CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

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Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Title: Song Ong Hydropower Project
Version 2.5
Date: 02/11/2010

A.2. Description of the small-scale project activity:

The Song Ong Hydropower Project involves the construction of a hydropower plant with 3 units, which is located on Ong River in Quang Son commune, Ninh Son district in Ninh Thuan province of Vietnam. The project's installed capacity and estimated annual gross power generation are 8.1 MW and 40,500 MWh, respectively.

The project's purpose is to generate and to supply renewable electricity to the national grid under the Power Purchase Agreement (PPA) signed with the Electricity Corporation of Vietnam (EVN). The net electricity generated from this project (annual estimated volume is 39,994 MWh[1]) will be supplied to the national grid via a 22 kV line which connects the plant with the Ninh Son 110/22 kV transformer station.

The project contributes to the sustainable development on the local, regional and national scale as follows:

General contributions towards national sustainable development:

- In recent years, Vietnam has suffered a critical electricity shortage as a consequence from rapidly increasing demand and insufficient supply, thereby imposing negative impacts on economic growth as well as on daily lives of people. This project activity will be a contribution towards balancing the supply and demand gap. By exporting electricity directly to the grid, it will help to reduce electricity losses across the national grid and to lessen the risks of cascading national grid collapse due to overload.
- The project activity will generate renewable power without any GHG emissions, which will displace part of the electricity otherwise supplied by fossil fuel fired power plants. Thus, GHG emission reductions can be achieved. Total expected CO_2 emission reduction from the proposed project is estimated to the amount of 149,912 tCO_2 over the first seven year crediting period.
- Reducing reliance on exhaustible fossil fuel based power sources and also reducing the import of fuels for the purpose of power generation.
- Modern and highly efficient turbines and generators are being used in the project and the power transmission will be at high voltage to ensure low losses. The project will accelerate the deployment of renewable energy technologies in Vietnam.

Contributions towards local sustainable development:

a) Economic well-being

Once commissioning, this proposed project will increase the industrial share in the economic structure of Ninh Thuan province.

[1] According to Feasibility Study report

By supplying a stable electricity output, this project will facilitate the industrialisation process of the province and leverage the performance of traditional trade villages as well as tourism industry and services inside the province.

After commissioning, this project will supply electricity to speed up the commissioning of other infrastructure projects in the region.

b) Social well-being

This project will contribute directly to improve the low-quality infrastructure systems of the Quang Son commune, where minority ethnics groups are living. The project will construct a new road that then will be integrated into the traffic system of the commune. The new 22 kV line will reduce electricity losses and improve the electricity quality supplied in the region.

The communication system and clean water treatment serving for workers of the project during the both construction and operation phases will be shared with local people. Besides, new jobs will be created during construction and operation phases. The project activity could result in the employment of the local people for the construction and operation later on.

This demonstrates that the project activity will contribute positively towards sustainable development and that it is consistent with the general encouragement of the investment in exploitation of renewable energy resources in Vietnam set by the Government. Therefore, it satisfies the sustainable development criteria for CDM projects set by the DNA of Vietnam.

A.3. Project participants:

Name of Party involved (*)((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Vietnam (host)	Song Ong Hydropower Joint Stock Company	No
Vietnam (host)	Energy and Environment Consultancy Joint Stock Company	No
Denmark	DONG Naturgas A/S	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required		

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party(ies):

Socialist Republic of Viet Nam

A.4.1.2. Region/State/Province etc.:

Ninh Thuan province

A.4.1.3. City/Town/Community etc:

Quang Son commune, Ninh Son district.

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

The Song Ong Hydropower project is located on Ong river, Quang Son commune, Ninh Son district, Ninh Thuan province. The Ong river is the first branch of the Cai river.

The geographic coordination of the power house[2]:

Northern latitude : $11^0$44'56"

Eastern longitudes : $108^0$49'20"

The geographic coordination of the water intake:

Northern latitude : $11^0$45'13"

Eastern longitudes : $108^0$48'19"

The site of the project is showed in Figure 1.

[2] The coordinate of this project was measure onsite that has been confirmed by the DOE.

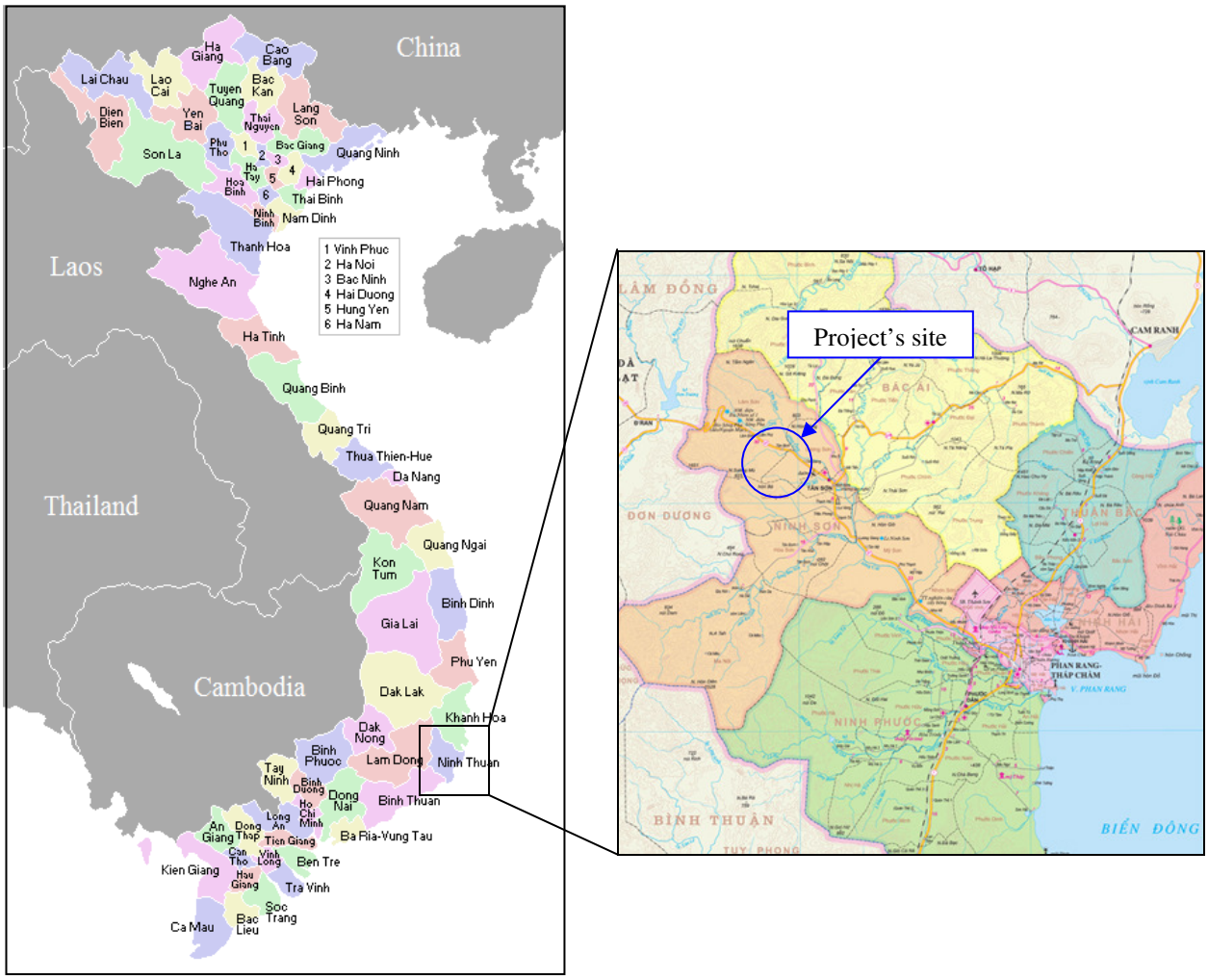

Figure 1. Project site on the map

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

A.4.2.1. Type and category

Scale: Small scale project

Type I: Renewable energy projects

Category I.D: Renewable electricity generation for the national power grid.

A.4.2.2. Technology

The project involves the construction of a hydro plant and installation of new hydro turbines and alternators in order to convert potential energy available in the river flow into electrical energy, which will be supplied to the national grid at the connection point through the transmission line. At the connection point, the power metering systems were installed. They are digital and bi-directional type to measure the export and import electricity of Song Ong Hydropower plant.

The metering systems include a main system and a back-up system, each system includes: current transformers (CTs), voltage transformers (VTs) and power meters which are met the IEC62053 or equivalent standard.

- Current Transformers (CTs) are used for measurement of electric currents. When current in a circuit is too high to directly apply to measuring instruments, a current transformer produces a reduced current accurately proportional to the current in the circuit, which can be conveniently connected to measuring and recording instruments (power meters).
- Voltage Transformers (VTs) are used in power systems to step-down extra high voltage signals and provide low voltage signals either for measurement
- Power meters are used to combine the current and voltage signal from CTs and VTs to measure the electrical power. More detail about the power meter are described in Annex 4

Figure 2 shows the layout of the project.

