The Gold Standard
Premium quality carbon credits

GOLD STANDARD PASSPORT

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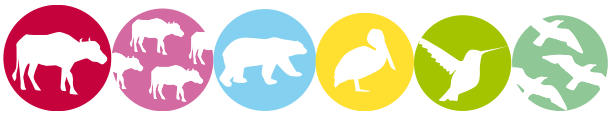

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SECTION A.	Project title

Metro Group Energy WWT Project

SECTION B.	Project description

"Metro Group Energy WWT Project" is being implemented by Metro Group Energy Co., Ltd (MGE) at Chaophyapeuchrai 2999 (Kamphaengphet) Co., Ltd., a tapioca starch processing plant in northern Thailand. The plant has a design starch production capacity of 250 tonnes per day.

Prior to the project implementation, the wastewater from the starch plant was treated through open anaerobic lagoons. The open anaerobic lagoons are sufficient to treat the wastewater and comply with Thailand's environmental regulations.

The purpose of the project activity is to use the wastewater from the starch factory to generate biogas. The project activity entails the installation of an anaerobic wastewater treatment facility—based on an "Upflow Anaerobic Sludge Blanket" (UASB) system—to complement an existing open lagoon based system. The implementation of the project activity will enable the generation and capture of biogas which will be used for electricity and thermal energy generation. Some biogas will be fed to a gas engine (capacity = 985kW). The remaining biogas will be sent to a thermal oil boiler (capacity = 4,060kW) to generate heat energy that will be used to dry starch.

The project will significantly reduce GHG emissions by combusting methane-rich biogas In the absence of the project activity, methane (a potent greenhouse gas) will be emitted to the atmosphere. Furthermore, the electricity generated in the gas engine will be exported to the national grid which will displace electricity generated from fossil fuels in the grid. By replacing fuel oil, the biogas used in the thermal oil boiler will further reduce GHG emissions. In the case of an emergency, excess biogas will be flared in an enclosed flare system.

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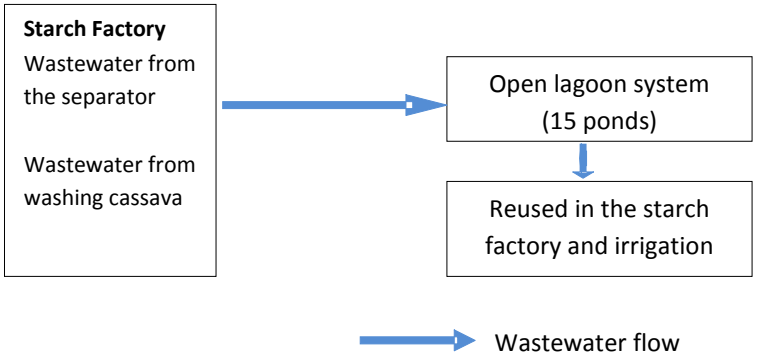
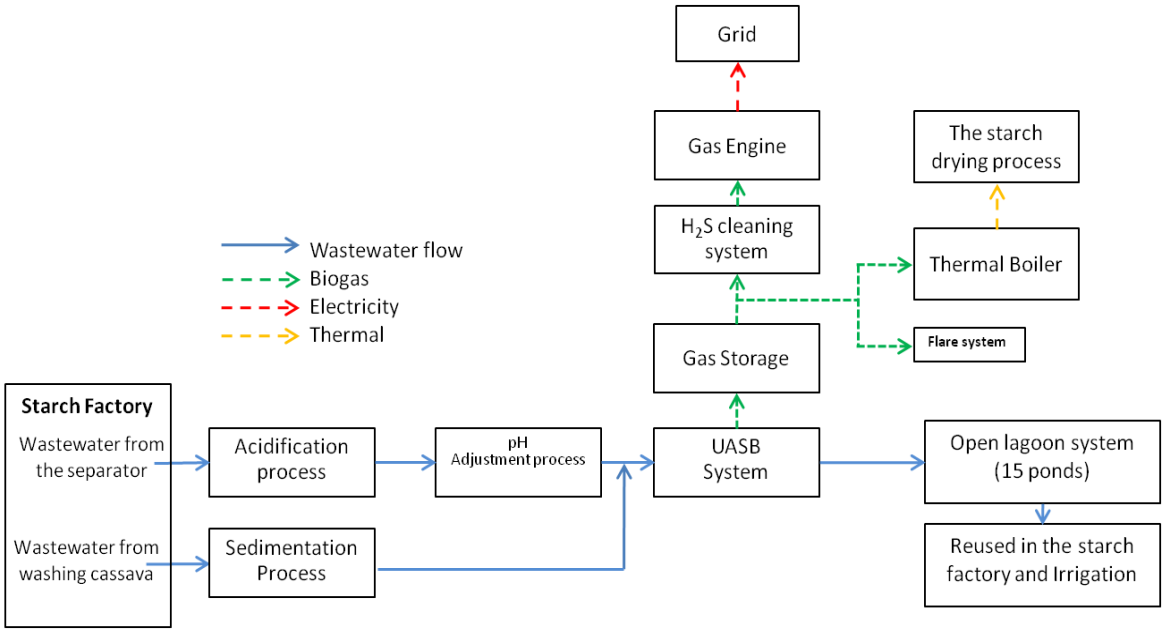
Pre and post-project diagrams are available below,

Pre-project diagram



Post-project diagram



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SECTION C Proof of project eligibility

C.1. Scale of the project

Project Type	Large	Small
	☐	X
	☐	☐
	☐	☐
	☐	☐
	☐	☐

	☐

C.2. Host country

Thailand

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C.3. Project type

Project type	Yes	No
Does your project activity classify as a Renewable Energy project?	X	☐
Does your project activity classify as an End-use Energy Efficiency Improvement project?	☐	X

The Renewable Energy Supply category is defined as the generation and delivery of energy service (e.g. electricity) from non-fossil and non-depletable energy sources. The project activity involves utilisation of biogas from wastewater (from a starch manufacturing plant) to generate renewable energy (electricity). The renewable energy (electricity) will be: 1) exported to the national grid and 2) used (instead of fuel oil) to generate heat in a thermal boiler. The project activity, therefore, satisfies the eligibility criteria.

In addition, the project activity is designed to maximise the utilisation ratio of biogas. The biogas consumption of the generator(s) should at least correspond to 65% of the expected volume of captured methane. This is included in the monitoring plan. Referring to the calculation sheet for the PDD, biogas sent to boiler is 57.5%, biogas sent to the gas engine is 32.5% and sent to flare is 10%, according to initial assumption.

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Pre Announcement	Yes	No
Was your project previously announced?	☐	X

Explain your statement on pre announcement.

Prior to any payment being made for the implementation of the project there was no public announcement of the project going forward without the CDM.

Project timeline

Date	CDM Timeline	Date	Project Timeline
05/08/2008	Company registration – mentioning that the company will manage biogas plant and generate carbon credits *Source: Company affidavit, Minute of meeting*	20/06/2008	Proposal from technology supplier *Source: Proposal from Papop*
29/10/2008	Early consideration - Letter of Intention (LoI) to TGO *Source: Copy of letter*	28/05/2009	Contracted with technology provider *Source: Contract between Metro Group Energy Co., Ltd., and Papop Co., Ltd.*
07/05/2009	Early consideration – Letter to UNFCCC *Source: Letter of Intent to UNFCCC*	02/06/2009	First payment to technology supplier *Source: First payment receipt to Papop Co., Ltd.*
12/05/2009	Emission reduction purchase agreement signed *Source: ERPA*	23/09/2009	Operation permit for biogas plant *Source:MGE Factory License*
01/07/2009	Confirmation that LoI has been received by the UNFCCC *Source: Email communication with UNFCCC*	16/11/2009	Subsidy from EPPO *Source: ENCON Fund contract*
22/09/2009	Local Stakeholder Consultation meeting Source: LSC documents	Nov-Dec2010	Expected commissioning of the project activity
21/05/2010	Application for Host country Approval to TGO Source: Covering letter	-	-

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C.4. Greenhouse gas

Greenhouse Gas	
Carbon dioxide	X
Methane	X
Nitrous oxide	☐

C.5. Project registration type

Project registration type	
Regular	X

Pre-feasibility assessment	Retroactive projects (T.2.5.1)	Preliminary evaluation (eg: Large Hydro or palm oil-related project) (T.2.5.2)	Rejected by UNFCCC (T2.5.3)
	☐	☐	☐

If Retroactive, please indicate Start Date of Construction dd/mm/yyyy:
(This is a regular project)

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SECTION D Unique project identification

D.1. GPS-coordinates of project location

	Coordinates
Latitude	16°36'53.94"N
Longitude	99°31'8.13"E

Explain given coordinates

N/A

D.2. Map

111 Moo 7, Prankatai sub-district, Prankatai district, Kamphaengphet Province, 62110, Thailand

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SECTION E Outcome of stakeholder consultation process

E.1. Assessment of stakeholder comments

The stakeholder construction was carried out on 22nd September 2009, at Phet hotel, Muang district, Kamphaengphet province, by Metro Group Energy Co.,Ltd.

