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

CONTENTS

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

Title: Biodiesel Fuel (BDF) production from organic oils of Jatropha and usage in Vietnam
Version: 01
Date: 15/11/2010

Review history

Version NO.	Date	Description and reason of revision
01	15 November 2010	First edition

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

The proposed project is located in Bac Ai District, Ninh Thuan Province in Vietnam. It intends to reduce GHG emissions by replacing fossil fuel with Biodiesel Fuel (BDF) for a captive fleet of vehicles.

BDF will be produced from Jatropha oil seeds, and will be used for transportation vehicles in Vietnam. Jatropha will be cultivated for BDF in dedicated plantations where used to be degraded land, which will not cause any damage in the existing vegetation. The local people in Bac Ai District will be employed to cultivate Jatropha, which will bring economic benefits to the local society.

The technology for BDF production will be introduced from Japan, which leads to transferring the technologies for proper operation of BDF production plant and quality control in Vietnam.

BDF production plant, which has the capacity to produce the amount of 30,000 litters per day, will be built at an industrial park in Thuan Nam District, Ninh Thuan Province. The local people will engage in the production of BDF.

GHG emission reduction can be achieved via this proposed project activity. Total annual expected CO2 emission reduction is about 7,531 tons CO2 per year by the project. The amount of emission reductions estimated for the first crediting period (7 years) is about 52,714 tons CO2.

Contributions towards national sustainable development:

- In recent years, in Vietnam, air pollution by fossil fuel use from economic growth is a serious problem. Especially the vehicles depend on fossil fuel. This project activity will contribute to reduce the fossil fuel use for vehicles by BDF. Consumption of the BDF made from oil seeds of Jatropha is considered to be carbon-neutral. Vehicle fuel conversion from fossil fuel to the BDF will lead to reduction of CO2 emissions and air pollution.

- This project activity will generate renewable energy without any GHG emissions. The Vietnamese government intends to promote the use renewable energy such as bioethanol fuel. This project will speed up the growth of renewable energy technologies in Vietnam.

Contributions towards local sustainable development:

- The project activity would contribute to the creation of employment opportunities to the local people during the construction of the project and provides regular employment opportunities during project operation.

A.3. Project participants:

Name of Party involved(*) ((host) indicates a host Party)	Private and/or public entity (ies) project participants(*) (as applicable)	Kindly indicates if the Party involved wishes to be considered as project participant (Yes/No)
Social Republic of Vietnam	Private Entity: RIN Vietnam	No
Japan	Private Entity: Revo International INC.	No

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

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

A.4.1.1. Host Party(ies):

Social Republic of Vietnam

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

Ninh Thuan Province

A.4.1.3. City/Town/Community etc:

Bac Ai District, Phuoc Tan Commune

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

This project sites will be located in Ninh Thuan Province, Vietnam.

The project plant is located at the geographic coordinates with east longitude of 108° 89’ 13” and south latitude of 11° 44’ 06”.
Other project sites of Jatropha cultivation lands are located in several places in Ninh Thuan Province.

The site of the plant is showed in Figure A.1.

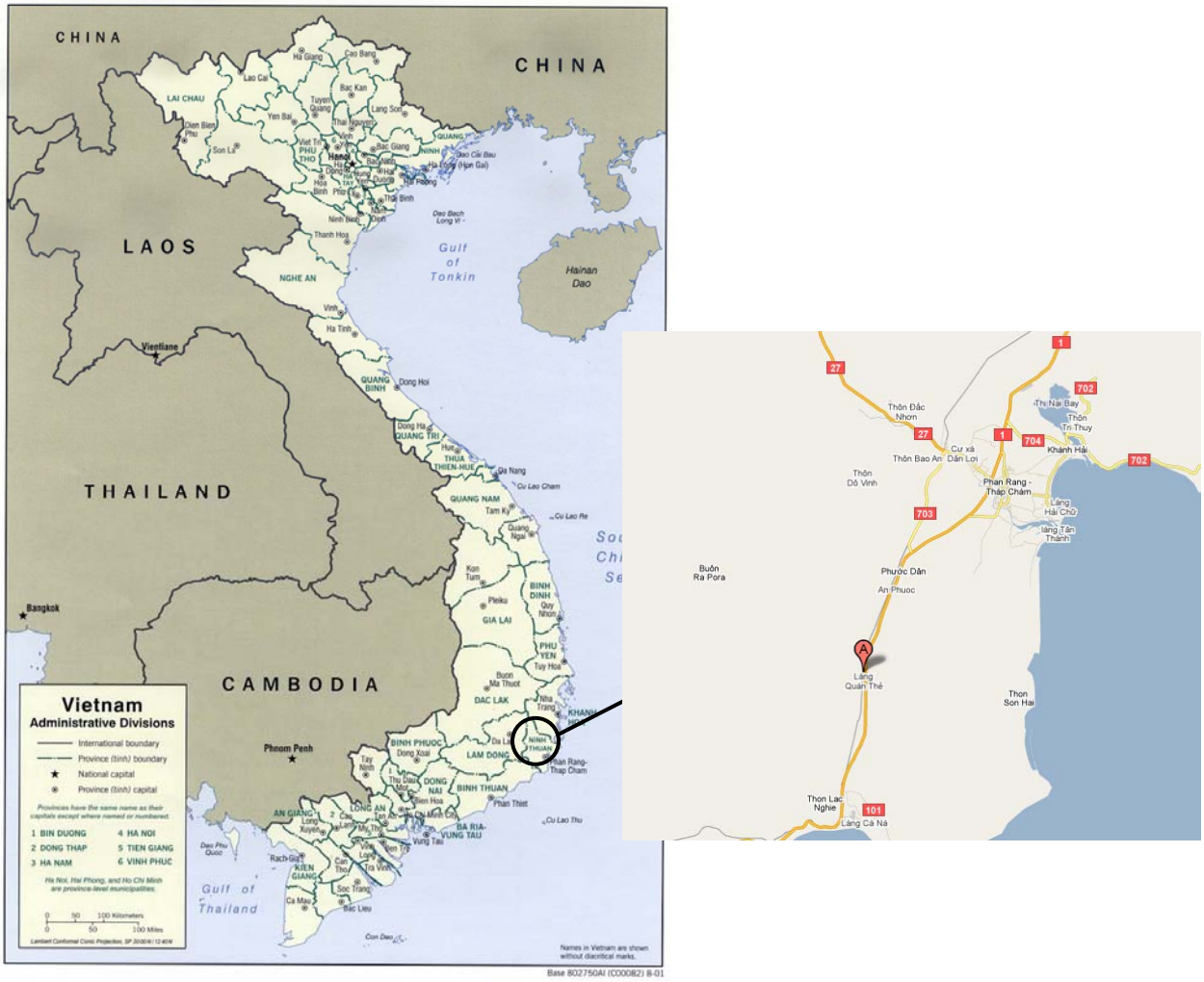


Figure A. 1. Plant site on the map

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

TYPE III - OTHER PROJECT ACTIVITIES
III.AK. Biodiesel production and use for transport applications, Version 01, Sectoral Scope 07

The proposed project is designed to produce BDF from oil seeds of Jatropha curcas, and then BDF is consumed by transportations such as trucks and trains.

The project includes the following processes;
1) Cultivation of Jatropha curcas
2) Pressing oil from Jatropha seeds
3) BDF production
4) Distribution of BDF
5) Consumption of BDF

1) Cultivation of Jatropha curcas

Jatropha curcas for this project will be cultivated at dedicated plantations in Ninh Thuan Province, Vietnam. There are several kinds of Jatropha around the world, and some types are indigenous in Vietnam but the seeds are small and contain little oil. The project participant has been trying to find out the best Jatropha type to be cultivated for Vietnamese climate and to contain more volume of oil at some test plantations also in Ninh Thuan Province.
At the same time, the method of cultivation including organic fertilizer to gain more yield amount has been studied at the test plantations. The project participant has achieved good results in such cultivations and will continue the study during the project period.

2) Pressing oil from Jatropha seeds

Orthodox type of oil press will be used for this project.

3) BDF production

BDF production plant is also to be located and constructed in Ninh Thuan Province. The technology of BDF production has been developed by the project participant, Revo International Inc. (referred as Revo), the leading company of BDF production in Japan. Revo has acquired the patent of BDF production in 2000 and started to produce and distribute BDF since 2001. Revo has also opened the largest BDF production plant, production capacity of 30,000 ℓ /day, in Japan in 2009.
The plant of this project will be designed and constructed by Revo with such experiences in BDF production.

The BDF production process to be installed at the project plant is described in Figure A.4.2-2 that equipments and units are also described.

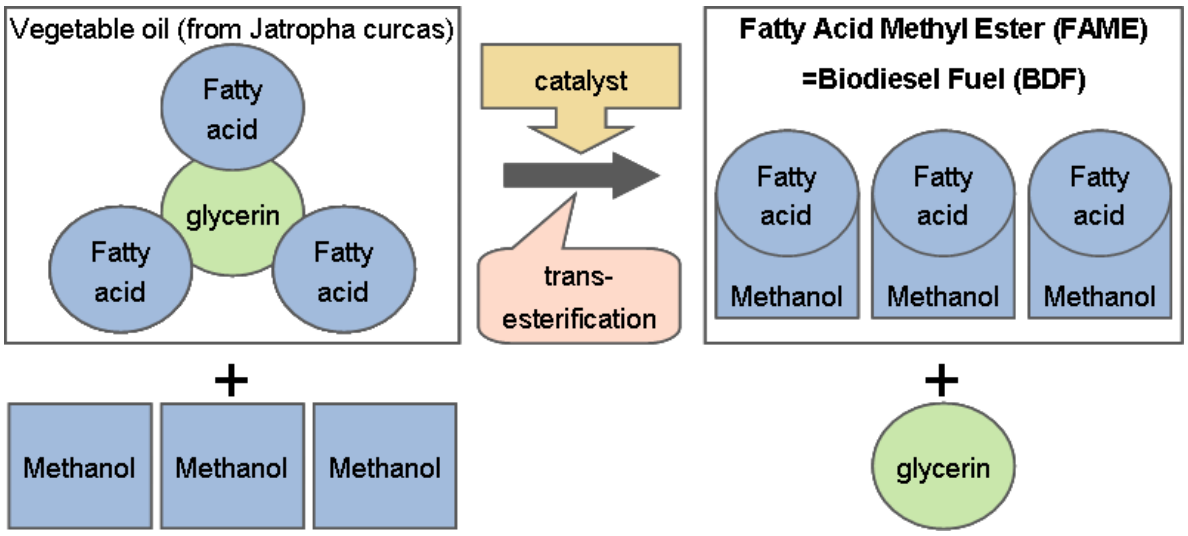
- Pre-processing:

Impurities contained in pressed oil are removed at this process. Water is also removed because its presence causes the triglycerides to hydrolyze, giving salts of the fatty acids (soaps) instead of undergoing transesterification to give biodiesel.

- Transesterification:

Vegetable oil such as Jatropha oil is typically made of triglycerides which are esters of free fatty acids with the trihydric alcohol, glycerol. In the transesterification process, the alcohol is deprotonated with catalysts to make it a stronger nucleophile. The triglyceride, which is jatropha oil, and the alcohol, which is methanol in the project, are the main inputs for this reaction.
This reaction will proceed either exceedingly slowly or not at all. Heat, as well as catalysts, KOH (potassium hydroxide), is used to help the reaction proceed more quickly.

Figure A.4.2-1. Description of transesterification



- Recovery:
Methanol is recovered at this process, and is used for the next transesterification batch.

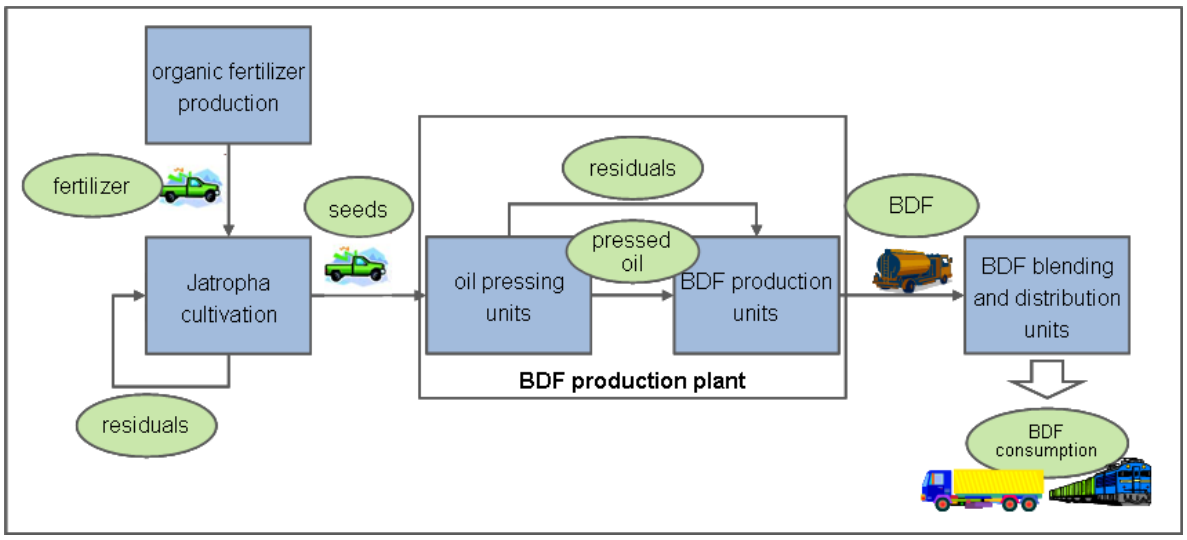
- Separation:
Transesterification process produces Fatty Acid Methyl Ester (FAME) and some by-products, particularly glycerin. Such by-product must be removed.
The density of glycerin is greater than that of biodiesel, and this property difference is exploited to separate the bulk of the glycerin.

