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:

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Title - Methane Recovery from waste water treatment in Seafood Industry in Maharashtra
Version - 01
Date – 21/05/08

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

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Gadre Marine Export Pvt Ltd is the lead manufacturer of Sea food, better known as SURIMI. SURIMI is stabilized myofibrillar protein obtained from deboned fish flesh i.e. washed with water and blended with cryoprotectants. Gadre Marine Export Pvt Ltd (GMEPL) is located at Maharashtra Industrial Development Corporation (MIDC), Ratnagiri, Maharashtra. This company is promoted for setting up the project of the manufacture of SURIMI. GMEPL is taking the lead in establishing the Effluent treatment plant in seafood industry. Effluent treatment in seafood industry is first of its kind.

The proposed project involves installation of an Effluent Treatment Plant for treatment of waste water in order to generate biogas. The project activity is the methane emission reduction through its controlled recovery in an anaerobic digestion plant. The effluent is treated in an anaerobic digestor followed by secondary and tertiary systems. The anaerobic digestion is carried out in an UASB bioreactor. This process is carried out by a variety of microorganisms. Initially, a group of microorganisms act upon the organic matter and convert them to volatile acids which are further decomposed by methane forming (methanogenic) anaerobic bacteria to produce methane. Installation of UASB digester in project activity would capture methane produced due to anaerobic reactions.

A pilot project similar to the project activity was set up in the facility of the GME with a lesser production capacity and now the processing facility has been shifted to a new location. In the last three years when the study has been conducted it has been discovered that biogas plant performance is very sensitive subjected to different variables including load rate, mixing etc and has seen a high fluctuation in the Biogas generation. GMEPL through information spreading, research activity, testing and setting up of a prior pilot plant taking into consideration the potential CDM incentives to be available for the project activity recognizing the nature of the project activity and the associated barriers to be overcome by the same in terms of its uniqueness in its application towards effective management of the effluent loading.

The wastewater due the existence of organic content when subjected to anaerobic degradation produces biogas. Biogas mainly consists of methane and carbon dioxide and is a valuable fuel. GMEPL realizing the effects of greenhouse gases being released into atmosphere and appreciating the importance of recovering valuable energy from the wastewater, had decided to establish a methane recovery plant through an anaerobic digestion system and utilize biogas as fuel to generate steam.

Project's Contribution to sustainable development

Social well-being

- The project would generate employment opportunities for both skilled and unskilled labour.
- Unskilled labour would be employed in the construction phase of the project.

- The project will employ experienced engineers to operate the equipments and machinery of the effluent treatment plant. The plant operating and maintaining personnel would be given suitable training before the commissioning of the plant.

Economic well-being

- By recovering the resulting biogas in the form of CH_4 and using it as a renewable in-house fuel replacing furnace fuel, the project activity will contribute to the development of renewable sources
- The use of domestically available biogas as an energy resource helps to conserve fossil fuel. Thus the project apart from creating local employment opportunities helps in conserving the non-renewable energy utilizing renewable energy sources.

Environmental well-being

- The project activity would contribute in reducing emissions of a major greenhouse house and will help improving air and water quality at local levels.
- The project activity involves anaerobic treatment in closed anaerobic digester to the untreated waste water which will mitigate large quantities of CH4, a potent GHG, from being emitted into the atmosphere.
- The controlled environment in which the waste water would be treated will reduce the strong odors being emitted from degradable component of the waste.
- Furnace oil saving will reduce the associated CO2 (GHG) emissions.

Technological well-being

- The project activity employs a technology called up-flow anaerobic sludge blanket (UASB) technology for treatment of waste water generated from Sea food manufacturing unit.
- During treatment of waste water, biogas is generated with high percentage of methane which is converted into thermal energy for its in-house requirements.
- The project activity involves anaerobic treatment in closed anaerobic digester to the untreated waste water which will mitigate large quantities of CH4, a potent GHG, from being emitted into the atmosphere.
- Since the anaerobic digestion takes place in a closed reactor, there is no foul smell in surrounding area and in the vicinity of E.T.P. Further, the nuisance due to flies, mosquitoes etc, is totally eliminated.

Each of the above indicators has been studied in the context of the project activity to ensure that the project activity contributes to the sustainable development.

A.3. Project participants:

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Name of the Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (host) Ministry of Environment and Forests	Gadre Marine Export Pvt Ltd (Private entity, project	No

(MoEF)	participant)	

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

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

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A.4.1.1. Host Party(ies):

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India

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

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Maharashtra

A.4.1.3. City/Town/Community etc:

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Ratnagiri

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

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The activity of the proposed project involves installation of an Effluent Treatment Plant in order to generate biogas and to fulfill the objective of recycling water. The project is located at Maharashtra Industrial Development Corporation (MIDC), Ratnagiri, Maharashtra.

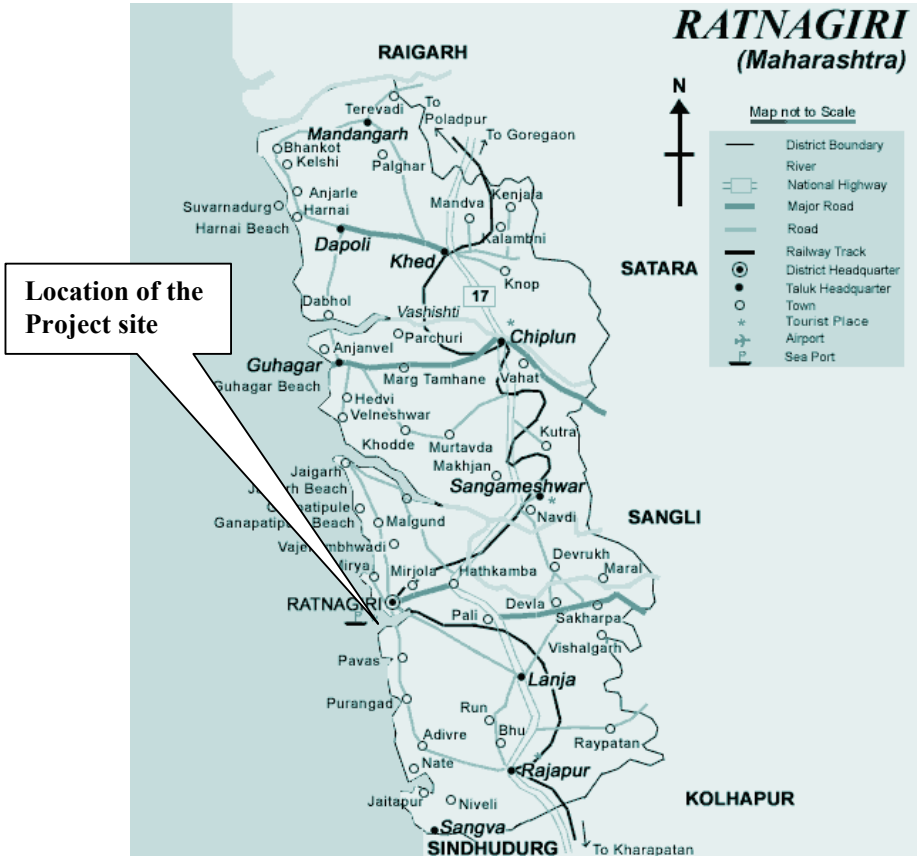
The district of Ratnagiri lies between latitudes 16°30'N and 18°04'N and longitudes 73°02'E and 73°52'E. The district is bound by Raigad district in the North, Sindhudurg in South, the Arabian Sea on the West and the Satara, Sangli, Kolhapur districts on the East. It is well connected by Rail and Road.

Air: Nearest airport is that of Kolhapur (129 kms). Mumbai (356 kms) and Pune (323 kms) are the other airports close by.

Rail: Connected by rail (broad gauge line), with a station at Ratnagiri

Road: National highway No 17 passes through the district. State highways and roads link district headquarters at Ratnagiri to all 9 tehsils (subdistricts) and towns.