For assessment of stakeholder comments, this refers to section C.3 Outcome of consultation process - section iii (Assessment of All Comments) and v. (Summary of Alternations Based on Comments)

Stakeholder comment	Was comment taken into account (Yes/ No)?	Explanation (Why? How?)
Origin of the wastewater	No	This question was mainly informative. Responses were provided during the meeting.
Safety of the biogas system	Yes	This issue is valid and very important. The construction and operation of the plant will be carried out in accordance with relevant safety standards. Safety procedures are part of the designed project operation manual.
Concern about odour	Yes	The project proponents admit that odour is a problem with the existing open lagoon system. The project will significantly reduce the odour problem.
Confidence in the performance of the biogas system	Yes	Biogas has economic value. The performance of the biogas system will be part of the CDM monitoring plan.
Discharge of wastewater	Yes	Although there will be no discharge of wastewater, the project proponents shall monitor water quality in the final pond.
Application of sludge	Yes	This issue was already considered and will be elaborated in the project design. The sludge will be taken out, dewatered, and exported to other wastewater treatment plants

During the stakeholder consultation process no comments surfaced about environmental, social or economic concerns that would necessitate a change in the project design. Hence, the project will be implemented as per the original plan.

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E.2. Stakeholder feedback round

Please describe how the feedback round was organised, what the outcomes were, and how you followed up on the feedback.

[See Toolkit 2.11]

The Stakeholder feedback round will be organised during the GS validation period and the details will be added in this section of the passport.

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SECTION F	Outcome sustainability assessment

F.1.	'Do no harm' assessment

Safeguarding principles	Description of relevance to my project	Assessment of my project risks breaching it (low/medium/high)	Mitigation measure
1 The project respects internationally proclaimed human rights including dignity, cultural property and uniqueness of indigenous people. The project is not complicit in Human Rights abuses.	Within 5 kilometres around the project area is a tapioca plantation area[1]; therefore, it is not closed to any cultural property. The project does not cause any human rights abuse. There are no indigenous people that would be affected by the proposed project activity. There is an extremely small risk of the project breaching this safeguarding principle.	Low	n/a
2 The project does not involve and is not complicit in involuntary resettlement.	This is not relevant as no resettlement is needed because the project activity takes place within the baseline project boundary[2].	n/a	n/a

[1] Referring to IEE, chapter 3 (Current Environmental Situation), section 3.3.1 (Land Use)

[2] Referring to IEE, section 2.1 Project Location and Map

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Safeguarding principles	Description of relevance to my project	Assessment of my project risks breaching it (low/medium/high)	Mitigation measure
3 The project does not involve and is not complicit in involuntary resettlement.	The project activity takes place within the baseline project boundary[3]. No cultural heritage is enclosed within the project boundary. Cultural heritage is, therefore, not endangered by the project.	n/a	n/a
4 The project respects the employees' freedom of association and their right to collective bargaining and is not complicit in restrictions of these freedoms and rights.	Employees have the freedom of association, and their rights to collective bargaining are not restricted. The legal basis is the national law. Therefore, the likelihood to breach this safeguarding principle is very low[4].	Low	n/a
5 The project does not involve and is not complicit in any form of forced or compulsory labour.	All staff are employed according to national labour legislation[5].The project does not involve any forced or compulsory labour. Therefore, it is very unlikely that the project will breach this safeguarding principle.	Low	n/a

[3] Referring to IEE, Chapter 2 (Project Details), section 2.1 (project location and map)

[4] See Labour Protection Act BE 2541 (1998) and Thai Civil and Commercial Code. More specifically, see Labour Relations Act BE 2518 (AD 1975) for rights of employees in forming trade unions. Note that as stipulated by the Act, the responsibilities of labour unions include a) participating in negotiation with employers, guild associations, other labour unions to provoke their rights and benefits; b) assist in an effort to arrange a work strike; c) clarify any unclear points on labour conflicts; and d) arrange demonstration and participate in a strike.

[5] Referring to Kingdom of Thailand Constitution, section 3 (right and freedoms of the citizens), the Thai citizens have the right to choose their jobs freely, http://www.thprc.org/book/node/16.htm

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Safeguarding principles	Description of relevance to my project	Assessment of my project risks breaching it (low/medium/high)	Mitigation measure
6 The project does not employ and is not complicit in any form of child labour.	The project does not involve any child labour and is in compliance with all the necessary national/international regulations[6].	Low	n/a
7 The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.	The project does not discriminate against individuals, and employment of staffs is not based on gender, race, religion, sexual orientation or on any other basis. In Thailand, there is labour legislation that protects against some facets of this principle [7].	Low	n/a
8 The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments.	Thailand has clear regulations on measures to ensure safety in the workplace[8]. Therefore, the risk of the project activity breaching	Low.	n/a

[6] See Labour Protection Act BE 2541 (1998) and Thai Civil and Commercial Code. According to the labour law, a child labour could be employed only if he has completed 15 years of age. But, in order to employ child labour below 18 years of age, the employer is required to notify it to the labour inspector regarding the employment of a child labour within 15 days from the date of joining the job. Likewise, the law restricts an employer to make a child labour below 18 years to work on public holidays and to do overtime. Further, child labour below 18 are not allowed work in certain working environments such as metal stamping, working with hazardous chemicals, and working with poisonous microorganisms.

[7] See Labour Protection Act BE 2541 (1998) and Thai Civil and Commercial Code. For example, according to the labour acts, both male and female employees must be treated equally in a working environment. However, there are certain exceptions in this case. For instance, an employer is restricted to employ female employee in such organizations engaged in mining as well as construction projects, underwater and tunnel works, and production and transportation of inflammable materials and explosives. Similarly, a pregnant female employee is prohibited from working in a plant or equipment that vibrates and is prohibited from lifting or carrying objects on her head that are more than 15 kilograms. Additionally, an employer cannot terminate a female employee when she is pregnant.

[8] See Labour Protection Act BE 2541 (1998). In the Act, it is stated that a National Safety Committee shall be established in order to determine guidelines for safety at work, and a private organization shall be established in order to assist, train and provide technology to all employers under the government's control. Note that under the Act, government inspector can inspect the employer's workplace; collect samples of materials or products in order to analyse the safety in the workplace; and write orders to the employer and the employee requiring them to comply with the law.

Safeguarding principles	Description of relevance to my project	Assessment of my project risks breaching it (low/medium/high)	Mitigation measure
	this safeguarding principle is small.		
9 The project takes a precautionary approach in regard to environmental challenges and is not complicit in practices contrary to the precautionary principle. This principle can be defined as: ”When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.”	The principle holds some relevance. Statutory regulations allow a maximum permissible COD level of discharged wastewater from a starch plant of 120 mg/L[9]. The project owner has taken a precautionary approach in becoming a ‘zero discharge’ plant to minimise negative environmental impact(s) with regards to water pollution/contamination. In addition, Thailand endorsed the Rio Declaration on Environment and Development which covers the precautionary approach[10]. Therefore, there is extremely small risk that the project activity is contrary to the precautionary principle.	Low	n/a

[9] Notification by the Ministry of Industry, No. 2, B.E. 2539 (1996) issued under the Factory Act B.E. 2535 (1992); Re: Standard of Discharging Effluent from Factories.

