



PHILIPPINES

Converting pineapple waste into biogas

The Philippines is an archipelago located in Southeast Asia comprised of more than 7,000 islands dotting the Pacific Ocean. With a long total coastline, the Philippines is blessed with stretches of pristine white sand beaches at the edge of crystal-clear waters. The warmth and hospitality of the Filipinos increase the potential of Philippines to become one of the top destinations for holiday and exotic travel with budget friendly options. But the Philippines also has other unseen potential, hidden in form of energy.

By Medina Berbic

Biogas technology was introduced in the Philippines in 1965 by Dr. Felix D. Maramba, an agricultural and mechanical engineer who is still well known there as an important scientist and developer of biogas applications. At the time it was introduced, biogas technology did not receive social or economic support as a method of energy production because fuel was cheap and readily available. It would take a few decades for the technology to gain environmental and commercial significance.

The oil crisis of 1973 affected the Philippines in a way similar to the largest oil spill incident in the country's history. After the crisis, more attention was paid to renewable energy, with a focus on the development and utilisation of hydropower, geothermal and solar energy.

The biogas industry, with its complex technology, really got started much later, early in 21st century (2000), after carrying out various studies and analysing the potential of biomass. Up to this time, practical applications included just small biogas plants for home use because large-scale plants were not economically feasible due to the ubiquity of coal for power generation. After the Philippines joined the Paris Climate Accord in 2017, when the country committed to reduce greenhouse gas emissions by 70% and to increase renewable energy sources to 35% by 2030, biogas technology started to play a larger role in reaching this goal. The great potential of the Philippines, as an agricultural country, lies in the large quantities of biowaste, a problem with which the Philippine government is struggling.

PHOTOS: LIPP GMBH



4,700 MW could be produced by using all organic waste

The waste management system is still not established in practice and the collected biowaste is unsorted, mixed with plastic and another waste. Further potential lies in municipal waste, animal manure – pork production is one of most important industries in the Philippines – fish waste and waste from exotic fruits. For example, a study by the U.S. Energy Association, carried out in 2015, indicates that 4,700 megawatts (MW) of energy could be generated if all of the organic waste in the Philippines were utilised.

Despite this high potential, biogas technology and its implementation is not yet widespread in the Philippines. There is not enough social and economic support to make up for the lack of information and experience and to help manufacturers and developers of biogas technology succeed.

A few large biogas plants, with an average capacity of 1 MW have been built, but most of the potential is still unused. At the same time, the country still depends heavily on coal for power generation and has the highest energy costs in comparison with other ASEAN countries. This affects not only the Filipino population, but also the country's global competitiveness.

How was the project started?

Mindanao, the second-largest island in the Philippines (after Luzon), is located in the southern region of the

archipelago. The largest pineapple canning facility in the Philippines, Dole Philippines, Inc., is located here. The company has two operating sites, Surallah and Polomolok, and processes fruit juices and canned fruits from pineapple as well as from smaller amounts of other exotic fruits such as bananas and mangos. Dole Philippines, Inc. is part of the Dole company, an international market leader with an extensive range of high-quality exotic fruits and products made from them. Their products can be found in every supermarket in Germany. Dole Philippines, Inc. produced more than 180,000 metric tonnes of organic waste (pineapple peels) in 2018 (based on the company's statistical data), and the amount is expected to grow in the coming years. The unprocessed pineapple residue was field-composted, releasing methane into the atmosphere during the process. Using the unprocessed pineapple residue in this way, however, called attention to the high methane emissions and the insufficient consumption of the rich nutrients in the fertiliser. This resulted in the identification of ways to improve the waste management system with an eye toward reducing greenhouse gas emissions and increasing the quality of fertiliser.

It was found that capturing the methane produced from the anaerobic digestion of pineapple peel waste can reduce CO₂ emissions by about 50,000 t per year. In turn, this methane can be used instead of fossil fuels to generate power and steam in the factory. These significant findings and CO₂ compensation played an important role in the decision to install an industrial biogas plant with a total capacity of 7.9 MW. This plant consists of two biogas plants, one at Surallah, with a capacity of 2.9 MW and one at Polomolok, with a capacity of 5 MW. The estimated costs for realising this project totaled one billion Philippine pesos (16.7 million euros).