Location of State Maharashtra in India



Location of Project Site in the District of Ratnagiri

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

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The project is a small scale CDM project activity and is as per the Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

This project activity falls under Type–III "Other Project Activities" and category H "Methane Recovery in Wastewater Treatment and under Type–I "Renewable Energy Projects", sub category C "Thermal Energy for the user with or without electricity as specified in indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories.

Technology employed:

Effluent treatment in seafood industry is first of its kind. This project generates around 2000 M^3/day of effluent. Anaerobic digestion is a biological process that produces a gas principally composed of methane (CH4) and carbon dioxide (CO2) otherwise known as biogas. Anaerobic decomposition is a complex process. It occurs in three basic stages as the result of the activity of a variety of micro-organisms. Initially, a group of micro-organisms converts organic material to a form that a second group of organisms utilizes to form organic acids. Methane-producing (methanogenic) anaerobic bacteria utilize these acids and complete the decomposition process.

The treatment process is carried in following steps:

The raw effluent from the Marine Products Processing unit will enter into the Screen Chamber where coarse material in the effluent will be removed periodically. The effluent from screen chamber will enter into Equalisation Tank where effluent is stored and also any hydraulic as well as organic variations will be dampened.

The equalised effluent will be then pumped to Buffer Tank. Buffer Tank is designed for a specific HRT considering the recycle of the treated effluent to maintain certain pH of the effluent entering UASB Reactor and also to maintain certain feed upflow velocity in the UASB Reactor for mixing purpose.

The effluent from buffer tank will then be pumped to the proposed UASB Reactor through a series of distribution pipes. The multiple distributions ensure a uniform flow of liquid throughout the sludge blanket making maximum use of available high bacterial population. The liquid rises to the top of UASB reactor along with the biogas generated and also some sludge particles.

The UASB system is the anaerobic reactor based on Upflow Anaerobic Sludge Blanket process. The reactor consists of a large corrosion resistant tank which incorporates a unique 3-phase settler called as GLSS, to separate the sludge, biogas and effluent. The settler is located at the top of the reactor and is designed for specific COD reactor loadings and hydraulic throughput.

A flow distribution network is located at the base of the reactor. This network is designed to distribute the flow evenly throughout the bottom of the reactor. This eliminates short - circuiting and promotes the proper formation of the sludge flocs which is a critical factor in reactor operation. The distribution network is designed to facilitate easy cleaning, thereby eliminating potential plugging problems.

New bacterial cells formed in the reactor aggregate into tiny flocs with extremely good settling characteristics. The biogas produced by the bacteria in the form of small bubbles rises upward through the sludge bed / blanket zones and provides a natural mixing action. When the biogas reaches the top of the reactor, it is removed by gas collectors.

The anaerobically treated effluent from the UASB Reactor shall then enter by gravity into a Hopper Bottom Tank where any carry over of suspended solids from the effluent will be separated and settled. The settled anaerobic sludge will be collected in the hopper and flow back to buffer tank by gravity.

The effluent from the hopper bottom tank shall then enter by gravity into two stage aeration system i.e. at Aeration Tank I. The aeration is achieved by means of mechanical aerators which also help in the complete mixing of the contents of the aeration tank. The activated sludge generated from the A.T I will be settled in the Secondary Clarifier I. A part of the settled activated sludge is recycled back to the aeration tank I for maintaining a desired MLSS concentration, while the excess sludge is pumped to the Holding Tank for necessary dewatering.

The treated effluent from the secondary clarifier I shall then enter by gravity into second stage aerobic process i.e. at Aeration Tank II. Here also the aeration is achieved by means of mechanical aerators which also help in the complete mixing of the contents of the aeration tank. The activated sludge generated from the A.T II will then be settled in the Secondary Clarifier II. A part of the settled activated sludge is recycled back to the aeration tank II for maintaining a desired MLSS concentration, while the excess sludge is pumped to the Holding Tank. The excess sludge from the Holding tank will be pumped to the Centrifuge for dewatering. The anaerobically treated effluent will be further subjected to Two Stage Aeration type of Activated Sludge Process.

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

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The expected emission reductions for the fixed period of crediting period from the project are as provided below.

Years	Annual estimation of emission reductions in tonnes of CO2 e
2009	26,256
2010	26,256
2011	26,256
2012	26,256
2013	26,256
2014	26,256
2015	26,256
2016	26,256
2017	26,256
2018	26,256
Total estimated reductions (tones of CO2 e)	**262,560**
Total number of crediting years	**10y-0m**

Annual average over the crediting period of estimated reductions (tones of CO2 e)	26,256

In the above table, the year 2009 corresponds to the period starting from 01.01.2009 to 31.12.2009. Similar interpretation shall apply for remaining years.

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

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No public funding is involved in the project financing.

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

As per the Appendix C, paragraph 2 of the latest version of Simplified Modalities and Procedures for Small-Scale CDM project activities states:

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.

As there is no large scale or small scale registered CDM project with the same project category, project participants and technology/measure within 1km of project boundary, it is confirmed that the small scale project activity is not a de-bundled component.

SECTION B. Application of a baseline and monitoring methodology

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

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Title: Indicative simplified baseline and monitoring methodologies for selected Small-Scale CDM project activities.

Reference of project categories: Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

The project falls under the following categories:

Type:	III - Other Project Activities
Reference of the approved baseline methodology:	AMS III.H. / Version 09, EB 38
Title:	Methane Recovery in Wastewater Treatment
Sectoral scope:	13, Waste handling and disposal
Type:	I – Renewable Energy Projects
Reference of the approved baseline methodology:	AMS I.C. / Version 13, EB 38
Title:	Thermal Energy for the user with or with electricity
Sectoral scope:	1, Energy industries (renewable - / non-renewable sources)

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

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Appendix B of the simplified M&P for small-scale CDM project activities provides indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. As per the M&P, the project activity falls under the following approved small scale methodologies

AMS III. H - Methane recovery in waste water treatment and
AMS.I.C - Thermal Energy for the user with or with electricity.

Justification of the small scale project activity as per technology/measure of AMS III.H

Option (vi) of Paragraph 1: Introduction of a sequential stage of wastewater treatment with methane recovery and combustion, with or without sludge treatment, to an existing wastewater treatment system without methane recovery (e.g. introduction of treatment in an anaerobic reactor with methane recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).

The project activity proposed to substitute the anaerobic lagoons with closed anaerobic reactors to recover methane rich biogas and to utilize this biogas for thermal applications.

Paragraph 2 (a): The recovered methane from the above measures may also be utilized:

The project activity will use the recovered methane for thermal energy generation.

Paragraph 9: Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO2 equivalent annually.

The small scale project activity is the installation of "introduction of a sequential stage of wastewater treatment with methane recovery and combustion, with or without sludge treatment, to an existing Wastewater treatment system without methane recovery. The estimated annual emission Reductions of the project activity are less than 60 kt CO2 equivalent.

Justification of the small scale project activity as per technology/measure of AMS I.C.