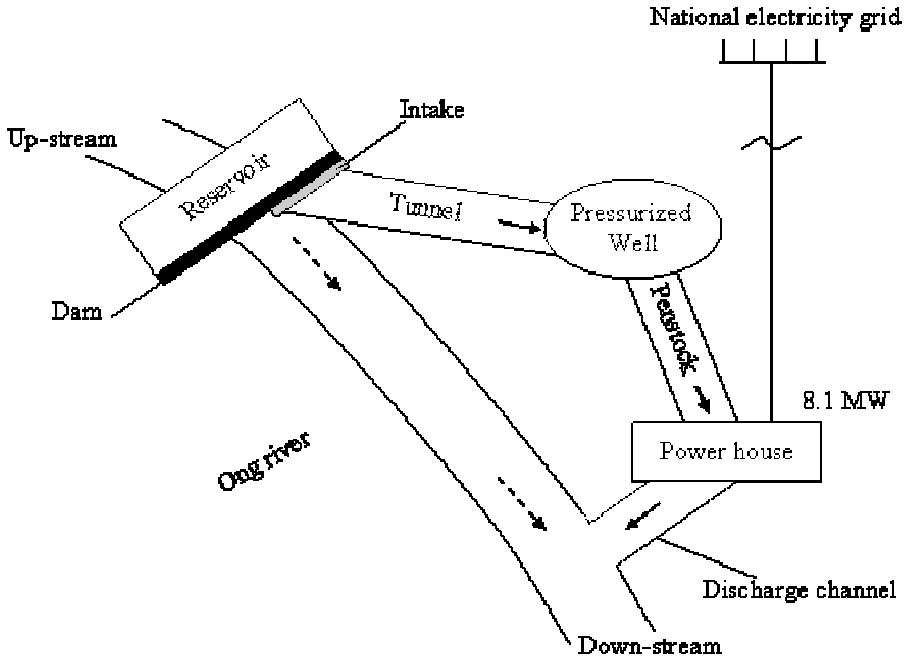

Figure 2: Project lay-out

The main technical parameters of the Song Ong Hydropower Project are shown in Table 1.

Table 1. Main technical parameters of the proposed project activity

Main parameters	Units	Values
1. Turbine		
• Manufacture		Chongqing Yunhe Industry (Group) Co., Ltd.
• Type		Francis, vertical axis
• Diameter of runner	m	1.4
• Rated net head	m	27
• Number of turbine	set	03

• Turbine discharge	m^3/s	11.57
• Efficiency	%	86.91
• Capacity	MW	2.7
• Annual utilisation hours	hour	5.000
2. Generator		
• Manufacturer		Chongqing Yunhe Industry (Group) Co., Ltd.
• Number	set	03
• Type		SF2700-20/3250
• Rated voltage	kV	6.3
• Rated capacity	MW	2.7
• Efficiency	%	95.2
3. Transformer		
• Manufacturer		ABB Ltd.
• Number	set	03
• Type		3 phases, 2 windings
• Rated capacity	MVA	3.5
• Primary voltage	kV	6.3
• Secondary voltage	kV	24
4. Annual river flow	m^3/s	5.81
5. *Expected lifetime of the project*[3]	years	30
6. Plant load factor[4]	%	57.08

The main equipment utilized in this project are imported from China. The supplier was chosen via tender which set criteria to ensure that the turbines and alternators are state-of-the-art technologies. The technicians and engineers from the equipment supplier will train the operational staff of the Song Ong Hydropower plant on the monitoring procedures, operation regulations, maintenance procedures, and transfer other relevant operational know-how before the power plant is operated. Furthermore, there will be regularly internal training courses on monitoring and operation for the staff during the operation period. Under this project, modern technologies and know-how will be transferred to Vietnam.

[3] Confirmed by equipment supplied

[4] The Plant load factor (PLF) for this proposed project was determined by the annual electricity output and the capacity which were provided by the third party contracted by the project owner. So it is in line with the EB 48 annex 11 "*The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company)*"
PLF = (Total electricity output / Maximum electricity could be generated) or
PLF = (the annual electricity output / (the capacity*8760) * 100%). In which 8760 is hours of one year.
So PLF for this proposed project = 40,500 / (8.1 * 8760) * 100% = 57.08%.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Estimated emission reductions of the proposed project over the chosen crediting period are given in Table 2.

Table 2. Emission reduction of the proposed project over the chosen crediting period

Years	Estimation of annual emission reductions in tonnes of CO_2 e
2011 (March to December)	17,847
2012	21,416
2013	21,416
2014	21,416
2015	21,416
2016	21,416
2017	21,416
2018 (January to February)	3,569
Total estimated reductions (tonnes of CO_2 e)	**149,912**
Total number of crediting years	**7**
Annual average of the estimated reductions over the crediting period (tCO_2e)	**21,416**

A.4.4. Public funding of the small-scale project activity:

There are no public and/or ODA funds involved in this project.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities (FCCC/CP/2002/7/Add.3), a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The Song Ong Hydropower Project is a unique hydropower plant constructed on Ong river in Quang Son commune in Ninh Son district, Ninh Thuan province. Therefore, this project is not a component of any large project. The project is a stand-alone project, which is privately owned by the Song Ong

Hydropower Joint Stock Company. The Company has not registered or operated another project in the region surrounding the project boundary.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

Project Type: I. Renewable energy project

Project Category: I.D. Grid connected renewable electricity generation - Version 16 (I.D./Version 16, Sectoral Scope: 01, EB 54)

Reference: Appendix B of the Simplified Modalities & Procedures for small scale CDM project activities (FCCC/KP/CMP/2005/8/Add.1)

B.2 Justification of the choice of the project category:

The details of how the proposed project is complied with the applicable requirements of AMS-I.D is presented in the Table below:

Table 3. Applicability of small scale methodology AMS-I.D.

	Applicability Criteria	Project Activity	Meet criteria?
1	This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to a national or a regional grid. Project activities that displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generated unit shall apply AMS I.F.	The proposed project is based on hydropower, a renewable energy generation source to generate electricity that is supplied to the national grid.	Yes
2	This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the proejct activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	The proposed project involves the installation of a new hydropower plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity.	Yes

3	The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	The project activity results in new reservoir and the power density of the power plant, as per definitions given in the Project Emissions section, is 476.5 W/m^2, which is greater than 4 W/m^2.	Yes
4	In the case of biomass power plants, no other biomass types than renewable biomass are to be used in the project plant.	The project activity involves the construction of a hydropower plant. This criterion is therefore not applicable.	Not applicable
5	If the new unit has both renewable and non-renewable components (e.g.,. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity does not incorporate a mix of renewable and non-renewable components. This criterion is therefore not applicable. The total installation capacity of the proposed project is 8.1MW, which is within the limit of 15MW stipulated for the chose (small-scale) methodology.	Not applicable
6	Combined heat and power (co-generation) systems are not eligible under this category.	There is no combined heat and power component in the project activity. This criterion is therefore not applicable.	Not applicable
7	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The project activity does not involve the addition of renewable energy generation units at an existing facility. This criterion is therefore not applicable.	Not applicable
8	In case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofited or replacement unit shall not exceed the limit of 15MW.	The project activity does not involve the retrofit or replacement of (an) existing unit(s). This criterion is therefore not applicable.	Not applicable

B.3. Description of the project boundary:

According to methodology AMS I.D, version 16 the boundary for this project type is delineated by:

- Geographical site: the area where the project is constructed.
- Physical boundary: the national power grid to which the project is connected.

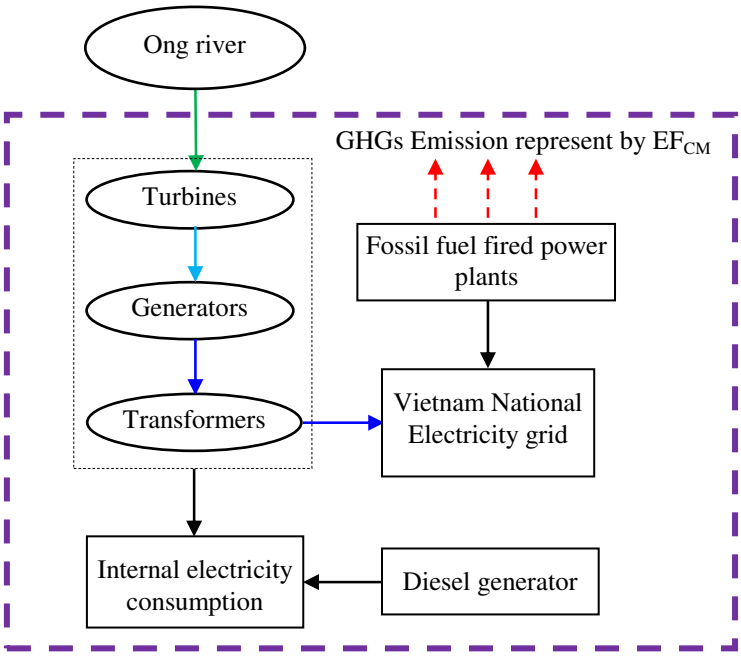

Figure 3: Project boundary

The GHGs and emission sources included in the project boundary are shown in Table below.

