CDM – Executive Board

CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

A. General description of project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / crediting period

D. Environmental impacts

E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

SECTION A. General description of project activity

A.1. Title of the project activity:

Project title: Thanh Thuy Hydropower Project.
Version 1.0: Prepared for host country approval purpose and validation processes
Completion date: 06/04/2010

A.2. Description of the project activity:

Project Entity and Purpose of the Project Activity

Thanh Thuy hydropower project is being developed by Viet Long Industry Joint Stock Company. The proposed project activity aims to construct and operate a run-of-river hydropower project which is considered as an environmentally friendly solution to growing energy demand. It will be situated in Xin Chai, Thanh Duc and Thanh Thuy Communes, Vi Xuyen District, Ha Giang Province in the north of Viet Nam and is hereafter referred to as "the project activity". The proposed project utilises the Thanh Thuy stream which starts from mountain ranges in Viet Bac region with a steep gradient.

The project will use imported critical items of plant to generate approximately 77.51GWh/pa of power, leading to estimated average annual emission reductions in the order of 43,697tCO_2 during the first seven year crediting period. This will offset the combustion of thousands of tonnes of fossil fuels and, in doing so, will help preserve non-renewable resources by promoting the exploitation and use of renewable resources and technologies.

Currently, due to shortfalls in the amount of electricity available, Viet Nam imports electricity from China, where the grid emission factor is higher than that of Viet Nam.

Contribution to Sustainable Development

An analysis of the economic, social and environmental aspects of the project shows that the project meets the host country's sustainable development criteria for a Clean Development Mechanism project. In order to quantify the sustainable development contribution of this project, the project owner has voluntarily agreed to donate 2% of the CER revenue from the project towards sustainable development initiatives for the local community.

The project has positive impacts with respect to the environment (offsetting fossil fuel use and lowering greenhouse gas emissions), socially (providing jobs, ensuring a reliable electricity supply and developing infrastructure), technologically (technology, knowledge and skill transfer) and economically (satisfying growing energy demands to allow the country to develop, contributing taxes to local budget and alleviating poverty).

CDM – Executive Board

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)
Socialist Republic of Viet Nam (host)	Private Entity: Viet Long Industry Joint Stock Company (as the project owner)	No
Switzerland	Private Entity: Bunge Emissions Holdings Sarl	No

Viet Long Industry Joint Stock Company: set up to develop energy projects and also trading in the energy industry, based in Hanoi, Viet Nam.

Bunge Emissions Holdings Sarl: Bunge is an integrated, global agribusiness and food company operating in the farm-to-consumer food chain. With respect to carbon emission reductions, Bunge has been active in this sector through is subsidiary Ecoinvest carbon SA for a number of years. Bunge Emissions Holdings Sarl, one of the subsidiaries that act as a buyer of CERs, VERs and ERUs and as financial partner, has been active for more than one year with expertise in more than thirty projects in more than ten countries across three continents.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Socialist Republic of Viet Nam

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

Ha Giang Province

A.4.1.3. City/Town/Community etc.:

Xin Chai, Thanh Duc and Thanh Thuy Communes, Vi Xuyen District

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The proposed project location is Ha Giang province in the north of Viet Nam, which is one of the poorest areas in Viet Nam. It is situated on the Thanh Thuy stream which starts from mountain ranges in Viet

CDM – Executive Board

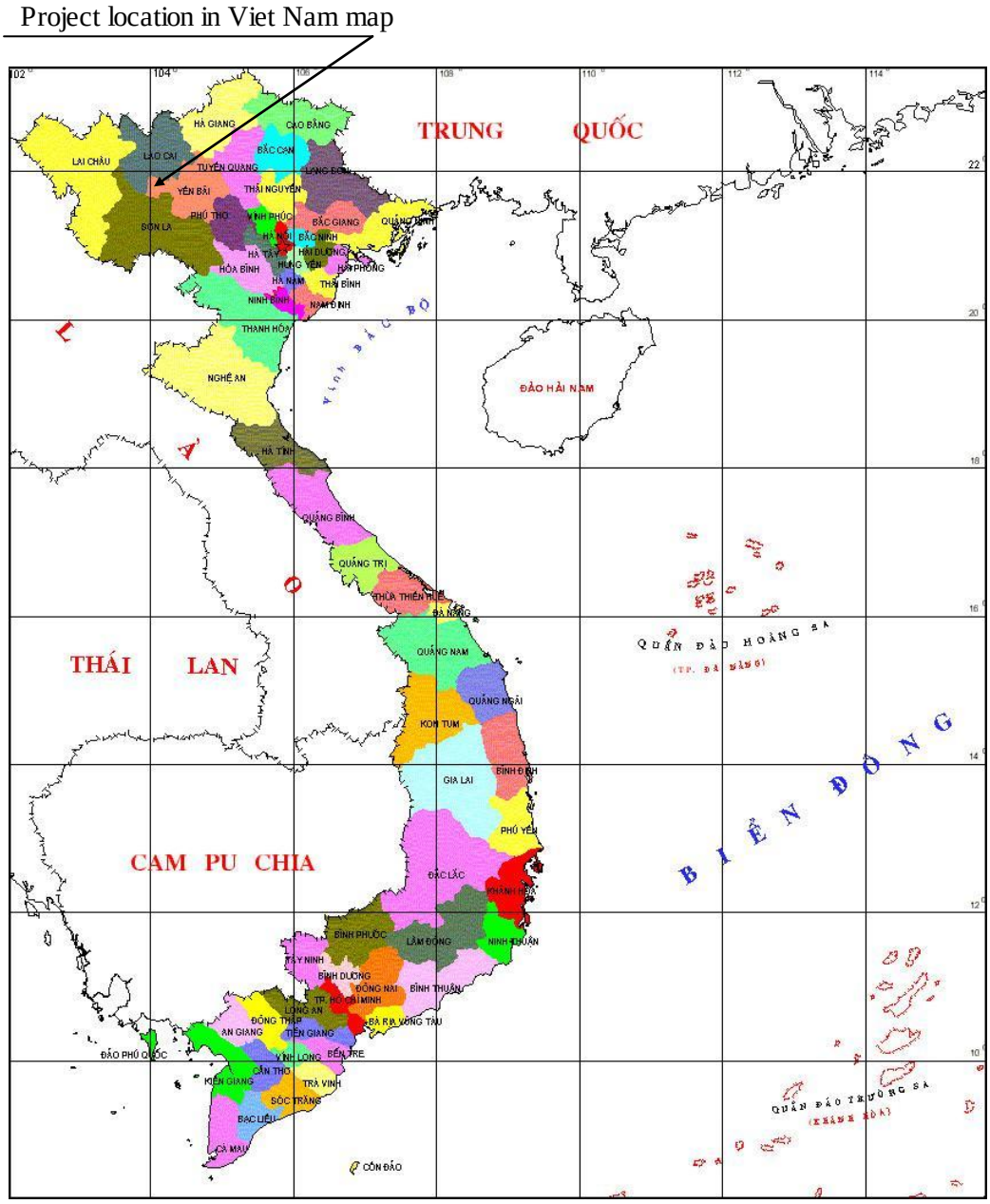
Bac region with the high slope.. The Thanh Thuy watershed is penniform, with the divide running from a height of 2324m to the height of 501m. The project site is 20 km from Ha Giang town, Ha Giang province.

