Sources Included in or Excluded from the Project Boundary

Source		GHG	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

Project activity	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Minor emission source
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source



B.4. Establishment and description of baseline scenario

The baseline scenario is the electricity delivered to the grid by the project activity which 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".

For the renewal of the crediting period the validity of the baseline is assessed according to the methodological tool for "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (Tool 11, version 03.0.1):

Step 1.1: The current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation or the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period.

Step 1.2: There are no new circumstances impacting the current baseline.

Step 1.3: The current equipment is still in good condition an up-to-date. There will not be any investment for new equipment for the next crediting period. The lifetime to EB 50 Annex 15 is 150,000 hours for hydro turbines - equivalent to 34 years. According to the Minister of Industry the life time is even 40 years (see file 5).

Step 1.4: The emission factor of the Vietnamse grid was up-dated. For the emission reduction calculation of the next period the latest official emission factor of Vietnam is used (EF 2019). In chapter B.6. the calculation of the CM is included. In the Annex the background information for the

official CM is given. For the emission reduction calculation only the electricity supply to Vietnam is integrated, the electricity supply to the Lao grid is not included. Therefore, the combined margin of Lao PDR is not relevant.

B.5. Demonstration of additionality

The additionality of the project is determined using the latest Version of the "Tool for the demonstration and assessment of additionality" (Version 05.2).

The project starting date is defined as the date on which the construction contract was signed being 04.04.2006. The project activity thus started prior validation and prior 2.8.2008 and is thus considered an existing project activity in line with EB 49 Annex 22 (section C of guidelines).

Based on section C part a) of EB 49 Annex 22 the following table shows awareness of the CDM of the project participant prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project.

Table 7: Prior Consideration Part A

Date	Milestone	Documentary Proof
11/10/2005	Offer CDM consultant	Letter (File 28)
15/11/2005	Instruction general director to realize CDM	Directive (File 29)
04/01/2006	BOT agreement with Government of Lao	Contract (File 27)
1/2006	Power purchase agreement with EDL Laos	Contract (File 26)
24/03/2006	Power purchase agreement with EVN Vietnam	Contract (File 25)
04/04/2006	Project starting date: Signature of construction contract	Contract (File 24)

The project was knowledgeable about CDM prior investment decision and took a decision to include CDM based on an instruction of the general director to ensure financial sustainability and feasibility of the project as of 11/2005 i.e. prior signature BOT agreement with the Government of Lao and prior project starting date defined in accordance with EB regulations.

Based on section C part b) of EB 49 Annex 22 the following table shows by means of reliable evidence, that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation.

Table 8: Prior Consideration Part B

Date	Milestone	Documentary Proof
04/04/2006	Project starting date: Signature of construction contract	Contract (File 24)
18/07/2006	CDM development contract	Contract (File 30)
27/12/2007	Contract termination with original CDM developer	Termination (File 31)
18/01/2008	MoU Carbotech for CDM development	MoU (File 32)
17/04/2008	Purchasing of equipment	Contract (File 21)
03/06/2008	MoU Ecotawa for CDM development	MoU (File 33)
01/10/2008	Approval of amendment of total investment	Approval (File 35)
10/06/2009	Carbon finance agreement	Contract (File 64)
28/10/2009	Approval of revised technical design	Board of Director decision (File 34)
08/12/2010	Request for validation offer	Mail (File 5)
03/2011	GSC of project UNFCCC	UNFCCC website
April 2012	Expected operational start of project	

July 2006 the project owner signed a CDM project development contract with a first service provider. This contract was terminated December 2007 and substituted with a MOU with

Carbotech which transferred the MoU mid 2008 to ecotawa. Ecotawa thereafter established a carbon finance agreement with the project owner signed June 2009.

Prior to 2010 it was unclear if the project required a new methodology or not. A comparable project for exporting electricity from a 0-grid country to a neighbouring country with a positive Combined Margin using a different approach had been submitted to the UNFCCC October 2007[10]. A 2nd comparable project from Laos had been submitted in July 2009[11]. Ecotawa decided to await a decision of the EB on these projects also in light of operational start of the project being only mid 2012 and thus sufficient time being available. The project from Bhutan received a request for review by the EB and finally got registered as project number 2746 as of 26/02/2010. As of mid 2010 the project of Laos was still stuck in validation. Based on this decision ecotawa started collection the relevant grid information of Laos (data on Vietnam was already available) and prepared the project for validation using the procedure as in the successfully registered project of Bhutan.

The project owner has thus shown clear steps of continuous action with less than 2 years between actions in line with point 6b of EB 49 Annex 22 which states: "Evidence to support this should include, *inter alia*, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds)».

STEP 1. IDENTIFICATION OF ALTERNATIVES TO THE PROJECT ACTIVITY CONSISTENT WITH CURRENT LAWS AND REGULATIONS

Sub-step 1a: Define alternatives to the project activity

Paragraph 4 of version 05.2 of the additionality tool states: "Project activities that apply this tool in context of approved consolidated methodology ACM0002, only need to identify that there is *at least one credible and feasible alternative* that would be more attractive than the proposed project activity."

Therefore following two scenarios are considered:

- Alternative 1: The proposed project undertaken without the CDM;
- Alternative 2: Continuation of the current situation with power from the Laos and the Vietnamese grid.

Sub-step 1b: Consistency with mandatory laws and regulations

Alternative 1 is theoretically technically feasible and complies with Vietnamese and Laotian current laws and Regulations. Alternative 2 does not face with any barrier from the current law and regulation because the project owner has no obligation to build or invest in the power plant to supply electricity for the local area.

Step 2. Investment analysis

The steps used and the procedures follow the Guidance on the Assessment of Investment Analysis as included as Annex in the methodological tool "Tool for the Demonstration and Assessment of Additionality" Version 5.2.

Sub-step 2a: Determine appropriate analysis method

[10] Dagachhu Hydropower Project in Bhutan, GSM 23.10.2007

[11] Xeset 2 Hydropower Project

Options include:

1. Simple cost analysis
2. Investment comparison analysis
3. Benchmark analysis

The project activity generates income other than CER revenues. Thus option 1 is not appropriate. The 2 options included are the project with or without revenue of CER. The baseline case has no investment. Thus the investment comparison analysis is not appropriate. Therefore the option 3 benchmark analysis is chosen as appropriate analysis method.

Sub-step 2b – Option III: Apply benchmark analysis

Determine Suitable Indicator

The financial/economic indicator chosen is the IRR as it is considered as the most suitable indicator for the project type. The IRR is taken as it can be easily compared to a financial benchmark. The IRR is capable of comparing the investment decision of the project with a financial benchmark and thus gives an indication of the financial profitability of the investment.

The financial analysis is based on a standard market parameter as benchmark. As benchmark the commercial lending rate used in Vietnam is used. The rate of Vietnam is used as the investor is a Vietnamese company with 100% funding from Vietnam of the project[12] and the investor has alternative investment possibilities in Vietnam. The State Bank of Vietnam (SBV) fixes the maximum loan interest rate. All commercial banks applied this same maximum commercial interest rate. This rate was 12.4% in VND at the time of financial analysis[13]. The benchmark is lower than the IMF commercial lending rate for the same period being 13.6%[14]. The benchmark is thus clearly justified and conservative.

[12] File 36

[13] Base rate of State Bank of Vietnam is 8.25% plus 50%; Base rate source: State Bank of Vietnam, Spread according to Directive of SBV; File 2

[14] IMF, 2007; interest rate for the year 2005; Table 21, p. 24 (fixed capital, medium term), File 3

Sub-step 2c: Calculation and comparison of financial indicators

The principles used for all calculations and their compliance with EB guidance is shown in the following table.

