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

CONTENTS

A. General description of the small scale project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / crediting period

D. Environmental impacts

E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the proposed small scale project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring Information

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

>>
"Methane recovery from wastewater generated at Paper manufacturing unit of Sree Sakthi Paper Mills Ltd.," Kerala", in Ernakulam, Kochi, Kerala by M/s Sree Sakthi Paper Mills Ltd..
Version 01
23rd August 2007

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

>>
Purpose of the Project Activity

Sree Sakthi Paper Mills Ltd. (SSPML), which manufactures various grades of kraft paper, duplex, special coloured and file board is planning for the installation of Upflow anaerobic sludge blanket (UASB) digester system to extract methane rich biogas from organic wastewater generated at the paper manufacturing unit of Sree Sakthi Paper Mills Ltd. The biogas is collected and utilized as fuel in boilers to produce steam. The emission reductions due to recovery of methane alone are considered as emission reductions of the project activity.

This CDM project involves implementation of new wastewater treatment scheme, which includes anaerobic treatment of wastewater in the digester system, and recovery of methane in an efficient manner for the generation of renewable energy. The unit has been traditionally using open lagoon to treat its high strength (Chemical Oxygen Demand (COD)) wastewater. Earlier activity resulted in significant amount of methane emissions through wastewater in open lagoons.

The project activity is the methane emission reduction through its controlled recovery in an anaerobic digestion plant. 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 is 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 and flare/burn it. The effluent from digester would then be treated aerobically so as to reduce the COD further to meet the statutory requirement of effluent discharge.

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

The anaerobic system releases methane having global warming potential of 21 times that of CO2. Subsequent to attaining the knowledge of the Kyoto Protocol and CDM potential in their plant, the management took the decision to capture the biogas and utilize its heat content in plant operations. The project activity is a small step towards sustainable development.

Project's Contribution to Sustainable Development

-Social and Economic well-being

The project activity provided direct and indirect employment to the local community during construction of the project activity and as well as during operation. During construction, employments were offered for lot of unskilled labour contributing in poverty alleviation leading to social well being and economic well being. The project activity had an investment of Rs.33Millions. All these have contributed to economic well being of the local community.

- Environmental well-being

The project activity is an environmental project treating organic wastewater recovering biogas and utilizing the same. This prevents the release of greenhouse gas emissions to the atmosphere leading to the environmental well being.

-Technological well-being

The project activity employs a technology called upflow anaerobic sludge blanket (UASB) technology, which is a recent development in anaerobic treatment of organic wastewater. Successful operation of the project activity would lead to replication of such projects contributing the technological well being.

The sustainable development contribution can be summarized as follows:

- Generation of direct and indirect employment
- Prevents release of large quantities of CH_4, a potent GHG, from being emitted into atmosphere.
- Collection and utilization of methane as a fuel to generate steam contributes to the development of renewable energy.
- Reduction of pollution through an energy saving technology.
- Reduction of bad odors as most of the odor producing reactions occur in closed anaerobic digesters.

A.3. Project participants:

>>

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ministry of Environment and Forest, Government of India	Sree Sakthi Paper Mills Limited (Private entity, project participant)	No

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

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

>>

A.4.1.1. Host Party(ies):

>>
India

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

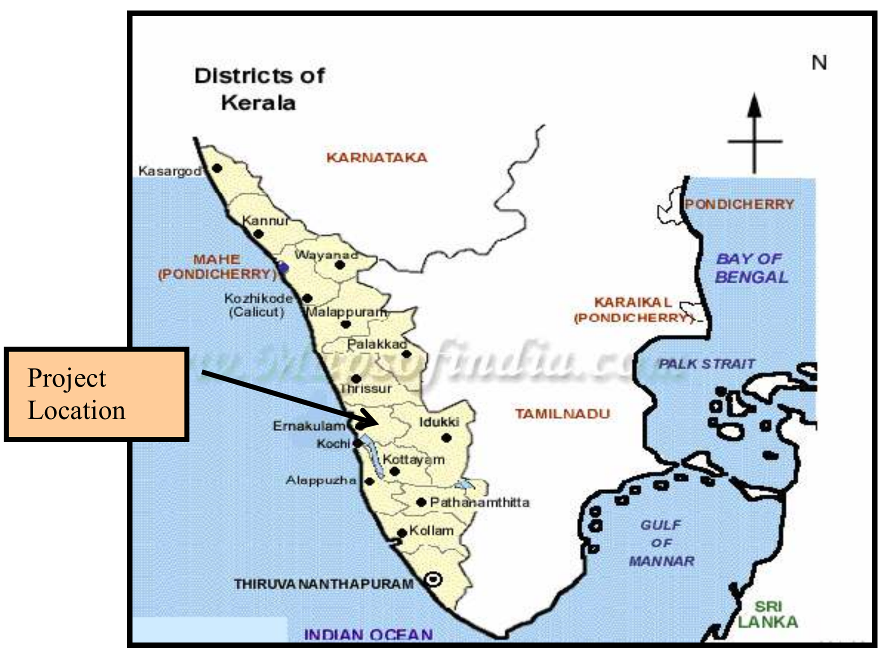
>>
Kerala

A.4.1.3. City/Town/Community etc:

>>
Ernakulam, Kochi

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

>>
The project activity is located within premises of paper manufacturing unit of SSPML at Sree Kailas, Paliam Road, Kochi of Ernakulam in Kerala (Latitude 10.00N and Longitue 76.15E). The city is one of the principal seaports of the country and is located in the district of Ernakulam, about 220km north of the state capital, Thiruvanthapuram. The Cochin International Airport, which is about 25 kilometres north of the city, handles both domestic and international flights. There are two main railway stations—the Ernakulam Junction and the Ernakulam Junction (locally known as the 'South' and 'North' railway stations respectively). The railway line connecting these two stations cuts the city longitudinally in two, with two narrow bridges connecting the two halves.



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

>>
This project activity falls under Type–III “other project activities” and category H “Methane recovery” III.H./Version 6, EB 33, as specified in indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories.

The approved methodology comprises measures that recover methane from biogenic organic matter in wastewaters 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).

Since the project activity is a methane recovery and combustion activity from biogenic organic matter to an existing wastewater treatment system of lagoons as per option (vi) above. The project activity, installation of high rate UASB reactor reduces GHG emissions by sources by recovering methane and directly results in emission reductions of less than or equal to 60 kt CO2 equivalent annually and thus qualify under the above mentioned project type and category.

