

GOLD STANDARD PASSPORT

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SECTION A. Project Title

Eiamrungruang Waste Water Treatment and Biogas Utilization Project

SECTION B. Project description

“Eiamrungruang Waste Water Treatment and Biogas Utilization”, hereafter referred to as ‘the Project’ is being implemented by Eiam Rung-Ruang Renewable Co.,Ltd (ERR) at a tapioca starch processing plant in Nakornratchasima province, the north east of Thailand. The starch plant has a design starch production capacity of 350 tonne per day.

Prior to the project implementation, the wastewater from the starch plant has been treated through open anaerobic lagoons. The open anaerobic lagoons were sufficient to treat the wastewater and no additional wastewater treatment (aerobic or anaerobic) was required.

The purpose of project activity is to treat the wastewater from the starch factory to generate biogas. The project activity entails the installation of an anaerobic wastewater treatment facility, based on an “Up flow Anaerobic Sludge Blanket” (UASB) system; to complement the existing open lagoon based system. The implementation of the project activity will enable the generation and capture of biogas which is used for electricity and thermal energy generation. The biogas is fed into the gas engine having a capacity of 3,120 kWel out of which first 1,560 kWel has been installed already by 2010 and remaining 1,560 kWel is expected to be installed within two years for power generation and to replace heavy fuel oil in the thermal oil boiler of amount approximately 7,600 litres per day which would have been utilised in the starch drying process.

The project will contribute significantly in the reduction of GHG emissions by combusting biogas, which is rich in methane (a greenhouse gas). In the absence of the project activity, methane would have been emitted to the atmosphere. Furthermore, the electricity generated by the gas engine will be used in the biogas plant and remaining will be exported to the national grid, which will displace electricity generated from fossil fuels in the grid. The biogas utilised in the thermal oil boiler will replace the usage of bunker oil thereby contributing further in the reduction of GHG emissions. In the case of an emergency, excess biogas may be flared in an enclosed flare system.

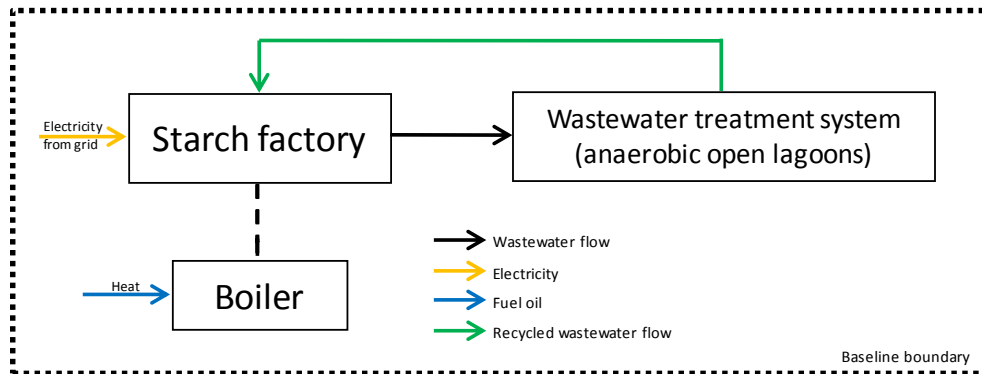
In accordance with the project owner plans, the electricity generated will be sold to PEA under a firm power purchase agreement under the Very Small Power Producer (VSPP) program.

The average estimated emission reduction is 48,216 tonnes per year of CO₂ equivalent.

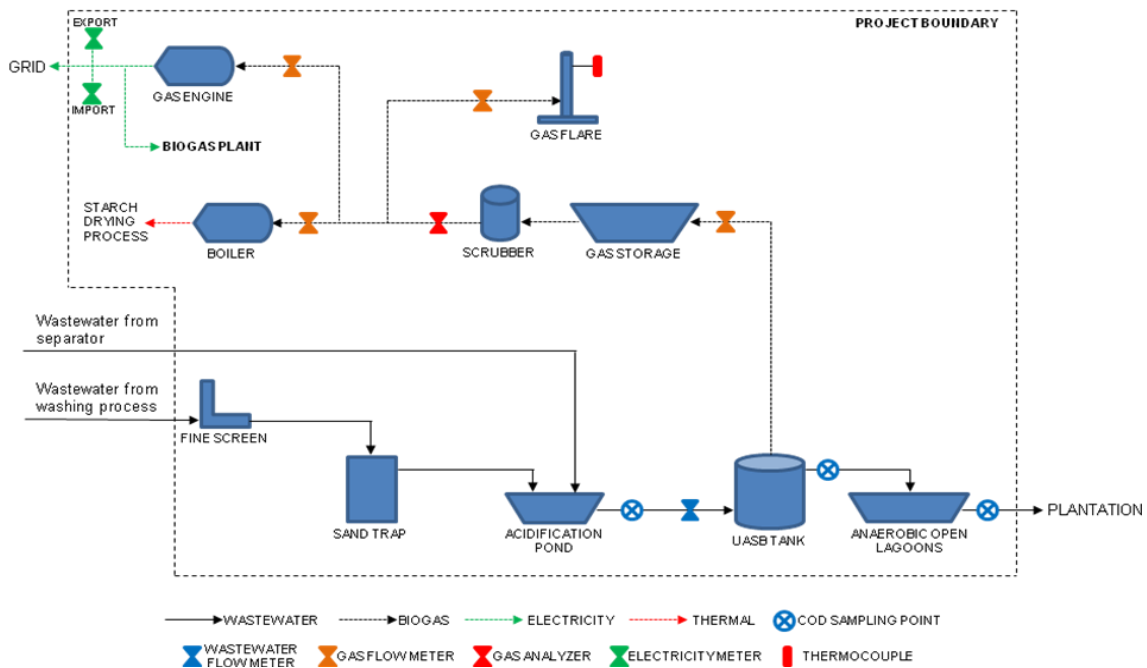
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The diagrams of the pre and post project situations are demonstrated below,

