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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

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Title: Wastewater treatment with Anaerobic Digester at a starch processing plant in Vietnam

Version no. and Date: Version 1, dated 5 March 2007

A.2. Description of the project activity:

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- The project activity involves the installation of an anaerobic digester with biogas extraction capacity for the treatment of organic wastewater treatment of Tapioca starch-processing plant of VIET MA CO., LTD. located in Tay Ninh Province, Vietnam.
- In the project activity, biogas will be captured in the anaerobic digester of the methane fermentation facilities and the captured biogas will be utilised as the fuel of the drying facilities of Tapioca starch-processing plant.
- At an existing plant, open lagoons store wastewater for a long time, and organic substances contained in the wastewater decompose, generating large amounts of methane gases that are emitted into the atmosphere and coal is used as the fuel in the drying facilities.
- By capturing the biogas with the installation of an anaerobic digester and substituting coal with the captured biogases, the amount of CO_2 emissions derived from the emitted methane gases into the atmosphere and combustion of coal as fossil fuels will be significantly reduced.
- In the project activity, total amount of 33,030 tCO_2/year is expected to reduce by avoiding methane gas emissions from the existing open lagoons and by substituting coal with captured biogas.

- VIET MA CO., LTD. is a subsidiary of DAWU RUBBER-TAPIOCA STARCH CORPORATION, which is a holding company, and is capable of producing 120 tons per day of Tapioca starch. VIET MA CO., LTD. currently produces 2,980 to 3,330 tons of Tapioca starch per month, and its production process emits approximately 2,500 m^3/day of wastewater from the plant.

- Regarding the sludge (solid contents) handling process, the project adopts following specific wastewater treating technology for Tapioca starch-processing effluent:
  Sludge that is mixed in the wastewater emitted from the plant will be transported to the anaerobic digester. Most of the sludge will be dissolved in the wastewater and made soluble in the digester and only small trace of the sludge will be flowed into the existing open lagoons together with digester effluent. Therefore, no solid sludge will be produced through the wastewater treatment process of the project activity.

The project activity will contribute to the sustainable development and meets the sustainability criteria of Vietnam as follows.

Contribution to Environmental Sustainability:

- ♦ The project activity will reduce the uncontrolled emissions of methane from the existing open lagoon, and replacing the use of fossil fuels by utilizing the captured biogas for heat generation, thus reducing the GHG emission into the atmosphere and the impact on global warming.
- ♦ The project activity will contribute to reduce the organic substance load flowing into the lagoons, thus improving the quality of treated water and consequently, contributing to improve the water

quality in nearby water areas.
- The project activity will contribute to reduce the generation of offensive odour from the lagoons.

Contribution to Economic Sustainability:
- The project activity will contribute to promote energy saving and will enhance the production efficiency of the plant, producing economic effects.

Contribution to Social Sustainability:
- The project activity will contribute to enable transfer of wastewater treatment technology that uses a digester, which is not generally used in the starch plants in Vietnam.
- The transfer of these technologies will promote wastewater treatment improvement in the future through training and fostering of human resources.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participants (Yes/No)
Japan	TOSHIBA CORPORATION	No
Socialist Republic of Vietnam (host)	DAWU RUBBER – TAPIOCA STARCH CORPORATION	No
	VIET MA CO., LTD	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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Socialist Republic of Vietnam

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

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Tay Ninh Province

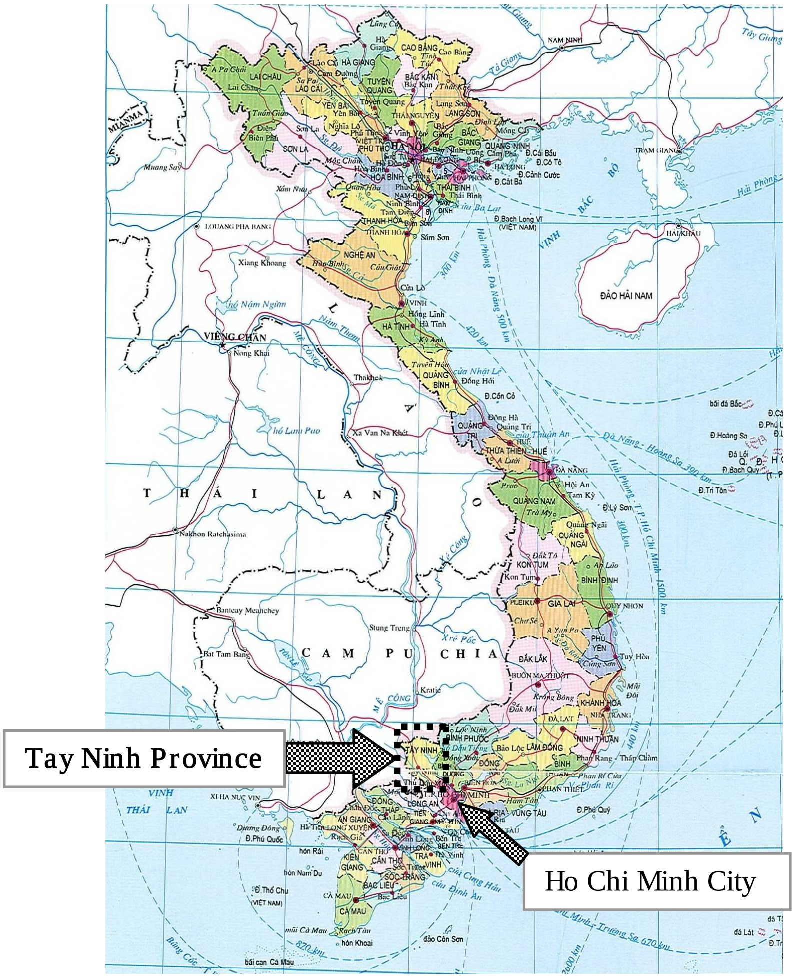

Figure A-1: Location of Tay Ninh Province

A.4.1.3. City/Town/Community etc:

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Tan Chau District, Tan Hiep Village

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

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The project is located at the VIET MA CO., LTD in Tay Ninh Province (Figure A-2)

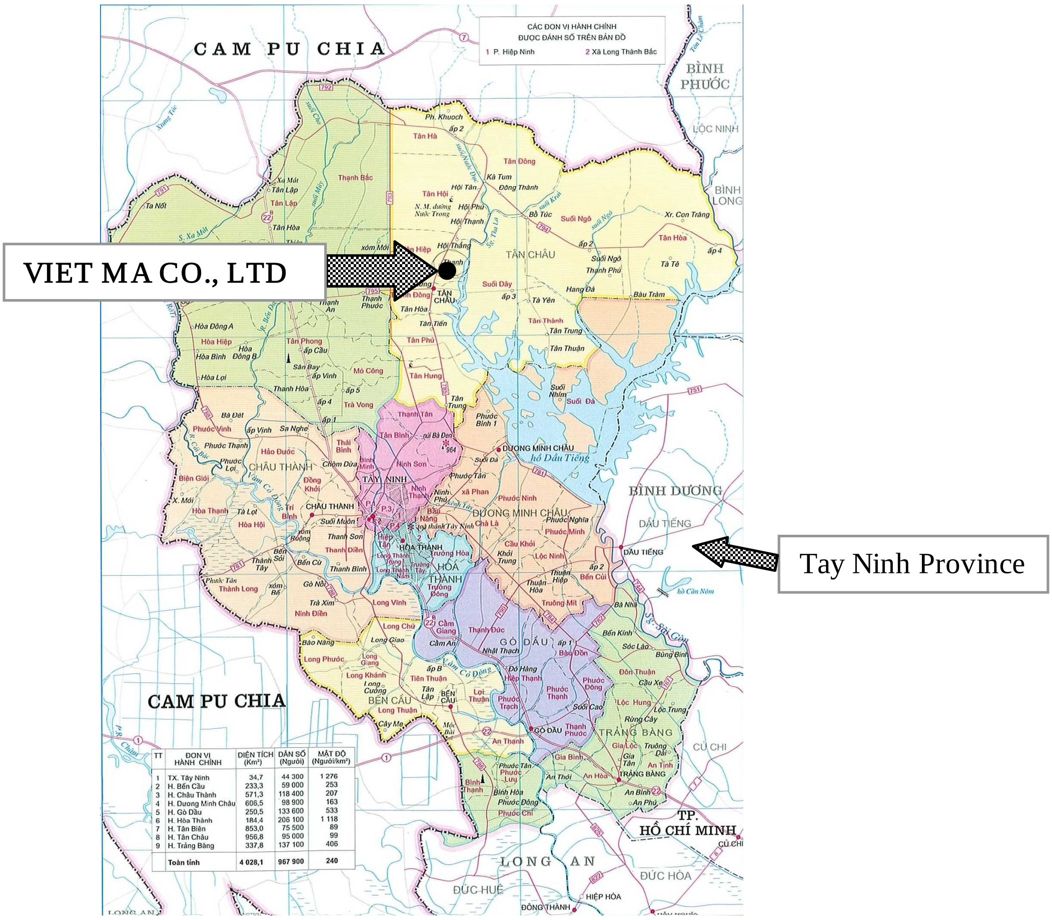

Figure A-2: Location of the Project activity

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

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The category applicable to the project is “Waste handling and disposal”

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

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- The tapioca starch plant at the project implementation site produces tapioca starch from cassava potatoes. (Figure A-3)
- In the tapioca starch production process, wastewater is produced in the skin peeling and washing process and tapioca starch extraction process by centrifugal separation and dewatering. In both processes, wastewater is emitted containing sludge (solid contents) and is flowed into the lagoons through a holding pool.
- Additionally, the separation and filtration process in the plant produces sludge, which is sold as fodder after sundrying. This sludge is produced in a system that is different from the system of wastewater to be treated under this project and is not included in the scope of this project because the amount and quality of this sludge do not differ before and after the implementation of this project.
- The drying process, which is the final process in starch production, uses an air-heating furnace that uses coal to generate hot air.

