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

CONTENTS

A. General description of the small scale 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 proposed small scale project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring Information

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

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BMP 3.5 MW Biomass Power Generation Project

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

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Purpose of the project activity

The project participant, Bio-Mass Power Company Limited (BMP), installs 3.5 MW power plant which uses biomass such as rice husk as primary fuel for power generation. The project generates electricity under the Very Small Power Producer (VSPP) scheme in Thailand. The install capacity of the plant is 3.5 MW and 3.0 MW is expected to supply to Provincial Electricity Authority (PEA).
The project location is Chainat province, in northern direction from Bangkok city, the capital of Thailand.

BMP has selected the appropriate plant design concept with robust combustion technology in using rice husk fuel for the process and produce reliable generation. The company is undergoing the planning for expansion using multi-biomass fuel in conjunction with rice husk. According to the feasibility study conducted by BMP, amount of annual electricity generation as gross output will be 27636 MWh and amount of annual electricity supplied to the grid will be 23688 MWh.

For using biomass waste as fuel, the electricity generated by the plant displaces an equivalent amount of electricity generated by grid connected power plants. As a result, the project activity will reduce 13767 tCO2e annually by displacing electricity from fossil fired power plants in the electricity grid of Thailand.

Contribution to the Sustainable Development for the Host Country:

The host country has established “Sustainable Development Criteria” for screening, evaluating and approving CDM projects in Thailand. With respect to the criteria, there are four major groups of sustainable development indicators: (1) Natural resources and environment indicators; (2) Social indicators; (3) Development and/or technology transfer indicators; and (4) Economic indicators.

(1) Natural resources and environment indicators:
The project activity utilizes biomass waste such as rice husks and other biomass which would be burnt or decayed in the absence of the project activity. Thus project activity will lead utilize local available resource as sustainable manner.
Also, as the project activity uses biomass waste, it leads to reduce SOx and NOx emissions from fossil fuel power plants connecting to the electricity grid.

(2) Social indicators:
The project activity would create the employment opportunities in the construction of the project and biomass collections process. Thus creating jobs will lead to income generation and contribute to social benefit.

(3) Development and/or technology transfer indicators:
Since the project required for using mixed biomass fuel for power plant operation, then the plant must be designed to accept the mixture of biomass fuel in order to obtain stable and reliable operation of the combustion and plant operation. Ash from the combustion has acceptable value for to sell to other usage and suitable agricultural in the local community. The project activity employs a multi-biomass fuel boiler which is ready to switch for fuel mixed patterns.

(4) Economic indicators:
The project activity reduces fossil fuel import requirement for the country.
The project activity leads monetary benefits to the farmers who provides with rice husks or other biomass through using such biomass waste.

The plant production process is full condensing operation and also has planned for additional income from Carbon Reduction; the other source of income can be benefit for selling of fly ash and bottom ash to other industrial user and supply to fertilizer maker.

A.3. Project participants:

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Name of Party involved (*) party((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)
Thailand (host)	Bio-mass Power Co., Ltd.	No
Japan	IDI carbon management Inc.	No

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

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

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A.4.1.1. Host Party(ies):

>>
Thailand

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

>>
Chainat Province

A.4.1.3. City/Town/Community etc:

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Makam Toa Sub-district, Wat Singh District

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

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15 Makam Tao Sub-district, Wat Singh District, Chainat Province, Thailand
The latitude and longitude of the project location is 15°12’56.64” N, 100°03’14.75” E.