Pre-project situation (baseline)



Post-project situation (project activity)









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SECTION C. Proof of project eligibility

C.1. Scale of the Project

Please tick where applicable:

| Project Type | Large | Small |
|-------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
|  | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|  | <input type="checkbox"/> | <input type="checkbox"/> |
|  | <input type="checkbox"/> | <input type="checkbox"/> |
|  | <input type="checkbox"/> | <input type="checkbox"/> |
|  | <input type="checkbox"/> | <input type="checkbox"/> |
|  | | <input type="checkbox"/> |

C.2. Host Country

Thailand

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C.3. Project Type

Please tick where applicable:

| Project type | Yes | No |
|------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|
| Does your project activity classify as a Renewable Energy project? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Does your project activity classify as an End-use Energy Efficiency Improvement project? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Please justify the eligibility of your project activity:

The project type falls under Biogas (landfill gas and biogas from agro-processing, wastewater and other residues), as specified in Appendix C of the Gold Standard Toolkit.

Adherence to the 65% rule of minimum utilisation

The biogas system at the project activity is designed in such a way to maximise the utilisation ratio of the biogas for the delivery of thermal and electrical energy. The flaring system will be used only in case of emergency.

| Pre Announcement | Yes | No | | | | | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------|-------|-------------|--------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------|------------------|-------------------------------------------------------------------|
| Was your project previously announced? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | |
| <p>Explain your statement on pre announcement</p> <p>There has been no public announcement of the project going ahead without the CDM, prior to any payment being made for the implementation of the project.</p> <p>*the table refers to the PDD</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Event</th> </tr> </thead> <tbody> <tr> <td>May 1, 2007</td> <td>Establishment of Eiam Rung-Ruang Industry Co.,Ltd. for producing native starch</td> </tr> <tr> <td>December, 2007</td> <td>Technical proposal from Papop Co.,Ltd., to Eiam Rung-Ruang Biotech Co.,Ltd. including CDM application services (Proof of early consideration)</td> </tr> <tr> <td>February 12, 2008</td> <td>Meeting to discuss the implementation of biogas project under consideration of CDM</td> </tr> <tr> <td>May 17, 2008</td> <td>Signing contract for the project activity between Papop Co.,Ltd and Eiam Rung-Ruang Biotech Co.,Ltd. including CDM application services (Project start date)</td> </tr> <tr> <td>December 8, 2008</td> <td>Establishment of Eiam Rung-Ruang Renewable Co.,Ltd. for biogas operation</td> </tr> <tr> <td>February 4, 2009</td> <td>South Pole Carbon Asset Management Ltd. submitted CDM proposal to</td> </tr> </tbody> </table> | | | Date | Event | May 1, 2007 | Establishment of Eiam Rung-Ruang Industry Co.,Ltd. for producing native starch | December, 2007 | Technical proposal from Papop Co.,Ltd., to Eiam Rung-Ruang Biotech Co.,Ltd. including CDM application services (Proof of early consideration) | February 12, 2008 | Meeting to discuss the implementation of biogas project under consideration of CDM | May 17, 2008 | Signing contract for the project activity between Papop Co.,Ltd and Eiam Rung-Ruang Biotech Co.,Ltd. including CDM application services (Project start date) | December 8, 2008 | Establishment of Eiam Rung-Ruang Renewable Co.,Ltd. for biogas operation | February 4, 2009 | South Pole Carbon Asset Management Ltd. submitted CDM proposal to |
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| May 17, 2008 | Signing contract for the project activity between Papop Co.,Ltd and Eiam Rung-Ruang Biotech Co.,Ltd. including CDM application services (Project start date) | | | | | | | | | | | | | | | |
| December 8, 2008 | Establishment of Eiam Rung-Ruang Renewable Co.,Ltd. for biogas operation | | | | | | | | | | | | | | | |
| February 4, 2009 | South Pole Carbon Asset Management Ltd. submitted CDM proposal to | | | | | | | | | | | | | | | |

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| | |
|-------------------|---------------------------------------------------------------------------------------------------|
| | Eiam Rung-Ruang Biotech Co.,Ltd. for purchase of CERs. |
| May 15, 2009 | First Payment paid to Papop Co.,Ltd. for construction of the biogas system |
| November 18, 2010 | Signing purchase agreement between Eiam Rung-Ruang Renewable Co.,Ltd. and Swiss Carbon Asset Ltd. |
| March 23, 2011 | Submission of Letter of Intent to UNFCCC |
| June 1, 2011 | Submission of Letter of Intent to Thai DNA |
| June 8, 2011 | Initial CDM Gold Standard stakeholder consultation |

C.4. Greenhouse gas

| | |
|-----------------------|-------------------------------------|
| Greenhouse Gas | |
| Carbon dioxide | <input checked="" type="checkbox"/> |
| Methane | <input checked="" type="checkbox"/> |
| Nitrous oxide | <input type="checkbox"/> |

C.5. Project Registration Type

| | |
|----------------------------------|--------------------------|
| Project Registration Type | |
| Regular | <input type="checkbox"/> |

| | 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) |
|----------------------------|-------------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| Pre-feasibility assessment | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

If Retroactive, please indicate Start Date of Project 17/05/2008

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SECTION D. Unique project identification

