south pole
Carbon Asset Management Ltd.

Lowering GHG emissions and improving water quality: South Pole's experience with wastewater treatment projects

Methane captured from industrial wastewater is replacing the use of heavy fuel oil. With the double effect of mitigating greenhouse gas (GHG) emissions from waste water, as well as from power generation, South Pole's Thai waste water treatment (WWT) projects contribute significantly to the fight against global warming.

The Background

The tapioca starch industry is one of the major agricultural industries in Thailand, playing a significant role in the country's economy. Currently, there are an average of 6.52 million rais (1 rai=1600 square meters) of tapioca cultivation, which makes Thailand the largest exporter of tapioca starch worldwide.
With a growing awareness of ecological impacts and revenues from carbon credit trading more and more plants change to modern WWT installations.
Most of the tapioca cultivation areas are located in the eastern and northeastern regions, especially in Nakhorn Ratchasima, Chaiyaphum and Kalasin provinces.

How does it work?

The production process in tapioca processing plants require large amounts of water, and produces a considerable amount of by-products and waste associated to the cleaning, peeling and extracting phases. On average, a ton of tapioca starch produces 10 – 20 cubic-meters of waste water, containing a high level of biodegradable organic material.

Typically, the wastewater from the starch plants is treated in cascading open anaerobic lagoons which requires a water retention time of more than a year. Lagons filled with waste water are dense in organic content and the average atmospheric temperature is around 28 degree Celsius which creates atmospheric conditions and an anaerobic environment. This results in the generation of methane, a powerful GHG with a global warming potential (GWP) 21 times higher than CO_2.
Sound environmental management systems are necessary for ensuring that environmental impacts associated to the tapioca starch industry are reduced and that best practices are adopted in the industry. Ensuring an efficient use of available resources as well as the minimization of waste production is important to a sound environment management system.

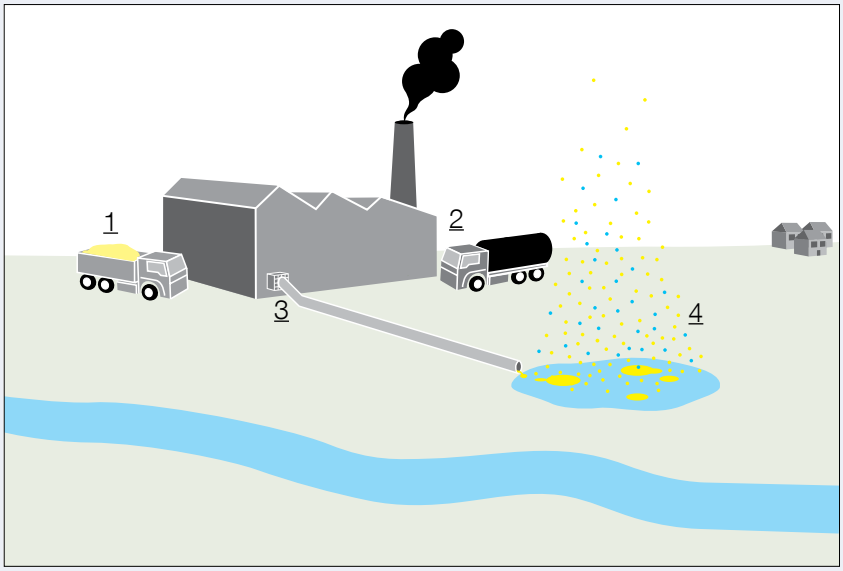
South Pole Carbon Asset Management Ltd. collaborates with technology partners and with project owners of tapioca manufacturing in Thailand, with the aim of developing projects that improve the efficiency of waste water treatment processes and fuel burners to reduce GHG emissions.
The projects entail the installation of anaerobic wastewater treatment facilities based on biogas reactor technology and covered lagoons. Such a system replaces the open anaerobic-lagoon based system and collects the biogas produced in the biogas reactor, avoiding the release of methane to the atmosphere.

Delivery of cassava 1

Heavy Oil Burner 2

Untreated waste water 3

Open lagoon releasing methane into the atmosphere 4

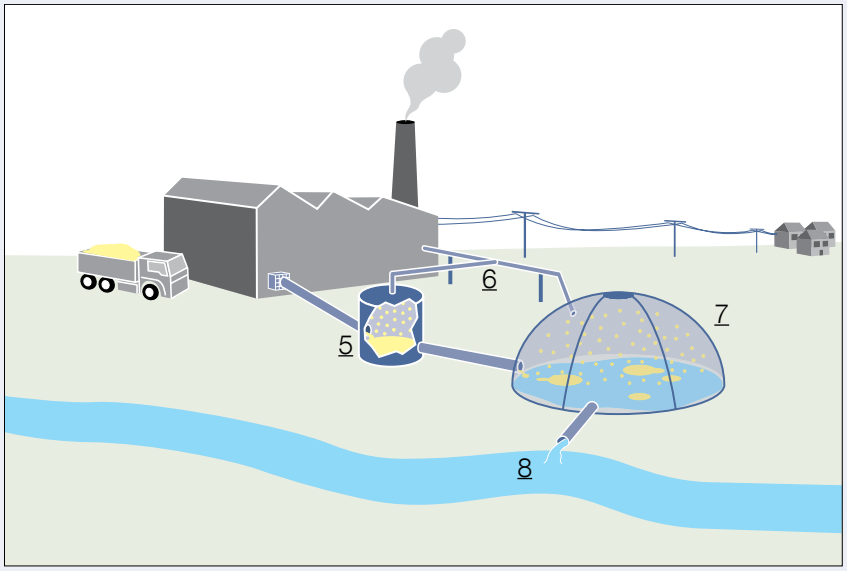


A

The graphs above show what the waste water treatment process looks like with and without project implementation, and provides an overview of the water treatment phases and water cycle.