Table 9: Investment Principles and EB Guidelines[15]

EB Guideline[16]	Project
Points1 and 2: General introduction of Guidance	
Point 3: Period of assessment	The period of assessment taken is 25 years of operation (total 29 years including 4 years of construction). According to the guidance "In general a minimum period of 10 years and a maximum of 20 years will be appropriate." After 25 years the plant is turned over to the Lao Government based on the BOT agreement; see FSR File 6 p. V.27 and BOT, File 27, p.23
Point 4: Salvage value	The salvage value after 25 years of operation is 0 as the HPP is turned over to the Laos government after 25 years based on the signed BOT agreement (see BOT, File 27, p.23). This was also considered in the FSR, File 6 p.V.27
Point 5: Depreciation and other non-cash items	Depreciation and other non-cash items such as amortization are not included when calculating the IRR. Taxes have not been included. This is in line point 11 as the IRR is calculated pre-tax as recommended in this point.
Point 6: Time of assessment	All input values are based on data available as of December 2005. The decision taking was after availability of the feasibility report (File 6, 11.2003), prior signature of BOT agreement (File 27, 1.2006), prior signature of purchasing power agreements with Laos and Vietnam (Files 25/26 dated 1.2006) and prior signature of first construction contract (File 24, 4.2006)
Point 7: Cesation of implementation	Not relevant for project
Point 8: Provision of spreadsheet	Spreadsheet is provided as File 1
Point 9: Finance expenditures	Financing expenditures are not included when calculating the IRR (see point 5).
Point 10: Equity IRR	Project IRR and not equity IRR is calculated.
Point 11: Taxation	Taxation is not included and a pre-tax benchmark is applied.
Point 12-18: Selection of benchmark	The applied benchmark is the local commercial lending rate as a project IRR is used. The benchmark is based on publicly available data sources of the State Bank of Vietnam.
Point 19: If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate.	A benchmark approach is used.
Point 20: 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.	Sensitivity analysis is made assuming following changes: • 10% lower investment costs • 10% lower operational costs • 10% higher income from electricity sale equivalent to a 10% higher plant load factor These are all important cost/revenue variables.
Point 21: The DOE should assess in detail whether the range of variations is reasonable in the project context. Past trends may be a guide to determine the reasonable range. As a general point of departure variations in the sensitivity	The sensitivity analysis covers a range of ±10%. Additionally an ex-post assessment is made and a cross comparison if data ranges and their variations are plausible

[15] Tool for the demonstration and assessment of additionality, Version 5.2. Annex: Guidance on the Assessment of Investment Analysis Version 04

[16] Tool for the demonstration and assessment of additionality, Version 5.2. Annex: Guidance on the Assessment of Investment Analysis Version 02

analysis should at least cover a range of +10% and -10%.	

The following table shows the core data used for the financial assessment.

Table 10: Core Data Used for Financial Assessment (Investment decision 12/2005)

Item	Unit	Value	Data Source
Local commercial lending rate	Percentage	12.4%	Base rate of State Bank of Vietnam is 8.25% plus 50%[17] Date of document: 1746/QĐ-NHNN dated 01/12/2005
Period of assessment	Years	29	See former table Based on FSR File 6 dated 11/2003 and confirmed by BOT signed after investment decision (File 27)
Salvage value	Million VND	0	See former table Based on FSR File 6 dated 11/2003 and confirmed by BOT signed after investment decision (File 27)
Total electricity generated per annum	MWh	977,500	Calculated based on 250 MW installed capacity (FSR, File 6, p. V.12) and 3,910 operating hours (FSR, File 6, p.V.12) Date of document: 11/2003
Operating hours	hours	3,910	FSR, File 6, p.V.12; In accordance with EB 48 Annex 11 "Guidelines for the reporting and validation of plant load factors" Version 01 point II.3.b) the PLF was determined by a 3rd Party contracted by the project proponent. The FSR was realized by Song Da Construction Consulting Company SDCCC i.e. an independent 3rd Party in compliance with the referred guidance. Date of document: 11/2003
Internal usage of electricity	Percentage	1.5%	FSR, File 6, p.V.28 Date of document: 11/2003
Electricity sold to the grid per annum	MWh	962,838	Calculated based on total produced minus internal usage
Electricity sale price	tsd VND / MWh	624	FSR, File 6, p.V.28 fixes the price of 0.04 USD/kWh and the exchange rate of 15,600 (FSR, File 6, p.V.29) Based on FSR economics File 6 p.1. Date of document: 11/2003
Annual operational cost	Percentage	1.5%	FSR, File 6, p.V.31 Date of document: 11/2003
Annual insurance fee	Percentage	0.1%	FSR, File 6, p.V.31 Date of document: 11/2003
Investment	Million VND	3,863,429	FSR, File 6, p.V.29/30 (see details following table) Date of document: 11/2003
Natural resources tariff Laos	Million VND per annum	9,013	FSR, File 6, p.V.28 annual tariff for resource usage of 577,748 USD at 15,600 VND exchange rate as in FSR, File 6 , pV.29 (this corresponds to a charge of 1.5% of revenue see also FSR File 6 p.V31) Date of document: 11/2003
Turnover tariff Laos	Percentage	5%	FSR File 6, p. V.31

[17] Base rate source: State Bank of Vietnam; Spread according to Directive of SBV. See File 2. The IMF published for 2005 a nominal interest rate in Vietnam of 13.6% which is higher than the base-rate used therefore showing the . conservativeness of the base rate (see file 3)

	of electricity income		This is not the income tax which is 20% (FSR, File 6, p.V.31) Date of document: 11/2003
Price of CERs	tsd VND /tCER	172	File 4 IETA/PCF, 2004, p. i, has projected a price of 11 USD; exchange rate VND to USD FSR File 6, p.V.29 Date of document: 06/2004
Quantity of CERs	tCERs	variable	Based on PDD

Table 11 shows the investment detail of the project.

Table 11: Investment Detail (million VND)

Item	Investment
Construction cost	2,259,076
Equipment cost	848,049
Transmission line to grid	105,000
Construction work preparation, consulting, compensation etc. excl. interest during construction	311,882
Contingencies	339,421
Total	**3,863,429**

Source: FSR, File 6 p.V.29/30, 11/2003

The IRR baseline is 10.5% and thus significantly lower than the benchmark of 12.4%.

Sub-step 2d: Sensitivity analysis

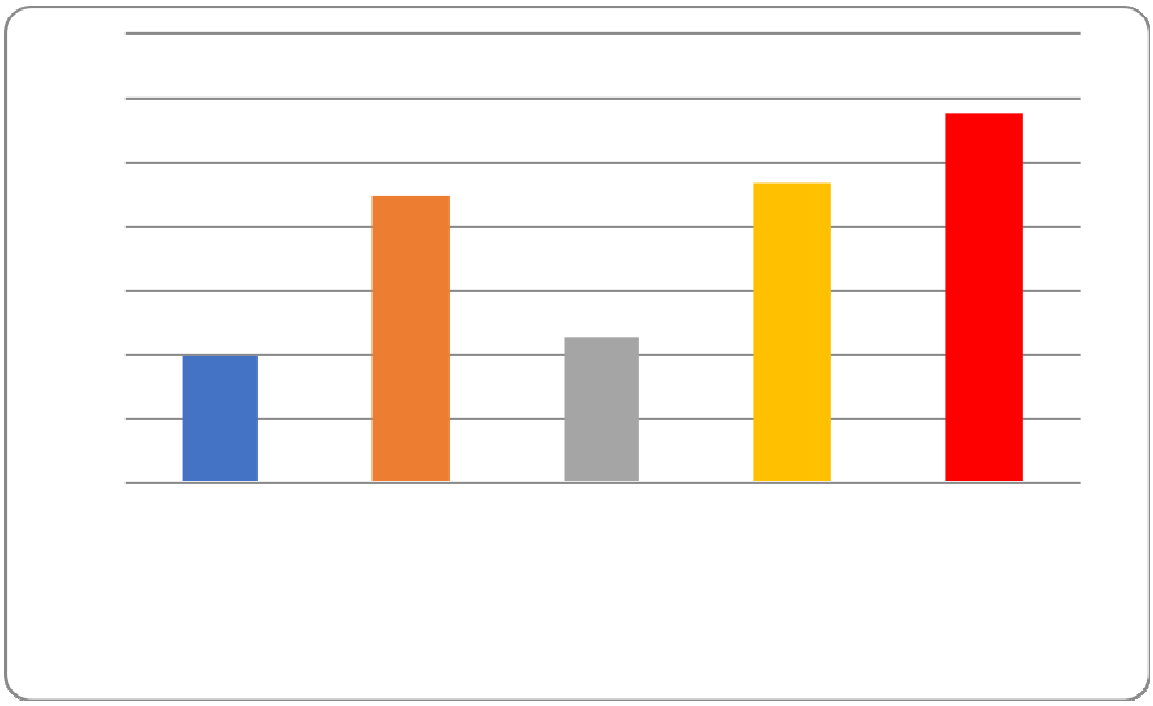
Table 12 and figure 6 show the financial profitability of the investment in absence of the CER including the sensitivity analysis and comparing the values with the benchmark. In all cases the IRR is below the benchmark.