D.1. GPS-coordinates of project location

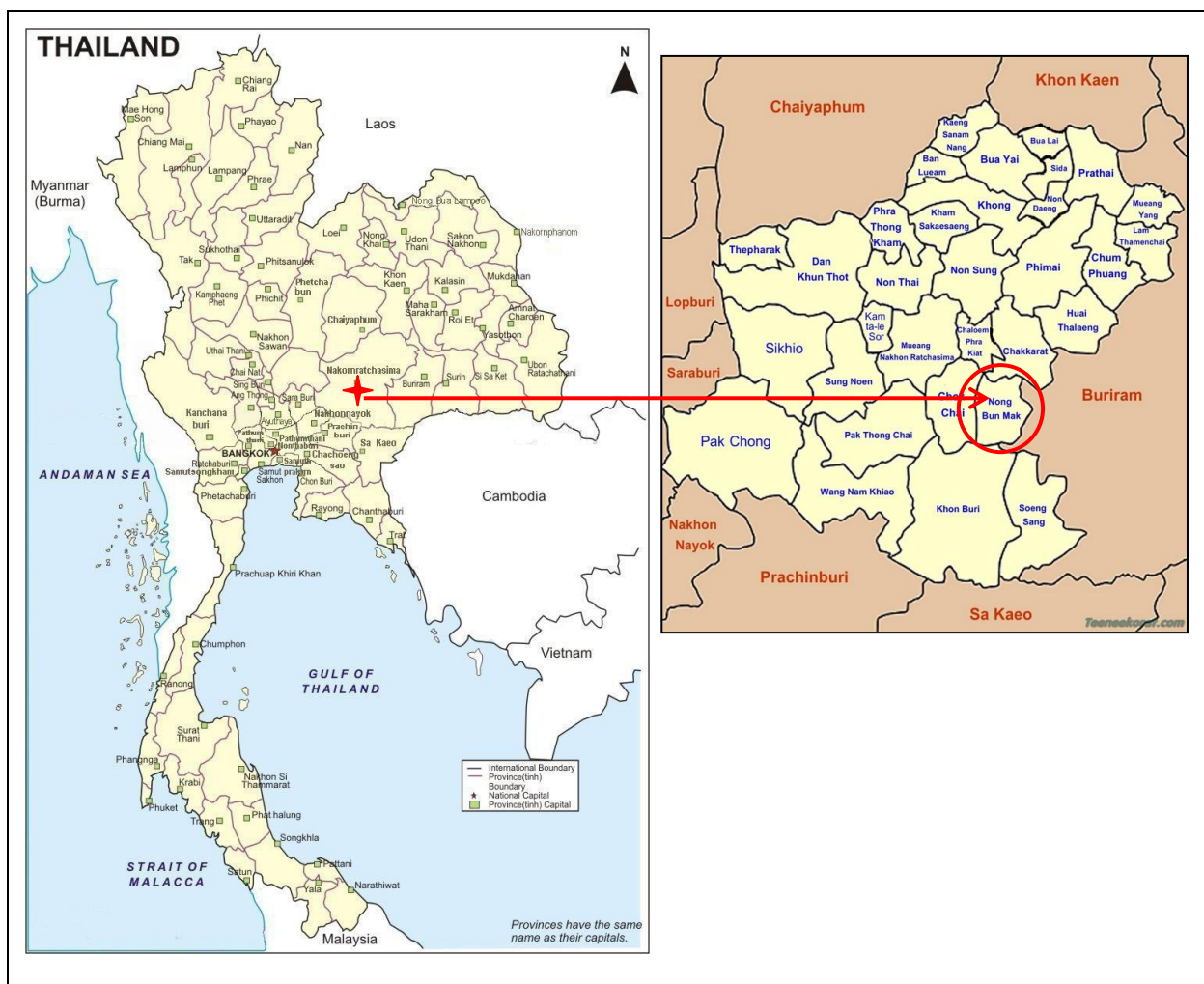
| | Coordinates |
|-----------|----------------|
| Latitude | 14°43'51.18"N |
| Longitude | 102°23'41.86"E |



Explain given coordinates

NA – the given coordinates are sufficient for unique project identification

D.2. Map



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SECTION E. Outcome stakeholder consultation process

E.1. Assessment of stakeholder comments

As this project is a retroactive project, the stakeholder consultation could not be conducted according to Gold Standard Rules. However stakeholders have been invited to comment on the project. A summary on the outcome of the stakeholder meeting is provided here below:

Initial stakeholder meeting

Place and date of the meeting

The local stakeholder consultation was held at the meeting room of Eiam Rungruang Industry Co.,Ltd, on June 8, 2011

Invitation method

Stakeholder groups were identified and informed through oral and written means about the meeting. The invitation letter was sent by fax to participants located far from the project site, in person to participants without access to a fax and there was also an announcement of the meeting posted at the community hall for people who had not received an invitation letter. This invitation process was done two weeks before the meeting date.

The persons or organizations invited were as follows:

Local people impacted by the project or official representatives

- Villager in Moo 1
- Villager in Moo 2
- Villager in Moo 5
- Villager in Moo 6
- Villager in Moo 9
- Subdistrict headman of Ban Mai
- Village headman Moo 1 of Nonghuarat
- Village headman Moo 1 of Ban Mai
- Assistant Village headman Moo 1
- Assistant Village headman Moo 9
- Community leader
- Village Fund
- Village Health Volunteer

Local policy makers and representatives of local authorities

- Ban Mai Subdistrict Administrative Organization (Ban Mai SAO)
- North Eastern Tapioca Trade Association (NETTA)
- Nakhon Ratchasima Provincial Public Health Office
- Nakhon Ratchasima Provincial Agriculture Extension Office
- Nakhon Ratchasima Provincial Administrative Office

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- Nakhon Ratchasima Provincial Industrial Office
- Nakhon Ratchasima Provincial Office of Natural Resources and Environment

Designated National Authority

- Thailand Greenhouse Gas Management Organization-TGO

Local non-governmental organisations working on topics relevant to the project

- Greenleaf Foundation
- Energy of Environment Foundation
- The Energy Conservation Foundation of Thailand
- Thailand Environment Institute
- WWF Greater Mekong Programme, Thailand Country Office
- Greenpeace Southeast Asia (Thailand Office)

The local Gold Standard expert who is located closet to the project location

- South East Asia Regional Manager

Relevant international NGOs supporting GS, with a representation in your region and ALL GS supporter NGOs located in the host country of the project

- HELIO International
- Mercy Corps
- REEEP
- WWF International
- Appropriate Technology Association (ATA)
- Dhammanart Foundation
- Renewable Energy Institute of Thailand, REIT