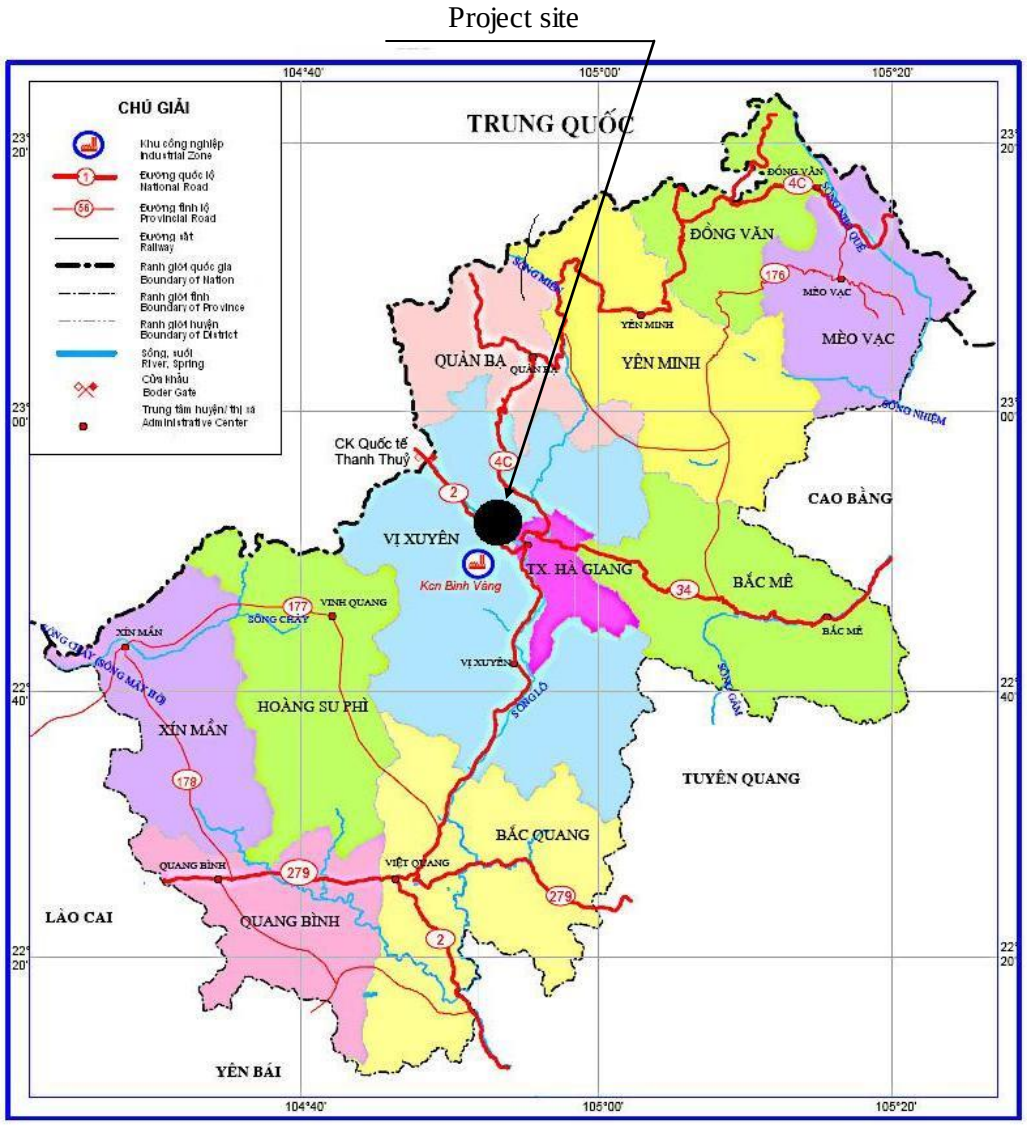
The co-ordinates of the site are:

Cascade 1: latitude of 22°52'00"N to 22°52'32"N and longitude of 104^0 48'16"E to 104°48'23"E.
Cascade 2: latitude of 22°52'32"N to 21°55'07"N and longitude of 104^0 48'23"E to 104°51'35"E.

Figure A.2 shows the location of the project.

Figure A.2 Project Location





A.4.2. Category(ies) of project activity:

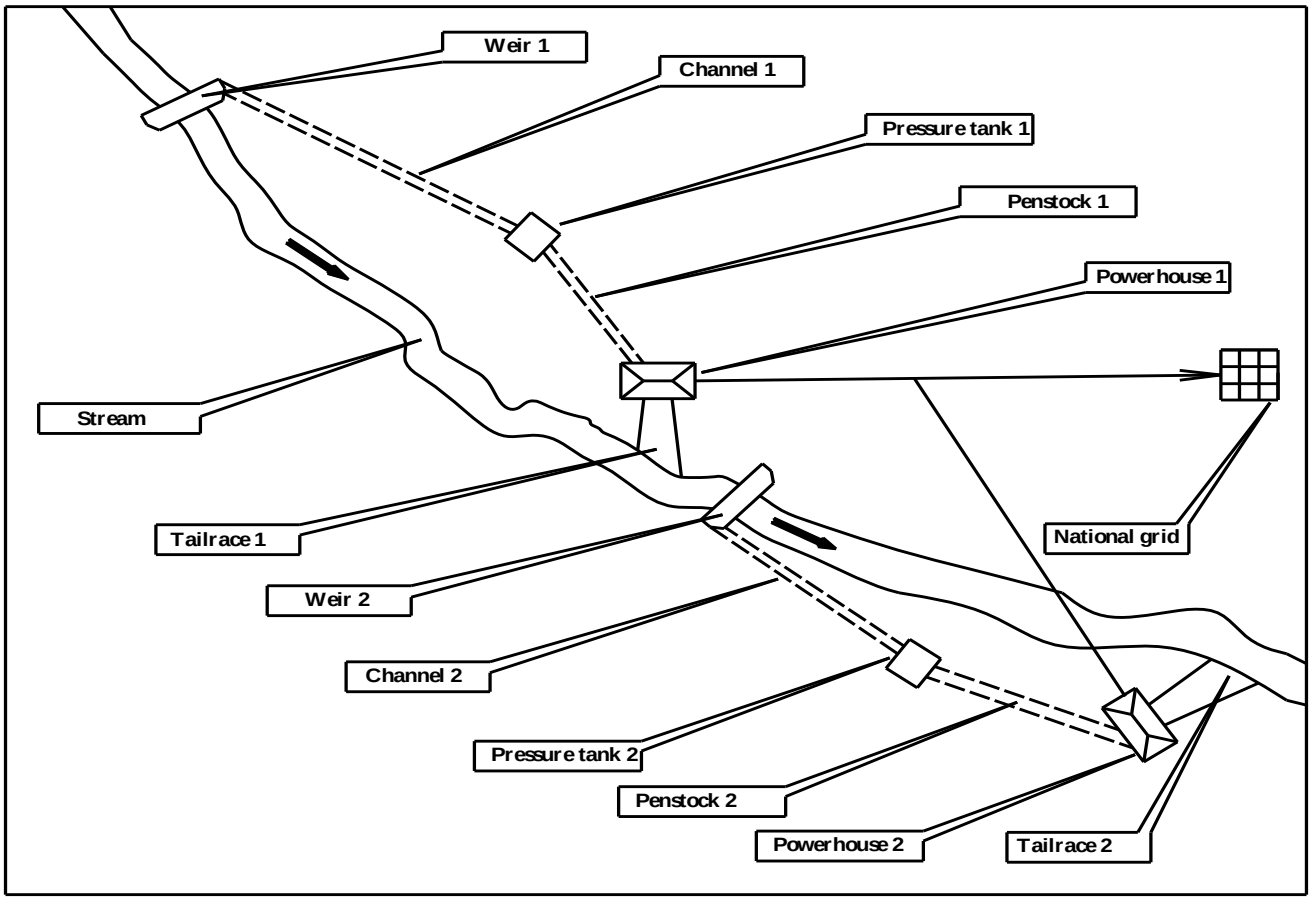
Sectoral Scope 1: Energy industries (renewable/non renewable sources)

A.4.3. Technology to be employed by the project activity:

The proposed project is a run-of-river hydropower plant without reservoir and consists of 2 cascades with a weir, an intake, a forcebay or pressure tank, a penstock, a powerhouse (containing turbines and generators) and a tailrace for both cascades as shown in Fig. A.3. The installed capacity of the project is 18 MW with total expected annual net generated electricity of 77,508 MWh per annum. The specific items of plant employed by the project are expressed in Table A.2. The main items of equipment such as

turbines, generators, governors shall be imported from China. This will contribute to the transfer of skills and technology to Viet Nam. The electricity generated by the first cascade of the project will be delivered to the Viet Nam national grid initially via a new 35 kV transmission line from Thanh Thuy hydropower plant and eventually through a series of transmission lines and transformers to the Vietnamese national electricity grid (full details are provided in Annex 4) After the construction of the second cascade, provision will be made to connect both cascades output to a 100 kV transmission line.

Fig. A.3. A schematic representation of the proposed project activity



The technology of the project is detailed in the Table A.2. This technology is considered to be relatively environmentally friendly as the plant is a run-of-river project without a reservoir. The plant can therefore be constructed and operated in a manner which does not involve significant land clearing or development, as in the case of accumulation reservoir types of projects. This is in addition to the fact that power is generated by a renewable resource and resulting in zero emissions.

