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

CONTENTS

Annexes

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	15 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:

Ta Niet Hydro Power Project

Version 02

Date of completion of the document: 09/07/2009

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

The Ta Niet Hydropower Project involves construction of a 3.6 MW run-of-river hydro power plant consisting of three units of 1.2 MW each on the Nam Sap stream which is a branch of Da river under Chieng Hac commune, Moc Chau district, Son La province. It will be located at adjacent to the 6 highway, far from Moc Chau town is 20 km to the Northwest. The electricity generated by the plant is of about 18,100 MWh and about 17,920 MWh will be fed to the national grid. The objective of the Ta Niet Hydro power project is to utilize hydro power resource in the Nam Sap stream to generate renewable electricity and to sell power to the Electricity of Vietnam (EVN).

The project's contributions to sustainable development of local area as well as the host country are:

– The project will generate renewable energy based electricity. This hydro power will support partly with increasing electricity demand in Son La province as well as in Vietnam. During last 15 years the electricity demand of the country is continuously increasing with annual growth rate of about 13-14%. It is obviously that the investment in power generation is a great burden of state budget and cannot meet the needs. At first half of year 2005, Northern areas are short of about 10GWh per day and blackouts are often occasions in the cities and it caused a big loss in industry. To mobilize the investment resources the Government encourages all enterprises to invest into power generation and proposed project is a good response to this need.

– Son La is a poor province in the North West of Vietnam with natural area of 14,055 km^2, occupy 4.27% area of whole country, population by the end of 2004 of 974,500 people and GDP of about 2462.9 billion VND in 2004. The Ta Niet hydropower project will play an important role in meeting the requirements of sustainable development desired by the local government. When the project comes into operation, it will provide a new and a vital force in the economic development of local administration, especially industrial development and building infrastructure to improve living standard of local people. In addition, average 1.77 billion VND (tax) per year will be added to the local budget, make up 0.106 % of the province's GDP of 2004

– The project will stimulate and accelerate the development of renewable energy technologies in order to reduce GHGs emissions, to protect the environment while responding to increasing energy demand and energy resource diversification imperatives necessary for national sustainable economic growth. It is congruent with energy policies of Vietnam; therefore it satisfies the sustainable development criteria for CDM project, established by DNA of Vietnam.

A.3. Project participants:

Participants in the project activity are the following:

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)	**Ta Niet Hydro Power Joint – Stock Company** in collaboration with **RCEE Energy and Environment JSC**	No
Sweden	**Carbon Asset Management Sweden AB**	No

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

The major designed parameters of the Ta Niet Hydropower plant are shown in below table:

Table 1: Basic parameters of the plant

No	Parameter	Unit	Value
I	**Drainage basin and natural flows**		
1	Catchment area	km^2	460.00
2	Annual average rainfall,	mm	1,633.00
3	Annual average flow	m^3/s	8.90
5	Flow at frequency of 1.5%	m^3/s	567.00
	Flow at frequency of 0.5%	m^3/s	707.00
5	**Construction grade of work**		**III**
III	**Main work**		
1	Main dam		
	Type		Ofixerop
	Crest elevation	m	432.00
	$Q_{p = 1.5\%}$	m^3/s	567.00
	$Q_{p = 0.5\%}$	m^3/s	707.00
IV	**Canal**		

	Type		BTCT
	Length of canal	m	1870.00
	Dimension of canal surface (BxH)	m	2.80x2.30
	Design flow	m^3/s	7.20
	Sullage pit	set	3.00
V	**Penstock**		
	Type		Steel, slanting
	Length	m	120.00
	Internal diameter	m	1.60
	Design flow	m^3/s	7.20
VI	**Power house**		
1	Number of units	unit	3.00
2	Installed capacity	MW	3.60
3	Dimension LxWxH	m	36.4x8.7x9.2
4	Type of turbine		Francis – horizontal axis
5	Average annual generation	GWh	18.10

The project lay-out is shown as follows:

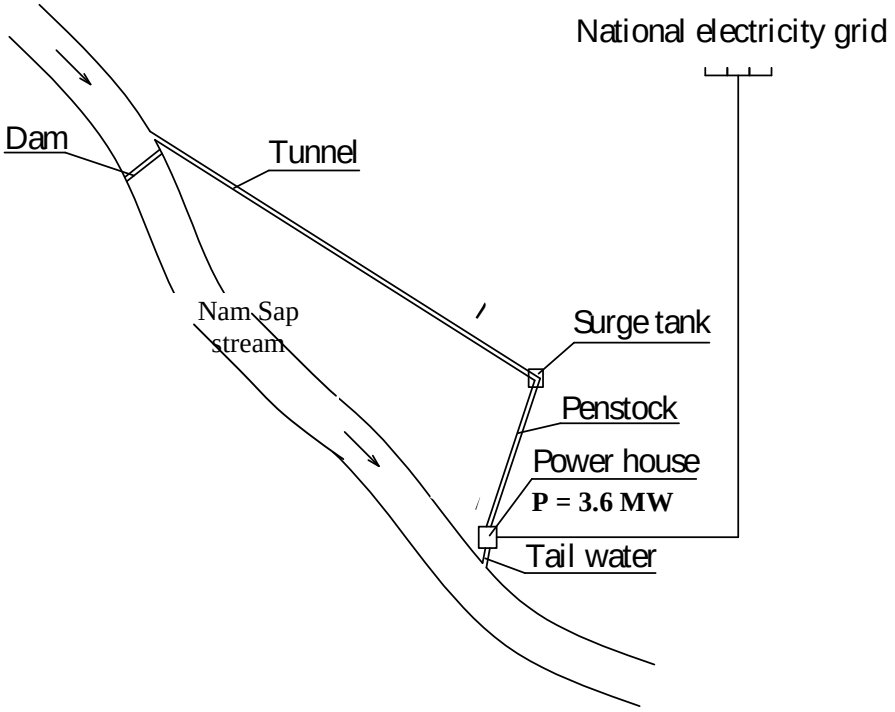

Figure 1: Project layout

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

A.4.1.1. Host Party(ies):

Socialist Republic of Vietnam

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

Son La province

A.4.1.3. City/Town/Community etc:

Chieng Hac commune, Moc Chau district.