Technology Description

This project generates around 1,000M^3/day of effluent having approximately 8,450mgCOD/lit. The technology employed is anaerobic digestion with upflow anaerobic sludge blanket (UASB) technology. UASB process is an advanced anaerobic treatment for wastewaters with high concentration of organic matter and with low or medium concentration of suspended solids. Anaerobic digestion is a biological process that produces a gas principally composed of methane (CH4) and carbon dioxide (CO_2) 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 paper 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. In the wastewater treatment the effluent generated is sent to grit chamber bar screen to remove coarse solid wastes. Then the effluent is collected in equalizing tank. From the equalizing tank it is discharged through clarifier in the mix (buffer tank) to maintain the ph. From the mix, effluent is pumped inside the digester. Here the effluent is treated anaerobically. The system releases biogas. When the biogas reaches the top of the reactor, it is removed by gas collectors. The activity involves the recovery of biogas. The gas generated is then collected & hold up in the gasholder.

The gas collected in the gasholder is then pumped to the biogas burner with the help of blower to boost up the pressure in the biogas line with pressure reduction valve in the biogas pipeline before the burner. In biogas burner the biogas is combusted in presence of air. Then the thermal energy generated is carried to the flash dryer where the drying activity is carried out in co-current manner i.e. the product that is to be dried & the gas generated from combustion flow in the same direction. The heat value of the gas is utilized for the drying of the products.

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

>>

The total emissions reductions throughout the crediting period from the project are expected to be as under:

Years	Annual estimation of emission reductions (tCO2e)
2008	7,475
2009	7,475
2010	7,475

2011	7,475
2012	7,475
2013	7,475
2014	7,475
2015	7,475
2016	7,475
2017	7,475
Total estimated reductions for crediting period	74,750
Total number of crediting years	10y-0m

In the above table, the year 2008 corresponds to the period starting from 01.01.2008 to 31.12.2008. Similar interpretation shall apply for remaining years.

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

>>

No public funding from parties included in Annex I is available to the project activity.

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

>>

As per appendix –c of the indicative simplified modalities and procedure for small scale CDM project activity. A project activity is considered to be a debundled component of large project activity if there is a registered small scale CDM project or request for registration by another small scale project activity

- By 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.

Since above points are not applicable in case of SSPML project activity, it can be said that the small scale project activity of SSPML is not a debundled component of a large project activity, hence eligible to use simplified baseline and monitoring methodology.

SECTION B. Application of a baseline and monitoring methodology

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

>>

Title of the approved baseline methodology : Methane recovery in waste water treatment
Reference of the approved baseline methodology : AMS III.H./ Version 06, EB 33
Type : III- Other Project Activities
Scope number : 13
Sectoral scope : Waste handling and disposal

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

>>

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 methodology AMS III. H - Methane recovery in waste water treatment.

The applicability conditions of approved baseline methodology in the context of the project activity are given in the following

The approved methodology comprises measures that recover methane from biogenic organic matter in wastewater by means of one of the following options:

(vii) Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with methane recovery and combustion.
(viii) Introduction of anaerobic sludge treatment system with methane recovery and combustion to an existing wastewater treatment plant without sludge treatment.
(ix) Introduction of methane recovery and combustion to an existing sludge treatment system.
(x) 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.
(xi) Introduction of anaerobic wastewater treatment with methane recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream.
(xii) 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).

Since the project activity is a methane recovery and combustion activity from biogenic organic matter to an existing wastewater treatment system of lagoons as per option (vi) above. The project activity, installation of high rate UASB reactor reduces GHG emissions by sources by recovering methane and directly results in emission reductions of less than or equal to 60 kt CO2 equivalent annually and thus qualify under the above mentioned project type and category.

Since the project activity meets all the technology /measures of the approved baseline methodology AMS-III.H, the project category is chosen for the project activity.

B.3. Description of the project boundary:

>>

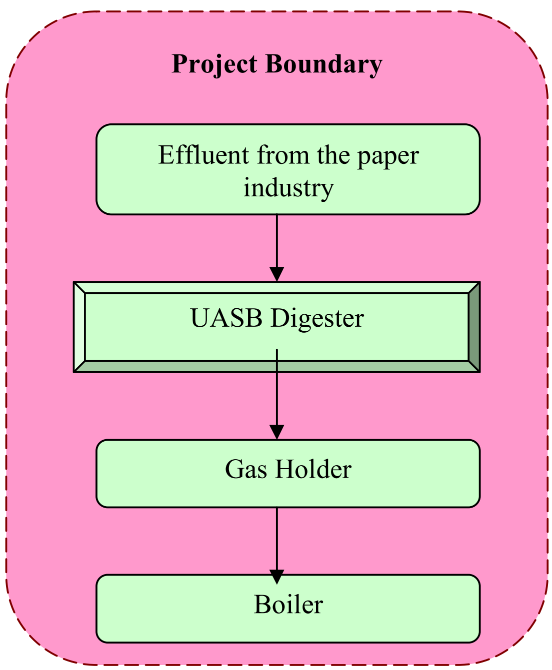
The project boundary as per AMS-III.H, is "the project boundary is the physical, geographical site where the waste water and sludge treatment takes place". The project boundary comprises of the following:

The proposed project activity involves Methane recovery system consisting of pre-treatment units, UASB reactor, collection of biogas released from wastewater treatment & utilization of this biogas as a fuel for heating applications. Therefore, for the project activity the project boundary is from the point of biogas collection and supply to the point of heat generation where the project proponent has a full control. The emissions from methane combustion are treated as project emissions in the selected project boundary.

Anthropogenic baseline emissions included in the project boundary are emission from anaerobic lagoon which would have been there in absence of the project activity. Project emissions included in the project boundary are as follows:

i. CO2 emissions related to the power used by the project activity facilities.
ii. Methane emissions through inefficiency of the wastewater treatment and presence of degradable organic carbon in treated wastewater.
iii. Methane emissions from the decay of the final sludge generated by the treatment systems.
iv. Methane fugitive emissions through inefficiencies in capture and flare systems.
v. Methane emissions resulting from dissolved methane in the treated wastewater effluent.

Following diagram depicts the physical units included in the project boundary.



B.4. Description of baseline and its development:

>>

The project activity captures methane generated from anaerobic decomposition of wastewater effluent in UASB reactor that would otherwise be released into the atmosphere from open lagoons. Although ministry of environment and forest, Government of India has stipulated standards for discharging waste water, deploying advanced technologies like UASB is not mandatory by law to achieve standards. In the absence of the project activity, the effluent generated from the paper manufacturing plant remains untreated and left to lagoons where the organic matter decays emitting methane and foul odour.

The project activity is introduction of methane recovery system for existing anaerobic wastewater treatment system to recover methane rich biogas which otherwise would have been emitted from open anaerobic lagoons. Thus methane is captured thereby preventing release of CH4 to atmosphere. Hence, the applicable emission baseline is the amount of methane that would be emitted to the atmosphere during the crediting period in the absence of the project activity.