Figure A.4.1.4.-1 Chainat Province in Thailand

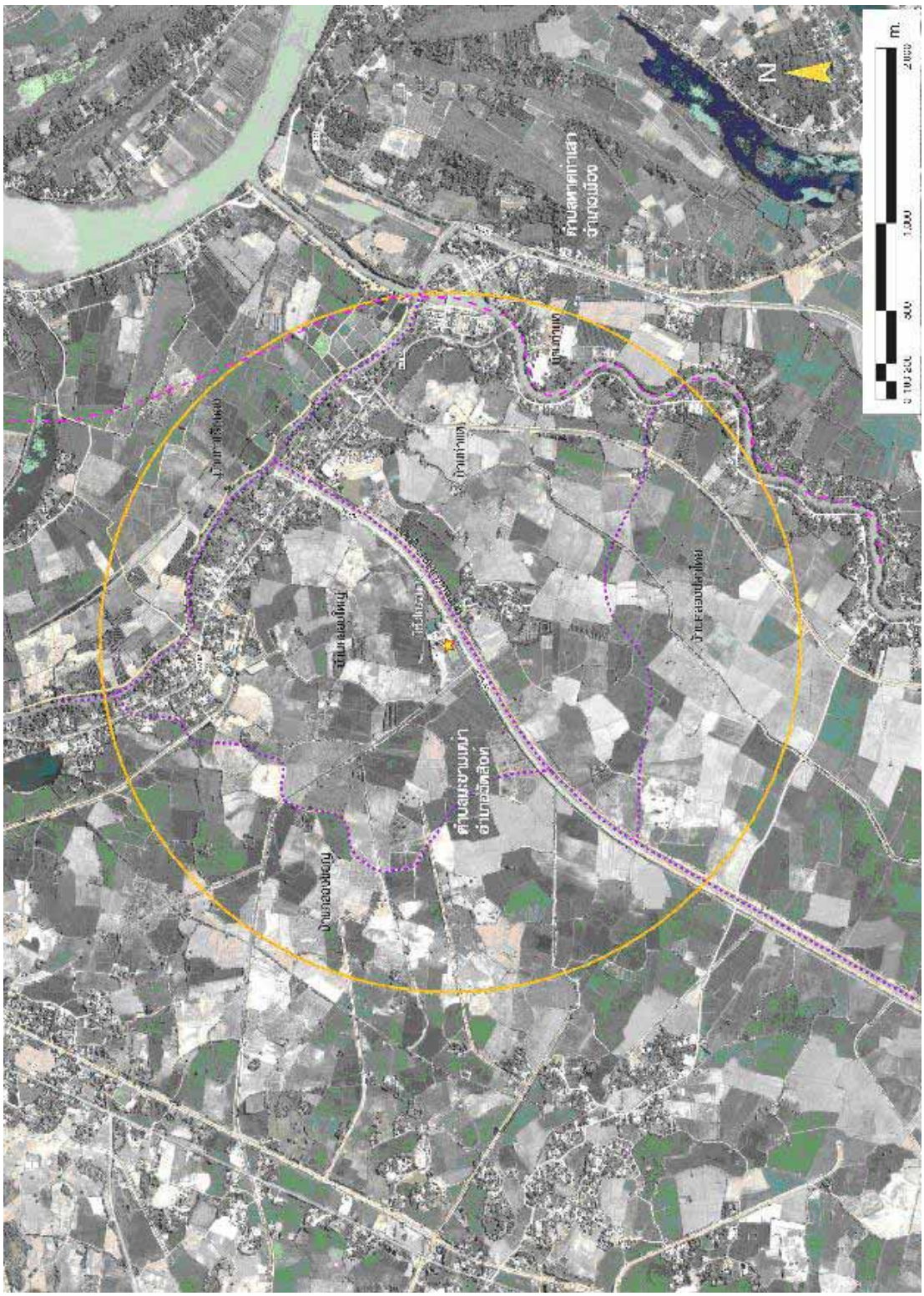

Figure A.4.1.4.-2 Location of BMP 3.5MW Biomass Power Generation Project

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

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(a) Type and category of the project activity

The project will produce electricity to sell to the Thailand grid using biomass fuel such as rice husk and other biomass. Therefore, the relevant type and category of the small scale project activity is:

Type I: Renewable Energy Projects
Category D: Grid connected renewable electricity generation
Sectoral Scope 01: Energy Industries (renewable / non-renewable sources)
Reference: Version 16

(b) Technology of the project activity

The project introduces:
1) Multi fuel boiler using combustion of rice husk and other biomass fuel to generate steam from the thermal energy
2) Steam turbine system of 3.5MW rated capacity to generate electricity

Table A.4.2-1 The main technical parameters of the boiler

Boiler type	Circulating Fluidized Bed (CFB) Boiler
Rated evaporation capacity of boiler	20 t/h
Rated steam pressure	3.82 MPa
Rated steam temperature	450 degree C
Feed water temperature	150 degree C
Design efficiency of boiler	83 %
Fuel type	Rice husk, Saw dust, Wood bark, King grass

Table A.4.2-2 The main technical parameters of the steam turbine

Model No.	N3.5-3.43
Rated power	3.5MW
Rated speed	3000 rpm
Rated inlet pressure	3.43 MPa
Rated inlet temperature	435 degree C
Rated inlet flow	17 t/h
Rated cooling water temperature	33 degree C
Feed water temperature	150 degree C
Rated steam rate	4.86 kg/kWh
Rated heat rate	12985 kJ/kWh

Table A.4.2-3 The main technical parameters of the generator

Model No.	QF-4-2
Rated power	4000 kW
Rated voltage	6300 V
Rated speed	3000 rpm
Power factor	0.8

(c) Air pollution control

The project controls air pollution from stack. Flue gas of boiler outlet is flow into the cyclone pre-collector before the bag filter. Then the flue gas is purified by the bag filter and discharged through the stack.
The efficiency of the bag filter can be over 99.5% and realize the dust concentration of the outlet flue gas less than 50mg/Nm3, which will meet the environment requirement.

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

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Years	Estimation of annual emission reductions in tonnes of CO_2e
2012	13,767
2013	13,767
2014	13,767
2015	13,767
2016	13,767
2017	13,767
2018	13,767
Total estimated reductions (tonnes of CO_2e)	96,369
Total number of crediting years	7
Annual average of the estimated reductions over the crediting period (t CO_2e)	13,767

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

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No public funding will be used for the project.

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

This project activity is not a debundled component of a large scale project activity. The project proponents do not have any other registered small-scale CDM projects nor will they apply to register another small scale CDM project activity that is:

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

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The approved baseline and monitoring methodology applied to the project is:
AMS-I.D. Grid connected renewable electricity generation, Version 16
Type I: Renewable energy projects
Category D: Grid connected electricity generation
Reference: Version 16, scope 1

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

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The project activity with biomass based electricity generation will displace part of electricity of Thailand national grid.
The Methodology AMS I.D version 16 is applicable to the project through the following criteria:

Table B.2 Applicability criteria for AMS-I.D.