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

The co-ordinates of the projects is as below:

20º 55’ 23’’ N
104º 44’ 36’’ E

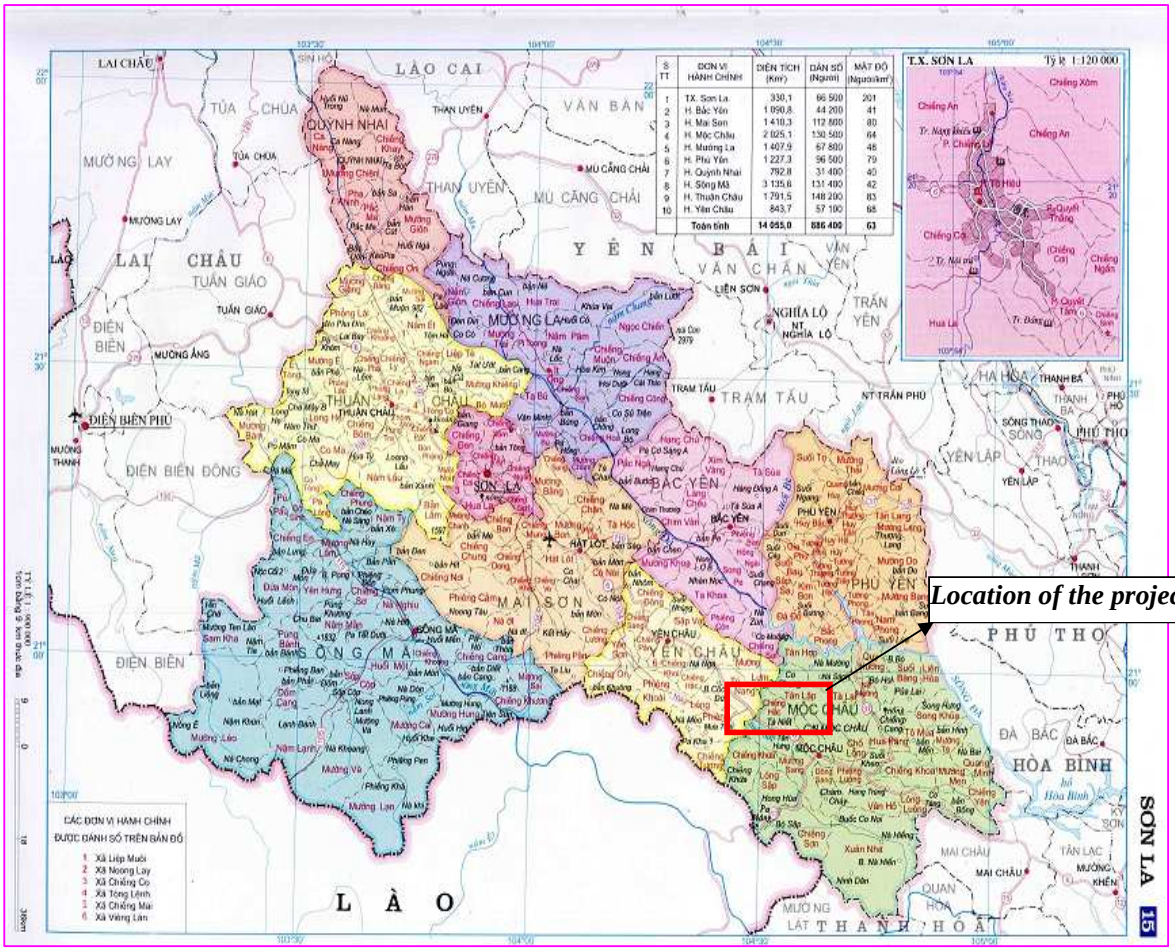

Figure 2: Map of Son La province

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

a. Type and category

Scale: Small Scale Project

Type I: Renewable Energy Project

Category I.D: Grid connected renewable electricity generation

b. Technology

Main equipments and technologies used for the project are described in the table below:

Table 2: Main equipments are used for the project

No	Parameters	Unit	Value
I	**Turbine**		
1	Number of unit	set	3
2	Type		Horizontal axis - Francis
3	Normal capacity	MW	1.277
4	Rating speed	rpm	1000.0
5	Efficiency		90.9
6	Water head		
	Maximum water head	m	60.38
	Minimum water head	m	59.45
	Calculated water head	m	60.00
II	**Generator**	**Synchronous three phase – horizontal axis**	
	Installed unit capacity	MW	1.2
	Rating speed	rpm	1000.0
	Efficiency		0.94
	Rating voltage	kV	6.30
	Rating frequency	Hz	50.0
	Power factor (cosφ)		0.8
III	**Main transformer**	**Outdoor**	
	Capacity	kVA	100
	Voltage	kV	6.3+-2x2.5%/0.4kV
	Number of unit	unit	2

The equipment tender has been implemented and provider has also been identified is that HACO Engineering Equipment Company Limited .

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

Table 3: Emission reduction of the proposed project during the first crediting period

Years	Annual estimation of emission reductions in tonnes of CO_2 e
2009 (from 1st, October to 31, December)	2,544
2010	10,176
2011	10,176
2012	10,176
2013	10,176
2014	10,176
2015	10,176
2016 (1 January- 30 September)	7,632
Total estimated reductions (tonnes of CO_2 e)	**71,232**
Total number of crediting years	7
Annual average of estimated reductions over the crediting period (tonnes of CO_2 e)	10,176

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

There is no public funding provided for the proposed project.

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

A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small scale CDM project activity or an application to register another small-scale CDM project activity:

(1) With the same project participants;

(2) In the same project category and technology/measure;

(3) Registered within the previous 2 years; and

(4) Whose project boundary is within 1 km of the project boundary if the proposed small-scale activity at the closest point.

There is only Ta Niet hydro power project which will be constructed on the Nam Sap stream, under Chieng Hac commune, Moc Chau district. In diameter of 1 km from the project, there is no any other hydro power project and hence the project is not a debundled component of any larger project activity.

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

Title of the approved baseline methodology applied to the proposed small-scale project activity is AMS-I.D. (Version 13)

B.2 Justification of the choice of the project category

The total installed capacity of the Ta Niet hydro power plant is 3.6 MW and hence the proposed project qualifies for a small-scale project as defined in AMS-I.D., version 13:

1. *This category comprises renewable, such as photovoltaic, hydro, tidal/wave, wind, geothermal and biomass, that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-renewable biomass fired generating unit*".
2. *If the unit added has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel1, the capacity of the entire unit shall not exceed the limit of 15MW.*

The proposed project comprises a hydro power plant that supplies electricity to the national electricity system; therefore it is applicable for project category I.D.

B.3. Description of the project boundary:

As referred to in Annex B for small-scale CDM project activities, the project boundary for a small scale hydro power project that provides electricity to a grid encompasses the physical, geographical site of the hydro power generation source.

(a) Geographical: The area where the Ta Niet Hydropower Plant is installed.

(b) Physical: The national electricity grid, which the plant is connected to.