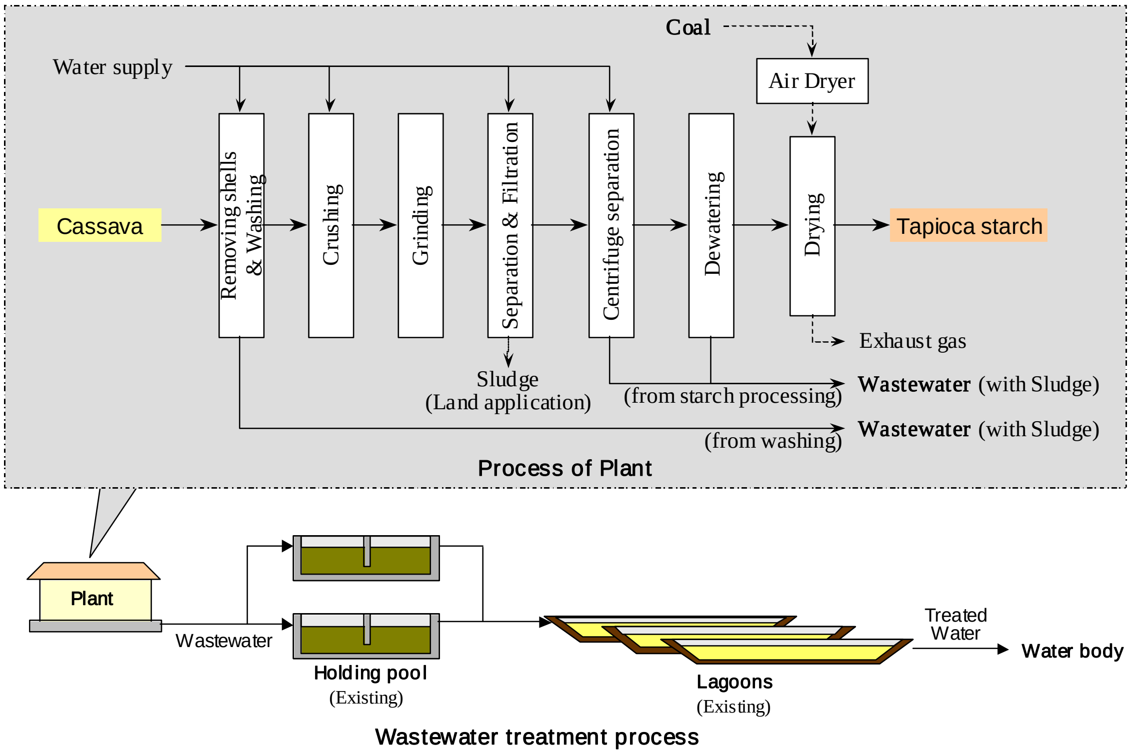

Figure A-3: Process diagram of existing process of Tapioca Starch Plant

- The scope of this project includes additional installation of methane fermentation facilities, gas-refining facilities, and energy utilization facilities in the existing wastewater treatment facilities. (Figure A-4)
- Wastewater emitted by the plant containing sludge will be flowed from the existing holding pool to methane fermentation facilities to be installed in this project.
- Methane will be fermented in the methane fermentation facilities using a digester, in which organic components contained in the wastewater are decomposed under an anaerobic condition, to produce biogases whose main component is methane. The methane fermentation process in the digester will decompose and remove about 80% of organic substances in the wastewater, and the wastewater will flow into the existing lagoons.
- Most of the sludge (solid contents) contained in the wastewater that flows into the digester together with the wastewater will be decomposed and made soluble by the digester. However, sludge made up of solid contents that cannot be decomposed and of part of the microorganisms related to methane fermentation will be flowed into the existing lagoons together with effluent from the digester.
- Biogases produced in the methane fermentation facilities will be fed to the gas-refining facilities, which will remove impurities such as hydrogen sulfide contained in biogases. By removing impurities, the operational safety of the equipment when biogases are used as energy will be enhanced, enabling sound operation of the project facilities for a long time.
- Part of the biogases produced in the gas-refining facilities will be fed to the boiler and will be consumed as a heat source for heating the digester.
- The remaining biogases will be used as a fuel of the drying facilities used in the starch production process, substituting coal that has been used in the drying facilities.

- In principle, all biogases that will be generated and recovered in the methane fermentation facilities will be used in the boiler and drying facilities. When these gas utilization facilities are not run and excessive biogases are generated, these gases will be burnt in the flaring system.

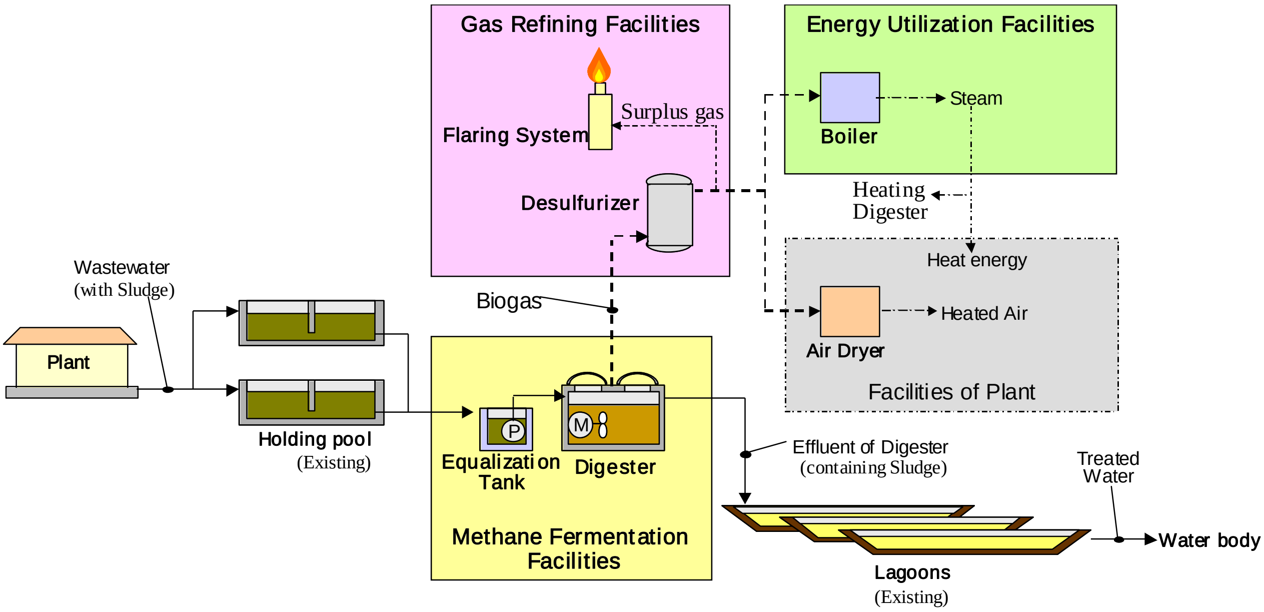

Figure A-4: Process diagram of the Project wastewater treatment system

- This project will use a digester that can receive, decompose, and remove wastewater that contains solid contents for the methane fermentation of wastewater.
- The digester to be employed in this project will have high operation stability, featuring ease of operation and management. Thus, local workers who do not have the technology for or knowledge of operation of methane fermentation facilities in the past will be able to continue stable operation. The specifications of the digester are presented below.

Type of Digester	Fully Mixed, Mesophilic fermentation
Active Volume of Digester	40,000 m^3
Retention time	Approx. 15- 20days
Target Removal Efficiency for COD	80% COD removal
Target Removal Efficiency for SS	50% SS removal
Feed / Draw	Top Feed / Top Draw
Mixing equipment	Submersible Mixer

- The gas-refining facilities will refine using microorganisms. Unlike other systems that use desulfurizing catalysts or chemicals, the facilities will not require consumable parts or supplies that will need periodic supply and replacement, except for a small amount of the electric power consumed by the pump and other equipment. The running cost of the facilities will be low, and a contribution will be made to the sustainable development of rural regions of Viet Nam, which are faced with issues such as availability of chemicals and other materials, transportation problems, and economic problems.

- Sludge (solid contents) that is emitted from the plant and mixed in the wastewater will be transported to the digester together with the wastewater. Part of the sludge will be dissolved and made soluble in the digester and will be flowed into the lagoons together with digester effluent.
- The wastewater treatment facilities of this project will not have a process to separate sludge from wastewater and to dewater it, thus producing no additional sludge in the wastewater treatment process.

Figure A-5: Photograph of existing anaerobic lagoon at VIET MA CO., LTD

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

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This project will reduce GHGs by 33,030 tCO_2/year every year, and the total acquired CERs during the crediting period of 14 years will be 462,420 tCO_2.

Years	Annual estimation of emission reductions in tonnes of tCO_2e
2009	33,030
2010	33,030
2011	33,030
2012	33,030
2013	33,030
2014	33,030
2015	33,030
2016	33,030
2017	33,030
2018	33,030
2019	33,030
2020	33,030
2021	33,030
2022	33,030
Total estimated reductions (tCO_2e)	462,420
Total number of crediting years	14 years
Annual average over the crediting period of estimated reductions (tCO_2e)	33,030

A.4.5. Public funding of the project activity:

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Neither public funding nor official development assistance will be utilized to finance the Project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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Avoided methane emissions from organic wastewater treatment (AM0013 Version 04)

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

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This CDM project meets the selected methodology requirements as follows.

Comparison of Requirements and this CDM Project

Requirement		This CDM Project
1	The project must be a methane avoidance project activity involving an organic wastewater treatment plants with the following applicability conditions:	YES
2	The existing waste water treatment system is an open lagoon system with an 'active' anaerobic condition, which is characterized as follows:	YES. Almost all lagoons in Tay Ninh Province, Viet Nam, are open lagoons.
	● The depth of the open lagoon system is at least 1 m;	YES. The existing open lagoons are more than 1 m deep.
	● The temperature of the anaerobic lagoons is higher than 10°C. If monthly average temperature in a particular month is less than 10 $_{o}$C, this month is not included in the estimations, as it is assumed that no anaerobic activity occurs below such temperature.	YES. Tay Ninh Province is located in the southern part of Viet Nam where the average monthly temperature is 25°C to 30°C throughout the year.
	● The residence time of the organic matter should be at least 30 days.	YES. There are three large lagoons, and the residence time is more than 30 days.
3	Sludge produced during project activity is not be stored onsite before land application to avoid any possible methane emissions from anaerobic degradation.	As shown in Figure B-1, sludge will not be produced within the scope of project activity.

Recovered methane will be used as a heat supply.

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

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The project boundary of this CDM project is shown in Figure B-1 and Table B-2.

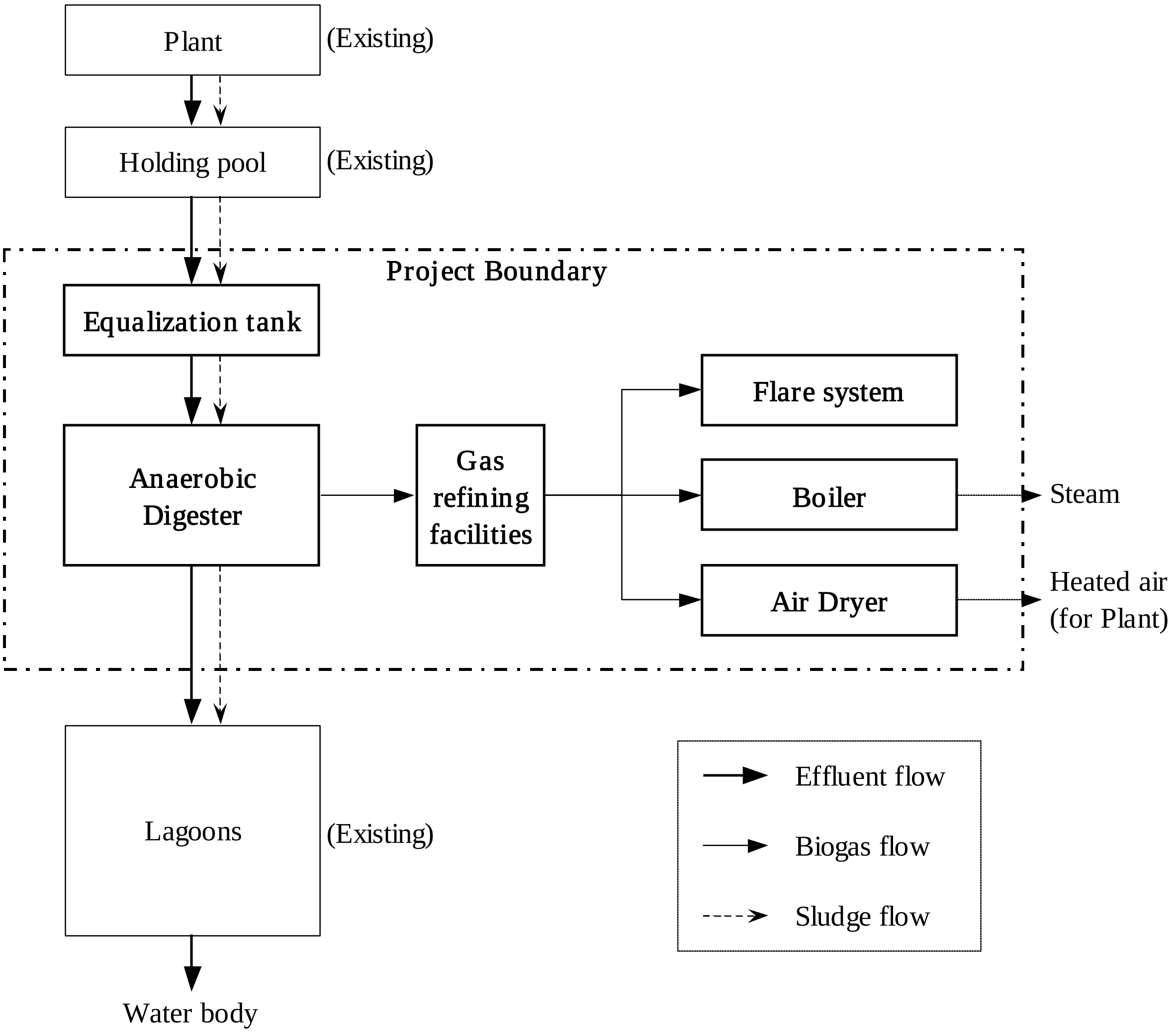

Figure B-1: Project Boundary

- Wastewater emitted from the plant will contain sludge (solid contents). However, sludge will be flowed into the lagoon together with the wastewater through an anaerobic digester.
- The wastewater treatment facilities of this project will not include a process for separating sludge from wastewater or for dewatering it. Sludge will not be produced from the wastewater treatment process of this project.