Table 4: Sources and gases included in or excluded from the project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	CO_2 emission 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	No	Main emission source. However, as the power density of the project is greater than 10 W/m^2, CH_4 emissions are neglected.
		N_2O	No	Minor emission source
	CO_2 emissions from backup power generation	CO_2	Yes	Main emission source. The volume of emission is estimated based on the operation hours of the backup system, and the volume and type of fossil fuel consumed by the backup system in year *y*. The accurate emission is monitored and calculated de factor in year *y*
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

B.4. Description of baseline and its development:

Because the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The baseline emissions are the product of electrical energy baseline $EG_{BL,\ y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,\ y}\ ^{x}\ EF_{CO2,grid,y}$$

Where:

BE_y	*Baseline Emissions in year y;(tCO_2)*
$EG_{BL,\ y}$	*Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)*
$EF_{CO2,grid,y}$	*CO_2 emission factor of the grid in year y (tCO_2/kWh)*

The Emission Factor can be calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

(b) The weighted average emissions (in tCO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used

Method (a) is used for calculation of the emission factor.

The Vietnam national electricity grid, which is operated and monopolized by the EVN and is the unique transmission and distribution line, to which all power plants in Vietnam are physically connected to is the project electricity system. Thus the baseline scenario of the proposed project is the delivery of equivalent amount of annual power output from the Vietnam national grid to which the proposed project is also connected. The database for calculating the baseline is provided by the EVN.

Following the EB guidance on the consideration of national and/or sectoral policies and circumstances in baseline scenarios (EB 22, annex 3), two types of policies E+ and E- have been examined.

(a) National and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels over less emissions-intensive technologies or fuels. Up to date, the government of Vietnam has not implemented any such E+ policies that are available and/or to be accessed publicly.

(b) National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs): the latest relevant policy is the –National Master Plan on national power development for the period 2006-2015 perspective to 2025 (Master plan VI) approved by the Prime Minister in 2007. According to EB 22, annex 3, it is not needed be taken into account in developing a baseline scenario as it is implemented after 11 November 2001. Furthermore, the main power capacity additions (new power plants) set out in the Master Plan are fossil fuel fired power plants. There are no special incentives for less emission intensive technologies.

So, the baseline scenario of this proposed project refers to a hypothetical situation or the delivery of equivalent amount of annual power output from the Vietnam national grid.

CDM – Executive Board

The development of the baseline will be described in section B.6.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

The incentive from the CDM was aware of by the Project owner since 2004 via the government documents to instruct the implementation of CDM projects in Viet Nam. After receiving the right to invest in Song Ong Hydropower project from the Midland Construction Corporation in Jun 2005, Song Ong Hydropower Joint Stock Company (Song Ong JSC) seriously considered the CDM by signing the MOU on CDM with an independent CDM consultant. Then a stakeholder consultation meeting was organized by the Project owner on 15 August 2005 with the participation of local people and local authorities. The meeting aimed at consulting public opinions on the social and environmental impacts of the proposed project in order to develop it as a CDM activity. This was prior to the starting date of the project activity which is defined as the date of signing the first construction contract on 22 December 2005. However, the construction of the project was last from the end of 2005 until August 2009 that is longer than it was planned initially. The reason was due to the delay in clearance of land to assign it to the Project Owner that was resulted from the dispute on the compensation with one household. The disputed was completely solved in March 2008 and it was confirmed by the authority that the compensation has been paid in consistent with the existing regulations

During the construction stage, to secure the CDM status, the Song Ong Hydropower Joint Stock Company sent official letters to the People Committee, Department of Natural Resources and Environment and Department of Industry of Ninh Thuan province and DNA Vietnam requesting for their support in pursuing the proposed project as a CDM project activity on 08 January 2007. Subsequently, the People's Committee sent an official letter to the DNA on 23 April 2007 verifying the request from the Company. After that, the Project owner signed the negotiation minutes with the CDM consultant for developing and registering of CDM project.

Since then the project owner has been spending continuously efforts in pursuing the CDM, i.e. submitting the project to the DNA for their official approval and looking and negotiating with buyers for CERs generated in parallel with the implementation of the investment project.

CDM Consideration

CDM early consideration and the serious actions to secure the CDM status for the project are reflected in the key milestones in the development of the project listed below:

Table 5: Major milestones in developing the investment project and CDM application

Development of the hydropower project	Activities taken to secure CDM status	Time	Implication on CDM
	Learnt about CDM via Government instructions on CDM implementation	From 2004	
Finalizing the Feasibility Study Report under the ownership of Midland Construction Corporation (MCC)		Jul 2004	

Transferring the right to invest in the proposed project from the MCC to the Song Ong Hydropower Joint Stock Company (Song Ong JSC)		17 Jun 2005	
	Signing the MoU on CDM between the project owner and the independent consultant	15 Jul 2005	Evidence for early CDM consideration
	Submitting the proposal for developing as CDM project by the independent consultant	25 Jul 2005	Evidence for early CDM consideration
	Official letter from Director Board to Management Board on application for the approval of developing and registering Song Ong Hydropower project as a CDM project	30 Jul 2005	Evidence for early CDM consideration
	Presenting the Internal financial analysis with CDM consideration by the vice director of Song Ong JSC	01 Aug 2005	Evidence for early CDM consideration
	Achieving Minutes of meeting to consult public opinions on the social and environmental impacts of the hydropower project in order to develop it as a CDM activity	15 Aug 2005	Evidence for early CDM consideration
	Issuing the decision by Management Board to invest in this project as CDM project	15 Aug 2005	Date of making decision
Signing the first Contracts for construction of main works		22 Dec 2005	Starting date of the project activity
Dispute on compensation with one local household and part of land for construction was not able to clear out to hand over to the project owner that caused the delay in the construction. The final sentence has been made by the government authorities to confirm that the compensation rate applied was fully complied with the existing regulations		Dec 2005 – Mar 2008	
Signing the first Contract for supply of Electromechanical equipment and technical services		16 Jan 2006	

	Seeking for data source for setting up the baseline by the consultant	From Feb 2006	
	Sending a letter from independent consultant to inform about transferring the CDM consultancy to VNEEC	24 Jul 2006	
	Signing the negotiation minutes on development and registration of CDM project with the CDM consultant	28 Oct 2006	
Approving the transfer of the right to invest in the hydropower project from the MCC to the Song Ong JSC by Ninh Thuan People's Committee (Ninh Thuan PC)		18 Dec 2006	Song Ong JSC was officially endorsed s the owner of the proposed project
	Submitting official letters by the project owner to request Ninh Thuan PC, Ninh Thuan Department of Natural Resources and Environment (DONRE) and Ninh Thuan Department of Industry (DOI) to verify and support for the CDM project submission to the DNA	8 Jan 2007	
	Providing guidelines to develop, verifying and approving CDM project by Ninh Thuan DOI	11 Jan 2007	
	Providing guidelines to develop, verifying and approving CDM project by Ninh Thuan DONRE	17 Jan 2007	
	Obtaining a draft CDM development and registration contract with the CDM consultant (CDM consultancy contract)	5 Mar 2007	
	Submitting an official letter verifying and support the CDM development by People's Committee to DNA	23 Apr 2007	
	Signing the contract for EF data supplying with the Institute of Energy	28 Aug 2007	

	Signing the CDM consultancy contract	28 Dec 2007	
	Seeking for Buyer	From early of 2008	
	Issuing the LOA	30 Jun 2008	
	Negotiations with final buyer	Ultimo 2008/ Primo 2009	
	Signed the Exclusive Purchase Agreement with buyer	June 2009	
Project commissioning		Aug 2009	

According to Attachment A to Appendix B to the simplified Modalities & Procedures for small-scale CDM project activities, which has listed various barriers, at least one barrier listed shall be identified due to which the project would not have occurred any way.

The main barrier identified by the project owner at the date of decision making was the financial barrier and the project owner hence made the decision to implement the project as a CDM project activity. The existence of the barrier is demonstrated in the following by benchmark analysis.

As the project generates financial benefits other than CDM related income, investment comparison analysis or benchmark analysis needs to be used to demonstrate additionality. As there are no other credible and realistic baseline scenario alternatives other than electricity supply from the grid, benchmark analysis is chosen to prove additionality.

In the following, pre tax project IRR is used to demonstrate the Additionality of the project.

The benchmark is defined as the local commercial lending rate of 12.6% per year for commercial medium-term and long-term loan rate in rural area published the State Bank of Vietnam[5]. The rate is eligible as the Guidelines on the assessment of Investment Analysis Version 03, EB 51, Report Annex 58 stated "local commercial lending rates…are appropriate benchmarks for a project IRR". The benchmark chosen is conservative as it is lower than the lending rate of 13.6% per annum for medium term in 2005 published by the IMF[6].

So the applied benchmark is 12.6% according to the report of State Bank of Vietnam.

The key assumptions used to calculate the project IRR of the proposed project are presented in Table below.

Table 6. Key assumption for investment analysis

No	Parameter	Unit	Value
1.	Gross capacity[7]	MW	8.1
2.	Annual net electricity generation[8]	MWh	39,994
3.	Annual operating hours[9]	hour	5,000
4.	Load factor[10]	%	57.08

[5] State Bank of Vietnam, ANNUAL REPORT 2OO4, page 47
[6] IMF Country Report No. 07/386, page 24
[7] According to Feasibility Study report
[8] According to Feasibility Study report
[9] According to Feasibility Study report

5.	Total investment cost[11]	billion VND	156.10
6.	Total annual O&M cost[12]	billion VND	2.19
7.	Preparation and construction period[13]	year	3
8.	Life time[14]	year	33
9.	Depreciation period[15]	Year	20
10.	Fair value[16]	Billion VND	0
11.	Electricity price[17]	VND/kWh	573.5
12.	Resources fee[18]	%	2
13.	**Project IRR without CDM**	**%**	**10.83**

This table shows that the project IRR was lower than the benchmark of 12.6% available at the time of decision making which is defined as the date of issuing the Decision on approval of the investment project by the Board of Management on 15 August 2005.