CDM – Executive Board

Table A.2. The main technologies used in the project, imported from China

Equipment Of Cascade 1	Items	Specification (4MW Unit)	Specification (2MW Unit)
Turbines	Quantity	2	1
	Capacity	4.180MW	2.105MW
	Type	Horizontal axis, 2 jets	Horizontal axis, 2 jets
	Rated speed	600 rpm	750 rpm
	Runaway speed	1080 rpm	1350 rpm
	Efficiency	87%	89.2%
Generators	Quantity	2	1
	Capacity	4.000 MW	2.000 MW
	Type	Three- phase synchronization, horizontal axis	Three- phase synchronization, horizontal axis
	Cosφ	0.8	0.8
	Rated speed	600 rpm	750 rpm
	Runaway speed	1080 rpm	1350 rpm
	Rated Efficiency	95.7%	95%
Governors	Quantity	2	1
	Type	Electricity-Hydraulic- Digital	Electricity-Hydraulic- Digital
	Working capacity (A)	1000 Kgm	600 Kgm

Equipment Of Cascade 2	Items	Specification (3MW Unit)	Specification (2MW Unit)
Turbines	Quantity	2	1
	Capacity	3.145MW	2.105MW
	Type	Francis, horizontal axis	Francis, horizontal axis
	Rated speed	1000 rpm	1000 rpm
	Runaway speed	1575 rpm	1845rpm
	Efficiency	91.61%	91.61%
Generators	Quantity	2	1
	Capacity	3.000 MW	2.000 MW
	Type	Three- phase synchronization, horizontal axis	Three- phase synchronization, horizontal axis
	Cosφ	0.8	0.8
	Rated speed	1000 rpm	1000 rpm
	Runaway speed	1575 rpm	1845 rpm
	Rated Efficiency	95.4%	95%
Governors	Quantity	2	1
	Type	Electricity-Hydraulic- Digital	Electricity-Hydraulic- Digital
	Working capacity (A)	1000 Kgm	600 Kgm

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

The annual average emission reductions of the proposed project are estimated to be 43,697tCO_2e as shown in Table A.3. The project will employ a renewable crediting period and the total emission reductions are estimated to be 305,952 tCO_2e for the first seven year crediting period.

Table A. 3. The annual emission reductions of the proposed project for the first crediting period

Years	Estimation of annual emission reductions in tonnes of CO_2e
01 October 2010- 30 September2011	25,922
01 October 2011- 30 September2012	46,660
01 October 2012- 30 September2013	46,660
01 October 2013- 30 September2014	46,660
01 October 2014- 30 September2015	46,660
01 October 2015- 30 September2016	46,660
01 October 2016- 30 September2017	46,660
Total estimated reductions (tCO_2e)	**305,952**
Total number of crediting years	**7**
Annual average of the estimated reductions over the crediting period	**43,697**

A.4.5. Public funding of the project activity:

There is no public funding for the proposed project.

SECTION B. Application of a baseline and monitoring methodology

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

Methodology: ACM0002, Consolidated Methodology for Grid Connected Electricity Generation from Renewable Sources, Version 11

As the project's total installed capacity is 18MW (above the 15MW CDM small / large scale project threshold) and employs a renewable source of energy (hydropower) to be exported to a national grid system, the proposed project should be considered under the above methodology and the accompanying tools:

- Tool for the demonstration and assessment of additionality (Version 5.2)
- Tool to calculate the emission factor of an electricity system (Version 2)

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

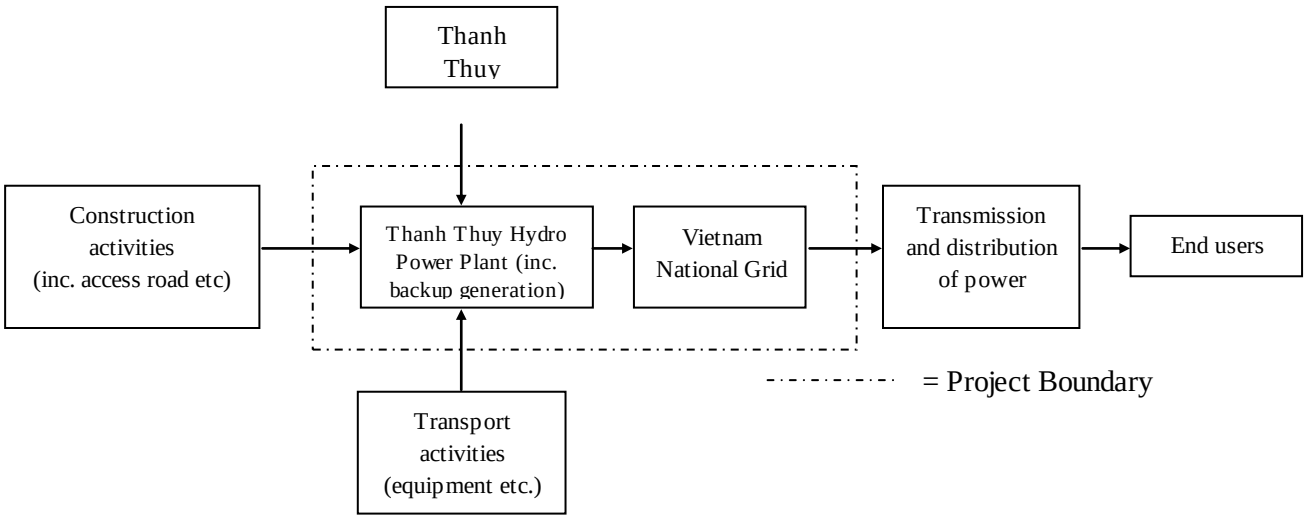
	Applicability Criteria	Project Activity
1	The project activity is the installation or modification/retrofit of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project activity involves the installation of a new run-of-river hydropower project without reservoir.
2	The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section of ACM0002, is greater than 4 W/m2.	There are no reservoir in the project.
3	The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.	This is the case, please refer to section B.4.

B.3. Description of the sources and gases included in the project boundary:

In the proposed project activity, the generated electricity of the project will be delivered to the Viet Nam national grid system. As per the guidance set out in ACM0002, the project boundary is therefore set at the extent of the Viet Nam national grid system which is mainly comprised of a range of thermal, gas,

diesel oil and hydropower plants (please see section B.4.). This is represented diagrammatically in Fig. B.1.

Figure B.1. The project boundary



As per ACM0002/Ver 11, the following sources and gases are included the project boundary

Table B.1. Source and gases in the project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	
Project activities	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	Excluded as per the guidance in the ACM0002 (Version 11
		CH_4	No	No reservoir
		N_2O	No	Minor emission source

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

As per the guidance of ACM0002, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to Calculate the Emission Factor for an Electricity System".

CDM – Executive Board

The state-owned company Electricity of Viet Nam (EVN) dominates power production, transmission, and sales in Viet Nam. One of the key assumptions made in determining the baseline is to treat the whole grid system as one entity. The grid system is not divided into provincial sub-groups (as in China for example), the only distinctions made by the EVN as to categorising power stations are by type (coal, gas, hydropower etc.), geographical location (North, Central and South) and ownership (state, independent power producer, "build-operate-transfer"). Over the period 2001-2005, total capacity in power sources has increased from 6,192 MW in the year 2000, to 11,298 MW in 2005 and the greatest contributor to the total amount of electricity generated are fossil fuel fired plants.[1]

Data Used to Determine Baseline Emissions

Table B.2 shows the parameters required to calculate the emission factor of each power plant that serves the national grid system.

Table B.2. Data used to determine baseline emissions

Parameter	Detail	Source
Amount of fossil fuel consumed	Amount of fossil fuel consumed by the power plant in the year	EVN dispatch data
Net calorific value of fuel consumed	Energy content of the fuel used by the power plant	IPCC data
Net electricity generated and delivered to the grid	Energy generated minus electricity consumed by the power plant itself	EVN dispatch data
Emission factor of fuel consumed	The amount of carbon dioxide released as a result of	IPCC data
Date power plant was built	The power plant is considered to be built when it started to supply electricity to the grid	National Power Development Master Plan in the period 2006-15 and Outlook to 2025.

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 CDM project activity (assessment and demonstration of additionality):

With the implementation of the project activity, the emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. The project activity is *additional* and would have not occurred anyway due to the barriers identified below.

In compliance with the "Tool for the Demonstration and Assessment of Additionality", the investment analysis (step 2) has been selected as an appropriate method to demonstrate additionality:

[1] Source: Electricity of Vietnam

Step 1. Identification of Alternatives to the Project Activity Consistent with Current Laws and Regulations

Sub-step 1a: Define Alternatives to the Project Activity

The following three scenarios are presented for consideration with respect to likelihood and credibility:

a. The proposed project activity undertaken without being registered as a CDM project activity;
b. Construction of a fossil-fuel fired power plant or any other energy renewable power plants with equivalent amount of annual electricity generation;
c. Continuation of the current situation (no project activity or other alternatives undertaken)

An analysis of the three options identified above to identify the most realistic and credible alternative is presented below:

- Alternative (a) is not a credible nor realistic alternative as, according to the investment analysis presented in section B.5 below, without the assistance of the CDM, the project is not a financially attractive for investment.
- Alternative (b) is also not realistic nor credible because, with respect to energy, the Viet Long Industry J.S.C only has experience in the field of hydropower project development and therefore a coal fired power station or wind farm is not an option.
- Alternative (c), where there is a continuation of the current situation (no project activity or other alternatives undertaken) and electricity is provided from the Viet Nam national grid, is a credible and realistic scenario (hence it is the baseline scenario).