[10] Referring to the guidelines for preparing IEE report by Thai DNA (TGO), http://www.tgo.or.th/download/projapprv/Guideline_for_Preparing_IEE_report.pdf

and “Thailand’s role in the United Nations” by Permanent Mission of Thailand to the United Nations Office and other International Organizations in Geneva, http://www2.mfa.go.th/ungeneva/ThailandAndUN.aspx

and definition of precautionary approach from Rio Declaration on Environment and Development, UNDP, principle 15, http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163 , at Rio de Janeiro, where the precautionary approach was implemented internationally.

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Safeguarding principles	**Description of relevance to my project**	**Assessment of my project risks breaching it (low/medium/high)**	**Mitigation measure**
10 The project does not involve and is not complicit in significant conversion or degradation of critical natural habitats, including those that are (a) legally protected, (b) officially proposed for protection, (c) identified by authoritative sources for their high conservation value or (d) recognised as protected by traditional local communities.	The project activity is located next to the starch plant. There are no rare plants, animals or their habitats in the project boundary[11]. The project activity will not result in conversion or degradation of critical natural habitats. Thus, safeguarding (while important) is a non issue in this case.	n/a	n/a
11 The project does not involve and is not complicit in corruption.	Thailand is a signatory of the Convention against Corruption[12]. The risk of the project breaching this safeguarding principle is low.	Low	n/a
Additional relevant critical issues for my project type	**Description of relevance to my project**	**Assessment of relevance to my project (low/medium/high)**	**Mitigation measure**
1			
2			
Etc.			

[11] Referring to IEE, 4.1.2 impacts on environmental resources (biodiversity)

[12] Signatories to the United Nations Convention Against Corruption http://www.unodc.org/unodc/en/treaties/CAC/signatories.html

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F.2. Sustainable development matrix

Indicator	Mitigation measure	Relevance to achieving Millennium Development Goals (MDGs)	Chosen parameter and explanation	Preliminary score
Gold Standard indicators of sustainable development	**If relevant copy mitigation measure from "do no harm" – table, or include mitigation measure used to neutralise a score of '–'**	Check **www.undp.or/mdg** and **www.mdgmonitor.org** **Describe how your indicator is related to local MDGs**	**Defined by project developer**	Negative impact: score '-' in case negative impact is not fully mitigated score 0 in case impact is planned to be fully mitigated No change in impact: score 0 Positive impact: score '+'
Air quality		Target 7. A: "integrate the principles of sustainable development into country policies and programmes and reverse the loss of	**Parameter: emission of NOx and SOx, odour** Air quality will be improved substantially compared to emission levels (SOx and NOx) related to fossil fuel combustion because the fossil fuels will be displaced by the use of biogas from the project activity for thermal and electricity energy generation. Electricity generation in Thailand is based mainly on natural gas and	+

		environmental resources".	coal. In general, using coal for electricity generation emits more SO_x and NO_x compared with biogas[13]. This is reflected from the Standard of Air Pollution from Power Plant: coal power plants cannot emit more than 320-1,300 ppm of SO_x and 500 ppm of NO_x. The emissions from electricity generation (biogas)in the project activity will be controlled to not exceed 72 ppm (for SO_x) and 180 ppm (for NO_x)[14]. For the thermal boiler, according to the Standard of Air Pollution from Factories[15], emissions from a factory using fuel oil cannot exceed 950 ppm (for SOx) and 200 ppm (for NOx) while emissions from a factory using other fuel (including biogas) cannot exceed 60 ppm (for SOx) and 200 ppm (for NOx). Therefore, using biogas in both the electricity generator and thermal boiler will reduce emissions of SOx and NOx compared with the baseline situation Furthermore, by replacing the open anaerobic lagoon with an enclosed biodigester, the project significantly reduces odour emissions[16]. This positively impacts the quality of life for the employees at the starch plant and residents who live close to the lagoons.	

[13] Referring to Standard of Air Pollution from Power Plants, B.E. 2547 (2004) – for SOx and NOx from coal, http://www.diw.go.th/diw/law50/air/A7.pdf , Ministry of Industry

[14] Referring to the IEE Chapter 4 (Environmental Impact Assessment), table 4.1-3 (Limitation of Emission from the Project Activity)

[15] Referring to Standard of Air Pollution from Factories, B.E. (2006) – for SOx and NOx from fuel oil, http://www.diw.go.th/diw/law50/air/A11.pdf, Ministry of Industry

[16] Referring to IEE, chapter 4 (Environmental Impact Assessment), topic 4 (odour)

Water quality and quantity		Target 7. A: “integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources”.	**Parameter: COD, contamination to and water quantity** The quality of the treated wastewater will be significantly improved with the implementation of the UASB system. Referring to IEE[17], efficiency evaluation shows that efficiency of the lagoon system is around 68% while UASB system’s efficiency is 90% on average. The UASB system treats the wastewater before it enters the open lagoon. Wastewater pollution in subsequent lagoons is reduced, thus reducing the risk of groundwater contamination from the bottom of the lagoons. The UASB system has a lining that prevents wastewater leakage[18]. In sum, the impact on water quality is positive. The treated wastewater will be kept in a lagoon with sufficient capacity. Therefore, wastewater will not be discharged to areas outside of the project activity region. Thus, the project does not negatively affect water quantity.	+

[17] IEE chapter 4 (environmental impact assessment – water pollution)

[18] IEE chapter 4 (environmental impact assessment – underground contamination)

Soil condition			**Parameter: pollution of soil, organic matter content** Discussions with participants revealed that they did not have comments on the impacts of these indicators. However, results from the questionnaires show that the stakeholders were positive. The UASB tank is a concrete tank. Therefore, there will be no wastewater leakage to the soil[19]. The sludge from the treatment process will be used in other biogas systems outside the project activity zone. Therefore, because there is no improvement to the baseline scenario, a neutral score is chosen.	0
Other pollutants			**Parameter: level of noise** Despite recognising some positive impacts, the project proponents and stakeholders feel that improvements relative to the baseline scenario are negligible. Therefore, to be conservative, the scoring is kept neutral. Referring to IEE[20], from the assessment, the noise during the construction period will not impact the local community because the project activity is surrounded by a tapioca plantation area. During the operational phase, the noise level will not exceed regulatory requirements. Therefore, the project activity does not have an impact on noise level.	0

[19] IEE chapter 4 (Environmental Impact Assessment), section 7 (soil pollution)

[20] IEE chapter 4 (Environmental Impact Assessment), section 3 (impact on noise)

Biodiversity			**Parameter: number of threatened plants and animals** There is no significant change to the livelihood of plants due to the project activity when compared to the baseline, since the project activity is located within the existing plant area (not within other specific natural habitats) and the surrounding area (1 kilometre in any direction from the project site) is tapioca plantation.[21]	0
Quality of employment			**Parameter: training record** The employees will undergo training[22] on how to operate and maintain the biogas and electricity generation systems. Those employees will also undergo safety training. Compared with the baseline, the training will result in more skilled staff. The local people in Kamphaengphet province mostly work in the agricultural sector.[23] Therefore, such training will have a positive impact on quality of employment compared to the baseline.	+

[21] IEE chapter 2 (Project Details), section 2.1 (project location and map)

[22] Referring to IEE, chapter 4 (Environmental Impact Assessment), section 4.3 (3) employee training

[23] Referring to IEE, chapter 3 (the Current environment), section 3.4.4 (Occupation)

Livelihood of the poor		Target 1. A: Between 1990 and 2015, halve the proportion of people whose income is less than one dollar a day (1.1. Proportion of population below $1 (PPP) per day, and 1.2 Poverty gap ratio)	**Parameter: poverty alleviation** Overall, the participants were convinced that the project will have a positive impact on the socio-economic development of the local population. However, compared to the baseline, the project will increase annual income for part of the employees or generate income[24] for new employees but will not significantly improve the livelihood of the poor in general. To be conservative, this indicator is scored neutral.	0
Access to affordable and clean energy services		Target 7. B: Reduce biodiversity loss, by 2010, achieving a significant reduction in the rate of loss (7.2 CO2 emissions, total, per capita and per $1 GDP (PPP))	**Parameter: Change in energy use** The project utilises biogas to produce electricity and will export the electricity to the existing grid. The project also plans to export electricity to the existing grid. People have already had an access to the existing grid[25]. Therefore, the project activity will not result in a change in the access to energy services.	0
Human and institutional capacity			**Parameter: public participation, education and gender equality** Although the project will improve the human and institutional capacity through involvement of stakeholders in the LSC[26] meeting, the overall benefits are not so significant. In practice, only the employees working on the project can be considered as the main beneficiaries. The scoring of this indicator is kept neutral to be conservative.	0