Sensitivity analysis

A sensitivity analysis of the project activity has been conducted to test the robustness of the above calculations. Although the O&M cost accounted less than 20% of total investment cost, it is still included in the project sensitivity analysis for more detail about the financial analysis. So the following parameters are used in the sensitivity analysis of the project activity:

- Annual amount of electricity exported to the national grid
- O&M costs
- Investment costs
- Electricity price set by EVN

Table 7 shows the impact of variations in key factors on the project IRR considering a ±10% variation in the parameters.

Table 7. Sensitivity analysis

[10] The Plant load factor (PLF) for this proposed project was determined by the annual electricity output and the capacity which were provided by the third party contracted by the project owner. So it is in line with the EB 48 annex 11 "*The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company)"*

[11] Decision of Management Board

[12] Decision No 709/QD-NLDK

[13] Project schedule

[14] Lifetime for financial analysis was based on the lifetime of equipment in the Table 1 (30 year operating time) and time of preparation and construction (3 years).

[15] This period is complied with the Vietnamese accounting standard for the project with long life time such as hydropower project. The depreciation is only utilized to calculate the income tax and it does not have a major impact on cash-outflows.

[16] Because the depreciation period of the proposed project was 20 years, so the remaining value (fair value) from the year 21 onward is zero. The applied fair value is in line with the paragraph 4 of "Guidance on Assessment of Investment Analysis" (version 03), Annex 58, EB 51, the fair value "should be calculated in accordance with local accounting regulations where available, or international best practice."

[17] Electricity price negotiation with EVN signed on 2 February 2004

[18] According to the Circular No 153/1998/TT-BTC issued on 26 November 1998 by Ministry of Finance, the resource tax will be calculated as the net electricity outputs supplied to the national electricity grid x electricity price x 2%

No	Parameter	Variation[20]	Project IRR
1	Annual amount of electricity exported to the national grid	10%	12.01%
		-10%	9.59%
2	O&M costs	10%	10.71%
		-10%	10.95%
3	Investment costs	10%	9.70%
		-10%	12.14%
4	Electricity price set by EVN	10%	12.01%
		-10%	9.59%

The sensitivity analysis shows that the Project IRR of the project was lower than the benchmark in all cases.

In conclusion, the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The baseline scenario is that electricity delivered to the national grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation based mainly on coal and oil resources.

I. Project emissions *(PE_y)*

According to the AMS.ID, the project emission for the Hydropower project includes the two proponents of emission from backup power and a new reservoir. The following formula is applied:

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

$PE_{FF,y}$ backup power emissions

$PE_{HP,y}$ the emissions from the reservoir

The emissions from the reservoir ($PE_{HP,y}$)

For hydropower project activity that results in new reservoirs and/or the increase of existing reservoirs, the power density (*PD*) of the project activity shall be calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

[20] The chosen parameters in the sensitivity analysis is selected according to the Decision No 709/QD-NLDK issued on 03 April 2004 by Ministry of Industry regulates for IPP project and they are in line with EB 51, Annex 58, paragraph 17 ”only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenue should be subjected to reasonable variation” and parapraph 18 “the sensitivity analysis should at least cover a range of +10% and -10%,”.

Where:

PD	Power density of the project activity, in 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.

If the *PD* is greater than 4 W/m^2 and less than or equal to 10 W/m^2:

$$PE_{HP,y} = \frac{EF_{Res} \times TEG_y}{1000}$$

Where:

$PE_{HP,y}$	Emission from reservoir expressed as tCO_2e/year
EF_{Res}	the default emission factor for emissions from reservoirs, and the default value as per EB23 is 90 Kg CO_2e /MWh.
TEG_y	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y* (MWh).

If *PD* is greater than 10 W/m^2, then:

$$PE_{HP,y} = 0$$

Emission from diesel backup generators ***($PE_{FF,y}$)***

The project will employ a diesel motor as backup power for emergency situation, such as both cut-off of electricity supply and the hydropower station. According to the "*Tool to calculate project or leakage CO_2 emissions from fossil fuel consumption"*, the annual CO_2 emissions from diesel oil combustion are calculated as follows:

$$PE_{FF,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

$$\text{and } COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:

$PE_{FF,j,y}$	The CO_2 emissions from fossil fuel combustion in process *j* during the year *y*
$FC_{i,j\,y}$	The quantity of fuel type *I* combusted in process *j* during the year *y* (mass or volume unit/year)

$COEF_{i,y}$	The CO_2 emission coefficient of fuel type *I* in year *y* (tCO_2/mass or volume unit)
$NCV_{i,y}$	The weighted average net calorific value of the fuel type *I* in year *y*
$EF_{CO2,i,y}$	The weighted average CO_2 emission factor of fuel type *I* in year *y* (tCO_2/GJ)
i	The fuel types combusted in process *j* during the year *y*

According to the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, the NCV of diesel oil is 43.3 TJ/Gg and the emission factor is 74,800 kgCO2/TJ, and thus the $COEF_{i,y}$ = 0.0032 tCO_2/kg diesel.

II. Baseline emissions *(BE_y)*

Baseline emissions include only CO_2 emissions from electricity generation by fossil fuel fired power plants that are displaced due to the project activity. It is calculated as follows:

$$BE_y = EG_{BL,y} \cdot EF_{grid,CM,y}$$

Where:

BE_y	Baseline emissions in year *y* (tCO_2/yr)
$EG_{BL,y}$	Quantity of net electricity generation supplied by the hydropower plant to 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 of the national electricity grid in year y (tCO_2/MWh)

Calculation of the emission factor (EF) of the national electricity grid

The version 02 of "Tool to calculate the emission factor for an electricity system" determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "operating margin" (OM) and "build margin" (BM) as well as the "combined margin" (CM), including 7 steps as follows:

STEP 1.	Identify the relevant electricity systems.
STEP 2. (optional).	Choose whether to include off-grid power plants in the project electricity system
STEP 3.	Select a method to determine the operating margin (OM)
STEP 4.	Calculate the operating margin emission factor according to the selected method.
STEP 5.	Identify the group of power units to be included in the build margin.
STEP 6.	Calculate the build margin emission factor.
STEP 7.	Calculate the combined margin emissions factor.

Step 1. Identify the relevant electricity systems

This hydropower project will be connected to the national electricity grid of Vietnam, which is operated and monopolized by the EVN. This national electricity grid is the unique transmission and distribution line, to which all power plants in Vietnam are physically connected. Hence the national electricity grid is the project electricity system.

There are electricity imports to the national electricity grid from China - another host country, thus the China Power Grid is the connected electricity system and the emission factor for the imported electricity is zero tons CO_2 per MWh by default.

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

There are 2 options in the tools to choose, including:

- Option I: Only grid power plants are included in the calculation.
- Option II: Both grid power plants and off-grid power plants are included in the calculation.

Because only the data of grid connected power plants is available, so Option I will be chosen for calculating the grid emission factor.

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

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

a) Simple OM;

b) Simple adjusted OM;

c) Dispatch data analysis OM;

d) Average OM.

The method (a) can be used in the project because low-cost/must-run resources in Vietnam is 36.08 % that constitute less than 50% of total grid generation in average of the five most recent years (details see the table below).

Table 12: Rate of low cost/must-run sources based on generation[21]

Year	2003	2004	2005	2006	2007	Average
Rate of low cost/must-run sources generation (%)	46.04	38.40	30.90	32.41	32.66	**36.08**

The data vintage which is used to calculation the Simple OM emission factor is the Ex-ante option of a 3-year generation-weighted average (2005, 2006 and 2007) that is the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

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 units. It is calculated based on one of the following options:

- Option A: Based on data on the net electricity generation and a CO2 emission factor of each power unit,
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

[21] Source: Appendix 7 of Summation of Operation of National Power System in 2007, EVN, January 2008

Because the necessary data for Option A is available so Option A "*Calculation based on average efficiency and electricity generation of each plant"* is used and then the simple OM emission factor is calculated as follows:

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

Where:

$EF_{grid,OM,y}$	the Simple operating margin CO_2 emission factor in year *y* (tCO_2/GWh)
$EG_{m,y}$	the net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (GWh)
$EF_{EL,m,y}$	the CO_2 emission factor of power unit *m* in year *y* (tCO_2/GWh)
m	All power plants/units serving the grid in year *y* except low-cost/must-run power plants/units
y	Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

Option A2. If for a power unit *m* only data on electricity generation and the fuel types used is available, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as follows:

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

Where:

$EF_{CO2,m,i,y}$	average CO2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO2/GJ)
$\eta_{m,y}$	average net energy conversion efficiency of power unit *m* in year *y* (%)

Where several fuel types are used in the power unit, the fuel type with the lowest CO2 emission factor for $EF_{CO2,m,i,y}$ are used.