Sub-step 1.b: Consistency with Mandatory Laws and Regulations

The only identified alternative to the project proceeding with carbon revenue from the CDM is alternative (c) and this in compliance with all Viet Nam legal and regulatory requirements.

Step 2: Investment Analysis

Sub-step 2a: Determine Appropriate Analysis Method

This is a large scale project activity. Hence, additionality of the project has to be demonstrated as per the Additionality Tool Ver. 05.2. The tool for the demonstration and assessment of additionality provides three methods of analysis: simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III).

The simple cost analysis (option I) cannot be employed because the proposed project produces economic benefits other than CDM related income (through the sale of electricity). Therefore, the project developer has the choice of using either Option II - "investment comparison analysis" or Option III - benchmark analysis. Of the alternatives, the project developer has chosen option III- benchmark analysis to demonstrate the additionality of the proposed project activity.

Sub-step 2b: Option III. Apply Benchmark Analysis

Additionality Tool, version 05.2 stipulates that the project developer should identify the financial / economic indicator, such as IRR, most suitable for the project type and decision context. As prescribed by the Additionality Tool itself, the project developer has chosen project IRR to demonstrate the additionality.

The project IRR needs to be compared with a benchmark to prove the financial unattractiveness of the project. The Additionality Tool stipulates that the benchmark/discount rates shall be derived from *inter alia* "Government/official approved benchmark where such benchmarks are used for investment decisions";The 'Guidance on the Assessment of Investment Analysis', issued by EB in its 41st meeting, requires that *"In the cases of projects which could be developed by an entity other than the project participant the benchmark should be based on publicly available data sources which can be clearly validated by the DOE".* Hence, when the Additionality Tool and Guidance are read together, the selected benchmark should satisfy three conditions: it should be Government/official approved; it should be used for investment decisions; and it should be publicly available data source so that DOE can validate.

Guidance on the Assessment of Investment Analysis states that, "In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR". Keeping the above in view, the project developer has selected the commercial lending rate offered by commercial banks in Viet Nam at the time the decision making. The average prime lending rate over a period preceding the decision was used with the legally mandated mark up[2] to arrive at the commercial lending rate of 12.54%.

- The lending rate of commercial banks is based on the State Bank of Viet Nam and hence it is *official rate*;
- The benchmark is *used* by commercial banks *to take a financing decision* in as much as a project which cannot service the interest does not merit consideration by bank; and
- The benchmark is *publicly available* data source and *verifiable by DOE*.

The benchmark chosen, therefore, fulfils all the criteria laid down by the Additionality Tool[3] and is considered conservative. The project developer has selected this rate as the benchmark as this covers the cost of the loan and also provides a return on equity (which is much riskier than term loan).

Sub-step 2c: Calculation and Comparison of Financial Indicators

The following input parameters were considered in making the projected income statement and IRR computation:

[2] State Bank of Viet Nam and Vietnamese civil law codes

[3] And also the *Guidance on the Assessment of Investment Analysis*, Point No.11 (page No.3)

CDM – Executive Board

Table B.3: Key Input Parameters

Parameters	Value	Basis
Installed capacity (MW)	18 (10 for first cascade 8 for second)	Feasibility Report
Plant load factor (%)	50.16%	Computed
Annual power supplied to the grid (MWh)	77,508	From Feasibility Report
Auxiliary consumption (as percent of generation)	2%	General norm, transmission and distribution losses
Total Investment (million VND)	431,591,763	Feasibility Report
Loan: equity ratio	70:30	Feasibility Report
Power tariff (Dong/ kWh)	666.86	Feasibility Report
O&M cost (as percent of project cost)	0.75%	EVN regulations 2014/QD-BCN
Escalation in O&M cost (per annum)	3%	Estimate
Insurance (as percent of project cost)	0.25	Estimate
Interest rate on term loan – in VND	12%	Feasibility Report
Loan repayment period (years)	10	Feasibility Report
Initial moratorium period (years)	2	Assumed and common practice for such loans in Viet Nam
Depreciation – Equipment	10%	Present practice in Viet Nam and Feasibility Report
-Civil works	5%	Present practice in Viet Nam and Feasibility Report
Natural Resource Tax (as percent of revenue)	2%	Ordinance on Natural Resource Tax
Enterprise Income Tax First four years Next nine years After thirteen years	 0% 12.5% 25%	Law No 14/2008/QH12 dt 03/6/2008 and Decree No. 124/2008/ND-CP dt. 11/12/2008
Life of the project (years)	30	Feasibility Report

Investment in the construction of electric power plants falls under List A domains and lines of business and hence is eligible for investment preferences as per the Decree No. 124/2008/ND-CP dated 11th December 2008. Moreover, the project activity is located in List C of geographical area with special economic difficulties and hence is eligible for investment preferences by the said Decree. The line of activity and the location of the project, therefore entitles it to certain tax concessions, which have been duly accounted for in computation of tax. Moreover, it has been ensured that all the expenditures are allowable as charge on the profit and loss account as per the Decree.

The income statement of the project and the project IRR has been computed based on the above input parameters. In computing the project IRR, profit after tax, depreciation, interest on term loan and salvage value have been taken as cash inflow and the entire project cost as cash outflow as suggested by the Guidance on the Assessment of Investment Analysis. Although the IRR has been computed for a period

of 30 years and the entire assets are fully depreciated[4], salvage value has been provided for. Based on the above, the project IRR works out to 9.20% as against the benchmark return of 12.54%. Table B.4 presents the result of the IRR analysis in comparison with the bench mark identified in sub-step 2b.

Table B.4: Comparison of IRR with the benchmark rate of return

	Project IRR	Benchmark
Values	9.20%	12.54%

The IRR estimate is quite conservative in the sense that the project cost does not include any of the administrative and operational expenses during construction. Likewise, the operating statement is also conservative as the escalation in O&M expenses has been taken only at 3% as against the inflation rate of over 25% and administrative salaries have not been provided. If provisions are made for this, IRR will come down further.

Sub-step 2d: Sensitivity Analysis

The robustness of the conclusion drawn above has been tested by subjecting critical assumptions to reasonable variations. Guidance on the Assessment of Investment Analysis defines critical assumptions as those which constitute more than 20% of total project costs or total project revenue and reasonable variation has been defined as a range of +10% and - 10% (item No 16 and 17 of the Guidance). Four factors have been identified as sensitive, viz., project cost, PLF, O&M cost and tariff. Though O&M cost does not account for 20% of total cost (total operating cost), it has been considered as interest on term loan and depreciation are not subject to variations as they are determined by project cost and loan documentation. Likewise, both civil works and equipment cost account for more than 20% of the total cost. Though non-tangible costs account for less than 20%, as they are eventually apportioned to tangible fixed assets, entire project cost has been subjected to reasonable variation as. The impact of a 'reasonable variation' in these three parameters on the project IRR have been worked out and the results are as follows:

Table B5: Sensitivity Analysis

Project IRR	-10%	0	+10%
PLF	7.83%	9.20%	10.48%
Project cost	10.82%	9.20%	7.79%
O&M cost	9.31%	9.20%	9.09%
Tariff	7.80%	9.20%	10.51%
Benchmark	12.54%		

[4] Including the additional investment provided in the 16 the year as permitted by the Guidance on the Assessment of Investment Analysis (item No.1)

CDM – Executive Board

It could be seen from the above that even under the most optimistic conditions, the project IRR will not cross the benchmark. The financial unattractiveness of the project is thus evident. Having said that, it needs to be mentioned that the PLF is based on the hydrological study and the most optimistic scenario is usually considered while preparing the income statement. Since it is dependent upon climatic conditions, higher PLF is a very remote possibility. O&M costs is not a very major assumption at all and the project is absolutely insensitive to the change in the O&M cost as could be seen that project IRR goes up by only 11 basis points when the O&M cost is brought down by 10%.

Reduction in project cost is also equally highly unlikely as the country hits the highest inflation within a decade. Though the inflation rate has touched 15.7% in February 2008[5] and still had gone up further to 25.2% in May 2008. In the above background, the possibility of any reduction in project cost is highly unlikely. In fact, the costs associated with the project have risen significantly since the feasibility study whilst the power tariff will be locked in the power purchase agreement (PPA). In the above background, the most plausible scenario is only a reduction in the PLF and increase in project cost and not the other way round. Such an occurrence will undoubtedly worsen the project's IRR further and gives greater need for assistance from the CDM.