[24] Referring to IEE, chapter 4 (Environmental Impact Assessment), section 4.4(1) income generation for new employees

[25] IEE chapter 3 (Current Environmental Situation), section 3.3.2 (1) electricity consumption

[26] LSC report

Quantitative employment and income generation		Target 1. A: Between 1990 and 2015, halve the proportion of people whose income is less than one dollar a day (1.1. Proportion of population below $1 (PPP) per day, and 1.2 Poverty gap ratio) Target 1. B: Achieve full and productive employment and decent work for all, including women and young people (1.5 Employment-to-population ratio, 1.6 Proportion of employed people living below $1 (PPP) per day)	**Parameter: number of jobs and income from employment** The project creates new jobs[27] and increases income for the region via construction contracts and plant operation/maintenance. The scoring reflects a positive impact.	+

[27] IEE chapter 4 (Environmental Impact Assessment), section 4.4 (1) (income generation for new employees)

Balance of payments and investment		Target 8.D: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term.	**Parameter: net foreign savings** The project activity leads to a reduction in fossil fuel consumption. Fuel oil (used to produce thermal energy) and fossil fuel (e.g. coal, which is used to generate electricity in Thailand) are normally imported[28]. Although the project seems to have an impact on net foreign currency savings, it is small at the macro-economic level. A neutral score is chosen for an accurate assessment of this indicator.	0
Technology transfer and technological self-reliance		Target 8. F: In cooperation with the private sector, make available the benefits of new technologies, especially information and communication.	**Parameter: training / or workshops for employees** The project showcases an innovative way to treat wastewater and generates clean and renewable energy. And it will provide technical training[29] to employees. However, since this point is already covered in the quality of employment, this indicator is scored 0 to be conservative.	0

[28] Referring to table 2 (Thailand Energy Balance 2009) on page XIV (please find imported crude oil), and VI (chart – fuel consumption for electric generation)

Thailand Energy Statistics 2009, by Department of Alternative Energy Department and Efficiency (DEDE), Ministry of Energy
http://www.dede.go.th/dede/fileadmin/usr/wpd/static/stat53/Thai_En_Stat_2009%28preliminary%29.pdf (the file is also available)

[29] Referring to IEE, chapter 4 (Environmental Impact Assessment), section 4.3 (3) employee training

Justification choices, data source and provision of references	
Air quality	Referring to Standard of Air Pollution from Power Plants, B.E. 2547 (2004) – for SOx and NOx from coal, http://www.diw.go.th/diw/law50/air/A7.pdf , Ministry of Industry Referring to the IEE Chapter 4 (Environmental Impact Assessment), table 4.1-3 (Limitation of Emission from the Project Activity) Referring to Standard of Air Pollution from Factories, B.E. (2006) – for SOx and NOx from fuel oil, http://www.diw.go.th/diw/law50/air/A11.pdf , Ministry of Industry Referring to Initial Environmental Examination (IEE), chapter 4 (environmental Impact Assessment), section 4 (odour)
Water quality and quantity	IEE chapter 4 (environmental impact assessment – water pollution) IEE chapter 4 (environmental impact assessment – underground contamination)
Soil condition	IEE chapter 4 (Environmental Impact Assessment), section 7 (soil pollution)
Other pollutants	IEE chapter 4 (Environmental Impact Assessment), section 3 (impact on noise)
Biodiversity	IEE chapter 2 (Project Details), section 2.1 (project location and map)
Quality of employment	Referring to IEE, chapter 4 (Environmental Impact Assessment), section 4.3 (3) employee training Referring to IEE, chapter 3 (the Current environment), section 3.4.4 (Occupation)
Livelihood of the poor	Referring to IEE, chapter 4 (Environmental Impact Assessment), section 4.4(1) income generation for new employees
Access to affordable and clean energy services	IEE chapter 3 (Current Environmental Situation), section 3.2.2 (1) electricity consumption
Human and institutional capacity	LSC report
Quantitative	IEE chapter 4 (Environmental Impact Assessment), section 4.4 (1) (income generation for new employees)

employment and income generation	
Balance of payments and investment	Referring to table 2 (Thailand Energy Balance 2009) on page XIV (please find imported crude oil), and VI (chart – fuel consumption for electric generation) Thailand Energy Statistics 2009, by Department of Alternative Energy Department and Efficiency (DEDE), Ministry of Energy http://www.dede.go.th/dede/fileadmin/usr/wpd/static/stat53/Thai_En_Stat_2009%28preliminary%29.pdf
Technology transfer and technological self-reliance	Referring to IEE, chapter 4 (Environmental Impact Assessment), section 4.3 (3) employee training

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SECTION G Sustainability monitoring plan

[See Toolkit 2.4.3 and Toolkit Annex I]

No		1
Indicator		Project eligibility criteria Compliance with the 65% biogas utilisation threshold
Mitigation measure		n/a
Chosen parameter		Biogas utilisation (%)
Current situation of parameter		Refer to the baseline situation
Estimation of baseline situation of parameter		0%
Future target for parameter		At least 65%
Way of monitoring	How	Measure: biogas consumption in the electricity generator biogas consumption instead of fuel oil in thermal boiler biogas flared, and calculation to determine biogas utilisation (%) <u>Details</u> <u>Quantity of biogas combusted in gas engine (Nm^3 in year y)</u> The biogas shall be monitored using continuous flow meter. The measurement will be taken on an hourly basis. The flow meter will be integrated with SCADA (Supervisory Control And Data Acquisition) system to have real time data monitoring and control. The biogas flow meter displays output as normalised flow of biogas. <u>Quantity of biogas combusted in thermal boiler (Nm^3 in year *y*)</u> The biogas shall be monitored using continuous flow meter. The measurement will be taken on an hourly basis. The flow meter will be integrated with SCADA (Supervisory Control And Data Acquisition system) to have real time data monitoring and control. The biogas flow meter displays output as normalised flow of biogas. <u>Total quantity of biogas flared (Nm^3 in year *y*)</u> The biogas shall be monitored using continuous flow meter. The measurement will be taken on an hourly basis. The flow meter will be integrated with SCADA (Supervisory Control And

		Data Acquisition) system to have real time data monitoring and control. The biogas flow meter displays output as normalised flow of biogas.
	When	Refer to how to monitor above
	By who	Project owner

No		2
Indicator		Stakeholder comment on the leakage of wastewater to surrounding crop plantation area.
Mitigation measure		The wastewater will be 'zero discharge'. Nevertheless, to alleviate any concerns by stakeholders there will be a monitoring plan to ensure that there is no problem.
Chosen parameter		Complaint(s) or record(s) of leakage of wastewater to the local authorities
Current situation of parameter		Refer to the baseline
Estimation of baseline situation of parameter		No complaint(s) or record(s) of the leakage due to the project activity of UASB system
Future target for parameter		No complaint(s) or record(s) of leakage due to the project activity of UASB system
Way of monitoring	How	DOE's interview with local authorities
	When	Once per verification period
	By who	Project owner