Table B-2: Project Boundary

	Source	Gas	Scope	Justification / Explanation
Baseline	Direct emissions from the waste treatment processes.	CH_4	Included	The major source of emissions in the baseline
		N_2O	Excluded	Excluded for simplification. This is conservative.
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted.
	Emissions from electricity consumption /generation	CO_2	Excluded	The baseline will not consume or generate electricity.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Emissions from thermal Energy generation	CO_2	Included	If thermal energy generation is included in the project activity
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel consumption due to the project activity	CO_2	Included	May be an important emission source
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from on-site electricity use	CO_2	Included	Power consumption is by pumps and other auxiliary equipment.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Direct emissions from the waste treatment processes.	N_2O	Excluded	Excluded for simplification. Not and important emission source.
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted.
		CH_4	Included	Sludge will not be generated, and the only emissions will be leakage from the digester.

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

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The baseline scenario was identified based on the flow diagram in Fig. B-2 in accordance with Option A, which is the method of identifying baselines for organic wastewater treatment in this methodology. As shown by the arrows in the diagram, the identification has shown that the baseline scenario is open lagoons. The feasibility of an alternative scheme for sludge treatment was studied based on STEP 1 to STEP 4 of this methodology, and it was identified that sludge treatment would be open lagoons.

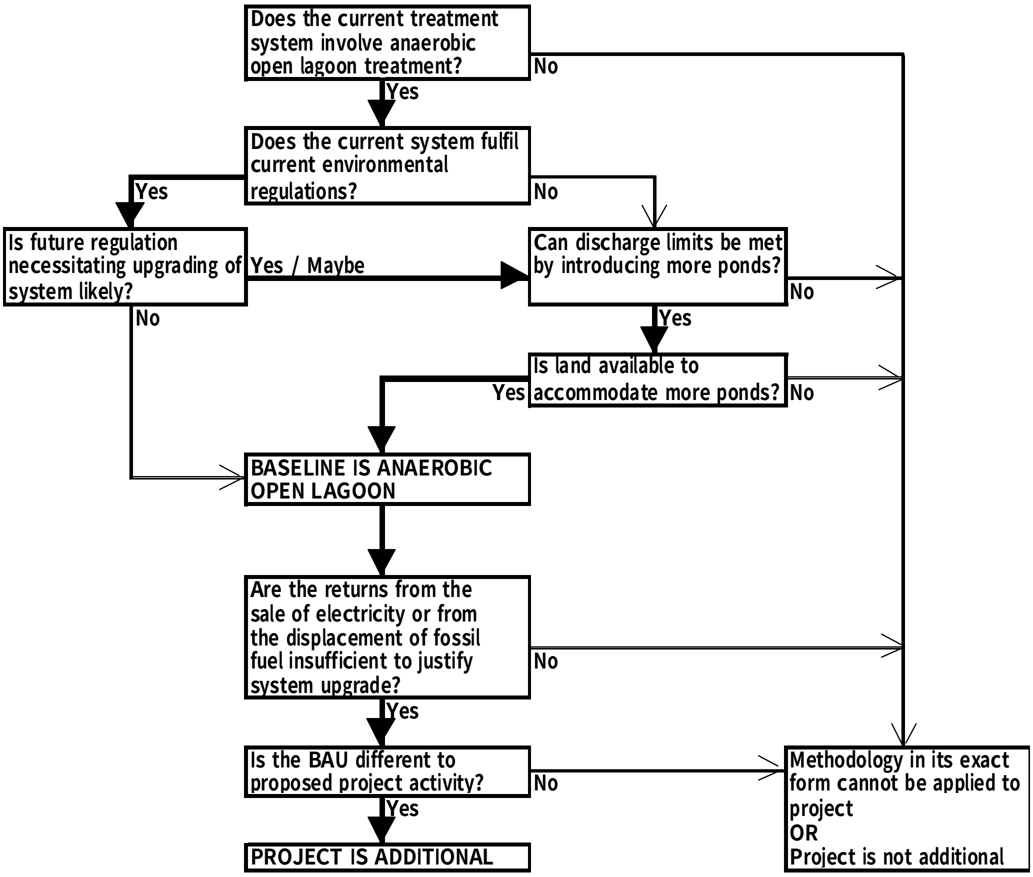

Figure B-2: Flow diagram of Option A

- Are the existing wastewater treatment facilities anaerobic open lagoons? → Yes
- Can the existing wastewater treatment facilities meet legal regulation? → Yes
- Will stricter legal regulation be possible in the future? → Yes/Maybe
- Will it be possible to add more ponds? → Yes

Accordingly, the baseline will be anaerobic open lagoons.

- Identification of sludge treatment (STEP 1 to STEP 4)
  Alternative schemes for sludge treatment were extracted based on STEP 1, and the alternative schemes were studied in accordance with STEP 2 to STEP 4. The results showed that the baseline for sludge treatment would be the open lagoon system as mentioned below.

  - Sludge (or wastewater) is brought to sludge pits (or deep open lagoons) (BAU).
    In the existing system, sludge is emitted to the open lagoons together with wastewater. Therefore the sludge is not separated and brought to the pit. The separation process of the sludge is not the realistic and credible alternative for the treatment of Tapioca starch-processing effluent.
    The existing open lagoon system is a BAU scenario for those plants.

  - Methane recovery and flaring.
    The additional investment in facilities is required for methane recovery and flaring. The existing coal-fired boilers will be used for the generation of steam by biogas combustion. This scenario is not feasible in financial aspects due to additional investment for new facilities for digester and related equipments. .

  - Methane recovery and utilisation for electricity or heat generation
    The additional investment in facilities is required for power and heat generation using methane gas. This scenario is not feasible in financial aspects due to additional investment for new facilities.

  The following treatment methods, which are listed in the approved methodology AM0013 Version 04, are deemed to be unrealistic, because sludge separation process is not the common technology for the treatment of Tapioca starch-processing effluent:
  - Landfilling
  - Mineralization
  - Aerobic composting
  - Composting
  - Land application of the sludge (effluent)

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

The additionality of the project activity was verified as follows.

- Legal barriers
  Legal regulation for plant facilities is enforced at present with the existing wastewater treatment facilities of tapioca plants. The most recent regulation value of Viet Nam set in 2005 is 80 mg/L or less for COD (when flowed into rivers)[1]. The site to be used for the project is wide, and the legal regulation can be met by additionally installing lagoons. Even at present, wastewater is treated over ample time in the lagoons. The law has just been made stricter, and there are no moves to make the regulation tighter for the moment.

[1] TCVN5945-2005: Industrial Wastewater – Discharge standards

- Investment barriers

  The investments needed for throughput and upgrading (project implementation) to be used in calculations of IRR for the tapioca starch-processing plant in this project are shown in the following table. The IRR to be cleared in business is 6.875% (10-year Viet Nam government bonds, coupons (yield)) and at US$1 = VND16,050 (as of Jan. 5 2007).

Parameter	Value
Capital cost inclusive of: Engineering, procurement & construction	43.0 billion VND
Operation & maintenance cost inclusive of: Labour, administration, repair, fuel and power cost	1,131 million VND/year
Revenue from internal biogas sales	5,325 million VND/year
CER price	0, 5, 10, 15 US$/t$CO_2$

Based on the foregoing data, IRR with and without CER was calculated. In the calculations, the CER trading price was set at US$5/tCER to US$15/tCER, and evaluation was made taking fluctuations of the trading price into consideration.

With/without CER	Without	With		
		CER trading price		
		5US$	10US$	15US$
IRR(%)	3.0	9.3	14.3	18.6

* IRR is a value in Year 14 of the project.

The calculations confirmed that IRR would be small without CER, that the project would be without BAU, and that the investment would accrue an advantage through CER.

- Feasibility of alternative scheme

  The feasibility of using other wastewater treatment facilities was analyzed. Approximately 90 tapioca starch plants are located in Tay Ninh Province, which has the largest cassava farming area in Viet Nam, namely, 35,000 to 40,000 ha, and all of them treat their wastewater using lagoons. This indicates that facilities that are alternative to this project such as UASB are difficult to install.

  The foregoing analysis indicates that "this project is additional."

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Calculations of baseline emissions, project emissions, leakage, and emission reductions related to this project are calculated in accordance with Approved Methodology AM0013/Ver. 04 as follows.

Baseline Emissions

Baseline emissions are the CH_4 emissions from open lagoon wastewater treatment systems, the CO_2 emissions associated with grid electricity generation that is displaced by the project, and the CO_2 emissions associated with fossil fuel combustion in the industrial process heating equipment.

(i) Lagoon baseline emissions
The baseline emissions from the lagoon are estimated based on the chemical oxygen demand (COD) of the effluent that would enter the lagoon in the absence of the project activity, the maximum methane producing capacity (Bo) and a methane conversion factor (MCF) that expresses what proportion of the effluent would be anaerobically digested in the open lagoons.

These CH_4 emissions from wastewater should be calculated according to the IPCC Guidelines as follows:

$$\underset{(kg/yr)}{CH_4 \text{ emissions}} = \underset{(kg\ COD/month)}{\text{Total } COD_{available,m}} \times \underset{(kg\ CH_4/kg\ COD)}{Bo} \times MCF_{baseline}$$

where:

$COD_{available,m}$	Is the monthly Chemical Oxygen Demand available for conversion which is equal to the monthly COD entering the digester or directed to land application $COD_{baseline,m}$ plus COD carried on from the previous month.
$COD_{baseline,m}$	Is the monthly Chemical Oxygen Demand of effluent entering lagoons or directed to land application (measured)
Bo	Is the maximum methane producing capacity
$MCF_{baseline}$	Is the monthly methane conversion factor (fraction)

$COD_{baseline,m}$ is to be directly measured by the project as the baseline activity level since the effluent that goes into the lagoon in the baseline situation is the same as the one that goes into the digester or to land application treatment in the project situation. $COD_{baseline,m}$ is calculated as the product of $COD_{c,baseline}$ concentration (kg COD/m^3) in the wastewater input to the digester or directed to land application and the flow rate F_{dig} (m^3/month)

In case there is an effluent from the lagoons in the baseline, $COD_{baseline}$ values should be adjusted by multiplying $COD_{baseline}$ by the following factor AD:

$$AD = 1 - \left(\frac{COD_{a,out}}{COD_{a,in}} \right)$$

where:
$COD_{a,out}$ is the COD that leaves the lagoon with the effluent
$COD_{a,in}$ is the COD that enters the lagoon

COD_{out} and COD_{in} should be based on one year historical data

The amount of organic matter available for conversion to methane $COD_{available,m}$ is assumed to be equal to the amount of organic matter produced during the month ($COD_{baseline,m}$ input to the digesters or to the land application treatment) plus the organic matter that may remain in the system from previous months.