Table 12: IRR Base Case and Sensitivity to Parameter Changes Excluding CER Revenues

Case	IRR
Base case	10.5%
10% lower investment cost	11.7%
10% lower operational cost	10.6%
10% higher income from electricity sale (either higher tariff or higher PLF)	11.8%
Benchmark	**12.4%**

Source: Finance File 1

Figure 6: IRR in Absence of CER Revenues



In all cases the IRR is clearly lower than the benchmark i.e. the project in absence of CDM is financially non-feasible.

Calculations done are conservative and the probability of 10% or even lower investment costs, 10% higher energy prices, 10% higher plant load factor or more than 10% lower operational costs are marginal. This conclusion is based on the following arguments listed below.

Probability of lower investment costs: This probability is considered as marginal. Often FSR underestimate the actual investment cost. The investment cost increased between 12.2005 (investment decision) and 5/2008 in USD from 277 million[18] USD to 312 million USD[19] i.e. an increase of 13%. The probability of lower investment costs is thus clearly not given. In practice the project will have significantly higher investment costs reducing the IRR.

Probability of lower operational costs: The incidence of this parameter on IRR is marginal. Even assuming 0 operational costs the IRR would remain significantly below the benchmark[20].

Probability of higher revenues: This can be caused either due to a higher plant load factor or due to higher income from sales of electricity. The incidence of revenues on the IRR is also significantly affected by the completion date of the project i.e. if the project is completed behind schedule the IRR will change less than if the project is completed early due to the discount factor embedded in the IRR. Large hydropower plants run a considerable risk of running behind schedule. This is also true of Xekaman. According to the FSR the construction timer period would have been 4 years while this time-period has been adjusted to 6.5 years. Based on the actual construction time the IRR has been recalculated (all other parameters no change). The IRR under this scenario would drop from 10.5% to 8.9%[21]. To achieve the benchmark the revenues would need to increase by 33% i.e. either a 33% higher price or a 33% increase in the PLF. Both

[18] FSR File 6 p.V30 of VND 4,312,322 million (total investment including interest) with an exchange rate VND to USD 15,600 see FSR, File 6, p.V.29

[19] File 37, p.14 approved by the Government (see File 35)

[20] With 0 operational costs the IRR would be 11.8%

[21] See Finance File 1

changes are highly improbable. It can thus be shown that the incidence of higher revenues is highly improbable not least due to the fact that the risk of longer construction times is prevalent and this will have a significant impact on reducing the IRR.

Based on the signed Purchase Power Agreements with Laos[22] signed January 2006 and the purchase power agreement with Vietnam signed 3.2006[23] the IRR was re-calculated based on the contractually agreed purchase power price which includes also an annual escalation[24]. The resulting IRR is 11.0% which is still significantly below the benchmark value thus showing the robustness of the result[25].

With the CDM the project is however profitable and financially feasible as can be seen in the following table. The access to CDM finance is thus decisive for project success and implementation.

Table 13: IRR with and without CER Revenues

	IRR
IRR base case without CER revenues	10.5%
IRR with CER revenues	12.5%
Benchmark	12.4%

With CDM the project is above the benchmark. To check the plausibility of this statement an ex-post calculation is made with the actual electricity prices as in the Purchasing Power agreements[26], receiving only 90% of the CERs (based on Purchasing power agreement with Laos where 10% is sold in Laos[27]) and ER prices of 5/2011. The IRR with CDM is thereafter 14.5% (under the same assumptions without CDM the IRR is 11.0%)[28]. This information was not available as of time of decision taking. However this scenario is calculated to test the plausibility of the above calculations realized at the time of decision taking. They clearly show that the conclusion of the project being financially non-feasible without CDM and being feasible with CDM are robust and consistent and can be confirmed with current available data.

Step 3 (Barrier analysis) is not performed.

Step 4: Common practice analysis

The above additionality test is complemented with an analysis of the extent to which the proposed project type has already diffused in the relevant sector and region.

Sub-step 4a: Analyze other activities similar to the proposed project activity

According to the additionality tool projects which are operational and which are in the same country/region, relying on a similar technology, of a similar scale and which take place in a comparable environment including inter alia investment climate and access to finance are considered as similar. Similar projects are thus:

[22] File 26

[23] File 25

[24] For operational and other costs no such annual escalation has been included thus the IRR in this case would be overstated.

[25] File 1

[26] Files 25 and 26

[27] File 26

[28] File 1

- Operational large scale hydropower plants (over 15 MW using the differentiation made by UNFCCC between large and small-scale power plants). This condition refers to “similar scale” and “similar technology”.
- Plants operating in Laos. This condition refers to “same country/region”.
- Hydropower plants operating in Laos and exporting their electricity to Vietnam with a Vietnamese investor. This condition relates to a comparable regulatory and financial surrounding which is given by the Laos-Vietnam accord dated 1998 on cooperation in the electric power sector[29].

Sub-step 4b: Discuss any similar Options that are occurring

No other similar projects are operational in Laos[30]. Thus the project can be considered as not being common practice.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

PROJECT EMISSIONS

Project activity emissions are 0.

The power density of the project is greater than 10 W/m^2 and therefore

$$PE_{HP,y} = 0 \quad (1)$$

Where

$PE_{HP,y}$ Project emissions from water reservoirs (tCO_{2e}/yr)

The power density of the project activity (*PD*) is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \quad (2)$$

Where:

PD Power density of the project activity (W/m^2)

Cap_{PJ} Installed capacity of the hydro power plant after the implementation of the project activity (W)

Cap_{BL} Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero

A_{PJ} Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)

A_{BL} Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

The hydropower project is new and thus the baseline parameters included are 0.(A_{BL} = Cap_{BL}= 0)

[29] File 27, articles B and C, page 7

[30] File 63

BASELINE EMISSIONS

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (3)$$

Where:

BE_y Baseline emissions in year *y* (tCO_2/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_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

The project is a greenfield plant and thus:

$$EG_{PJ,y} = EG_{facility,y} \quad (4)$$

Where:

$EG_{PJ,y}$ 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)

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

Step 1: Identify the relevant electricity systems

The project is grid-connected to the national grid. Vietnam has one national grid. This is defined as the relevant electricity power system.

For imports from connected electricity systems located in another host country(ies), the emission factor is 0 tons CO_2 per MWh.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Option I is chosen and only grid power plants are included in the calculation.

Step 3: Select a method to determine the operating margin (OM)

The simple OM is used (method a). According to the Tool any of the four methods can be used, however, the simple OM method can only be used if low-cost/must-run resource constitute less than 50% of total grid generation in the average of the five most recent years. No geothermal, wind, nuclear and solar generation facilities connected to the grid are operating.

Table 15: Low-Cost/Must-Run Power Plants in Vietnam (2013-2017)

	2015	2016	2017	2018	2019
Hydro low-cost/must run MWh	47.213.934	50.254.951	71.056.945	69.485.682	54.411.106
Total generation GWh	146.014.346	159.817.731	169.942.517	188.063.484	188.063.484
Percentage low-cost/must run	32.33%	31.44%	41.81%	36.9%	28.9 %

Source: MONRE, official CM, table 2 (File 98)

Low-cost/must-run facilities had on average 34.28 % of total electricity generation and thus clearly less than 50% of total grid generation.

The ex-ante option is taken based on a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PDD to the DOE for validation.

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants. The ex-ante option is taken based on a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PDD to the DOE for validation. The data vintage taken is 2015-2019 The data is based on the official data for the Combined Margin in Vietnam.

Data per power plant on fuel consumption is available based on fuel usage per kWh (plant efficiency). Therefore Option A is employed.

$$EF_{grid,OMsimple,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (5)$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in the year *y* (tCO_2/MWh)
m	All power units serving the grid in year *y* except low-cost/must run power plants / units
y	Last 3 years available

The emission factor is determined as follows for plants where the fuel consumption is known (Option A1):

$$EF_{EL,m,y} = \frac{\sum_{i,m} FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}} \quad (6)$$

Where:

$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in the year *y* (tCO_2/MWh)
$FC_{i,m,y}$	Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (mass or volume unit)
$NCV_{i,y}$	Net calorific value of fossil fuel type *i* in the year *y* (GJ / mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type *i* in the year *y* (tCO_2/GJ)

$EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m All power units serving the grid in year *y* except low-cost/must run power plants / units
i All fossil fuels combusted in power unit *m* in year *y*
y Last 3 years available

If for a power unit *m* only data on electricity generation and the fuel types used is available, the emission factor is determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as follows:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad (7)$$

Where:
$EF_{EL,m,y}$ CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$ Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO_2/GJ)
$\eta_{m,y}$ Average net energy conversion efficiency of power unit *m* in year *y* (ratio)
m All power units serving the grid in year *y* except low-cost/must-run power units
y Last 3 years available

Step 5: Identify the group of power units to be included in the build margin

The sample group of power units *m* used to calculate the build margin consists of either:

- The set of five power units that have been built most recently, or
- The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

The set of power units that comprises the larger annual generation is used. A power unit is considered to have been built at the date when it started to supply electricity to the grid. In the case of Vietnam the set of power capacity additions that comprise 20% of the system is used, as this comprises the larger annual generation.