GOLD STANDARD PASSPORT

No		3
Indicator		Air quality (Emissions of SOx and NOx)
Mitigation measure		n/a
Chosen parameter		Biogas consumption
Current situation of parameter		Refer to the baseline situation
Estimation of baseline situation of parameter		Electricity generation in Thailand is based mainly on natural gas and coal. In general, using coal for electricity generation emits more SOx and NOx compared to biogas. This is reflected from the Standard of Air Pollution from Power Plant[30], that coal power plants cannot emit more than 320-1,300 ppm of SO_x and 500 ppm of NO_x. For a thermal boiler, according to the Standard of Air Pollution from Factories[31], emissions from a factory using fuel oil cannot exceed 950 ppm (for SO_x) and 200 ppm (for NO_x).
Future target for parameter		SO_x and NO_x emissions are reduced compared to the situation in which the electricity generator and thermal boiler use fossil fuels (coal and fuel oil).
Way of monitoring	How	The reduction of SO_x and NO_x is directly related to the amount of fuel oil replaced by biogas in the thermal boiler and the amount of biogas consumption in the electricity generator. Quantity of biogas combusted in gas engine (Nm3 in year y) The biogas shall be monitored using continuous flow meter. The measurement will be taken on an hourly basis. The flow meter will be integrated with SCADA (Supervisory Control And Data Acquisition) system to have real time data monitoring and control. The biogas flow meter displays output as normalised flow of biogas. Quantity of biogas combusted in thermal boiler (Nm^3 in year *y*) The biogas shall be monitored using continuous flow meter. The measurement will be taken on an hourly basis. The flow meter will be integrated with SCADA (Supervisory Control And Data Acquisition) system to have real time data monitoring and control. The biogas flow meter displays output as normalised flow of biogas.
	When	Refer to how to monitor above
	By who	The project owner

[30] Referring to Standard of Air Pollution from Power Plants, B.E. 2547 (2004) – for SOx and NOx from coal, http://www.diw.go.th/diw/law50/air/A7.pdf , Ministry of Industry

[31] Referring to Standard of Air Pollution from Factories, B.E. (2006) – for SOx and NOx from fuel oil, http://www.diw.go.th/diw/law50/air/A11.pdf , Ministry of Industry

GOLD STANDARD PASSPORT

No		4
Indicator		Air quality (Odour)
Mitigation measure		n/a
Chosen parameter		Biogas consumption
Current situation of parameter		Refer to the baseline situation
Estimation of baseline situation of parameter		The open lagoon system releases biogas directly to the atmosphere. The biogas contains hydrogen sulphide which produces an obnoxious odour. The volume of biogas produced is directly related to the magnitude of odour.
Future target for parameter		No unpleasant odour from biogas
Way of monitoring	How	Monitoring biogas consumption in the gas engine and thermal boiler to demonstrate a reduction in odour emission <u>Details</u> <u>Quantity of biogas combusted in gas engine (Nm^3 in year y)</u> The biogas shall be monitored using continuous flow meter. The measurement will be taken on an hourly basis. The flow meter will be integrated with SCADA (Supervisory Control And Data Acquisition) system to have real time data monitoring and control. The biogas flow meter displays output as normalised flow of biogas. <u>Quantity of biogas combusted in thermal boiler (Nm^3 in year *y*)</u> The biogas shall be monitored using continuous flow meter. The measurement will be taken on an hourly basis. The flow meter will be integrated with SCADA (Supervisory Control And Data Acquisition) system to have real time data monitoring and control. The biogas flow meter displays output as normalised flow of biogas. <u>Total quantity of biogas flared (Nm^3 in year *y*)</u> The biogas shall be monitored using continuous flow meter. The measurement will be taken on an hourly basis. The flow meter will be integrated with SCADA (Supervisory Control And Data Acquisition) system to have real time data monitoring and control. The biogas flow meter displays output as normalised flow of biogas.
	When	Refer to how to monitor above
	By who	Project owner

GOLD STANDARD PASSPORT

No		5
Indicator		Water quality
Mitigation measure		n/a
Chosen parameter		For water quality – COD of treated wastewater
Current situation of parameter		Refer to baseline situation
Estimation of baseline situation of parameter		COD of treated wastewater from the open lagoon system
Future target for parameter		Reduction of COD of treated wastewater from the UASB system in comparison to the open lagoon system
Way of monitoring	How	Measure the COD of treated wastewater before and after the UASB system COD of the wastewater before the treatment system affected by the project activity ($COD_{ww,untreated,y}$, $tCOD/m^3$) The COD content will be analyzed using a colorimetric method in the on-site laboratory. The results will be logged in the plant operation report on a daily basis. COD of wastewater after the treatment system k of the project activity equipped with biogas recovery in the year y ($COD_{ww,treated,y}$, $tCOD/m^3$) The COD content will be analyzed using a colorimetric method in the on-site laboratory. The results will be logged in the plant operation report on a daily basis.
	When	COD will be monitored on daily basis
	By who	The project owner

No		6
Indicator		Quality of employment
Mitigation measure		n/a
Chosen parameter		training record
Current situation of parameter		Refer to the baseline situation
Estimation of baseline situation of parameter		No training records for the baseline; the project has no additional employment for the new biogas system
Future target for parameter		training records in relation to training of operating and maintaining the biogas system as well as safety
Way of monitoring	How	Archive training records
	When	After each training
	By who	Project owner

GOLD STANDARD PASSPORT

No		7
Indicator		Quantitative employment and income generation
Mitigation measure		n/a
Chosen parameter		The number of employees due to the project activity and their incomes
Current situation of parameter		Refer to the baseline situation
Estimation of baseline situation of parameter		No additional employment and income due to the project activity
Future target for parameter		Additional employment and income due to the project activity
Way of monitoring	How	Review of the Human Resource record on additional employment and income
	When	Once per verification period
	By who	Project owner

Additional remarks monitoring

n/a

GOLD STANDARD PASSPORT

SECTION H Additionality and conservativeness

This section is only applicable if the section on additionality and/or your choice of baseline does not follow Gold Standard guidance.

H.1. Additionality

In line with the requirement from the Gold Standard, the additionality of the project activity has been demonstrated using the "Tool for demonstration and assessment of additionality"[32]. A step-wise approach is used to demonstrate and assess additionality:

1) Identification of alternatives to the project activity;
2) Investment analysis;
3) Barrier analysis; and
4) Common practice analysis

Step 1: ***Identification of alternatives to the project activity consistent with current laws and regulations***

Define realistic and credible alternatives scenario to the project activity through the following Sub-steps:

Sub-step 1a: Define alternatives to the project activity:

The main output or service of the project activity is the treatment of effluent water. The by-products of the project activity arising from the utilisation of biogas captured are the production of heat and electricity. Therefore, the alternative scenarios that are available to the project participants and that provide outputs or services with comparable quality, properties and application areas as the proposed small-scale CDM project activity are:

Alternative 1: Methane recovery and utilization for heat and electricity generation (proposed project without CDM assistance)

Alternative 2: Open anaerobic lagoon based wastewater treatment system (continuation of the current situation) – The project proponent has been using open anaerobic lagoons to treat the wastewater from the starch factory prior to the project activity. In the absence of the project activity, the same would have continued.

[32] Version 05.2, EB39, Annex 10.

Sub-step 1b: Consistency with mandatory laws and regulations:
Alternatives 1 and 2 are in compliance with current laws and regulations in Thailand, which allow the use of open lagoon systems and other wastewater treatment technologies that meet effluent standards for the discharge of treated wastewater into the environment. The release of wastewater into watercourses in Thailand is regulated by the "Notification of the Ministry of Science, Technology and Environment, No. 3, B.E.2539 (1996)"[33] published in the Royal Government Gazette, Vol. 113 Part 13 D, dated February 13, B.E.2539 (1996). According to this regulation the COD of wastewater is not allowed to exceed 120 mg/litre and 5-day BOD (BOD_5) shall not exceed 20 mg/litre. However there is an exception for starch plants which stipulates that BOD_5 should not exceed 60 mg/litre[34]. Considering the high COD-load of a starch plant, it is prohibited by legal regulations to release wastewater directly into water bodies.

There is no other regulatory requirement for the implementation of a specific wastewater treatment technology such as anaerobic digester or aerobic treatment system to tapioca starch processing plants for effluent treatment.

Step 2: Investment analysis
The project participant has used (Step 3: Barrier analysis).

Step 3: Barrier analysis

The project activity (Alternative 1) faces sever barriers related to access to capital and project financing in comparison to the alternative 2. In line with the step 3 of the "Tool for the demonstration and assessment of additionality", we need to determine whether the project faces barriers that:

a) Prevent the implementation of this type of project activity; and
b) Do not prevent the implementation of at least one of the alternatives.

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

Investment Barrier:
The tapioca processing industry is considered to be one of the largest food processing industrial sector in Thailand. However, the growth of the tapioca starch industry has resulted in heavy water pollution as it generates large amount of solid waste and wastewater with high organic content.