So baseline emissions of the project activity are CH4 emissions in the absence of the project activity from anaerobic lagoons.

This project activity comprises measures that recover methane from biogenic organic matter in wastewater by means of Introduction of anaerobic wastewater treatment with methane recovery and combustion without anaerobic sludge treatment, to an untreated wastewater stream. This is category (vi) of all the categories mentioned in the "III.H. Methane Recovery in Wastewater Treatment".

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

>>

In the absence of the proposed CDM project activity, the wastewater with high content of BOD & COD generated from paper-manufacturing unit would have been left to open lagoons, which would result in large amount of methane emissions through wastewater in open lagoons. The proposed project activity involves Biogas capture & utilization of biogas released as a fuel for thermal applications. The biogas released from the wastewater treatment is recovered in the gasholder & the same biogas is used as a fuel in the project activity.

The implementation of the project activity results less than 60 KT of CO2 equivalent as specified in Annex-II "Simplified Modalities & Procedures for Small-Scale CDM Project Activities" Type III project activity. Project category as per appendix B of the simplified M & P for small-scale CDM project activities.

The proposed project activity is additional (using attachment A to appendix B of the simplified M&P for small-scale CDM project activities) because the project activity would not have occurred anyway due to the following barriers:

In absence of the project activity, the effluent generated from the paper Industry would be untreated and would be transferred to open lagoons where it would be subjected to natural oxidation. This has been less cost intensive and economically feasible option but this has also been responsible for the pollution of the air, water and land .The advantage with this option is that the production of the paper industry is no way affected.

Identification of possible alternatives:

SSPML identified the different potential alternative(s) to the project activity.

Alternative 1- Implementation of the project activity not undertaken as a "CDM project activity"

Considering the current prevalent practice of most of the paper manufacturing industry, is treated only through open lagoon systems to meet the regulatory requirements of the land and water.

The SSPML project activity being one of the first of its kind in the southern part of the country for this industrial sector application, it had to undergo a lot of barriers, which has been detailed. This is where the potential CDM incentive anticipated for the project activity would contribute in playing a vital role in the successful implementation of the project.

Therefore, the Alternative 1 would not be a possible baseline alternative, which is also strengthened by the fact that the similar project activity has not been implemented in the country without the incentives from CDM before.

From the above, it naturally implies that the only other alternative available is Alternative 2.

Alternative 2 – No project activity and continuation with the existing system - Open Lagoon

In this alternative, SSPML project activity is not implemented resulting in the continuation of the existing system of waste water management, which is an Open Lagoon System.

In Alternative 2 *i.e.* in absence of SSPML project activity, SSPML could have continued with the existing open lagoon system and let the methane gas into the atmosphere. In the absence of the methane rich biogas plant, SSPML would have untreated the wastewater and would be transferred to open lagoons where it would be subjected to natural oxidation. and would emit carbon dioxide into the atmosphere. This scenario was the status quo of the existing facility before CDM project implementation.

"No project activity and continuation with the existing system - Open Lagoon is the most likely baseline scenario and has been considered as business as usual scenario for the baseline emission calculations.

This alternative is in compliance with all applicable legal and regulatory requirements. As such, it is likely that even in the event of stricter regulations being enforced, the lagoon system will remain as the business-as-usual scenario for this project.

From the above assessment, it is clear that the project would not have occurred without the dependence on the assistance of CDM. There is no reason for an upgrade of the existing waste water treatment system, given that no circumstance exists to necessitate the change. Neither there are any planned regulations that will force them to implement the project activity in India within crediting period nor there are any national or sectoral policies enforcing the project activity. Therefore the implementation of the project activity is a voluntary step undertaken by SSPML with no direct or indirect mandate by law.

The open lagoon treatment is clearly the cheapest option for any wastewater treatment system. Although crude, it meets the desired requirement of reducing the oxygen demand of the wastewater prior to its release.

The project activity of SSPML is an innovative venture, considering the current sectoral industrial practices in the country, as explained in detail. The project activity would be one of the first of its kind in the southern part of the country to implement the project activity and a national & sectoral trendsetter, which indicates that, for financial, technological or whatever other barriers, this project is not an attractive or Business-As-Usual.

Demonstration of Additionality

Investment barrier

SSPML being conscious about the responsibilities towards environment and water conservation has planned to set up an Effluent treatment plant in order to generate biogas and fulfill the objective of thermal applications. The project activity had adopted the process of controlled decomposition of effluent in a digester and capture of the methane generated. However the project activity requires more of investments, managerial intervention and operation and 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 total project cost estimated is INR 33Million which is a huge investment for this scale of operation of the plant is into. An investment analysis of the project activity was conducted with the Internal Rate of Return as the financial indicator. 'Internal Rate of Return' is one of the known financial indicators used by project developers, banks, and financial institutions for making investment decisions.

The income from the project activity is due to the steam generation using methane rich biogas as fuel, replacing biomass. The cost of biomass replaced by biogas based on the calorific value of biomass and biogas is considered for estimation of IRR for the project activity.

The IRR of the project was estimated with assuming the total cost invested, debt component, equity investment, rate of interest of debt component, O&M cost and revenue from utilization of biogas based on cost of biomass per year. The IRR of the project activity, which is -2.15%, is far lesser than the project proponent's expectations and standard returns in the market. However SSPML went ahead with the implementation of the project to prevent GHG emissions released to the atmosphere and with the expectations of realizing the revenue from the sale of CERs and the same will improves to 13.65% with CDM revenue. Therefore CDM revenue would certainly help to achieve a reasonable IRR considering the GHG revenue.

Technological Barrier

The capture of biogas & utilization of captured biogas as a fuel for thermal applications is a new concept in paper industry in India. The technology is less popularly known in paper industry in India & in the state

of Kerala. The implementation of Upflow Anaerobic Sludge Blanket (UASB) process based methane recovery project was first of its kind for SSPML and SSPML had no prior experience in operation and monitoring of such advanced anaerobic treatment processes. SSPML staff had to be trained by the technology provider in operation, maintenance, trouble shooting and monitoring of the UASB based anaerobic digestion plant. SSPML was meeting environmental requirements from the current existing lagoon system and training the staff in a new treatment method was a barrier.

UASB is an advanced anaerobic treatment system and one of the latest developments. The operation of UASB based is complex as compared to operation of anaerobic lagoons. In the case of anaerobic lagoons, very little operation is required where as in the case of UASB digester, several process parameters like acidity, alkalinity, temperature, loading rates, recirculation rates , etc., have to be monitored and maintained for optimum performance and sustained performance of the UASB system.