- Purification:
After the processes of methanol recovery and glycerin separation, FAME still contains impurities which must be removed.
Impurities contained in FAME are adhered to water added at this process and removed, and the FAME is purified.

- By-products control:
Impurities recovered at pre-processing and purification processes and glycerin recovered at separation process are gathered in this by-products control unit. These by-products are used as a main source of boiler fuel. Sine they are not released into the environment and utilization of by-products leads to a reduction of fossil fuel consumption, this thermal recycling system is very environmental friendly.

- Boiler:
This boiler unit provides heat to the BDF production proves, especially to pre-processing, transesterification and purification, to accelerate the processes.

Figure A.4.2-2. BDF production process at the project plant



4) Distribution of BDF

The project participants are planning to cooperate with a local distributor of oils so that the project can utilize the existing equipments such as storage tanks and petrol pumps.

5) Consumption of BDF

Distributed BDF is planned to be consumed only in a captive fleet of vehicles; e.g. trucks, buses, trains. The project participants are now negotiating with the possible consumers of BDF.

As descried, the technologies adopted for the proposed project have been developed and operating to meet the strict environmental regulations in Japan. The project construction and operation is required to meet Vietnamese environmental standards and an Environmental Impact Assessment (see Section D). Such environmentally safe and sound technology and know how will be transferred to the Host Party for application in the project activity.

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

The renewable crediting period of 7 years has been chosen for this proposed project.

Years	Estimation of annual emission reductions in tonnes of CO_2e
2011.06 – 2012.05	871
2012.06 – 2013.05	8,659
2013.06 – 2014.05	8,659
2014.06 – 2015.05	8,659
2015.06 – 2016.05	8,659
2016.06 – 2017.05	8,659
2017.06 – 2018.05	8,659
Total estimated reductions (tonnes of CO_2e)	52,818

Total number of crediting years	7 years
Annual average of the estimated reductions over the crediting period	7,545

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

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

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

As mentioned under Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project Activities, the following results into debundling of large CDM project:

"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:

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

The project proponent confirms that it has not registered any small scale CDM activity or applied for registration another small scale CDM project activity within 1 km of the project boundary of this proposed project, in the same project category and technology/measure. Hence the above criteria of debundling cases are not applicable for the proposed CDM project.

SECTION B. Application of a baseline and monitoring methodology

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

TYPE III - OTHER PROJECT ACTIVITIES
III.AK. Biodiesel production and use for transport applications, Version 01, Sectoral Scope 07

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

1) Meet the eligibility criteria for small-scale CDM project activities set out in paragraph 6 (c) of decision 17/CP.7;
The proposed project is BDF production and use for transport applications and falls into the category of Type III. In addition, the annual average CO2 emission reduction is to be of the order of 7,551 tCO2 per year, which is within the limit of Type III small scale CDM project activity requirement. Therefore, the

project activity meets the eligibility criteria for small-scale CDM project activities set out in paragraph 6 (c) of decision 17/CP.7

2) Conform to one of the project categories in appendix B to this annex;
The project activity conforms to "Project Category - III.AK. Biodiesel production and use for transport applications" in Appendix B. Justification of the choice of the project category can be provided by comparison between the features of proposed project activity and project category - III.AK described in table B.2 in terms of baseline methodology and monitoring methodology.

Table B.2. Applicability comparison between the applied methodology AMS- III.AK Version 01 and the proposed project

Technology/measure	The project activity
1. This methodology comprises project activities for cultivation of oilseeds and sourcing of waste oil/fat[1] to be used in production of biodiesel[2] for use in transportation applications.[3]	Jatropha curcas, oilseeds, is cultivated in dedicated plantations to produce BDF for use in transportation applications such as trucks and trains.
2. This methodology is only applicable if the final biodiesel blending proportion is a maximum of 20% by volume (B20). This is to ensure that technical performance characteristic of the blended biodiesel do not differ from those of petrodiesel.	The BDF blending proportion is planned not to exceed 20% by volume (B20), which will be made sure by contracts with distributors and consumers of BDF.
3. Only biodiesel consumed in excess of mandatory regulations is eligible for the purpose of the project activity.[4]	There is no mandatory regulation on BDF use in transportation applications in Vietnam, which has been confirmed by Vietnamese officials at the meetings.
4-(a) In the baseline situation the vehicles/transportation applications use diesel;	BDF can only be used in diesel engines.
4-(b) Biodiesel or its blends are end-used in a captive fleet of vehicles/transportation applications;	It is planned that BDF will be used in trucks owned by certain transportation companies and in trains owned by a certain railway company. The project participant will make contract with those companies to make sure usage of BDF and monitoring.
4-(c) The petrodiesel, the biodiesel and the blended biodiesel comply with the national regulations (if existent) or with applicable international standards such as ASTMD6751, EN14214, or ANP42;	BDF will be produced at a quality which complies with EN14214.
4-(d) Final users and the producer of the biodiesel and its blends are bound by a contract that states that the final consumers shall not claim emission reductions resulting from its consumption. The contract also enables the producer to monitor the consumption of biodiesel and its blends. Only the producer of the biodiesel can claim emission reductions under this methodology;	The project participants will make contracts with final users that states final users will not claim emission reductions resulting from its consumptions and also enables the project participant to monitor the consumption of biodiesel and its blends.
4-(e) The alcohol used for esterification is	It is planned that only methanol from fossil fuel

methanol from fossil fuel origin. Volumes of biodiesel produced with alcohols other than methanol (for example, ethanol) are not included in the quantity of biodiesel for which emission reductions are claimed;[5]	origin is used for esterification.
4-(f) The export of biodiesel produced under this category is not allowed.	It is planned that BDF produced in this project will only consumed in Vietnam. There is no plan of export.
5. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO2 equivalent annually.	The annual average reduction of CO2 emission is expected to be the order of 7,551 tCO2 per year, which is clearly below 60 ktCO2 per year.
6. The following conditions have to be met only if the feedstock for production of the biodiesel is vegetable oil produced from oil seeds cultivated in dedicated plantations: *(a) The project activity does not lead to a shift of pre-project activities outside the project boundary i.e. the land under the proposed project activity can continue to provide at least the same amount of goods and services as in the absence of the project;*	Jatropha curcas will be cultivated in degraded lands where no agricultural or livestock activity has been operated prior to the project cultivation.
(b) The plantations are established on a land: *(i) Which was at the start of the project implementation, classified as degraded or degrading as per the "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities"; or* *(ii) Area that is included in the project boundary of one or several registered A/R CDM project activities.*	The plantations are established on lands where were at the start of the project implementation, classified as degraded or degrading based on official citification provided by a responsible authority in the host country.
(c) Plantations established on the peatlands are not eligible even if qualifying under condition (b) above.	The plantations are not peatlands, which can be explained by official certification same as (b) above.

[1] *Waste oil/fat is defined as a residue or waste stream of biogenic origin from restaurants, agro and food industry, slaughterhouses or related commercial sectors.*

[2] *Biodiesel is a diesel fuel consisting of long-chain alkyl (methyl, propyl or ethyl) esters which is produced by esterification of vegetable oils and/or waste oil/fat with alcohols from biogenic and/or fossil origin.*

[3] *Domestic water borne transport as defined by IPCC 2006, vol.2, chapter 3 can be considered as eligible.*

[4] *Regulations that have been implemented since the adoption by the COP of the Modalities and Procedures of CDM (Decision 17/CP.7, 11 November 2001) need not to be taken into account.*

[5] *Only methanol from fossil fuel origin is included because the methodology does not provide procedures for estimating emissions associated with the use of other alcohols than methanol from fossil fuel origin. Project proponents are invited to propose procedures to estimate the emissions associated with the production of other alcohols that could be used for esterification, such as ethanol or methanol from renewable sources, as a revision to this methodology.*

B.3. Description of the project boundary:

The applied methodology AMS-III.AK Version 01 states the project boundary as follows;

7. The project boundary is the geographical area of the oil seeds cultivation, itinerary for transportation of the feedstock sources[6] *processing of oil-seeds and biodiesel production, the sites where*

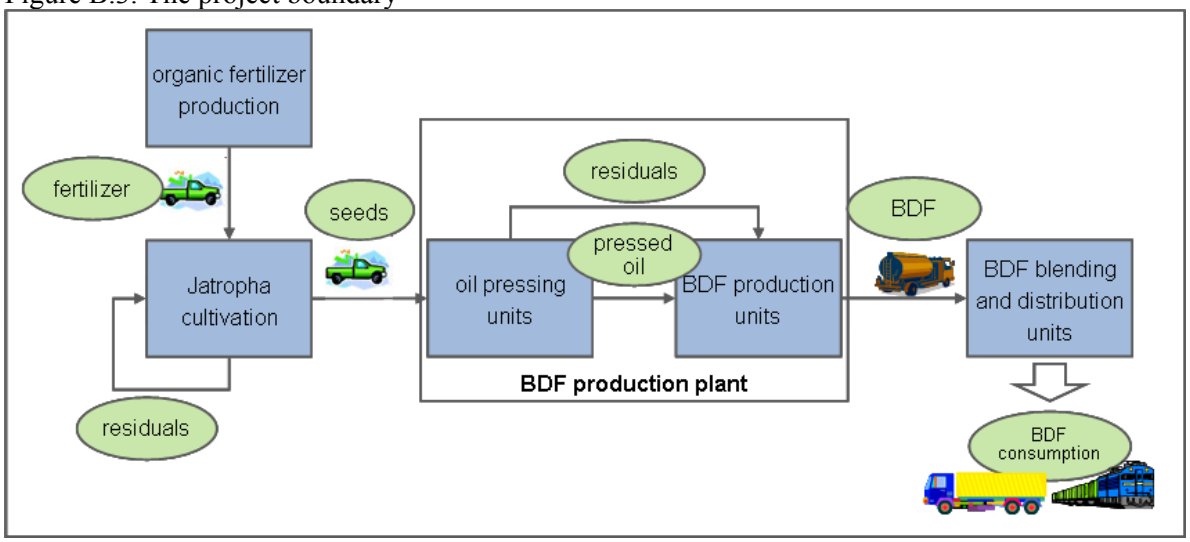
the waste water and solid waste are treated, the areas where biodiesel is blended and sold to the final users. The vehicles/transportation applications of the final users where the biodiesel or blends thereof are consumed are also included in the project boundary.

[6] *Feedstock sources are the harvested parts of the plants from dedicated plantations that are transported from the fields to the facility for plant oil processing and/or biodiesel production. In case of waste oil/fat the feedstock sources are the activities where they are generated.*

The project boundary encompasses the following areas;

- The plantation lands of Jatropha curcas
- The organic fertilizer production
- The oil pressing units
- The BDF production units
- The BDF blending and distribution units
- Trucks and trains where BDF is consumed
- Transportation of fertilizer, jatropha seeds, residuals, jatropha oil, and BDF

Figure B.3. The project boundary



B.4. Description of baseline and its development:

The project activity provides BDF to substitute diesel oil. Accordingly, the baseline for the project activity is the continuation of diesel oil consumption in vehicle/transport applications, because there is no other choice to substitute diesel oil.

The methodology AMS-III.AK states that "baseline emissions are calculated based on the amount of displaced petrodiesel".

Table B.4. Key data/parameters for baseline calculations

Variables/ Parameters	Data unit	Description	Data source
BD_y	tonnes	Quantity of biodiesel eligible for	BD_y can be calculated with the

Variables/ Parameters	Data unit	Description	Data source
		crediting in year y	equation as; $BD_y = \min[(P_{BD,y} - P_{BD,on\text{-}site,y} - P_{BD,other,y}), (f_{PJ,y} \times f_{PD,y} \times C_{BBD,y} - P_{BD,other,y})]$
$NCV_{BD,y}$	GJ/tonne	Net calorific value of BDF produced for the year y	Calculated with data from a published literature and general invariables. $NCV_{BD,y}$ = 9,000 kcal/kg[1] × 4.186 kJ/kcal × 0.883[2]
$EF_{CO2,PD,y}$	tCO2/GJ	Carbon dioxide emissions factor for petrodiesel	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
$P_{BD,y}$	tonnes	Production of BDF in the project plant in year y	$P_{BD,y}$ can be estimated with the following equation; $P_{BD,y} = A_y$ × Average yield of Jatropha seeds × Oil contents of Jatropha oil seeds × Production loss Where, "A_y" is derived regarding to the business plan. "Average yield of Jatropha seeds" is based on a published document from the Ministry of Vietnam[3]. "Oil contents of Jatropha oil seeds" is based on literatures[4] and a published document from the Ministry of Vietnam[5]. "Production loss" is based on the experiences of the project participants.
$P_{BD,on\text{-}site,y}$	tonnes	Quantity of BDF consumed at the project BDF production plant in year y	BDF produced is not planned to consume at the project BDF production plant for ex-ante estimation of baseline emissions.
$P_{BD,other,y}$	tonnes	Quantity of BDF that is either produced with other alcohols than	It is planned for ex-ante estimation of baseline emissions that BDF is neither

[1] Table.I-1, Page.8, Biodiesel Handbook, NIPPO CO., LTD.