The build emission factor is determined ex-ante based on the most recent information available at the time of PDD submission for validation.

Step 6: Calculate the build margin emission factor

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (8)$$

Where:
$EF_{grid,BM,y}$ Build margin CO_2 emission factor in the year *y* (tCO_2/MWh)
$EG_{m,y}$ Net electricity generated and delivered to the grid by power unit *m* in the year *y* (MWh)
$EF_{EL,m,y}$ CO_2 emission factor of power unit *m* in the year *y* (tCO_2/MWh)
m Power units included in the build margin
y Most recent year for which data is available (2019)

The CO_2 emission factor for each power unit is determined per guidance step 4(a) using Option A1.

Step 7: Calculate the combined margin emission factor

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (9)$$

Where:

$EF_{grid,CM,y}$	Combined margin CO_2 emission factor in the year *y* (tCO_2/MWh)
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in the year *y* (tCO_2/MWh)
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in the year *y* (tCO_2/MWh)
w_{OM}	Weighting of operating margin emission factor (%)
w_{BM}	Weighting of build margin emission factor (%)

The default values for weighting w_{OM} and w_{BM} of 0.25 and 0.75 are used as the project is a hydropower plant in the 2nd crediting period.

LEAKAGE EMISSIONS

No leakage emissions are included according to ACM0002.

EMISSION REDUCTIONS

$$ER_y = BE_y - PE_y \quad (10)$$

Where:

ER_y	Emission reductions in the year *y* (tCO_2)
BE_y	Baseline emissions in year *y* (tCO_2)
PE_y	Project emissions in year *y* (tCO_2)

B.6.2. Data and parameters fixed ex ante

Data/Parameter	**$EF_{CO2,i}$**
Data unit	tCO_2/TJ
Description	CO_2 emission factor of fossil fuel type *i*
Source of data	IPCC 2006 guidelines, Chapter 1 Vol. 2 table 1.4, lower limit of the uncertainty at a 95% confidence interval
Value(s) applied	Anthracite Coal: 94.6 Other Bituminous coal: 89.5 Natural gas: 54.3 Fuel Oil: 75.5 Diesel oil: 72.6
Choice of data or measurement methods and procedures	For second crediting period according to 1st crediting period
Purpose of data	Calculation of baseline emissions
Additional comment	

Data/Parameter	$EF_{grid,CM}$
Data unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor for grid connected power generation
Source of data	See B.6.3. and above sources
Value(s) applied	0.823425
Choice of data or measurement methods and procedures	As per Tool Version 07 "Tool to calculate the emission factor for an electricity system" OM: 0.8907 BM: 0.8010 CM= (0.25 OM) + (0.75 BM)
Purpose of data	Calculation of baseline emissions
Additional comment	Official National emission factor for grid connected power generation 2019 (see file 70)

Data/Parameter	$FC_{i,m,y}$
Data unit	Mass or volume unit
Description	Amount of fossil fuel type *i* consumed by power plant *m* in the year *y*
Source of data	MONRE, 2021
Value(s) applied	See B.6.3.
Choice of data or measurement methods and procedures	Data years 2017/8/9 used i.e. 3 most recent year's prior validation.
Purpose of data	Calculation of baseline emissions
Additional comment	Data based on fuel efficiency factor per power plant (fuel usage in relation to net electricity generation) as reported by EVN

Data/Parameter	$EG_{m,y}$
Data unit	MWh
Description	Net electricity generated by power plant *m* in the project electricity system in the year *y*
Source of data	MONRE, 2021 (File 70)
Value(s) applied	See B.6.3.
Choice of data or measurement methods and procedures	Data years 2017/8/9 used i.e. 3 most recent years prior validation. Once for 2nd crediting period determined ex-ante.
Purpose of data	Calculation of baseline emissions
Additional comment	Gross electricity generated minus internal power consumption as reported by EVN

Data/Parameter	NCV_i
Data unit	TJ/Gg
Description	Net calorific value of fossil fuel type *i*
Source of data	MONRE, 2021 (see file 70)
Value(s) applied	per power plant
Choice of data or measurement methods and procedures	Official data of Vietnam, see file 70
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	Cap_{BL}
Data unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero
Source of data	Project site
Value(s) applied	0
Choice of data or measurement methods and procedures	Determine the installed capacity based on manufacturer's specifications or recognized standards
Purpose of data	Calculation of project emission
Additional comment	

Data/Parameter	A_{BL}
Data unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m2). For new reservoirs, this value is zero
Source of data	Project site
Value(s) applied	0
Choice of data or measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc
Purpose of data	Calculation of project emission
Additional comment	

B.6.3. Ex ante calculation of emission reductions

Project Emissions

The Power Density PD is calculated based on formula 2.

Data required[31]:
Cap_{PJ}: 250 MW

[31] File 6, p. V.12 and File 19, p.I

A_{PJ}: 5.251 km^2
A_{BL} = 0
Cap_{BL}= 0

The energy intensity is thus 47.6 W/m^2. According to ACM0002 if the power density is >10 W/m^2 the project emissions are 0.

Table 16: Calculation of Emission Reductions

Parameter	Value
Operating margin (weighted average years 2015-2019)	0.8907 tCO_2/MWh
Build margin (year 2019)	0.8010 tCO_2/MWh
Combined margin (2019)	0.823425 tCO_2/MWh
Annual energy generation to the grid	962,838 MWh
Annual emission reductions (962,838 MWh x 0.823425 tCO_2/MWh)	792,824 tCO_2

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2020 (8 months)	528,550	0	0	528,550
2021	792,824	0	0	792,824
2022	792,824	0	0	792,824
2023	792,824	0	0	792,824
2024	792,824	0	0	792,824
2025	792,824	0	0	792,824
2026	792,824	0	0	792,824
2027 (4 months)	264,274	0	0	264,274
Total	**5,549,768**	0	0	**5,549,768**
Total number of crediting years	7			
Annual average over the crediting period	792,824	0	0	792,824

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{PJfacility,y} = EG_{pj,y}$
Data unit	MWh
Description	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)
Source of data	Energy meters (two M21 in Than My Station (see figure 7)
Value(s) applied	962,838 MWh/yr

Measurement methods and procedures	The electricity supplied to the Vietnamese grid will be measured with two main meters and two backup meters at Thanh My station of EVN. The electricity consumed by the project from the grid will also be measured by the mentioned meters. All electricity consumed for internal use will be purchased from Vietnam - no electricity will be bought from the Lao grid. The net electricity is calculated (total supplied electricity to the grid minus the consumption of electricity coming from the grid). For more details see chapter B.7.2.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	Measuring equipment will be certified and calibrated according to Vietnamese standards (see File 69). Measurement results are checked with protocol of the monthly meter reading made by the two companies (Xekaman and EVN). Formula for net electricity supplied (see also figure 7 below): $EG_{y,net}$ = (M21supplied + M21supplied) - (M11consumed + M11consumed) The net electricity export/supplied to the Vietnamese grid is the difference between the measured quantities of the grid electricity export and the import. Total electricity produced and total electricity supplied to Laos grid will also be monitored for cross check. But electricity export to Laos will not be included in the emission reduction calculation - only the export to Vietnam
Purpose of data	Calculation of baseline emissions
Additional comment	Main meter and back-up meter are multi-functional meters, which can measure both exported and imported power.

Data/Parameter	**CAP_{PJ}**
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site
Value(s) applied	250,000,000
Measurement methods and procedures	Determine the installed capacity based on recognized standards
Monitoring frequency	Yearly
QA/QC procedures	--
Purpose of data	Calculation of project emissions
Additional comment	The equipment is not changed since the hydropower plant was built. Thus the capacity did not change.