TYPE I C: Thermal Energy for the user with or without electricity	This category comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels.	The project activity involves utilization of biogas generated from waste water treatment for fulfilling thermal energy requirements in the manufacturing plant. Biogas generated in the effluent treatment process would replace furnace oil.	YES
	Where thermal generation capacity is specified by the manufacturer, it shall be less than 45 MW.	The project activity falls within the small-scale rating as the thermal energy output is 2.267 MWth, i.e. below the 45 MW.	YES

B.3. Description of the project boundary:

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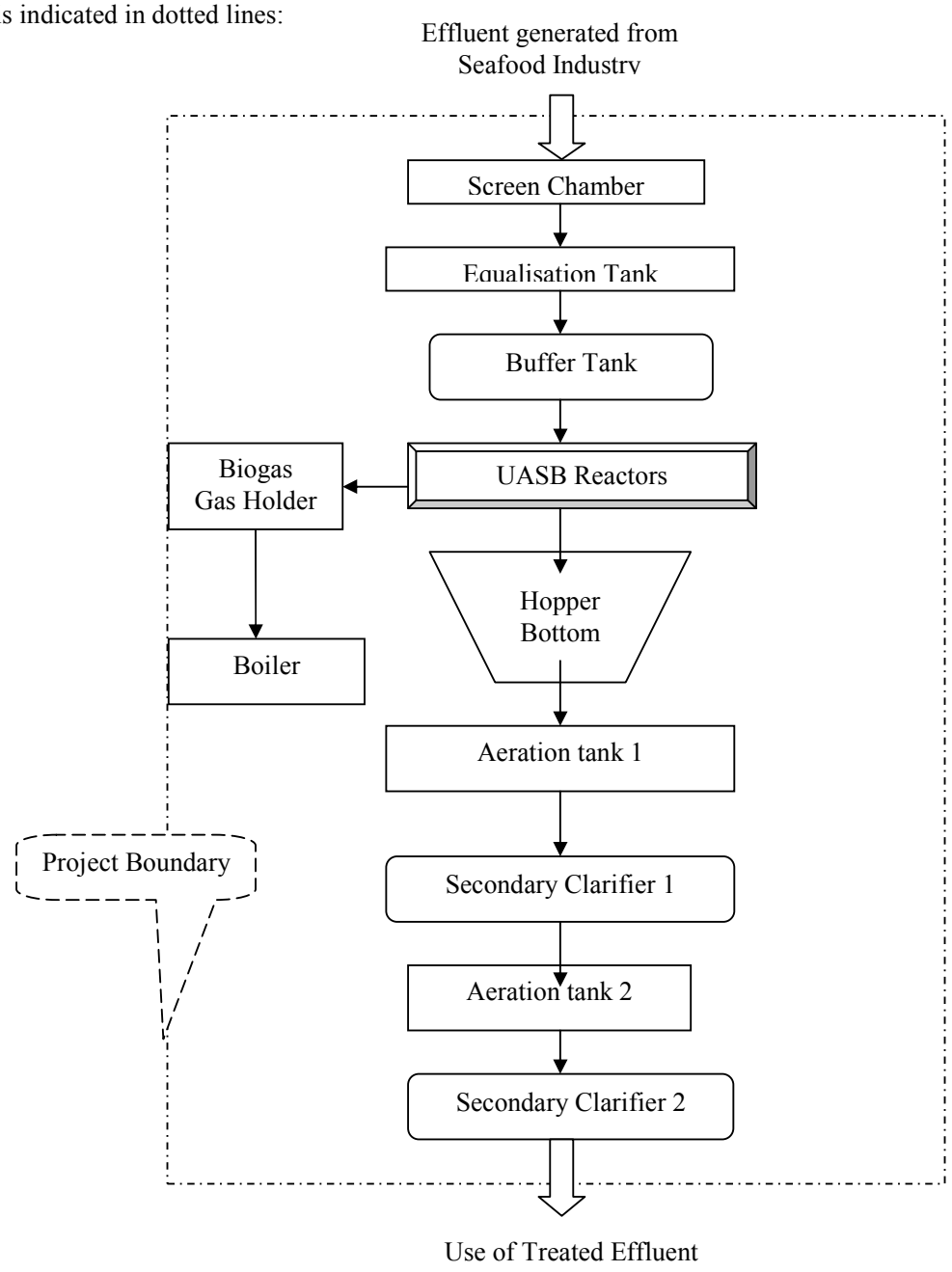
As mentioned in the Appendix B of the simplified modalities and procedures for small-scale projects, the project boundary encompasses the physical, geographical site of the Effluent Treatment Plant (ETP). For the proposed project the project boundary is from the point of entry of raw effluent into the Screen Chamber to the treated effluent generated from the Clarifier tank and till the point of thermal energy generation and consumed. The project boundary diagram is given as follows where the project boundary is indicated in dotted lines:



B.4. Description of baseline and its development:

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As per Annex 35 Indicative simplified baseline and monitoring methodologies for selected Small-Scale CDM project activity categories (version 11) of EB35, any type III Greenfield projects (new facilities): can use a 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 III Small-Scale methodology. The demonstration should include the assessment of the alternatives of the project activity.

The project has adopted steps 1 to 3 of the latest version of "Combined Tool to identify the baseline scenario and demonstrate additionality"[1] to identify the baseline scenario

As per the decision by the EB on its 38th meeting under Para 57 specified that by including eligibility criteria based on test using relevant sections of the combined tool to identify the baseline scenario and demonstrate additionality

For the following reasons GMEPL opted to assess the alternatives available for the project activity through the EB 38th decision.

1. Increase in effluent load due to increase in production capacity

2. Change in the location of the plant – decommission of the existing plant and the activity was shifted to a new location.

The determination of the baseline scenario requires the following methodological procedures as stated in the tool:

STEP 1. Identification of alternative scenarios
STEP 2. Barrier analysis
STEP 3. Investment analysis

STEP 1. Identification of alternative scenarios
This step serves to identify all alternative scenarios to the proposed CDM project activity(s) that can be the baseline scenario through the following sub-steps:

Step 1a. Define alternative scenarios to the proposed CDM project activity

The identified alternative scenarios those are available to the project participant:

a) The proposed project activity undertaken without being registered as a CDM project activity;
b) All other plausible and credible alternative scenarios to the project activity scenario, including the common practices in the relevant sector, examples of scenarios identified in the underlying methodology III.H.
c) If applicable, continuation of the current situation and, where relevant, the "proposed project activity undertaken without being registered as a CDM project activity" undertaken at a later

[1] http://cdm.unfccc.int/methodologies/Tools/EB28_repan14_Combined_tool_rev_2.1.pdf

point in time (e.g. due to existing regulations, end-of-life of existing equipment, financing aspects)

Analysis of the alternative scenarios:

Option a: The proposed project activity not undertaken as a CDM project activity

The project participant does not have any prior experience in implementation and operation of the methane recovery and utilization of recovered biogas for thermal energy generation. Project participant is a pioneer in seafood industry. The capture of biogas & utilization of captured biogas as a fuel for thermal purpose is a new concept in seafood industry in India. The technology is less popularly known in seafood industry in India & in the state of Maharashtra. It involves more risks due to the performance uncertainty or low market share. Performance uncertainty is due to relatively smaller quantity of biogas generation and its usage for heat generation, uncertainties related to quantum of methane in biogas, efficiency of the equipments, and requirement of skilled manpower.

These factors bothered the promoter to go for the project activity and were reluctance to set up the project activity, primarily on account of the risks involved in initial investment and as well the technology accessibility is not that prevalent. In fact it was only when the CDM related revenue was highlighted to the investor group and concrete offers were produced to the promoter, the promoter greed to invest the equity component required to fund the project activity. Otherwise, the investors were of the opinion that the project was very risky and preferred to continue the current practice.

No industry has installed thermal energy generation system utilizing the recovered biogas as fuel the project activity is first of its kind initiative in seafood industry in the state as well in the country wherein wastewater from seafood manufacturing would be treated in a UASB digester and gas liberated would be recovered and burnt. The small scale project activity is not a common prevailing practice.

In view of the above, it may be concluded that at the inception stage of project activity when the decision to proceed with the project was taken, the related CDM linked revenue were seriously considered and was a key factor responsible for the favorable decision.

Option b: All other plausible and credible alternative scenarios to the project activity scenarios identified in the underlying methodology III.H.

As per AMS III.H the potential alternative scenario that is available for the treatment of effluents (wastewater) other than the project activity are as follows: other alternative scenarios to the project activity identified comprise measures that recover methane from biogenic organic matter in by means of one of the following options:

(i) Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with methane recovery and combustion.
(ii) Introduction of anaerobic sludge treatment system with methane recovery and combustion to an existing wastewater treatment plant without sludge treatment.
(iii) Introduction of methane recovery and combustion to an existing sludge treatment system.
(iv) Introduction of methane recovery and combustion to an existing anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on site industrial plant.
(v) Introduction of anaerobic wastewater treatment with methane recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream.