[2] Density of diesel fuel, Japanese standard under taxation

[3] Ministry of Agriculture and Rural Development, 2008, "Research, development and product utilization of Jatropha L. in Viet Nam for the period 2008-2015 and the vision 2025"

[4] Achten WMJ, Mathijs E, Verchot L, Singh VP, Aerts R, Muys B 2007. Jatropha biodiesel fueling sustainability? and, Achten WMJ, Verchot L, Franken YJ, Mathijs E, Singh VP, Aerts R, Muys B 2008. Jatropha bio-diesel production and use.

[5] Ministry of Agriculture and Rural Development, 2008, "Research, development and product utilization of Jatropha L. in Viet Nam for the period 2008-2015 and the vision 2025"

Variables/ Parameters	Data unit	Description	Data source
		methanol from fossil origin or that is produced using other oil seeds or waste oil(s)/fat(s) than those eligible under this methodology according to the applicability conditions	produced with other alcohols than methanol from fossil origin nor that is produced using other oil seeds or waste oil(s)/fat(s) than those eligible under this methodology.
$f_{PJ,y}$	volume ratio	Fraction of blending in year y	B20 (20%) according to the applicability condition of applied methodology.
$f_{PD,y}$	volume ratio	1.0 if pure petrodiesel is used for blending otherwise use the fraction of petrodiesel in the fuel used for blending (blending rate shall be established volume by volume)	It is planned to use pure petrodiesel for blending for ex-ante estimation of baseline emissions. Hence $f_{PD,y} = 1.0$.
$C_{BBD,y}$	tonnes	Consumption of (blended) BDF from the project plant by the captive consumer(s) in year y	It is planned that all of BDF produced will be consumed by the captive consumer(s) with blending rate of 20%, therefore $C_{BBD,y}$ is calculated from the following equation for ex-ante estimation of baseline emissions; $C_{BBD,y} = P_{BD,y} \times 1/0.2$

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 General Guidelines to SSC CDM methodologies (Version 14.1), Type II and III Greenfield projects may use a Type II and Type III small-scale methodology provided that they can demonstrate that the most plausible baseline scenario for this project activity is the baseline provided in the respective Type II and III small-scale methodology.

The applied methodology AMS-III.AK defines the baseline scenario as the following: (a) In the baseline situation the vehicles/transportation applications use diesel. For the purpose of a thorough analysis, the project participant supplements scenario analysis of BDF production and applied the steps shown in the guidelines to identify the most plausible baseline scenario as follows:

Step 1:
Identify the various alternatives available to the project proponent that deliver comparable level of service including the proposed project activity undertaken without being registered as a CDM project activity.

Alternatives considered for this project activity are as follows:
1. Continuation of current practices with no investment in jatropha plantation and biodiesel production capacity;
2. The project activity implemented without the CDM; and

3. Investment in any other alternative oilseed plantation/waste oil recycling and alternative fuel replacing partially or totally the diesel fuel.

Step 2:
List the alternatives identified per step 1 in compliance with the local regulations (if any of the identified baseline is not in compliance with the local regulations, then exclude the same from further consideration).

The alternative 1 is in compliance with any legal or regulatory conditions.
The alternatives 2 and 3 are also in compliance with any legal or regulatory conditions provided that they meet required procedures such as EIA and project approval by the local authority to be implemented.

Step 3:
Eliminate and rank the alternatives identified in Step 2 taking into account barrier tests specified in attachment A to Appendix B of simplified modalities and procedures of SSC CDM.

According to attachment A to Appendix B of simplified modalities and procedures of SSC CDM, there are 4 types of barriers. Amongst the 4 barriers, the project faces the following barriers:

(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

As there is no regulations obliging the use of BDF fuel in Vietnam, BDF production has not been commercialized according to interviews conducted by the project to major ministries in the host country. The interviewed ministries are as follows:
Ministry of Transport: Ministry in charge of regulating fuels used in transportation
Ministry of Industry and Trade: Ministry in charge of fuel production
Ministry of Agriculture and Rural Development: Ministry in charge of crops and tree cultivation

In all interviews, the project participant confirmed that there are no regulations that oblige production of BDF or BDF producers producing the fuel. In this aspect, in Vietnam the technology to produce BDF is yet to be introduced and locals have no access to the technology.
Conversely, the currently used diesel is proven fuel and has no unknown risk as it does with BDF. As there is no case of introducing BDF in Vietnam, BDF could have inherent risk of performance in comparison with diesel.

(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

As mentioned above, there is no regulation and also no case where BDF was introduced for replacing diesel in transport sector of Vietnam. Current practices for transport sector are to use diesel as BDF is not available in the market. This would lead to alternative with higher emissions.

Step 4:
If only one alternative remains that is:

- *Not the proposed project activity undertaken without being registered as a CDM project activity; and*
- *It corresponds to one of the baseline scenarios provided in the methodology; then the project*

activity is eligible under the methodology.
If more than one alternative remains that corresponds to the baseline scenarios provided in the methodology, choose the alternative with the least emissions as the baseline.

From situation of Vietnam explained above, it could be concluded that the only plausible baseline scenario is 1 Continuation of current practice.

The project would not take place in a remote area of Ninh Thuận province as this project plans to hire local minority people to plant jatropha trees and harvest their oilseeds.
The project participant aims to register this project as a CDM project activity in order to secure subsidy for BDF by the Vietnamese government. The Vietnamese government has issued Inter-Ministerial Circular No. 58/2008/TTLT-BTC-BTN&MT and in its Article III, it defines subsidy policy to products of CDM projects. The project activity could be viable with the subsidy programme of the government. Being as a CDM project with subsidy incentivize the project participant to bring in new technology from Japan and implement the project activity overcoming the said barriers above.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

1) Baseline emissions
Baseline emissions are calculated with the following equation provided by AMS-III.AK.

$BE_y = BD_y \times NCV_{BD,y} \times EF_{CO2,PD,y}$
with
$BD_y = \min[(P_{BD,y} - P_{BD,on\text{-}site,y} - P_{BD,other,y}), (f_{PJ,y} \times f_{PD,y} \times C_{BBD,y} - P_{BD,other,y})]$

Where:

BE_y	Baseline emissions during the year y (tCO2)
BD_y	Quantity of biodiesel eligible for crediting in year y (tonnes)
$NCV_{BD,y}$	Net calorific value of BDF produced for the year y (GJ/tonne)
$EF_{CO2,PD,y}$	Carbon dioxide emissions factor for petrodiesel (tCO2/GJ)
$P_{BD,y}$	Production of BDF in the project plant in year y (tonnes)
$P_{BD,on\text{-}site,y}$	Quantity of BDF consumed at the project BDF production plant in year y (tonnes)
$P_{BD,other,y}$	Quantity of BDF that is either produced with other alcohols than methanol from fossil origin or that is produced using other oil seeds or waste oil(s)/fat(s) than those eligible under this methodology according to the applicability conditions[7]
$f_{PJ,y}$	Fraction of blending in year y (volume ratio)
$f_{PD,y}$	1.0 if pure petrodiesel is used for blending otherwise use the fraction of petrodiesel in the fuel used for blending (blending rate shall be established volume by volume)
$C_{BBD,y}$	Consumption of (blended) BDF from the project plant by the captive consumer(s) in year y (tonnes)

2) Project activity emissions
For project activity emission, AMS-III.AK states as follows;

11. Project activity emissions are the emissions related to the cultivation of oil seeds and production and distribution of biodiesel (.field-to-tank. emissions). The emissions from the combustion of the renewable carbon content in biodiesel (.tank to wheel.) are carbon neutral and may be disregarded. The

following sources of project emissions shall be considered:

(a) Emissions associated with the cultivation of land to produce the oil seeds used for production of biodiesel/plant oil;

(b) Emissions due to transportation of feedstock sources from their originating sites to the biodiesel production facility;8

(c) Emissions from energy use for biodiesel production;

(d) Emissions from fossil fuel carbon in the biodiesel due to the use of methanol from fossil origin in the trans-esterification process;

(e) Where applicable CH4 emissions due to stockpiling, land filling of solid waste generated by the project or from the waste water generated in the biodiesel production facility.

$PE_y = PE_{CC,y} + PE_{TT,y} + PE_{OP,y} + PE_{BP,y} + PE_{BB,y} + PE_{MeOH,y} + PE_{CH4,y}$

Where:

PE_y	Project emissions in year y (tCO2e)
$PE_{CC,y}$	Emissions from cultivation of Jatropha in year y (tCO2e)
$PE_{TT,y}$	Emissions from transportation of organic fertilizers, Jatropha oilseeds, residuals of Jatropha, pressed oil and BDF in year y (tCO2e)
$PE_{OP,y}$	Emissions from oil pressing using Jatropha oilseeds in year y (tCO2e)
$PE_{BP,y}$	Emissions from BDF production using Jatropha oil in year y (tCO2e)
$PE_{BB,y}$	Emissions from BDF blending at distribution process in year y (tCO2e)
$PE_{MeOH,y}$	Emissions from fossil fuel carbon in methanol used in the transesterification process in year y (tCO2e)
$PE_{CH4,y}$	Where applicable project emissions of CH4 from solid waste and/or waste water in year y (tCO2e)

Emissions from cultivation

For project activity emission, AMS-III.AK states as follows;

Project participants may choose among two options to calculate this emission source:

· Option A provides a simplified approach, using conservative default values for the emissions associated with the cultivation of lands, taking into account different geographical regions where the crop is grown. This approach can only be used for oil seeds from palm or jatropha;

· Option B calculates the emissions based on actual data from the cultivation process and is more accurate than option A but requires additional data collection efforts.

The project participant has chosen the "Option A".

$PE_{CC,y} = A_y \times EF_y$

Where:

$PE_{CC,y}$	Emissions from cultivation of Jatropha in year y (tCO2e)
A_y	Total area in which Jatropha is cultivated for use in the project plant in year y (ha)
EF_y	Default emission factor for the GHG emissions associated with the cultivation of land to produce oil seed type s (tCO2e/ha). See table III.AK.1 below for available values

Table III.AK.1: Conservative default emission factors for the GHG emissions associated with the cultivation of land to produce oil seeds

Crop	Climate Zone	$EF_{s,y}$ (tCO_2e/ha)
Palm	Tropical Moist	1.87
Palm	Tropical Wet	1.87
Jatropha	Tropical Moist	1.76
Jatropha	Tropical Dry	2.52

Emissions from transportation

For ex-ante estimation;

$PE_{TT,j,y} = (Q_{j,y} / CT_{j,y}) \times DAF_{j,y} \times EF_{j,CO2}$

Where:

$PE_{TT,j,y}$ Emissions from transportation of j in year y (tCO2e),
where:
j=1; organic fertilizers
j=2; Jatropha oilseeds
j=3; residuals of Jatropha
j=4; pressed oil
j=5; BDF

$Q_{j,y}$ Quantity of j in the year y (tonnes)

$CT_{j,y}$ Average truck capacity for transportation of j (tonnes/truck)

$DAF_{j,y}$ Average distance for transportation of j (km/truck)

$EF_{j,CO2}$ CO2 emission factor from fuel use due to transportation of j (tCO2/km, IPCC default values or local values may be used)

For ex-post calculation;

$PE_{TT,y} = FC_{i,BP,y} \times NCV_i \times EF_{CO2,i}$

Where:

$PE_{TT,y}$ Emissions from transportation in year y (tCO2e),

$FC_{i,BP,y}$ Consumption of fossil fuel type i for transportation in year y (tonnes)

NCV_i Net calorific value of fossil fuel i (GJ/tonnes)

$EF_{CO2,i}$ Emissions factor of fossil fuel i (tCO2/GJ fuel)

Emissions from oil pressing

$$PE_{OP,y} = EC_{OP,y} \times EF_{CO2,ELEC} + \sum_i (FC_{i,OP,y} \times NCV_i \times EF_{CO2,i})$$

Where:

$PE_{OP,y}$ Emissions from oil pressing of Jatropha oilseeds in year y (tCO2e)

$EC_{OP,y}$ Electricity consumption in oil pressing in year y (MWh)