Methane generation in the UASB digester is dependent on the quantum of raw COD and subjected to ambient and wastewater temperature and their variations. The anaerobic bacterial culture in the digester which is responsible for digestion of organic matter in the waste water gets adversely affected with even 3- 5^0C fluctuation in the reactor. In a country like India where high seasonal temperature variation persist installation of a temperature sensitive technology may prove risky because temperature variation may result in damaging bacterial film in the reactor and thus making digester futile.

Biogas generated in digesters mainly consist of methane, presence of hydrogen sulphide in the biogas which gets generated in anaerobic conditions makes biogas corrosive. Desulphurisation is required to remove corrosive hydrogen sulphide from biogas which would otherwise corrode digester, gasholders and boilers. It involves more risks due to the performance uncertainty. 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 is anticipating some technological & operational risks such as short supply of biogas, maintenance of biogas digester for few days, drying activity during rainy season. 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 dryers operates only on gas & hence there is problem of stoppage of operation of dryers in case of any disruption in gas supply thereby resulting in significant production losses to the company. Installation of a desulphurisation unit requires additional expenses which eventually reduce financial viability of a UASB technology and acts as a barrier.

Barrier due to prevailing Practice

The UASB technology was introduced in India in late eighties for treating waste water of high COD content. Disadvantages enumerated below associated with its operations have prevented its widespread use in Industry in India.

- Requirement of secondary treatment to bring down the COD of waste to stipulated discharge standards.
- The effluent from UASB is highly Anoxic and it exerts high immediate oxygen demand (IOD) on the receiving water body or land.

As mentioned earlier the existing activity is a less popularly known technology in starch industry not only in the state of Kerala but also in India. Also it involves more risks due to the performance uncertainty or low market share. But the prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions.

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 which emits higher GHG emissions. The project activity is first of its kind initiative in kerala wherein wastewater from paper manufacturing would be treated in a UASB digester and gas liberated would be recovered and burnt.

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. SSPML intends to utilize the CDM incentive revenue from the sale of CERs who has taken a major decision to finance the project activity of this innovative nature knowing the barriers involved.

The registration of the CDM project will alleviate the identified barriers by providing additional revenue to the plant by sale of emission reductions.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

This project activity falls under Type –III "other project activities" and category H "Methane recovery from wastewater" as specified in indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories.

The baseline scenario will be discharge of untreated wastewater to the environment, in the case of introducing the treatment to an untreated wastewater stream. The baseline emissions in absence of the project activity is methane generation potential of the untreated waste water stream.

The emission reduction of the project activity is the difference between the baseline emissions and the sum of the project emissions and leakage.

$ER_y = BE_y - (PE_y + Leakage)$

Where ER_y is the emission reductions of the project activity for the year "y"(tCO_2 e)
BE_y is the baseline emissions in the year "y" (tCO_2e)
PE_y is the project activity emissions in the year, "y' (tCO_2 e)
Leakage is the leakage of emissions in the year,"y" (t CO_2 e)

Baseline emissions – BEy

The baseline emissions is calculated by using the formula given in section 7 (d) of AMS III .H is given below :
$BE_y = Q_{y,ww} * COD_{y,ww,untreated} * B_{o,ww} * MCF_{ww,treatment} * GWP\_CH_4$
BE_y is baseline emissions in the year "y" (ton CO_2e)

$Q_{y,ww}$ 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 0.25 ton CH4/ ton COD. This value is corrected accounting uncertainties and a lower value of 0.21 ton CH4 t/ ton COD 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 deep lagoon (depth more than 2 metres). The MCF value in Table III.H.1 is 1.0 is preferred.

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

Project Activity Emissions

As per AMS III.H, the project activity emissions **(PEy)** consist of:

(i) CO2 emissions on account of power used by the project activity facilities in the year "y" **(PEy,power).** Emission factor for grid electricity or diesel fuel use as the case may be shall be calculated as described in category AMS I.D
(ii) Methane emissions through inefficiency of the wastewater treatment and presence of degradable organic carbon in treated wastewater in the year "y" **(PEy,ww,treated).**
(iii) Methane emissions from the decay of the final sludge generated by the treatment systems in the year "y" (**PEy,s final**).
(iv) Methane fugitive emissions through inefficiencies in capture and flare systems in the year "y" (**PE y,fugitive**)
(v) Methane emissions resulting from dissolved methane in the treated wastewater effluent in the year "y" (**PEy, dissolved**)

PEy (t CO_2e /year) **= PE y,power+ PE y,ww,,treated+ PE y,s final+ PE y,fugitive + PE y, dissolved**

(i) CO2 emissions related to the power used by the equipment in the project activity (**PE y,power**).

These are the emissions due to electricity consumed by the installations in the project activity. These emissions are obtained by multiplying the electricity consumed in the year (E MWh/ year) and the electricity baseline emission factor of the grid. (EFy t CO2/ MWh)

PE y,power	=	Ey	*	EFy
(t CO2e /year)		(MWh/year)		(tCO2/MWh)

<u>Ey - Power consumed /year</u>
On an average, 5MU is assumed to be consumed to operate the installations in the wastewater treatment plant. This average value is now considered for estimation of ex-ante emission calculations. Actual value would be used during monitoring for calculation of emission reductions.

EFy- Electricity baseline emission factor of the grid

AMS IIIH specifies to determine the electricity baseline emission factor of the grid as per AMS I.D. The project activity is in Kerala state in India which is part of southern regional grid. Hence, southern regional grid has been considered for electricity baseline emission factor.

CEA has made an elaborate study (to advise the Government of India (Host Party)) and has determined electricity baseline emission factor for all grids in India for both the options of weighted average emissions and on combined margin approach which is as per AMS I.D. The latest emission factor of the southern regional grid would be considered for electricity baseline emission factor. The latest data is available for the year 2005-06 which is adopted. Since the emission factor is considered for estimation of project activity emissions, the weighted average emission factor (0.735tCO2/MWh) would be adopted for estimation of project activity emissions due to electricity consumed by the facilities.

(ii) Methane emissions through inefficiency of the wastewater treatment and presence of degradable organic carbon in treated wastewater in the year “y” **(PEy,ww,treated).**

These emissions (PEy, ww, treated) are due to the emissions of methane from the wastewater after leaving the anaerobic digesters as the wastewater will still have some chemical oxygen demand. But, in the closed anaerobic UASB reactors, all the anaerobically degradable carbon would have degraded and the wastewater leaving the anaerobic reactors would not practically degrade further. However, the emissions from this degradable carbon are calculated as a conservative estimate.