(vi) Introduction of a sequential stage of wastewater treatment with methane recovery and combustion, with or without sludge treatment, to an existing wastewater treatment system without methane recovery (e.g. introduction of treatment in an anaerobic reactor with methane recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).

Option (i) Introduction of aerobic wastewater or sludge treatment systems is not applicable. Not possible based on the combined tool since the local regulation requires certain prescribed levels of BOD and COD, whereas this treatment system cannot reach those levels. Hence not an alternative.

Option (ii) is not applicable since the project activity is not a substitution of wastewater treatment with sludge disposal system. For the existing unit the PP is not having the sludge disposal system. The project proponent would have continued its current practice of existing for the new facility too. Hence this option of baseline cannot be an alternative to the new facility of project activity.

Option (iii) is not applicable since there is no sludge treatment system to the existing plant. The project proponent would have continued its current practice of existing for the new facility too. Hence this option of baseline cannot be an alternative to the new facility of project activity.

Option (iv) is not applicable. Project is an introduction of a sequential stage of wastewater treatment with methane recovery and combustion to an existing wastewater treatment system without methane recovery and moreover there will not be any sludge disposal system in absence of this project. Not eligible.

Option (v) is not applicable. The wastewater in absence of this project cannot be let untreated. As per the regulation the wastewater to be treated to meet the pollution control board limits and is then discharged into water courses. As per the substep 1(b) of the combined tools this is not applicable for the project activity. Since any alternatives that do not meet the local regulation can be removed from the plausible baseline condition. Hence not an alternative.

Option (vi) is applicable and is likely alternative scenario.

This is a credible baseline alternative:

1. Common practice in the sector:
2. Earlier experience in operating similar plant:
3. No problem in operating the plant without any trouble because the team has already working on similar technology of lesser scale of production.
4. Experience in the Pilot plant

The project activity proposed to substitute the anaerobic lagoons with closed anaerobic reactors to recover methane rich biogas and to utilize this biogas for thermal applications. The small scale project activity is the installation of “introduction of a sequential stage of wastewater treatment with methane recovery and combustion, with or without sludge treatment, to an existing Wastewater treatment system without methane recovery. At the same time the project activity also involves utilization of biogas generated from waste water treatment for fulfilling thermal energy requirements in the manufacturing plant. Biogas generated in the effluent treatment process would replace furnace oil. Therefore the baseline emissions are the emissions from amount of furnace oil displaced.

Option c: Continuation of the current situation and the "proposed project activity undertaken without being registered as a CDM project activity" undertaken at a later point in time (e.g. due to existing regulations, end-of-life of existing equipment, financing aspects)

Continuation of current situation (treatment of wastewater in anaerobic lagoon) is not a setback for the project proponent. The implementation of the methane recovery and utilization of recovered biogas for thermal energy generation is a voluntary step undertaken by GMEPL with no direct or indirect mandate by law. The main driving forces to this 'Climate change initiative' are GHG reduction by capturing methane rich biogas being emitted from lagoons and GHG reduction by producing thermal energy from captured methane rich biogas and thus displacing the fossil fuel as well the demonstration of such projects would educate other entrepreneurs too.

Outcome of Step 1a: Thus the option (a) and (c) can be the most plausible scenarios, to undertake this project as a non-CDM project was/is not a viable baseline scenario.

STEP 2. Barrier analysis and STEP 3. Investment analyses are detailed in subsequent section.

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:

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In the absence of the proposed CDM project activity, the wastewater with the chemical content from seafood manufacturing unit would have treated in open anaerobic lagoons were consistently meeting the environmental norms and hence there was no drive for the project proponent to implement the complex to operate anaerobic reactors. Also without the project activity the plant would have used furnace oil for meeting thermal requirements.

The implementation of the methane recovery and utilization of recovered biogas for thermal energy generation is a voluntary step undertaken by GMEPL with no direct or indirect mandate by law. The main driving forces to this 'Climate change initiative' are GHG reduction by capturing methane rich biogas being emitted from lagoons and GHG reduction by producing thermal energy from captured methane rich biogas and thus displacing the fossil fuel as well the demonstration of such projects would educate other entrepreneurs too.

The project proponent was aware of the various barriers associated to project implementation. But it was felt that the availability of carbon financing against a sale consideration of emission reductions generated due to project activity would help to overcome these barriers.

As per the attachment A to Appendix B of the simplified M&P for small-scale CDM project activities of the UNFCCC CDM website, to prove that the project is an additional, explanation regarding the project activity would not have occurred anyway due to at least one of the following barriers is required:
- Investment barriers
- Technological barriers
- Barrier due to prevailing practice
- Other barriers

Methane capture and using for internal thermal energy generation project had its own barriers for implementation, which had to be overcome by GMEPL to implement the project activity and to reduce green house gas emissions. The perceived risks and barriers to the project activity are discussed below:

Investment barrier

GMEPL being conscious about the responsibilities towards environment and adopted the process of controlled decomposition of effluent in a digester and capture of the methane generated. The biggest barrier for the implementation of the project was the investment cost. The capital cost of the anaerobic lagoons and the treatment systems is INR 0.9Million where as the capital cost of the methane recovery system and thermal unit is INR.49.53 Million.

The high investment cost is a barrier for the small scale project activity. This is a substantial investment for GMEPL considering that there were no great returns from the project activity. The project activity requires more investment on managerial intervention and operation & maintenance controls of the technology. It also has to invest in other related facilities such as laboratory infrastructure at the site for the analysis of wastes, production & control of bacteria for the digester and suitably skilled human resource. The project developer envisaged the project in order to improve the standard of wastewater treatment and reduce greenhouse gas emissions.

A financial analysis was thus conducted for the project with and without CDM revenues in order to assess the project IRR as the financial indicator of the project. The results of this analysis are presented in the table below:

• The project has become feasible after accounting for benefits from carbon credits

Summary of Financial Analysis	
Total project Cost	49.53 Million INR
Means of financing	30 % Equity, 70 % Debt
Project IRR without CERs	7.84 %
Project IRR with CERs	21.72%
WACC	13.31%

Operation and Maintenance costs

The operation and maintenance costs are high for UASB based systems as compared to anaerobic lagoons. In case of anaerobic lagoons there are very little O&M costs as wastewater is just led into lagoons. No chemicals, nutrients, manpower is required to maintain the lagoons. Whereas incase of anaerobic digesters neutralizing chemicals, nutrients and skilled manpower would be required for optimum performance of the UASB digesters. Also, skilled and trained manpower would be required to continuously monitor the operating parameters of the anaerobic digestion process and energy generation system.

Technological barrier

Wastewater treatment in seafood industry is first of its kind in India. GMEPL do not have any prior experience for operating such processes. The capture of biogas & utilization of captured biogas as a fuel for thermal purpose is a new concept in seafood industry in India. The technology is less popularly known in seafood industry in India & in the state of Maharashtra. It involves more risks due to the performance uncertainty or low market share. Performance uncertainty is due to relatively smaller

quantity of biogas generation and its usage for heat generation, uncertainties related to quantum of methane in biogas, efficiency of the equipments, and requirement of skilled manpower.

The project activity involves treatment of the effluent anaerobically in an UASB bioreactor where few factors that need to be considered i.e. organic loading, start up period, requirement of culture of micro organisms in controlled atmosphere, maintaining adequate temperature and pH levels. The core area of business of the project developer is the production of surimi. Their expertise therefore lies in this area of business and this fact results in the lack of experience of the project developer with wastewater treatment technologies that generate biogas for use in boilers. GMEPL lack of familiarity in handling and managing biogas presents a technical barrier to the development of the project. This needs in-depth understanding of the process and its controls, which requires continuous supervision and involvement of very high degree of technological intervention. Improper selection of key equipments would hamper the project activity. The project developer had to hire additional experienced staff in order to operate the newly installed plant. In comparison, the business as usual scenario of anaerobic lagoons did not require any additional staff or training.