Graph A: Before installation of the project:
Heavy fuel oil (2) is burnt for heat generation that is needed to dry the starch. The waste water from the factory is filtered (3) to allow solids to begin settling and to maintain a more constant flow rate through the treatment system.
The water is discharged into open air lagoons (4) for evaporation, where the anaerobic environment and the long retention periods allow for the generation of methane, which is progressively released into the atmosphere.
The treated water from the lagoons is utilized for irrigation of plantations or partly re-used in the process for washing tapioca roots.

The captured gas is then reused as fuel in the existing heat generating devices in the industrial plants, or is used to produce electricity, which is then either used on-site or sent to the national grid, therefore replacing fossil fuels and leading to further GHG emission reductions.
Besides mitigating global warming, our projects significantly improve the quality of the treated water due to higher efficiency and improved process control. The biogas reactor system also allows the factories to reuse the treated water, contributing to water conservation and optimization of resource use. Furthermore, the project drastically reduces odour emissions as compared to an anaerobic lagoon, which contributes significantly to an improved quality of life for communities living in the areas.



B

Graph B: After installation of project:
The water is sent to the biogas reactor (5), where the organic matter from the wastewater is digested by methanogenic bacteria. This results in the production of biogas, consisting of methane and carbon dioxide, which are separated and collected (6) for further use as a fuel for the production of heat or electricity. This displaces the use of fossil fuels that would be necessary in the absence of the project.
The effluent from the biodigester can be sent to covered lagoons (7), where additional gas can be captured and reused (6) within the production plant. Effluent from the anaerobic wastewater treatment system is treated in a secondary treatment consisting of anaerobic lagoons and eventually facultative ponds. A large amount of treated water can be reused within the factory, used for irrigation, or can be discharged into natural water systems (8).
Regular laboratory checks (9) ensure high water quality and prompt identification of anomalies.


5 Upflow Anaerobic Sludge Blanket (UASB) Biogas Reactor


6 Biogas pipeline


7 Covered lagoons


8 Waste water, after treatment in a lake at one of the plants


9 Regular laboratory checks

The Benefits

We believe that the development of climate friendly societies is best supported with access to modern technologies, local employment and vocational training, improvement of educational options, and last but not least consideration of healthy livelihoods with clean air, water, and soil. This is why we encourage the project owners to invest not only into their plants but to take on a holistic responsibility and approach.

- Construction, operation and maintenance of the biogas plants generate local employment, for both qualified and support staff positions. Local staff are supported with vocational training on modern technology, and enjoy fair and safe working conditions. Implementation of modern technology enhances the skill set of workers.









- Close collaboration between external experts and local counterparts promotes long term sustainable partnerships, benefiting local stakeholders. Several stakeholder consultations are held during the registration process to ensure their needs are respected.
- The application of UASB technology used in the WWT process has wide replication potential and is driving further investment in industry and generating economic growth.
- The plants collaborate closely with the farmers delivering the raw material, and provide free fertilizer from the treated waste water. It contains a number of nutrients, such as Nitrogen, Phosphorus and Potassium and is a good alternative to chemical fertilizers.

- Project owners usually contribute to the communities, e.g. supporting educational structures through scholarships, donations to schools, help offered after poor harvest, etc.






South Pole and its services

South Pole is proud of its high quality portfolio with more than 50% of its projects being Gold Standard.
The Gold Standard is a quality label endorsed by major NGOs. The Gold Standard is an independently audited best practice benchmark for emission reduction projects that deliver high quality carbon credits of premium value. Initiated by WWF, the Gold Standard is supported by approximately 40 environmental and development NGOs worldwide. Projects labeled Gold Standard are guaranteed to fulfill the strictest rules concerning monitoring, additionality, and involvement of stakeholders.
South Pole insists on the strictest guidelines since its inception in 2006 because we believe that only those changes will have a sustainable impact that are quantifiable, verifiable and permanent, rooted in their environment and accepted by its stakeholders.
South Pole seeks Gold Standard certification for its projects wherever feasible.

South Pole offers attractive surplus to its high quality credits.
For most of our WWT projects, we have a rich selection of pictures of: the plants and its processes, the impacts and benefits, and the ecologic and cultural surroundings. We are happy to offer these to our clients for use in their own marketing work.
In addition, a South Pole video on the WWT cycle provides insight into the work on site. The video includes interviews with residents, stakeholders, and engineers, making the positive impacts of carbon trading come alive.
Please check with our experts at the sales desk for information on the projects you are interested in.

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