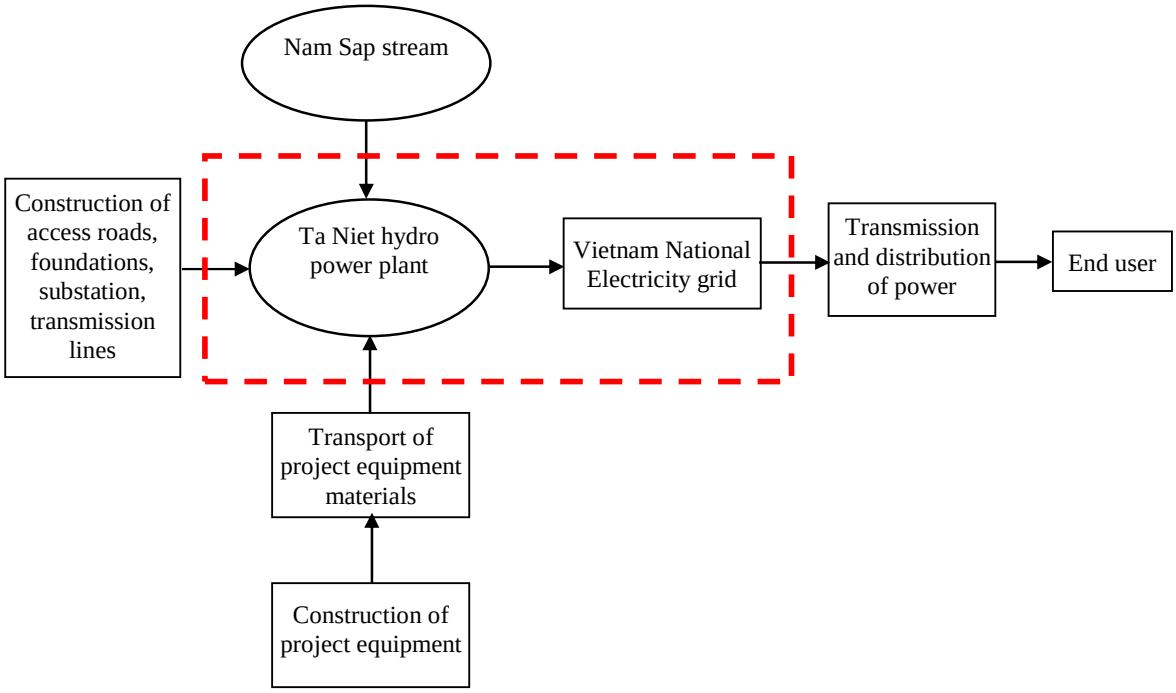

Figure 3: Project boundary

B.4. Description of baseline and its development:

The following are real and credible alternatives to provide the same amount of power as the project activity:

Alternative 1: The project activity will be implemented without the incentive from CDM

As will be demonstrated in the following sections, the alternative 1 cannot be the baseline scenario because it is not a financially attractive option

Alternative 2: The generation of equivalent amount of electricity will be provided by existing plants that are connecting to the national electricity grid.

This alternative is the continuation of the current practice, in the case of the proposed project should not be implemented, an equivalent electricity among will be provided by the Vietnam national electricity grid (including existing plants). The alternative is also the baseline scenario to be applied for the project.

For the project category, the item I.D is applied in context of sub item 9, as listed below: ***I.D. Renewable electricity generation for a grid:*** *"9. For the other system, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in $kgCO_2equ/kWh$) calculated in a transparent and conservative manner as*:

According to the baseline and monitoring methodology of AMS.I.D. Grid Connected Electricity Generation (version 13) and analysis in B.3. above, the national electricity grid is selected as the project boundary. The baseline emission factor is calculated according to the method (a)

provided by the " Tool to calculate the emission factor for an electricity system" which is a requirement of the methodology AMS.I.D. (version 13) as: (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM).

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

In accordance with the Attachment A to the Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the additionality of this project is demonstrated though a financial barrier.

The investment analysis of the project undertaken in 2005 in line with the governmental guidance shows that the Financial Internal Rate of Return was below the benchmark. In January 2006, after considering the additional benefits that could be received through the CDM it was decided by the Board of Directors to approve the implementation of the project as a CDM project (Decision No 07A/2006/QD-HDQT). In 2006 a CDM consultant was hired according to the Service agreement signed on 22/11/2006 and an application for a host-country approval was made (Documents No 87/2006/CV – CT and No: 88/2006/CV – CT). The preliminary construction works started in March 2006 (Contract No. 22HD-XD), however the implementation of the main part of the project started only in February 2007 when the equipment purchase agreement was signed with HACO Engineering Equipment Company Limited (Contract No. 01/HDKT-HACO). Table 4 provides a project implementation timeline.

Table 4. Project implementation timeline.

Date	Milestone
3 January 2006	Board of Directors' decision to implement the project with CDM
6 March 2006	A construction contract for "Diversion canal and works on the canal" is signed and minor pre-construction works begins – this is the project's starting date.
8 November 2006	Application for HCA
22 November 2006	CDM consultant is appointed
6 February 2007	Equipment purchase agreement is signed
19 May 2007	ERPA with the CER buyer is signed
May 2007 – May 2008	Development of PDD
21 May 2008	Pre-validation
01 September 2009[1]	Expected commissioning

Benchmark analysis

[1] This information is updated to be in line with construction process of the project.

The identified financial indicator is Internal Rate of Return (IRR)

According to the Decision number 709 dated 13, April, 2004 of Ministry of Industry then a electricity project will be not feasible if its IRR is less than I_f (financial discount rate) and NPV < 0.

According to the decision, the **I_f** can be calculated based on following formula:

$$I_f\,\% = \frac{V_{cp}}{V} * i_{cp}\,\% + \frac{V_v}{V} * i_v\,\%$$

In which:

V_{cp}: Equity investment capital

V_v: Loaned investment capital

V: Total investment capital

I_{cp}%: Required rate of return for the equity investment capital

I_v: Interest rate of loaned capital

I_f: Weighed Average Financial Discounting Rate of Capital

The main assumptions that are used for the **I_f** calculation is shown in the following table:

Table 5: The main assumptions in the I_f calculation

No	Parameters	Symbol	Unit	Value	Source
1	Total investment capital	V	Billion VND	66.021	Decision No86/2006/BC-CT
2	Equity investment capital	V_{cp}	Billion VND	19.807	The ratio is defined in the FSR from 2003 and has not changed to date.
3	Required rate of return for the equity investment capital	I_{cp}	%	12	Decision 709
4	Loaned investment capital	V_v			
	Value		Billion VND	46.215	The ratio is defined in FSR and has not changed to date.

	Interest rate	I_v	%	11.5	FSR; the actual interest rate for the loan received (contract signed in August 2007) is 13,2%.
5	**Weighted Average Financial Discounting Rate of Capital**	$\boldsymbol{I_f}$	**%**	**11.65**	

Calculation and comparison of financial indicators

Revenue of the proposed project comes only from the electricity sale in the case of the absence the revenue from CER credits. Financial analysis by the project participants has concluded that IRR of the project is 8.80 **%** based on the assumptions described in the tables 5 and 6.