An existing pilot project similar to the project activity (three year trial run) discovered that biogas plant performance is very sensitive subjected to different variables including load rate, mixing etc. GMEPL through information spreading, research activity, testing and setting up of a prior pilot plant taking into consideration the potential CDM incentives to be available for the project activity recognizing the nature of the project activity and the associated barriers to be overcome by the same in terms of its uniqueness in its application towards effective management of the effluent loading.

Operational risk also involves need for more safety precautions due to usage of gas, skilled manpower to operate the system due to gas handling, also the entire system of manufacturing process indirectly operates on gas & hence there is problem of stoppage of operation of the process in case of any disruption in gas supply thereby resulting in significant production losses to the company.

Barrier due to Prevailing Practice

As mentioned earlier the existing activity is a less popularly known technology in seafood industry not only in the state of Maharashtra but also in India. But the prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher GHG emissions. Prevailing practice in the region is use of furnace oil. Barrier due to technological acceptance, risk of short supply of biogas, prevailing practices and regulatory circumstances would have led continuous release of methane in the atmosphere & also continuous furnace oil consumption, which emits higher GHG emissions.

In Maharashtra there are 17 seafood processing plants. Among them GMEPL shall be the first to have an effluent treatment system in Seafood industry. The state-wise summary of the list of approved Seafood processing units to EU given as follows[2]:

Maritime State	PP	PPa	A	Total
Gujarat		17	1	18
Maharashtra		17	0	17
Karnataka	6	1	0	7

[2] http://www.mpeda.com/firstpage/eu2000/eu2000.htm

Kerala	42	13	15	70
Tamil Nadu		18	0	18
Andhra Pradesh		27	0	27
Orissa		6	0	6
West Bengal		5	1	6
Total	48	104	**17**	**169**

PP	Processing Plant
PPa	Processing Plant engaged in processing fully or partially farm raised materials
CS	Exclusive Cold Storage facility for F&FP

GMEPL is the only one seafood producing industry in the sector in the state of Mahrashtra. Similarly, most of the seafood industries in other states of India treat the wastewater in open anaerobic lagoons. No industry has installed thermal energy generation system utilising the recovered biogas as fuel the project activity is first of its kind initiative in seafood industry in the state aswell in the country wherein wastewater from seafood manufacturing would be treated in a UASB digester and gas liberated would be recovered and burnt.

The above shows that the small scale project activity is not a common prevailing practice.

Other barriers

Production Risk
GMEPL has planned to install an Effluent Treatment Plant (ETP) in order to generate biogas and use the biogas as fuel in meeting its thermal requirements for its manufacturing process. The effluent quantity that would be treated in the ETP would depend on the production targets of the Seafood industry. Variations in the quality will become a bottleneck for the treatment plant in order to achieve the water suitable for recycling. The operation of the manufacturing plant would solely depend on the biogas generation. Therefore profitability of plant depends on biogas generation. Variations in quality and quantity of production of effluent produced would lead to fluctuations in production of the plant. Thus this project activity would involve uncertainties regarding the production.

Managerial Risk
Since the Effluent treatment in seafood industry is first of its kind there was no prior experience in operation and maintenance of the equipments of the Effluent treatment plant. For proper operation of the Effluent treatment plant well experienced engineers are needed to be appointed. The plant operating and maintenance personnel must be trained before the plant commissioning. The objective of the training programme must be to equip each individual to carry out his particular function with skill and confidence. The training programme shall be based on the classification of the main functions as operation and maintenance, and within the main classification, designed to cater to engineers, supervisors, skilled workers etc. The appointment of skilled individuals and implementation of proper training programme would require lot of investment which would not be an economically feasible option.

Impact of CDM registration

The registration of this CDM project activity, will contribute to overcome all the perceived risks and barriers. Technological, production and investment barriers will all be significantly mitigated on account of the additional revenue generation from the sale of carbon credits. This would also bring more solidity to the investment.

As mentioned in earlier steps that the project is additional and the anthropogenic emissions of GHGs produced from sources will be reduced below the levels of emissions that occurred in absence of the project activity. But the risks and costs of this project is much higher than its benefits. The registration of the CDM project will alleviate the identified barriers by providing additional revenue to the plant by sale of emission reductions.

Thus the project can not proceed on a business-as-usual basis.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The project activity involves installation of closed anaerobic digesters where the wastewater is treated to recover methane rich biogas and utilize the biogas to generate thermal energy.

The first component is the anaerobic digestion of organic wastewater replacing existing anaerobic lagoon treatment system to recover methane. The baseline is the methane generation potential of the untreated wastewater in the absence of the project activity.

The second component of the project activity is generation of thermal energy utilizing the renewable source of methane, displacing the furnace oil. The baseline is the amount of CO2 emissions that would have occurred due to equivalent amount of thermal energy generated by fossil fuel.

Hence, emission reductions of the project activity are the sum of emission reductions of methane recovery system and thermal generation system.

Baseline emissions

The baseline emissions from the methane generation potential is calculated by using the formula given in section 13 (d) of AMS III .H is given below :

BEy(i) = Qy, ww, * CODy, ww, untreated * Bo, ww, * MCFww, treatment * GWP_CH4

BEy(i) is baseline emissions in the year “y” (ton CO2e)

Q y, ww is volume of wastewater treated in the year “y” (m3/year) which is calculated by multiplying volume of wastewater generated per day and number of operating days in a year.

COD y, ww, untreated is chemical oxygen demand of the wastewater entering the anaerobic reactor in the year, “y” (tons/m3). This parameter is being analysed regularly by the project proponents in tonnes/m3. Average value shall be used for estimation of ex-ante calculations and actual value would be used during monitoring and estimation of emission reductions of the project activity.

Bo, ww is the methane producing capacity of the wastewater (ton CH4/ton COD). IPCC default value is of 0.21 tCH4/tCOD would be adopted.

MCF ww, treatment is the methane correction factor for the existing wastewater treatment system to which the sequential anaerobic treatment step is being introduced (MCF lower value in Table III.H.1). The existing wastewater treatment system is anaerobic lagoon. The MCF value in Table III.H.1 is 0.8 is preferred.

GWP_CH4 is the Global Warming Potential of methane (21 ton CO2e / ton CH4)

Project Activity Direct Emissions

The project activity emissions consist of:

PEy (i) = PEy, power + PEy,ww,treated + PEy,s,final + PEy,fugitive + PEy,dissolved

Where:

PEy (i) :	project activity emissions in the year "y" (tonnes of CO2 equivalent)
PEy,power	emissions through electricity or diesel consumption in the year "y"
PEy,ww,treated	emissions through degradable organic carbon in treated wastewater in year "y"
PEy,s,final	emissions through anaerobic decay of the final sludge produced in the year y". If the sludge is controlled combusted, disposed in a landfill with methane recovery, or used for soil application, this term can be neglected, and the destiny of the final sludge will be monitored during the crediting period.
PEy,fugitive	emissions through methane release in capture and flare systems in year "y".
PEy,dissolved	emissions through dissolved methane in treated wastewater in year "y"

(i) PEy, power = Electric power required (MU) * Grid emission factor

(ii) PEy,ww,treated = Qy,ww * CODy,ww,treated * Bo,ww * MCFww * GWP_CH4

Where:

Qy,ww	volume of wastewater treated in the year "y" (m3)
CODy,ww,treated	chemical oxygen demand of the treated wastewater in the year "y" (tonnes/m3)
Bo,ww	methane producing capacity of the wastewater (IPCC default value for domestic wastewater of 0.21 kg CH_4/kg.COD)
MCFww,final	methane correction factor based on type of treatment and discharge pathway of the wastewater (fraction)(MCF Higher Value in table IIIH.1 for sea, river and lake discharge i.e 0.2).
GWP_CH4	Global Warming Potential for CH4 (value of 21 is used

(iii) PEy,s,final = Sy,final * DOCy,s,final * MCFs,final * DOCF * F * 16/12 * GWP_CH4

Where:

PEy,s,final	Methane emissions from the anaerobic decay of the final sludge generated in the wastewater system in the year "y" (tonnes of CO2 equivalent)
Sy,final	Amount of final sludge generated by the wastewater treatment in the year y

(tonnes).

