Thai company generates power from wastewater

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Thai cassava processor partners with Global Water Engineering to cut influent COD levels by 95%, generate electricity from biogas

Chockyuenyong Industrial, which processes 1,200 tonnes/day of cassava roots, has installed GWE anaerobic technology (supplied by local GWE agent Retech Energy) with the capacity to treat 3,200 m3/day of effluent. “The installation provides an international model in terms of attaining top environmental standards of wastewater treatment while generating green power and carbon credit profits as well,” said GWE CEO Jean Pierre Ombregt, whose company has completed more than 300 water and wastewater projects in over 60 countries including Asia, Africa, North and South America, Australia, China, Europe (including Eastern Europe) and Russia. GWE has successfully built and commissioned more than 75 biogas utilisation systems for clients worldwide.

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Chokyeunyong’s process involves an equalisation basin (total volume 1,600m3) with submerged agitators, degasifying basin with agitator (24m3) in-line pH adjustment, NaOH storage tank (25m3) UASB methane reactor (active volume 4,800m3) and biogas flare (standby, for use if required). The implementation is all above-ground.

Chockyuenyong’s wastewater treatment process has delivered following benefits:

- Cut the Chemical Oxygen Demand (COD) pollution level of influent wastewater from 22,500 ml/l (14,525mg/l Biochemical Oxygen Demand, BOD O2) to less than 1125 mg/l, resulting in substantially cleaner discharges to treatment ponds and ultimately the environment, while reducing odour from typical ponds.
- Returns up to 2.7MW of electricity a year to a provincial power grid, PEA, which serves areas distant from major generating sources.
- Saves the equivalent of up to 21,000 litres/ day of fuel oil by producing up to 34,000 Nm3 of biogas, which is used to power the boilers and heating equipment used extensively in cassava drying and processing and generate electricity for the large amounts of rotating equipment used in processing
- Generates carbon credits under the United Nations’ Framework Convention on Climate Change, through which it earns valuable internationally tradeable CER certificates, representing the right to emit one tonne of carbon dioxide or carbon dioxide equivalent.

The wastewater passes through several pre-treatment steps before entering a methane reactor, in which the wastewater’s organic content (COD) is digested by bacteria in a closed reactor, degrading the compounds and converting them into biogas and treated effluent. Biogas from the process is collected and reused as renewable fuel in the plant’s thermal oil boiler, saving money that would otherwise be spent on bunker oil, which is subject to wide fluctuations in price. Excess biogas is used in electrical power generation.

“Food processing plants such as Chokyeunyong’s depend extensively on electrically-powered rotating equipment, so it is very wise to have an almost infinite fuel source which provides a hedge against rising oil prices and which can also be sold back into the grid,” said Ombregt. “Chokyeunyong’s achievement has implications for a broad range of primary processing industries and particularly for cassava-producing countries that turn this relatively low-cost raw material into high-value starch for domestic and international markets.”

The UN’s Food & Agriculture Organisation (FAO) estimates that each year, some 60 million tonnes of starch are extracted from a wide range of cereal, root and tuber crops for use in a staggering

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variety of products: as stabilisers in soups and frozen food, as coating on pills and paper, as adhesives on stamps and plywood, as a stiffening agent in textiles, as raw material for making ethanol, in non-food products, such as pharmaceuticals and thermo-bio-plastics and even as binder in concrete. Cassava, of which 200 million tonnes is produced every year, accounts for 10% of the global starch production.

Chokyeunyong Industrial President Tawatchai Yuenyong said his company's investment programme has been well-justified by the outcome in terms of environmental and financial results and as a good local community member. "Our investment programme has had a very happy ending," he said.

Ombregt claimed that results achieved at Chokyeunyong can be further improved by converting its solid waste (residual pulp from the roots, after starch extraction) into biogas using GWE's RAPTOR treatment system for solid organic residues. RAPTOR stands for Rapid Transformation of Organic Residues. It's a liquid-state anaerobic digestion process that consists of enhanced pre-treatment followed by multi-step biological fermentation to optimise conversion of organic residue or energy crop into biogas, valuable electricity or heat.

The Global Water Engineering group specialises in industrial wastewater solutions and renewable energy solutions. GWE's wide range of technologies covers water recycling, digestion of biomass and sludge and slurries, biogas production and reuse, bioenergy and carbon credits.

Tags: Agitators, Anaerobic Digestion, Biogas, Carbon Credit, Chemical Oxygen Demand (COD), pH, Upflow Anaerobic Sludge Blanket (UASB)

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