Table 6: Parameters used in financial analysis

No	Parameters	Value	Unit	Data sources
1	Gross electricity generation	18.1	GWh	FS report; has not changed to date.
2	Parasitic and loss load	2	%	FS report; has not changed to date.
3	Project life time	25	Year	FS report; has not changed to date.
4	O&M cost	2	%	FS report; has not changed to date.
5	Electricity price	3.69	UScent/kWh	FS report and electricity purchasing memorandum of understanding
6	Natural resource tax	2	%	FS report; has not changed to date.
7	Business tax	From year: 1; Tax (%): 0; To year: 4	%	FS report; has not changed to date.

		5	7.5	11		
		12	15	25		

Potential CERs revenue will improve the project's IRR indicator from 8.80 to 11.91**%** (with CER price of about 9.1[2] USD/tCO_2). This increase of IRR will make the project feasible.

The following table shows the IRR with and without the revenue of CERs.

Table 7: The IRR with and without CDM

Parameters	Value (%)
IRR without CDM	8.80
Benchmark	**11.65**
IRR with CDM	11.91

Sensitivity analysis

A sensitivity analysis was conducted using assumptions that are conservative from the point of view of analysing additionality, i.e. the 'best-case' conditions for the IRR were assumed by altering the following parameters:

• O&M costs

• Investment costs

• Electricity tariff

• Annual operating hours

Table 8 summarizes the results of the sensitivity analysis, showing the variation of each parameter needed to reach the 11.65% benchmark.

Table 8: Results of sensitivity analysis

Parameters	Variation of the parameters needed to reach the benchmark of 11.65% in absolute value	Basic value of each parameters	Variation of parameters in percent
Electricity tariff (Uscent)	4.17	3.69	13.01%
O&M cost (%)	-0.29%	2.00%	-114.50%
Investment cost	57,232,042,649	66,022,670,000.00	-13.31%

[3] http://www.austdoorvietnam.com/index.php/tin-tc/20-gia-vt-liu-xay-dng-tip-tc-tng

(VND)			
Annual operating hours	5,682.68	5,027.78	13.03%

O&M costs: The results of the sensitivity analysis mean that even if the project incurred zero operating costs, which is not reasonable, the IRR of the project would not reach the 11.65% benchmark.

Investment costs: Construction of the main works of the project was carried out at the end of 2007 and in 2008. During this period the prices of the main raw materials used for the construction like steel and cement increased 15-20%[3]. Therefore the actual total investment is expected to be higher than the value used in the IRR analysis. Therefore, 13.31% decrease in investment costs is very unlikely and the IRR cannot reach the 11.65% benchmark.

Electricity tariff: The IRR reaches the benchmark when the tariff is increased by 13.01% which is 4.17 US cent in absolute value. This increase is not realistic for the following reasons.

The electricity tariff of 3.69 Uscent/kWh applied for the project has been defined in the FSR and in the Memorandum of understanding signed on 07 January, 2003 between the project owner and EVN. The actual price will be defined in the PPA which will be signed only after the projects starts generating electricity. The recently signed PPAs and MoUs between other independent power producers (IPP) and EVN show that the tariff has been in the range of 3.68-3.84 US cents/kWh and it is not likely to reach 4.17 US cents/kWh (table 9).

Table 9. Electricity tariff

Plant#	IPP	Installed capacity, MW	PPA/MoU date	Tariff	
				VND/kWh	US cent/kWh[4]
1	Confidential (PPA submitted to DOE)	28	December 2005	610 VND	3.84 US cent (at the rate 15,867 VND/USD on 15/12/2005)
2	Confidential (MoU submitted to DOE)	6.6	January 2007	594 VND	3.68 US cent (at the rate 16,120 VND/USD on 30/01/2007)
3	Confidential (MoU submitted to DOE)	9	January 2007	603 VND	3.74 US cent (at the rate 16,120 VND/USD on

[4] All exchange rates are official rates of the State Bank of Vietnam

					30/01/2007)
4	Confidential (MoU submitted to DOE)	30	November 2007	607 VND	3.76 US cent (at the rate 16,131 VND/USD on 26/11/2007)
5	Confidential (MoU submitted to DOE)	18	April 2008	604 VND	3.78 US cent (at the rate 15,960 VND/USD on 02/04/2008)
6	Confidential (PPA submitted to DOE later)	16	February 2008	605 VND	3.76 US cent (at the rate 16,076 VND/USD 15/02/2008)

Therefore, the IRR is not likely to reach the benchmark of 11.65%

Annual operating hours: The expected operating hours of the proposed Project indicated in the Preliminary Design Report were calculated based on 22-years historical hydrological data. As the operating hours were calculated based on historical data, assuming a 13.03% of increase in annual average operating hours is unrealistic, and that the IRR is not likely to reach the 11.65% benchmark.

These results show that only with highly unrealistic very favorable circumstances would it be possible to reach the IRR benchmark. In reality, circumstances typically occur more unfavorably than projected and the IRR would be even further away from the benchmark. We can conclude that the IRR is lower than the benchmark for a realistic range of assumptions for the input parameters of the sensitivity analysis, and therefore, that the Project is not financially attractive. This demonstrates that the project activity would not be implemented without the CDM.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Calculation of baseline emission factor of the national electricity grid

Following the methodology, the baseline emission factor (EF) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors according to the following six steps:

Step1: Identify the relevant electricity power system

The relevant electricity power system is that the national electricity grid that the project activity will connect to

Step 2: Select an operating (OM) margin method

As no dispatch data is available and must run/low cost resources constitute less than 50% of total grid generation over past 5 years. Therefore, the simple OM method is used. For the simple OM, ex-ante option is selected

Table 10: Rate of low cost/must-run sources based on generation[5]

Year	2003	2004	2005	2006	2007	**Average**
Hydro power generation (GWh)	19,004.00	17,968.00	16,432.00	19,573.00	22,438.00	95,415.00
Biomass (GWh)	72.00	58.00	43.00	57.00	69.00	299.00
Import (GWh)	-	39.00	383.00	966.00	2,630.00	4,018.00
Total (GWh)	41,197.00	46775.00	53176.00	60392.00	68699.00	270239.00
Rate of low cost/must-run sources generation, %	46.30%	38.62%	31.70%	34.10%	36.59%	36.91%

The Simple OM emission factor ($EF_{OM,simple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants.

Step 3: Calculate the operating margin emission factor (OMEF) according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The Tool allows three options to estimate OMEF. Since the fuel consumption of all the plants for the past three years is not available (especially for the IPPs), Option A cannot be used. Therefore, Option B has been defined to be applied, i.e. based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit.