$EF_{CO2,ELEC}$ Emissions factor for grid electricity supplied to the project facility using the calculation methods of AMS-I.D (tCO2e/MWh)

$FC_{i,OP,y}$ Consumption of fossil fuel type i for oil pressing in year y (tonnes)

NCV_i Net calorific value of fossil fuel i (GJ/tonnes)

$EF_{CO2,i}$ Emissions factor of fossil fuel i (tCO2/GJ)

Emissions from BDF production

$$PE_{BP,y} = EC_{BP,y} \times EF_{CO2,ELEC} + \sum_i (FC_{i,BP,y} \times NCV_i \times EF_{CO2,i})$$

Where:

$PE_{BP,y}$	Emissions from BDF production using Jatropha oil in year y (tCO2e)
$EC_{BP,y}$	Electricity consumption in BDF production in year y (MWh)
$EF_{CO2,ELEC}$	Emissions factor for grid electricity supplied to the project facility using the calculation methods of AMS-I.D (tCO2e/MWh)
$FC_{i,BP,y}$	Consumption of fossil fuel type i for BDF production in year y (tonnes)
NCV_i	Net calorific value of fossil fuel i (GJ/tonnes)
$EF_{CO2,i}$	Emissions factor of fossil fuel i (tCO2/GJ fuel)

Emissions from BDF blending

$$PE_{BB,y} = EC_{BB,y} \times EF_{CO2,ELEC} + \sum_i (FC_{i,BB,y} \times NCV_i \times EF_{CO2,i})$$

Where:

$PE_{BB,y}$	Emissions from BDF blending at distribution process in year y (tCO2e)
$EC_{BB,y}$	Electricity consumption in BDF blending in year y (MWh)
$EF_{CO2,ELEC}$	Emissions factor for grid electricity supplied to the project facility using the calculation methods of AMS-I.D (tCO2e/MWh)
$FC_{i,BB,y}$	Consumption of fossil fuel type i for BDF blending in year y (tonnes)
NCV_i	Net calorific value of fossil fuel i (GJ/tonnes)
$EF_{CO2,i}$	Emissions factor of fossil fuel i (tCO2/GJ fuel)

Emissions from methanol

$$PE_{MeOH,y} = MC_{MeOH,y} \times EF_{C,MeOH} \times 44/12$$

Where:

$PE_{MeOH,y}$	Emissions from fossil fuel carbon in methanol used in the transesterification process in year y (tCO2e)
$MC_{MeOH,y}$	Quantity of methanol consumed in the BDF plant, including spills and evaporations in year y (tonnes)
$EF_{C,MeOH}$	Carbon emission factor of methanol, based on molecular weight (tC/tMeOH) (= 12/32)
44/12	Molecular weight ratio to convert tonnes of carbon into tonnes of CO2 (tCO2/tC)

Emissions from solid waste and/or waste water

Solid waste such as residuals of Jatropha oil seeds are to be used as fertilizers, which are directly supplied into the cultivation lands, and fuels for boiler at the BDF production plant.
Waste water is to be treated the same manner as in Japan. Impurities contained in waste water are separated with adsorptive filtration and burnt in a boiler as a fuel.
The above treatment will not lead to a consumption of additional fossil fuels or electricity and formation of CH4. Therefore, emissions from solid waste and waste water need not to be considered.

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

Data / Parameter:	$EF_{CO2,PD,y}$
Data unit:	tCO2/GJ
Description:	Carbon dioxide emissions factor for petrodiesel
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories

Value applied:	0.0741
Justification of the choice of data or description of measurement methods and procedures actually applied :	No reliable national, regional or local data are available, and no supplier data has been acquired; therefore the IPCC default value is used.
Any comment:	

Data / Parameter:	EF_y
Data unit:	tCO2e/ha
Description:	Default emission factor for the GHG emissions associated with the cultivation of land to produce oil seed type s
Source of data used:	Default value set in the applied methodology AMS-III.AK.
Value applied:	1.76
Justification of the choice of data or description of measurement methods and procedures actually applied :	The project site is located in the south of Vietnam, where there are two seasons, rainy and dry. The monthly average rainfall reaches over 300mm during the rainy season in Ho Chi Minh also south part of Vietnam. Therefore, climate zone of the project site can be considered as "Tropical Moist". http://www.vietnamembassy.org.uk/climate.html
Any comment:	

Data / Parameter:	$EF_{CO2,ELEC}$
Data unit:	tCO2e/MWh
Description:	Emissions factor for grid electricity supplied to the project facility using the calculation methods of AMS-I.D
Source of data used:	Calculated data as per the "Tool to calculate the emission factor for an electricity system".
Value applied:	0.5764
Justification of the choice of data or description of measurement methods and procedures actually applied :	The factor is calculated based on the "Tool to calculate the emission factor for an electricity system" as required in AMS ID Version 16. The data used was for the years 2006-08 and was the most recent available at the time of the submission of the PDD to the DOE.
Any comment:	

Data / Parameter:	$EF_{C,MeOH}$
Data unit:	tC/tMeOH
Description:	Carbon emission factor of methanol, based on molecular weight
Source of data used:	Value set in the applied methodology AMS-III.AK.
Value applied:	12/32
Justification of the choice of data or description of measurement methods and procedures actually	The value is according to the applied methodology AMS-III.AK.

applied :	
Any comment:	

Data / Parameter:	NCV_{diesel}
Data unit:	GJ/tonne
Description:	Net calorific value of petrodiesel
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	43.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	No reliable national, regional or local data are available, and no supplier data has been acquired; therefore the IPCC default value is used.
Any comment:	

Data / Parameter:	$NCV_{bunker\ A}$
Data unit:	GJ/tonne
Description:	Net calorific value of bunker A fuel
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	43.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	No reliable national, regional or local data are available, and no supplier data has been acquired; therefore the IPCC default value is used.
Any comment:	

Data / Parameter:	$EF_{CO2,bunker\ A,y}$
Data unit:	tCO2/GJ
Description:	Carbon dioxide emissions factor for bunker A fuel
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.0741
Justification of the choice of data or description of measurement methods and procedures actually applied :	No reliable national, regional or local data are available, and no supplier data has been acquired; therefore the IPCC default value is used.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Baseline emissions

Baseline emissions can be derived with the equation determined in section B.6.1.

$BE_y = BD_y \times NCV_{BD,y} \times EF_{CO2,PD,y}$
with
$BD_y = \min[(P_{BD,y} - P_{BD,on\text{-}site,y} - P_{BD,other,y}), (f_{PJ,y} \times f_{PD,y} \times C_{BBD,y} - P_{BD,other,y})]$

The estimation results are detailed in Table B.6.3-1.

Table B.6.3-1. Detailed calculation of the Baseline Estimations

parameter	data unit	year1	year2	year3	year4	year5	year6	year7
BE_y	tCO2	6,685	24,874	24,874	24,874	24,874	24,874	24,874
BD_y	tonnes	2,395	8,910	8,910	8,910	8,910	8,910	8,910
$NCV_{BD,y}$	GJ/tonne	37.67	37.67	37.67	37.67	37.67	37.67	37.67
$EF_{CO2,PD,y}$	tCO2/GJ	7.410E-02	7.410E-02	7.410E-02	7.410E-02	7.410E-02	7.410E-02	7.410E-02

parameter	data unit	year1	year2	year3	year4	year5	year6	year7
BD_y	tonnes	2,395	8,910	8,910	8,910	8,910	8,910	8,910
$P_{BD,y}$	tonnes	2,395	8,910	8,910	8,910	8,910	8,910	8,910
$P_{BD,on\text{-}site,y}$	tonnes	0	0	0	0	0	0	0
$P_{BD,other,y}$	tonnes	0	0	0	0	0	0	0
$f_{PJ,y}$	volume ratio	0.2	0.2	0.2	0.2	0.2	0.2	0.2
$f_{PD,y}$	blending rate	1	1	1	1	1	1	1
$C_{BBD,y}$	tonnes	11,973	44,550	44,550	44,550	44,550	44,550	44,550
$P_{BD,other,y}$	tonnes	0	0	0	0	0	0	0

Project emissions
Baseline emissions can be derived with the equation determined in section B.6.1.
$PE_y = PE_{CC,y} + PE_{TT,y} + PE_{OP,y} + PE_{BP,y} + PE_{BB,y} + PE_{MeOH,y} + PE_{CH4,y}$

The estimation results are detailed in Table B.6.3-2.

Table B.6.3-2. Detailed calculation of the Baseline Estimations

parameter	data unit	year1	year2	year3	year4	year5	year6	year7
PE_y	tCO2e	5,815	16,218	16,218	16,214	16,214	16,214	16,214
$PE_{CC,y}$	tCO2e	1,892	7,040	7,040	7,040	7,040	7,040	7,040
$PE_{TT,y}$	tCO2e	15	57	57	54	54	54	54
$PE_{OP,y}$	tCO2e	3,023	5,829	5,829	5,829	5,829	5,829	5,829
$PE_{BP,y}$	tCO2e	404	1,504	1,504	1,504	1,504	1,504	1,504
$PE_{BB,y}$	tCO2e	52	195	195	195	195	195	195
$PE_{MeOH,y}$	tCO2e	428	1,593	1,593	1,593	1,593	1,593	1,593
$PE_{CH4,y}$	tCO2e	0	0	0	0	0	0	0

Leakage:
No leakage is indicated from the project.

Emission reductions
Emission reductions can be derived with the following equation;
$ER_y = BE_y - PE_y$

The estimation results are detailed in Table B.6.3-3.

Table B.6.3-3. Detailed calculation of the Estimation Reductions

parameter	data unit	year1	year2	year3	year4	year5	year6	year7	total
ER_y	tCO2	870	8,656	8,656	8,659	8,659	8,659	8,659	52,818
BE_y	tCO2	6,685	24,874	24,874	24,874	24,874	24,874	24,874	155,926
PE_y	tCO2	5,815	16,218	16,218	16,214	16,214	16,214	16,214	103,108

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

Year	Estimation of project activity emissions (tCO2 e)	Estimation of baseline emissions (tCO2 e)	Estimation of leakage (tCO2 e)	Estimation of overall emission reductions (tCO2 e)
1	5,815	6,685	0	870
2	16,218	24,874	0	8,656
3	16,218	24,874	0	8,656
4	16,218	24,874	0	8,656
5	16,218	24,874	0	8,656
6	16,218	24,874	0	8,656
7	16,218	24,874	0	8,656
Total (tonnes of CO2 e)	**103,108**	**155,926**	**0**	**52,818**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	BD_y
Data unit:	tonnes
Description:	Quantity of biodiesel eligible for crediting in year y
Source of data to be used:	Meter readings of BDF volume at the BDF production plant
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. 2,395 t for year 1 8,910 t for year 2 - year 7
Description of measurement methods and procedures to be applied:	Electronic meters complying with Vietnamese metering standards.
QA/QC procedures to be applied:	Proofed meter with international standard is installed, and the meter will be calibrated every year. The data from meter reading is collected automatically as electronic data in a data base.
Any comment:	Electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$NCV_{BD,y}$
Data unit:	GJ/tonne
Description:	Net calorific value of BDF produced for the year y
Source of data to be used:	Calorimeter readings of BDF net calorific value at the BDF production plant Table.I-1, Page.8, Biodiesel Handbook, NIPPO CO., LTD. for ex-ante estimation of baseline emissions.
Value of data	To be monitored. 37.68 for the purpose of calculating expected emission reductions in section B.5. 37.68 (GJ/tonne) = 9,000 (kcal/kg) × 4.186 (kJ/kcal) Where, 9,000 is a calorific content of BDF. 4.186 is a conversion factor from kcal to kJ.
Description of measurement methods and procedures to be applied:	Calorimeter complying with Vietnamese and/or international metering standards.
QA/QC procedures to be applied:	Proofed meter with international standard is installed, and the meter will be calibrated every year. The data from meter reading is collected automatically as electronic data in a data base.
Any comment:	Electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$P_{BD,y}$
Data unit:	tonnes
Description:	Production of BDF in the project plant in year y
Source of data to be used:	Meter readings of BDF volume at the BDF production plant
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. 2,395 t for year 1 8,910 t for year 2 - year 7
Description of measurement methods and procedures to be applied:	Electronic meters complying with Vietnamese metering standards.
QA/QC procedures to be applied:	Proofed meter with international standard is installed, and the meter will be calibrated every year. The data from meter reading is collected automatically as electronic data in a data base. Monitored records will be cross checked with records for consumption and sales by the plant mamager.
Any comment:	Electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$P_{BD,on\text{-}site,y}$
Data unit:	tonnes
Description:	Quantity of BDF consumed at the project BDF production plant in year y
Source of data to be	Meter readings of BDF volume at the BDF production plant

used:	
Value of data	To be monitored. 0(zero) t for the purpose of calculating expected emission reductions in section B.5.
Description of measurement methods and procedures to be applied:	Electronic meters complying with Vietnamese metering standards.
QA/QC procedures to be applied:	Proofed meter with international standard is installed, and the meter will be calibrated every year. The data from meter reading is collected automatically as electronic data in a data base.
Any comment:	Electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$P_{BD,other,y}$
Data unit:	tonnes
Description:	Quantity of BDF that is either produced with other alcohols than methanol from fossil origin or that is produced using other oil seeds or waste oil(s)/fat(s) than those eligible under this methodology according to the applicability conditions
Source of data to be used:	Meter readings of BDF volume at the BDF production plant
Value of data	To be monitored. Since there is no plan of using other alcohols than methanol from fossil origin and of using other oil seeds or waste oil(s)/fat(s) than Jatropha, 0(zero) t for the purpose of calculating expected emission reductions in section B.5.
Description of measurement methods and procedures to be applied:	In case $P_{BD,other,y}$ has to be considered, it will be calculated with the metered volume of methanol and other alcohols or Jatropha and other sources (oils/fats) of BDF.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$f_{PJ,y}$
Data unit:	volume ratio
Description:	Fraction of blending in year y
Source of data to be used:	Meter readings of BDF and petrodiesel volume at the blending site.
Value of data	To be monitored.
Description of measurement methods and procedures to be applied:	Electronic meters complying with Vietnamese metering standards.
QA/QC procedures to be applied:	The data from meter reading is collected automatically as electronic data in a data base. The data will be double checked by the plant manager. Blending ratio which shall be under 20% will be ensured by a contract between the project participants and the consumers of BDF.