Data/Parameter	**A_{PJ}**
Data unit	km^2
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data	Project site
Value(s) applied	5.251
Measurement methods and procedures	The reservoir level will be controlled regularly when the water overflows the dam in order to assess the highest level of the reservoir. Based on the water level and on the topographical survey which was carried out during the feasibility study the largest reservoir area can be calculated.
Monitoring frequency	Yearly

QA/QC procedures	--
Purpose of data	Calculation of project emissions
Additional comment	--

TEG is not monitored as according to ACM 0002 this parameter is only required for power plants with a power density of the project activity (PD) greater than 4 W/m^2 and less than or equal to 10 W/m^2 which is not the case in the project activity.

All the above monitored data will be stored for 2 years after the end of the crediting period.

B.7.2. Sampling plan

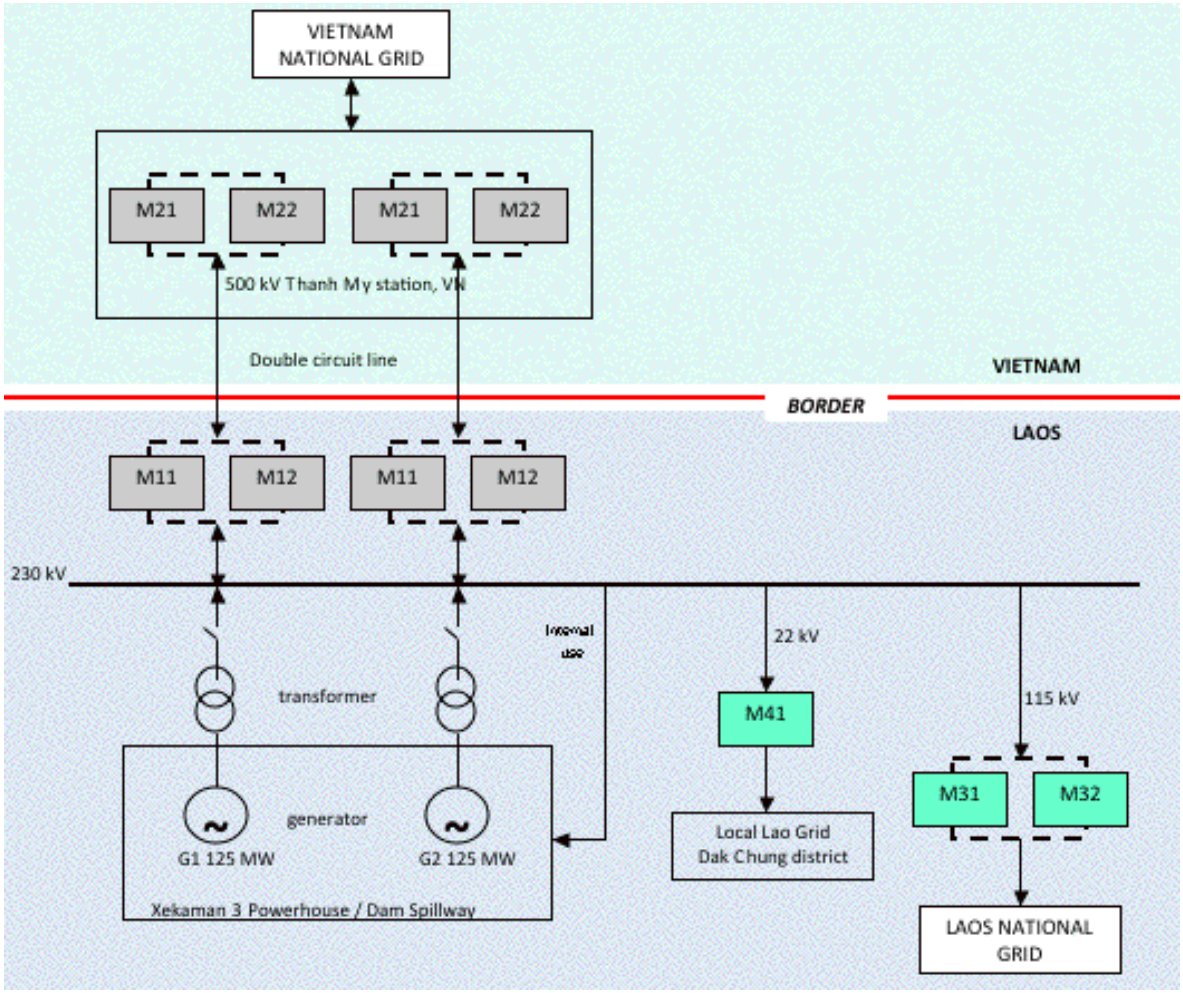
No sampling is made and therefore not applicable.

B.7.3. Other elements of monitoring plan

The produced and sold electricity will be measured through electric metering devices installed in the electric system (see figure below). Continuous measurement and monthly recording of electricity supplied/consumed by the project activity. The export to EVN and the import from EVN can be seen in the metering protocol between the the companies. Since some years EVN has an automatic system for calculating electricity prices at the delivery time. With this system the invoices only show the total costs for the months.

The meters shall achieve the accuracy class 0.2s and comply fully with the requirements of the Vietnamese standard TCVN 6571:1999 which is equivalent with the international standard IEC-60687.The backup meters shall be the same technical parameters as the main meters.

Figure 7: Electric Scheme of Xekaman 3



Xekaman 3 hydropower plant will export mainly to Vietnam. According to the agreement with Laos Xekaman 3 hydropower plant will sell maximum 10 % of the electricity production to Laos if it is needed. If there is no need this part of the electricity will also be sold to Vietnam.

Laos will construct two connection lines to the power plant: a 22 kV and a 115 kV line. At the plant site, there are metering systems for measuring the outgoing electricity to Laos. For the 115 kV line there is one main meter (M31) and one backup meter (M32). The electricity supply will be measured through the main meter. If the main meter is out of operation the measurement of the backup meter is used for billing. For the local electricity consumption a 22kV line will be built. The main meter (M41) will measure the supplied electricity to Dak Chung district (details see file 26).

The Xekaman 3 hydropower plant will not use any electricity from Laos (no contractual agreement for it). All the electricity consumed by the hydropower plant for internal use will be exclusively purchased from Vietnam through the double circuit line.

The electricity production for Lao PR will not be included in the emission reduction calculation. Only the electricity supplied to Vietnam will be accounted for. In any case, if Xekaman 3 hydropower plant would use electricity from Laos (this is not foreseen and there is no contractual agreement) this consumption would be integrated in the net electricity calculation.

For the electricity export to Vietnam a double circuit line between Xekaman 3 hydropower plant (seller) and the Thanh My station of EVN (buyer in Vietnam) will be used. Therefore, two metering systems are installed in each place at Xekaman 3 plant and at Thanh My station (see figure above).

The total amount of electricity in both places are thus the sum of the two main meters (M11 + M11 in Xekaman 3 HPP) and (M21 + M21 in Thanh My station). At both sites there are backup meters if the main meters are out of operation. All the used meters (see figure above) are multi-function meters from elster (see file 65) which can measure in- and outgoing electricity. Xekaman 3 Company will maintain and calibrate their meters at the plant site, while EVN maintain the meters in Thanh My station (details concerning this see file 25, purchase agreement with EVN). According to the Vietnamese standard[32] the main meter must have an accuracy of 0.2% (File 67).

The meters are sealed and maintained through the owners. The owner is also responsible for the calibration of the meters. The calibration process must comply with the Article 33 of Circular No 27/2009/ TT – BCT of Ministry of Industry and Trade dated 25/09/2009 on regulating the metering of electricity in a competitive electricity generation market[33]. The main meters will be calibrated every two years[34].

Calibration is only conducted with the presence of the power generating company and the power trading company[35].

The emission reduction calculation will be based on the main meters in Thanh My station (in - and outgoing electricity, see formula below). This is conservative because the electricity loss in the grid will be integrated for supplied and for consumed electricity. For billing between the two companies the grid loss will be covered through the suppliers (see §8 of the purchase agreement between the project owner and EVN, file 25).

The net electricity ($EG_{y,net}$) supplied to the grid is calculated as follows:

$$EG_{y,net} = (M21_{supplied} + M21_{supplied}) - (M21_{consumed} + M21_{consumed})$$

If the main meters are out of operation at any time, the values of the backup meters will be used for the emission reduction calculation during this time. If both meters are out of service no emission reduction will be claimed during this time.

