

Monitoring Report for Gold Standard

Version 02.1

Date 12/11/2013

CYY Biopower Wastewater treatment plant including biogas reuse for thermal oil replacement and electricity generation project, Thailand

UNFCCC Reference No: 2141

GS Project ID: GS560

Monitoring Period: 01/01/2013 – 20/08/2013 (Including both days)

Emission Reductions: 46,136 tCO₂e

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1. CDM project description and monitored parameters

The project activity involves the installation of an upflow anaerobic sludge blanket technology (UASB) and two gas engines at an existing starch factory for:

- a) The extraction of methane (biogas) from the wastewater stream through the biogas reactor;
- b) The reuse of biogas as fuel in existing thermal oil boiler within the starch plant for starch drying;
- c) The reuse of biogas as fuel for power generation (using two gas engines each of 1.36 MW_{el} capacity)

The implementation of the project activity helps in the avoidance of methane (a GHG) emissions, which would have occurred from the anaerobic decay of wastewater in the baseline. Furthermore, biogas is used as a fuel in the thermal oil boiler and in a gas engine. The use of biogas reduces GHG emissions related to fossil fuel use in the baseline in the boiler and in the grid.

More details about the project description and all the monitored parameters as mentioned in the registered PDD of the project activity have been described in the CDM monitoring report version 2 dated 09/10/2013.

Relevant dates for the project activity related to Gold Standard

Event	Date
Completion of validation	19/01/2010
Registration	24/05/2010

2. Gold Standard monitored parameters

No	1
Indicator	Water quality and quantity
Chosen parameter	COD concentration in wastewater at the outlet of the UASB reactor (in kg COD / m ³)
Implications on monitoring requirements and justification	<p>The aim of the project is to improve the current wastewater treatment facilities and avoid any harm or threat to the environment or people. The installed wastewater treatment system is more efficient and robust (from a process control perspective) than the open anaerobic lagoon system (baseline scenario). The biogas reactor system reduces 90% to 98% of the COD load in the wastewater. The effluent from the biogas reactor is still diverted to the old lagoon system, for a final treatment, which further reduces the COD load to a value well below the Thai wastewater discharge limits.</p> <p>The lagoon system at CYY is designed in such a way that there is no effluent leaving the lagoon system. Most of the produced wastewater is constantly re-circulated as wash water for the starch production process. The rest is stored in the aerobic lagoons at the end of the cascading lagoon system, where part of the water evaporates, keeping a hydrological balance.</p> <p>The wastewater treatment plant includes safety and</p>

		<p>monitoring devices as well as safety and quality control procedures in order to avoid abnormal operating conditions, which could lead to abnormal wastewater discharges. Wastewater quality from the outlet of the reactor is already subject to continuous monitoring under CDM and periodic controls by environmental authorities.</p> <p>Given the fact that the treated wastewater cannot be discharged and is constantly re-circulated and re-used in the starch plant, which was already done prior to the project, the project activity does not have a significant impact on water quantity,</p> <p>From this, it is evident that the impact on the water quality is the only crucial for an overall positive impact of sustainable development and its monitoring would thus be required in the verification period.</p>
Way of monitoring	How	Daily sampling of the UASB reactor effluent. COD concentration is analyzed daily at the Project site. The Reactor Digestion Method is applied for wastewater analysis.
	When	Daily
	By who	CYY plant operator
QA/QC procedures to be applied		The Standard Solution Method is used for accuracy check of the on-site measurements. Periodic tests will be carried out by accredited laboratory (ISO/IEC 17025) in order to provide quality assurance.
Monitored Value & Frequency		Average value: 1.965 kg COD/m ³

No		2
Indicator		Air quality: <i>Odour from the wastewater treatment plant</i>
Chosen parameter		Volume of biogas production and combustion (Nm ³)
Implications on monitoring requirements and justification		As explained by the project owner during the public consultation, the odour is reduced as a result of the project activity, because the new system is a closed system and the biogas produced is utilized for electricity and heat generation. Any gases that would lead to odour emissions (mainly H ₂ S and other sulphur compounds) are captured with the biogas and either destroyed in the boilers or removed in the desulphurization system (gas scrubber) prior to reaching the engine, without release of odour emissions to the atmosphere. Given this fact, monitoring of biogas production and utilization would be sufficient to demonstrate a reduction in odour emissions from the project.
Way of monitoring	How	Measured using gas flow meters at the reactor outlet and at the inlet of the boiler, engine/generator sets and flare system. Combustion of the biogas, and consequently the destruction of any gases that would lead to odour emissions, is monitored through measurement of the energy output of the boiler and engine/generator systems as well as the flame detection period of the flare system. More details about all these parameters are provided in the monitoring plan (Section B.7) of the registered PDD.
	When	Continuously using totaliser meters
	By who	CYY plant operator