The project, therefore is not a business-as-usual scenario and hence additional. The CDM benefits will enable the project to improve its return and become viable, as evident from the fact that with CDM benefits, the project will earn a return of 16.29%. It is in the above background, the CDM registration is requested.

Step 3: Barrier Analysis

Sub-step 3a: Identify Barriers That Would Prevent the Implementation of the Proposed CDM Project Activity

As per the Additionality Tool, the project developer can choose either investment analysis or barrier analysis to demonstrate the additionality. The foregoing paragraphs have already established the additionality of the project based on investment analysis. However, since the project faces a few barriers also, which cannot be succinctly brought out by the investment analysis, the project developer has chosen to highlight some of the non-investment barriers faced by the project activity as well. The Additionality Tool lists out the following four barriers of which at least there should be one barrier preventing the implementation of the proposed project activity without CDM benefits:

a) Investment barrier
b) Technological barrier
c) Barrier due to prevailing practice and
d) Other barriers

Of the above, the project faces an instance of each barrier.

Technological barrier: The project suffers from non availability of skilled and/or trained labour force to operate the plant, lack of infrastructure and risk of technological failure. As mentioned earlier, the project is located in Category 'C' area which has been classified as geographical area with *special economic*

[5] http://www.iht.com/articles/ap/2008/02/28/business/AS-FIN-ECO-Vietnam-Inflation.php, downloaded on August. 15, 2008

difficulties. The nearest habitat is far from the site, therefore the location and non-availability of social infrastructure near the project location renders the project susceptible to the barrier of non-availability of skilled and /or trained labour force to operate the plant. To overcome this barrier, the project owner plans to award a training contract to equip local people for plant operation.

The project area suffers from some disadvantages of infrastructure. That apart, the project participants will be required to spend approximately VND 11 billion to construct access roads to the project site. Moreover, the construction of the project is only executed during the dry season from November of the previous year to April of the next year. Whilst the construction of road no doubt brings benefits to the location in terms of improved infrastructure, the additional cost does negatively impact the profitability of the project.

Barrier Due To Prevailing Practice: The clear majority of hydro power plants are developed by the State in the form of state owned IPPs, EVN ownership or by the state taking a shareholding in the project (85% of projects). Of the plants remaining, there are very few that would cross the large scale threshold of 15MW generation capacity, as in the case of Thanh Thuy (only 15% of projects). This is discussed further in the common practice analysis below.

Other Barriers: Policy: Private investment has only been possible in Viet Nam relatively recently and EVN does not have policies in place to promote the development of small scale hydropower plants, e.g. through preferential tariffs. Neither are there any preferential policies for projects which are located in remote areas or do not employ reservoirs. There is however a policy in place to promote the use of accumulation reservoir projects (Ministry of Industry issued Decision No. 3837/QD-BCN on 22/11/2005) but whilst they may be able to generate electricity on a larger scale, their development is more often than not associated with deforestation, resettlement and flooding. Also, the development of small scale hydropower projects located in areas such as those where the proposed project is planned is discouraged, "some works are located in the areas difficult to exploit and far from the power consumption centre so they will not be developed in the short-term period" (EVN 2006). Further, due to the state owned EVN's monopoly position, the negotiation of a power purchase agreement is difficult for the independent project developer, where there is no State involvement in the project (it is still common for the state to take a shareholding position) as the market is far from transparent.

Further, the financing and construction phase of the proposed project have taken place during the period of the high inflation rate Viet Nam has experienced since 1996. The rate of inflation recorded in /Viet Nam was as high as 25% in May 2007. High inflation will affect the construction costs adversely as domestic material and transportation costs are bound to rise. The CDM revenue would surely help in absorbing a part of this unforeseen additional cost burden.

Sub-step 3b: Show That the Identified Barriers Would Not Prevent the Implementation of At least One of the Alternatives (Except the Proposed Project Activity).

None of these barriers would apply to State owned thermal power projects and hydropower power projects as these projects are invariably located in regions with well developed infrastructure and human habitation. These projects also have Government backing. In the above background, registration of the project as a CDM activity will enable the project proponent to overcome the barriers, as CER revenue would compensate the loss likely to be incurred by the project proponent in case the risks become reality.

CDM – Executive Board

Setting up of hydro power projects for this size and that too in the private sector is not a common practice in Viet Nam. Most of the hydro power plants are owned by the State or benefit from State involvement at some level, most important in a country such as Viet Nam where contacts and government connections are key. Based upon an exhaustive research on the hydropower projects in Viet Nam, 143 hydropower plants (those seeking CDM registration or not yet started construction were not included in the study) were identified which included details of hydro power plants presently in operation[6], those that have permission granted to build power plants from 2006-2008[7] and those that fall into the build own operate (BOO) or build operate transfer (BOT) category of projects[8].

The results of this study have been furnished to the DOE and have been categorised into those, which are privately owned and those that benefit from some kind of state involvement. Examples of the latter may be power plants which are wholly owned by the EVN, are state owned IPPs or have the EVN as a shareholder / equity investor.
It can be seen from the study that:

- The clear majority of hydro power plants are developed by the State in the form of state owned IPPs, EVN ownership or by the state taking a shareholding in the power producer (121 projects or 85% of projects listed).
- Of the plants remaining, there are few that are considered privately owned (22 or 15% of identified projects) and fewer still would cross the CDM large scale / small scale threshold of 15MW generation capacity as Ho Bon does (only 7 or 5% of projects).

Hence, construction of hydropower plants of the size of Thanh Thuy by private corporations is not a common practice in Viet Nam.

It should be noted that in the interest of conservatism, for those plants for which no information could be publicly found (the market is not transparent), it has been assumed that there is private ownership. So, in fact, the figures above could go further to demonstrate that the Thanh Thuy project is not common practice.

Further, the companies that have been identified as private investors have been found to be large corporations. Viet Long Industry Joint Stock Company, the developer of the Thanh Thuy project is made up from individuals and so resources and capital might not be mobilised so easily.

It is not only that the State Utility has monopolized all the large power plants; it is proposing to enter into small scale hydro power projects as well. A news report in Viet Nam Business Finance reveals that "the State-owned Electricity of Viet Nam Group (EVN) plans to build 37 small hydropower plants with the total investment of VND3.1 trillion (US$193.75 million) in the Viet Nam-China border by 2010"[9]

[6] http://www.industcards.com/hydro-vietnam.htm, downloaded on August 14, 2008

[7] EVN Masterplan for Electricity production 2005-2015

[8] Overview of Policy Instruments for the Promotion of Renewable Energy and Energy Efficiency in Vietnam, 2005: http://www.serd.ait.ac.th/cogen/62/reports/countries/vietnam.pdf

[9]3 http://www.vnbusinessnews.com/2008/06/evn-to-build-37-small-hydropower-plants.html . Downloaded 14 August 2008.

The fact that setting up of hydro power plants such as Thanh Thuy by the private sector is not a common practice places the project in a disadvantageous situation vis-à-vis its counterpart, viz., the State Utility – EVN. The involvement of state owned companies in a country like Viet Nam helps the project significantly, as in the power purchase agreement, permit application and People's Committee approval processes they can use their Government contacts. However, in the case of Viet Long Industry J.S.C, the project developer, there is no state involvement and its shareholders are individuals and not even organisations. Besides, by virtue of the fact that the State projects are large in size as revealed in the above table, the economies of scale work in favour of the projects and render them more profitable. This renders the investment safer. The Thanh Thuy hydropower plant project is located in a very remote part of one of the poorest provinces in Viet Nam. Hence, the project has to confront more barriers than even a similar sized project if it is set up by the State Utility. The CDM registration will therefore enable the Thanh Thuy hydropower plant to overcome the barriers and contribute its mite to the global emission reduction effort.

Perhaps most significantly however, the projects detailed above have not been subject to the relatively recent surge in price inflation that Viet Nam has witnessed since mid-late 2007. In addition to price inflation, interest rates have risen sharply in a bid to curb rising costs and this has led to a large number of hydropower plants' development being stopped due to unfavourable economic conditions. The CDM will enable the Thanh Thuy hydropower plant to be developed despite this, and ensure emission reductions can take place.

Prior Consideration of the CDM

The CDM benefit was identified by the Board of Directors of the Thanh Thuy hydropower plant project as imperative to make the project financially attractive. A resolution to this effect was passed by the Board of Directors on 20 April 2008. After the Board accorded approval, a contract was signed with CDM consultant on 26th June 2008. The construction contract has been signed on 08 December 2008. And following the guidelines from EB on prior consideration of the CDM, the Notification from the project owner has been acknowledged on 06 May 2009 (please refer to Table B.6).