The backup meters (M22) will be used to cross check the main EVN meters (M21). The net electricity production of the Xekaman 3 hydropower plant will be cross-checked with the invoices for supplied electricity and electricity used from the grid.

Data Collection and Management

Following principles are applied:

- The electricity supplied by the project to the Vietnamese as well as the Laotian grid will be automatically monitored by each metering system (see figure above).
- The data is measured continuously and recorded monthly.
- All records of electricity generation output will be archived in paper form for at least two years after finishing the crediting period.
- Paper invoices are collated by the Project Manager and archived for at least two years beyond the end of the crediting period.

[32] File 66 regulates the devices which must be calibrated; File 66: Regulates the frequency of calibration (2 years for 3-phase electrical meters); File 67: Accuracy of the different meters systems (0.2% main meter)

[33] see File 69

[34] see File 67

[35] see File 25

In case of any unforeseen event that is not covered under this monitoring plan, staff of the CDM group shall inform the manager and the director. The manager and director are then responsible to ensure that the cause for the unforeseen event is detected, the event is remedied and for the period of time in which the unforeseen event has occurred uncertainty in data gathered is limited as much as possible.

Xekaman 3 Power Co. Ltd established with Decision No 21/XKM3-QD-VP a CDM team for implementing and monitoring the CDM project activities[36]. The CDM Implementation & Monitoring Team (CDM team) consists of following members with their responsibilities:

- Team leader (Deputy Director): Responsible for QA/QC. The team leader is responsible for guiding and managing the overall monitoring process, writing monitoring reports and working with related partners on the quantity of Certified Emission Reductions (CERs) of the project as well as keeping the CDM project on track.
- Financial – Accounting and Economic – Planning Department: They are responsible for providing invoices and documents relevant to power purchase activities of the company and for power generation data for grid (Vietnam and Laos) and self use power generation. They also monitor the annual emission reduction amount, the amount of sold CERs and control the expenses for CDM implementation.
- Operation Division: This Division is responsible of keeping track of the operation diary and the operation booklet and of keeping record of the indicators for power generation, power generation per grid and internal use. They also monitor the adjustment and calibration of equipment and identify and resolve incidents in a timely manner to ensure the accuracy of measured data. They also monitor the reservoir operation and check and supervise daily monitoring data of all shifts.
- Shift leader: This is the person who will be responsible for monitoring and reporting operating results to the Management and Technical Department including electricity output, water volume running into turbines and emission reduction amount of the project in line with the monitoring forms.

The annual monitoring reports and data quality check will be realized by ecotawa AG through its Vietnamese partner.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

04/04/2006

Signature of construction contract[37].

C.2. Expected operational lifetime of project activity

30 years[38] (as per 1st CP)

[36] File 43

[37] File 24

[38] Generators and transformers according to EB 50 Annex 15 30 years; 150,000 hrs for hydro turbines according to EB 50 Annex 15 (equivalent to 38 years at planned operational hours per annum)

C.3. Crediting period of project activity

C.3.1. Type of crediting period
Renewable crediting period; this is the second crediting period

C.3.2. Start date of crediting period
30/04/2020

C.3.3. Duration of crediting period
7 years 0 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts
Hydropower plants in Laos must meet the following environmental requirements:

- Law on Environmental Protection of Laos approved by the National Assembly on 03/04/1999 and signed for implementation by the President of Laos on 26/04/1999;
- Regulation on Environmental Assessment in Laos, 2000;
- Regulation on the implementation of the environmental assessment for electricity projects in Laos No. 447/ Min issued 20/11/2001by the Ministry of Industry and Handicraft;
- Regulation on environmental assessments in Laos No 1170/ TEA issued on 03/10/2000 by Science/Technology/Environment Department of the Governmental Office;
- Law on Land No 04/ NA passed by the National Assembly of Laos on 21/10/2003;
- The Forestry Law approved in 1996;
- The Land Law approved in 1997;
- The Water and Water Resource Law approved in 1996;
- The Decree to Implement the Law on Water and Water Resources, 2001.

The project made an EIA issued in May 2004[39] and an environmental and social management plan in September 2006[40] (see details chapter D.2).

Certificate No 2385/ UBKHCNMT – VPTTCP issued by the Committee of Science, Technology and Environment Office of the Laotian Government dated 17/11/2004 approved the Environmental Impact Assessment of Xekaman 3 Hydropower Project[41].

Certificate No 2441/UBKCM.VPTT issued by the Science, Technology and Environment Agency of Laos on 23/10/2006 accepted the environmental and social management plan of Xekaman 3[42].

The project is also validating its conformance with WCD requirements.

D.2. Environmental impact assessment
An EIA[43] was realized May 2004 and approved by the by the Committee of Science, Technology and Environment Office of the Laotian Government November 2004[44].

[39] File 44

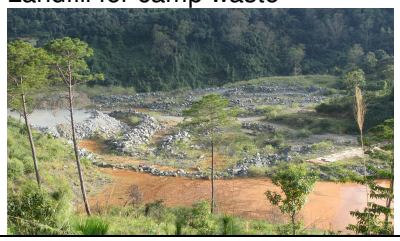
[40] File 17

[41] File 45

[42] File 46

The main environmental impacts of the project, recommendations given and actions taken are listed in table 17.

Table 17: Environmental Impacts, Recommendations and Actions Taken

Potential Environmental Impacts	Recommendations Given by EIA	Actions Taken by Project
Construction Period		
Air and noise pollution being basically mud and dust from transportation and construction vehicles, dust from and raw materials exploitation	Compliance with regulations	Usage of modern equipment; watering of road
Solid waste from worker's camp and from earthwork	Storage of materials for other usage in the future; appropriate disposal of camp waste	Landfill for camp waste 
Impacts on land use and ecosystem including tree cutting for reservoir, changing habitat of flora and fauna due to construction of dam, leaking through cavities	Organize rescue of animals; disposal of harmful war toxics; sealing and shutting of caves which might cause leakage;	Decision No 3171/BNL dated 19/08/ 2010 by the Ministry of Agriculture and Forestry on the establishment of a board for upstream forest management and protection[45]; Official Letter No 0149/BNLM.CXTPTNL dated 05/02/2010 from the Department of Promotion and Energy Development under the Ministry of Energy and Mines sent to Xekaman 3 Power Co., Ltd on afforestation, reforestation and forest protection along with expense table[46].
Water pollution due to waste from maintenance & cleaning such as mechanical oil, lubricants etc and from workers camp	Landfills and appropriate storage	See above (solid waste); periodic testing of water surface quality[47]
Fire/Explosion/Safety	Compliance with regulations; protective equipment; sanitation and health service; ensure transport and telecommunication	Pasport of explosive application [48] ; Contract No07/HDKT/XKM3/2004 on

[43] File 44

[44] File 45

[45] File 50

[46] File 51

[47] Files 48 and 49

[48] File 52

	on-site	unexploded ordnance clearance[49]
Operation Period		
Change of water balance downstream	Ensured that the discharge is 12,89 m^3/s	Comply with discharge value
Erosion and sedimentation in reservoir bed and downstream	Basically forestation measures	Decision No 3171/BNL by the Ministry of Agriculture and Forestry on establishment of a board for upstream forest management and protection of Xekaman 3 HPP[50]
Water pollution due to biomass decay during flooding	Clearance of reservoir bed and periodic controls	Decision 09/CTT by Sekong Province on granting power to the supervising committee of Xekaman 3 hydropower project[51]; Decision No 330/TT by Sekong Province on the establishment of a supervising group for reservoir bed clearance of Xekaman 3 HPP[52]; Contract No 01/2010/HDXD between Xekaman 3 Power Co., Ltd and Department of Agriculture and Forestry of Sekong Province, Laos on reservoir bed clearance before storing water[53].
Improving living standards	Fishery and tourism development	

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

No people were dislocated due to the project as no people were living in the reservoir bed area [54].

Living disorder was experienced by 57 households with about 342 people. As of end 2010 five stages of compensations were completed with 48 households, a border post and a cemetery[55].

[49] File 53

[50] File 50

[51] File 54

[52] File 55

[53] File 56

[54] File 9, p.24, 26 and 27

[55] File 10 p.17; File 11 p,3; File 12 p.3; File 13 p.3; File 14 p.2

The investor plans to complete stage 6 and stage 7 with 9 households[56]. The compensation plan for these two stages was submitted to the authority for approval. TETA consultants worked with the investor and the local authorities to carry out an onsite interview with local residents of Dak Chung district between January 12th and14th 2011 with a stakeholder meeting on January 12th 2011[57]. It was stated that Dak Grang Nhay Village was relocated due to free migration. There were only two households of this village left and the rest moved to Kontum. These two households moved to Dak Grang Noi Village to form Dak Grang Village.