The amount of organic matter consumed during the month is equal to the amount available for conversion $COD_{available,m}$ multiplied by $MCF_{monthly}$.

The amount of organic matter carried over from one month to the next equals to the amount available for conversion minus the amount consumed and minus the amount removed from the sludge pit. In the case of the emptying of the sludge pit, the accumulation of organic matter restarts with the next inflow.

Carry on calculations are limited to a maximum of one year. In case the residence time is less than one year carry-on calculations are limited to this period where the sludge resides in the lagoon. Project participants should provide evidence of the residence time of the organic matter in the lagoon.

The default IPCC value for Bo, the maximum amount of CH_4 that can be produced from a given quantity of wastewater, is 0.25 kg CH_4/kg COD. Taking into account the uncertainty of this estimate, project participants should use a value of 0.21 kg CH_4/kg COD [3] as a conservative assumption for Bo.

$MCF_{baseline,m}$ is estimated as the product of the fraction of anaerobic degradation due to depth (f_d) and the fraction of anaerobic degradation due to temperature (f_t):

$$MCF_{baseline,m} = f_d \times f_{t,monthly} \times 0.89$$

Where:
f_d is the fraction of anaerobic degradation due to depth as per table 1
f_t is the fraction of anaerobic degradation due to temperature
0.89 is an uncertainty conservativeness factor (for an uncertainty range of 30% to 50%) to account for the fact that the equation used to estimate $f_{t,monthly}$ assumes full anerobic degradation at 30℃.

Table 1 default values of fraction due to depth (f_d)

	Deep > 5m	Medium depth 1-5 m	Small depth <1m
Fraction of degradation under anaerobic conditions due to depth of sludge pit	70%	50%	0

is calculated as follows:

$$f_{t,monthly} = \exp\left[\frac{E * (T_2 - T_1)}{R * T_1 * T_2}\right]$$

Where:

$f_{t,monthly}$	anaerobic degradation factor due to temperature.
E	Activation energy constant (15,175 cal/mol).
T_2	Ambient temperature (Kelvin) for the climate.
T_1	303.16 (273.16° + 30°).
R	Ideal gas constant (1.987 cal/ K mol).

The factor '$f_{t,monthly}$' represents the proportion of organic matter that are biologically available for conversion to methane based upon the temperature of the system. The assumed temperature is equal to the ambient temperature. The value of ft to be used cannot exceed unity.

Monthly values for $f_{t,monthly}$ is calculated as follows:

(1) The monthly average temperature for the area is obtained from published national weather service information .

(2) Monthly temperatures are used to calculate a monthly van't Hoff – Arrhenius '$f_{t,monthly}$' factor above. A minimum temperature of 10 °C is used. Months were the average temperature is less than 10 °C, $f_{t,monthly} = 0$. The value of $f_{t,monthly}$ to be used cannot exceed unity.

It is the possible to calculate the MCF both monthly and annual.
Annual MCF can be estimated from the following equation:

$$MCF_{annual} = \frac{\sum_{m=1}^{12} CH_{4,m}}{Bo * \sum_{m=1}^{12} COD_{baseline,m}}$$

$$CH_4 = Bo \times COD_{available,m} \times MCF_{monthly}$$

Where:

$CH_{4,m}$	estimated monthly methane production
Bo	is the maximum methane producing potential of organic waste
$COD_{baseline,m}$	monthly COD entering the digester or directed to land application.
$COD_{available,m}$	Monthly COD available for conversion (monthly COD entering the digester or directed to land application plus COD carried on from the previous month)
$MCF_{monthly}$	Monthly conversion efficiency of organic matter to CH_4 .

The total baseline CH_4 emissions are translated into CO_2 equivalent emissions by multiplying by its global warming potential (GWP) of 21.

(ii) Electricity (or thermal energy) baseline emissions

$$BE_{elec/heat} = EG_y \times CEF_{Bl,elec,,y} + EG_{d,y} \times CEF_{grid} + HG_{Bl,y} \times CEF_{Bl,therm,y}$$

where,

EG_y	is the amount of electricity in the year y that would be consumed at the project site in the absence of the project activity (MWh).
$CEF_{Bl,, elec,y}$	is the CO_2 emission factor for electricity consumed at the project site in the absence of the project activity (tCO_2/MWh)
$EG_{d,y}$	is the amount of electricity generated utilizing the biogas collected during project activity and exported to the grid during the year y (MWh)
CEF_{grid}	is the CO_2 emission factor for the grid where electricity is exported (tCO_2/MWh)
$HG_{Bl,y}$	is the quantity of thermal energy that would be consumed in year y at the project site in the absence of the project activity (MJ) using fossil fuel.
$CEF_{Bl, therm}$	is the CO_2 emissions intensity for thermal energy generation (tCO_2 e/MJ)

Note: Project proponents need to estimate electricity component only if the captured methane is used for generation of electricity, which is atleast as much as the project requirement,and the Project participants wish to claim emissions reduction due to the same. Similarly if the Heat in project case is completely met by biogas and project participants do not wish to claim the credits, the CO_2 emission from heat can be ignored.

Determination of $CEF_{Bl,elec}$:

- In cases where electricity would in the absence of the project activity be generated in an on-site fossil fuel fired power plant, project participants should use for $CEF_{Bl,elec}$, the default emission factor for a diesel generator with a capacity of more than 200 kW for small-scale project activities (0.8 tCO_2/MWh, see AMS 1.D.1 in the simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories).

- In cases where electricity would in the absence of the project activity be purchased from the grid, the emission factor $CEF_{Bl,elec}$ should be calculated according to methodology ACM0002 ("Consolidated baseline methodology for grid-connected electricity generation from renewable sources"). If electricity consumption is less than small scale threshold (15 GWh/yr), AMS. 1.D.1 may be used.

In this project, the electricity generation unit requirement in Viet Nam is calculated according to Category I.D. Renewable electricity generation for a grid, which is a methodology for small-scale CDM projects.

Determination of CEF_{grid}:

- CEF_{grid} should be calculated according to methodology ACM0002 ("Consolidated baseline methodology for grid-connected electricity generation from renewable sources").

Determination of $CEF_{Bl,therm}$: The emission factor is estimated as product of (i) CO_2 emission factor for fuel used (tCO_2/MJ), and (ii) oxidation factor for the thermal device.

Baseline electricity and thermal energy consumptions should be estimated as the average of the historical 3 years consumption.

Project Emissions

The physical delineation of the project is defined as the plant site. Project emissions mainly consist of methane emissions from the lagoons, physical leakage from the digester system, stack emissions from flaring and energy generating equipment, emissions related with the consumption of electricity in the digester auxiliary equipment, emissions from land application of sludge, and emissions from wastewater removed in the dewatering process.

(i) Methane emissions from lagoons

After the majority of the COD is treated and reduced by anaerobic digestion, the effluent will pass through the ponds prior to release. A significant majority of the COD load will have been reduced by anaerobic digestion and the ponds are expected to operate under largely aerobic conditions. The MCF value for fully aerobic systems is 0, as no methane is produced.

However, due to the uncertainty regarding the exact extent of aerobic/anaerobic digestion after project implementation, the calculation of these CH_4 emissions is conservatively carried out in the same way as for the baseline, using the same values for Bo and the methane conversion factor (MCF):

CH_4 emissions from the lagoons (kg/yr)	=	Total COD_{dig_out} (kg COD/yr)	x	Bo (kg CH_4/kg COD)	x	MCF_{dig_out}

Where:

COD_{dig_out}	Is Chemical Oxygen Demand of effluent entering lagoons (measured)
Bo	Is maximum methane producing capacity
MCF_{dig_out}	Is methane conversion factor (fraction) estimated as described in the baseline section above

The CH_4 emissions are translated into CO_2 equivalent emissions by multiplying by its global warming potential (GWP) of 21.

(ii) Physical Leakage from biodigesters

The emissions directly associated with the digesters involve the physical leakage from the digester system. IPCC guidelines specify physical leakage from anaerobic digesters as being 15% of total biogas production. Where project participants use lower values for percentage of physical leakage, they should provide measurements proving that this lower value is appropriate for the project.

(iii) Stack emissions from the flare or energy generation

Methane may be released as a result of incomplete combustion either in the flaring option or in case of biogas use for electricity and/or heat production.

To calculate project emissions from flaring of a residual gas stream containing methane ($PE_{flare,y}$) the "Tool to determine project emissions from flaring gases containing Methane" should be used.

These emissions are estimated by monitoring the:

(i) The amount of biogas collected in the outlet of the Biodigester using a continuous flow meter, CH_{4bio}.
(ii) Percentage of biogas that is methane (P_{CH4})[4], which should be measured either with continuous analyzer or alternatively with periodical measurement at 95% confidence level using calibrated portable gas meters and taking a statistically valid number of samples.
(iii) parameters related for flare efficiency and projects emissions due to flaring as per the monitoring requirements in the "Tool to determine project emissions from flaring gases containing Methane"

(iv) Emissions from heat use and electricity use due to the project activity (PEelec/heat):

$PE_{elec/heat} = El_y \times CEF_d + HG_{Pr,y} \times CEF_{Pr,therm,y}$

where,

$EL_{P,y}$	is the amount of electricity in the year y that is consumed at the project site for the project activity (MWh).
CEF_d	is the CO_2 emissions factor for electricity consumed at the project site during the project activity (tCO_2/MWh), estimated as described below. Factor is zero if biogas is used to produce electricity.
$HG_{Pr,y}$	is the quantity of thermal energy consumed in year y at the project site due to the project activity (MJ).
$CEF_{Pr, therm,y}$	is the CO_2 emissions intensity for thermal energy generation (tCO_2e/MJ), estimated as per method described for baseline thermal energy use. Factor is zero if biogas is used for generating thermal energy.

Determination of CEF_d: Where the project activity involves electricity generation from biogas, CEF_d should be chosen as follows:

- In case the generated electricity on-site fossil fuel fired power plant, the default emission factor for a diesel generator with a capacity of more than 200 kW for small-scale project activities (0.8 tCO_2/MWh, see AMS 1.D.1 in the simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories).
- In case the generated electricity is sourced the grid in the baseline, CEF_d should be calculated according to methodology ACM0002 ("Consolidated baseline methodology for grid-connected electricity generation from renewable sources"). If electricity consumption is less than small scale threshold (15 GWh/year), AMS. 1.D.1 may be used.

In this project, the electricity generation unit requirement in Viet Nam is calculated according to Category I.D. Renewable electricity generation for a grid, which is a methodology for small-scale CDM projects.