Table 13: Operating Margin emission factor of the most recent 3 years (2005, 2006 and 2007)[22]

Year	**2005**	**2006**	**2007**	$EF_{grid,OM}$ (tCO_2/MWh)
Total emission of the Vietnam national grid (tCO_2e)	22,635,750	24,417,140	27,053,720	**0.6202**
Total electricity delivered to the grid by fossil power sources (MWh)	36,417,100	39,523,850	43,546,790	

So $EF_{grid,OM,y}$ is derived as follows:

$$\boldsymbol{EF_{grid,OM,y} = 0.6202\ tCO_2/MWh}$$

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:

[22] Source: EVN, 2009. The data and source are submitted to the DOE for validation. EVN provides the most actually updated data relevant to the power generation in Vietnam that could be accessed by public.

a) The set of five power units that have been built most recently, or

b) 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.

In terms of vintage of data, Option 1 shall be chosen for the proposed project. Details are as follows: For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor shall be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period shall be used. This option does not require monitoring the emission factor during the crediting period.

The comparison carried out by the project participants shows that the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) that have been built most recently has the larger annual generation (13,960,040MWh) than the set of five power units that have been built most recently in 2007 does (1,181,040MWh), and hence it is employed.

Step 6. Calculate the build margin emission factor

The BM emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available. It is calculated as follows:

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

Where:

$EF_{grid,BM,y}$	Build 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 year *y* (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

Then $EF_{grid,BM,y}$ is derived as follows:

$$\boldsymbol{EF_{grid,BM,y} = 0.4508\ tCO_2/MWh}$$

Step 7. Calculate the combine margin emissions factor

The CM emissions factor is calculated as follows:

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

Where:

w_{OM} Weighting of OM emissions factor (%)

w_{BM} Weighting of BM emissions factor (%)

For the proposed project, the following default values are used: $w_{OM} = 0.5$ and $w_{BM} = 0.5$ in the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ in the second and third crediting period.

So in the first crediting period, the CM emission factor is derived as follows:

$$EF_{grid,CM,y} = 0.5 \times 0.6202 + 0.5 \times 0.4508 = 0.5355 \text{ tCO}_2\text{/MWh}$$

The baseline emission factor EF shall be fixed for the crediting period.

III. Leakage *(LE_y)*

Because the technology used in this project is neither transferred to nor transferred from another activity leakage is considered to be zero ($L_y = 0$).

IV. Reduction emissions *(ER_y)*

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y Emission reductions in year y (tCO_2e/y).

BE_y Baseline emissions in year y (tCO_2e/y)

PE_y Project emissions in year y (tCO_2/y).

LE_y Leakage emissions in year y (tCO_2/y).

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	**Cap_{BL}**
Data unit:	MW
Description:	Installed capacity of hydropower plant before the implementation of the project activity.
Source of data used:	This is a newly constructed power plant. This value does not exist prior to the implementation of the project activity
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually	The project activity constructs a new hydropower plant, so Cap_{BL} is considered by zero.

applied :	
Any comment:	For calculating the power density (PD)

Data / Parameter:	**A_{BL}**
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full. For new reservoirs, this value is zero.
Source of data used:	This is a newly constructed power plant. This value does not exist prior to the implementation of the project activity
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The project activity builds a new reservoir, so A_{BL} is considered by zero.
Any comment:	For calculating the power density (PD)

Data / Parameter:	**Heat rate**
Data unit:	kcal/kWh
Description:	Heat rate of each power plant or the energy conversion[23]
Source of data used:	Data supplied by EVN
Value applied:	Value applied in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied:	Dispatch data is not disclosed by the Government of Vietnam. EVN provides the most actually updated data relevant to the power generation in Vietnam that could be accessed by public. And this data source is recommended by DNA Vietnam
Any comment:	For calculation of EF_{OM} or EF_{BM}

Data / Parameter:	**$EG_{m,y}$**
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by power plant/unit m in year *y*
Source of data used:	Data supplied by EVN
Value applied:	Value applied in Annex 3

[23] When establishing the baseline, the local or actual data for the plants in calculation is provided by EVN and then endorsed by the Vietnam DNA. By the DNA's request and the fact in Viet Nam, the project participants use the actual data to reflect the actual emission factor but not the default data in the tool.

Justification of the choice of data or description of measurement methods and procedures actually applied:	Dispatch data is not disclosed by the Government of Vietnam. EVN provides the most actually updated data relevant to the power generation in Vietnam that could be accessed by public. And this data source is recommended by DNA Vietnam
Any comment:	For calculation of EF_{OM} or EF_{BM}

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data used:	Default value of the IPCC 2006 Guidelines
Value applied:	Value applied in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied:	With reference to Version 1.1 of "Tool to calculate the emission factor for an electricity system"
Any comment:	For calculation of EF_{OM} or EF_{BM}

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	TJ/Gg
Description:	Net calorific value (energy content) of diesel in year *y*
Source of data used:	IPCC default value
Value applied:	43.3
Justification of the choice of data or description of measurement methods and procedures actually applied:	With reference to Version 02 of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" version 02, report annex 11, EB41
Any comment:	For calculation of $PE_{FFj\,y}$

Data / Parameter:	**$EF_{CO2,diesel,y}$**
Data unit:	kgCO2/TJ
Description:	CO_2 emission factor of diesel in year *y*
Source of data used:	IPCC default value
Value applied:	74,800
Justification of the choice of data or description of measurement methods and procedures actually	With reference to Version 02 of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" version 02, report annex 11, EB41

applied:	
Any comment:	For calculation of $PE_{FFj\,y}$

B.6.3 Ex-ante calculation of emission reductions:

Baseline emissions

Baseline emissions include only CO_2 emissions from electricity generation by fossil fuel fired power plants that are displaced due to the project activity. It is calculated as follows:

$$BE_y = EG_{BL,y} \cdot EF_{grid,CM,y}$$

Where:

EG_y = Electricity supplied by the Song Ong hydropower plant to the grid

$EG_{BL,y}$ = 39,994 MWh

$EF_{grid,CM,y}$ = 0.5355 tCO_2/MWh

therefore:

$$BE_y = 39{,}994 \times 0.5355 = 21{,}416\ tCO_2$$

Project emissions

The project emission includes the tow proponents of emission from backup power and a new reservoir. The following formula is applied:

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

$PE_{FF,y}$ is backup power emissions

$PE_{HP,y}$ is the emissions from the reservoir

The emissions from the reservoir ($PE_{HP,y}$)

The proposed project activity involves the construction of a new hydropower plant with capacity (Cap_{PJ}) of 8.1 MW and a new reservoir with surface (A_{PJ}) of 1.7 ha, thus $A_{BL} = 0$ and $Cap_{BL} = 0$.

The power density of the project activity is derived as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} = \frac{8.1 \times 10^6 - 0}{1.7 \times 10^4 - 0} = 476.5(W / m^2)$$

Because the power density (PD) of power plant is greater than 10 W/m^2 so:

$$PE_{HP,y} = 0\ (tCO_2e / year)$$

Emission from diesel backup generators ($PE_{FF,y}$)

In ex ante emission calculation, the diesel consumption is assumed as zero. Because in a very special case when the generation from the plant is temporarily terminated, diesel back-up generators with installed capacity of 250KVA will be used to generate electricity for internal use in the plant. However,

this case rarely happens and is not at any frequency. Even in case it happens, it's expected that it will last during a couple of days only. Furthermore, fuel consumed for the power backup is expected very small. It is not able to estimate this emission *ex ante*. Therefore, the emission from this source is considered very negligible or $PE_{FF,y} = 0$ *ex ante*. The accurate emission is monitored and calculated PE_{FF} *de factor* in year *y*.

When $FC_{i,j,y}$ is more than or equal to 66.925 tons DO, the project emission of diesel motor is more than or equal to 214.16 tCO_2e, which is 1% of expected annual emission reductions of proposed project, then the project emissions from diesel motor will be accounted in, otherwise, the CO_2 emission from diesel oil combustion is negligible.

Therefore the GHG emission from the project activity is considered as zero.

$$PE_y = PE_{FF,y} + PE_{HP,y} = 0$$

Leakage

Because the technology used in this project is neither transferred to nor transferred from another activity leakage is considered to be zero ($L_y = 0$)

Reduction emissions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - L_y = BE_y$$
$$= 21{,}416\ tCO_2$$

B.6.4 Summary of the ex-ante estimation of emission reductions:

The estimated emission reduction of the project activity is provided in the table below.

Table 9. Emission reduction of the project activity

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2011 (Mar – Dec)	0	17,847	0	17,847
2012	0	21,416	0	21,416
2013	0	21,416	0	21,416
2014	0	21,416	0	21,416
2015	0	21,416	0	21,416
2016	0	21,416	0	21,416
2017	0	21,416	0	21,416
2017 (Jan – Feb)	0	3,569	0	3,569
Total (tonnes of CO_2e)	**0**	**149,912**	**0**	**149,912**

The summary of the ex-ante estimation of emission reductions is shown in Table 9.