Methodology applicability criteria	Project activity in accordance with the applicability criteria
This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to a national or a regional grid. Project activities that displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit shall apply AMS I.F.	The project activity installs biomass fuel power plant. The project activity generates electricity using biomass fuel to supply to the national grid. This electricity will displace electricity from Thai national grid system that would have been supplied by mainly fossil fuel fired generating unit.
2. This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity	The project activity is a green field project.

addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	
3. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: ・ The project activity is implemented in an existing reservoir with no change in the volume of reservoir; ・ The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2; ・ The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	The project activity newly constructs a biomass power plant which is not a hydro power project. Therefore, this criteria is not applicable to the project activity.
4. In the case of biomass power plants, no other biomass types than renewable biomass are to be used in the project plant.	The project activity uses only renewable biomass for power generation.
5. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity introduces 3.5 MW power plant capacity lower than 15MW and uses only biomass fuel.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The project activity does not have any combined heat and power systems.
7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The project activity does not involve any additions at existing facility but it is newly introduction of whole complete project.
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of retrofitted or replacement unit shall not exceed the limit of 15 MW.	The project activity does not retrofit or replace an existing facility for renewable energy generation.

Based on check of criteria above, the methodology of AMS-I.D. can be applied to the project activity.

B.3. Description of the project boundary:

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According to the methodology of AMS-I.D., the project boundary should include the physical, geographical site of the renewable generation source delineates the project boundary.
Therefore, the boundary of the project activity covers biomass stock yard, boiler, steam turbine and generator and other relative facilities.

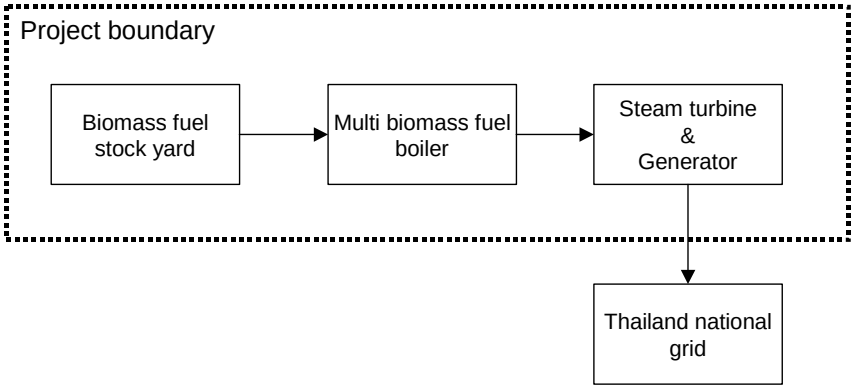

Figure B.3 The project boundary

The below table indicates the GHG emissions that are considered in the proposed CDM project activity.

Source	Source	Gas	Included/ Excluded	Justification/Explanation
Baseline	Electricity Generation	CO_2	Included	Main emission source. Generated electricity is export to national grid.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel and electricity consumption due to the project activity	CO_2	Included	The CO_2 emissions in biomass handling process from bulldozer are account for.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Off-site transportation of biomass and ash	CO_2	Included	The emissions from truck transportation & handling of biomass and ash are accounted for.
		CH_4	Excluded	There is no CH4 emissions associated with the project activity.
		N_2O	Excluded	There is no N2O emissions associated with the project activity.

B.4. Description of baseline and its development:

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The baseline scenario for the project activity is the continuation of operation of grid connected electricity generation plants. The equal amount of energy generated by the project activity would have been produced by other grid connected sources.
According to methodology of AMS-I.D, the baseline emissions are the product of electrical energy baseline expressed in kWh produced by the renewable generating unit multiplied by an emission factor. The Emission Factor can be calculated in a transparent and conservative manner as follows:

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

OR

(b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Calculations must be based on data from an official source (where available) and made publicly available.

Option (a) is selected as the baseline and the method for calculating the emissions coefficient for the project. All data used to calculate the Combined Margin emissions coefficient is publically available and shown in Annex 3.

Table B.4 Calculation result of combined margin emissions coefficient

OM/BM	Weight	Emission factor
Operating margin	0.5	0.6147
Build margin	0.5	0.5477
$EF_{grid,CM,y}$ (tCO_2/MWh) (Combined Margin)		**0.5812**

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:

Demonstration of Prior consideration of CDM

The project proponent has made serious consideration to CDM prior to it decision to go ahead with the project and has also made real actions to pursue its CDM status. The following table lists the important events in chronological order and with evidences that illustrates the above statements.