The simple OM emission factor is calculated based on net electricity generation and fuel consumption efficiency of each power plant/unit (Option B2). The following formula is used to calculate Simple OM.

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

[5] Sources: Recapitulative Report on the operation of Vietnam Netional Electricity System in Year 2007, EVN/National Electricity system Dispatching Center - Department for Electricity System Operation, Hanoi, January 2008

Where:

Parameter	Unit	Description
$EF_{grid,OMsimple,y}$	tCO_2/MWh	Simple operating margin CO_2 emission factor in year y
$EG_{,m,y}$	MWh	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y*.
$EF_{EL,m,y}$	tCO_2/MWh	CO_2 emission factor of power unit *m* in year *y*.
M		All power plants/units serving the grid in year *y* except low–cost/must–run power plants/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) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

(Ex-ante) the full generation – weighted average for the most recent 3 years (2005, 2006 and 2007) for which data are available at the time of PDD submission is used to calculate the Simple OM emission factor.

Again since fuel consumption of none of the plants is known accurately the emission factor of each unit *m* is estimated using **Option B2** as provided in the Emission factor tool.

Option B2. **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**:

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

Where:

Parameter	Unit	Description
$EF_{EL,m,y}$	tCO_2/MWh	CO_2 emission factor of power unit *m* in year *y*.
$EF_{CO2,i,y}$	tCO_2/GJ	Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y*
$EG_{m,y}$	MWh	Net electricity generated and delivered to the grid by power unit *m* in year *y*
$\eta_{m,y}$	%	Average net energy conversion efficiency of power unit *m* in year *y* (%)
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) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

Where several fuel types are used in the power unit, the default value of emission factor of CO_2 by IPCC 2006 for $EF_{CO2,i,y}$ are used.

Step 4: Identify the cohort of power units to be included in the build margin

For the proposed project, **Option 1** shall be chosen: Calculate the Build Margin emission factor $EF_{BM,y}$ *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either the five power plants that have been built most recently; or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently. Sample group that comprises the larger annual generation should be used.

Step 5: Calculate the build margin emission factor

The build margin is calculated as the generation-weighted average emission factor (tCO_2/MWh) of a sample of power plants as follows:

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

Parameter	Unit	Description
$EF_{grid,BM,y}$	tCO_2/MWh	Build margin CO_2 emission factor in year *y*
$EG_{m,y}$	MWh	Net quantity of electricity generated and delivered to the grid by power unit m in year *y*
$FE_{EL,m,y}$	tCO_2/MWh	CO_2 emission factor of power unit m in year *y*
m		Power units included in the build margin
y		Most recent historical year for which power generation data is available

Step 6: Calculate the combined margin baseline emission factor EF

The baseline emission factor *EF* is calculated as the weighted average of the Operating Margin emission factor (EF_{OM}) and the Build Margin emission factor (EF_{BM}):

$$EF = w_{OM} * EF_{OM} + w_{BM} * EF_{BM}$$

Where the weights w_{OM} and w_{BM}, by default, are 50%

Baseline emission

The baseline emissions (BEy) are the product of the baseline emissions factor (EFy) calculated above, times the electricity supplied by the project activity to the national grid (EGy), as per the formulae given below:

$$BEy = EGy * EFy$$

Project emission

The plant type is run-off-river hydro power plant, without any reservoirs. So the project emission PEy = 0 tCO_2/MWh.

Leakage

The main emissions potentially giving rise to leakage in the context of electric sector project are emission arising due to activities such as power plant construction, fuel handling (extraction, processing and transport) and land inundation. Project participants do not need to consider these emission sources as leakage in applying this methodology. Project activities using this baseline methodology shall not claim any credit for the project on account of reducing these emissions below the level of the baseline scenario. So emissions due to leakage Ly = 0 tCO_2/MWh

Emission reduction

The proposed project activity reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable-hydro electricity. The emission reduction ERy by the project activity during a given year y is calculated as the difference between baseline emissions (BEy), project emissions (PEy) and emissions due to leakage (Ly), as per the formulae given below:

$$ERy = BEy – PEy – Ly$$

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

Data / Parameter:	**Emission factor of CO_2**
Data unit:	tCO2/MWh
Description:	Emission factor of CO_2 of national grid of Vietnam
Source of data used:	The data source is prepared by EVN
Value applied:	0.56786
Justification of the choice of data or description of measurement methods and procedures actually applied :	The factor is calculated by RCEE based on the baseline methodology AMS-I.D version 13 and fixed ex-ante for the whole crediting period.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Calculation of baseline emission factor of the national electricity grid

Following the methodology, the baseline emission factor (EF) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors

Calculate the operating margin emission factor

The operating margin emission factor calculations are performed *ex-ante* using available official data on fuel consumption efficiency and net electricity generation for each plants connected to the Vietnamese national grid in period of 2005-2007. Detailed calculation is shown in Annex 3, here is a summary of the calculation.

Table 11: Summary of results

Parameter	Unit	2005	2006	2007
$\sum_m EG_{m,y}$	*GWh*	36,418	39,525	43,934
$\sum_m EG_{m,y} \times EF_{EL,m,y}$	$ktCO_2$	**23,526**	**25,377**	**28,196**

Then, average $EF_{grid,OM,y}$ for 2005-2007 is :

$$EF_{grid,OM,y} = \frac{23{,}526 + 25{,}377 + 28{,}196}{36{,}418 + 39{,}525 + 43{,}934} = 0.64293 tCO_2 / MWh$$

Based on the above calculations, the OM is estimated to be ***0.64293 tCO_2/MWh***.

Calculate the Build Margin emission factor

For the proposed project, **Option 1** shall be chosen: Calculate the Build Margin emission factor $EF_{BM,y}$ *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either the five power plants that have been built most recently; or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently. Sample group that comprises the larger annual generation should be used.

Table 12: Five power plants that have been build most recently [6]

[6] Sources: The data on net electricity generation and Heat Rate in the OM and BM emission factor calculation was provided by EVN in May 2008

No	Plants	Com… year	Installed Capacity	Output	Energy type
			MW	GWh	
1	Đại Ninh	Dec-07	150	0.04	Hydro
2	Quảng Trị	Nov-07	64	64	Hydro
3	Se San 3A	May-07	108	345	Hydro
4	Cà Mau	Apr-07	500	691	Gas/ GT
5	Cái Lân	Mar-07	6x6.5	81	FO/ST
	Total			**1181.04**	

In 2007, total electricity outputs of the Vietnam national electricity system was 65,675.00[7] GWh and its 20% was 13,135 GWh. This figure is much higher than total electricity generation of five power plants that have been built most recently as shown in the table 12, so this option cannot be chosen to calculate the built margin emission factor.