(v) Emissions from land application of sludge

Regarding the sludge (solid contents) handling process, the project adopts following specific wastewater treating technology for Tapioca starch-processing effluent:
Sludge that is mixed in the wastewater emitted from the plant will be transported to the anaerobic digester. Most of the sludge will be dissolved in the wastewater and made soluble in the digester and only small trace of the sludge will be flowed into the existing open lagoons together with digester

effluent. Therefore, no solid sludge will be produced through the wastewater treatment process of the project activity.

(vi) Emissions from wastewater removed in the dewatering process
As described in the item **(v) Emissions from land application of sludge,** the dewatering process is not needed to install for the project. Therefore, no emissions from wastewater removed in the dewatering process will be produced through the wastewater treatment process of the project activity.

Leakage

No leakage is associated with the project activity.

Emission Reductions

Emission reductions are calculated as the difference between baseline and project emissions, taking into account any adjustments for leakage.

The calculation based on ex ante information is the following:

Baseline emissions (tCO_2/yr)	=	Baseline emissions from open lagoons (t CO_2e/yr)	+	Baseline emissions from grid electricity generation (tCO_2/yr)	+	Baseline emissions from the portion of fossil fuel displaced by biogas used in heating equipment (tCO_2/yr)
Emission reductions (tCO_2/yr)	=	Baseline emissions (tCO_2e/yr)	-	Leakage (t CO_2e/yr)	-	Project emissions (t CO_2e/yr)

The ex-ante estimate of methane emissions reductions is the difference between "Baseline emissions from open lagoons" and "Project emission" (=$ER\_CH_{4exante}$).

Ex-post monitoring of the actual amount of CH_4 captured and fed to the flare or fed to the electricity generator and/or to the heating equipment leads to an ex-post estimate of methane emissions reductions (= $ER\_CH_{4expost}$). The value of the actual methane captured and flared should be calculated as the difference of the value of the actual methane captured and fed to the flare less the value of the project emissions from flaring of a residual gas stream containing methane ($PE_{flare,y}$). PE_{flare} is estimated using the "Tool to determine project emissions from flaring gases containing Methane".

The ex-ante baseline and project methane emissions and to be reported in the CDM-PDD are based on estimation equations defined earlier. Whereas, for the purpose of claiming emissions reductions, the lower of the two shall be assumed as the baseline emissions:
(i) baseline methane emissions less the physical leakage
(ii) the actual methane captured and flared/used for energy generation

If (ii) above is the baseline emissions then physical leakage from anaerobic digester for estimating emissions reduction shall be taken as zero.

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

Data / Parameter:	**$COD_{c, baseline\_p}$**
Data unit:	kgCOD/m^3
Description:	COD concentration in wastewater from starch processing
Source of data used:	Measurement by project participants
Value applied:	16.682 kgCOD/m^3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Analysis by sampling
Any comment:	-

Data / Parameter:	**F_{dig_p}**
Data unit:	m^3/day
Description:	Flow rate of wastewater from starch processing
Source of data used:	Plant owner
Value applied:	2079.252 m^3/day
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated based on operating data
Any comment:	-

Data / Parameter:	**$COD_{c, baseline\_w}$**
Data unit:	kgCOD/m^3
Description:	COD concentration in wastewater from washing
Source of data used:	Measurement by project participants
Value applied:	7.520 kgCOD/m^3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Analysis by sampling
Any comment:	-

Data / Parameter:	**F_{dig_w}**
Data unit:	m^3/day
Description:	Flow rate of wastewater from washing
Source of data used:	Plant owner
Value applied:	456.173 m^3/day
Justification of the choice of data or	Calculated based on operating data

description of measurement methods and procedures actually applied :	
Any comment:	-

Data / Parameter:	$COD_{c,a,out}$
Data unit:	$kgCOD/m^3$
Description:	COD concentration in the effluent that leaves the lagoon
Source of data used:	Discharge standard
Value applied:	0.08 $kgCOD/m^3$
Justification of the choice of data or description of measurement methods and procedures actually applied :	Reference to concerned official regulation TCVN5945-2005 (Industrial Wastewater- Discharge standards)
Any comment:	-

Data / Parameter:	$COD_{carry\ on}$
Data unit:	kgCOD/month
Description:	COD carried over from one month to the next
Source of data used:	Assumed
Value applied:	0 kgCOD/month
Justification of the choice of data or description of measurement methods and procedures actually applied :	Estimated as a conservative assumption
Any comment:	-

Data / Parameter:	f_d
Data unit:	-
Description:	The fraction of anaerobic degradation due to depth
Source of data used:	Measured by project participants
Value applied:	0.7
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value recommended in AM0013 Ver.04 based on the measurement by project participants
Any comment:	Depth of lagoon: approx. 5.5m

Data / Parameter:	T_2
Data unit:	deg C
Description:	Ambient temperature for the climate

Source of data used:	Published information
Value applied:	25.2 to 28.9 deg C
Justification of the choice of data or description of measurement methods and procedures actually applied :	Reference to the Environmental Impact Assessment Report (2007) of VIET MA CO., LTD
Any comment:	-

Data / Parameter:	COD removal efficiency of digester
Data unit:	-
Description:	COD removal efficiency of digester
Source of data used:	Designed value
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	Provided from plant engineer based on past experience
Any comment:	-

Data / Parameter:	Bo_{dig}
Data unit:	kg CH_4/kg COD
Description:	The maximum methane producing potential of Digester
Source of data used:	IPCC
Value applied:	0.25 kg CH_4/kg COD
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default IPCC value
Any comment:	-

Data / Parameter:	MCF_{dig}
Data unit:	-
Description:	The methane conversion factor of Digester
Source of data used:	Designed value
Value applied:	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Digester applied in this project is consisted of closed tank with temperature control system and mixing equipments.
Any comment:	-

Data / Parameter:	**$HG_{Pr,y}$**
Data unit:	MJ/yr
Description:	The quantity of thermal energy consumed in year y at the project site due to the project activity
Source of data used:	Designed value
Value applied:	36,253,477 MJ/yr
Justification of the choice of data or description of measurement methods and procedures actually applied :	Provided from plant engineer
Any comment:	-

Data / Parameter:	**CEF_{coal}**
Data unit:	tC/TJ
Description:	Carbon emission factor of coal
Source of data used:	IPCC
Value applied:	27.6 tC/TJ
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default IPCC value Reference to Revised 1996 IPCC Guideline for National Greenhouse Gas Inventories
Any comment:	-

Data / Parameter:	**Fraction of C oxidised**
Data unit:	-
Description:	Fraction of C oxidised
Source of data used:	IPCC
Value applied:	0.98
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default IPCC value Reference to Revised 1996 IPCC Guideline for National Greenhouse Gas Inventories
Any comment:	-

Data / Parameter:	**EL_y**
Data unit:	MWh/yr
Description:	The amount of electricity in the year y that is consumed at the project site for the project activity
Source of data used:	Designed value
Value applied:	603.38 MWh/yr
Justification of the	Provided from plant engineer

choice of data or description of measurement methods and procedures actually applied :	
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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Baseline Emissions

The ex-ante calculations of the baseline emissions are shown as follows.

(i) Lagoon baseline emissions

Lagoon baseline emissions are calculated using the formula shown in Section B.6.1.

CH_4 emissions (kgCH_4/yr) = Total $COD_{available, m}$ (kg COD/yr) x Bo (kg CH_4/kg COD) x $MCF_{baseline}$

Month No.	CH_4 emissions (kgCH_4/month)	$COD_{available, m}$ (kgCOD/month)	Bo (kg CH_4/kg COD)	$MCF_{baseline}$
1	107,696	1,181,653	0.21	0.434
2	103,999	1,067,312	0.21	0.464
3	128,540	1,181,653	0.21	0.518
4	136,386	1,143,410	0.21	0.568
5	133,007	1,181,653	0.21	0.536
6	119,338	1,143,410	0.21	0.497
7	119,111	1,181,653	0.21	0.480
8	119,111	1,181,653	0.21	0.480
9	111,414	1,143,410	0.21	0.464
10	113,403	1,181,653	0.21	0.457
11	105,891	1,143,410	0.21	0.441
12	103,229	1,181,653	0.21	0.416
Total	1,401,124	13,912,523	-	-

Where:

$COD_{available, m} = COD_{baseline, m} + COD_{carry\ on}$

$COD_{baseline, m} = (COD_{c, baseline\_p} \times F_{dig\_p} + COD_{c, baseline\_w} \times F_{dig\_w}) \times AD$

$AD = 1 - \{COD_{c,a,out} \times (F_{dig\_p} + F_{dig\_w}) / (COD_{c, baseline\_p} \times F_{dig\_p} + COD_{c, baseline\_w} \times F_{dig\_w})\}$

Month No.	$COD_{available, m}$ (kgCOD/month)	$COD_{baseline, m}$ (kgCOD/month)	F_{dig_p} (m^3/month)	F_{dig_w} (m^3/month)	AD	$COD_{carry on}$ (kgCOD/month)
1	1,181,653	1,181,653	64,459	14,142	0.995	0
2	1,067,312	1,067,312	58,222	12,773	0.995	0
3	1,181,653	1,181,653	64,459	14,142	0.995	0
4	1,143,410	1,143,410	62,373	13,684	0.995	0
5	1,181,653	1,181,653	64,459	14,142	0.995	0
6	1,143,410	1,143,410	62,373	13,684	0.995	0
7	1,181,653	1,181,653	64,459	14,142	0.995	0
8	1,181,653	1,181,653	64,459	14,142	0.995	0
9	1,143,410	1,143,410	62,373	13,684	0.995	0
10	1,181,653	1,181,653	64,459	14,142	0.995	0
11	1,143,410	1,143,410	62,373	13,684	0.995	0
12	1,181,653	1,181,653	64,459	14,142	0.995	0
Total	13,912,523	13,912,523	758,927	166,503	-	-

$MCF_{baseline} = 0.89 \times f_d \times f_{t,y}$

$f_{t,y} = \exp[E \times (T_2 - T_1) / (R \times T_1 \times T_2)]$

Month No.	$MCF_{baseline}$	f_d	$f_{t,monthly}$	T_2 (deg C)
1	0.434	0.7	0.696	25.7
2	0.464	0.7	0.745	26.5
3	0.518	0.7	0.832	27.8
4	0.568	0.7	0.912	28.9
5	0.536	0.7	0.860	28.2
6	0.497	0.7	0.797	27.3
7	0.480	0.7	0.771	26.9
8	0.480	0.7	0.771	26.9
9	0.464	0.7	0.745	26.5
10	0.457	0.7	0.733	26.3
11	0.441	0.7	0.708	25.9
12	0.416	0.7	0.667	25.2
Ave.	0.480	-	-	-

Therefore, the lagoon baseline emissions are calculated as follows.
$BE_{lagoons}$ = 1,401,124 $kgCH_4$/yr x 21 / 1,000 = 29,424 tCO_2/yr

(ii) Electricity (or thermal energy) baseline emissions

In this project, the methane generated and recovered in the process of this project will be used as a fuel in the drying facilities of the tapioca starch production process, substituting coal that is used in the existing drying facilities. Electricity will not be generated using the recovered methane.
The existing wastewater treatment facilities connect open lagoons through natural flowing down of open lagoons and do not have equipment or facilities that consume electricity.

Electricity (or thermal energy) baseline emissions are calculated using the formula shown in Section B.6.1.

$BE_{elec/heat}$ (tCO_2/yr)	=	EG_y (MWh/y)	x	$CEF_{Bl,elec,,y}$ (tCO_2/MWh)	+	$EG_{d,y}$ (MWh/y)	x	CEF_{grid} (tCO_2/MWh)	+	$HG_{Bl,y}$ (MJ/y)	x	$CEF_{Bl,therm,y}$ (tCO_2/MJ)
	=	0	x	0.637	+	0	x	0	+	102,245,709	x	0.0000992
	=	10,143										

Where:

EG_y = 0 MWh/y

The site of this project does not consume electricity that would be consumed had this project been not implemented.