Government of Thailand is promoting renewable energy based on the investment subsidy mechanism in various sectors. Following the initial biogas promotion in the livestock sector, the Ministry of Energy expanded its biogas campaign into the agro-industrial sector, and focused on the tapioca starch sub-sector. During 2003–2005, pilot demonstrations of biogas system in the starch industry were carried out by receiving financial support from the Energy Conservation Promotion Fund (ENCON). As per the report there has been insufficient knowledge / confidence in the available technology. Besides, wastewater treatment technology comes together with high

[33] Ministry of Science, Technology and Environment. Thailand (1996). Notification the Ministry of Science, Technology and Environment, No. 3, B.E.2539 (1996). Cited at: http://infofile.pcd.go.th/law/3_4_water.pdf (Document in Thai)
[34] Pollution Control Department. Thailand (2004). Industrial effluents standards. Cited at http://www.pcd.go.th/info_serv/en_reg_std_water04.html (Document in English)

investment cost and high operating cost. As a result, most of manufacturers choose to retain wastewater in open ponds within their factory. The treatment of wastewater in the open lagoons is the least cost option with minimum operating costs. The project proponent was also treating the wastewater in the open lagoons prior to the implementation of the project activity.

Therefore penetration of advanced wastewater treatment technologies (for e.g. UASB) is difficult in Thailand and biogas projects are considered high risk propositions by financiers.
It is important to note that private investment in the renewable/clean technology sector in Thailand faces some key challenges. The following is the outcome of the Investment plan[35] for The Clean Technology Fund (CTF)[36].

The key challenge in stimulating private investment in cleaner technology is overcoming institutional, technical, market, and financial barriers considered as high by investors. Although there is ample liquidity in the domestic financial market, lending to renewable energy projects remain limited. ***Access to affordable financing is a key barrier to investors***, suggesting there are structural rigidities in the renewable power generation development market. Key factors include: (i) lack of knowledge (e.g., limited familiarity and experiences of such projects among lenders and borrowers); and (ii) lack of demonstrated successes (e.g., project designs, deal flows, and business models for such investment projects have not yet been widely demonstrated). As a result financial institutions perceive lending to these projects as risky, resulting in higher costs of project development and debt financing.

Furthermore, the following instances reflect the views of two banks:

TMB Bank Public Co. Ltd (a major Thai bank) states “Access to financial resources and Low priority projects” as the major barriers faced by projects in the wastewater treatment sector[37].

Furthermore, the same view has been highlighted explicitly for the biogas projects by PROPARCO[38] (private sector financing arm of French Development Agency – AFD) as follows:

- High transaction cost – size rather small to attract commercial lenders
- New technologies, less experienced developers
- Capital intensive: projects extremely sensitive to the structure & conditions of capital cost financing
- High level of uncertainty – related to the level of activities of the host companies creates a difficult risk profile, including difficulty in guaranteeing cash flows

The issues highlighted above lead to a complicated and time-consuming process from lender’s point of view.

[35] Paragraph 36, 71, 88, 94: Clean Technology fund investment plant for Thailand, http://www.nesdb.go.th/Portals/0/home/interest/09/Final_Draft_CTF_InvestmentPlan_Oct09.pdf

[36] The Clean Technology Fund (CTF) invests in projects and programs that contribute to the demonstration, deployment and transfer of low carbon technologies with a significant potential for long-term greenhouse gas emissions savings. The CTF Trust Fund Committee oversees the operations of the Fund. The World Bank (IBRD) is the Trustee of the Fund.

[37] Slide no - 6 and 7 http://www.google.co.th/url?sa=t&source=web&cd=9&ved=0CDwQFjAI&url=http%3A%2F%2Fwww.cd4cdm.org%2FAsia%2FFifth%2520Regional%2520Workshop%2FID%26developCDM-Thailand_Prapasawad.ppt&rct=j&q=financial%20barrier%20%2B%20clean%20technology%20%2B%20thailand&ei=cX6ETLmoNInksQOvvez2Bw&usg=AFQjCNG4YY-blMPmMvEg1Ud-sp9miPCNnQ&cad=rja

[38] Slide no – 9 and 10 http://www.setatwork.eu/events/thailand/25%20Paper/Working%20session%203.5_Proparco.pdf

It is therefore, clear that biogas project face sever access to finance barrier both from the point of view of a local commercial bank and development agencies and additional benefits from CDM play a crucial role in successful implementation of such projects.

In reference to the Guidelines for objective demonstration and assessment of barrier, Annex 13, EB50, it is important to enhance the objectivity of the demonstration of additionality by providing quantitative approach to demonstration of barrier. Point 4, Guideline 1 states that:

"While demonstrating barriers related to the lack of access to capital, information should include nature of company, organization and its ownership and, financial information".
The project proponent – "Metro Group Energy Company Limited" is a private limited company incorporated on 5th August 2008 with a registered capital of 10mTHB. The main business of the company is to implement biogas plant and generate power[39]. The ownership detail of the company will be provided to the DOE.

As can be seen from above from the information about the company, it is classified under the SME category. The Thai government classifies SME[40] as a company having capitol not more than 200 million THB.

The project proponent applied for loan to various banks many of which showed interest initially. However, either the banks had very stringent conditions (high securities and interest rates) or simply refused to lend without giving a written refusal letter. The banks normally do not wish to provide written rejection letter. This issue can be verified after interaction with the project proponent. Nevertheless, the problem in securing loan faced by the project proponent is a problem faced by SMEs in Thailand. This can be verified by a detailed analysis provided by the Bank of Thailand's discussion paper on "*A Cross-Country Survey on SME Financial Access and implications for Thailand*"[41]. The paper clearly outlines barriers from SME's point of view and financial institution's perspective.

SME perspective: "*it has been reported that lack of information and advice from financial institutions, complexity and inconvenience related to loan application process, inadequate qualification of SMEs, expenses/fees and interest rates charged, and lack of collateral are the main obstacle to access to finance."*

Financial institution perspective: *" the main obstacles for lending to SMEs include the following factors: inadequate collateral; lack of business experience; inadequate management; unreliable accounting system; lack of business planning, firm's NPL history; high transaction and operational costs per SME loan application; strict government rules and regulations regarding loan lost provision and credit history in credit bureau."*

[39] Company affidavit

[40] http://www.sme.go.th/cms/c/portal/layout?p_l_id=47.43

In English - http://www.smebank.co.th/whoissme_en.php

[41] Page 2, 3 – section 2.2 Challenges in SME financing

http://www.bot.or.th/Thai/EconomicConditions/Publication/Documents/dp032010_SME.pdf

Referring back to the "Guidelines for objective demonstration and assessment of barrier" it is mentioned in Guideline 1:

"A company that is a subsidiary of a multinational group may have different access to capital, technologies or skilled labour than a local SME company."

The project proponent is not a subsidiary of a multinational group and clearly has a different access to capital due to its size and local financial environment.

The above discussion demonstrates the existence of Investment barrier faced by the project proponent in an objective manner.

Outcome of Step 3a:
From the above analysis, the investment barrier prevents the implementation of Alternative 1 (project activity).

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives:

This step focuses on Alternative 2, which is not prevented by the barrier identified above. *Alternative 2* creates acceptable investment and operational costs to achieve compliance with domestic effluent regulation. The project proponent has been using this alternative prior to the project activity to treat the wastewater generated from the starch factory. The anaerobic open lagoon technology is well established at the project site and easy to operate. Open anaerobic lagoons require less investment and have lower operation and maintenance costs[42,43], as compared to alternative systems such as anaerobic reactors, covered lagoons and aerobic systems. Therefore, it can be concluded that Alternative 2 does not face any investment barriers and the project proponent would have continued with the current situation.