Meeting participants

The mentioned meeting was attended by local residents and representatives from the following stakeholder categories:

1. Local people impacted by the project or official representatives
2. Local policy makers and representatives of local authorities
3. The local Gold Standard expert who is located closet to the project location

Language

Documentation and meeting was held in Thai (local language)

Meeting procedure

The agenda of the meeting was as follows:

| Time | Agenda |
|-----------------------|---------------------------------------------------------------------------------------------------------------|
| 1:00 - 1:30 PM | Registration |
| 1:30 - 1:40 PM | Welcome to the meeting and objectives of the meeting |
| 1:40 - 2:10 PM | About Eiam Rung-Ruang Renewable Co.,Ltd. |
| 2:10 - 2:40 PM | About Papop Co.,Ltd. Details of wastewater treatment system and biogas utilization |
| 2:40 - 3:10 PM | About Swiss Carbon Asset Ltd. or South Pole Carbon (Thailand) Co.,Ltd. - Clean Development Mechanism (CDM) |

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| | |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | - Impacts on environment, social, etc. |
| 3.10 - 3:50 PM | <p>Blind sustainable development exercise</p> <ul style="list-style-type: none"> - Assessment the result of the impacts – positive, neutral, negative - Open discussion on the mitigation measures of negative impact and further discussion on other impacts - Discussion on practical and cost-effective parameters that can be used for monitoring |
| 3:50 - 4:00 PM | Closing the meeting |

Summary of the comments received

There were two representatives who are a Chief Executive of the Subdistrict Administrative Organization and a skilled teacher provided comments related to the environmental impact of odour from the implementation of the Project and the employment.

| No. | Comment received | Response to comment |
|-----|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Odour from the implementation of the Project | The project proponents admit that odour is a problem with the existing open lagoon system. The project will significantly reduce the odour problem. |

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.

E.2. Stakeholder Feedback Round

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

This section will be filled in as soon and the Stakeholder Feedback Round has been carried out.

Stakeholder feedback round will start as soon as the project documentation has been finalized. The hard copies of the documents will be made available at the biogas plant and at local governmental office(s) for those interested. The project proponents will also announce at the social gathering of the village that the mentioned documents are now available for review, in which the stakeholders will be invited to comment on the project during the Stakeholder Feedback Round for a period of two months.

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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. | The project does not cause any human rights abuse. Also, 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 there was no use of project area before implementing the project. Therefore, the project does not involve any involuntary resettlement. | Low | N.A. |
| 3 The Project does not involve and is not complicit in the alteration, damage, or removal of any critical cultural heritage. | This is not relevant as there was no use of project area before implementing the project. Therefore, there exists no cultural heritage within the project site. | 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 | With all the staff being employed according to national legislation ¹ , there is very little chance of the project breaching this safeguarding principle. The project does not prevent collective bargaining or encourage restriction of freedoms and rights. | Low | N.A. |
| 5 The project does not involve and is not complicit in any form of forced or compulsory labour. | The project does not, and will not, involve any forced or compulsory labour. It is also not in the interest of project owner to invest time and money in | Low | N.A. |

¹ 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.

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| Safeguarding principles | Description of relevance to my project | Assessment of my project risks breaching it (low/medium/high) | Mitigation measure |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------|
| | training people who have not consented to the job. This principle is thus considered as having little or no relevance. | | |
| 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 ² . | 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 and will not discriminate against individuals and employment of staffs is not based on gender, race, religion, sexual orientation or on any other basis. | 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 | Although careless operation of the project could threaten the workers' safety, training on issues such as safety is a requirement by statutory regulations ³ and shall be duly complied with by the project operators. | Low | N.A. |
| 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 | The principle holds relevance in consideration to the project. Although statutory regulations allows a maximum permissible COD level of discharged wastewater from a starch plant of 120 mg/L ⁴ . The project owner has taken a precautionary approach in becoming a 'zero discharge' plant to minimise negative environmental | Low | N.A. |

² See Labor Protection Act BE 2541 (1998) and Thai Civil and Commercial Code. According to the labor law, a child labor could be employed only if he has completed 15 years of age. But, in order to employ child labor below 18 years of age, the employer is required to notify it to the labor inspector regarding the employment of a child labor within 15 days from the date of joining the job. Likewise, the law restricts an employer to make a child labor below 18 years to work on public holidays and to do overtime. Further, child labor below 18 are not allowed work in certain working environments such as metal stamping, working with hazardous chemicals, and working with poisonous microorganisms.

³ See Labor 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 analyze the safety in the workplace; and write orders to the employer and the employee requiring them to comply with the law.

⁴ 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.

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| Safeguarding principles | Description of relevance to my project | Assessment of my project risks breaching it (low/medium/high) | Mitigation measure |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------|
| should be taken even if some cause and effect relationships are not fully established scientifically.” | impact(s) with regards to water pollution/contamination. | | |
| 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. This safeguarding is considered not applicable to the implementation of project. The project activity will not result in conversion or degradation of critical natural habitats. | 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 but has not ratified it, neither has Thailand ratified the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions. However, the project is not considered as offering potential corruption opportunities. The principle is considered with no relevance. | Low | N.A. |

F.2. Sustainable Development matrix

Insert table in section D3 from your Stakeholder Consultation report (Sustainable Development matrix).