DOCy,s,final	Degradable organic content of the final sludge generated by the wastewater treatment in the year y (fraction). It shall be measured by sampling and analysis of slugde produced, and estimated ex-ante using the IPCC default dry matter content of 10 percent) or 0.09 for industrial sludge (wet basis, assuming dry matter content of 35 percent)
MCFs,final	Methane correction factor of the landfill that receives the final sludge, estimated as described in category AMS III.G
DOC_F	Fraction of DOC dissimilated to biogas (IPCC default value is 0.5).
F	Fraction of CH4 in landfill gas (IPCC default is 0.5).

(iv) PEy,fugitive = PEy,fugitive,ww + PEy,fugitive,s

Where:

PEy,fugitive,ww	Fugitive emissions through capture and flare inefficiencies in the anaerobic Wastewater treatment in the year "y" (tonnes of CO2 equivalent)
PEy,fugitive,s	Fugitive emissions through capture and flare inefficiencies in the anaerobic sludge treatment in the year "y" (tonnes of CO2 equivalent)

PEy,fugitive,ww = (1 – CFEww) * MEPy,ww,treatment * GWP_CH4

Where:

CFEww	capture and flare efficiency of the methane recovery and combustion equipment in the wastewater treatment (a default value of 0.9 shall be used, given no other appropriate value)
MEPy,ww,treatment	methane emission potential of the untreated wastewater in the year "y" (tonnes)

MEPy,ww,treatment = Qy,ww * CODy,ww,untreated * Bo,ww * MCFww,untreated

Where:

CODy,ww,untreated	Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year "y" (tonnes/m3)
MCFww,untreated	methane correction factor for the wastewater treatment system that will be equipped with methane recovery and combustion(MCF higher values in table III.H.1)

PEy,fugitive,s = (1 – CFEs) * MEPy,s,treatment * GWP_CH4

where:

CFEs	capture and flare efficiency of the methane recovery and combustion equipment in the sludge treatment (a default value of 0.9 shall be used, given no other appropriate value)
MEPy,s,treatment	methane emission potential of the sludge treatment system in the year "y"(tonnes)

MEPy,s,treatment = Sy,untreated * DOCy,s,untreated * DOCF * F * 16/12 * MCFs,treatment

where:

Sy,untreated	amount of untreated sludge generated in the year "y" (tonnes)
DOCy,s,untreated	Degradable organic content of the untreated sludge generated in the year y (fraction). It shall be measured by sampling and analysis of the sludge produced, and estimated ex-ante using the IPCC default values of 0.05 for domestic sludge (wet basis, considering a default dry matter content of 35 percent)
MCFs,treatment	methane correction factor for the sludge treatment system that will be equipped with methane recovery and combustion (MCF Higher value of 1.0 as per table III.H.1)

(v) PEy,dissolved = Qy,ww * [CH4]y,ww,treated * GWP_CH4

where:

[CH4]y,ww,treated	dissolved methane content in the treated wastewater (tonnes/m3). In aerobic wastewater treatment default value is zero, in anaerobic treatment it can be measured, or a default value of 10e-4 tonnes/m3 can be used.

Therefore,
PEy (i) = PEy, power + PEy,ww,treated + PEy,s,final + PEy,fugitive + PEy,dissolved

Leakage

Leakage effects are not considered because there is no transfer of equipment from another activity and no transfer of existing equipment to another activity.

Emission Reductions: ERy (i) = BEy (i) – PEy (i) - Leakage

The baseline emission from displacing the furnace oil with biogas for thermal energy generation is calculated by using the formula given in section 6 of AMS I.C is given below:

AMS.I.C paragraph 6 states: "For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used".

BEy(ii)	=	Quantity of furnace oil saving per year (KL)	*	emission co-efficient of the fuel oil saved (tCO_2/tonne fuel)

Project Emissions: Project activity includes the emissions that will occur due to combustion of biogas at the project site and electricity consumption of the project. Since this combustion and auxiliary consumption are already included in the project emissions in methane recovery system, the project emissions due to the same are not considered. Hence, Project Emissions from this component are considered zero.

Leakage: The project will not give rise to any leakage. Leakage is not considered because there is no transfer of energy generating equipment from another project activity and no transfer of existing energy equipment to another activity. And there is no potential source of leakage for this project activity since there is no increase in emissions from fossil fuel combustion or other sources due to diversion of biomass from other uses to the project plant as a result of the project activity. Hence leakage from this component is zero.

Emission Reductions are calculated as ERy (ii) = BEy(ii) – PEy (ii)- Leakage

Emission Reductions: ERy = ERy (i) + ERy (ii)

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

(Copy this table for each data and parameter)

Data / Parameter:	EFy
Data unit:	ton CO2/ MWh
Description:	Electricity baseline emission factor of the grid
Source of data used:	Website of Central Electricity Authority. www.cea.nic.in
Value applied:	0.8314
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is required to estimate project activity emissions due to electricity consumed by the facilities in the wastewater treatment and thermal generation plant. The latest official baseline emission factor of the western regional grid from Central Electricity Authority, Government of India.
Any comment:	-

Data / Parameter:	NCV of the fossil fuel combusted
Data unit:	Kcal/Kg
Description:	NCV of the fossil fuel combusted
Source of data used:	National available data (energy management training annexure)
Value applied:	10,050
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is required to estimate baseline emissions due to the combustion of fossil fuel in absence of the project activity.
Any comment:	-

Data / Parameter:	Emission co-efficient of the fuel oil saved
Data unit:	tCO2/ton of fuel
Description:	Qty of CO_2 emitted in tones per tone of fuel oil burned
Source of data used:	National available data and 2006 IPCC guidelines for National Greenhouse Gas

	Inventories
Value applied:	3.2555
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is required to estimate the baseline emissions due to the combustion of fossil fuel in absence of the project activity. CO_2 emission factor for FO has been calculated from NCV of fuel and IPCC default values available.
Any comment:	Referring table 1.4 of chapter 2 of volume 2 of 2006 IPCC guidelines, value for carbon emission factor for FO is 21kg/GJ, and NCV of 10,050kcal/kg which is equal to 3.255tCO_2/ton of fuel

B.6.3 Ex-ante calculation of emission reductions:

>>

Baseline emissions:

The baseline emissions from the methane generation potential is calculated by using the formula given in section 13 (d) of AMS III .H is given below :

BEy(i) = Qy, ww, * CODy, ww, untreated * Bo, ww, * MCFww, treatment * GWP_CH4

BEy(i) = 6,00,000 * 0.013* 0.21 * 0.8 * 21 = 27,518 tCO2/yr

BEy (i) = 27,518 tCO2/yr

Project Emissions

PEy (i) = PEy, power + PEy,ww,treated + PEy,s,final + PEy,fugitive + PEy,dissolved

(i) PEy, power = Electric power consumed (GWh) * Grid emission factor (tCO2e/GWh)

PEy, power = 1.177 * 831.4 = 978.5 tCO2/yr

(ii) PEy,ww,treated = Qy,ww * CODy,ww,treated * Bo,ww * MCFww * GWP_CH4

PEy,ww,treated = 6,00,000 * 0.00025 * 0.21 * 0.2 * 21 = 132.3 tCO2/yr

(iii) PEy,s,final = Sy,final * DOCy,s,final * MCFs,final * DOCF * F * 16/12 * GWP_CH4

Since the final sludge generated by the treatment systems are not treated anaerobically, this is not applicable and hence PEy, s, final is zero.