Step 4: Common practice analysis
The purpose of the common practice analysis as defined by the Tool for the demonstration of additionality (Version 05.2) is a credibility check on the investment or barrier analysis. Projects are considered similar if they: *"are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc"*

Sub-step 4a: Analyze other activities similar to the proposed project activity:
There is an average of 6.52[44] million of rais[45] of cassava cultivation areas in Thailand. In total, there are 85 native starch factories, mostly located in the Northeastern (46%) and in the eastern region (33%) of the country, followed by the central (14%) and the northern region (7%), respectively[46]. The starch factories are normally closely distributed in the cassava cultivation

[42] Cinara, 2004 "Waste stabilization ponds for wastewater treatment, International Water and Sanitation Centre"

[43] Pena,M.R, Mara, D., 2003, High-rate anaerobic pond concept for domestic wastewater treatment: results from pilot scale experience.
[44] Source: http://www.thaitapiocastarch.org/article05.asp
[45] A rai is a unit of area, which is equal to 1,600 square meters (40 m x 40m), used for measuring land area. It is commonly used in Thailand.
[46] Source: http://www.thaitapiocastarch.org/article05.asp

areas. Furthermore, cassava cultivation and starch production practices do not vary significantly throughout the country. Thus, Thailand is chosen as the common practice comparison region.

In Thailand, most of the wastewater management systems for starch production plants are open anaerobic lagoons[47], which require little investment, have low operation and maintenance costs and fulfill the national regulations for wastewater discharge. Out of 85 starch factories mentioned above, the project proponent could identify the names of 81 plants. From 81 starch factories, 39 are known to have installed UASB systems or similar technology and 6 have installed covered lagoons system. Thus, the proposed project needs to be compared with these 45 projects as the remaining either have open lagoons or don't provide any information.

Sub-step 4b: Discuss any similar Options that are occurring:

From the 45 projects, twelve projects have been registered by the CDM Executive Board as listed in Table 3, another 19 projects, including the proposed project, have received the letter of approval from Thai DNA, and are available on the UNFCCC CDM website as in Table 4 and the status of T.P.K Starch Co Ltd (uses UASB) is not available. The remaining 13 projects are currently undergoing validation and initial verification under VER standards as in Table 5[48].These projects had an intention to register under CDM; however, due to delays to establish the Thai DNA and the subsequent standstill of the DNA's work during the political turmoil surrounding the military coup and the interim government from 2006/2007, these projects could not apply for CDM and opted for the voluntary carbon market.

Thus, none of the 45 installed biogas reactor projects are being implemented without taking additional revenues from carbon credits into account, which reinforces the credibility on the existence of the same or similar barriers that avoid these projects from being successfully implemented without consideration of carbon credits. About other remaining tapioca mills, information is not available to the project participants[49].

No.	Project Title	Project Developer
1	Korat Waste to Energy (KWTE)[50]	Korat Waste to Energy Company Ltd.
2	Cassava Waste To Energy Project, Kalasin, Thailand (CWTE project)[51]	Cassava Waste To Energy Co., Ltd.
3	CYY Biopower Wastewater treatment plant including biogas reuse for thermal oil replacement and electricity generation Project, Thailand[52]	CYY Bio Power Co Ltd
4	Chao Khun Agro Biogas Energy Project[53]	Thai Biogas Energy Company
5	Jiratpattana Biogas Energy Project[54]	Thai Biogas Energy

[47] Source: http://www.thaitapiocastarch.org/article01.asp
[48] Source: South Pole Carbon Asset Management Ltd (please see attachment I)

[49] The number of 41 factories with anaerobic digesters or covered lagoons is based on the information gathered by the project owner. An extensive research has been carried out by South Pole to identify the 85 starch plants and the technology used to treat the waste water. The information has been obtained through Internet websites (Thai Tapioca Association, VCS, UNFCC among others) and through telephonic interviews with project owners and technology suppliers. Results of the survey have been provided to the DOE during validation.
[50] Source: http://cdm.unfccc.int/Projects/DB/KPMG1175141470.89/view
[51] Source: http://cdm.unfccc.int/Projects/DB/TUEV-SUED1218551520.16/view
[52] Source: https://cdm.unfccc.int/Projects/DB/RWTUV1218617500.62/view
[53] Source: http://cdm.unfccc.int/Projects/DB/DNV-CUK1218616482.16/view
[54] Source: http://cdm.unfccc.int/Projects/DB/DNV-CUK1218619436.44/view

		Company
6	Siam Quality Starch Wastewater Treatment and Energy Generation Project in Chaiyaphum[55]	Siam Quality Starch Co.,Ltd
7	Biogas project, Cargill Siam Borabu[56]	Cargill Siam Ltd
8	Wastewater Treatment with Biogas Technology in a Tapioca processing plant at Roi Et Flour Company Limited, Thailand[57]	Roi-Et Flour Co.,Ltd
9	Bangna Starch Wastewater Treatment and Biogas Utilization Project[58]	Bangna Tapioca Flour CO., Ltd.
10	Eiamburapa Company Ltd. Tapioca starch wastewater biogas extraction and utilization project, Sakaeo Province, Kingdom of Thailand[59]	Eiamburapa CO., Ltd.
11	Kitroongruang Biogas Energy Project[60]	Kitrungruang Tapioca Factory Ltd.
12	Wastewater Treatment with Biogas Technology in a Tapioca Processing Plant at P.V.D. International Company Limited, Thailand [61]	P.V.D. International CO., Ltd.

Table 1. The project has been registered by the CDM Executive Board

No.	Project Title	Project Developer
1	C.P.A.T tapioca processing wastewater biogas extraction and utilization project, Nakhonratchasima Province, Kingdom of Thailand[62]	Corn Product Amardass (Thailand) Ltd.
2	Wastewater treatment with Biogas System in a Starch Plant for Energy and Environment Conservation in Nakorn Ratchasima[63]	Sima Interproduct Co.,Ltd.
3	Northeastern Starch (1987) Co.,Ltd. – LPF Fuel Switching Project[64]	Northeastern Starch (1987) Co., Ltd.
4	Chok Chai Starch Wastewater Treatment and Energy Generation Project in Uthai Thani, Thailand (the Project)[65]	Chok Chai Starch Co.,Ltd.
5	Wastewater Treatment with Biogas System (AFFR) in a Starch Plant for Energy & Environment Conservation at Chachoengsao[66]	Sima Interproduct Co.,Ltd.

[55] Source: http://cdm.unfccc.int/Projects/DB/SGS-UKL1217944948.76/view

[56] Source: http://cdm.unfccc.int/Projects/DB/SGS-UKL1244562449.1/view

[57] Source: http://cdm.unfccc.int/Projects/Validation/DB/FM4PO6Y2F43X9YLKXFZ6ATL7N4N1B6/view.html

[58] http://cdm.unfccc.int/Projects/DB/RWTUV1241593452.75/view

[59] http://cdm.unfccc.int/Projects/DB/DNV-CUK1244589730.2/view

[60] http://cdm.unfccc.int/Projects/DB/DNV-CUK1244564976.96/view

[61] http://cdm.unfccc.int/Projects/DB/SGS-UKL1244535025.33/view

[62] Source: http://cdm.unfccc.int/Projects/Validation/DB/0YHT06OEYX01W32NELCWVQJ4V0YLNW/view.html

[63] Source: http://cdm.unfccc.int/Projects/Validation/DB/R0ELBG2HXEZWZ346RBXJ8F1U5N9ETN/view.html

[64] Source: http://cdm.unfccc.int/Projects/Validation/DB/W6U8BGDTG0FWSF13K00CIDA528UO3O/view.html

[65] Source: http://cdm.unfccc.int/Projects/Validation/DB/LQTJF5681NVDBMDZ353AK88VQOJ0YS/view.html