Any comment:	Electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$f_{PD,y}$
Data unit:	blending rate shall be established volume by volume
Description:	1.0 if pure petrodiesel is used for blending otherwise use the fraction of petrodiesel in the fuel used for blending
Source of data to be used:	Purchase records of petrodiesel
Value of data	To be monitored. 1.0 for the purpose of calculating expected emission reductions in section B.5.
Description of measurement methods and procedures to be applied:	Reading from purchase records.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$C_{BBD,y}$
Data unit:	tonnes
Description:	Consumption of (blended) BDF from the project plant by the captive consumer(s) in year y
Source of data to be used:	Meter readings of BDF and petrodiesel volume at the distribution sites (e.g. fuelling stations).
Value of data	To be monitored.
Description of measurement methods and procedures to be applied:	Electronic meters complying with Vietnamese metering standards. Consumption of BDF from the project plant by the captive consumers themselves will be ensured by a contract between the project participants and the consumers of BDF.
QA/QC procedures to be applied:	The data from meter reading is collected automatically as electronic data in a data base. The data will be cross checked with records of consumption and sales by the plant manager.
Any comment:	Electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	A_y
Data unit:	ha
Description:	Total area in which Jatropha is cultivated for use in the project plant in year y
Source of data to be used:	Maps and the contracts between the project participant and local people to be employed to keep the cultivation lands
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. 1,075 ha for year 1 4,000 ha for year 2 - year 7
Description of	Calculated using maps.

measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	Calculation results will be cross checked to be consistent with yield of cultivation by the plant manager.
Any comment:	Maps, contracts, and electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$Q_{j,y}$
Data unit:	tonnes
Description:	Quantity of j in the year y; where, j=1; organic fertilizers j=2; Jatropha oilseeds j=3; residuals of Jatropha j=4; pressed oil j=5; BDF
Source of data to be used:	j=1; daily reports j=2; purchase records j=3; estimated from purchase records of Jatropha oilseeds j=4; meter readings at the oil pressing units j=5; meter readings at the BDF production site
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. [j=1] 5,376 t for year 1 20,004 t for year 2 - year 3 0 t for year 4 - year 7 [j=2] 8,063 t for year 1 30,000 t for year 2 - year 7 [j=3] 0 t for year 1 - year 7 [j=4] 0 t for year 1 - year 7 [j=5] 7,256 t for year 1 27,000 t for year 2 - year 7
Description of measurement methods and procedures to be applied:	[j=1, j=2] Reading from purchase records and daily reports. [j=5] Electronic electricity meters complying with Vietnamese metering standards.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data and purchase records will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$CT_{j,y}$
Data unit:	tonnes/truck
Description:	Average truck capacity for transportation of j
Source of data to be used:	Specification documents of trucks.
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. [j=1] and [j=2] 2 tonnes/truck [j=5] 30 tonnes/truck
Description of measurement methods and procedures to be applied:	Reading from specification documents.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data and specification documents will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$EF_{j,CO2}$
Data unit:	tCO2/km
Description:	CO2 emission factor from fuel use due to transportation of j
Source of data to be	IPCC 2006 Guidelines for National Greenhouse Gas Inventories

used:	J-VER, Ministry of Environment, Japan
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. [j=1] and [j=2] 1.637E-05 (tCO2/km) = 6.19 (ℓ/km)×(43.0 (GJ/t)×7.410 (tCO2/GJ)/1000×0.83 (kg/ ℓ))/1000 Where, 6.19 (ℓ/km) is an average fuel consumption of 2 tonnes truck[6] 43.0 (GJ/t) is a net calorific value of diesel fuel[7] 7.410 (tCO2/GJ) is an emission factor of diesel fuel[8] 0.83 (kg/ℓ) is a conversion factor from ℓ to kg[9] [j=5] 6.929E-06 (tCO2/km) = 2.62 (ℓ/km)×(43.0 (GJ/t)×7.410 (tCO2/GJ)/1000×0.83 (kg/ ℓ))/1000 Where, 2.62 (ℓ/km) is an average fuel consumption of 30 tonnes truck[10] 43.0 (GJ/t) is a net calorific value of diesel fuel[11] 7.410 (tCO2/GJ) is an emission factor of diesel fuel[12] 0.83 (kg/ℓ) is a conversion factor from ℓ to kg[13]
Description of measurement methods and procedures to be applied:	Reading from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, and the list of emission factors (J-VER).
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data and the IPCC 2006 Guidelines, the list of emission factor (J-VER) will be kept for 2 years following the end of the crediting period.

[6] The list of emission factors (J-VER), Ministry of Environment, Japan, http://www.4cj.org/document/jver/jver_default_list.pdf

[7] IPCC 2006 Guidelines for National Greenhouse Gas Inventories, http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

[8] IPCC 2006 Guidelines for National Greenhouse Gas Inventories, http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

[9] Calculated from the values set by the Japanese standard under taxation, from 0.8017 to 0.8762 at 15 degrees C (average is 0.8389)

[10] The list of emission factors (J-VER), Ministry of Environment, Japan, http://www.4cj.org/document/jver/jver_default_list.pdf

[11] IPCC 2006 Guidelines for National Greenhouse Gas Inventories, http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

[12] IPCC 2006 Guidelines for National Greenhouse Gas Inventories, http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

[13] Calculated from the values set by the Japanese standard under taxation, from 0.8017 to 0.8762 at 15 degrees C (average is 0.8389)

Data / Parameter:	$EC_{OP,y}$
Data unit:	MWh
Description:	Electricity consumption in oil pressing in year y
Source of data to be used:	Billing statements of electricity from electric company in Vietnam.
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. 1,045 MWh for year 1 3,888 MWh for year 2 - year 7
Description of measurement methods and procedures to be applied:	Reading from billing statements. The billing statement will include both $EC_{OP,y}$ and $EC_{BP,y}$ in total.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Billing statements and electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$FC_{i,OP,y}$
Data unit:	tonnes
Description:	Consumption of fossil fuel type i for oil pressing in year y
Source of data to be used:	Purchase records of fossil fuel type i for oil pressing.
Value of data	To be monitored. The fuel type is “bunker A” and the volume is as follows for the purpose of calculating expected emission reductions in section B.5. 324 tonnes for year 1 1,204 tonnes for year 2 - year 7
Description of measurement methods and procedures to be applied:	Reading from purchase records.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data and purchase records will be kept for 2 years following the end of the crediting period.

Data / Parameter:	NCV_i
Data unit:	GJ/tonnes
Description:	Net calorific value of fossil fuel i
Source of data to be used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value of data	To be monitored.

	The fuel type is "bunker A", therefore the value of 43.0 GJ/tonnes is applied for the purpose of calculating expected emission reductions in section B.5.
Description of measurement methods and procedures to be applied:	Reading from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data and the IPCC 2006 Guidelines will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tCO2/GJ
Description:	Emissions factor of fossil fuel i
Source of data to be used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value of data	To be monitored. The fuel type is "bunker A", therefore the value of 7.410E-02 tCO2/GJ is applied for the purpose of calculating expected emission reductions in section B.5.
Description of measurement methods and procedures to be applied:	Reading from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data and the IPCC 2006 Guidelines will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$EC_{BP,y}$
Data unit:	MWh
Description:	Electricity consumption in BDF production in year y
Source of data to be used:	Billing statements of electricity from electric company in Vietnam.
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. 701 MWh for year 1 2,609 MWh for year 2 - year 7
Description of measurement methods and procedures to be applied:	Reading from billing statements. The billing statement will include both $EC_{OP,y}$ and $EC_{BP,y}$ in total.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Billing statements and electronic data will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$FC_{i,BP,y}$
Data unit:	tonnes
Description:	Consumption of fossil fuel type i for BDF production in year y
Source of data to be used:	Purchase records of fossil fuel type i for oil pressing.
Value of data	To be monitored. Since the fossil fuel usage is not planned for BDF production, the volume of 0(zero) is applied for the purpose of calculating expected emission reductions in section B.5.
Description of measurement methods and procedures to be applied:	Reading from purchase records.
QA/QC procedures to be applied:	The data will be double checked by the plant manager.
Any comment:	Electronic data and purchase records will be kept for 2 years following the end of the crediting period.

Data / Parameter:	$MC_{MeOH,y}$
Data unit:	tonnes
Description:	Quantity of methanol consumed in the BDF plant, including spills and evaporations in year y
Source of data to be used:	Measurement at the BDF production plant
Value of data	To be monitored. The following values applied for the purpose of calculating expected emission reductions in section B.5. 311 tonnes for year 1, which is derived from the equation as follows; 311 (tonnes) = $P_{BD,y}$ (2,359 tonnes) $\times$ 0.13[14] 1,158 tonnes for year 2 - year 7, which is derived from the equation as follows; 1,158 (tonnes) = $P_{BD,y}$ (8,910 tonnes) $\times$ 0.13
Description of measurement methods and procedures to be applied:	Electronic meters complying with Vietnamese metering standards.
QA/QC procedures to be applied:	Proofed meter with international standard is installed, and the meter will be calibrated every year. The data from meter reading is collected automatically as electronic data in a data base. The data will be cross-checked with purchase records of methanol by the plant manager.
Any comment:	Electronic data and purchase records will be kept for 2 years following the end of the crediting period.

[14] Methanol content ratio in BDF based on the PP's experiences

Data / Parameter:	$M_{OM,k,y}$
Data unit:	tonnes
Description:	Amount of oilseed meal (press-cake) obtained from oilseed type k in year y
Source of data to be used:	Measurement at oil pressing facility, i.e. the BDF production plant
Value of data	To be monitored. The following values can be estimated with assumptions made for the purpose of calculating expected emission reductions in section B.5. 5,402 tonnes for year 1, which is derived from the equation as follows; 5,402 (tonnes) = A_y (1,075 ha)×7.5[15] (tonnes/ha)×(1－0.33[16]) 20,100 tonnes for year 2 - year 7, which is derived from the equation as follows; 20,100 (tonnes) = A_y (4,000 ha)×7.5[17] (tonnes/ha)×(1－0.33[18]) These values are not used for an ex-ante calculation of emission reductions because all oilseed meals will be used as a renewable energy fuel for boiler in the BDF project plant.
Description of measurement methods and procedures to be applied:	Calculated from the volume data of oil seeds purchased and oil pressed.
QA/QC procedures to be applied:	The data will be cross checked with records of consumption and sales if available by the plant manager.
Any comment:	

Data / Parameter:	$M_{G,k,y}$
Data unit:	tonnes
Description:	Amount of glycerin associated with the production of biodiesel from oilseed type k in year y
Source of data to be used:	Measurement at the BDF production plant
Value of data	To be monitored. The following values can be estimated with assumptions made for the purpose of calculating expected emission reductions in section B.5. 156 tonnes for year 1, which is derived from the equation as follows;

[15] Average yield of Jatropha oil seeds, source; Ministry of Agriculture and Rural Development, 2008, "Research, development and product utilization of Jatropha L. in Viet Nam for the period 2008-2015 and the vision 2025"

[16] Oil content of Jatropha seeds, source; Achten WMJ, Mathijs E, Verchot L, Singh VP, Aerts R, Muys B 2007. Jatropha biodiesel fueling sustainability?, and Achten WMJ, Verchot L, Franken YJ, Mathijs E, Singh VP, Aerts R, Muys B 2008. Jatropha bio-diesel production and use.

[17] Average yield of Jatropha oil seeds, source; Ministry of Agriculture and Rural Development, 2008, "Research, development and product utilization of Jatropha L. in Viet Nam for the period 2008-2015 and the vision 2025"

[18] Oil content of Jatropha seeds, source; Achten WMJ, Mathijs E, Verchot L, Singh VP, Aerts R, Muys B 2007. Jatropha biodiesel fueling sustainability?, and Achten WMJ, Verchot L, Franken YJ, Mathijs E, Singh VP, Aerts R, Muys B 2008. Jatropha bio-diesel production and use.