Table 10. Ex-ante estimation of emission reductions

Parameters	Unit	Value
1. Capacity	MW	8.1
2. Baseline CO_2 emissions		
• The OM	tCO_2/MWh	0.6202
• The BM	tCO_2/MWh	0.4508
• Baseline emission factor	tCO_2/MWh	0.5355
3. Total baseline CO_2 emissions over the chosen crediting period	tCO_2	**149,912**
4. Total project CO_2emissions over the chosen crediting period	tCO_2	**0**
5. Total leakage CO_2emissions over the chosen crediting period	tCO_2	**0**
6. Total CO_2 emission reductions over the chosen crediting period	**tCO_2**	**149,912**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{y, export}$**
Data unit:	MWh
Description:	Electricity supplied by the proposed hydropower plant to the national grid
Source of data to be used:	Direct measurement at the connection point
Value of data applied for the purpose of calculating expected emission reductions in section B.6	39,994
Description of measurement methods and procedures to be applied:	Two-way power meters will be installed at the grid-connected point to measure the amount of electricity supplied to the grid by the proposed project by the positive direction. The readings of electricity meter will be hourly measured and monthly recorded. The recorded data will be confirmed by the joint balance sheet which will be signed by the representatives of EVN and the project owner. Electronic data will be archived within the crediting period and 2 years after the end of the crediting period.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures to be applied:	The uncertainty level of this data is low. The measurement/ monitoring equipment should be complied with national standard and technology. These equipment and systems should be calibrated and checked every 2 year.
Any comment:	

Data / Parameter:	**$EG_{y, import}$**

Data unit:	MWh
Description:	Electricity supplied by the national grid to the proposed hydropower plant
Source of data to be used:	Direct measurement at the connection point
Value of data applied for the purpose of calculating expected emission reductions in section B.6	0
Description of measurement methods and procedures to be applied:	Two-way power meters will be installed at the grid-connected point to measure the amount of electricity supplied to the grid by the proposed project by the positive direction. The readings of electricity meter will be hourly measured and monthly recorded. The recorded data will be confirmed by the joint balance sheet which will be signed by the representatives of EVN and the project owner. Electronic data will be archived within the crediting period and 2 years after the end of the crediting period.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures to be applied:	The uncertainty level of this data is low. The measurement/ monitoring equipment should be complied with national standard and technology. These equipment and systems should be calibrated and checked every 2 year.
Any comment:	

Data / Parameter:	**$EG_{BL,y}$**
Data unit:	MWh
Description:	Net electricity supplied to the national grid by the proposed hydropower plant
Source of data to be used:	Calculating from $EG_{y,\ import}$ and $EG_{y,\ export}$
Value of data applied for the purpose of calculating expected emission reductions in section B.6	39,994
Description of measurement methods and procedures to be applied:	Calculating by subtracting $EG_{y,\ import}$ from $EG_{y,\ export}$. Double checking by the joint balance sheet issued by EVN and project owner to ensure the consistency. Data will be archived within the crediting period and 2 years after the end of the crediting period.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures to be applied:	The uncertainty level of this data is low
Any comment:	For CERs calculation ($EG_{BL,y,} = EG_{y,\ export} - EG_{y,\ import}$)

Data / Parameter:	**A_{PJ}**
Data unit:	m^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 to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.6	17,000
Description of measurement methods and procedures to be applied:	Measured from topographical surveys, maps, satellite pictures, etc
Monitoring frequency	Yearly
QA/QC procedures to be applied:	The uncertainty level of this data is low
Any comment:	For power density calculation

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 to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.6	8,100,000
Description of measurement methods and procedures to be applied:	Manufacture's nameplate
Monitoring frequency	Yearly
QA/QC procedures to be applied:	
Any comment:	Use for calculating the power density

Data / Parameter:	$FC_{i,j,y}$
Data unit:	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description:	the quantity of fuel type I combusted in process j during the year y in the event of black out of the plant
Source of data to be used:	Onsite measurements

Value of data applied for the purpose of calculating expected emission reductions in section B.6	Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift)
Description of measurement methods and procedures to be applied:	Continuously if backup system is used
Monitoring frequency	Yearly
QA/QC procedures to be applied:	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records
Any comment:	Use for calculating $PE_{FF,y,i}$

B.7.2 Description of the monitoring plan:

Because the baseline emission factor of Vietnam National Grid ($EF_{grid,CM,y}$) is fixed ex-ante (detail in Section B.6), the main data to be monitored is $EG_{BL,y}$. $EG_{BL,y}$ will be calculated according to this formula below:

$$EG_{BL,y,} = EG_{y,\ export} - EG_{y,\ import}$$

The electricity generated from the project activity will be sold to the EVN for the complete project lifetime under a long-term PPA with EVN.

The electricity generated from the project activity before entering into the grid at the grid interconnection point will be measured by a digital kilowatt hour (kWh) meter. The metering system includes the main system and a back-up system. The back-up system will be used in case of failing of the main meter.

Data from the operating meters will be recorded hourly. Additionally, monthly manual readings will be taken from the operating meters.

Monthly, EVN staff and staff of the operation division of the power plant will cross-check manual meter readings with the electronically recorded data and prepare and sign a joint balance sheet which indicates the amount of power fed into the grid within that month.

This joint balance sheet is also the basis of payment by the EVN to the project proponent. Hence, the monitoring plan is well integrated into the standard EVN procedures.

When the electricity generation from the plant is cut off, a backup generator with installed capacity of 250KVA to generate electricity will be used internally within the plant. In such case, the CDM team will keep all relevant records for verification purposes.

For further details see Annex 4.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date: 15/07/ 2009

The responsible entity: **Energy and Environment Consultancy Joint Stock Company (VNEEC)** which is the project participant listed in Annex 1 of this document.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

22/12/2005 (defined as the date when the first construction contract was signed)

This is the earliest contract signed by the project owner to commit for the project's expenditures. This is in accordance with the "CDM Glossary of Terms/version 05", which define the starting date of project as "the earliest date at which either the implementation or construction or real action of a project activity begins".

C.1.2. Expected operational lifetime of the project activity:

30 years 0 months

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

01/03/2011 or date of registration (whichever is later)

C.2.1.2. Length of the first crediting period:

7 years 0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

Pursuant to Decree No 175CP dated 18 November 1994 on issuance of the guidelines to implement the Environment Protection Law and Circular No. 490/1998/TT-BKHCNMT of the Ministry of Science Technology and Environment dated 29 April 1998 on issuance of the guidelines to establish and verify

the environment impact assessment report of investment projects, the EIA report has been carried out for this project. This report was approved by the Department of Natural Resources and Environment of Ninh Thuan (Ninh Thuan DONRE) via the issuance of the Environment Protection Certificate No. 09/PXN-STN&MT on 04 November 2003

Furthermore, based on the impact assessments of the proposed project, the EIA report proposes that the mitigation measures shall be conducted during the construction and operation phases in order to minimize the negative impacts and ensure the long-term benefits from this project.

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The summary of the environmental impacts of the project activity is given below:

1.1. Environment Impacts

1. Impact on land

The proposed project will occupy about 25.53 ha[24] of land, of which about 02 ha is housing land and 10.9 ha is farming land The rest of land occupied (12.63 ha) is empty land along the banks of the Ong river.

No historical culture and archaeological places exist in the project site.

2. Impact on water flow

The project will create a small reservoir with an area of 1.73 ha[25]. Although the reservoir regulates water level on a seasonally basis, the water flow of Ong river will be affected insignificantly in quality and quantity. The content of dissolved oxygen as well as other chemical content as pH, turbidity, etc... will not be changed.

When commissioning, the reservoir will be used for the purpose of generating electricity but also be helpful to regulate water serving for irrigation purpose in the region. The flow regime in the reservoir area as well as downstream areas behind the powerhouse will be more stable which in turn can create favorable conditions for fishery.

So the main impact on water quality is the disposal of septic wastewater discharging from the work camps and waste oil from the truck and vehicle during the construction phase

3. Impacts on ecological system

The Song Ong hydropower project does not cross-out any natural conservation areas, national forests or specialized forest.

After commissioning, the forest area which is temporarily occupied will be reforested, combining with perennial and fruit-tree plantation. The reservoir will adjust local climate to be more moderate. This fine weather not only has positive impacts on local people health but also has favorable impacts on surrounding flora system.

4. Impacts on local environment surrounding the construction site

[24] Environment Impact Assessment Report, page 25
[25] Environment Impact Assessment Report, page 23

During the construction period, the project's activities such as material exploitation, material transportation, mine explosion, and road construction as well as the concentration of workers will have certain negative impacts on local environments, namely local air and noise pollutions.

However, these impacts are temporary and will be terminated after commissioning the construction phase.

1.2. Socio-economic impacts

1. Negative impacts

The main negative impact is from the occupation 25.53 ha of land. Land area replaced by the proposed project activity will be compensated adequately as regulated by the government.

2. Positive impacts

As presented in Section A.2

1.3. Mitigation measures to reduce negative impacts

1. Construction phase

- *Waste collection and treatment*

– Implement regular collection and treatment of solid and liquid wastes, including the construction of a dumping area.

– Conduct reforestation in the temporarily occupied areas and strengthen the slopes to avoid erosions, after accomplishing the construction of main works.

– Conduct awareness on the environmental protection for workers and local people.

- *Local pollution*

– Dust removal measures will be taken such as spraying water along the roads.

– All means/vehicles for transport of construction materials must be covered in order to minimize dust dispersion.

– All transport equipment/vehicles and machines must have operational certifications issued by the Directorate for Standards and Quality.

- *On socio-economic impacts:*

– Implement the compensation plan for the local impacted people according to the government law.

