Starch Producer Transforms Waste to Energy

Processing 1,200 tons of cassava roots a day, Chockyuenyong Industrial, headed by Tawatchai Yuenyong, uses Global Water Engineering (GWE) anaerobic technology, supplied by local GWE agent Retech Energy, with a capacity of 3,200 m3 effluent a day. The installation provides wastewater cleanliness while generating green power and carbon credit profits as well, says GWE CEO Jean Pierre Ombregt, whose company has completed more than 300 water and wastewater projects in more than 60 countries. GWE has successfully built and commissioned more than 75 biogas utilization systems for clients worldwide.

Commissioned and refined over the past three years, the Chockyuenyong installation:

- Cuts the chemical oxygen demand (COD) pollution level of influent wastewater from 22,500 ml/l (14,525 mg/l biochemical oxygen demand (BOD) O2) to less than 1125 mg/l, resulting in substantially cleaner discharges to treatment ponds and ultimately the environment.
- Returns up to 2.7 Mw of electricity a year to a provincial power grid, PEA, which serves some areas distant from major generating sources and welcomes fresh input of green power generated locally.
- Saves the equivalent of up to 21,000 liters a 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 to

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 tradable CER certificates, representing the right to emit one ton of carbon dioxide or carbon dioxide equivalent.

"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," says Ombregt.

"The UN's Food and Agriculture organization estimates that each year, some 60 million tons of starch are extracted from a wide range of cereal, root and tuber crops for use in a variety of products: as stabilizers 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 thermobioplastics, and even as binder in concrete.

"Our technology applies to a broad range of these crops. The FAO says many developing countries could strengthen their rural economies by converting more of that relatively low-cost raw material into high-value starches."

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

GWE's anaerobic treatment significantly reduces the plant's carbon footprint by

avoiding the release of methane gas into the atmosphere. The wastewater passes through several pre-treatment steps before entering a GWE 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 valuable biogas and cleaned 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 and which, Jean-Pierre Ombregt says, can only increase in price over time. Chokyeunyong's excess biogas is used in electrical power generation.

"Food product 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 that provides a hedge against rising oil prices and which can also be sold back into the grid," says Ombregt.

Results achieved at Chokyeunyong can be even further improved by converting its solid wastes (residual pulp from the roots, after starch extraction) into biogas as well, using GWE's RAPTOR™ treatment system for solid organic residues, says GWE.

Its RAPTOR technology stands for Rapid Transformation of Organic Residues. It's a powerful liquid-state anaerobic digestion process that consists of enhanced pre-treatment followed by multi-step biological fermentation to optimize conversion of almost any organic residue or energy crop into biogas, valuable electricity or heat.

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

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