	156 (tonnes) = $P_{BD,y}$ (2,395 ha) × 0.065[19] 579 tonnes for year 2 - year 7, which is derived from the equation as follows; 579 (tonnes) = $P_{BD,y}$ (8,910 ha) × 0.065[20]
Description of measurement methods and procedures to be applied:	Electronic electricity meters complying with Vietnamese metering standards.
QA/QC procedures to be applied:	The data will be cross checked with records of consumption and sales if available by the plant manager.
Any comment:	

B.7.2 Description of the monitoring plan:

Management and Data Recording Responsibility
In order to ensure that the monitoring and reporting requirements are implemented correctly, specific operational and management responsibilities will be assigned to RIN Vietnam. Detailed responsibilities and a diagram are contained in Annex 4.

Monitoring Procedure
Data from the electronic meters will be recorded consciously and stored electronically in a database. Data from the purchase records and billing statements will be recorded monthly and stored in a database. Any problems with the meters, or discrepancies between the meter readings and the purchase records or billing statements, will be noted in an operation and maintenance log and entered into the database.
A semi-annual monitoring report will be prepared by monitoring officer, containing all the data recorded and details of any meter faults and/or loss of data, discrepancies of data.
All records will be retained for at least two years after the end of the crediting period during which the data was recorded.

Quality Assurance
The following quality assurance measures will be taken relating to the electronic meters and their installation and operation:
- The electronic meters will meet the relevant Vietnamese Quality standards and/or international standards
- The meters will be located in appropriate places by technical experts to prevent meter malfunction
- Routine calibration of the meters will be performed in accordance with the manufacturer's specification to ensure that the data remains accurate
- To ensure the quality of the recorded data, all personnel will be trained before operation of the plant begins and annually in accordance with this monitoring plan
- The following quality assurance measures will be taken relating to the storage of the monitored data:
  > A paper backup of the monthly electronic data file will be stored in a secure location onsite
  > The monthly data files will be included as part of the semi-annual monitoring report and an electronic backup of the report will be emailed/mailed to a separate location (ie Revo International INC. HQ in Kyoto, Japan)

[19] Glycerin ratio of BDF, based on the PP's experiences

[20] Glycerin ratio of BDF, based on the PP's experiences

Quality Control Procedures
To check that the data has been recorded correctly, the monthly monitored data will be cross checked with the purchase records (e.g. methanol, BDF consumption) and theoretical values (e.g. glycerin).
Any meter faults or loss of metered data will be recorded in the database with details of the fault and length of time over which data was affected.
An audit of the monitoring plan will be undertaken on a twelve month basis. The audit will check that the monitoring procedure and the Quality Assurance and Quality Control procedures are being followed correctly.

For further detail of the operational and management structure developed to implement the monitoring plan refer to Annex 4.

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

Date of completion: 08/11/2010

Contact information of responsible persons:

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Mitsubishi UFJ Research & Consulting Co., Ltd. is a consulting firm and not a project participant.

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:

1/10/2011 (date of implementation (date that the project participant is expected to sign a contract for construction of a BDF refinery plant)

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:

1/10/2011 or the date of registration (whichever comes the later)

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not selected

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 proposed project activity consists of three components: 1) jatropha planting at dedicated areas, 2) crude oil processing in a BDF refinery plant in a industrial estate and 3) BDF usage in vehicles as a substitute of diesel.
The environmental impact assessment (EIA) for this project will be conducted for 1) jatropha planting and 2) refinery construction of the components above. As the project is at the planning stage, it has not applied for EIA necessary for a project approval from local authority, Peoples Committee of Ninh Thuận province. Although it has not received formal EIA approval by the local government, the project participant believes that the project would not lead to environmental impacts for the following reasons:

Jatropha plantations
For jatropha oilseeds production, dedicated plantations will be established on degrading and degraded lands to minimize the environmental impacts to the site. The lands planned to be used for the project are mostly un-vegetated lands. Jatropha trees are expected to provide cover to the soil reducing erosion caused by direct precipitation. At the same time, jatropha trees would provide organic matter as in the form of forest litter which is expected to improve the physical structure of the soil on the site.

Refinery plant
The plant is planned to be constructed in an industrial estate of the province which the local government has established. As construction of the plant takes place in the already established industrial estate,

environmental impacts to the construction site are expected to be minimal. The details of the impacts will be analyzed in the EIA when applying for project approval of the local government.
For operation of the refinery, there are certain aspects of its operation that could possibly affect the environment.
In the process of refining BDF quality water is used to increase purity of the oil and as a result waste water will be discharged from the plant. Waste water treatment is important for clean BDF production and for appropriate water treatment, project participant is planning to select the industrial estate managed by the local government.
BDF production also results in a by-product "glycerine" which needs proper disposal. In the project activity, the project participant will use glycerine to feed boilers on site so that the project would not result in waste generation.

Diesel substitution by BDF
In Vietnam there are no legislations or standards for regulating BDF and no EIA is required for BDF consumption in vehicles. According to a study conducted in Japan, BDF resulted in 1/100 of SOx emissions, 1/2 PM emissions and slight increase in NOx emissions compared to those of diesel fuel. As such diesel substitution by BDF could result in overall air quality improvement of the areas where BDF fed vehicles operate.

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

The results of the EIA for the jatropha plantation and plant construction will be provided as soon as they are obtained from the local authority.

SECTION E. Stakeholders' comments

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

The stakeholders' comments have been collected in several manners.

Meeting with local people at project site:
Stakeholder consultation was organized to invite local people who will cultivate the Jatropha at the project site. The agenda for stakeholder consultation was posted on the notice board of the project site community house.

The meeting was held on 12/10/2010 at the community house, Phuoc Tan Commune, Bac Ai District, Ninh Thuan Province, Vietnam. 24 people attended to the meeting.

Agenda of the meet was as follows;

- Introduction to the proposed project
- Overview of the proposed project
- Environmental aspects of the project
- Socio-economic aspects of the project
- Q&A

Meeting with member ministries of DNA:

The meetings with four ministries have been taken place. The project participants explained about the proposed CDM project and collected some comments from responsible personnel on CDM in Vietnam.

14/10/2010 Ministry of Transport
14/10/2010 Ministry of Industry and Trade
14/10/2010 Ministry of Natural Resources and Environment
15/10/2010 Ministry of Agriculture and Rural Development

Meeting with local government:
The meeting with local government has been taken place. The project participants explained about the proposed CDM project and collected some comments from responsible personnel on CDM at project site.

12/10/2010 Ninh Thuan Province
13/10/2010 Bac Ai District

Meeting with Japan International Cooperation Agency (JICA):
The meeting with Mr.Taro Katsurai (Senior Project Formulation Officer) was taken place on 13/10/2010 at their office in Hanoi. The project participants explained about the proposed CDM project and collected some comments from responsible personnel on CDM in Vietnam.

All the list of attendants can be submitted at the request of DOE and UNFCCC.

E.2. Summary of the comments received:

Here is a summery of comments and questions received from stakeholders.

Comments from local people at project site:

- ✓ The project activity will contribute to socio-economic development of the project site at Phuoc Tan Commune
- ✓ The local people expect that the project activity will employ local people for cultivating Jatropha
- ✓ A question about the compatibility of their land quality with Jatropha planting
- ✓ A question about usable chemicals to exterminate harmful insects

Comments from member ministries of DNA:

- ✓ The project activity is environmental friendly and welcomed in terms of GHG emission reductions
- ✓ The Vietnam government will work to increase the use of bioethanol-blended(5%) gasoline from November 2010
- ✓ The new and renewable energy source such as BDF is expected to serve as one of the alternatives to fossil fuel
- ✓ Activities to reduce fossil fuel consumption are very much encouraged in Vietnam
- ✓ It is required to implement environmental impact assessment (EIA) for the all processes of the project activity
- ✓ The following documents are identified as the main guidelines for CDM activities in Vietnam
  - ➢ Decision No.130/2007/QD-TTg dated 02 August 2007 on a number financial mechanisms and policies for CDM projects issued by Vietnamese prime minister
  - ➢ Joint-Circular No.58/2008/TTLT-BTC-BTNMT dated 04 July 2008 for guiding the implementation of some articles in Decision 130/2007/QD-TTg dated 02 August 2007
  - ➢ Decision No. 47/2007/ QD-TTg dated 06 April 2007 on approving KP implementing plan to the UNFCCC for the period 2007-2010 issued by Vietnamese prime minister
- ✓ The following documents are identified as the Biofuel policies in Vietnam

- Decision No.177/2007/QD-TTg of November 20, 2007, approving the scheme on development of Biofuel up to 2015, with a vision to 2025
- TCVN 7716:2007 for Denatured ethanol standard: similar to ASTM D4806
- TCVN 7717:2007 for B100 standard: similar to ASTM D6751
- TCVN 8063:2009 for E5 standard
- TCVN 8064:2009 for B5 standard

Comments from local government:

- ✓ The project activity is environmental friendly and welcomed in terms of GHG emission reductions
- ✓ Main concern of local government is demonstration Jatropha experiments such as growth rate and yield performance
- ✓ Ninh Thuan Province is suggestion the location of national industrial park as construction site of BDF production plant
- ✓ Ninh Thuan Province will issue the certificate for the lands which are degraded before cultivating Jatropha

Comments from JICA:

- ✓ This type of new and renewable energy activity is environmental friendly and welcomed in Vietnam

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

The project participants have responded and answered to the concerns and questions given by the stakeholders at the meetings. No negative comments have received for the project activity to be carried out.

The project participants confirm and implement that:

- To implement environmental impact assessment (EIA) for the all processes of the project activity
- To respect the regulations for CDM activities of Vietnamese government
- To respect the Biofuel policies and quality standard of Biofuel of Vietnamese government
- To gather information about conditions of national industrial park as construction site of BDF production plant

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding will be used for this Project Activity.

Annex 3

BASELINE INFORMATION

In accordance with the Document No. 151/ KTTVBDKH is issued by Department of Meteorology, Hydrology and Climate Change (DNA) on March 26th 2010 about Emission Factor of Vietnam Electricity Grid Below we provide the main data used in the calculation of the baseline emission factor.

Calculations and Data for Vietnam Grid Emission Factor

a) Calculation of operating margin EF_{OM} period 2006-2008

Operating margin CO2 emission factor in year 2006 (Table 3.1-Simple OM 2006)

Total electricity supplying to national grid	37,618,249	MWh
Total amount of emission	25,702,898	tCO2
Emission factor	0.683	tCO2/MWh

Operating margin CO2 emission factor in year 2007 (Table 3.2-Simple OM 2007)

Total electricity supplying to national grid	43,921,357	MWh
Total amount of emission	28,544,283	tCO2
Emission factor	0.650	tCO2/MWh

Operating margin CO2 emission factor in year 2008 (Table 3.3-Simple OM 2008)

Total electricity supplying to national grid	48,719,874	MWh
Total amount of emission	29,963,699	tCO2
Emission factor	0.615	tCO2/MWh

Operating margin CO2 emission factor

	Unit	2006	2007	2008	Total
Total electricity generated from fossil fired power plants serving grid	MWh	37,618,249	43,921,357	48,719,874	130,259,480
Total emissions	tCO2	25,702,898	28,544,283	29,963,699	84,210,880
OM emission factor	**tCO2/MWh**	**0.6465**			