Compensated land was to build roads 16B, D4, D3, TC17, TC15B, stone mine No 3, auxiliary works and the transmission line. Compensation prices are based on Decision No 298/CT dated 04/07/2006 by Sekong Province[58]. At each stage of compensation, the investor has to ask for permission of the local authority[59].

The involvement of people was through meetings between the investor and affected people:

- A meeting was organized by the Environmental and Social Management Committee of Dak Chung District to discuss about compensation prices on 22/05/2006[60]. At this meeting, representatives of nine villages, officials of the District Departments and representatives of the Investor discussed about compensation prices and alternatives. The meeting reached a mutual agreement on compensation prices or in case residents do not receive monetary compensation, the investor will provide them with land instead.
- A Compensation Team was formed to carry out compensations. The team includes the Deputy head of the Compensation Board of the Dak Chung District and staff of the Investor. When local residents receive compensation, it has seen the participation of Representatives of the Investor, Representatives of the Compensation Board of Xekaman 3 project, Representatives of villages and Representatives of households as can be see in the signatures in the compensation minutes[61].

During the realization of the Feasibility Study, the EIA report and the Relocation and Resettlement report several workshops and meetings were realized and there were several interviews realized with affected people[62]. These workshops were to introduce Xekaman 3 hydropower project and to identify possible environmental and social issues that may happen during the project implementation and the mitigation measures proposed by project owner.

12/01/ 2011 a formal stakeholder meeting with Dak Chung District People's Committee was realized[63]. The meeting focused on clarifying local environmental and economic - social issues. Questions were raised about impacts on lost land, water source, noise problem, air quality … as well as satisfaction of the participants concerning project implementation and its contribution to local economic development. Interviews with stakeholders were conducted during that time including head of villages and affected farmers. People were asked about their opinion on the

[56] Files 15 and 16

[57] File 57

[58] File 58

[59] Stage 1 see File 10, p.15; stage 2 see File 11, p.1; stage 3 see File 12, p.1; stage 4 see File 13, p.1; stage 5 see File 14, p.1.

[60] File 59

[61] See e.g. File 10, p.25-27

[62] See File 44, p.7-2 and 7-3; see also File 9, p.31 point 2

[63] File 57

hydropower project especially but not only concerning environmental aspects. The interviews of the stakeholder meeting were carried out according to the following process through an independent person: Identification of stakeholders – selection of stakeholders – make an official interview list – invitation for interviews – interviews – following actions. The identification and determination of the stakeholders was made among individuals and organizations who are directly affected by the project (e.g. land loss, use of affected lands certified under the compensation policy of local authority and the Government), local authorities. Criteria such as age, position, relation to the project, etc. were defined in order to make a representative choice for all the affected groups. Thereafter a list of the selected persons was made and was checked with the project owner and the head of villages. The selected people were informed by the head of villages in order to arrange meetings. Also, interviews were carried out at local resident's houses. Each representative of a household was delivered a questionnaire. The questionnaire consists of two parts. Part 1 details the information about the interviewee, for example, age, gender and occupation. Part 2 emphasizes environmental issues. The households' representative was clearly explained each question through a local translator before answering them. Also, each questionnaire had the confirmation of the head of each village Afterwards the interviewed people could read and sign the minutes[64].

E.2. Summary of comments received

The following summary is based on the stakeholder meeting January 12th 2011 and the interviews realized[65].

Major positive comments received include:

- Socioeconomic development including improved road, upgrading of the hospital, building of a school;
- Assistance of project investor in growing crops;
- Power supply to the villages.

The major concerns or recommendations mentioned were:

- Moderate noise during construction;
- Clearing of reservoir bed is important;
- Laotian engineer should be working at the plant when operational;
- Ensure safety of workers during construction;
- Replacement of the broken water supply system of the village through the investor;
- Finish construction as soon as possible.

No impact on agricultural activities or on irrigation and water resource is previewed. The financial compensations received are considered as fair.

The overall conclusion is that the project is beneficial for the community especially in improving their livelihood. All interviewed were in favour of the project and none against it.

E.3. Consideration of comments received

The concerns mentioned have been addressed by the company being basically:

- Noise and dust pollution have been mitigated as far as possible based on the recommendation given by the EIA.

[64] File 60

[65] Files 61 and 62

- Socio-economic development and inclusion of local labour force is strived at by the investor. The investor is training local staff to perform this job in the future.
- The investor signed an agreement with the Province for reservoir bed clearance[66].

SECTION F. Approval and authorization

Letters of Approval of the project participants are available.

[66] File 56

Appendix 1. Contact information of project participants

Organization name	Viet Lao Power Joint Stock Company
Country	Vietnam
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Contact person	Mr. Nguyen Thang Long

Organization name	Xekaman 3 Power Company Limited
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Telephone	+856.21262822
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Website	
Contact person	Hoang Dinh Chinh

Organization name	ecotawa AG
Country	Switzerland
Address	Breisacherstrasse 45 4057 Basel
Telephone	+41 79 200 63 31
Fax	
E-mail	dwunderlin@ecotawa.com
Website	www.ecotawa.com
Contact person	Mr. Daniel Wunderlin

Appendix 2. Affirmation regarding public funding

There is no Official Development Assistance in this project and the project will not receive any public funding from Parties included in Annex I.

Appendix 3. Applicability of methodologies and standardized baselines

see section B.2.

Calculation of the official Combined Margin 2019 see attached file 70 EN (Ministry of Industry and Trade/ Ministry of Natural Resources and Environment, January 2021, The calculation of the combined margin in the 2nd crediting period is : 0.25 OM + 0.75 BM and differs from the calculation made in the official document (File 70 EN).

The Combined Margin of Laos is not integrated in the emission reduction calculation because the electricity supplied to the Lao grid is not integrated in the emission reduction calculation.

Appendix 4. Further background information on ex ante calculation of emission reductions

All the information are provided in section B 6.3.

Appendix 5. Further background information on monitoring plan

All the information has been provided in section B.7.

Appendix 6. Summary report of comments received from local stakeholders

All the information has been provided in Section E.

Appendix 7. Summary of post-registration changes

No post-registration changes have been made.

Appendix 8. Files Used

File 1 ecotawa, Finance File, 2011
File 2 State Bank of Vietnam, Base Interest Rate and Decision No. 16/2008/QD-NHNN dated 16 May 2008 of the Governor of the State Bank, 2009
File 3 IMF, Vietnam: Statistical Appendix 2007
File 4 IETA et.al., Estimating the Market Potential for the CDM, 2004
File 5 ecotawa, Mail SQS, 08/12/2010
File 6 Song Da Construction Consulting Company, Feasibility study, Volume 1, Main report, 2003
File 7/7e Laotian Committee for Planning and Investment, Foreign investment license 002-06/KHDT for Xekaman 3 Power Company Limited by Laos Committee for Planning and Investment, 03/01/2006
File 8/8e Department of Domestic Trade of Laotian Ministry of Trade, Business registration license 0003/TD-DN for Xekaman 3 Power Company Limited by the Department of Domestic Trade of Laotian Ministry of Trade, 11/01/2006
File 9 Song Da Construction Consulting Company, Report on relocation and resettlement, 2004
File 10 Compensation document stage 1
File 11 Compensation document stage 2
File 12 Compensation document stage 3
File 13 Compensation document stage 4
File 14 Compensation document stage 5
File 15 Environmental and Social Management Committee of Xekaman 3 Power Co., Ltd, Projected list of projected families receiving compensation of stage 6 in 2010 by the Environmental and Social Management Committee of Xekaman 3 Power Co., Ltd
File 16 Environmental and Social Management Committee of Xekaman 3 Power Co., Ltd, Projected list of projected families receiving compensation of stage 7 in 2010 by the Environmental and Social Management Committee of Xekaman 3 Power Co., Ltd
File 17 Institute of Materials Science, Environmental and social management plan, 2006
File 18 Song Da Consulting Joint Stock Company, Technical Design - Stage 2 - Summary report, 2007
File 19 Song Da Consulting Joint Stock Company, Technical design- Stage 1, supplemetary report, description, 2006
File 20 Song Da Consulting Joint Stock Company, Technical design stage 1, annex 4, Hydraulic- energy economics, 2005
File 21 VA TECH Hydro GmbH, Contract Agreement No 05/2008/ HDTB/ VATH - XKM3 : supply of complete electrical - mechanical equipment and technical services - Xekaman 3 Hydropower Project dated 17/04/2008
File 22 Xekaman 3 Power Company Limited, Decision 25/QD-HDQT by Xekaman 3 Power Co.,Ltd Board of Directors approving Document of Technical design-stage 2-Xekaman 3 Hydropower Project, 18/05/2007
File 23 Xekaman 3 Power Company Limited, Non-ODA declaration, 10/01/2011
File 24 Xekaman 3 Power Co., Ltd and Song Da Corporation, General construction contract 34/2006/XKPC-Song Da between Xekaman 3 Power Co., Ltd and Song Da Corporation, 04/04/2006
File 25/25e Xekaman 3 Power Company Limited and Electricity of Vietnam, Power purchase agreement 2006/XKM3-EVN/VL between Xekaman 3 Power Company Limited and Electricity of Vietnam for Xekaman 3 Hydropower Plant, 2006
File 26 Xekaman 3 Power Company Limited and Electricite Du Laos, Power purchase agreement between Xekaman 3 Power Company Limited and Electricite Du Laos, 2006
File 27 Lao People's Democratic Republic represented by Committee for Planning and Investment and Xekaman 3 Power Company Limited, Build-operate-transfer contract between the government of Lao People's Democratic Republic represented by