PEy,s,final = 0 tCO2/yr

(iv) PEy,fugitive = PEy,fugitive,ww + PEy,fugitive,s

PEy,fugitive,ww = (1 – CFEww) * MEPy,ww,treatment * GWP_CH4

PEy,fugitive,ww = 3,440 tCO2/yr

PEy,fugitive,s = 0 tCO2/yr

PEy,fugitive = 3,440 tCO2/yr

(v) PEy,dissolved = Qy,ww * [CH4]y,ww,treated * GWP_CH4

PEy,dissolved = 6,00,000*0.0001*21 = 1,260 tCO2/yr

Therefore,
PEy (i) = PEy, power + PEy,ww,treated + PEy,s,final + PEy,fugitive + PEy,dissolved

PEy (i) = 978.5 + 132.3 + 0 + 3,440 + 1,260 = 5,810 tCO2/yr

PEy (i) = 5,810 tCO2/yr

Leakage

Leakage effects are not considered because there is no transfer of equipment from another activity and no transfer of existing equipment to another activity.

Emission Reductions: ERy (i) = BEy (i) – PEy (i) - Leakage

ERy (i) = 27,518 – 5,810- 0

ERy (i) = 21,708 tCO2/yr

Baseline emissions:

The baseline emission from displacing the furnace oil with biogas for thermal energy generation is calculated by using the formula given in section 6 of AMS I.C is given below:

BEy(ii) = Quantity of furnace oil saving per year (tones/yr) * emission co-efficient of the fuel oil saved (tCO_2/tonne fuel)

BEy(ii) = 1,397 * 3.255 = 4,548 tCO2/yr

Project Emissions: Project activity includes the emissions that will occur due to combustion of biogas at the project site and electricity consumption of the project. Since this combustion and auxiliary

consumption are already included in the project emissions in methane recovery system, the project emissions due to the same are not considered. Hence, Project Emissions from this component are considered zero.

Leakage: The project will not give rise to any leakage. Leakage is not considered because there is no transfer of energy generating equipment from another project activity and no transfer of existing energy equipment to another activity. And there is no potential source of leakage for this project activity since there is no increase in emissions from fossil fuel combustion or other sources due to diversion of biomass from other uses to the project plant as a result of the project activity. Hence leakage from this component is zero.

Emission Reductions are calculated as ERy (ii) = BEy(ii) – PEy (ii)- Leakage

Emission Reductions: ERy = ERy (i) + ERy (ii) = 21,708 + 4,548 = 26,256 tCO2/yr

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

>>

Year	Project activity Emissions (tCO_2/yr)	Baseline Emissions (tCO_2/yr)	Leakage (tCO_2/yr)	Emission Reductions (tCO_2/yr)
2009	5,810	32,066	0	26,256
2010	5,810	32,066	0	26,256
2011	5,810	32,066	0	26,256
2012	5,810	32,066	0	26,256
2013	5,810	32,066	0	26,256
2014	5,810	32,066	0	26,256
2015	5,810	32,066	0	26,256
2016	5,810	32,066	0	26,256
2017	5,810	32,066	0	26,256
2018	5,810	32,066	0	26,256

In the above table, the year 2009 corresponds to the period starting from 01.01.2009 to 31.12.2009. Similar interpretation shall apply for remaining years.

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	Volume of wastewater (Qy,ww)
Data unit:	m3
Description:	Volume of wastewater entering the wastewater treatment plant
Source of data to be used:	Plant records on Actual measurements
Value of data	6,00,000
Description of	Value of data would be used to calculate project emissions and baseline

measurement methods and procedures to be applied:	emissions. Flow meter would be used to measure the volume of wastewater entering the treatment plant and readings would be recoded and archived electronically for the entire crediting period and two years thereafter.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	

Data / Parameter:	COD of Effluent, COD y, ww, untreated
Data unit:	mg/L
Description:	Chemical Oxygen Demand of the untreated wastewater
Source of data to be used:	Actual in-house lab measurements at the plant
Value of data	13,000
Description of measurement methods and procedures to be applied:	Value of data would be used to calculate project emissions and the baseline emissions. COD would be analyzed in the in-house lab by industrial accepted standards and archived electronically for the entire crediting period and two years thereafter. Average yearly values would be adopted for estimation of emissions.
QA/QC procedures to be applied:	COD of the untreated wastewater would be analyzed in external accredited laboratories once in a year as per the agreed terms with the project proponent.
Any comment:	

Data / Parameter:	COD of treated wastewater, COD y, ww, treated
Data unit:	mg/L
Description:	Chemical Oxygen Demand of the treated wastewater leaving the treatment plant
Source of data to be used:	Actual in-house lab measurements at the plant
Value of data	250
Description of measurement methods and procedures to be applied:	Value of data would be used to calculate project emissions and the baseline emissions. COD would be analyzed in the in-house lab by industrial accepted standards and archived electronically for the entire crediting period and two years thereafter. Average yearly values would be adopted for estimation of emissions.
QA/QC procedures to be applied:	COD of the untreated wastewater would be analyzed in external accredited laboratories once in a year as per the agreed terms with the project proponent.
Any comment:	

Data / Parameter:	Ey, consumed
Data unit:	GWh
Description:	Electricity consumed by the project activity from the grid
Source of data to be used:	Actual Plant records
Value of data	1.177
Description of measurement methods and procedures to be applied:	Data is required to estimate project activity emissions for estimating emissions due to electricity consumed by the facilities in the wastewater treatment plant. Electricity is consumed from the grid will be measured using electricity meters installed in the plant, project emissions due to electricity consumption would be

	recorded and archived in electronic & paper form for the entire crediting period and two years thereafter.
QA/QC procedures to be applied:	Monthly electricity consumption data of the installations in the wastewater treatment plant shall be recorded. Meters will be calibrated and checked for accuracy as per suggestions given by the electricity board as per standards.
Any comment:	-

Data / Parameter:	Q y, biogas
Data unit:	m3/day
Description:	Volume of biogas generated
Source of data to be used:	Actual Plant records
Value of data	10,400
Description of measurement methods and procedures to be applied:	The data would be measured by continuous flow meters and recorded. The data would be electronically archived for the entire crediting period and two years thereafter.
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards.
Any comment:	

Data / Parameter:	Q_{FO}
Data unit:	KL/day
Description:	Volume of fuel oil replaced with biogas generated in the project activity
Source of data to be used:	Calculated value from actual measured amount of biogas
Value of data	4.987
Description of measurement methods and procedures to be applied:	The data would be based on measured biogas by continuous flow meters and recorded. The data is calculated and would be electronically archived for the entire crediting period and two years thereafter.
QA/QC procedures to be applied:	-
Any comment:	-

B.7.2 Description of the monitoring plan:

>>

GMEPL has a well defined mechanism for monitoring the emission reductions. It has system in place wherein all the inputs to the complex including raw materials, supplies, components, accessories etc. would be recorded and archived. The operating parameters are measured regularly and recorded in appropriate record books. The records and electronic data would be maintained and validated regularly by GMEPL's internal auditors.

The operational and management structure basically consists of three levels:

A. Project Owner:
B. Project Manager
C. Project Operator

A. Project Owner
The project activity is represented by the owner of the project, which is GMEPL Management.
Their specific responsibilities:

1. Handling of the project performances
2. Ensure that recording & monitoring procedure followed at the project site is in line with the verification requirement of the project
3. To keep the records of the data monitored by outside agencies.
4. To provide the records of the data monitored by outside agencies to Project Operator.

B. Project Manager:
His specific responsibilities:

1. Appointment of Project Operators
2. Ensure that Project Operators have undergone initial training to create awareness about the process
3. Assure that the Project Operators have received proper training regarding the process
4. To direct the project operators on key maintenance aspects
5. Ensure proper & timely calibration of the monitoring equipment & also the data acquisition
6. Ensure that annual monitoring report is as per requirement of the verification of the project.
7. Submission of the annual monitoring report for verification to the Designated Operational Entity (DOE)
8. To take the corrective action in case of deviation in data recording while monitoring the project.