The project activity emissions due to COD in the wastewater leaving the digesters are calculated as per the following formula given in the approved methodology AMS III.H;

PEy, ww, treated = Qy, ww * CODy, ww, treated *B0, ww * MCFww, final * GWP_CH4

Where PEy, ww, treated is the project emissions due to degradable organic carbon in the wastewater leaving the wastewater treatment in t CO2 e/year in the year “y”

Qy, ww is the volume of wastewater treated in the year “y”

CODy, ww, treated is the chemical oxygen demand of the treated wastewater in the year”y” in “tonne/m3)

B0, ww is the methane generation capacity of the treated wastewater (as per AMS III. H. IPCC default value of 0.21t CH4/t COD is adopted)

MCFww, treated is the methane conversion factor based on type of treatment and discharge pathway of the wastewater. (MCF higher value in table III.H.1. shall be adopted). The wastewater after the UASB reactors would flow to anaerobic deep lagoon (depth more than 2 metres). The MCF higher value as per Table III.H.1 for anaerobic deep lagoon is 1.0

GWP_CH4 Global Warming Potential for CH4 (21 ton CO2/ton CH4)

(iii) Methane emissions from the decay of the final sludge generated by the treatment systems in the year "y" (PEy,s final).

These are the emissions that arise from the anaerobic degradation of the final sludge produced by the treatment systems. In the project activity, the sludge produced by the treatment systems is very less. This sludge is basically the excess sludge in the UASB reactors which are removed from the UASB reactors periodically. In the project activity, this sludge would be mixed with pressmud and treated wastewater and subjected to aerobic composting. Since the sludge is processed through aerobic methods, the sludge would not degrade anaerobically and hence there would be no emissions.

(iv) Methane fugitive emissions through inefficiencies in capture and flare systems in the year "y" **(PEy,fugitive.)**

These are the emissions that would occur when biogas is combusted in flare and heating equipment.
PE y,fugitive = PE y,fugitive,ww + PE y,fugitive, s

Where :
PE y,fugitive,ww is fugitive emissions through capture and flare inefficiencies in the anaerobic wastewater in the year, "y' (ton CO2e) and
PE y,fugitive,s is fugitive emissions through capture and flare inefficiencies in the year, "y' and anaerobic sludge treatment (ton CO2e).

Since the sludge is not treated anaerobically, PE y, fugitive, s is not calculated

Hence, **PE y,fugitive = PE y,fugitive,ww**
$PE_{y,fugitive,ww} = (1-CFE_{ww}) * MEP_{y,\ ww,\ treatment} * GWP\_CH_4$

Where, CFEww is capture and flare efficiency of methane recovery and combustion equipment. The methodology specifies a default value of 0.9. This default value would be used only when biogas is combusted in a flare. When biogas is combusted in the heating equipment where all the biogas would be burnt completely a default value of 0.99 (as per approved methodology AM0013 would be adopted)

MEP y, ww, untreated is methane emission potential of the untreated wastewater in the year "y" (tons)
GWP_CH4 is Global Warming Potential for CH4 (21 ton CO2/ton CH4)

MEPy,ww, treatment = Q y,ww * COD y,ww, untreated * Bo, ww * MCFww, treatment
(ton CH4/year) (m3/year) (ton COD/m3) (ton CH4/ton COD)

Where:
Qy, ww is the volume of wastewater treated in the year "y" in m3/year
COD y,ww, untreated is chemical oxygen demand of the wastewater entering UASB in the year in tonnes/m3
B0, ww is the methane generation capacity of the treated wastewater (as per AMS III. H. IPCC value of 0.21ton CH4/ ton COD is adopted)
MCFww, treatment is the 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.) The MCF higher value for anaerobic deep lagoon (depth more than 2 meters) is 1.0.

PEy, fugitive = 0.1 * Q y,ww * COD y,ww, untreated * Bo, ww * MCFww, treatment * GWP_CH4
(tCO2 e/year) (m3/year) (t COD/m3) (tCH4/ton COD) (tCO2e/tCH4)

(v) Methane emissions resulting from dissolved methane in the treated wastewater effluent in the year "y" **(PEy, dissolved)**

These are the methane emissions due to methane dissolved in the treated wastewater which are calculated by the formula as per AMS III.H:

PE y, dissolved = Qy, ww * [CH4], y, ww, treated * GWP_CH4
(ton CO2 e/year) (m3/year) (tonnes/m3) (tCO2 e /ton CH4)

Where,
Qy, ww is the volume of wastewater treated in the year "y"
[CH4], y, ww, treated is the dissolved methane content in the treated wastewater. As per methodology, default value of 10 e-4 tonnes/ m3 would be adopted for estimation of ex-ante calculations.

Leakage

As per approved methodology AMS III.H, the leakage is to be considered if the used technology is equipment is transferred from another project activity or if the existing equipment is transferred to another activity. Since this is not case in the project activity, no leakage is considered for the project activity.

Therefore, Emissions reductions (ERy) = Baseline emissions (BEy)- Project emissions (PEy)

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:	0.735
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 by the facilities in the wastewater treatment. The latest official baseline emission factor of the southern regional grid
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

GHG emission reduction for the project activity has been calculated using following formula
$ER_y = BE_y – PE_y$ – Leakage

Where

ER_y = emission reductions in year 'y'
BE_y = Baseline emissions
PE_y = Emissions due to project activity in year 'y'

Baseline emissions - BEy
The baseline emissions is calculated by using the formula given in section 7 (d) of AMS III .H which is given below:

BEy = Q y, ww, * COD y, ww, untreated * B o, ww, * MCF ww, treatment * GWP_CH4

BEy = 1000*330 * 0.00845 * 0.21 * 1 * 21

= **7,475 ton CO2e / year**

Project activity emissions

PEy = PEy, power + PEy,ww,treated + PEy,s,final + PEy,fugitive + PEy,dissolved

$PE_{y, power}$ = Ey*EFy
Where:
EF = Grid Emission factor calculated tons of CO_2/GWh
EC = Electricity consumed per year in GWh

PEy,ww,treated = Qy,ww * CODy,ww,treated * Bo,ww * MCFww,final * 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 of 0.21kg CH_4/kg.COD)
MCFww,final	methane conversion factor for the anaerobic decay of wastewater. (Default value of 1 is suggested)
GWP_CH_4	Global Warming Potential for CH_4 (value of 21 is used)

$PE_{y,s,final} = S_{y,final} * DOC_{y,s,final} * MCF_{s,final} * DOC_F * F * 16/12 * GWP\_CH_4$
where:

$PE_{y,s,final}$	Methane emissions from the anaerobic decay of the final sludge generated in the wastewater system in the year "y" (tonnes of CO2 equivalent)
$S_{y,final}$	Amount of final sludge generated by the wastewater treatment in the year y (tonnes).
$DOC_{y,s,final}$	Degradable organic content of the final sludge generated by the wastewater treatment in the year y (mass fraction). It can be measured by sampling and analysis of the sludge produced, or the IPCC default value for solid wastes of 0.3 is used.
DOC_F	Fraction of DOC dissimilated to biogas (IPCC default value is 0.77).
$MCF_{s,final}$	Methane correction factor of the landfill that receives the final sludge
F	Fraction of CH_4 in landfill gas (IPCC default is 0.5).