Table B.5 Chronology of events for the project activity

No.	Date	Event/Activity	Evidence
1	September 2009	The feasibility study was completed by	Feasibility study

		STFE (engineering support company to BMP)	
2	13 August 2009	PPA approval was obtained.	PPA
3	25 March 2010	Annual General Meeting of Shareholder on project construction and CDM development.	Minute of meeting
4	7 April 2010	MOU regarding CERs purchase between BMP and IDI.	MOU
6	25 May 2010	CDM development contract was concluded between BMP and IDI.	Contract
7	3 June 2010	The Prior Consideration Form was submitted to the UNFCCC secretariat.	Email & F-Form
8	2 June 2010	Letter of Intent was submitted to DNA of Thailand (TGO).	LOI
9	6 June 2010	The Prior Consideration Form was confirmed receipt by UNFCCC secretariat.	Email
10	June 2010	Letter of Intent was confirmed receipt by DNA of Thailand (TGO).	TGO letter
11	30 June 2010	A loan agreement concluded between BMP and a local bank.	Loan agreement
12	20 July 2010	Construction contract agreement was concluded between BMP and an EPC company.	Contract
13	29 November 2010	Construction started.	
14	17 December 2010	Public Consultation Program was conducted.	Meeting minutes

With the implementation of the project activity, the emissions of GHG by sources will be 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 following barriers :

According to the Attachment A to Appendix B of the "Simplified Modalities and Procedures for Small Scale CDM Project Activities" agreed by the CDM Executive Board the additional of the proposed project will be demonstrated and assessed, in which listed various barriers, at least one barrier listed shall be identified due to which the project would not have occurred any way.

a) Investment barrier, i.e., a financially more viable alternative to the project activity would have led to higher emissions;
b) Technological barrier, i.e., a less technologically advanced alternative to the project activity, though would involves lower risks due to the performance uncertainty or low market share of the new technology adopted by the project activity and so would have led to higher emissions;
c) Barrier due to prevailing practice, i.e., prevailing practice or existing regulatory or policy requirements would have led to the implementation of a technology with higher emissions;

d) Other barriers, i.e., without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

The additionality of the project activity is demonstrated based on guidance for the Access-to-finance barrier as follows:

Access-to-finance barrier: Best practice examples include but are not limited to, the demonstration of limited access to capital in the absence of the CDM, such as a statement from the financing bank that the revenues from the CDM are critical in the approval of the loan.

The barrier analysis is applied using the guidance of the Validation and Verification Manual (VVM) 113-116 by demonstrating that the CDM project activity faces barriers that:

(a) Prevent the implementation of this type of proposed CDM project activity;
(b) Do not prevent the implementation of at least one of the alternatives.

As described below, the access to finance barrier would have prevented implementation of the project because the project developer would not have been able to finance the project in the absence of CDM revenues which were crucial in the decision to approve the loan. This barrier does not prevent the continued operation of the existing power plants which supply electricity to the Thailand grid. Therefore, it is clear that CDM project faces a barrier which does not prevent implementation of one alternative to the project activity.

Investment Barrier Analysis

The additionality has been demonstrated using the benchmark analysis as the project activity generates revenues from selling of power in addition to the CDM related income. The financial indicator chosen is the project IRR.

The project activity entails an investment of 174.98 million THB. The investment analysis has been done over a period of 20 years consistent with the project's operational lifetime. The input values have been sourced from the project's feasibility study and all the supportive documents will be provided to the DOE for validation.

The following table outlines the key input parameters and the tariff used in the investment analysis:

Assumption	Projected Figures
Total Investment Cost	THB 174,980,000
Length of Construction and Testing	21 months
Plant Operation Hour	Annually 7896 hours
Gird Sale	3000kW
Peak Power Price	THB 2.9278/kWh
Off-Peak Power Price	THB 1.1154/kWh
Fuel Adjustment Price	THB 0.9177/kWh
Adder	THB 0.3/kWh
Average Fuel Price	THB 680/Ton
Labour Cost	THB 4,000,000 Annually
Maintenance Cost	THB 4,300,000 Annually

Escalation	1%

Type of Fuel	Ratio	THB/Ton
Rice Husk	50%	1000
Wood Bark	50%	400
Woodchip	0%	
Palm Shell	0%	
Saw Dust	0%	
Giant King Glass	0%	
Weighted average	**100%**	**680**

The project activity has an installed capacity of 3500 kW. 3000 kW of electricity will be exported to the national grid and 500kW will be used internally.
In line with the guidance available in "Guideline on the assessment of investment analysis" (Annex 58, EB51), depreciation has been added back to the net profits. The result of this analysis is a pre tax project IRR 13.26% which is not attractive enough to be viable under the business-as-usual scenario. The benchmark is referred from the two indicative rates associated with power generation in Thailand. We refer to a recent rate sourced from "IPP Bidding" by Ayudhya Securities Public Company Limited, which cites the benchmark of 15% for an Independent Power Producer (IPP). The 15% benchmark is chosen as bother realistic and conservative. In the light of the above, the project activity (project IRR – 11.08%) is clearly not financially attractive compared to the benchmark (15%). Also we also estimated 5-year weighted average of cost of capital (WACC) calculated by Thailand's actual minimum loan rate and the result of return of equity of Energy and Utilities sector of the stock market in the Stock Exchange of Thailand during 2004 to 2009. The pre tax WACC is 14.13%. If we include the revenue of CERs, a pre tax project IRR is 16.83% which exceeds both the benchmarks described above.
The robustness check of the analysis has been carried out by a sensitivity analysis of the parameters subjected to reasonable variation (±10%).