Table 3.1-Simple OM 2006

Name of power plant	Electricity selling national grid (MWh)	Main fuel						Secondary fuel						
		Type of fuel	Amount of consumed fuel	Net calorific value		Emission factor of fuel		Type of fuel	Amount of consumed fuel	Net calorific value		Emission factor of fuel		Amount of emission
			Coal, DO, FO:kt; Gas:mill.m3	Coal,DO,FO:kCal/kg; Gas:MJ/m3	Coal,DO,FO:GJ/kt; Gas:GJ/mill.m3	kgCO2/TJ	tCO2/GJ		Coal,DO,FO:kt; Gas:mill.m3	Coal,DO,FO:kCal/kg; Gas:kCal/m3	Coal,DO,FO:GJ/kt; Gas:GJ/mill.m3	kgCO2/TJ	tCO2/GJ	t CO2
A	B	C	D	E	Coal, DO, FO: F=E*4.1868 Gas:F=E*1000	G	H=G/10^6	I	J	K	L=K*4.1868	M	N=M/10^6	O=D*F*H+J*L*N
Coal power plant														
Pha Lai 1	2,464,209	Coal	1,717	4,953	20,737	98,300	0.0983	FO	7.62	9,800	41,031	77,400	0.0774	3,524,257
Pha Lai 2	3,696,205	Coal	1,951	5,039	21,097	98,300	0.0983	FO	3.76	9,800	41,031	77,400	0.0774	4,058,045
Uong Bi	766,634	Coal	554	5,258	22,014	98,300	0.0983	FO	1.52	10,097	42,273	77,400	0.0774	1,203,127
Uong Bi 2	0	Coal	0	0	0	98,300	0.0983	FO	0.00	0	0	77,400	0.0774	0
Ninh Binh	721,277	Coal	440	5,421	22,697	98,300	0.0983	FO	0.09	10,376	43,442	77,400	0.0774	982,282
Na Duong	641,510	Coal	514	4,006	16,770	98,300	0.0983	FO	0.35	7,496	31,386	77,400	0.0774	848,198
Cao Ngan	0	Coal	0	0	0	98,300	0.0983	FO	0.00	0	0	77,400	0.0774	0
Formosa	701,395	OtherBituminousCoal	470	6,483	27,143	94,600	0.0946	FO	0.23	9,810	41,073	77,400	0.0774	1,207,702
Gas Turbine														
Gas Turbine powered by gas														
Ba Ria	1,308,583	Gas	436.24	34.85	34,850	56,100	0.0561	-		0	0	0	0	852,889
Phu My	10,073,917	Gas	2,432.92	37.17	37,173	56,100	0.0561	-		0	0	0	0	5,073,624
		Gas	523.22	38.80	38,797	56,100	0.0561	-		0	0	0	0	1,138,792
Phu My 3	2,531,004	Gas	703.82	38.75	38,750	56,100	0.0561	-		0	0	0	0	1,530,021
Nhon Trach	0	Gas	0.00	0.00	0	56,100	0.0561	-		0	0	0	0	0
Ca Mau 1&2	0	Gas	0.00	0.00	0	56,100	0.0561	DO	0	0	0	77,400	0.0774	0
Phu My 2.2	4,838,810	Gas	1,354.87	38.75	38,750	56,100	0.0561	-		0	0	0	0	2,945,311
VE DAN	47,894	Gas	236.67	42.80	42,800	56,100	0.0561	FO	1.09	9,665	40,465	77,400	0.0774	571,687
Dam Phu My	38,556	Gas	55.49	42.50	42,500	56,100	0.0561	-			0	0	0	132,307
Gas Turbine powered by oil														
Ba Ria	13,958	DO	4	10,300	43,124	74,100	0.0741	-			0	0	0	14,188
Phu My	13,958	DO	18	10,895	45,615	74,100	0.0741	-			0	0	0	61,889
Phu My 3	13,958	DO	3	10,255	42,936	74,100	0.0741	-			0	0	0	10,583
Phu My 2.2	13,958	DO	0	0	0	74,100	0.0741	-			0	0	0	0
CAN THO	13,958	DO	33	10,860	45,469	74,100	0.0741	-			0	0	0	112,583
THU DUC	13,958	DO	11	10,800	45,217	74,100	0.0741	-			0	0	0	35,684
Tail gas														
Ba Ria	660,965	Tail Gas			0	0	0	-			0	0	0	0
Phu My	5,336,388	Tail Gas			0	0	0	-			0	0	0	0
Phu My 3	1,473,329	Tail Gas			0	0	0	-			0	0	0	0
Nhon Trach	0	Tail Gas			0	0	0	-			0	0	0	0
Ca Mau 1&2	0	Tail Gas			0	0	0	-			0	0	0	0
Phu My 2.2	0	Tail Gas			0	0	0	-			0	0	0	0
Oil thermal power plant														
HIEP PHUOC	453,303	FO	229	10,220	42,789	77,400	0.0774	DO	0.011	10,150	42,496	74,100	0.0741	758,788
CAN THO	118,748	FO	36	10,226	42,814	77,400	0.0774	DO	1.9693	10,860	45,469	74,100	0.0741	126,004
THU DUC	471,940	FO	133	10,300	43,124	77,400	0.0774	DO	0.132	10,800	45,217	74,100	0.0741	442,801
Dissel used FO														
CAI LAN-VINASHIN	0	FO	0	0	0	77,400	0.0774	-			0	0	0	0
AMATA	80,000	FO	16.60	9,600	40,193	77,400	0.0774	-			0	0	0	51,642
Dissel used DO														
NM dien Dong Khoi (Ben Tre)	3,150	DO	0.81	10,700	44,799	74,100	0.0741	-			0	0	0	2,676
KM dien Disel Ca Mau	3,123	DO	0.83	10,970	45,929	74,100	0.0741	-			0	0	0	2,834
NM dien Diesel An Giang	1,505	DO	0.39	10,305	43,145	74,100	0.0741	-			0	0	0	1,247
Dien luc Dong Thap	119	DO	0.03	10,320	43,208	74,100	0.0741	-			0	0	0	109
Dien luc Binh Thuan	6,372	DO	1.54	10,150	42,496	74,100	0.0741	-			0	0	0	4,843
Diesel khan	10,732	DO	2.79	10,150	42,496	74,100	0.0741	-			0	0	0	8,787
Imported	**937,000**	-			0	0	0	-			0	0	0	0

Table 3.2-Simply OM 2007

Name of power plant	Electricity selling national grid (MWh)	Main fuel						Secondary fuel						
		Type of fuel	Amount of consumed fuel	Net calorific value		Emission factor of fuel		Type of fuel	Amount of consumed fuel	Net calorific value		Emission factor of fuel		Amount of emission
			Coal, DO, FO:kt; Gas:mill.m3	Coal,DO,FO:kCal/kg; Gas:MJ/m3	Coal,DO,FO:GJ/kt; Gas:GJ/mill.m3	kgCO2/TJ	tCO2/GJ		Coal,DO,FO:kt; Gas:mill.m3	Coal,DO,FO:kCal/kg; Gas:kCal/m3	Coal,DO,FO:GJ/kt; Gas:GJ/mill.m3	kgCO2/TJ	tCO2/GJ	t CO2
A	B	C	D	E	Coal, DO, FO: F=E*4.1868 Gas:F=E*1000	G	H=G/10^6	I	J	K	L=K*4.1868	M	N=M/10^6	O=D*F*H+J*L*N
Coal power plant														
Pha Lai 1	2,501,097	Coal	1,728	4,946	20,708	98,300	0.0983	FO	6.59	9,800	41,031	77,400	0.0774	3,538,411
Pha Lai 2	3,804,635	Coal	2,054	5,021	21,022	98,300	0.0983	FO	4.66	9,800	41,031	77,400	0.0774	4,259,288
Uong Bi	705,778	Coal	526	5,210	21,813	98,300	0.0983	FO	1.74	11,975	50,137	77,400	0.0774	1,133,997
Uong Bi 2	520,000	Coal	281	5,021	21,022	98,300	0.0983	FO	0.64	11,975	50,137	77,400	0.0774	582,589
Ninh Binh	652,464	Coal	412	5,286	22,131	98,300	0.0983	FO	0.10	10,376	43,442	77,400	0.0774	895,616
Na Duong	660,520	Coal	546	4,076	17,067	98,300	0.0983	FO	0.17	9,973	41,754	77,400	0.0774	916,604
Cao Ngan	352,577	Coal	330	4,980	20,850	98,300	0.0983	FO	1.52	9,800	41,031	77,400	0.0774	680,234
Formosa	639,334	OtherBitu minousCo al	511	6,259	26,205	94,600	0.0946	FO	0.11	9,802	41,039	77,400	0.0774	1,266,157
Gas Turbine														
Gas Turbine powered by gas														
Ba Ria	1,244,018	Gas	416.89	34.85	34,850	56,100	0.0561	-		0	0	0	0	815,059
Phu My	10,700,737	Gas	3,040.39	36.99	36,988	56,100	0.0561	-		0	0	0	0	6,308,885
		Gas	99.85	38.49	38,486	56,100	0.0561	-		0	0	0	0	215,576
Phu My 3	2,393,620	Gas	665.69	38.56	38,560	56,100	0.0561	-		0	0	0	0	1,440,029
Nhon Trach	0	Gas	0.00	0.00	0	56,100	0.0561	-		0	0	0	0	0
Ca Mau 1&2	697,572	Gas	15.82	39.00	39,000	56,100	0.0561	DO	20.669	10,909	45,674	74,100	0.0741	104,554
Phu My 2.2	4,942,360	Gas	1,383.86	38.56	38,560	56,100	0.0561	-		0	0	0	0	2,993,590
VE DAN	26,742	Gas	229.22	42.80	42,800	56,100	0.0561	FO	0.44	9,665	40,465	77,400	0.0774	551,758
Dam Phu My	18,542	Gas	59.23	42.50	42,500	56,100	0.0561	-			0	0	0	141,217
Gas Turbine powered by oil														
Ba Ria	80,828	DO	25.33	10,300	43,124	74,100	0.0741	-			0	0	0	80,957
Phu My	80,828	DO	64.92	10,895	45,615	74,100	0.0741	-			0	0	0	219,435
Phu My 3	80,828	DO	4.50	10,244	42,890	74,100	0.0741	-			0	0	0	14,317
Phu My 2.2	80,828	DO	0.00	0	0	74,100	0.0741	-			0	0	0	0
CAN THO	80,828	DO	45.10	10,880	45,552	74,100	0.0741	-			0	0	0	152,247
THU DUC	80,828	DO	23.41	10,800	45,217	74,100	0.0741	-			0	0	0	78,438
Tail gas														
Ba Ria	618,330	Tail Gas			0	0	0	-			0	0	0	0
Phu My	5,986,285	Tail Gas			0	0	0	-			0	0	0	0
Phu My 3	1,377,820	Tail Gas			0	0	0	-			0	0	0	0
Nhon Trach	0	Tail Gas			0	0	0	-			0	0	0	0
Ca Mau 1&2	911,012	Tail Gas			0	0	0	-			0	0	0	0
Phu My 2.2	0	Tail Gas			0	0	0	-			0	0	0	0
Oil thermal power plant														
HIEP PHUOC	1,102,498	FO	410	10,196	42,690	77,400	0.0774	DO	0.018	10,150	42,496	74,100	0.0741	1,355,716
CAN THO	128,641	FO	38	10,215	42,768	77,400	0.0774	DO	3.1779	10,880	45,552	74,100	0.0741	136,341
THU DUC	603,270	FO	166	10,300	43,124	77,400	0.0774	DO	0.24	10,800	45,217	74,100	0.0741	554,312
Dissel used FO														
CAI LAN-VINASHIN	104,626	FO	25.12	9,800	41,031	77,400	0.0774	-			0	0	0	79,867
AMATA	0	FO	0.00	9,600	40,193	77,400	0.0774	-			0	0	0	0
Dissel used DO														
NM dien Dong Khoi (Ben Tre)	4,483.00	DO	1.14	10,700	44,799	74,100	0.0741	-			0	0	0	3,794
KM dien Disel Ca Mau	6,820.60	DO	0.18	10,870	45,511	74,100	0.0741	-			0	0	0	600
NM dien Diesel An Giang	1,628.51	DO	0.42	10,305	43,145	74,100	0.0741	-			0	0	0	1,343
Dien luc Dong Thap	272.26	DO	0.08	10,320	43,208	74,100	0.0741	-			0	0	0	248
Dien luc Binh Thuan	7,246.00	DO	1.73	10,150	42,496	74,100	0.0741	-			0	0	0	5,460
Diesel khan	21,549.63	DO	5.60	10,150	42,496	74,100	0.0741	-			0	0	0	17,643
Imported	**2,629,000**	-			0	0	0	-			0	0	0	0