$PE_{y,fugitive} = PE_{y,fugitive,ww} + PE_{y,fugitive,s}$
where:

$PE_{y,fugitive,ww}$	Fugitive emissions through capture and flare inefficiencies in the anaerobic wastewater treatment in the year "y" (tonnes of CO_2 equivalent)

$PE_{y,fugitive,s}$ Fugitive emissions through capture and flare inefficiencies in the anaerobic sludge treatment in the year "y" (tonnes of CO_2 equivalent)

$$\mathbf{PE_{y,fugitive,ww} = (1 - CFE_{ww}) * MEP_{y,ww,untreated} * GWP\_CH_4}$$

where:

CFE_{ww} capture and flare efficiency of the methane recovery and combustion equipment in the wastewater treatment (a default value of 0.9 shall be used)

$MEP_{y,ww,untreated}$ methane emission potential of the wastewater plant in the year "y"

$$\mathbf{MEP_{y,ww,untreated} = Q_{y,ww} * COD_{y,ww,untreated} * B_{o,ww} * MCF_{ww,untreated}}$$

where:

$COD_{y,ww,untreated}$ Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year "y" (tonnes/m^3)

$MCF_{ww,untreated}$ methane conversion factor for the anaerobic decay of the untreated wastewater (IPCC default value of 1 is suggested).

$$\mathbf{PE_{y,dissolved} = Q_{y,ww} * [CH_4]_{y,ww,treated} * GWP\_CH_4}$$

where:

$[CH_4]_{y,ww,treated}$ dissolved methane content in the treated wastewater (tonnes/m^3). In aerobic wastewater treatment default value is zero, in anaerobic treatment it can be measured, or a default value of 10e-4 tonnes/m^3 can be used.

PEy, power = **EF*EC** = 730[1] X 0.5= 367.5 tCO_2/year
PEy,ww,treated = 3638.25 tCO_2/year
PEy,s,final = 0 tCO_2/year
PEy,fugitive = 122.97 tCO_2/year
PEy,dissolved = 693 tCO_2/year

Hence, total project activity emissions, PEy
PEy = PE y,power + PE y,ww,,treated+ PE y,s final + PE y,fugitive+ PE y, dissolved
= 4,821.7 ton CO2 e/ year

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

>>

GHG emissions due to the project activity within the project boundary include direct project emissions and leakage.

Emission reductions = Baseline emissions – Project emissions - Leakage

Baseline emissions = 12,297.2 **tCO_2/year**
Project activity emissions = 4,821.7**tCO_2/year**

Emission reduction = 7,475 **tCO_2/year**

[1] CEA Baseline Carbon Dioxide Emissions Database from Power Sector

Years	Annual estimation of emission reductions (tCO2e)
2008	7,475
2009	7,475
2010	7,475
2011	7,475
2012	7,475
2013	7,475
2014	7,475
2015	7,475
2016	7,475
2017	7,475
Total estimated reductions for crediting period	74,750
Total number of crediting years	10y-0m

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:	**Q y, ww**
Data unit:	M3/day
Description:	Volume of wastewater entering the wastewater treatment plant
Source of data to be used:	Actual measurements in the Plant
Value of data	Value of data would be used to calculate project emissions
Description of measurement methods and procedures to be applied:	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 rate measurement is essential for calculation of both baseline and project emissions. Flow meters complying with standards should be used for monitoring. Flow meters would be calibrated as per manufacturer's prescribed standards.
Any comment:	

Data / Parameter:	**COD y, ww, untreated**
Data unit:	ton/m3
Description:	Chemical Oxygen Demand of the untreated wastewater
Source of data to be used:	Actual measurements in the in-house lab.
Value of data	Value of data would be used to calculate project emissions

Description of measurement methods and procedures to be applied:	COD would be analysed in the in-house lab by internationally accepted standards and archived electronically for the entire crediting period and two years thereafter. Average monthly values would be adopted for estimation of emissions.
QA/QC procedures to be applied:	COD (Inlet) is a measure of methane generation potential of untreated waste water and is essential for calculating both baseline and project emissions. Analysis will be done in laboratory for measurement. Standard procedures would be used for measurement.
Any comment:	

Data / Parameter:	**COD y, ww, treated**
Data unit:	ton/m3
Description:	Chemical Oxygen Demand of the treated wastewater
Source of data to be used:	Actual measurements in the in-house lab.
Value of data	Value of data would be used to calculate project emissions
Description of measurement methods and procedures to be applied:	COD would be analysed in the in-house lab by internationally accepted standards and archived electronically for the entire crediting period and two years thereafter. Average monthly values would be adopted for estimation of emissions.
QA/QC procedures to be applied:	COD (outlet) is a measure of methane generation potential of treated waste water and is essential for calculating both baseline and project emissions. Analysis will be done in laboratory for measurement. Standard procedures would be used for measurement.
Any comment:	

Data / Parameter:	**Ey**
Data unit:	KWh
Description:	Electricity consumed per day
Source of data to be used:	Actual measurements
Value of data	Data is required to estimate project activity emissions for estimating emissions due to electricity consumed by the facilities in the wastewater treatment plant.
Description of measurement methods and procedures to be applied:	Monthly electricity consumption data of the installations in the wastewater treatment plant shall be recorded.
QA/QC procedures to be applied:	Electricity meters would be calibrated as per standards.
Any comment:	

Data / Parameter:	**Q y, biogas**
Data unit:	m3
Description:	Volume of biogas generated
Source of data to be used:	Actual measurements
Value of data	

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 would be calibrated as per manufacturer's recommendations.
Any comment:	

Data / Parameter:	**C_{CH4}**
Data unit:	%
Description:	Methane content in the biogas
Source of data to be used:	Actual measurements
Value of data	Data would be used to estimate methane content in the biogas generated and the baseline emissions
Description of measurement methods and procedures to be applied:	The methane content of the biogas would be measured once in a month by internationally accepted methods. Average value would be used for estimation of methane content and baseline emissions. The data would be electronically archived for the entire crediting period and two years.
QA/QC procedures to be applied:	Methane fraction is to be calculated in laboratory.
Any comment:	

Data / Parameter:	**P CH4**
Data unit:	kg /cm2
Description:	Pressure of the biogas
Source of data to be used:	Actual measurements
Value of data	Data would be used to estimate density of the biogas to calculate the baseline emissions
Description of measurement methods and procedures to be applied:	The pressure of the biogas would be measured and recorded. Average value would be used for estimation of density of methane and baseline emissions. The data would be electronically archived for the entire crediting period and two years thereafter.
QA/QC procedures to be applied:	The instrument would be maintained as per as per manufacturer's recommendations.
Any comment:	