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| Indicator | Mitigation measure | Relevance to achieving MDG | 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 ‘-‘ | <p>Check www.undp.or/mdg and www.mdgmonitor.org</p> <p>Describe how your indicator is related to local MDG goals</p> | Defined by project developer | <p>Negative impact: score ‘-‘ in case negative impact is not fully mitigated score 0 in case impact is planned to be fully mitigated</p> <p>No change in impact: score 0</p> <p>Positive impact: score ‘+‘</p> |
| Air quality | | <p>Target 7. A: “integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources”.</p> | <p>Odour and other air pollutants:</p> <p>Air quality shall improve substantially compared to emission levels (SOx and NOx) related to fossil fuel combustion. Fuel oil will be displaced by the use of biogas from the project activity for thermal energy generation. The GHG emissions will also be reduced as a consequence of the project. Furthermore, by replacing the open anaerobic lagoon with a closed bio-digester system, the project significantly contributes to an improvement of odour emissions, which has a substantial impact on quality of life for the employees at the starch plant and</p> | 0 |

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| Indicator | Mitigation measure | Relevance to achieving MDG | Chosen parameter and explanation | Preliminary score |
|----------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| | | | <p>residents living in the area close to the lagoons.</p> <p>Some participants still had concerns about odour resulting from the wastewater treatment system.</p> | |
| Water quality and quantity | | <p>Target 7. A: “integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources”.</p> | <p>Contamination of public water resources, shortage of water supply:</p> <p>There is a significant improvement in water quality due to the implementation of a more efficient and reliable effluent treatment system (UASB reactor). The wastewater after the effluent treatment process will be in compliance with the standards and requirements of the national regulation for wastewater discharge or based on the conditions given in the operating licence of the project. Moreover, some of the treated wastewater will be reused in the process of the starch plant.</p> <p>Risks of groundwater contamination due to leakage of organic pollutants from the bottom of the lagoons into the groundwater can also be reduced by the use of a concrete lining for each system. Thus, it is unlikely that</p> | 0 |

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| Indicator | Mitigation measure | Relevance to achieving MDG | Chosen parameter and explanation | Preliminary score |
|------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| | | | wastewater leakage will occur. The participants have no doubt about the operation or performance of UASB system; however they worry about discharge of treated wastewater from the open lagoon system into any public water sources around their communities. The neutral score is given on this indicator. | |
| Soil condition | | Target 7. A: “integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources”. | Soil contamination and erosion: There is no significant difference relative to the baseline scenario as the project releases no treated wastewater or sludge into lands or areas which cause soil contamination and erosion. | 0 |
| Other pollutants | | Target 7. A: “integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources”. | Noise pollutant: For the project, a source of noise might be the power generation system which has to operate engine which there is no comment until now by the participants for this issue. The project proponents are confident that there is no significant change compared with the baseline scenario. However, a neutral score is given for conservativeness. | 0 |
| Biodiversity | | Target 7. A: “integrate the principles of | Threatened plants and animals: | 0 |

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| Indicator | Mitigation measure | Relevance to achieving MDG | Chosen parameter and explanation | Preliminary score |
|------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| | | sustainable development into country policies and programmes and reverse the loss of environmental resources”. | The project proponents and stakeholder believed that the project is located in the area of the starch factory which will not cause any impact on threatened plants and animals. However, there were no sufficient explanations to support this claim; thus to be conservative a neutral score is given. | |
| Quality of employment | | N/A | Training of staffs: The project proponents will provide annual plan for training staffs for the operation of biogas system which the quality of employment can be significantly enhanced. However, this is valid especially when considering that training on issues such as safety is becoming a requirement by statutory regulations. A neutral score is thus given as a modest assessment. | 0 |
| 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) | Livelihood of workers: Overall, the project proponents and the stakeholders are satisfied with the project implementation that there will be benefits on the livelihood of the local participants. However, the project proponents | 0 |

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| Indicator | Mitigation measure | Relevance to achieving MDG | Chosen parameter and explanation | Preliminary score |
|------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| | | | give the neutral score owing to its limited impact. | |
| Access to affordable and clean energy services | | <p>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))</p> <p>Target 8. F: In cooperation with the private sector, make available the benefits of new technologies, especially information and communication.</p> | <p>Change in energy use: Both the project proponents and participants are agreed that the change from fossil fuel to renewable energy can cause good environment. Moreover, the project participants feel good that there is clean energy in their communities.</p> | + |
| Human and institutional capacity | | N/A | <p>Public participation, education and skills: Although the project participants are satisfied with the public participation such as the LSC meeting and the knowledge about biogas system, the project proponents chose a neutral scoring because the project will not contribute directly to the local education, gender equality or social structure.</p> | 0 |
| Quantitative employment and income generation | | <p>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)</p> | <p>Employment records: The project creates new jobs and increases income for the region via the fostering of contracts for the construction, operation and maintenance of the</p> | + |

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| Indicator | Mitigation measure | Relevance to achieving MDG | Chosen parameter and explanation | Preliminary score |
|-----------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| | | <p>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)</p> | <p>plant which the participants also agreed on this indicator. An increased demand for tapioca roots also leads to more jobs and revenues in the rural sector.</p> | |
| Balance of payments and investment | | <p>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.</p> | <p>Level of fuel import: It was clearly explained about replacing heavy fuel oil for thermal energy generation and fossil fuel for power generation by national grid. As a consequence, fuel import can be decreased. However, since the impact will be small relative to the wide-economy, a neutral score is chosen.</p> | 0 |
| Technology transfer and technological self-reliance | | <p>Target 8. F: In cooperation with the private sector, make available the benefits of new technologies, especially information and communication.</p> | <p>Introduction of new technology in the region, trainings, workshops: The project proponents and participants agreed that the project will promote technology transfer to the region. In addition, there will be regular trainings or workshops for the staff such as on the technology, the monitoring, and the safety in working.</p> | + |