$CEF_{Bl,elec,,y}$ = 0.637 tCO_2/MWh (Please see the following.)

$EG_{d,y}$ = 0 MWh/y

This project will not generate electricity using biogases to be recovered during the project activity.

CEF_{grid} = 0 tCO_2/MWh

This project will not generate electricity using biogases to be recovered during the project activity.

$HG_{Bl,y}$ = { (total of $COD_{baseline,m}$ x COD removal efficiency of digester x Bo_{dig} x MCF_{dig})

— Physical Leakage from biodigester*1 } x specific heat of methane

— Heat consumption of project facilities*2

= {(13,912,523kgCOD/yr x 0.8 x 0.25kgCH_4/kgCOD x 1.0) — 12,521 kgCH_4/yr} x 50MJ/kg

— 36,253,477MJ/yr

= 102,245,709 MJ/y

*1: Please see "Project emissions"

*2: Heat consumption of project facilities = $HG_{Pr,y}$, Please see "Project emissions."

$CEF_{Bl,therm,y}$ = CEF_{coal} x Fraction of C oxidised x(44/12)tCO_2/tC ÷ 1,000,000

= 27.6tC/TJ x 0.98 x 3.667tCO_2/tC ÷ 1,000,000

= 0.0000992 tCO_2/MJ

Determination of $CEF_{Bl,elec}$:

All the electricity to be consumed at the site of this project will be supplied by AC power through the grid. $CEF_{B1,elec,,y}$ was calculated by applying the calculation formula for combined margins based on Category I.D. Renewable electricity generation for a grid, which is a methodology for small-scale CDMs, to the electricity generation unit requirement in Viet Nam. **Tables B-3** and **B-4**, respectively ,show the operating margins and build margins.

Based on these margins, the electricity generation unit requirement of a baseline grid can be calculated as follows:

$$(0.840+0.434)/2=0.637(\text{kg-}CO_2/\text{kWh})$$

Table B-3: The average emission coefficient of operating margin from 2003 to 2005

Type	EG (MWh/year)*	Emissions (t-CO_2/year)	Average operating margin (OM) emission factor (t-CO_2/MWh)
Coal thermal	7,454,333	9,607,078	
Fuel Oil thermal	723,667	633,461	
Diesel Oil thermal	43,333	37,752	
Natural Gas	14,406,333	8,719,746	
Total	22,627,667	18,998,037	0.840

*Data source is ELECTRICITY OF VIETNAM 2004-2005, EVN Annual Report 2005-2006

Table B-4: The average emission coefficient of build margin

Operation year*	Plant Name*	Type*	EG* (MWh)	Emissions ($t-CO_2$/year)	Build margin (BM) emission factor ($t-CO_2$/MWh)
2006	Phu my 2.2+3	Gas	9,462,000	3,802,782	
2006	Cao ngan	Coal	604,500	576,432	
2005	Na Duong	Coal	604,500	576,432	
2005	Phu my 2.1 and 4	Gas	7,010,000	2,817,322	
2005	Can don	Hydro	226,000	0	
Total			17,907,000	7,772,967	0.434

*Data source is ELECTRICITY OF VIETNAM 2004-2005, EVN Annual Report 2005-2006

The reference data for the calculation in table B-3 and B-4 are shown below.

GEF (Emission factor):
Data source is the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.
Coal＝26.8, Fuel Oil=21.1, Diesel Oil＝20.2, Gas＝15.3（t-C/TJ）

ρ (Oxidization proportion coefficient of carbon):
Data source is the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.
Coal＝0.98, Oil＝0.99, Gas＝0.995

Project Emissions

The ex-ante calculations of the project emissions are shown as follows.

(i) Methane emissions from lagoons

Methane emissions from lagoons are calculated using the formula shown in Section B.6.1.

CH_4 emissions from the lagoons ($kgCH_4$/yr)	=	COD_{dig_out} (kg COD/yr)	x	Bo (kg CH_4/kg COD)	x	MCF_{dig_out}
	=	2,782,505	x	0.21	x	0.480
	=	280,477				

Where:
COD_{dig_out} = total of $COD_{baseline,\,m}$ x (1 − COD removal efficiency of digester)
= 13,912,523kgCOD/yr x (1 − 0.8)
= 2,782,505kgCOD/yr
MCF_{dig_out} = Average of $MCF_{baseline,m}$ = 0.480

Therefore, methane emissions from lagoons are calculated as follows:
$PE_{lagoons}$ = 280,477 $kgCH_4$/yr x 21 / 1,000 = 5,890 tCO_2/yr

(ii) Physical Leakage from biodigesters

The methane fermentation tank to be installed in this project will have an opening on its top side for maintenance servicing of the equipment installed in it. Methane leaking through this opening is calculated as physical leakage from biodigesters.

Physical Leakage from biodigesters (tCO_2/yr)	=	CH_4 generation of digester ($kgCH_4$/yr)	x	Area of the opening in proportion to the surface area of the methane fermentation tank	x	GWP_{CH4} ($tCO_2/kgCH_4$)
	=	2,782,505	x	0.0045	x	(21 / 1000)
	=	263				

Where:

CH_4 generation of digester

= total of $COD_{baseline,m}$ x COD removal efficiency of digester x Bo_{dig} x MCF_{dig}

= 13,912,523kgCOD/yr x 0.8 x 0.25$kgCH_4$/kgCOD x 1.0

= 2,782,505 $kgCH_4$/yr

Area of the opening in proportion to the surface area of the methane fermentation tank: 0.45%

(iii) Stack emissions from the flare or energy generation

A flaring system will be installed in this project. However, this system will be an emergency system to be operated only when a boiler that will generate thermal energy and a dryer are not operated and if excess gas is generated. Therefore, CO_2 generation related to the flaring system is not included in the ex ante calculations.

Ex post, stack emissions from the flare or energy generation will be calculated based on monitoring results, and CO_2 generation will be calculated accordingly.

(iv) Emissions from heat use and electricity use due to the project activity (PEelec/heat):

Emissions from heat use and electricity use due to the project activity based on electricity and fuel to be consumed by the equipment and facilities installed for this project are calculated by the formula shown in Section B.6.1.

The facilities to be installed for this project will use thermal energy for heating the methane fermentation facilities. This thermal energy will be generated by a boiler that will use biogases to be generated and recovered in the methane fermentation facilities.

$PE_{elec/heat}$ (tCO_2/yr)	=	EL_y (MWh/y)	x	CEF_d (tCO_2/MWh)	+	$HG_{Pr,y}$ (MJ/y)	x	$CEF_{Pr,therm,y}$ (tCO_2/MJ)
	=	603.38	x	0.637	+	36,253,477	x	0
	=	384						

Where:

CEF_d =0.637 tCO_2/MWh (=$CEF_{Bl,elec,,y}$, Please see ii) “Baseline emissions.”)

$CEF_{Pr,therm,y}$ = 0 tCO_2/MJ

In this project, thermal energy consumed in the project activity will be generated using biogases to be generated and recovered in the methane fermentation facilities.

(v) Emissions from land application of sludge

In this project, sludge will flow into lagoons together with wastewater through the methane fermentation facilities, and there will be no sludge that will be applied to land.

(vi) Emissions from wastewater removed in the dewatering process

In this project, sludge will flow into lagoons together with wastewater through the methane fermentation facilities, and there will be no process to separate sludge from wastewater. There will therefore be no wastewater removed in the dewatering process.

Leakage

No leakage is associated with the project activity in accordance with AM0013 Version 04.

Emission Reductions

Emission reductions will be the difference between baseline emissions and project emissions calculated earlier. **Emission reductions** are calculated using the formula shown in Section B.6.1.s

Expected Baseline Emissions (tCO_2/yr)	=	$BE_{lagoons}$ (tCO_2/yr)	+	$BE_{elec/heat}$ (tCO_2/yr)
	=	29,424	+	10,143
	=	39,567		

Expected Project Emissions (tCO_2/yr)	=	$PE_{lagoons}$ (tCO_2/yr)	+	Physical Leakage from biodigesters (tCO_2/yr)	+	$PE_{elec/heat}$ (tCO_2/yr)
	=	5,890	+	263	+	384
	=	6,537				

Expected Emission reductions (tCO_2/yr)	=	Expected Baseline emissions (tCO_2e/yr)	—	Leakage (t CO_2e/yr)	—	Expected Project emissions (t CO_2e/yr)
	=	39,567	—	0	—	6,537
	=	33,030				

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

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The expected emission reductions for 14 years crediting period are provided below:

Year	Estimation of project activity emissions (Tonnes of CO_2e)	Estimation of baseline emissions (Tonnes of CO_2e)	Estimation of Leakage (Tonnes of CO_2e)	Estimation of overall emission reductions (Tonnes of CO_2e)
2009	6,537	39,567	0	33,030
2010	6,537	39,567	0	33,030
2011	6,537	39,567	0	33,030
2012	6,537	39,567	0	33,030
2013	6,537	39,567	0	33,030
2014	6,537	39,567	0	33,030
2015	6,537	39,567	0	33,030
2016	6,537	39,567	0	33,030
2017	6,537	39,567	0	33,030
2018	6,537	39,567	0	33,030
2019	6,537	39,567	0	33,030
2020	6,537	39,567	0	33,030
2021	6,537	39,567	0	33,030
2022	6,537	39,567	0	33,030
Total (tCO_2e)	91,518	553,938	0	462,420

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**F_{dig} (ID_1)**
Data unit:	m^3/yr
Description:	Flow rate of organic wastewater into the digester
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	758,927 m^3/yr (F_{dig_p}) 166,503 m^3/yr (F_{dig_w})
Description of measurement methods and procedures to be applied:	Measurement by flow meter
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would

	be different for each application e.g. wastewater flow rate, gas flow rate, etc.
Any comment:	Data should be kept two years after last issuance of CERs Parameter monitored continuously but aggregated monthly for calculations

Data / Parameter:	$COD_{c,Bl}$ (ID_2)
Data unit:	kg/m^3
Description:	COD concentration of organic wastewater into the digester or directed for land application
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	16.682 $kgCOD/m^3$ ($COD_{c,baseline\_p}$) 7.520 $kgCOD/m^3$ ($COD_{c,baseline\_w}$)
Description of measurement methods and procedures to be applied:	Analysis by sampling
QA/QC procedures to be applied:	Sampling will be carried out adhering to internationally recognized procedures.
Any comment:	Data should be kept two years after last issuance of CERs

Data / Parameter:	$COD_{a,out}$ (ID_3)
Data unit:	kg/yr
Description:	COD that leaves the lagoon with the effluent
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	74,034 kg/yr $= (F_{dig\_p} + F_{dig\_w}) \times COD_{c,a\_out}$
Description of measurement methods and procedures to be applied:	Calculated based on analytical data obtained in sampling
QA/QC procedures to be applied:	Sampling will be carried out adhering to internationally recognized procedures.
Any comment:	Data should be kept two years after last issuance of CERs

Data / Parameter:	$COD_{a,in}$ (ID_4)
Data unit:	kg/yr
Description:	COD that enters the lagoon
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of	2,782,505 kgCOD/yr (COD_{dig_out})

calculating expected emission reductions in section B.6	
Description of measurement methods and procedures to be applied:	Calculated based on analytical data obtained in sampling (ID_1 x ID_2)
QA/QC procedures to be applied:	Sampling will be carried out adhering to internationally recognized procedures.
Any comment:	Data should be kept two years after last issuance of CERs

Data / Parameter:	T_{lag} (ID_5)
Data unit:	K
Description:	Ambient Temperature
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	298.36K to 302.06K
Description of measurement methods and procedures to be applied:	Measurement by a thermometer
QA/QC procedures to be applied:	-
Any comment:	Data should be kept two years after last issuance of CERs Daily average is monitored but monthly average is used in the calculations

Data / Parameter:	D_{lag} (ID_6)
Data unit:	m
Description:	Depth of lagoon
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	5.5 m
Description of measurement methods and procedures to be applied:	Measurement by a gauge
QA/QC procedures to be applied:	-
Any comment:	Data should be kept two years after last issuance of CERs

Data / Parameter:	$HG_{Bl,y}$ (ID_7)
Data unit:	MJ/yr
Description:	Quantity of thermal energy that would be consumed in year y at the project site in the absence of the project activity using fossil fuel
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	102,245,709 MJ/yr
Description of measurement methods and procedures to be applied:	Calculated from purchasing document data
QA/QC procedures to be applied:	Fuel purchase records to be cross checked with estimates.
Any comment:	Data should be kept two years after last issuance of CERs Thermal energy consumed is determined from quantity of fuel consumed and calorific value of fuel.