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Baseline emissions

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

$$BE_y = EG_{BL,y} * EF_{CO2,\,grid,\,y} \quad (1)$$

Where:

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

Project emissions

As per paragraph 19 in version 16 of AMS I.D., the project activity utilizes biomass residues as a source of energy.
Therefore the project emissions is zero.

$PE_y = 0$ (2)

Where:
PE_y Project Emissions in year y (t CO2/year)

Leakage

As per attachment C to Appendix B of INDICATIVE SIMPLIFIED BASELINE AND MONITORING METHODOLOGIES FOR SELECTED SMALL-SCALE CDM PROJECT ACTIVITY CATEGORIES "General guidance on leakage in biomass project activities (Version 03)", (EB47 annex 28), the emission source for type of biomass is shown in the table:

Table Emission source per type of biomass

Biomass type	Activity / source	Shift of pre-project activities	Emissions from biomass generation / cultivation	Competing use of biomass
Biomass from forests	Existing forests	-	-	x
	New forests	x	x	-
Biomass from croplands or grasslands (woody or non-woody)	In the absence of the project the land would be used as cropland / wetland	x	x	-
	In the absence of the project the land would be abandoned	-	x	-
Biomass residues or wastes	Biomass residues or wastes are collected and used	-	-	x

As the project activity uses biomass residues including rice husk, saw dust and wood bark.
The project participants evaluate a surplus of the biomass in the region of the project activity, which is not utilized.

Table Survey on rice husk availability

Province	Rice Paddy (ton/day)	Rice Husk (ton/day)
Chainart (within 30km)	3,420	564
Uthaithani (within 30km)	320	69
Supanburi (within 60km)	3,580	662
Singburi (within 60km)	1,005	153
Total	8,325	1,448

According to the survey on rice husk availability, while the quantity of available rice husk is 1,448 ton /day comparing to that the quantity of consumption rice husk by the project activity is 120 ton/day. The quantity of available biomass in the region (60km radius) is at least 25% larger than the quantity of biomass that is utilised including the project activity. Therefore, this source of leakage can be neglected.

$LE_y = 0$ (3)

Where:
LE_y Leakage emissions in year y (t CO2/year)

Emission reductions

Emission reductions are calculated as follows:

$ER_y = BE_y - PE_y - LE_y = BE_y$ (4)

Where:
ER_y Emission reductions in year y (t CO2/year)
PE_y Project emissions in year y (t CO2/year)
LE_y Leakage emissions in year y (t CO2/year)

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

(Copy this table for each data and parameter)
Data and parameters available at validation are listed as follows:

Data / Parameter:	$EF_{CO2,grid,y}$
Data unit:	t-CO2/MWh
Description:	Carbon emissions factor of "Combined Margin" for the Thailand Grid
Source of data used:	Summary Report "The Study of emission factor for an electricity system in Thailand 2009" provided by TGO (Thailand Greenhouse gas Office).
Value applied:	0.5812
Justification of the choice of data or description of measurement methods and procedures actually	For full details of the choice of data and methods applied refer to Annex 3.

applied :	
Any comment:	This $EF_{CO2,grid,y}$ value equal to $EF_{grid,CM,y}$ is used for entire of crediting period.

Data / Parameter:	**$EF_{grid,OM,y}$**
Data unit:	t-CO2/MWh
Description:	Carbon emission factor of "Operating Margin" for the Thailand Grid
Source of data used:	Summary Report "The Study of emission factor for an electricity system in Thailand 2009" provided by TGO (Thailand Greenhouse gas Office).
Value applied:	0.6147
Justification of the choice of data or description of measurement methods and procedures actually applied :	For full details of the choice of data and methods applied refer to Annex 3.
Any comment:	This data is an ex-ante factor.

Data / Parameter:	**$EF_{grid,BM,y}$**
Data unit:	t-CO2/MWh
Description:	Carbon emission factor of "Build Margin" for the Thailand Grid
Source of data used:	Summary Report "The Study of emission factor for an electricity system in Thailand 2009" provided by TGO (Thailand Greenhouse gas Office).
Value applied:	0.5477
Justification of the choice of data or description of measurement methods and procedures actually applied :	For full details of the choice of data and methods applied refer to Annex 3.
Any comment:	This data is an ex-ante factor.

B.6.3 Ex-ante calculation of emission reductions:

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Baseline emissions

The baseline emissions is calculated as follows:

$BE_y = EG_{BL,y} * EF_{CO2, grid, y}$

Applying the values, $EG_{BL,y}$ = 23,688 MWh and $EF_{CO2, grid, y}$ = 0.5812 tCO2/MWh, the baseline emissions are:

BE_y = 23,688 * 0.5812 = 13,767 tCO2

As the emission reductions are equal to the baseline emissions:

$ER_y = BE_y$ = 13,767 tCO2/year

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

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Year	Estimation of project activity emissions (tCO2e)	Estimation of baseline emissions (tCO2e)	Estimation of leakage (tCO2e)	Estimation of overall emission reductions (tCO2e)
2012	0	13,767	0	13,767
2013	0	13,767	0	13,767
2014	0	13,767	0	13,767
2015	0	13,767	0	13,767
2016	0	13,767	0	13,767
2017	0	13,767	0	13,767
2018	0	13,767	0	13,767
Total (tonnes of CO2e)	**0**	**96,369**	**0**	**96,369**