Table B.6

Action	Date	Source
First presentation from CDM consultant	01/04/2008	Interview
Board of Directors meeting to decide to proceed with Than Thuy project as CDM revenue makes project feasible	20/04/2008	Board resolution
Contract for CDM	26/06/2008	Carbon Asset Management Agreement
First contract for civil construction signed*	08/12/2008	No. 05/HD-XD
Prior Consideration of CDM	06/05/2009	No. 16/TB-CT

*Taken as project start date

It could be seen from the above that the PP had taken simultaneous action to secure CDM status with the implementation of the project. Therefore, the project activity fulfils both the conditions stipulated by EB vide annex 22 in its 49th meeting.

CDM – Executive Board

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

In order to calculate the baseline, project and leakage emissions and hence emission reductions, methodology ACM0002 is used in conjunction with the "Tool to calculate the emission factor for an electricity system (Version 2)" including the following steps:

1. Calculation of baseline emissions;
2. Calculation of project emissions;
3. Calculating leakage emissions;
4. Calculating emission reductions.

1. Baseline Emissions

Step 1: Identify the Relevant Electric Power System

As per section B.4., the identified business as usual scenario is the continued generation of power by the Vietnamese national grid system, and baseline emissions are those produced as a result of this. Therefore, the Viet Nam national grid is identified as the relevant electric power system.

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

This step is skipped as only grid connected power plants are considered.

Step 3: Select an Operating Margin (OM) Method

In this case, the Simple Operating Margin has been calculated. In order to use the Operating Margin, assumption has been made with respect to "low cost" and "must run" resources. These are defined as "as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants."

The state owned EVN defines only hydropower as "low cost" and does not make any reference to "must run" power stations in its documentation. As the contribution of hydropower to the grid's supply capacity is well below 50%, it is safe to assume that "low cost" and "must run" power stations do not make up more than 50% of the grid's input (please refer to table B5). Therefore the "Simple Operating Margin" can be calculated for the purpose of deriving the grid emission factor as per Step 3 of the tool to calculate emission factor from an electricity system.[1]

Table B.5. Contribution of low cost and "must run" sources to overall power generation in Viet Nam[10]

Year	2003	2004	2005	2006	2007	Average
Percentage share of low cost and "must run" power stations	47.6	40.5	32.8	34.5	34.4	38.0

The emission factor using the Simple Operating method has been calculated using a three year generation-weighted average, based on 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. The years used are therefore 2005-07 inclusive.

Step 4: Calculate the Operating Margin Emission Factor According to the Selected Method

In the case of Viet Nam, some information regarding the output of the state owned EVN is private and confidential and / or unavailable publicly. As such, Option A under Step 4 of the tool to calculate grid emissions is employed. Here the Simple OM emission factor is calculated based on the electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_{m} EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (1)$$

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 year *y* (tCO_2/MWh)
m = All power units serving the grid in year *y* except low cost / must run power units
y = 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).

If for a power unit *m* data on fuel consumption and electricity generation is available, the emission factor ($EF_{EL,m,y}$) should be determined as follows (Option A1):

[10] EVN data and interview with EVN generation expert, attended by the DOE

CDM – Executive Board

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}} \quad (2)$$

Where:

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in 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 (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)

$EF_{CO2,I,y}$ = CO_2 emission factor of fossil fuel type *i* in 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 units

I = All fossil fuel types combusted in power unit *m* in year *y*

y = 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) or the applicable year during monitoring (*ex post* option), following the guidance on data vintage in step 2

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 (Option A2):

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \cdot 3.6}{\eta_{m,y}} \quad (3)$$

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* (%)

y = 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)

Viet Nam currently imports electricity from China to make up for the shortfall in supply from its own generation system. Whilst the emission factor of China's grid is higher than that of Viet Nam's, as a conservative approach, this PDD has considered these imports as zero emissions whilst taking into account their contribution to the overall power generation of Viet Nam.

CDM – Executive Board

Step 4. Identify the Cohort of Power Units to be Included in the Build Margin

It was found that the most recent set of power plants which generate 20% of the country's electricity generated more power (MWh) in 2007 than the five most recently built power stations. As such, the weighted carbon emissions from the former were used to calculate the build margin.

For the first crediting period, the build margin emission factor will be calculated *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 (Option 1).

Step 5. Calculate the Build Margin Emission Factor

The build margin 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, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EC_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (4)$$

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

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) will be determined as per the guidance in step 3 (a) for the simple OM, using options B1 and B2, using for *y* the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

CDM – Executive Board

Step 6. Calculate the Combined Margin Emissions Factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (5)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)

w_{OM} = Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

The weightings used are as follows: $w_{OM} = 0.5$ and $w_{BM} = 0.5$ for the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period.

Step 7. Calculate of the Baseline Emission *(BE_y)*

The baseline emissions (BE_y in t CO_2e) are the product of the baseline emission factor (EF_y in tCO_2e/MWh) multiplies with the electricity supplied by the project activity to the grid EG_y in MWh)

$$BE_y = EF_y \times EG_y \quad (6)$$

In addition to the guidelines in the **“**“Tool to calculate the emission factor for an electricity system”, ACM0002 states:

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

Where:

BE_y = Baseline emissions inyear *y*($tCO_{2/}yr$)

$EG_{PJ,y}$ = Quantitiy 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 CO2 emission factor for the 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 result is the same; baseline emissions multiplied by the amount of electricity supplied to the grid by the project equate to emission reductions

CDM – Executive Board

2. Project Emissions

From the Reservoir

There is no reservoir associated with this project. Therefore, the project emissions from the project activity are considered to be zero.

3. Leakage

As per methodology ACM002, version 10, the project owner does not need consider leakage.

Therefore:

$$LE_y = 0 \quad (8)$$

4. Emission Reductions

Emission reductions are calculated as follows

$$ER_y = BE_y - PE_y - LE_y \quad (9)$$

Where:

ER_y = Emission reductions in year y (t CO_2e/yr)
BE_y = Baseline emissions in year y (t CO_2e/yr)
PE_y = Project emissions in year y (t CO_2e/yr)
LE_y = Leakage emissions in year y (t CO_2e/yr)

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

Data / Parameter:	NCV_i
Data unit:	TJ per mass or volume of fuel
Description:	Net calorific value (energy content) per mass or volume unit of a fuel *i*
Source of data used:	IPCC values
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is collected from the IPCC as national and / or local data is unavailable.
Any comment:	

Data / Parameter:	***Fi,j,y***
Data unit:	10^4t,10^8m^3
Description:	The quantity of fuel *i* (by mass or volume) consumed by the relevant power source *j*, in year(s) *y*.
Source of data used:	Report on the Operation of Viet Nam National Electricity System in Years 2005-7: EVN/National Electricity System Dispatching Centre - Department for Electricity System Operation, Hanoi.
Value applied:	Please refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data are used from Electricity of Viet Nam (EVN), the only source for such information.
Any comment:	

Data / Parameter:	**Installed Capacity**
Data unit:	MW
Description:	Installed capacity of power plants serving the Vietnamese national grid system
Source of data used:	Masterplan 6, EVN
Value applied:	Please refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data are used from Electricity of Viet Nam (EVN), the only source for such information.
Any comment:	

Data / Parameter:	**Electricity Generated**
Data unit:	MWh
Description:	Electricity generation attributable to power source *j*
Source of data used:	Report on the Operation of Viet Nam National Electricity System in Years 2005-7: EVN/National Electricity System Dispatching Centre - Department for Electricity System Operation, Hanoi.
Value applied:	Please refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data are used from Electricity of Viet Nam (EVN), the only source for such information.
Any comment:	

Data / Parameter:	**Internal Electricity Consumption**
Data unit:	%
Description:	The internal power consumption of power source *j*
Source of data used:	Report on the Operation of Viet Nam National Electricity System in Years 2005-7: EVN/National Electricity System Dispatching Centre - Department for Electricity System Operation, Hanoi.
Value applied:	Please refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data are used from Electricity of Viet Nam (EVN), the only source for such information.
Any comment:	

Data / Parameter:	**$EF_{CO2,i}$**
Data unit:	tCO_2/TJ
Description:	The CO_2 emission factor per unit of fuel *i*
Source of data used:	IPCC default values
Value applied:	Please refer to Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is collected from the IPCC as national and / or local data is unavailable.
Any comment:	

CDM – Executive Board

B.6.3. Ex-ante calculation of emission reductions:

Based on the proposed project's feasibility study, the annual electricity generated and supplied to the grid is 43,060 MWh with the first cascade increasing to 77,508 MWh with the second cascade. Therefore, according to formula (6) and (9), repeated below for convenience, the annual emission reductions in the first crediting period can be calculated as follows:

$BE_y = EF_y \times EG_y$ (6)

$ER_y = BE_y - PE_y - LE_y$ (9)

First year:

$ER_y = (43{,}060 \times 0.602 - 0 - 0) = 25{,}922\ tCO_2e$

Subsequent years:

$ER_y = (77{,}508 \times 0.602 - 0 - 0) = 46{,}660\ tCO_2e$

Thus the annual emission reductions attributable to the proposed project activity are 48,311 tCO_2e.