2. Operational phase

Preventive measures and reaction towards environment problems: Installing monitoring equipment to monitor absorption and distortion of water rising and water quality released from the plant and propose suitable preventive measures if required.

1.4. Conclusion

The main negative impacts on environment happen during the construction phase. However, all these impacts will be mitigated by implementing mitigation measures and then will be terminated after accomplishing the construction. Preventive and mitigation measures are planned to conduct during the operation period to reduce and prevent any negative impacts.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Not applicable.

SECTION E. Stakeholders' comments

The stakeholders' consultation has been made pursuant to the existing regulations on development of CDM projects and investment in power generation in Vietnam.

E.1. Brief description how comments by local stakeholders have been invited and compiled:

According to the existing regulations on development of CDM projects in Vietnam, the following stakeholders of the proposed project have been consulted:

- People Committee of Ninh Thuan province (the highest local authority): has supported to develop this project as a CDM project activity in official letter No. 1514/UBND-KT on 23 April 2007.
- Department of Natural Resources and Environment of the Ninh Thuan province: issuing the certificate of registration of Environment Protection Commitment on 04 November 2003 (Confirmation No. 09/PXN-STN&MT).

Besides, the local people of Quang Son commune were involved in the consultation process.

On 04 August 2005, the Project Owner sent an invitation letter to Quang Son People's Committee to invite local authorities and local people to the meeting to consult public opinions on the social and environmental impact of Song Ong hydropower project in order to develop it as the CDM project. Then, on 15 August 2005, a meeting between the project owner and the following representatives of the local people was held in order to inform the project activity:

- Commune's People Committee (CPC): CPC is the lowest administration level in Vietnam administrative hierarchy. Chairman of CPC is elected by the Commune People Council so he well represents the commune's interest.
- Commune's Party Committee this is the key government body in making development strategies at the communal level.
- Commune's Farmer Association, Commune's Women Association and Commune's Young Union: representing for the interests of different groups
- Hamlet's representative: head of La Vang 2 hamlet

Then the internal meetings of local commune were organised subsequently to announce the proposed project activity in non-technical and local language to local residents.

The local people were informed about the meetings by the local authorities.

E.2. Summary of the comments received:

All organizations, except one household agreed that the project will certainly contribute to sustainable development and environment protection in Vietnam and especially this project will increase local budget and reduce poverty. Therefore, they fully support the project and promptly made comments.

Comments of the representatives of local people and local authority are summarized as follows:

- The proposed hydropower project is a clean industrial project and will contribute to socio-economic development of the project's area;
- The good impacts are expected from infrastructure improvement such as road, electricity access, and clean water system. Besides, the increase of awareness and market access are also implies the positive impacts on spiritual and material lives of local people;
- The project will contribute to conservation of forest and environmental protection; and
- The local people expect that the project activity will employ local people for construction as well as operation phases if suitable and will minimise negative impacts during the construction phase.
- There is only one household has argued for the rate of compensation.

The comments of the above mentioned organisations are carefully examined by the project's owner. In general, all comments are positive comments without any main concerns or any objections.

E.3. Report on how due account was taken of any comments received:

The project's owner committed to employ suitable local people to work during the construction and operation phases and to comply and implement mitigation activities during the construction phase as planned in the EIA report in order to minimise negative impacts on local environment.

The compensation for the household having a dispute on the compensation rate has been paid. The government authorities confirmed that the compensation rate is eligible and met the existing governmental regulations and standards on compensation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	**Song Ong Hydropower Joint Stock Company**
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Title:	Director
Salutation:	Mr.
Last Name:	Nguyen
Middle Name:	Hai
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Organization:	**Energy and Environment Consultancy Joint Stock Company**
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from the Annex I parties is involved in the project activity

Annex 3

BASELINE INFORMATION
Data of power plants in the Vietnam national grid in 2005, 2006 and 2007[26]

Data for calculating of $EF_{grid, OM, 2005}$

Sr. No.	Power Station	Fuel/ Technology	Heat Rate Kcal/KWh	Annual Generation GWh		
	EVN Plants			2005	2006	2007
1	**Pha Lai 1**	Coal/ST	3,037.00	2,462.40	2,766.70	2,830.00
2	**Pha Lai 2**	Coal/ST	2,402.00	4,299.00	4,315.00	4,198.00
3	**Uong Bi**	Coal/ST	3,877.00	668.90	759.10	693.90
4	**Uong Bi 2**	Coal/ST	1,880.00			520.00
5	**Ninh Binh**	Coal/ST	3,824.00	689.53	794.70	728.90
6	**Thu Duc**					
	ST	FO/ST	2,694.00	549.99	471.94	603.30
	GT	DO/GT	3,431.00	34.35	32.29	70.26
7	**Can Tho**					
	ST (S4)	FO/ST	2,709.00	127.76	127.87	137.30
	(GT1,2,3,4)	DO/GT	3,056.00	141.63	108.74	150.70
8	**Ba Ria**					
	CCGT	Gas/CCGT	2,210.00	2,150.50	2,024.30	1,982.70
9	**Phu My 1**					
	CCGT	Gas/CCGT	1,746.00	7,179.14	6,421.71	8,076.73
10	**Phu My 2.1**					
	CCGT	Gas/CCGT			6,110.50	

[26] Source: EVN, 2009. The data and source are submitted to the DOE for validation. EVN provides the most actually updated data relevant to the power generation in Viet Nam that could be accessed by public. The data set is required to be used to calculate the EF by the DNA Viet Nam

			1,857.00	3,640.97		5,975.20
11	**Phu My 4**					
	CCGT	Gas/CCGT	1,829.00	3,125.93	3,209.00	3,276.80
	IPPs					
1	Na Duong	Coal	2,748.00	389.00	709.00	744.00
2	Hiep Phuoc	DO	3,232.00	1,424.00	955.00	1,726.00
3	Formosa	Coal	2,270.00	800.00	1,086.00	1,113.00
4	Amatar	DO	3,300.00	67.00	26.00	13.00
5	Bourbon	Co-gen	2,700.00	43.00	57.00	69.00
6	Ve Dan	Gas	2,900.00	463.00	514.00	534.00
7	Cai Lan	DO	3,300.00			81.00
8	Phu My 2.2	Gas	1,573.00	3,719.00	4,855.00	5,004.00
9	Phu My 3	CCGT	1,739.00	4,442.00	4,110.00	3,883.00
10	Cao Ngan	Coal	2,748.00		70.00	445.00
11	Ca Mau	Gas	2,583.20			691.00

Data for calculating of $EF_{grid, BM, 2007}$

Sr. No.	Name of plant	Unit	Date of commissioning	Capacity	Technology	Generation GWh
				[MW]		2007
1	M1 Dai Ninh	M1	11-Dec-07	150	Hydro	0.04
2	Quang Tri					64
	M2 Quang Tri	M2	27-Nov-07	32	Hydro	
	MI Quang Tri	M1	12-Sep-07	32	Hydro	
3	Se San 3A					345
	M2 Se San 3A	M2	22-May-07	54	Hydro	
	M1 Se San 3A	M1	12-Dec-06	54	Hydro	
4	Ca Mau					691
	GT2 Ca Mau	GT2	24-Apr-07	250	Thermal	
	GT3 Ca Mau	GT3	04-Apr-07	250	Thermal	
5	Cai Lan		08-Mar-07	6x6.5	Thermal	81
6	Srok phu mieng					252

	Srok phu mieng	**M2**	**03-Jan-07**	**26**	**Hydro**	
	Srok phu mieng	**M1**	**12-Oct-06**	**25**	**Hydro**	
7	**Uong Bi 2**	**M7**	**18-Dec-06**	**300**	**Thermal**	**520**
8	**Se San 3**					**1130**
	M2 Se San 3	**M2**	**28-Jul-06**	**130**	**Hydro**	
	Ml Se San 3	**M1**	**23-Apr-06**	**130**	**Hydro**	
9	**Cao Ngan**					**445**
	M1 Cao Ngan	**M1**	**03-Feb-06**	**57.5**	**Thermal**	
	M2 Cao Ngan	**M2**	**10-May-06**	**57.5**	**Thermal**	
10	**Na Duong**					**744**
	Na Duong S2	**S2**	**28-Otc-05**	**50**	**Thermal**	
	Na Duong S1	**S1**	**25-Apr-04**	**50**	**Thermal**	
11	**Phu My** 2.2					**5004**
	GT1 Phu My 2.2	**GT1**	**03-Oct-04**	**250**	**Thermal**	
	GT2 Phu My 2.2	**GT2**	**04-Sep-04**	**250**	**Thermal**	
	ST3 Phu My 2.2	**ST3**	**05-Sep-04**	**263**	**Steam Turbine**	
12	**Phu My 4**					**3210**
	GT42 Phu My 4	**GT42**	**03-Sep-04**	**237**	**Thermal**	
	ST43 Phu My 4	**GT41**	**03-Apr-04**	**178**	**Thermal**	
	ST43 Phu My 4	**ST43**	**14-May-04**	**150**	**Steam Turbine**	
13	**S1 Formosa**	**S1**	**31-Mar-04**	**150**	**Thermal**	**1113**
14	**Can Don**					**361**
	M2 Can Don	**M2**	**02-Feb-04**	**38.8**	**Hydro**	
	Ml Can Don	**M1**	**21-Nov-03**	**38.8**	**Hydro**	
15	**Na Loi**		**03-Dec-03**	**3x3.1**	**Hydro**	**47**
16	**Phu My 3**					**3882**
	GT1 Phu My 3	**GT1**	**03-Aug-03**	**237**	**Thermal**	**1247**
	GT2 Phu My 3	**GT2**	**03-Aug-03**	**237**	**Thermal**	**1247**
	ST3 Phu My 3		**03-Aug-03**	**263.7**	**Thermal**	**1388**
17	**M6 Pha lai 2**		**30-May-02**	**300**	**Thermal**	**4198**

IPCC default values

Fuel fossil	CO2 emission factor [kg CO2/TJ]	Source
Diesel	72,600	*IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories*
Residual Fuel Oil	75,500	
Anthracite	94,600	
Gas	54,300	

Annex 4

MONITORING INFORMATION

A. Description of technical equipment

The metering system will be installed at the connecting point in 110kV Ninh Son Station. They are digital meters bi-directly with the accuracy of 0.5 S. The metering system includes the main system and a back-up system.