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

B.7.1 Data and parameters monitored:

Parameter:	**EG_y**
Unit:	MWh/year
Description:	Net quantity of electricity supplied by the project activity to grid during year y
Source of data:	Plant records
Value of data	23,688
Brief description of measurement methods and procedures to be applied:	Measurements are undertaken using continuous electricity recording meters.
QA/QC procedures to be applied:	Calibration of continuous electricity meters will be undertaken as per the recommendation from the manufacturer. The recording data will be cross checked with evidence of electricity sales receipt.
Any comment:	None

Parameter:	**$Q_{rice\ husk}$**
Unit:	tonne/year
Description:	Quantity of rice husk consumed by the project activity
Source of data:	Plant records

Value of data	36,000 (to be confirmed)
Brief description of measurement methods and procedures to be applied:	Quantity of rice husk will be measured continuously using the weighbridge. The data will be collected daily and compiled monthly.
QA/QC procedures to be applied:	The weighbridge will be calibrated according to the manufacturer's specification annually.
Any comment:	

Parameter:	$\mathbf{Q_{wood\_bark}}$
Unit:	tonne/year
Description:	Quantity of wood bark consumed by the project activity
Source of data:	Plant records
Value of data	(to be confirmed)
Brief description of measurement methods and procedures to be applied:	Quantity of wood bark will be measured continuously using the weighbridge. The data will be collected daily and compiled monthly.
QA/QC procedures to be applied:	The weighbridge will be calibrated according to the manufacturer's specification annually.
Any comment:	

Parameter:	$\mathbf{Q_{saw\ dust}}$
Unit:	tonne/year
Description:	Quantity of saw dust consumed by the project activity
Source of data:	Plant records
Value of data	(to be confirmed)
Brief description of measurement methods and procedures to be applied:	Quantity of saw dust will be measured continuously using the weighbridge. The data will be collected daily and compiled monthly.
QA/QC procedures to be applied:	The weighbridge will be calibrated according to the manufacturer's specification annually.
Any comment:	

Parameter:	$\mathbf{Q_{king\_grass}}$
Unit:	tonne/year
Description:	Quantity of king grass consumed by the project activity
Source of data:	Plant records
Value of data	(to be confirmed)
Brief description of measurement methods and procedures to be applied:	Quantity of king grass will be measured continuously using the weighbridge. The data will be collected daily and compiled monthly.
QA/QC procedures to be applied:	The weighbridge will be calibrated according to the manufacturer's specification annually.
Any comment:	

Parameter:	**$NC_{rice\ husk}$**
Unit:	kcal/kg
Description:	Net calorific value of rice husk (HHV, dry base)
Source of data:	Plant records
Value of data	3702.15
Brief description of measurement methods and procedures to be applied:	Net calorific value of rice husk will be measured in laboratories. The data will be measured and compiled monthly.
QA/QC procedures to be applied:	The measuring instrument will be calibrated according to the manufacturer's specification annually.
Any comment:	

Parameter:	**$NC_{wood\ bark}$**
Unit:	kcal/kg
Description:	Net calorific value of wood bark (HHV, dry base)
Source of data:	Plant records
Value of data	3467.80
Brief description of measurement methods and procedures to be applied:	Net calorific value of wood bark will be measured in laboratories. The data will be measured and compiled monthly.
QA/QC procedures to be applied:	The measuring instrument will be calibrated according to the manufacturer's specification annually.
Any comment:	

Parameter:	**$NC_{saw\ dust}$**
Unit:	kcal/kg
Description:	Net calorific value of saw dust (HHV, dry base)
Source of data:	Plant records
Value of data	2377.90
Brief description of measurement methods and procedures to be applied:	Net calorific value of saw dust will be measured in laboratories. The data will be measured and compiled monthly.
QA/QC procedures to be applied:	The measuring instrument will be calibrated according to the manufacturer's specification annually.
Any comment:	

Parameter:	**$NC_{king\ grass}$**
Unit:	kcal/kg
Description:	Net calorific value of king grass
Source of data:	Plant records
Value of data	(to be confirmed)
Brief description of measurement methods	Net calorific value of king grass will be measured in laboratories. The data will be measured and compiled monthly.

and procedures to be applied:	
QA/QC procedures to be applied:	The measuring instrument will be calibrated according to the manufacturer's specification annually.
Any comment:	

Parameter:	**CO2 emission factor of fossil fuel (diesel)**
Unit:	kg-CO2/TJ
Description:	CO2 emission factor of fossil fuel
Source of data:	National or IPCC default value
Value of data	74100
Brief description of measurement methods and procedures to be applied:	The CO2 emission factor of fossil fuel (diesel) which is used for biomass transportation will be used for project emission calculation. "2006 IPCC Guidelines for National Greenhouse Gas Inventories, p.3.16"
QA/QC procedures to be applied:	
Any comment:	

Parameter:	**Net calorific value of fossil fuel (diesel)**
Unit:	TJ/Gg
Description:	Net calorific value of fossil fuel
Source of data:	National or IPCC default value
Value of data	43.33
Brief description of measurement methods and procedures to be applied:	Net calorific value of fossil fuel (diesel) which is used for biomass transportation will be used for project emission calculation. "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual (Volume3), p.1.23"
QA/QC procedures to be applied:	
Any comment:	