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

Year	Project Activity Emissions (tCO_2e)	Baseline Emissions (tCO_2e)	Leakage (tCO_2e)	Overall Emission Reductions (tCO_2e)
01 October 2010- 30 September2011	0	25,922	0	25,922
01 October 2011- 30 September2012	0	46,660	0	46,660
01 October 2012- 30 September2013	0	46,660	0	46,660
01 October 2013- 30 September2014	0	46,660	0	46,660
01 October 2014- 30 September2015	0	46,660	0	46,660
01 October 2015- 30 September2016	0	46,660	0	46,660
01 October 2016- 30 September2017	0	46,660	0	46,660

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data to be used:	Site measurements.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	43,060 / 77,508
Description of measurement methods and procedures to be applied:	Electricity meters, continuous measurement and at least monthly recording
QA/QC procedures to be applied:	Cross check measurement results with records for sold electricity

B.7.2. Description of the monitoring plan:

A final monitoring plan will be prepared prior to the start of the crediting period based on the as-built project activity. It will address the following aspects:

1. The CDM monitoring team and allocation of responsibility to ensure compliance with the monitoring requirement of the methodology is given here below:

Position	Responsibilities
Operational staff	• Ensure meter readings are captured in standard format
Site Supervisor	• Ensuring monitoring takes place • Initial check for anomalies (e.g. Significant changes against previous readings or expected values) • Site record management • Communication of meter readings to Project Director • Attendance at annual verification
Project Director	• Collation of metered data from the project site • Collation of confirmation records from TNB (see Annex 4) • Monthly cross-check of confirmation records against metered data

	Tasks description	Operator	Supervisor	Project director	CDM Consultant
Monitoring activity					
1	Recording of monitored data	✓			
Quality Assurance & Quality Control					
2	Verification of data monitored (consistency and completeness)		✓		
3	Ensuring adequate training of staff		✓		
4	Ensuring adequate maintenance		✓		
	Ensuring calibration of monitoring instruments		✓		
5	Data archiving: ensuring adequate storage of data monitored (integrity and backup): 2 years after the end of the crediting period			✓	
6.	Identification of non-conformance and corrective/preventive actions and monitoring plan improvement		✓		
7	Emergency procedures		✓		
8	External audit				✓
Calculation of GHG emission reductions and reporting					
9	Processing of data and calculation of emission reductions			✓	
10	Monitoring report: management review of monitoring report (internal audit)			✓	

2. Monitoring point

- Net electricity generation of the project will be measured and monitored through the use of on-site metering equipment at the outgoing feeder the hydropower plant.
- There are two systems, one main and the other one is the backup system.

Additional information is available at Annex 4.

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

26/02/2010.

Kyoto Energy Pte. Ltd. 80 Raffles Place UOB Plaza 1, Level 36-01 Singapore 048624		
Tel.: +65 6248 4728	Fax: +65 6248 4531	Email: info@kyotoenergy.net

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:

As per the guidance of EB41 meeting report, the project activity started on 08/12/2008 when the project proponent signed the construction contract.

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

30 years

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:

Upon commercial operation date, currently planned for 1st October 2010 or date of registration – whichever is later.

C.2.1.2. Length of the first crediting period:

7 years, 1st October 2010 – September 30th 2017

C.2.2. **Fixed crediting period:**

C.2.2.1. **Starting date:**

C.2.2.2. **Length:**

SECTION D. Environmental impacts

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

Preparation and Construction

In the preparation and construction stages, the project will cause environmental impacts, however they are only temporary and considered relatively small.

Impacts on Air Quality (Including Noise) During Construction

During construction, Dust, Exhaust gases and Noise generated from the following activities:

- Land clearance, concrete mixing, exploitation, temporary road construction and a considerable amount of transport activity ;
- Dust: As such, during this stage, airborne dust may increase remarkably unless effective mitigation measures are taken. The two main type of dust are rock dust and cement dust. No toxic or hazardous dust will be generated. The diffusion of dust is largely caused by excavation and backfill. Besides, the unintended leakage of refuse during transport may also increase the amount of dust in the air.
- Exhaust gases from transport activities and other motorized as activities such as: bulldozing, excavation, drilling, concrete mixing, etc.

Impacts on Water Quality During Construction

- The construction of Thanh Thuy Hydropower shall not lead to significant lasting change to the flow and quality of river water. Water quality may be temporarily affected as a result of excavating and land clearance activities, the washout of rock, sand and grit from dump site during construction. When the construction is complete, the quality of water will revert to normal.

Solid Waste During Construction

- Solid waste will be generated from human activities and land clearance.

Impact on soil environment during construction:

During construction phase, due to the excavation of rock and soil for the construction of foundation and road, the administrative building and site hut, hydropower plant at the project site etc. Therefore, the regolith with vegetation at the construction site may disappear entirely, leading to a number of negative effects such as:

- Changing the discharge channel of surface water may form concentrated flow areas which cause marked erosion
- Forming the bend, increasing the probability of landslide on the downhill slope

CDM – Executive Board

Operation

Following construction, the hydropower plant will inevitably lead to some environmental impacts, but again, the environmental assessment regards these as relatively low:

Impact on air quality (including noise) during operation:

- When coming into operation, Thanh Thuy Hydropower plant will help forming ideal weather and fresh air. No noise and dust, solely the noise from machine which is relatively insignificant and affect only within the sphere of the plant.

Impacts on Water During Operation

- There will only be a negligible affect on water quality due to domestic wastewater from workers who are in machine operation and maintenance.

Impacts on Ecosystems

- Small negative impacts on Ecosystem during operation shall be negligible.

Preventative, Mitigation and Compensation Measures

The project proponent has committed to the following measures in order to mitigate and prevent environmental impacts as a result of the project:

- Using modern facilities and equipment to reduce noise and limit the quantity and potency of emissions.
- Spraying water to decrease the magnitude of airborne dust.
- Implementing construction in the dry season to minimize landslide as happened in almost other constructions.
- No rock or solid waste shall disposed of to the river bed. Proper landfill sites shall be managed properly at each construction phase. While implementing the road construction, it is essential to avoid levelling off the rock and earth in the vicinity of river bank. As for refuse dump, there must be a discharge channel so as to avoid the risk of contamination of water source. Earth from land clearance is used for land filling in the project site.
- Oil used in the transformer will be replenished and removed in a safe manner by a third party contractor with the necessary experience and developed handling procedures required for the task. Staff onsite will however be trained so they are aware how potentially damaging to the environment the transformer oil can be.
- Afforestation to keep the water clean, recovering the eco-system after impounding
- Regular water samples to be taken so as to test the quality of water (by concerned authorities)
- Building the toilet according to set standard.
- Waste water will be treated to meet the Viet Nam Environmental Standards before discharging to the environment.
- Stringently examine the discharging of organic substances. Waste will be collected, buried or incinerated as regulated..
- Committing to monitor the environment as required by Vietnamese law.

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:

The environmental impacts of the project are not considered significant by the Vietnamese authorities and hence the EPC (Environmental Protection Commitment) was approved by the People's Committee of Vi Xuyen district on June 30th 2008.

SECTION E. Stakeholders' comments

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

The stakeholder meeting for Thanh Thuy Hydropower project was conducted in the Administrative Building of Thanh Thuy Commune People's Committee, Vi Xuyen District, Ha Giang Province, Viet Nam at 08:30 am on July 28th, 2009. Viet Long Industry JSC., held this meeting in collaboration with the CDMconsultant. Personal invitations were sent to community leaders, the local People's Committee representatives, Media etc. and public notices of the planned consultations were placed in the Ha Giang Newspaper which is widely published and read in the provinces. During the consultation, presentations were made by the project owner and consultant outlining the planned project activities in a non-technical manner (including environmental, social and technological considerations), climate change, the role of the Clean Development Mechanism and annual emission reductions potential. In addition, questionnaires were circulated and filled in by the attendees to gauge their views on and concerns regarding the project. There were 26 attendees including experts from Vi Xuyen Department of Natural Resources and Environment, Ha Giang Power Company, Vice Chairman of Thanh Thuy Commune People's Committee, Chairman of Thanh Duc Commune People's Committee and representatives of households near the project site.