The meter type used is an electronic 3 phase and details on the technical equipment can be found in the hard copy document "Technical explanation for metering system" as developed by the project proponent and approved by EVN. The following figure mentions the position of installed meter equipment as the connected point.

B. Monitoring organization

The structure of the monitoring group is as follows:

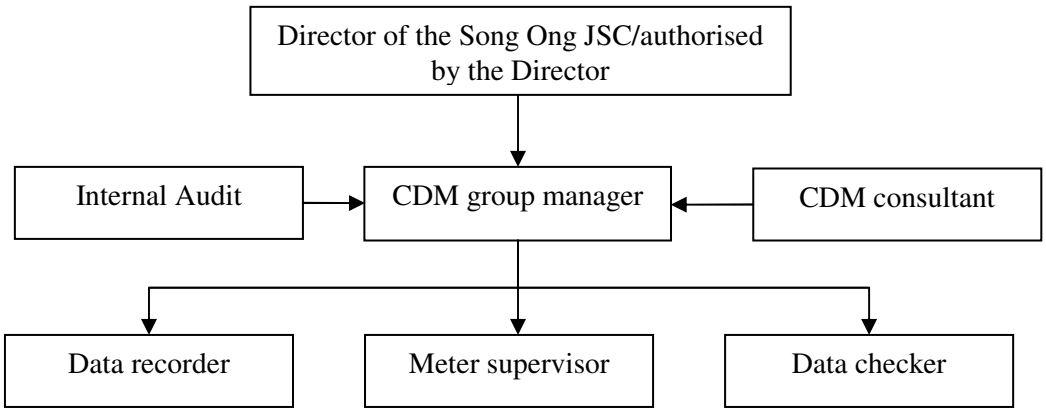

Figure 4: Structure of the monitoring group

The responsibilities of each person involved are elaborated as follows:

Group members and their responsibilities

Person	Responsibility
Director of the Song Ong JSC/authorised by the Director	Check and sign the monitoring report annually
CDM group manager	Managing the whole CDM business of Song Ong power plant, guiding and supervising data recorder after trained by CDM consultant.
CDM consultant	Providing CDM group manager training and technical support about CDM monitoring plan.

Internal auditor	Check the monitoring procedure at least once in a year
Data recorder	Collecting and recording data every month.
Meter supervisor	Checking power meter periodically according to relevant regulation.
Data checker	Double checking the collected data measured by power meter.

C. Monitoring procedure

The steps of monitoring the electricity supplied to the grid and the electricity imported from grid and consumed by the proposed project are as follows:

(1) Persons in charge of data record and meter supervisor from Song Ong power plant together with staff from EVN shall read and collect data from main power meters on the first day of every month, the result will be signed by both parties and kept respectively;

(2) The data from the backup power meter will be hourly recorded by the person in charge of data record of Song Ong power plant. This recorded data will be cross checked with the data from main power meter. Data will be filled in the form provided by VNEEC.

(3) Song Ong power plant provides electricity sales invoice to EVN, and keeps the copy of invoice;

(4) Song Ong power plant provides the record of main, backup power meters and copy of invoices to the verifier of DOE.

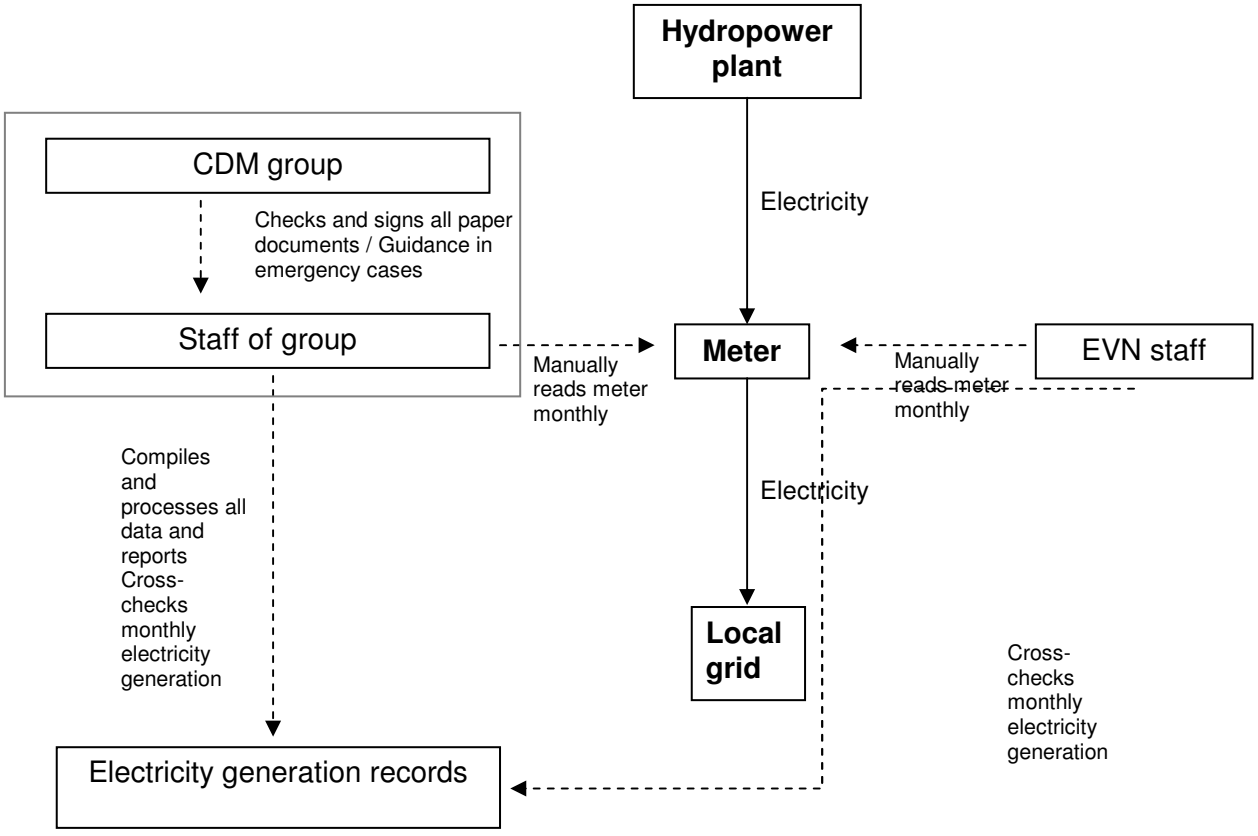

Figure 5: Monitoring process

D. Calibration of metering equipment

Before on-site installation meters will be calibrated and verified by local STAMEQ pursuant to the Decision No 65/2002/QD-BKHCNMT[27]. According to this Decision, calibration and verification for 3 phase meters need to be conducted every second year. This means that calibration will be undertaken by local STAMEQ once in every two-year period during project operation. Local STAMEQ will after every calibration seal the meters so that no interference is possible.

E. Data recording and archiving procedures

- The CDM group appointed by Song Ong power plant shall keep monitored data in electronic archives at the end of every month. Paper documents should be stored in electronic format and copied by CD. Electronic documents should be printed out and kept.
- Song Ong power plant shall keep the copy of electricity sales/purchase invoices (the original electricity sales/purchase invoices shall be kept by Finance Department of Song Ong Hydropower JSC).
- In order to help verifiers obtain documents and information related to the emission reduction of the proposed project, Song Ong Hydropower JSC shall prepare an index of the data documents and monitoring report.
- All the data and information in the form of paper documents shall be archived by the CDM group, with at least one copy backup for each datum.
- All the data shall be kept for 2 years after the crediting period.

F. Emergency procedures

In case of any unforeseen event that is not covered under this monitoring plan, staff of the operation division will immediately inform the chief of the operation division. The chief of the operation division is 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. In doing so, the chief of division shall seek guidance from VNEEC.

G. Training

Before the start of the crediting period, VNEEC will in close collaboration with the chief of the operation division of the power plant develop a training manual and training course for the staff of the operation division that will clearly lay out rules and procedures for all activities related to metering, data recording and processing, data archiving and preparation of monitoring reports.

[27] Decision No 65/2002/QD-BKHCNMT[27] issued by the Minister of Scientific, Technology and Environment on 19 August 2002 to promulgate "The list of meter equipment must be calibrated and verified and the verification procedures".