Data / Parameter:	**T_{CH4}**
Data unit:	Deg C
Description:	Temperature of the biogas
Source of data to be used:	Actual measurements
Value of data	Data would be used to estimate density of the biogas to calculate the baseline emissions

Description of measurement methods and procedures to be applied:	The temperature of the biogas would be measured and recorded. Average value would be used for estimation of density of methane and baseline emissions. The data would be electronically archived for the entire crediting period and two years thereafter.
QA/QC procedures to be applied:	The instrument would be maintained as per as per manufacturer's recommendations.
Any comment:	

Data / Parameter:	$\mathbf{D_{CH4}}$
Data unit:	Ton/m3
Description:	Density of the methane
Source of data to be used:	Calculated based on temperature and pressure of biogas.
Value of data	Data would be used to estimate to calculate the baseline emissions.
Description of measurement methods and procedures to be applied:	The data 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:

>>

SSPML has planned an operation and management structure for the project activity with roles and responsibilities of individuals defined. The management would be responsible for monitoring and reporting of the parameters involved. All parameters would be monitored and reported in a transparent manner so that they can be easily verified by DOE.

For measurement of all the parameters and maintenance of records due care is to be taken and to prepare elaborated formats for data collection; methodology is described for measurement and collection of each of the parameter; proper training being provided to concerned personnel; for supervising recovery of methane to avoid leakage, to check regular supply of biogas, inventory and other instruments are calibrated; and verification of the data, measurements and tests shall be carried out.

Accredited laboratory will monitor the COD content of the wastewater entering the anaerobic digestor, methane content in Biogas and calorific value of biogas once in a month.

Procedures identified for Calibration of Monitoring equipment:
The volume of the biogas consumption will be monitored by the calibrated permanently installed online gas meter. The accredited laboratory carrying out the calibration will be involved. If in any case the meter reading is not acceptable then it should be checked immediately by competent agency. Necessary standby meters or checked meters as required will be installed when the main meters are not functioning.

Procedures identified for monitoring, measurements & reporting:

Volume of biogas consumption will be monitored by using calibrated online permanently installed meter. The annual monitoring report should be worked out. It will be submitted to the DOE. The report will be archived to make it available for the external audit & verification purposes.

Procedures identified for dealing with possible monitoring data adjustments and uncertainties:
The important parameters in calculating project emissions are biogas consumption. Biogas consumption is metered continuously. If biogas meter readings are not available then the estimated values will be used.

Procedures identified for internal audits of GHG project compliance with operational requirements as applicable:
In order to check the project's compliance with operational requirements, internal audit can be carried out. For this purpose, a team will be formed under the supervision of the Project Manager.

Procedures identified for day-to-day record handling (including what records to keep, storage area of records and how to process performance documentation):

- Procedures identified for day-to-day record handling are as follows:
- Daily record of quantity of the biogas consumed should be maintained properly in the format provided.
- Daily record of quantity of the wastewater treated should be maintained properly in the format provided.
- Records of the parameters that are monitored monthly should be maintained properly in the format provided.
- All these records should be placed properly at the place provided.
- Performance parameters are to be monitored by the outside accredited agencies. Monitored data should be collected from the agencies and stored properly for further reference.

Procedures identified for corrective action:
If any of the performance parameter monitored above is not found as per the monitoring methodology then the following corrective actions shall be taken:
1. Operating procedures will be reviewed.
2. System will be checked whether it is in proper working condition or not.
3. Check that the data monitoring is properly done or not.
4. If necessary, changes should be made accordingly in the emission calculation workbook.

Procedures identified for training:
Training procedures identified are as follows:
1. Initial training is given to the project operators to create awareness about the project activity.
2. Detailed training should be given to the project operators including:
- Information about data to be collected and its quality
- Proper data collecting procedures
- Correct data entry procedures
- Maintenance of data records in logbook and spreadsheet
- Proper storage of data records
- Emission reduction calculation as provided in the emission calculation workbook
- Checking whether the emission reduction is as per the monitoring methodology or not
- Preparation of annual monitoring report

The operational and management structure basically consists of two 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 SSPML Management. Their specific responsibilities:
1. Handling of the project performances
2. To keep the records/ logsheet for daily methane consumption and daily waste water treated
3. To provide the records/ logsheet for methane consumption and waste water treated to Project Operator for verification of the methane consumption

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. Submission of the annual monitoring report for verification to the Designated Operational Entity (DOE)

C. Project Operators:

Their specific responsibilities:
1. Collect the necessary data as required by the monitoring methodology
2. Store the collected data in logbook (paper) and spread sheet (electronic)
3. Keep the record of collected data in a logbook for at least three years and in a spread sheet for at least twelve years
4. Ensure that the data is entered properly and to take proper care to avoid any loss of information
5. Prepare the annual monitoring report
6. Check that CER calculation is carried out as per the monitoring methodology
7. Submit the annual monitoring report to the Project Manager

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

>>
Baseline and monitoring for the project activity has been developed using methodology Type III.H. Listed in simplified modalities and procedure for small scale CDM project activity

Date of completion of Baseline: 23/07/2007
Name of the person/entity determining baseline: Sree Sakthi Paper Mills Ltd.

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:

>>
01/08/2006

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

>>
25y-0m

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

The project activity will use the fixed crediting period.

C.2.1. Renewable crediting period

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

>>
Not selected

C.2.1.2. Length of the first crediting period:

>>
Not selected

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/01/2008 (or the crediting period will start from the date of registration of the project activity)

C.2.2.2. Length:

>>
10y-0m

SECTION D. Environmental impacts

>>

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

>>

Environmental impact assessment for such type of projects is not required by the prevailing regulations in India, still environmental impact of the project activity have been assessed. Short summary of the findings and measurements are given below.

Environmental impacts of the project activity are evaluated at the project site. There are no negative environmental impacts from the implementation of the project activity. The project activity is a new innovation at SSPML. The project activity, setting up of UASB digester requires mandatory reporting of impacts on various environmental attributes. SSPML has obtained consent from the state authorities (State Pollution Control Board) in the form of "No Objection Certificate". The project activity results in positive impacts on the environment. Methane capture reduces large amount of methane emissions thereby controlling the odour due to foul smell of methane release and contributing to the prevention of air pollution. Use of biogas as a fuel reduces GHG emissions. Also treated wastewater & the sludge generated are used for agriculture purpose because of the significant amount of nitrogen content.