Fig.E. 1 – Picture of the local stakeholder consultation meeting on 28 July 2009

E.2. Summary of the comments received:

The attendees demonstrated keen interest in the Thanh Thuy project activities. After the presentations were done, they filled in the questionnaires and provided their comments. A summary of the feedback to which a majority of the participants agreedis presented below:

- 60% of participants believed that the project would result in accident risks during construction and operation phase; in particular the excavation phasephase while 45% of those said that there is a possibility of landslide in the project site which would affect the socio-economic status of the project.

- 75% of attendants agreed that the project would create new transport routes and infrastructure inside or around the local area - providing convenient transportation of local residents. Slightly more than 30% of those highly appreciated the job creation that the project represents.

- 65% of participants expressed the concern that the project partly used farm land and would thus have some negative impact..

Apart from the above views, a small proportion of participants were concerned about the risk of hazardous, toxic or noxious substances contaminating land or surface water or groundwater which might pose threat to human health.

After finishing the presentations of both owner and consultant, the representatives asked the following questions verbally:

- Which projects in Viet Nam received revenue from CDM? And How to calculate the amount of emissions?
- How many projects have been registered up to now in Viet Nam?
- How will the fines of developed countries be used if the amount of emissions surpass the emission standards?

In general, the project received positive response from the local communitu. They were foresaw positive impacts on social, economic and environmental aspects because of the project. Moreover, all concerns about environmental aspects have been addressed by the project owner prior to the implementation of the project.

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

The project owner answered and explained in detail each comment from attendants in stakeholder meetings.

- About the noise and risk in construction, or landslide, the project owner pointed out that the impact is temporary during the construction and the company would apply the mitigating methods as defined in approved EIA report.
- Replying to the comment on land use, project owner said the impact would be minor and confirmed that the company had complied with the Vietnamese law and regulations on compensation for any agricultural land used for the project.
- About the comment that the construction of the project might lead to releases of substances which might be pollutant, hazardous, toxic or noxious, the project owner confirmed that they would follow the relevant law and regulations on construction and operation of hydropower plant.

Answering for the questions raised by the attendants on CDM, the CDM consultant gave answers on behalf of the project owner. For example, in order to answer the last question, the consultant gave England as a developed country. If a certain company were to be fined for non-compliance to emission limits, the fine money either would either go to the government's budget for energy proficiency or help the poorer developing countries to undertake sustainable development.

The project owner assured that:

- The project's construction and operation would be in line with the environmental and health and safety laws of Viet Nam;
- As the project is run-of-river and does not employ a reservoir, it's environmental impact is relatively low;

In addition, participants were informed of the voluntary pledge of 2% of CER revenue to be specifically donated to sustainable development which could include:

- Construction of new infrastructure including new roads, healthcare centre, cultural centre, etc.
- Supply of consistent power at a reasonable retail price.
- Sponsorship of local community events

Annex 1

CONTACT INFORMATION OF PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Viet Long Industry JSC.,
Street/P.O.Box:	No. 94, Linh Lang street, Cong Vi ward, Ba Dinh district
Building:	
City:	Hanoi
State/Region:	
Postfix/ZIP:	10000
Country:	Viet Nam
Telephone:	+84-4-37664450
FAX:	+84-4-37661732
E-Mail:	vietlonghg@yahoo.com
URL:	
Represented by:	Mr. Pham Hai Ha
Title:	General Director
Salutation:	
Last Name:	Pham
Middle Name:	Hai
First Name:	Ha
Department:	
Mobile:	
Direct FAX:	+84-4-37661732
Direct tel:	+84-4-37664450
Personal E-Mail:	

Organization:	Bunge Emissions Holdings Sarl
Street/P.O.Box:	c/o Bunge SA, 13 Route de Florissant, P.O. Box 518
Building:	
City:	Geneva
State/Region:	Geneva 12
Postfix/ZIP:	1211
Country:	Switzerland
Telephone:	+41 22 59 29 621
FAX:	+41 22 580 3360
E-Mail:	Emissions@bunge.com
URL:	
Represented by:	Francois Gigante
Title:	Head of Project Investment
Salutation:	Mr.
Last Name:	Gigante
Middle Name:	Louis
First Name:	Francois
Department:	
Mobile:	
Direct FAX:	+41 22 580 3360
Direct tel:	+41 22 59 29 655
Personal E-Mail:	Francois.gigante@bunge.com

CDM – Executive Board

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Neither public nor ODA funding from an Annex 1 country was applied for by the project proponent for the project.

ANNEX 3 - BASELINE INFORMATION

Operating Margin		A	B	C	D	E
		Fuel Consumption 2005-7	Emission Factor	Carbon Dioxide Per Annum	Annual Output 2005-7	tCO2 / MWh
		TJ	tCO2/TJ	tCO2 (= A * B)	GWh	(= C / D)
Coal		301,193	94.6	28,492,859	28,529	0.999
Fuel Oil		22,425	75.5	1,693,105	1,892	0.895
Diesel Oil		54,391	72.6	3,948,780	5,503	0.718
Natural Gas		840,675	54.3	45,648,645	78,388	0.582
Import from China		0	0	0	3,979	0.000
				79,783,389	**118,290**	**0.674**

Build Margin		A	B	C	D	E
	Commercial Operation Date	Fuel Consumption 2007	Emission Factor	Emissions	Generation (2007)	Emissions Rate
	Year	TJ	tCO2/TJ	tCO2/y	GWh	tCO2 / MWh
				tCO2 (= A * B)		(= C / D)
Option 2. Additions represents 20% of the system generation						
Quang Tri (Hydroelectric)	2007	0	0	0	64.0	0.000
Ca Mau 1 (Natural Gas)	2007	6,634	54.3	360,204	691.0	0.521
Uong Bi MR 1 (Coal)	2007	4,800	94.6	454,080	520.0	0.873
Cai Lan (Diesel)	2007	748	72.6	54,282	81.0	0.670
Se San 3A (Hydroelectric)	2006	0	0	0	345.0	0.000
Cao Ngan (Coal)	2006	4,108	94.6	388,588	445.0	0.873
Srok Phu Mieng (Hydroelectric)	2006	0	0	0	252.0	0.000
Se San 3 (Hydroelectric)	2006	0	0	0	1,128.9	0.000
Dam Phu My (Natural Gas)	2006	1,440	54.3	78,192	150.0	0.521
Formosa (Coal)	2004	10,274	94.6	971,906	1,113.0	0.873
Na Duong (Coal)	2004	6,868	94.6	649,684	744.0	0.873
Phu My 2.2 (Natural Gas)	2004	48,038	54.3	2,608,485	5,004.0	0.521
Phy My 4 (Natural Gas)	2004	24,011	54.3	1,303,786	2,032.7	0.641
Can Don (Hydroelectric)	2004	0	0	0	312.0	0.000
Phy My 3 (Natural Gas)	2004	37277	54.3	2,024,130	3,883.0	0.521
		144,197		**8,893,337**	**16,765.6**	**0.530**

A	Estimated operating margin emission rate	tCO2/MWh	**0.674**
B	Estimated build margin emission rate	tCO2/MWh	**0.530**
C	Estimated baseline emission rate	tCO2/MWh	**0.602**

Annex 4

MONITORING INFORMATION

1. **Power purchasing company name**: Electricity of Viet Nam (EVN)

2. Connection point details*:* The electricity generated by the project will be delivered to the Vietnam national grid initially via a new 35 kV transmission and subsequently a 110 kV line.

3. Project Manager name: Pham Hai Ha
4. Site Manager name:
5. Data Monitoring:

The monitoring methodology involves the monitoring of the kWh by using energy meter(s).

The purpose of the monitoring procedure will be to direct and support monitoring of project performance project indicators to determine project outcomes, greenhouse gas (GHG) emission reductions. The project employs latest state of art monitoring and control equipment that measure, control and record key parameters continuously.

Ensuring adequate maintenance and calibration of monitoring instruments

- Specific maintenance, repair or replacement of monitoring equipment will be recorded and will describe the time and action undertaken.
- The calibration will occur at intervals determined on the basis of instrument manufacturers' recommendations, stability, purpose, usage and history of repeatability. Recalibration should be performed whenever an event occurs that places the accuracy of the instrument in doubt.
- Energy meters are delivered with a certificate of conformity and are not calibrated after installation. They will be calibrated at least every three years after the first year of service.
- Last calibration certificates and next calibration date will be provided during periodic verification
- Defect, repair or change of monitoring equipment will be recorded.

Data archiving

The monitored data will be kept for a minimum of 2 years after the end of the crediting years by using paper documents and electronic files.