Table 3.3-Simple OM 2008

Name of power plant	Electricity selling national grid (MWh)	Main fuel						Secondary fuel						
		Type of fuel	Amount of consumed fuel	Net calorific value		Emission factor of fuel		Type of fuel	Amount of consumed fuel	Net calorific value		Emission factor of fuel		Amount of emission
			Coal, DO, FO:kt; Gas:mill.m3	Coal,DO,FO:kCal/kg; Gas:MJ/m3	Coal,DO,FO:GJ/kt; Gas:GJ/mill.m3	kgCO2/TJ	tCO2/GJ		Coal,DO,FO:kt; Gas:mill.m3	Coal,DO,FO:kCal/kg; Gas:kCal/m3	Coal,DO,FO:GJ/kt; Gas:GJ/mill.m3	kgCO2/TJ	tCO2/GJ	t CO2
A	B	C	D	E	Coal, DO, FO: F=E*4.1868 Gas:F=E*1000	G	H=G/10^6	I	J	K	L=K*4.1868	M	N=M/10^6	O=D*F*H+J*L*N
Coal power plant														
Pha Lai 1	2,299,120	Coal	1,621	4,788	20,046	98,300	0.0983	FO	7.66	9,800	41,031	77,400	0.0774	3,218,609
Pha Lai 2	3,929,218	Coal	2,081	4,995	20,913	98,300	0.0983	FO	4.05	9,800	41,031	77,400	0.0774	4,290,874
Uong Bi	722,766	Coal	515	5,216	21,838	98,300	0.0983	FO	1.13	10,087	42,231	77,400	0.0774	1,109,945
Uong Bi 2	532,000	Coal	282	4,995	20,913	98,300	0.0983	FO	0.55	10,087	42,231	77,400	0.0774	581,018
Ninh Binh	675,372	Coal	431	5,191	21,734	98,300	0.0983	FO	0.16	10,376	43,442	77,400	0.0774	922,073
Na Duong	627,930	Coal	532	4,034	16,889	98,300	0.0983	FO	0.20	9,923	41,545	77,400	0.0774	883,846
Cao Ngan	708,693	Coal	526	4,980	20,850	98,300	0.0983	FO	0.75	9,800	41,031	77,400	0.0774	1,081,145
Formosa	560,295	OtherBituminousCoal	495	6,579	27,545	94,600	0.0946	FO	0.28	9,808	41,064	77,400	0.0774	1,291,302
Gas Turbine														
Gas Turbine powered by gas														
Ba Ria	1,331,905	Gas	450.37	34.85	34,850	56,100	0.0561	-		0	0	0	0	880,515
Phu My	11,085,997	Gas	3,193.95	36.99	36,991	56,100	0.0561	-		0	0	0	0	6,628,061
		Gas	72.54	38.18	38,184	56,100	0.0561	-		0	0	0	0	155,387
Phu My 3	3,167,237	Gas	883.26	38.59	38,590	56,100	0.0561	-		0	0	0	0	1,912,160
Nhon Trach	544,809	Gas	166.38	40.50	40,500	56,100	0.0561	-		0	0	0	0	378,023
Ca Mau 1&2	2,106,807	Gas	647.24	39.00	39,000	56,100	0.0561	DO	4.417	10,909	45,674	74,100	0.0741	1,431,048
Phu My 2.2	4,141,980	Gas	1,159.75	38.59	38,590	56,100	0.0561	-		0	0	0	0	2,510,751
VE DAN	12,780	Gas	209.48	42.80	42,800	56,100	0.0561	FO	0.79	9,665	40,465	77,400	0.0774	505,453
Dam Phu My	4,716	Gas	56.15	42.50	42,500	56,100	0.0561	-			0	0	0	133,868
Gas Turbine powered by oil														
Ba Ria	34,460	DO	10.64	10,300	43,124	74,100	0.0741	-			0	0	0	34,014
Phu My	34,460	DO	18.69	10,895	45,615	74,100	0.0741	-			0	0	0	63,174
Phu My 3	34,460	DO	0.00	10,246	42,898	74,100	0.0741	-			0	0	0	0
Phu My 2.2	34,460	DO	0.00	0	0	74,100	0.0741	-			0	0	0	0
CAN THO	34,460	DO	19.39	10,890	45,594	74,100	0.0741	-			0	0	0	65,515
THU DUC	34,460	DO	5.62	10,800	45,217	74,100	0.0741	-			0	0	0	18,830
Tail gas														
Ba Ria	658,459	Tail Gas			0	0	0	-			0	0	0	0
Phu My	6,037,037	Tail Gas			0	0	0	-			0	0	0	0
Phu My 3	1,853,448	Tail Gas			0	0	0	-			0	0	0	0
Nhon Trach	0	Tail Gas			0	0	0	-			0	0	0	0
Ca Mau 1&2	2,728,872	Tail Gas			0	0	0	-			0	0	0	0
Phu My 2.2	0	Tail Gas			0	0	0	-			0	0	0	0
Oil thermal power plant														
HIEP PHUOC	877,631	FO	366	10,195	42,685	77,400	0.0774	DO	0.019	10,150	42,496	74,100	0.0741	1,209,684
CAN THO	66,709	FO	20	10,220	42,789	77,400	0.0774	DO	3.7286	10,890	45,594	74,100	0.0741	78,681
THU DUC	537,540	FO	149	10,300	43,124	77,400	0.0774	DO	0.228	10,800	45,217	74,100	0.0741	496,461
Dissel used FO														
CAI LAN-VINASHIN	90,465	FO	22.48	9,800	41,031	77,400	0.0774	-			0	0	0	71,385
AMATA	0	FO	0.00	9,600	40,193	77,400	0.0774	-			0	0	0	0
Dissel used DO														
NM dien Dong Khoi (Ben Tre)	860.00	DO	0.22	10,700	44,799	74,100	0.0741	-			0	0	0	734
KM dien Disel Ca Mau	1,273.50	DO	0.33	10,940	45,804	74,100	0.0741	-			0	0	0	1,118
NM dien Diesel An Giang	252.86	DO	0.07	10,305	43,145	74,100	0.0741	-			0	0	0	224
Dien luc Dong Thap	51.25	DO	0.01	10,320	43,208	74,100	0.0741	-			0	0	0	46
Dien luc Binh Thuan	7,575.00	DO	1.80	10,150	42,496	74,100	0.0741	-			0	0	0	5,675
Diesel khan	4,987.39	DO	1.30	10,150	42,496	74,100	0.0741	-			0	0	0	4,083
Imported	**3,220,000**	-			0	0	0	-			0	0	0	0

CDM – Executive Board

b) Calculation of build margin EF_{BM}

Build Margin CO2 Emission Factor, 2008

Total domestic electricity of Vietnam Grid in 2008	74,689,635.97	MWh
20% of domestic electricity generation of Vietnam Grid in 2008	14,937,927.19	MWh

Build Margin CO2 Emission Factor, 2006-2008

Total electricity supplying to national grid	16,514,761.12	MWh
Total amount of emission	8,362,386.08	tCO2
Emission factor	**0.5064**	**tCO2/MWh**

Table 3.4-Simple BM

Name of power plant	Operate on year	Electricity selling national grid (MWh)	Main fuel						Secondary fuel						
			Type of fuel	Amount of consumed fuel	Net calorific value		Emission factor of fuel		Type of fuel	Amount of consumed fuel	Net calorific value		Emission factor of fuel		Amount of emission
				Coal,DO,FO:kt; Gas:mill.m3	Coal,DO,FO:kCal/kg ; Gas:MJ/m3	Coal,DO,FO:GJ/kt; Gas:GJ/mill.m3	kgCO2/TJ	tCO2/GJ		Coal,DO,FO:kt; Gas:mill.m3	Coal,DO,FO:kCal/kg ; Gas:kCal/m3	Coal,DO,FO:GJ/kt; Gas:GJ/mill.m3	kgCO2/TJ	tCO2/GJ	t CO2
A	B	C	D	E	F	Coal, DO, FO: G=F*4.1868 Gas: G=F*1000	H	I=H/10^6	J	K	L	M=L*4.1868	N	O=N/10^6	P=E*G*I+K*M*O
5 most recently power plants															
A Vuong	2008	168,103.50	Hydropower												
Tuyen Quang	2008	1,136,112.18	Hydropower												
Dai Ninh	2008	1,145,108.50	Hydropower												
Nhon Trach	2008	544,808.60	Gas	166.38	40.50	40,500	56,100	0.0561	–		0	0	0	0	378,023
Ca Mau 1&2	2007	2,106,807.24	Gas	647.24	39.00	39,000	56,100	0.0561	DO	4.417	10,909	45,674	74,100	0.0741	1,431,048
		2,728,872.00	Tail Gas												
Total		**7,829,812.02**													
Most recently power plant capacity additions in the electricity system that comprise 20%															
A Vuong	2008	168,103.50	Hydropower												
SROC Phu Mieng IDICO	2006	241,556.00	Hydropower												
SE SAN 3A	2006	394,895.70	Hydropower												
Tuyen Quang	2008	1,136,112.18	Hydropower												
Dai Ninh	2008	1,145,108.50	Hydropower												
SE SAN 3	2006	1,131,614.00	Hydropower												
Quang Tri	2007	250,804.40	Hydropower												
Uong Bi 2	2007	532,000.00	Coal	281.759	4,995	20,913	98,300	0.0983	FO	0.548	10,087	42,231	77,400	0.0774	581,018
Na Duong	2005	627,930.00	Coal	532	4,034	16,889	98,300	0.0983	FO	0.20	9,923	41,545	77,400	0.0774	883,846
Cao Ngan	2007	708,693.00	Coal	526	4,980	20,850	98,300	0.0983	FO	0.75	9,800	41,031	77,400	0.0774	1,081,145
Formosa	2004	560,295.00	OtherBituminousCoal	495	6,579	27,545	94,600	0.0946	FO	0.28	9,808	41,064	77,400	0.0774	1,291,302
Nhon Trach	2008	544,808.60	Gas	166.38	40.50	40,500	56,100	0.0561	–		0	0	0	0	378,023
Ca Mau 1&2	2007	2,106,807.24	Gas	647.24	39.00	39,000	56,100	0.0561	DO	4.417	10,909	45,674	74,100	0.0741	1,431,048
		2,728,872.00	Tail Gas												
Phu My 2.2	2004	4,141,980.00	Gas	1,159.75	38.59	38,590	56,100	0.0561	–		0	0	0	0	2,510,751
Dam Phu My	2006	4,716.00	Gas	56.15	42.50	42,500	56,100	0.0561	–			0	0	0	133,868
CAI LAN–VINASHIN	2007	90,465.01	FO	22.48	9,800	41,031	77,400	0.0774	–			0	0	0	71,385
Total		**16,514,761.12**													**8,362,386**

c) Calculation of combined margin EF_{CM}

Build margin CO2 emission factor in year 2008	BM	tCO2/MWh	0.5064
Average Operating margin CO2 emission factor (2006,2007,2008)	OM	tCO2/MWh	0.6465
Combined margin CO2 emission factor in year 2008	**CM**	**tCO2/MWh**	**0.5764**

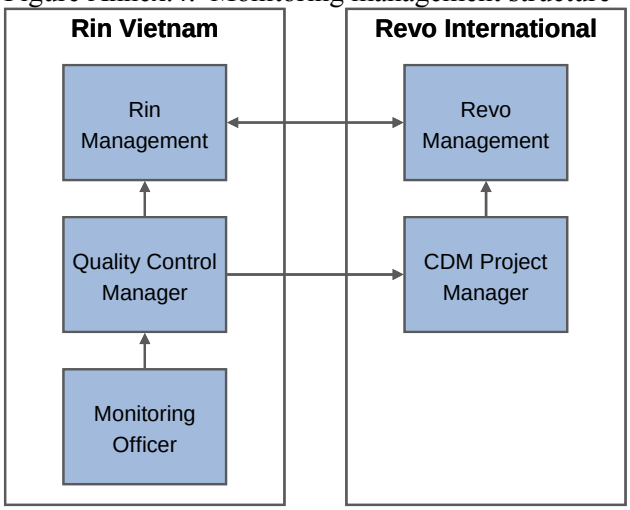
Annex 4

MONITORING INFORMATION

Operational and Management Structure

Rin Vietnam will be responsible for the on-site monitoring and implementation of the quality assurance and quality control procedures. Revo International will be responsible for compiling the CDM monitoring report for submission to the Designated Operation Entity (DOE). The operational and management structure that will be implemented to monitor emission reductions is described in the following diagram.

Figure Annex.4. Monitoring management structure



Monitoring Officer (Rin Vietnam)

Rin Vietnam will designate monitoring officers to fulfill the primary monitoring activities. The monitoring officers will be responsible for maintaining electronic data recorded, keeping copies of purchase records and inputting such data into an electronic database, and producing semi-annual monitoring reports. They will print the monthly data sheets and store it in a secure location as backup. They will also be responsible for reporting to the quality control manager (the plant manager) when any kind of meter malfunction and data fault will be detected.

Quality Control Manager (Rin Vietnam)

Rin Vietnam will designate a Quality Control Officer to administer the monitoring plan and ensure Quality Assurance and Quality Control Procedures are adhered to. The Quality Control Officer will be responsible for integrating the Monitoring Plan into Rin Vietnam's operation and maintenance procedures for the project site. The manager will be responsible for training the Monitoring Officer in the correct procedures and to ensure that they understand the requirements of the monitoring plan.

Prior to operation of the project, the Quality Control Officer will ensure that the meters meet the required accuracy and manufacturing standards. During the project, they will ensure the ongoing maintenance and calibration of the meters. Any meter faults recorded by the Monitoring Officer will be followed up by the Quality Control Officer who will ensure that the meter is repaired/replaced as necessary.

The Quality Control Officer is responsible for compiling the semi-annual report and submitting it to the Revo International CDM Project Manager and Rin Management. They will also participate in a yearly audit in co-ordination with the Revo International CDM project manager to verify the effectiveness of the monitoring plan.

CDM Project Manager (Revo International)
Revo International will designate a CDM Project Manager to oversee the preparation of the project annual Monitoring Report. They will review the monitored data provided semi-annually by the Rin Vietnam Quality Control Officer and write the report for submission to the Designated Operational Entity (DOE). They may also participate in and review the annual audit in co-ordination with the Rin Vietnam Quality Control Officer. Upon completion of the monitoring report they will submit copies to management of Rin Vietnam and Revo International.

Project Participants (Rin Vietnam & Revo International Management)
The project participants will review the monitoring report produced by the Revo International CDM Project Manager and approve it for submission to the DOE. Rin Vietnam Management will be responsible for conducting the annual training and the annual audit of the monitoring plan. The audit report will be submitted to and approved by both project participants.