Committee for Planning and Investment and Xekaman 3 Power Company Limited, 04/01/2006

File 28/28a Energy and Construction Consultant JSC, Letter, 11/10/2005

File 29/29a Viet Lao Power Investment and Development JSC, Directive 56, 15/11/2006

File 30/30a Energy and Construction Consultant JSC, Contract, 18/07/2006

File 31/31a Xekaman 3 Power Co. Ltd, Contract Termination Paper, 27/12/2007

File 32 Carbotech, MoU, 18/01/2008

File 33 ecotawa, MoU, 03/06/2008

File 34 Xekaman 3 Power Co., Ltd, Decision No 34/QD-HDQT by Board of Directors of Xekaman 3 Power Co., Ltd on approval of revised design of slopping tunnel 1 and sloping tunnel 2 in the techical design stage 2- Technical Design- Xekaman 3 hydropower plant, 28/10/2009

File 35/35e Prime Minister of Viet Nam, Official letter No 1645/TTg-QHQT by the Prime Minister of Viet Nam on amending total investment of Xekaman 3 hydropower project, Laos, 01/10/2008

File 36/36e Vietnam Ministry of Planning and Investment, Decision No 2528/GP by the Ministry of Planning and Investment on allowing Viet-Lao Power Investment and Development JSC to found a 100 percent Vietnam capital company namely Xekaman 3 Power Co., Ltd, 30/11/2005

File 37 Xekaman 3 Power Co., Ltd, Decision No 35/QD-HDQT by Board of Directors of Xekaman 3 Power Co., Ltd on approval of norm, unit price document and cost estimation of Xekaman 3 hydropower plant, 16/05/2008

File 38 Government of the Socialist Republic of Vietnam, Protocol on the Co-operation in Economic, Cultural and Technical Science, 09/01/2003

File 39 MONRE, No: 151 /KTTVBDKH, Official Combined Margin Vietnam, 26/03/2010

File 40, Electricite du Laos, Annual report 2008

File 41 ecotawa, CER spreadsheet, 2011

File 42 EDL, Statistic Yearbook 2009

File 43/43e Xekaman 3 Power Co., Ltd, Decision No 21/XKM3-QD-VP by Xekaman 3 Power Co., Ltd on establishment of the CDM team of Xekaman 3 hydropower project, 2011

File 44 Song Da Construction Consulting Company, Environmental impact assessment, Main text, 2004

File 45 The Committee of Science, Technology and Environment of Office of Laotian Government, Certificate of Environmental impact assessment by Xekaman 3 Hydropower Project, 2004

File 46/46e Science Technology and Environment Agency under the Prime Minister's Office, Certificate No 2441/UBKCM.VPTT dated 23 Oct 2006 by Science Technology and Environment Agency on acceptance of environmental and social management plan of Xekaman 3, 2006

File 47 Power Plants commissioning year

File 48 Environmental Technology Centre under Da Nang Department of Natural Resources and Environment, Water quality testing result No 239-DV/TBM conducted by Environmental Technology Centre under Da Nang Department of Natural Resources and Environment, 30/07/2009

File 49 Environmental Technology Centre under Da Nang Department of Natural Resources and Environment, Water quality testing result No 321-DV/TBM conducted by Environmental Technology Centre under Da Nang Department of Natural Resources and Environment, 15/10/2009

File 50 Ministry of Agriculture and Forestry, Decision No 3171/BNLby the Ministry of Agriculture and Forestry on establishment of board for upstream forest management and protection of Xekaman 3 HPP, 19/08/2010

File 51 Department of Promotion and Energy Development under the Ministry of Energy and Mines, Official Letter No 0149/BNLM.CXTPTNL of Department of Promotion and Energy Development under the Ministry of Energy and Mines sent to Xekaman 3 Power Co., Ltd on afforestation, reforestation and forest protection along with expense table, 05/02/2010

File 52 Passport of Explosive application

File 53 Viet-Lao Power Investment and Development JSC and Lung Lo Construction Company, Economic contract No 07/HDKT/XKM3/2004 2004 between Viet-Lao Power Investment and Development JSC and Lung Lo Construction Company on unexploded ordnance clearance of Xekaman 3 hydropower plant in Dak chung district, Sekong province, Lao PDR, 13/05/2004

File 54 Sekong Province, Decision 09/CTT by Sekong province on granting power to the supervising committee of Xekaman 3 hydropower project, 09/01/2009

File 55 Sekong province, Decision No 330/TT by Sekong province on establishment of supervising group for reservoir bed clearance of Xekaman 3 HPP, 20/10/2009

File 56 Xekaman 3 Power Co., Ltd and Department of Agriculture and Forestry of Sekong Province, Contract No 01/2010/HDXDbetween Xekaman 3 Power Co., Ltd and Department of Agriculture and Forestry of Sekong Province, Laos on reservoir bed clearance before storing water, 02/07/2010

File 57 Xekaman 3 Power Co., Ltd, Stakeholder meeting minutes, 12/01/2011

File 58 Sekong Province, Decision No 298/CT by Sekong province on regulation of compensation unit price for Xekaman 3 hydropower project, 04/07/2006

File 59 District Environmental and Social Management Committee, Meeting minutes No 01/BQLCH by the District Environmental and Social Management Committee, 22/05/2006

File 60 stakeholder interviews, 2011

File 61 stakeholder interview results, 2011

File 62 Xekaman 3 Power Co., Ltd, Stakeholder meeting minutes translated, 12/01/2011

File 63 Ministry of Energy and Mines, Power Plants Laos 2010

File 64 ecotawa, contract, 10/06/2009

File 65 elster metering systems: A1700, Programmable Polyphase Meter; Users Manual; 5/2008

File 66: Decision No.13/2007/QD-BTNMT of Minister of Science and Technology Ministry on “List of metrological devices must be calibrated”, 06/072007 (English Summary in File 55EN)

File 67 Decision No.25/2007/QD-BTNMT of Minister of Science and Technology Ministry on Applying Calibration procedure and frequency for measuring devices in the list of measuring devices that must be calibrated , 05/10/2007 (English Summary see File 56 EN)

File 68 Ministry of Industry and Trade (MOIT): Decision 02-2007-QD-BCN (Accuracy of electrical metering systems), 09/01/2007

File 69: Article 33 of Circular No 27/2009/ TT – BCT on regulating the metering of electricity in competitive electricity generation market; Ministry of Industry and Trade (MOIT); Sep - 25 – 2009 (English summary as File 69 EN)

File 70: Ministry of Natural Resources and Environment (MONRE), Emission Factor of the Vietnam National Grid), Hanoi, January 2021 (English and VN version).

File 71: ecotawa AG; CER-Spreadsheet for the second crediting period, 15/03/2021

File 72: Pictures of the hydropower plant, metering system

File 73/74 Commission Certificate for Hydro Power Plant

File 75 Lao Government, 01/02/2019: Agreement of Lao Government concerning repairing and maintenance (Lao/EN version)

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Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for CDM project activities" (EB 66, Annex 8).

Version	*Date*	*Description*
03.0	26 July 2006	EB 25, Annex 15
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