Data / Parameter:	F_{dig_out} (ID_8)
Data unit:	m^3/yr
Description:	Flow rate of organic wastewater into the digester
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	925,430m^3/yr
Description of measurement methods and procedures to be applied:	Measurement by flowmeter
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would be different for each application e.g. wastewater flow rate, gas flow rate, etc.
Any comment:	Data should be kept two years after last issuance of CERs Parameter monitored continuously but aggregated monthly for calculations

Data / Parameter:	COD_{c,dig_out} (ID_9)
Data unit:	kg/m^3
Description:	COD concentrations in discharged effluent from digester
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of	3.01 kg/m^3

calculating expected emission reductions in section B.6	
Description of measurement methods and procedures to be applied:	Analysis of sampling
QA/QC procedures to be applied:	Sampling will be carried out adhering to internationally recognized procedures.
Any comment:	Data should be kept two years after last issuance of CERs

Data / Parameter:	**$EL_{p,y}$ (ID_10)**
Data unit:	MWh/yr
Description:	Amount of electricity in the year y that is consumed at the project site for the project activity
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	603.38 MWh/yr
Description of measurement methods and procedures to be applied:	Measurement by a watt-hour meter
QA/QC procedures to be applied:	Electricity meters will undergo maintenance/calibration subject to appropriate industry standards. The accuracy of the meter readings will be verified by receipts issued by the purchasing power company. Uncertainty of the meters to be obtained from the manufacturers. This uncertainty to be included in a conservative manner while calculating CERs.
Any comment:	Data should be kept two years after last issuance of CERs

Data / Parameter:	**$HG_{Pr,y}$ (ID_11)**
Data unit:	MJ/yr
Description:	Quantity of thermal energy consumed in year y at the project site due to the project activity
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	36,253,477 MJ/yr
Description of measurement methods and procedures to be applied:	Calculated from purchasing document data

QA/QC procedures to be applied:	Fuel purchase records to be cross checked with estimates.
Any comment:	Data should be kept two years after last issuance of CERs Thermal energy consumed is determined from quantity of fuel consumed and calorific value of fuel

Data / Parameter:	FR_{bio} (ID_12)
Data unit:	m^3/yr
Description:	Amount of biogas collected in the outlet of the Biodigester
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	5,565,010 m^3/yr
Description of measurement methods and procedures to be applied:	Measurement by flowmeter
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would be different for each application e.g. wastewater flow rate, gas flow rate, etc.
Any comment:	Data should be kept two years after last issuance of CERs Parameter monitored continuously but aggregated monthly for calculations

Data / Parameter:	$P_{CH4,bio}$ (ID_13)
Data unit:	%
Description:	Percentage of methane in the biogas in the outlet of the biodigester
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	70%
Description of measurement methods and procedures to be applied:	Calculated based on analytical data obtained in sampling
QA/QC procedures to be applied:	Sampling will be carried out adhering to internationally recognized procedures.
Any comment:	Data should be kept two years after last issuance of CERs

Data / Parameter:	$FR_{f,inlet}$ (ID_14)
Data unit:	m^3/yr
Description:	Flow rate of the biogas entering the flare

Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	0 m^3/yr
Description of measurement methods and procedures to be applied:	Measurement by flow meter
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would be different for each application e.g. wastewater flow rate, gas flow rate, etc.
Any comment:	Data should be kept two years after last issuance of CERs Parameter monitored continuously but aggregated monthly for calculations

Data / Parameter:	$fv_{i,h}$ (ID_15)
Data unit:	-
Description:	Volumetric fraction of component i in the residual gas in the hour h where i = CH_4, CO, CO_2, O_2,H_2, N_2
Source of data to be used:	Measurements by project participants using a continuous gas analyser
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Not considering
Description of measurement methods and procedures to be applied:	Ensure that the same basis (dry or wet) is considered for this measurement and the measurement of the volumetric flow rate of the residual gas ($FV_{RG,h}$) when the residual gas temperature exceeds 60 °C
QA/QC procedures to be applied:	Analysers must be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check should be performed by comparison with a standard certified gas.
Any comment:	Monitoring frequency: is continuously. Values to be averaged hourly or at a shorter time interval Data should be kept two years after last issuance of CERs As a simplified approach, project participants may only measure the methane content of the residual gas and consider the remaining part as N_2.

Data / Parameter:	$FV_{RG,h}$ (ID_16)
Data unit:	m^3/h
Description:	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h
Source of data to be used:	Measurements by project participants using a flow meter
Value of data applied	Not considering

for the purpose of calculating expected emission reductions in section B.6	
Description of measurement methods and procedures to be applied:	Ensure that the same basis (dry or wet) is considered for this measurement and the measurement of volumetric fraction of all components in the residual gas ($fv_{i,h}$) when the residual gas temperature exceeds 60 ºC
QA/QC procedures to be applied:	Flow meters are to be periodically calibrated according to the manufacturer's recommendation.
Any comment:	Monitoring frequency: is continuously. Values to be averaged hourly or at a shorter time interval Data should be kept two years after last issuance of CERs

Data / Parameter:	$t_{O2,h}$ (ID_17)
Data unit:	-
Description:	Volumetric fraction of O_2 in the exhaust gas of the flare in the hour h
Source of data to be used:	Measurements by project participants using a continuous gas analyser
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Not considering
Description of measurement methods and procedures to be applied:	Extractive sampling analysers with water and particulates removal devices or in situ analysers for wet basis determination. The point of measurement (sampling point) shall be in the upper section of the flare (80% of total flare height). Sampling shall be conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes). An excessively high temperature at the sampling point (above 700 ºC) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.
QA/QC procedures to be applied:	Analysers must be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check should be performed by comparison with a standard gas.
Any comment:	Monitoring frequency: is continuously. Values to be averaged hourly or at a shorter time interval. Data should be kept two years after last issuance of CERs Monitoring of this parameter is only applicable in case of enclosed flares and continuous monitoring of the flare efficiency.

Data / Parameter:	$fv_{CH4,FG,h}$ (ID_18)
Data unit:	mg/m^3
Description:	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h
Source of data to be used:	Measurements by project participants using a continuous gas analyser
Value of data applied for the purpose of	Not considering

calculating expected emission reductions in section B.6	
Description of measurement methods and procedures to be applied:	Extractive sampling analysers with water and particulates removal devices or in situ analyser for wet basis determination. The point of measurement (sampling point) shall be in the upper section of the flare (80% of total flare height). Sampling shall be conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes). An excessively high temperature at the sampling point (above 700 ºC) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.
QA/QC procedures to be applied:	Analysers must be periodically calibrated according to manufacturer's recommendation. A zero check and a typical value check should be performed by comparison with a standard gas.
Any comment:	Monitoring frequency: is continuously. Values to be averaged hourly or at a shorter time interval. Data should be kept two years after last issuance of CERs Monitoring of this parameter is only applicable in case of enclosed flares and continuous monitoring of the flare efficiency. Measurement instruments may read ppmv or % values. To convert from ppmv to mg/m^3 simply multiply by 0.716. 1% equals 10 000 ppmv.

Data / Parameter:	T_{flare} (ID_19)
Data unit:	deg C
Description:	Temperature in the exhaust gas of the flare
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Not considering
Description of measurement methods and procedures to be applied:	Measure the temperature of the exhaust gas stream in the flare by a Type N thermocouple. A temperature above 500 ºC indicates that a significant amount of gases are still being burnt and that the flare is operating.
QA/QC procedures to be applied:	Thermocouples should be replaced or calibrated every year.
Any comment:	Monitoring frequency: is continuously. Data should be kept two years after last issuance of CERs An excessively high temperature at the sampling point (above 700 ºC) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.

Data / Parameter:	$FR_{e,inlet}$ (ID_20)
Data unit:	m^3/yr
Description:	Flow rate of the biogas entering the heat generation equipment
Source of data to be used:	Measurements by project participants

Value of data applied for the purpose of calculating expected emission reductions in section B.6	5,565,010 m^3/yr
Description of measurement methods and procedures to be applied:	Measurement by flow meter
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would be different for each application e.g. wastewater flow rate, gas flow rate, etc.
Any comment:	Data should be kept two years after last issuance of CERs Parameter monitored continuously but aggregated monthly for calculations

Data / Parameter:	$FR_{e,s}$ (ID_21)
Data unit:	m^3/yr
Description:	Flow rate of the heat generation equipment stack gases
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Not considering
Description of measurement methods and procedures to be applied:	Measurement by flow meter
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would be different for each application e.g. wastewater flow rate, gas flow rate, etc.
Any comment:	Data should be kept two years after last issuance of CERs Parameter monitored continuously but aggregated monthly for calculations

Data / Parameter:	$P_{CH4,e,s}$ (ID_22)
Data unit:	%
Description:	Methane content in stack gas of heat generation equipment
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Not considering
Description of measurement methods and procedures to be	Calculated based on analytical data obtained in sampling

applied:	
QA/QC procedures to be applied:	Sampling will be carried out adhering to internationally recognized procedures.
Any comment:	Data should be kept two years after last issuance of CERs

Data / Parameter:	$T_{comb,e}$ (ID_23)
Data unit:	fraction
Description:	Fraction of time gas is combusted in the heat generation equipment
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Not considering
Description of measurement methods and procedures to be applied:	Measurement by a runtime meter
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. (No description for AM0013v4)
Any comment:	Data should be kept two years after last issuance of CERs Measured using a run time meter connected to a flame detector or a flame continuous temperature controller

B.7.2 Description of the monitoring plan:

>>

The monitoring items are shown in Figure B-3. The Nos. in the diagram indicate ID Nos.