Therefore, the power plant capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently shall be used to calculate the BM emission factor.

The power generation by 13 power plants which were commissioned latest and that contribute to 20% of the annual generation in 2007 was 13,599GWh. These comprised 8 thermal and 5 hydropower plants. The cumulative CO_2 emission of these were 6,701 ktCO_2. Thus $\underline{\boldsymbol{EF_{grid,BM,y}}}$ is 0.49279 ***tCO$_2$/MWh***

A detailed calculation is shown in the Annex 3, here is a summary of results

Table 13: Summary of results

Parameters	Net output (GWh)	CO2 emission (ktCO2)	BMEF (tCO2/MWh)
Results	13,599	6,701	0.49279

Calculate the combined margin baseline emission factor CMEF

The baseline emission factor *EF* is calculated as the weighted average of the Operating Margin emission factor (EF_{OM}) and the Build Margin emission factor (EF_{BM}):

$$EF = w_{OM} * EF_{OM} + w_{BM} * EF_{BM}$$

Where the weights w_{OM} and w_{BM}, by default, are 50%

So the baseline emission factor will be:

$$EF = 0.5*0.64293 + 0.5*0.49279 = 0.56786 \text{ tCO}_2\text{/MWh}$$

[7] Source: Recapitulative Report on the operation of Vietnam National Electricity System in Year 2007, EVN/National Electricity system Dispatching Centre - Department for Electricity System Operation, Hanoi, January 2008

Baseline emission

The baseline emissions (BEy) are the product of the baseline emissions factor (EFy) calculated above, times the electricity supplied by the project activity to the national grid (EGy), as per the formulae given below:

BEy = EGy * EFy

Where:

EFy = 0.56786 tCO_2/MWh

EGy = 17,920 MWh (net electricity generation)

So BEy = 0.56786 x 17,920 = 10,176 tCO_2

Project emission

The plant type is run-off-river hydro power plant, without any reservoirs. So the project emission PEy = 0 tCO_2/MWh.

Leakage

The main emissions potentially giving rise to leakage in the context of electric sector project are emission arising due to activities such as power plant construction, fuel handling (extraction, processing and transport) and land inundation. Project participants do not need to consider these emission sources as leakage in applying this methodology. Project activities using this baseline methodology shall not claim any credit for the project on account of reducing these emissions below the level of the baseline scenario. So emissions due to leakage Ly = 0 tCO_2/MWh

Emission reduction

The proposed project activity reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable-hydro electricity. The emission reduction ERy by the project activity during a given year y is calculated as the difference between baseline emissions (BEy), project emissions (PEy) and emissions due to leakage (Ly), as per the formulae given below:

ERy = BEy – PEy – Ly

So ERy = 10,176 – 0 – 0 = 10,176 tCO_2/MWh

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

Summary of the above calculations is shown in below table:

Table 14: Summary of the calculated parameters

>>

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2009 (1 October- 31 December)	0	2,544	0	2,544
2010	0	10,176	0	10,176
2011	0	10,176	0	10,176

2012	0	10,176	0	10,176
2013	0	10,176	0	10,176
2014	0	10,176	0	10,176
2015	0	10,176	0	10,176
2016 (1 January- 30 September)	0	7,632	0	7,632
Total (tonnes of CO_2e)	0	**71,232**	0	**71,232**

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

Monitoring methodology:

Title and reference of the methodology applied to the project activity are shown as following:

Type I: Renewable Energy Project

Category I.D: Grid Connected Renewable Electricity Generation. Version 13

Reference: http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

For the project, the category I.D is applied in context of sub item 13: *I.D. Renewable Electricity Generation for a grid:* "13. Monitoring shall consist of: Metering the electricity generated by the renewable technology.".

No leakage calculation is required

The methodology requires monitoring of the following:

- Net electricity generation from the proposed project activity, which is supplied to the national grid.

B.7.1 Data and parameters monitored

Data / Parameter:	**Electricity quantity**
Data unit:	MWh
Description:	Net Electricity supplied to the national grid by the project
Source of data to be used:	Hydro power plant and electricity bill
Value of data:	17,920
Description of measurement methods and procedures to be applied:	Directly measured by electronics equipments
QA/QC procedures to be applied:	QA/QC procedures for this are planned. These data will be directly used for calculation of emission reductions. Sales

	record to the grid are used to ensure the consistency.
Any comment:	The value used in the calculation is based on the average flow in the Nam Sap stream. The actual production can vary with +/- 10%

B.7.2 Description of the monitoring plan:

The project activity does not involve any leakage within the project boundary because no alternate fuel (fossil fuel or any other GHG emitting fuel) can be used to run the turbines and generate electricity.

The generated electricity from the project is sold to the National electricity utility, EVN, for the complete project lifespan, for which the project owner will enter into a long term power purchase agreement (PPA) with EVN. Thus throughout the project cycle (crediting period) and beyond, the electricity generated from the project will be monitored by both the project proponent and the third party (EVN).

The generated electricity, before entering into the grid, at the grid interconnection point will be measured by digital, kilowatt hour (kWh) meter. The readings of the meter will be recorded on a monthly basis. The measuring equipments will be calibrated according to the relevant regulation by EVN. The electricity generation records will be signed by the officials from project proponent and third party (EVN). This generation record will form the basis of payment by EVN to the project proponent.

All of the data and documents related to the net electricity generation feed to the national grid will be kept in during the crediting periods and two years later.

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 of completion of the application of the baseline and monitoring methodology

01/04/2008

Name of the responsible person(s)/entity(ies)

RCEE Energy & Environment Joint Stock Company, which is the CDM project developer listed in Annex 1 as project participant.

The individuals developing the baseline are:

Mr. Nguyen Ba Hai – hai.nguyen@rcee.org.vn

Dr. Nguyen Van Hanh – nguyenvanhanh53@yahoo.com

The contact for CDM project activity is:

Ms. Le Thi Bao Ngoc

RCEE Energy and Environment Joint Stock Company

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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:

Starting date of construction: 06/03/2006

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

25 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:

01/10/2009

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

Not applicable

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

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

The Environment Impacts Assessment Report was made by project manager and it was approved by Moc Chau District People's Committee.

Summary of impacts on environment for the implementation of the project as follow:

The project will initiate impacts on the environment the following:

Land occupation: Total land occupied area will be 20 ha

Impact on water environment

Impact on air environment

Impact on fauna and flora system

(1) Land occupation

In which:

Homestead land:	0.88 ha
Pond and lake and garden land:	19.12 ha

(2) Impact on water environment

+ The construction of a dam will create a small reservoir, occupying mainly pond, lake and garden land. Not the total stream of water flow is supplied for the reservoir, hence stream section after the dam will not become exhausted. Beside, continuous discharge of sand will supply a significant amount of water for this stream section. When the plan comes into operation, the total water flow thought will turn back the stream so its water flow will not be affected in quality and quantity, content of dissolved oxygen as well as other chemical content as pH, turbidity, etc. will not be changed. Water environment will be the least affected by the project construction.