QA/QC procedures to be applied	Meters will undergo maintenance / calibration subject to appropriate industry standards. In the event of technical problems with a biogas flowmeter, the value can be calculated based on a mass balance using the other installed gas meters (e.g. biogas sent to boilers = total biogas produced – biogas sent to flare – biogas sent to engine).										
Monitored Value & Frequency	<p>Following values are referred from the parameters, AM0022 ID 5 (volume of biogas sent to boiler), AM0022 ID 9 (volume of biogas sent to flare) and AM0022 ID 10 (volume of biogas sent to gas engines). The details of the parameters can be found in the CDM monitoring report version 2.</p> <p>Regarding the value of biogas production, there was technical problem with the monitoring equipment installed at the reactor outlet during the monitoring period. Therefore, the approach as per QA/QC procedure above is applied to calculate volume of biogas production.</p> <table border="1"> <thead> <tr> <th>Period</th> <th>biogas produced (Nm³)</th> <th>biogas to boiler (Nm³)</th> <th>biogas to flare (Nm³)</th> <th>biogas to gas engines (Nm³)</th> </tr> </thead> <tbody> <tr> <td>01/01/2013 – 20/08/2013</td> <td>4,694,529</td> <td>1,809,398</td> <td>4,286</td> <td>2,880,845</td> </tr> </tbody> </table>	Period	biogas produced (Nm ³)	biogas to boiler (Nm ³)	biogas to flare (Nm ³)	biogas to gas engines (Nm ³)	01/01/2013 – 20/08/2013	4,694,529	1,809,398	4,286	2,880,845
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No	3	
Indicator	Employment (numbers)	
Chosen parameter	Number of employed staffs and the level of income generation	
Implications on monitoring requirements and justification	To date the job creation has been in the higher end of the range and the owner expects it to increase. Reference to the organisation chart is also made available.	
Way of monitoring	How	Number of employees and the level of income generation are recorded through salary payment records.
	When	Monthly
	By who	CYY
QA/QC procedures to be applied	NA. Careful monitoring of salary payments and expenditures is a general practice of the company required for financial accounting as per Thai regulations.	
Monitored Value & Frequency	<p>Monthly records for list of employees and income generation are Recorded Monthly and Monthly records provided as attachments. Summary of number of employees who come from the local community is provided as follows. Regarding income generation, please refer to the attachments submitted to the verification team</p> <p>Number of employees: 14</p>	

No	4
Indicator	Technological self reliance
Chosen parameter	Training records
Implications on monitoring requirements and justification	The project contributes to technology transfer and has a great replication potential in the starch sector in Thailand and other countries.

		In Thailand, GWE, the technology provider for this particular project, implements the technology along with a special training for operators at the project site.
Way of monitoring	How	Training records are archived at the end of each training
	When	Periodical (depending of the frequency of training)
	By who	CYY
QA/QC procedures to be applied		All training plans are approved by the plant manager prior to implementation.
Monitoring Value and Frequency		<p>Following training programs have been provided to operators. Further, summary of the training with attendees and trainer has been submitted to the verification team.</p> <ul style="list-style-type: none"> - Operation and maintenance of biogas system - Safety in biogas operation - Knowledge of biogas - Wastewater analysis

No		-
Indicator		Sludge application
Chosen parameter		Type of sludge application
Implications on monitoring requirements and justification		This parameter is included as an addition to the monitoring plan to satisfy comment/request 2 of the GS registration review process.
Way of monitoring	How	The log book of the operator tracks the sludge application at the plant. In the case that the sludge is sold to farmers, a confirmation on the sludge application must be given by the purchasers. Note that the sludge will only be used for soil application as fertiliser.
	When	Plant record every time sludge is removed from the system
	By who	CYY
QA/QC procedures to be applied		Plant manager's signature is required on the record
Monitored Value & Frequency		There was no sludge removed during the monitoring period.

Additional information about the monitoring period:

- In the current monitoring period, the methane utilization ratio for biogas is approximately 99.91%, which is over 65% limit as per GS regulations.