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| Indicator | Mitigation measure | Relevance to achieving MDG | Chosen parameter and explanation | Preliminary score |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------|-------------------|
| Justification choices, data source and provision of references | | | | |
| Air quality | Air quality will be improved substantially compared to emission levels (SO _x and NO _x) related to fossil fuel combustion. Fossil fuels will be displaced by the use of biogas from the project activity for thermal energy generation. Moreover, the project also expects to see a reduction in odour. This information will be evaluated in the Initial Environmental Evaluation (IEE) to be submitted to the Thai DNA. | | | |
| Water quality and quantity | Water quality will improve in comparison to the baseline with the addition of the wastewater treatment facility. COD removal efficiency of the UASB system can be obtained from the technical proposal documents developed by the supplier (Papop Co., Ltd). The water quality will be in compliance with national standard. | | | |
| Soil condition | The project proponents do not expect to see significant impacts on the soil condition. However, it may be argued that when compared to open lagoons, the anaerobic digesters allow for easier handling of the produced sludge, which can be used as high quality organic fertilizer. Thus replacing the use of chemical fertilizers. Such information is available in the IEE. | | | |
| Other pollutants | The project shall ensure that the level of noise pollution shall be within the maximum permissible level for the industry. This information will be evaluated in the IEE. | | | |
| Biodiversity | The project proponents believe that there is no significant change in the biodiversity. However, this information will be evaluated in the IEE. | | | |
| Quality of employment | The staffs will be trained according to annual plan provided by the project proponents. | | | |
| Livelihood of the poor | The project will, in general, raise the income level and improve the living quality of the local community. This information will be noted in the PDD and the IEE. | | | |
| Access to affordable and clean energy services | This indicator can be confirmed by Power Purchase Agreement (PPA) between the project and Provincial Electricity Authority (PEA). This will result in a small and positive contribution in meeting national power demand and thus indirectly helps to maintain the security of the electricity system | | | |
| Human and institutional capacity | The project might not significantly contribute to local education, gender equality or social structure in the near future. However, local stakeholders had a feeling of empowerment brought about by the participatory process under which this project was developed. | | | |
| Quantitative employment and income generation | The project will generate employment opportunities and income to the local stakeholders which can be substantiated through employment record. | | | |
| Balance of payments and investment | It was clearly explained about replacing heavy fuel oil for thermal energy generation and fossil fuel for power generation by national grid. As a consequence, fuel import can be decreased. In addition, the IEE will also address this information. | | | |
| Technology transfer and technological self-reliance | The project results in knowledge transfer on waste management principles, biogas recovery and utilization. Training records can substantiate such practice. Further elaboration on this will be available in the IEE. | | | |

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SECTION G. Sustainability Monitoring Plan

| | | |
|-----------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No | 1 | |
| Indicator | Project eligibility criteria Compliance with the 65% of methane utilization | |
| Mitigation measure | n/a | |
| Chosen parameter | Methane utilization (%) | |
| Current situation of parameter | n/a | |
| Estimation of baseline situation of parameter | n/a | |
| Future target for parameter | At least 65% | |
| Way of monitoring | How | <p>The parameter will be calculated based on the consumption of biogas in the gas engine, thermal heater and the amount of biogas flared. Based on the monitored % of methane in biogas, it can be estimated how much methane was utilized.</p> <p><u>Details⁵</u></p> <p><u>$Q_{\text{biogas, gas engine, y}}$ (Quantity of biogas combusted in gas engine)</u> Measurements of volume of biogas sent to the gas engines are done continuously using gas flow meters. In recording these parameters, plant's operators shall first manually archive the monitored data onto log sheets then transfer to the computer for electronic storage. The measurement is thereby continuous but data recording happens once in a day.</p> <p><u>$Q_{\text{biogas, boiler, y}}$ (Quantity of biogas combusted in thermal boiler)</u> Measurements of volume of biogas sent to boiler are done continuously using gas flow meters. In recording these parameters, plant's operators shall first manually archive the monitored data onto log sheets then transfer to the computer for electronic storage. The measurement is thereby continuous but data recording happens once in a day.</p> <p><u>$Q_{\text{biogas, flared, y}}$ (Total quantity of biogas flared)</u> Measurements of volume of biogas sent to flare are done continuously using gas flow meters. In recording these parameters, plant's operators shall first manually archive the monitored data onto log sheets then transfer to the computer for electronic storage. The measurement is thereby continuous but data recording happens once in a day.</p> |
| | When | Refer to how to monitor above |
| | By who | The project |

⁵ For full details, please refer to those parameters in the PDD section B.7.1

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| | | |
|-----------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No | | 2 |
| Indicator | | Air quality |
| Mitigation measure | | n/a |
| Chosen parameter | | Sulfur oxide (SOx), Nitrogen oxide (NOx), Hydrogen Sulfide (H2S) and Total Suspended Particulate (TSP) emissions in boiler stack and exhaust gases in the gas engine |
| Current situation of parameter | | Refer to the baseline situation |
| Estimation of baseline situation of parameter | | Electricity Generation Component: Electricity generation in Thailand is based mainly on natural gas and coal. In general, using coal for electricity generation emits more SOx, NOx, H2S and TSP compared to electricity generated using renewable sources. Thermal Generation Component: In the baseline, the boiler would have been operated on fuel oil. |
| Future target for parameter | | The limits as per the industrial regulation |
| Way of monitoring | How | The emission of SOx, NOx, H2S and TSP will be monitored as per the national standard. |
| | When | Once a year |
| | By who | The project owner |

| | | |
|-----------------------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No | | 3 |
| Indicator | | Water quality |
| Mitigation measure | | n/a |
| Chosen parameter | | COD of water out from the open lagoon system (post-treatment system of the project activity) |
| Current situation of parameter | | Refer to baseline situation |
| Estimation of baseline situation of parameter | | In the baseline, there would have been risks of water contaminations and leakage from the open lagoons with water with high COD content. |
| Future target for parameter | | There is no as such future target for this parameter but to make sure that the COD entering open lagoons in the project is lower than COD entering the open lagoons in the baseline scenario. |
| Way of monitoring | How | COD out from the post-treatment system will be measured by external laboratory |
| | When | Once a month |
| | By who | Project owner |

| | | |
|--------------------|--|-----------------------------------------------|
| No | | 4 |
| Indicator | | Quantitative employment and income generation |
| Mitigation measure | | N/A |