+ Water resource supplies for local people's life and production activities mainly rain and small streams from hill and mountain ranks. So construction of the plan will not influence on their activities.

(3) Impact on air environment

The influence on the construction period of infrastructures on the air environment is most among the project's construction period. It includes ground levelling, material transportation, etc that make dust, emissions such as CO_x, NO_x, SO_x, etc., causing bad influences on people and animal's health.

Noise caused by mine explosions, motorized hammer, machines also can cause bad influences on people and animal's health.

However, when the project construction is completed, these activities and their impacts are stopped.

(4) Impact on fauna and flora system

The project will result in the loss of 20 ha of forest, the decrease of forest cover, the death and emigration of some wild animal species.

Table 15: Environment and social impact assessment and comparison

No	Activities which may impact on environment	Project duration			
		Construction period		Operation period	
		Positive	Negative	Positive	Negative
I	**Natural environment**				
1	Water Environment	O	-	O	-
2	Air Environment	O	-	+	O
3	Vegetation cover	O	-	+	O
4	Animal systems	O	--	+	O
5	Land	O	-	O	-
II	**Economic – social environment**				
1	Economic activity	+	O	+	O
2	Agriculture	O	O	+	O
3	Transportation	O	-	+	O
4	Trade and service	++	O	+	O
5	Life level of inhabitants	O	O	+	O
6	Culture	O	-	+	O

Note: - : Minimal or temporary adverse impacts
-- : Strong or long – term adverse impacts
+ : Minimal or temporary profitable impacts
++ : Strong or long – term profitable impacts
O : None

Mitigation solutions

Waste collection system: The wastes generated during the construction period will be handled in a most hygienic way and shall be disposed in a planned manner.

After construction of headwork, intake, powerhouse and access road, the areas will be cleaned, including reforestation and creating supporting slopes to prevent landslides and erosion. Dump of solid waste materials will be levelled to grow trees.

Minimising noise and dust: During the construction, water will be sprayed in and around construction areas.

The cultivated land area to be occupied for reservoir component shall be compensated satisfyingly.

Reservoir area shall be cleaned before it is stored water.

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:

Moc Chau District People's Committee Certifies

Ta Niet Hydroelectric Joint Stock Company issued the Document No. 90/2006/CV-CT dated November 10, 2006 on requesting to confirm registration of the Commitment of Environmental Protection of the project of Ta Niet Hydroelectric Plant.

Ta Niet Hydroelectric Joint Stock Company is responsible to implement fully and sufficiently the content on environmental protection as specified in the Commitment of Environmental Protection.

The Commitment of Environmental Protection of the project is the basis on which state management organs on environmental protection control, check and inspects environmental protection work of the Project.

SECTION E. Stakeholders' comments

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

According to the regulation of International Cooperation Department of Ministry of Natural Resources and Environment, which was designated as a Clean Development Mechanism National Authority (CNA) in Vietnam, the following organizations are the stakeholders of the proposed project, whose comments should be involved:

- Ta Niet Hydro Power Joint Stock Company
- The People' committee of Son La province (local authorities)
- The People' committee of Moc Chau

All documents related to the project were sent to the organizations mentioned above to receive their comments.

Beside these comments, following the international CDM modalities, the comments of commune's representatives were colleted. These comments were received by project sponsor

during meetings with the communes' representatives at 8 am, dated 13 November, 2006 in Chieng Hac commune, Moc Chau district, Son La province. The proposed project is solely located in Chieng Hac commune. Communes' representatives at these meetings were:

- Chairman of Commune's People Committee (CPC). CPC is lowest administration level in the Vietnamese administrative hierarchy. The Chairman of CPC is elected by the Council so he well represents the commune's interest.

Local side:

– Chairman of Commune's People Committee.

– Chairman of Association of Farmers,

– Chairman of Association of Woman,

– Chairman of Association of Veteran,

– Chairman of Executive Board of Youth, and

– Heads of Ta Niet Village, Co Liu Village, Chieng Pan Village, Tong Han Village.

Project sponsor side:

- Mr. Nguyen Vinh Phuc - Director

- Mr. Doan The Anh - Deputy head of Project Management Unit

In the meeting, representative of Investor presents feasibility study of the project as well as socio-economic and environmental effects of the works on the local area, After that, participants have given their comments to the project entity.

E.2. Summary of the comments received:

All organizations understood that the project contributes to sustainable development and environment protection of Vietnam, especially increase in local budget and reduction of poverty; hence they fully support the project and respond with their comments promptly.

The comments of the Communes representative are summarized as follow:

– The proposed hydropower project is a clean industrial project in this mountainous and remote area and will contribute to socio-economic development of commune and region.

– The good impacts are expected from infrastructure improvement such as road, electricity access, irrigation, also from better contact and exchange possibilities. (These will improve people knowledge (including Vietnamese language efficiency) and market access).

– Project sponsor is requested to coordinate with local authorities to:

Construct new public welfare works such as primary school, small clinic, potable water system viewing peoples life stability and improvement.

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

The organization's comments are carefully reviewed. All of them are positive comments.

The project sponsor is committed to create jobs for commune people.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	**Ta Niet Hydro Power Joint – Stock Company**
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URL:	
Represented by:	
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Salutation:	Mr
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Middle Name:	Vinh
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Organization:	**RCEE Energy and Environment Joint – Stock Company**
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There are no any public funding which supported for this project

Annex 3
BASELINE INFORMATION
VIETNAM ELECTRICITY GRID DATA[8]

Please see the sheet of Power plants in the baseline calculation file

A. Calculation of Operating Margin Emission Factor

EVN Plants

1	2	3	4	5			6	7	8	$-\sum_m EG_{m,y} * EF_{EL,m,y}$		
No.	Power Station	Fuel/ Technology	Heat Rate Kcal/kWh	Annual Generation GWh			Efficiency ηm,y%	EFco2,m,feel,y tCO2/GJ	FEEL,m,y tCO2/MWh	2005	2006	2007
				2005	2006	2007				ktCO2		
1	**Pha Lai 1**	Coal/ST	3037	2,462	2,767	2,830	28.32%	0.0983	1.2497	3,077	3,458	3,537
2	**Pha Lai 2**	Coal/ST	2402	4,299	4,315	4,198	35.80%	0.0983	0.9884	4,249	4,265	4,149
3	**Uong Bi**	Coal/ST	3877	669	759	694	22.18%	0.0983	1.5953	1,067	1,211	1,107
4	**Uong Bi 2**	Coal/ST	NA			520		0.0983		na	na	na
6	**Ninh Binh**	Coal/ST	3824	690	795	729	22.49%	0.0983	1.5735	1,086	1,251	1,147
7	**Thu Duc**											
	ST	FO/ST	2694	550	472	603	31.92%	0.0774	0.8729	480	412	526
	(GT1,2,3,4)	DO/GT	3056	34	32	70	28.14%	0.0741	0.9479	32	30	66