6	N.E. Biotech wastewater treatment and power production project[67]	N.E. Biotech Co.,Ltd
7	Eiamheng Tapioca Starch Industry Co.,Ltd. Tapioca starch wastewater biogas extraction and utilization project, Nakhonratchasima Province[68]	Eiamheng Tapioca Starch Industry Co.,Ltd
8	Avoidance of methane emission from the wastewater treatment facility in K.S. Bio-Plus Co.,Ltd[69]	K.S. Bio-Plus Co.,Ltd.
9	T.H. Pellet Wastewater Treatment and Heat and Electricity Generation in Nakhon Ratchasima, Thailand[70]	T.H. Pellet Co.,Ltd
10	Chantaburi Starch Wastewater Treatment and Biogas Utilization Project[71]	Chantaburi Starch Power Co.,Ltd
11	Blue Fire Bio wastewater treatment and biogas utilization project[72]	Blue Fire Bio Co.,Ltd
12	Chaiyaphum Starch Plant Wastewater Treatment and Energy Generation Project[73]	CHAIYAPHUM PLANT PRODUCTS CO., LTD.
13	N.P. Biopower project at Charoensuk Starch Co. Ltd.[74]	CHAROENSUK STARCH (2005) CO., LTD.
14	Methane Emission Avoidance & Residual Oil Replacement at Tapioca Flour Mill[75]	KORAT FLOUR INDUSTRY CO., LTD.
15	Sangpetch Tapioca Flour Wastewater Treatment and Energy Generation Project[76]	SANGPETCH TAPIOCA FLOUR CO., LTD.
16	Kalasin Wastewater Treatment to Energy[77]	SIAM PRODUCTS (1994) CO., LTD.
17	Metro Group Energy WWT Project	CHAOPHYAPEUCHRAI 2999 (KAMPHAENGPHET) CO., LTD.
18	Maesod Wastewater Treatment and Biogas Utilisation Project[78]	Maesod Starch Co. Ltd
19	UB Tapioca Starch Wastewater Treatment Project[79]	Ubon Agricultural Energy Co. Ltd

[66] Source: http://cdm.unfccc.int/Projects/Validation/DB/6TRWORS2C3D44MQJ61L8WWDPJUAM34/view.html
[67] Source: https://cdm.unfccc.int/Projects/Validation/DB/DBQJEP01EIC0PUEJCPTNCOQI6Z2YUC/view.html
[68] Source: http://cdm.unfccc.int/Projects/Validation/DB/XSRV77E1U7BWLXTY546PPGPKO8W1MO/view.html
[69] Source: http://cdm.unfccc.int/Projects/Validation/DB/FHLEVPUIGEWY8HRSMVWM3IF400M0P6/view.html
[70] Source: http://cdm.unfccc.int/Projects/Validation/DB/C5K6YURDJOY3WVI4QXUVGM7A2BYTUY/view.html
[71] Source: http://cdm.unfccc.int/Projects/Validation/DB/2G1DSV4WSX3GOMWVT86O0ZS6Z834R0/view.html and http://www.tgo.or.th/english/index.php?option=com_content&task=view&id=19&Itemid=29
[72] Source: https://cdm.unfccc.int/Projects/Validation/DB/LPCZTTNZ8ZSJYJP4BOCATXSGM75XVL and http://www.tgo.or.th/english/index.php?option=com_content&task=view&id=19&Itemid=29
[73] Source: http://www.tgo.or.th/english/index.php?option=com_content&task=view&id=17&Itemid=29&limit=1&limitstart=2
[74] Source: http://cdm.unfccc.int/Projects/Validation/DB/JJY1ZBR4P44QH9K2WD9ALQQFTT4E15/view.html
[75] Source: http://cdm.unfccc.int/UserManagement/FileStorage/T4XCHP5DM708F3AVKY6U2BRLESJZI1
[76] Source: https://cdm.unfccc.int/Projects/Validation/DB/UR2SAADSQOV4ZG1UPBL69GZB2E8ZNB/view.html
[77] Source: http://cdm.unfccc.int/Projects/Validation/DB/D7GX65CTGLH8Y7WW6EQSD567Q6TYNJ/view.html
[78] http://cdm.unfccc.int/Projects/Validation/DB/G5ETNKI6NYWZYBG6OXTCVR4XQ3JXMB/view.html
[79] http://cdm.unfccc.int/Projects/Validation/DB/V49FZJ0PEEYF3FPQH7ST86JS15I5OJ/view.html

Table 2. The projects at validation or requesting registration available on UNFCCC CDM website or Thai DNA website

No.	Project Title	Project Developer
1	Wastewater Treatment with Biogas production (UASB) and heat utilization at General Starch Co Ltd	General Starch Ltd.
2	SD BioSupply wastewater treatment and biogas utilization project	SD Biosupply Co.,Ltd
3	VP BioSupply wastewater treatment and biogas utilization project	VP Biosupply Co.,Ltd
4	Banpong Tapioca Flour Industrial wastewater treatment and biogas utilisation project	Banpong Tapioca Flour Industrial Co.,Ltd
5	Sahamitr Tapioca Chonburi Wastewater Treatment and Biogas Utilization Project	Sahamitr Tapioca Chonburi Ltd., Part
6	Chol Charoen Group Wastewater Treatment with Biogas System (Chonburi)	Chol Chareon Co., Ltd
7	Chol Charoen Group Wastewater Treatment with Biogas System (Khon Kaen)	Kean Chareon Co., Ltd
8	Chol Charoen Group Wastewater Treatment with Biogas System (Kampangpet)	Kean Chareon Co., Ltd (Kampangpet Branch)
9	Chol Charoen Group Wastewater Treatment with Biogas System (Chacheongsao)	S.C. Industry Co., Ltd
10	Chorchiwat Wastewater Treatment and Biogas Utilization Project	Chorchaiwat Industry Co.,Ltd
11	Thanawat wastewater treatment and biogas utilization project	Thanawat Biogas Co.,Ltd
12	Chakangrao Starch wastewater treatment and biogas utilization project	Chakangrao Starch Co.,Ltd
13	P.S.C Starch wastewater treatment and biogas utilization project	P.S.C Starch Product (PLC)

Table 3. The projects applying for VER[80]

It can be seen from this analysis that all the projects have either registered or applied for CDM or VER registration. None of the 45 projects, which have installed biogas reactors, are implemented without taking additional revenues from the carbon credits into account.

Therefore, it has been demonstrated that the implementation of the project as “the proposed project activity undertaken without being registered as CDM” is not the common practice in the region.

Therefore, the proposed project activity is additional.

[80] South Pole Carbon Asset Management Ltd.

H.2. Conservativeness

The baseline scenario selection and the calculation of greenhouse gas emission reductions have been carried out in a conservative manner.

Please refer to the PDD Sections B.3, B.4, B.5 and B.6 for more details on project boundary definition, baseline scenario selection and emission reductions calculation.

GOLD STANDARD PASSPORT

ANNEX 1 ODA declaration

[See Toolkit Annex D]

Metro Group Energy Company Limited
205 Rajawongse Road, Chakkawad,
Sampanthawongse, Bangkok 10100, Thailand.
Tel. 0-2225-0200 Ext. 1200 Fax: 0-2224-5536

Date : October 14, 2010

Ref: Metro Group Energy WWW Project (300392)

To: Gold Standard Foundation

Declaration of Non-Use of Official Development Assistance by Project Owner

Metro Group Energy Co., Ltd

As Project Owner of the above-referenced project, acting on behalf of all project participants, I now make the following representations:

Mr. Sunpitt Sethpornpong

I hereby declare that I am duly and fully authorised by the project owner of the above referenced project, acting on behalf of all project participants, to make the following representations on Project Proponent's behalf:

I. Gold Standard Documentation

I am familiar with the provisions of Gold Standard Documentation relevant to Official Development Assistance (ODA). I understand that the above-referenced project is not eligible for Gold Standard registration if the project receives or benefits from Official Development Assistance under the condition that some or all credits coming out of the project are transferred to the ODA donor country. I now expressly declare that no financing

provided in connection with the above-referenced project has come from or will come from ODA that has been or will be provided under the condition, whether express or implied, that any or all of the credits [CERs, ERUs or VERs] issued as a result of the project's operation will be transferred directly or indirectly to the country of origin of the ODA.

II. Duty to Notify Upon Discovery

If I learn or if I am given any reason to believe at any stage of project design or implementation that ODA has been used to support the development or implementation of the project, or that an entity providing ODA to the host country may at some point in the future benefit directly or indirectly from the credits generated from the project as a condition of investment, I will make this known to the Gold Standard immediately.

III. Sanctions. I am fully aware that under Section 10 of the Gold Standard Terms and Conditions sanctions and damages may be incurred for the provision of false information related to Projects and/or Gold Standard credits.

Signed: _____
Name: (Mr. Sunpitt Sethpornpong)
Title: Director
On behalf of: Metro Group Energy Company Limited

บริษัท เมโทร กรุ๊ป เอนเนอร์ยี่ จำกัด
METRO GROUP ENERGY COMPANY LIMITED

GOLD STANDARD PASSPORT