Parameter:	**Quantity of fossil fuel (diesel) consumed by the project activity**
Unit:	Litre/year
Description:	Quantity of fossil fuel (diesel) consumed by the project activity
Source of data:	It can be directly measured with support documents such as record of distance of return trip between biomass supplier and project site, truck capacity, etc.
Value of data	(to be confirmed)
Brief description of measurement methods and procedures to be applied:	Quantity of fossil fuel (diesel) consumed by the project activity which is used for biomass transportation will be used for project emission calculation.
QA/QC procedures to be applied:	
Any comment:	

Parameter:	**$FC_{i,j,y}$**
Unit:	Litre
Description:	Amount of fossil fuel (diesel) used in the project activity in year y
Source of data:	Plant's estimation
Value of data	---
Brief description of measurement methods and procedures to be applied:	Data choice is referred to Tool to calculate project or leakage CO_2 emission from fossil fuel combustion
QA/QC procedures to be applied:	
Any comment:	

Parameter:	**NCV**
Unit:	MJ/Litre
Description:	Net calorific value for fossil fuel (diesel) used in the project activity
Source of data:	Thailand Energy Situation, 2009, DEDE
Value of data	36.42
Brief description of measurement methods and procedures to be applied:	This parameter will be reviewed yearly.
QA/QC procedures to be applied:	
Any comment:	

Parameter:	**MC**
Unit:	%
Description:	Moisture content of each biomass fuel (rice husk, wood bark, saw dust, king grass)
Source of data:	Plant records
Value of data	---
Brief description of measurement methods and procedures to be applied:	Random samples to be tested by portable equipment in monthly basis.
QA/QC procedures to be applied:	Internationally accepted procedure to be adopted. The measure is specified according to ASTM D121
Any comment:	This parameter is not used in ex-ante calculation. But it will be monitored and made available during verification.

Parameter:	Specific energy consumption for rice husk
Unit:	TJ/MWh
Description:	Specific energy consumption for rice husk
Source of data:	Provided by technology supplier
Value of data	XX.X TJ/MWh of rice husk (the actual value depends on the moisture content)
Brief description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	This parameter is not used in ex-ante calculation. But it will be monitored and made available during verification.

B.7.2 Description of the monitoring plan:

>>

Data to be monitored

The data and parameters to be monitored are described in B.7.1. The amount of electricity supplied to the grid is monitoring data in order to calculate emission reductions.

The methodology, AMS-I.D, indicates relevant parameters to be monitored. It includes the quantities and net calorific value of each biomass fuel consumed by the project activity.

Quality of moisture measurement

The power plant specified in the contract for fuel quality for moisture measurement of less than 13%. The measure is specified according to ASTM D121 provide by the plant laboratory and by mobile Hygrometer Stick, with specification as below.

Mode	RH	Temp.	Dew Point
Range	5.0 to 95.0% RH	-5 to 140 degF (-20 to 70 degC)	-5 to 140 degF (-20 to 70 degC)
Resolution	0.1% RH	0.1 degF or degC	0.1 degF or degC
Accuracy	±2% RH	±0.5degF	---
Sensor	Capacitance	NTC	---

Monitoring Team

The managing director is responsible for the whole monitoring process.
The monitoring officer, who is responsible for measurement and calculation of emission reduction, will measure the electricity supplied to the grid and collect sale receipts. All of bought rice husk, wood balk and king grass will be recorded in purchasing books and relevant invoices.

The monitoring officer will prepare operational reports of the project activity, recording the daily operation of the power plant including operating hours, power generation, electricity supplied to the grid, the quantity of biomass fuel (rice husk, wood balk, saw dust and king grass) consumed.
All data will be recorded with reference to the data archiving procedures and stored electronically in a systematic and transparency manner. The monitoring officer will review the data archived and submit a complete set of documentation to the plant manager.
The technical officer is responsible for maintenance and calibration of all monitoring equipment according to regulated procedures.
Finally, the monitoring report will be verified by the plant manager and reviewed by the managing director.

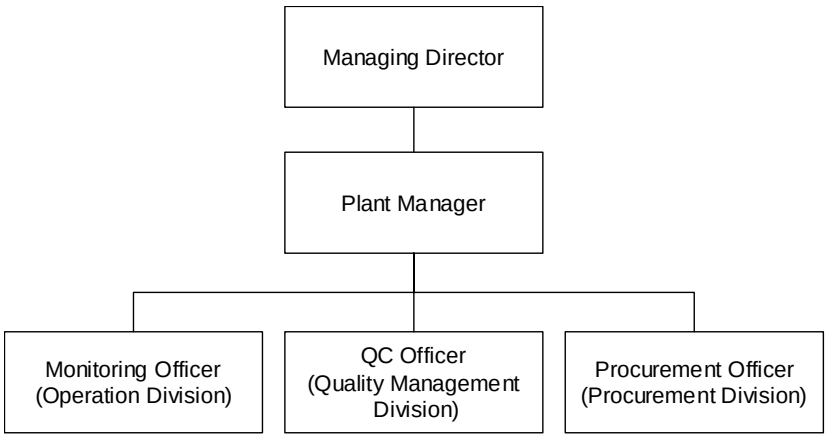

Fig. B.7 Management structure for monitoring

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: 28 February 2011.