[8] The data sources on net electricity generation and Heat Rate in OM and BM emission factor calculation was provided by EVN. Emission factors of CO2 of fuel types are default values of the IPCC 2006

8	**Can Tho**											
	ST (S4)	FO/ST	2709	128	128	137	31.75%	0.0774	0.8777	112	112	120
	(GT1,2,3,4)	DO/GT	3056	142	109	151	28.14%	0.0741	0.9479	135	103	143
9	**Ba Ria**											
		Gas/CCGT	2210	2,151	2,024	1,983	38.91%	0.0561	0.5190	1,116	1,050	1,029
10	**Phu My 1**											
		Gas/CCGT	1746	7,179	6,422	8,077	49.26%	0.0561	0.4100	2,944	2,633	3,312
11	**Phu My 2.1**											
		Gas/CCGT	1857	3,641	6,111	5,975	46.31%	0.0561	0.4361	1,588	2,665	2,606
12	**Phu My 4**											
	GT41,43	Gas/CCGT	1829	3,126	3,209	3,277	47.02%	0.0561	0.4295	1,343	1,378	1,408
	EG of EVN's plants in 3 years			25,071	27,143	29,244	Emission of EVN's plants in 3 years			17,229	18,570	19,150

Thermal IPPs

1	2	3	4	5			6	7	8	$-\sum_m EG_{m,y} * EF_{EL,m,y}$		
No.	Power Station	Fuel/ Technology	Heat Rate Kcal/kWh	Annual Generation GWh			Efficiency ηm,y%	EFco2,m,feel,y tCO2/GJ	FEEL,m,y tCO2/MWh	2005	2006	2007
				2005	2006	2007				ktCO2		
1	Na Duong	Coal/ST	2748.00	389	709	744	31.30%	0.0983	1.1308	440	802	841
2	Hiep Phuoc	FO/ST	3232.00	1,424	955	1,726	26.61%	0.0774	1.0472	1491	1000	1807

3	Formosa	Coal/ST	2270.00	800	1,086	1,113	37.89%	0.0983	0.9341	747	1014	1040
4	Amatar	DO/ST	3300.00	67	26	13	26.06%	0.0741	1.0236	69	27	13
5	Bourbon	Co-gen	2700.00	43	57	69	31.85%	0.0983	1.1110	48	63	77
6	Ve Dan	Gas/GT	2900.00	463	514	534	29.66%	0.0561	0.6810	315	350	364
7	Cai Lan	DO/ST	3300.00			81	26.06%	0.0741	1.0236			83
8	Phu My 22	Gas/CCGT	1573.00	3,719	4,855	5,004	54.67%	0.0561	0.3694	1374	1793	1848
9	Phu My 3	Gas/CCGT	1739.00	4,442	4,110	3,883	49.45%	0.0561	0.4084	1814	1678	1586
10	Cao Ngan	Coal/ST	2748.00		70	832	31.30%	0.0983	1.1308		79	941
11	Cà Mau	Gas/GT	2583.20			691	33.29%	0.0561	0.6066			419
		EG of IPPs in 3 years		11347	12382	14690		Emission of IPPs in 3 years		6298	6807	9019
		Total EG		**36,418**	**39,525**	**43,934**		**Total Emission**		**23,526**	**25,377**	**28,169**

$EF_{OM,y}$ **0.64293** **tCO2/MWh**

B. Calculation of Build Margin Emission Factor

1	2	4	5	6	7	8	$-\sum_m EG_{m,y} * EF_{EL,m,y}$	
No.	**Name of plant**	**Date of commisioning**	**Capacity**	**Technology**	**Generation GWh**	**FEEL,m,y tCO2/MWh**		ktCO2
1	Đại Ninh	Dec-07	150	Hydro	0	-		
2	Quảng Trị	Nov-07	64	Hydro	64	-		
3	Se San 3A	May-07	108	Hydro	345	-		
4	Cà Mau	Apr-07	500	Gas/ GT	691	0.6066		419
5	Cái Lân	Mar-07	6x6.5	FO/ST	81	1.0236		83
6	Srokphumiêng	Jan-07	51	Hydro	252	-		
7	Uông Bí 2	Dec-06	300	Coal/STI	520	1.1308		588
8	Sê San 3	Jul-06	260	Hydro	1130			
9	Cao Ngạn	May-06	115	Coal/STI	445	1.1308		503
10	Na Duong	Apr-05	100	Coal/ST	744	1.1308		841
11	Phú Mỹ 2.2	Oct-04	763	Gas/GT	5004	0.3694		1848
12	Phú Mỹ 4	Sep-04	565	Gas/GT	3210	0.4295		1379
13	Formosa	Mar-04	150	Coal/STI	1113	0.9341		1040
	Total Generation of plants in BM calculation				**13599**		**Total emission**	**6701**
	Total Generation of the Vietnam electricity grid				**65675**			
	20% of total generation of Vietnam electricity grid				**13135**			

`	BMEF	**0.49279**	**tCO2/MWh**	

Annex 4

MONITORING INFORMATION

Selection procedure:

The monitoring officers will be appointed by the general manager of the Ta Niet Hydropower Project. The monitoring officers will be selected from among the operation workers of the plant. Before commences monitoring duties, they have to in joint a training on the operation and maintenance processing by the EVN and project entity.

Tasks and responsibilities:

The monitoring officers will be responsible for carrying out the following tasks:

Supervise and verify metering and recording:

The monitoring officers will coordinate with the plant manager to ensure and verify adequate metering and recording of data, including power delivered to the grid.

• Collection of additional data, sales / billing receipts:

The monitoring officers will collect sales receipts for power delivered to the grid and billing receipts for power delivered by the grid to the hydropower station

• Calibration:

The monitoring officers will coordinate with other staffs of the project entity to ensure that calibration of the metering instruments is carried out periodically in accordance with regulations of the EVN

• Calculation of emission reductions:

The monitoring officers will provide with data and information that have been collected in the last operation period to the project's CDM consultant.

• Preparation of monitoring report:

The monitoring officers will annually prepare a monitoring report which will include among others a summary of daily operations, metering values of power supplied to and received from the grid, copies of sales/billing receipts, a report on calibration and a calculation of emission reductions.