C. Project Operator: Their specific responsibilities:

1. Collect the necessary data as required by the monitoring methodology
2. Store relevant data in a systematic & reliable way in logbook (paper) and spread sheet (electronic)
3. Keep the record of all the collected data in a logbook for at least three years and in a spread sheet for at least twelve years
4. Reporting & recording of any distinguishing event as a special log
5. Ensure that the data is entered properly and take proper care to avoid any loss of information
6. Evaluate the monitored data regularly & ensure the availability of pertinent information for verification
7. Prepare the annual monitoring report
8. Check that CER calculation is carried out as per the monitoring methodology. Submit the annual monitoring report to the Project Manager

Training of personnel

The technology provider for the methane recovery system will train the personnel of GMEPL in operation, trouble shooting and maintenance of the methane recovery system. The personnel from technology provider will visit the site after commissioning of the methane recovery system. During that period, GMEPL‘s personnel will be trained in operation, maintenance, trouble shooting, analysis of operating parameters, measuring COD, analysis of biogas and other safety measures of the anaerobic digestion plant. The plant operators run the plant on a day today basis and are assisted by the technicians for maintenance of mechanical and electrical installations in the plant. A chemist would be available in each shift for analysis of all operating parameters like COD, biogas, etc, The technicians will be responsible for maintenance of equipment and installations in the anaerobic digestion plant. Any break

down shall be recorded with details like type of break down, trouble shooting done, etc., and verified by the Project Manager.

Data monitoring

Records shall be maintained for quantity of waste water entering the digesters/day, its COD, gas flowing to thermal energy generation, gas to flare etc., All these records shall be verified by Project Manager and after verification and approval shall be maintained in electronic form as per monitoring methodology. The records shall be maintained in office cum laboratory of the anaerobic digestion plant. A back up shall be created in electronic form for all the records and maintained for two years after last issuance of CERs. The monitoring parameters like COD of wastewater entering digesters, COD of wastewater leaving the digesters, flow of wastewater entering digesters, methane content of biogas etc., shall be measured and recorded by the chemists. These parameters shall be checked by Project Manager. After approval by the Project Manager, these values shall be maintained in electronic form till two years after the last issuance of CERs.

QA/QC procedures

All instruments like wastewater flow meter, gas flow meters, temperature and pressure measuring instruments, Gas analyser shall be calibrated as per manufacturers' recommendations. The flow meters shall be calibrated as per international/ manufacturers' recommendations

Internal Audits

All reported results and measurements shall be periodically reviewed by Project Owner and any discrepancy shall be corrected with authorization from Project Owner.

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

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Date of completion and application of baseline and monitoring methodology: 10/03/2008
Name of responsible person/entity: Gadre Marine Export Pvt Ltd.
Detailed contact Address of the project participant is given in Annex 1.

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:

>>
02/12/2005

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

>>
25y-0m

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:

>>
Not Applicable

C.2.1.2. Length of the first crediting period:

>>
Not Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/01/2009 (or from the date of registration)

C.2.2.2. Length:

>>
10y-0m

SECTION D. Environmental impacts

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

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The environmental regulations of the Host Party are regulated by Ministry of Environment and Forests, (MoEF), Government of India which is also the DNA for the project activity. MoEF fixes the rules and regulations for environmental norms. Each state of the country has a "State Pollution Control Board (SPCB)" to enforce, monitor and ensure compliance of the environmental norms by industries, and other commercial establishments.

Maharashtra State Pollution Control Board (MSPCB) is the local environmental authority for the project activity. As per MSPCB, each industry has to obtain Consent under Water (Prevention and Control of Pollution) Act, 1974 and Consent for Operation under Air (Prevention and Control of Pollution) Act, 1981. GMEPL has valid "Consents" under Water and Air Acts. GMEPL has been complying with all environmental requirements and has been operating with valid consents from environmental authorities.

However, a brief analysis of environmental impacts associated with the project activity is discussed below during construction and during operation phase

The project activity involves installation of an Effluent treatment plant which is aiming at anaerobic treatment of effluent under controlled conditions generating water suitable for recycle. In the process of the treatment, biogas is generated which would replace the furnace oil.

This facility generates air pollution, and adequate measures should be built into the project proposal to contain these pollutants within acceptable limits.

During construction phase

During construction phase the project because of its size will not have significant negative impact on the local environment or local community. Although there will be few impacts on environment due to movement of men and materials for construction, these impacts were negligible and do not have any significant impact on the environment.

However, the project activity has several positive impacts on the local community during construction, which is briefly mentioned below:

Several skilled and unskilled workers got employment opportunities during construction of the project activity. Procurement of construction materials, erection materials improved the local economy. The special leak and explosion proof construction gave exposure to GMEPL employees in such types of construction.

During operation phase

Impact on Air

The most important positive impact obviously is the reduction of release of greenhouse gas to the atmosphere. In absence of this project activity the wastewater would have been treated in open anaerobic lagoons and now due to the project activity it is treated in closed digesters leading to the capture of methane and utilizing it as fuel, has positive impacts on air quality of the environment.

The negative impacts on air are due to the emissions of burning biogas for energy generation. Biogas is largely a "clean fuel" and does not give much hazardous emissions. The other major constituent of the biogas apart from methane is carbon dioxide, which is of biogenic in nature. However the exhaust gases from the boilers are vented off into atmosphere through a high stack to reduce the ground level concentration of exhausts. There are no other negative impacts on air due to the project activity. However there are few positive impacts on air due to the project activity.

Impact on water
The effluent leaving the anaerobic digesters after digestion is further treated through aerobic system to reduce the organic content. The treated wastewater meets the local environmental requirements and is used for irrigation purposes within the industry premises. Hence, there is no impact on water due to the project activity.

Impact on odour
In the open lagoon treatment system, bad odours were produced due to anaerobic degradation of high COD strength wastewater in open lagoons. The production of these bad odours is completely reduced as majority of treatment takes place in closed reactors and the odour producing gases are captured and consumed. Hence, the project has immense positive impact on the environment and local community in reduction of bad odours.

Impact on ecology
There are no endangered species in the vicinity of the project and GMEPL is located in a setting with no fragile or sensitive ecology nearby. The project activity is located within the industry premises and no significant impact is affected on the ecology.

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:

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There are no significant impacts on the environment, ecology and local community due to the project activity. The project has only positive impacts on the environment. The project is itself an environment friendly project with no drive from regulatory requirements.

SECTION E. Stakeholders' comments

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

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The local community, local municipal authority, environmental authorities are the most important local stakeholders of the project. A local stakeholders' meeting was organized, they were invited by giving paper notification. And the project has achieved all the clearances from the above mentioned stakeholders.

E.2. Summary of the comments received:

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The company representative welcomed the gathering and explained about the purpose of the meeting. He briefly mentioned about the background of the company, its operations, installations and proposed expansions. He also explained about the Emission Reductions initiatives taken by UNFCCC and how GMEPL is taking of this CDM project to make it a successful installation.

He also informed that as part of CDM project, a local stakeholder meeting has to be conducted, to document the views and comments of local stakeholders of the project activity. Minutes of meeting and the queries raised by the local stakeholder and answers by the project proponent is documented.

The stakeholders thanked the project promoter for initiating the CDM project and suggested to replicate this idea all over the country in different type of projects. They also expressed their concern about the immediate implementation of the project with the active participation of all the concerned authorities. Overall there was agreement that the proposed project was a beneficial project form sustainability view point.

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

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There was no comment requiring specific action from the project proponents.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no funding from Annex- I parties

Annex 3

BASELINE INFORMATION

Please refer section B

Annex 4

MONITORING INFORMATION

Please refer section B

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