With the support of the Joint Crediting Mechanism (JCM), a programme introduced by the Government of Japan, it was possible to secure co-financing to implement this idea. The JCM programme supports the reduction of global greenhouse gas emissions by promoting advanced low carbon technologies and systems and so on in developing countries. This financing programme supports 172 projects in 17 different developing countries. This biogas project in the Philippines is titled "Biogas Power Generation and Fuel Conversion".

How did LIPP become part of the project?

The German company Lipp GmbH is well-known on the international biogas market with their unique "Double-Seam System" construction technique and tanks produced from Verinox® material. Thanks to many years of experience and expert technology, the company offered competitive solutions for meeting the challenges of realising this large biogas plant and processing pineapple residue, a feedstock that has not been adequately researched. In addition, this German biogas technology was considered a suitable technology for meet- ▶



ing the high requirements for a JCM grant to ensure the long-term, reliable operation of the biogas plant and equipment. Lipp was commissioned by Met-Power Venture Partners, the official contractor of the project, to develop and build two biogas plants to be integrated into Dole's Surallah and Polomolok canning facilities (South Cotabato, Philippines). The first draft of pre-feasibility studies for these two large-scale plants was started in 2017. Two years were needed to complete the final plans and obtain all of the necessary permits and required contracts.

The biogas plant complex in Surallah consists of the following LIPP components: two LIPP ECO Digesters, each with a volume of 5,000 m³, with an additional 8,300 m³ gas storage membrane, one LIPP buffer tank with a volume of 2,500 m³ and another LIPP buffer tank with a volume of 900 m³. The biogas plant complex in Polomolok consists of the following LIPP components: three LIPP ECO Digesters, each with a volume of 6,000 m³, with an additional 8,300 m³ gas storage membrane, one LIPP buffer tank with a volume of 5,000 m³ and another LIPP buffer tank with a volume of 1,300 m³.

The construction of the first biogas plant in Surallah started in 2019, but due to the impact of covid-19 in 2020, building was postponed for a few months. Additional difficulties with international travel restrictions and quarantine protocols have strongly affected the continuing work on site. Thanks to good cooperation and organization among all participants, however, work has been completed up to commissioning phase. Hopefully the plant will be in full operation in the next few months. The construction of the second biogas plant in Polomolok, with a planned start in 2020, had to be postponed due to the covid-19 pandemic. Despite the current situation, the Lipp team arrived in the Philippines some time ago and continues to work on site. Once fully operational, the two plants will utilise 100% of the pineapple waste designated for disposal to produce renewable energy and contribute to reducing greenhouse gases and air pollutant emissions along

with lowering electricity costs for Dole. Once the biogas power plant is operational, the digestate, which is much more potent and environmentally sustainable, will be used. This project will certainly be among the best references for all of the participants, but it also represents one more successful milestone among the challenging projects in which Lipp has participated.

Educational project for Filipinos – biogas training

“Can I smell methane?” “Doesn't it smell bad?” “What can I do with biogas?” These questions illustrate the lack of information about and experience with the biogas industry in this country. For this reason, the LIPP company carried out an additional promotion project in the Philippines with educational content. As part of a develoPPP.de project programme, experienced German biogas experts, the team of the German Biogas Association (GBA) and the LIPP team, supported by a local partner, the German-Philippine Chamber of Commerce and Industry (AHK Philippines), will provide biogas training and a biogas laboratory. This project incorporates not only high-quality technology, but also the transfer of technical know-how as well as thorough and comprehensive theoretical and practical training, including safety training.

Due to the covid-19 pandemic, the experts from GBA could not travel to the Philippines to conduct the first training on site, but a virtual training programme was organized. Designed with six blocks of three hours each, the training was performed in March 2021 with 70 participants. Filipinos participated in interactive activities and showed interest in continuing education, which provides positive feedback regarding the overall feasibility of the project. Spots are available in the three additional training sessions which will be organised in the near future.

The develoPPP.de project was co-financed by the German Investment Corporation (DEG) with public funds from the German Federal Ministry for Economic Cooperation and Development (BMZ, www.developpp.de). BMZ can support your company's innovative projects and commercial investments in developing and emerging countries provided that they offer long-term benefits for the local population. ◀

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