Person/entity determining the baseline:
Mr. Masao Tomizawa
Industrial Decisions, Inc.
5-11-1 Higashigotanda, Shinagawa-ku, Tokyo 141-0022 Japan

CDM – Executive Board

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:

>>
30 June 2010 (Loan agreement concluded)

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

>>
25 years 0 months

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

C.2.1. Renewable crediting period

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

>>
1 February 2012 or date of registration whichever is later.

C.2.1.2. Length of the first crediting period:

>>
7 years and 0 month

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applied.

C.2.2.2. Length:

>>
Not applied.

SECTION D. Environmental impacts

>>

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

>>

In accordance with the Thai environmental regulations, projects with a capacity of electricity under 10MW are not required to conduct the Environmental Impact Assessment. Instead, the Initial Environmental Evaluation (IEE) is required by the Thai DNA (TGO). The IEE report must be approved in accordance with Thai sustainable development criteria for CDM.

The evaluation is conducted based on the basic information of natural resources and environmental value including the detail of activities of the project during the construction and operation periods by considering both positive and negative impacts as well as direct and indirect impacts. The primary result of the Initial environmental evaluation will be clarified for the sustainable development evaluation whether the project is in accordance with the Sustainable Development Criteria of Clean Development Mechanism or not.

Air Pollution
During the construction phase, the project will stipulate the contractor to carry out the activity to mitigate the effect of particulate matter dispersion, for example, require regular spraying the opened area of working sites and the entry-exit road in front of the site, specifies the use of sites only when needed. Therefore, it is expected that the impact on air quality during the construction period will be at a very low level.

Noise
The noise effect from the construction is considered at low level and also during operation phase it can be summarized that the project has the preventive measure of disruptive noise level in the community which is better than the standard criteria of higher than 5 decibel (A).

Odor Pollution
The operation of the CDM project is not relevant to bad odor consequence.

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:

>>

According to the IEE report, there is no significant environmental impact likely to be caused due to the project activity.
Also the scores according to Sustainable Development Criteria can meet the conditions set by Thai DNA for Host country's CDM approval.

SECTION E. Stakeholders' comments

>>

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

>>
A local stakeholder consultation meeting was held at the community hall of XXXX on December 17, 2010. To encourage active participation, invitation letters were sent to and handed out to the potential stakeholders identified and the local community members.

Date: 17 December 2010
Time: 1: 40 pm – 3.40 pm

Venue: Meeting room of Makham Tao Subdistrict Administrative Organization, Makham Tao Subdistrict, Watsingh District, Chainart Province
Participants: The management team, the consultants and 45 persons of Government and local people

The stakeholder consultation meeting included a session of project activity description, a brief explanation on how this project activity will mitigate climate change and contribute to social, economic and environmental development of host country, an overview of benefits to local community, followed by a question and answer session.

E.2. Summary of the comments received:

>>

To date no formal comments have been received from stakeholders. While, during the meeting, local stakeholders raised various questions pertaining to the project activity and requested for further explanation on their concerns. These concerns have been specified in the following areas:-

(1) Impact on the local environment
- air quality
- water quality
- noise levels

(2) Potential benefits to the local community
- employment opportunities
- clean energy supply

All questions were duly answered and no subsequent negative comments were raised.

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

>>

The comments are carefully reviewed and there are no negative comments on the project activity. However, some villagers request more information about the project activity in terms of public relations. Therefore, the project company agrees to provide more public information of the project activity to the local people.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Bio-mass Power Co., Ltd.
Street/P.O.Box:	17th Floor S.P. Building, 388 Phaholyothin Rd., Phayathai
Building:	
City:	Bangkok
State/Region:	
Postfix/ZIP:	10400
Country:	Thailand
Telephone:	+662 273 0037
FAX:	+662 273 0735
E-Mail:	Rungrath@stfe.co.th
URL:	
Represented by:	
Title:	Managing Director
Salutation:	Ms.
Last Name:	Prapasirikul
Middle Name:	
First Name:	Rungrath
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	IDI carbon management Inc.
Street/P.O.Box:	5-11-1 Higashigotanda, Shinagawa-ku
Building:	
City:	Tokyo
State/Region:	
Postfix/ZIP:	141-0022
Country:	Japan
Telephone:	+81 3 5447 6288
FAX:	+81 3 5447 6286
E-Mail:	mtomizawa@idi-carbon.com
URL:	
Represented by:	
Title:	CEO
Salutation:	Mr.
Last Name:	Tomizawa
Middle Name:	
First Name:	Masao
Department:	
Mobile:	

Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funds are utilized in the project activity.

Annex 3

BASELINE INFORMATION

Refer to the "Summary Report: The Study of emission factor for an electricity system in Thailand 2009" prepared by Thailand Greenhouse Management Organization (TGO) who is DNA of Thailand.
The report is available on the web (www.tgo.or.th/download/publication/GEFReport_EN.pdf).

Annex 4

MONITORING INFORMATION

The monitoring plan will be undertaken by the project as described in section B.7.

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