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| | | |
|-----------------------------------------------|--------|-----------------------------------------------------------------------------------------------------|
| Chosen parameter | | Number of employed staffs and the level of income generation. |
| Current situation of parameter | | Current situation of parameter is equal to baseline situation. |
| Estimation of baseline situation of parameter | | In the baseline, no additional jobs or income would have been generated. |
| Future target for parameter | | Additional employment as a result from the project activity |
| Way of monitoring | How | Number of employees and the level of income generation will be demonstrated through company records |
| | When | Once a year |
| | By who | The project owner |

| | | |
|-----------------------------------------------|----------------------------------------------------------------------------|---------------------------------------|
| No | 5 | |
| Indicator | Technology transfer and technological self-reliance | |
| Mitigation measure | n/a | |
| Chosen parameter | Training records | |
| Current situation of parameter | Refer to the baseline situation | |
| Estimation of baseline situation of parameter | In the baseline, no additional jobs or training would have been generated. | |
| Future target for parameter | This is no future target for this indicator. | |
| Way of monitoring | How | Training records will be presented |
| | When | Refer to training plan of the project |
| | By who | The project owner |

Additional remarks monitoring

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"⁶. A step-wise approach is used to demonstrate and assess additionality:

- 1) Identification of alternatives to the project activity;
- 2) Investment analysis;

⁶ Version 05.2, EB39, Annex 10.

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- 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 utilization 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.

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)”⁷ 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 (BOD₅) shall not exceed 20 mg/litre. However there is an exception for starch plants, which stipulates that BOD₅ should not exceed 60 mg/litre⁸. 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

⁷ 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)

⁸ 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)

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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:

Access to Finance barrier

The tapioca processing industry is considered to be one of the largest food processing industrial sectors 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 at a high investment cost and high operating cost. As a result, most starch producers 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) under regular approach faces difficulties in Thailand and biogas projects are considered as a high risk proposition 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 plan⁹ for The Clean Technology Fund (CTF)¹⁰ by the World Bank.

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 remains limited. ***Access to affordable financing is a key barrier to investors***, suggesting that there are structural rigidities in the renewable power generation development market. Key factors include: (i) lack of knowledge (e.g., limited familiarity and experience with such projects among lenders and borrowers);

⁹ 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

¹⁰ 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.

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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 sector¹¹.

Furthermore, the same view has been highlighted explicitly for biogas projects by PROPARCO¹² (private sector financing arm of French Development Agency – AFD) as follows:

- High transaction cost – the project size is typically rather small to attract commercial lenders
- New technologies combined with limited experience by developers
- Capital intensive - projects are 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 a both a lender's and a borrower's point of view.

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

Project-specific situation with regards to access to finance

(i) nature of company, organization and its ownership and financial information

In reference to the “*Guidelines for Objective Demonstration and Assessment of Barriers*”, Annex 13, EB50, it is important to enhance the objectivity of the demonstration of additionality by providing project specific information. Paragraph 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 – “Eiam Rung-Ruang Renewable Company Limited” is a private limited company incorporated on 8th December 2008 with a registered capital 50 million THB. The main business of the company is to implement the biogas plant and generate energy¹³.

The project proponent applied to banks to secure a loan for the project activity. The banks initially

¹¹ Slide no - 6 and 7

http://www.google.co.th/url?sa=t&source=web&cd=9&ved=0CDwQFjAl&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=cX6ETLmoNlnksQOvvez2Bw&usq=AFQjCNG4YY-bIMPmMvEg1Ud-sp9miPCNnQ&cad=rja

¹² Slide no – 9 and 10

http://www.setatwork.eu/events/thailand/25%20Paper/Working%20session%203.5_Proparco.pdf

¹³ Company affidavit

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showed keen interest but later refused to finance the project owing to uncertainty in the production capacity of the starch factory due to risks in the supply chain of raw material (Cassava) and due to the risk of underperformance of the biogas plant. Nevertheless, the problem in securing the loan faced by the project proponent is a general problem faced by small and medium enterprises (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"¹⁴. 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 loss provision and credit history in credit bureau."*

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 the local financial environment.

The above discussion indicates the existence of **access to finance** barrier faced by the project proponent in an objective manner.

(ii) financial closure achievement through CDM

As per the guideline 6 from the "Guidelines for objective demonstration and assessment of barrier" it is mentioned that:

"In case the PPs make the claim for investment barriers, they should demonstrate in the PDD that the financing of the project was assured only due to the benefit of the CDM."

As mentioned above, the project proponent faced problems in accessing finance for the project activity. After applying to banks, the loan was finally approved by the Krung Thai bank which also considered benefits from CDM¹⁵. The bank has also confirmed¹⁶ that CDM has played a crucial role in the loan approval process for the project activity. There is no doubt that the bank considered revenues

¹⁴ Page 2, 3 – section 2.2 Challenges in SME financing

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

¹⁵ Loan approval document

¹⁶ Confirmation letter from the bank

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from the carbon credits crucial while approving the loan and hence, financing of the project was assured due to CDM. This is an objective demonstration of access to finance barrier as per the guideline 6 mentioned above.

The above discussion demonstrates in an objective manner that the project activity faced investment barrier which was overcome only due to the additional benefits from CDM.

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^{17,18}, 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 as per the Tool for the demonstration of additionality (Version 05.2) is as 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”. The project decision was made on the basis of the additionality. However as per requirement of the GS regulations the common practice analysis was included at the stage of PDD finalization. The common practice analysis is provided based on latest data and references available.

Sub-step 4a – Analyze other activities similar to the proposed project activity

There is an average of 6.52¹⁹ million of rai²⁰ of cassava cultivation areas in Thailand, most of which located in the northeastern and eastern region, especially Nakhorn Ratchasima (where the project is located), Chaiyaphum and Kalasin provinces. In total, there are 85²¹ 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. The starch factories are normally closely distributed in the cassava cultivation areas. Furthermore, cassava cultivation and starch production

¹⁷ Cinara, 2004 “Waste stabilization ponds for wastewater treatment, International Water and Sanitation Centre”

¹⁸ Pena, M.R, Mara, D., 2003, High-rate anaerobic pond concept for domestic wastewater treatment: results from pilot scale experience.