The main objective of the project activity is to treat the wastewater in anaerobic digesters, produce biogas and consume the biogas as fuel. This activity thus avoids release of methane, a potential greenhouse gas (GHG) with a global warming potential of 21 to atmosphere. Thus the project activity assists in reduction of greenhouse gases. SSPML had implemented the project with no drive from environmental regulations. No separate environmental impact assessment studies were done as not required by local environmental regulations.

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

During construction phase

During construction phase the project because of its size did not have any negative impact on the local environment or local community. Although there were 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 had several positive impacts on the local community during constructions, which are briefly mentioned: Several skilled and unskilled workers got employment opportunities during construction of the project activity. Procurement of construction materials, erection materials improved local economy. The special leak and explosion proof construction gave exposure to SSPML employees in such types of construction.

During operation phase

Impact on Air

The impacts on air are due to the emissions of burning biogas in boiler. All the methane in the biogas is expected to burn as boiler is a big capacity boiler for burning biomass. Biogas, is largely a "clean fuel", and when burnt 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 20 meter 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. The most important positive impact obviously is the reduction of release of greenhouse gas to the atmosphere. Earlier the wastewater was treated in open anaerobic lagoons and now due to the project, 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.

Impact on water

The effluent leaving the anaerobic digesters after digestion is collected in a tank from where it is transported to lagoons and mixed with pressmud, waste slurry from sugar mill and aerobically composted to produce organic compost. Since no wastewater is discharged on land or any water course, 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 due to noise

There are no major noise producing equipment in the digestion plant but for centrifugal pumps and blowers. Moreover this equipment is inside the industry. Hence, there are no significant impacts on the environment due to noise.

Impact on ecology

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

Social and economy issues

The location of paper mill, effluent treatment plant and the project has given immense job opportunities to the local community during construction and operation of the paper mill, effluent treatment plant and the project activity. Hence, the economy of the local community has improved, thereby improving the standard of living of the local community with access to better transportation, education, medical and other basic amenities.

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:

>>

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.

SECTION E. Stakeholders' comments

>>

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

>>

Stakeholder identified for the project activity include following:

- Local residents
- Gram Panchayat
- Kerala Pollution Control Board

A meeting of local stakeholder meeting was organized as part of CDM project activity and invitations were sent to residents of villages around the project activity in person. The meeting was organized on 30.07.2007 and the project has achieved all the clearances from the above mentioned stakeholders.

E.2. Summary of the comments received:

>>

The company representative Mr.Padma Kumar 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 Sree Sakthi Paper Mills Ltd. (SSPML), 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. The queries raised by the local stakeholder and answers by the project proponent are given below; On being asked by one of the villager that how in what way the project activity contributes for emission reductions? He explained in details how the wastewater stored in lagoons for a prolonged time results in release of methane in to atmosphere. Presently by using modern technology we are extracting methane in closed condition by using the appropriate technology. The methane generated is used in boiler thus by avoiding emission to the atmosphere. The steam is produced from boiler by the methane generated is utilized for production of steam. A resident asked in what way the project activity should increase the job opportunities for local population. Then he pointed out that already local people have been employed as much as possible and we assure you that in expansion, the local people would be considered for employment as much as possible in future also. He also listed out the road work done by company and further assured to do the needful after consulting.

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:

>>

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

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Sree Sakthi Paper Mills Ltd.
Street/P.O.Box:	57/2993, Paliam Road
Building:	Sree Kailas
City:	Ernakulam, Cochin
State/Region:	Kerala
Postfix/ZIP:	682 016
Country:	India
Telephone:	+91 484 2373230, 2382182
FAX:	+91 484 2370395
E-Mail:	sreesakthi@eth.net
URL:	www.sreekailas.com
Represented by:	
Title:	-------------------------------
Salutation:	Mr.
Last Name:	Kumar
Middle Name:	
First Name:	Padma
Department:	
Mobile:	+91 9447796924
Direct FAX:	
Direct tel:	
Personal E-Mail:	spadmakumar@yahoo.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding in the project activity.

Annex 3

BASELINE INFORMATION

AMS IIIH specifies to determine the electricity baseline emission factor of the grid as perAMS I.D.

The project activity is in Kerala state in India which is part of southern regional grid. Hence, southern regional grid has been considered for electricity baseline emission factor.

CEA has made an elaborate study and has determined electricity baseline emission factor for all grids in India for both the options of weighted average emissions and on combined margin approach which is as per AMS I.D. The latest emission factor of the southern regional grid would be considered for electricity baseline emission factor. The latest data is available for the year 2005-2006 which is adopted. Since the emission factor is considered for estimation of project activity emissions, the weighted average grid emission factor would be adopted for estimation of project activity emissions due to electricity consumed by the facilities.

Annex 4

MONITORING INFORMATION

Description of the Monitoring Plan

The Monitoring and Verification (M&V) procedures define a project-specific standard (baseline of historical emissions) against which the project's performance (i.e. GHG reductions) and conformance with all relevant criteria will be monitored and verified. It includes developing suitable data collection methods and data interpretation techniques for monitoring and verification of GHG emissions with specific focus on wastewater generated and treated and total biogas generated.

Parameters monitored will be as follows:

- Flow rate of waste water
- CODinlet
- CODoutlet
- Electricity consumption
- Temperature of gas
- Pressure of gas
- Volume of gas
- Quantity of gas
- Methane quantity generated

All instruments will be calibrated and marked at regular intervals so that the accuracy of measurement can be ensured all the time.

Monitoring Approach

The general monitoring principles are based on:

· Frequency

· Reliability
· Registration and reporting

As the emission reduction from the project are determined by the quantity of biogas fuelled into the boiler, it is important to discuss the monitoring principles in context of monitoring these parameters.

Frequency of monitoring
Reliability
The amount of emission reduction units is proportional to the biogas generated and fuelled in to the boiler. Thus the flow meter reading is importance. Since the reliability of the monitoring system is governed by the accuracy of the measurement system and the quality of the equipment for reproducibility, all instruments must be calibrated once a year for ensuring reliability of the system. All instruments carry tag plates, which indicate the date of calibration and the date of next calibration. Therefore it ensures the monitoring system is highly reliable.

Registration and reporting
The following reports will be generated for monitoring and controlling emissions.
The daily report of shift-wise data on biogas generated used in the ETP plant, is maintained. The specific steam consumption per unit of steam generation from the boiler is worked out. The net reduction in steam consumption is thus estimated by multiplying difference in specific steam consumption and actual steam generated from the boiler. The project activity has resulted in emissions for the electrical load of the digester and the other equipments. Therefore, emissions due to electricity consumption of equipments have actually reduced under the project activity. So, there need to be a monitoring of the electricity consumption of the equipments added under the project activity.

Verification
The major activities to be verified are as under:
· Verification of various measurement and monitoring methods
· Verification of instrument calibration methods
· Verification of data generated through meters
· Verification of measurement accuracy

- - - - -