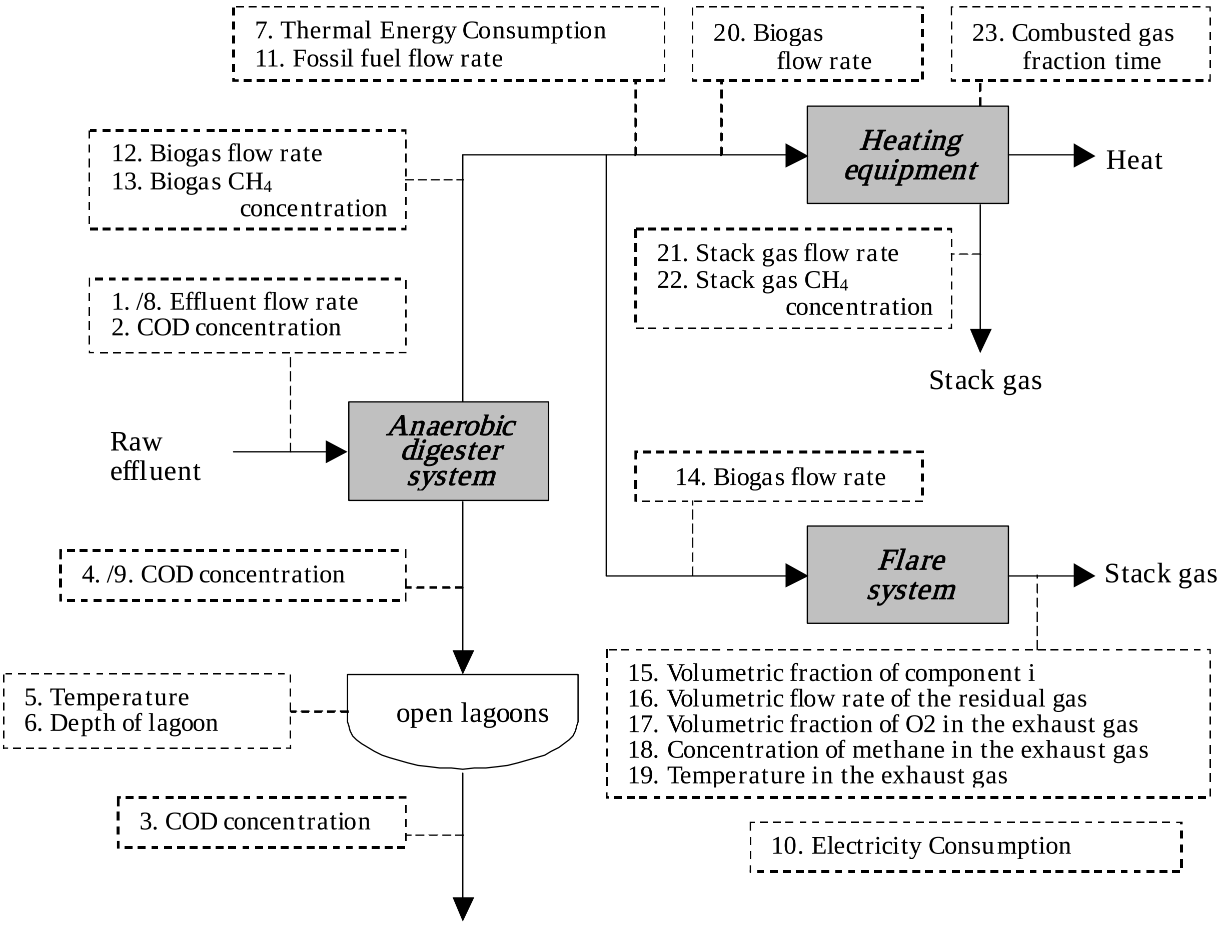

Figure B-3: Monitoring items

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

>>

Date of completion: 5 March 2007

Persons responsible:

Mr. Seiichiro Sano
Environmental Systems Engineering Department
TOSHIBA CORPORATION
1-1, Shibaura 1-Chome, Minato-ku, Tokyo 105-8001
Japan
Tel No: +81-3-3457-4181 Email: seiichiro1.sano@toshiba.co.jp

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:

>>

01/01/2008

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

>>

15 years

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

C.2.1. Renewable crediting period

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

>>

01/01/2009

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 applicable

C.2.2.2. Length:

>>

Not applicable

SECTION D. Environmental impacts

>>

The conclusion of Environmental Impact Assessment Report of CDM project is that environmental impacts such air pollution, water contamination may occur along with construction and operation, however, the project's overall impact on environment will not only be small but also be reduced to minimum by implementation of project.

Negative impacts on environment during construction including include air pollution, water pollution and noise to some extent, as material transportation, number of worker increase, installing of digester and pipelines. These negative impacts shall be reduced by taking the following mitigation measure: use truck with closed body for transportation of material, minimize the transport activities in the peak hours, spraying water at site in the very hot and windy days etc.

Negative impacts on environment during operation include water and groundwater pollution, air pollution due to discharge of treated water to Tan Hiep channel and methane gas from flare and air-heating furnace may occur in case of incident happen with digester and flare. These negative impacts shall be reduced by taking the following mitigation measure: the stacks of flare and air-heating furnace will be higher than the roof of Vietma plant 3 meters for good dispersion of flue gas. The bottom of lagoons will be reinforced for prevention of groundwater pollution. The characteristics of inlet and outlet wastewater from treatment system will be strict control. The solid waste (wet cassava residue) will be collected and transported to the sun dried site immediately etc.

The positive environmental impacts of the project activity are as follows:

-The project activity will reduce methane emission from existing lagoons to the atmosphere. This will improve working condition of employees of the factory and also improve living environment conditions of the residents in surrounding area of plant.

-The project will minimize the surface and ground waters pollution by improving the treated wastewater quality before entering the lagoons.

- The project activity will reduce CO_2 emissions from combustion of coal at the air dryer by displacing coal to biogas, which is captured from installed anaerobic digester. Other emission from coal burning such as SO_X is also reduced

- In the project activity, total amount of 33,030 tCO_2/year is expected to reduce by avoiding methane gas emissions from the existing open lagoons and by substituting coal with captured biogas.

Conclusion: Construction and operation period of the project will not bring out any negative impacts to the environment but will improve current environmental conditions as said above.

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

The Environmental Impact Assessment Report of CDM project has been conducted by the project participants. The contents of Environmental Impact Assessment Report which is required for approval process of CDM project in Vietnam is corresponding with the requirements of new Environmental Protection Law of 2006

The Environmental Impact Assessment Report was submitted to People's Committee and Department of Natural Resource and Environment of Tay Ninh in March 2007. People's Committee of Tay Ninh

formed a Committee for review EIA Report. It took about 30 days from submitting EIA report to Tay Ninh people's committee to receiving approval.
During preparation of EIA report, project participants have received the comments from people's Committee of Tan Hiep Village and Fatherland Front of Tan Hiep Village. This is formal procedure required by Environmental Protection Law of 2006.

The certificate of approval of EIA was given by Chairman of Tay Ninh people's committee the on beginning of April 2007.

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

>>
Not applicable

SECTION E. Stakeholders' comments

>>

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

>>
The conceptual plan of the CDM project activity was explained to Tay Ninh People's Committee (Local Authority) and relevant organizations of Tay Ninh such as Department of environment and Natural Resource, Department of Planning and Investment. They are supported to the implementing of the project.
The conceptual plan of the CDM project activity was explained to also Ministry of Agriculture and Rural Development (MARD) and Ministry of Environment and Natural Resources for getting the support in the approval procedures because they are Central government Authorities on CDM and tapioca starch development control.

The project design document of wastewater treatment with Anaerobic Digester at Vietma starch-processing plant has been submitted to Tay Ninh People's Committee under the signature of Vietma, a project partner. Tay Ninh People's Committee informed relevant parties of the project in writing and gathered comments from them. Tay Ninh People's Committee sent the gathered comment to Vietma.
The project design document also has been submitted to MARD for stakeholder comments.

E.2. Summary of the comments received:

>>
All Parties welcome the participations of Vietma and TOSHIBA Corporation in the project and support the implementation of project at Vietma plant.

1. Ministry of Agriculture and Rural Development (MARD): This is a project for wastewater treatment with Anaerobic Digester at a starch processing plant and recovering the biogas that will be displacing coal for air-heating furnace. The project will improve the environment of Tay

Ninh Province and promote the use of renewable energy in Vietnam. The treatment Technology may be transfer and use for other tapioca starch plants in Tay Ninh and other provinces.

2. Tay Ninh People's Committee and other relevant parties: Support this project because this is first tapioca starch plant in Tay Ninh that is to be implemented under CDM policy. The project will not affect on the environment and also contribution to the economic development of Tay Ninh.
3. VIET MA CO., LTD supports the implementation of project and wishes the project would be build as soon as possible.

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

>>

At present project has not received any claims in writing from local stakeholders to obstruct project implementation. All the local stakeholders including people's Committee of Tan Hiep Village and Fatherland Front of Tan Hiep Village support the project implementation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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URL:	http://www.toshiba.co.jp/index_j3.htm
Represented by:	
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Represented by:	
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Salutation:	Mr.
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URL:	
Represented by:	
Title:	President
Salutation:	Mr.
Last Name:	VU
Middle Name:	HOANG
First Name:	LONG
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is provided the project activity.

Annex 3

BASELINE INFORMATION

The following tables "Table Annex 3.1 –2" summarises the data used in the ex-ante calculations of baseline emissions.

Table Annex 3.1 Operation data of VIET MA factory

Item	Value	Remarks
Starch processing capacity	120 t/day	-
Starch production volume	103.7 t/day	Average
Operational load	86.4 %	= Production volume / Capacity
Supply rate of raw cassava	481.8 t/day	Average
Water consumption	22 m^3/t-starch	Average

Table Annex 3.2 Climate of Tay Ninh Province

Month	Temperature (deg C)	Humidity (%)	Precipitation (mm)
January	25.7	68.6	7.2
February	26.5	68.9	10.5
March	27.8	68.2	29.8
April	28.9	71.2	100.4
May	28.2	78.4	204.4
June	27.3	82.4	247.6
July	26.9	83.1	272.5
August	26.9	83.5	219.0
September	26.5	85.8	382.5
October	26.3	84.6	349.2
November	25.9	77.8	143.6
December	25.2	70.1	23.3
Maximum	28.9	85.8	382.5
Minimum	25.2	68.6	7.2
Average	26.8	76.9	1990.0 (total)

(Source: Existing EIA report of VIET MA factory)

Annex 4

MONITORING INFORMATION

1. Organization

Monitoring formation is shown in Figure Annex 4.1

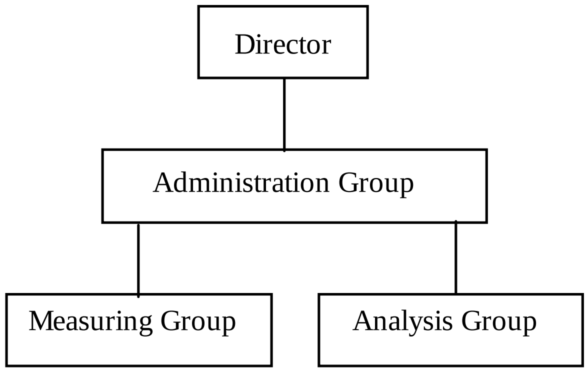

Figure Annex 4.1 Monitoring formation

- Director has responsibilities to carry out the monitoring plan and advice to the stuff of administration group.
- Administration Group shall carry out the management work for measuring group and analysis group.
- Measuring Group and Analysis Group shall carry out the measuring, calculation, and analysis these are based on the monitoring plan.

2. Monitoring period

- Monitoring period is from Jan. 2009 to Dec. 2022.

3. Data keeping

- Data shall be put into the computer as the electronic data, which is handled by the computer software.
- Data shall be arranged to the monthly report once a month.
- The monthly report shall be kept from Jan. 2009 to Dec. 2027 in the factory.

4. Device maintenance

- In order to keep the accuracy of measuring device, maintenance shall be done periodically.

5. Accuracy keeping for water analysis

- In order to keep the accuracy of water analysis, analysis is done based on the international standard by the specialty testing body.

- - - - -