¹⁹ Source: <http://www.thaitapiocastarch.org/article05.asp>

²⁰ 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.

²¹ Source: <http://www.thaitapiocastarch.org/article05.asp>

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practices do not vary significantly throughout the country. Thus, Thailand is chosen as the common practice comparison region.

In Thailand, the primary wastewater management systems for starch production plants were open anaerobic lagoons²² systems, which required little investment, had low operation and maintenance costs and fulfilled the national regulations for wastewater discharge. The common practice analysis is based on latest information available from various sources. In perspective of the project developer the biogas system was something that was still being tested and demonstrated by the national institutions²³. The referred document published in 2007, clearly demonstrates that in 2005 the number of biogas projects were negligible and the project were being put up for demo purposes by some institutions. In the last few years many industries have invested in biogas based systems. In the following analysis, the starch industries in Thailand are discussed for their wastewater management practices.

As per latest information, majority of starch industries have installed wastewater projects. The PP has collected information from the various sources to analyse the biogas projects being developed all across the country, which are similar to the project activity. The projects similar to project are tabulated in the following sub-step.

Sub-step 4b – Discuss any similar options that are occurring

As per the report published by EPPO in August 2007, 25 projects have installed anaerobic systems. The project proponent has collected information from different sources and concluded that a total of 62 starch manufacturing units have anaerobic biogas systems for wastewater treatment. All these projects have either already invested or have started construction of wastewater treatment system. These new installation are capable of biogas capture and utilization depending on the requirements of the particular project.

Out of these 62 projects, 43 projects have considered CDM revenues as per the publically available information on UNFCCC website. Another 14 projects have VCS revenue streams considered as part of project revenue as per information on VCS registry website. 1 of the projects has received funding from the government extended by EPPO (Energy policy and planning office, Ministry of Energy, Thailand). 3 projects implemented biogas in 1990's i.e. before 2000 and one project has been fitted with an indigenous system based on fairly simple technology i.e. covered lagoon. Covered lagoon technology is not comparable to the project activity and is thereby neglected from analysis.

Out of the remaining 23 projects, 17 starch manufacturing units have open lagoon systems, whereas for 6 sites no information is publically available and no contact was possible via telephone as well. The above numbers are tabulated as below:

Table 1: Wastewater treatment technique break up of Tapioca plants in Thailand

| <i>Technology type</i> | <i>No of Plant</i> |
|---------------------------------------------------------|--------------------|
| <i>Open Lagoon</i> | <i>17</i> |
| <i>Anaerobic Digesters</i> | <i>62</i> |
| <i>Covered Lagoons</i> | <i>1</i> |
| <i>Info not available (publically or through phone)</i> | <i>6</i> |

²² Source: <http://www.thaitapiocastarch.org/article01.asp>

²³ Source: Seminar Document Part 1, page 47: The Promotion of Biogas from Wastewater as An Alternative Energy and for Environmental Improvement, published by the Energy Conservation and Renewable Energy Division and Energy Policy and Planning Office (EPPO), 2007. <http://www.eppo.go.th/encon/report/BioGasMartBook/index.html> (in Thai)

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| | |
|--------------|-----------|
| Total | 85 |
|--------------|-----------|

The projects with biogas facility = 63.

Table 2: Tapioca mills supported under CDM/VCS/ EPPO Fund

| Source of fund/grant | No of plants |
|-----------------------------|---------------------|
| CDM | 43 |
| VCS | 14 |
| KMUTT / EPPO Fund support | 1 |
| Total | 58 |

Out of remaining 4 projects,

Table 3: Tapioca mills with biogas system but no CDM / VCS support

| Parameter | No of Plants |
|------------------------------------------|---------------------|
| Plants implemented before 2000 | 3 |
| Installed with indigenous old technology | 1 |
| Total | 4 |

The remaining project is the project under consideration in this project passport.

For details of the source of information, please refer to the excel sheet provided along for the common practice analysis.

Thus, none of the 62 installed anaerobic biogas reactor projects (comparable to project activity) have been implemented under normal circumstances without any additional external financial support in form of income from emission reductions.

Since the Sub-steps 4a and 4b are satisfied, the Project activity is additional.

Conclusion:

It is clear that the carbon credits revenues play a significant role in the financial viability of the project and that the project owner would not have invested in such a project without the consideration of carbon credits revenues. In absence of the project activity, the existing lagoons would lead to higher green house emissions due to methane release from the lagoon to the atmosphere and CO₂ emissions related to fossil fuel fired power plants connected to the grid.

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.

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ANNEX 1 ODA declaration



Eiam Rung-Ruang Renewable Co.,Ltd.
129 Moo1, Nonghuarat, Nongbunmak,
Nakornratsima 30410

5 July 2011

Eiamrungruang Waste Water Treatment and Biogas Utilization Project
To: Gold Standard Foundation

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

Mr. Prasong Satthakun and Ms. Sudawan Wangsuphakijkosol on behalf of Eiam Rung-Ruang Renewable Co.,Ltd.

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

Mr. Ingo Puhl and Mr. Patrick Bürgi on behalf of Swiss Carbon Asset Ltd.

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.

Project Owner:

Signed:

Name: Mr. Prasong Satthakun
Title: Managing Director
On behalf of: Eiam Rung-Ruang Renewable Co.,Ltd.

Project Owner: 

Signed: 

Name: Ms. Sudawan Wangsuphakijkosol
Title: Managing Director
On behalf of: Eiam Rung-Ruang Renewable Co.,Ltd.





The Gold Standard
Premium quality carbon credits

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Eiam Rung-Ruang Renewable Co.,Ltd.
129 Moo1, Nonghuarat, Nongbunmak,
Nakornratsima 30410

Authorized Representative:

Signed:

Name: Mr. Ingo Pühl

Title: Managing Director

On behalf of: Swiss Carbon Asset Ltd.

Authorized Representative:

Signed:

Name: Mr. Patrick Bürgi

Title: Managing Director

On behalf of: Swiss Carbon Asset Ltd.

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