

BIOGAS TECHNOLOGY of GEN. MARIANO ALVAREZ, CAVITE

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Mr. **MICHAEL S. TEMPLONUEVO** is the Chief Consultant and founder of the MHE Biogas Technology and Waste Disposal Consultancy. He introduced ideas of combining business ventures with environmental protection. Thus, the overlying principles of **“ENVIRONMENTAL PROTECTION, THAT EVERYTHING IS CONNECTED TO EVERYTHING ELSE”**. A simple act of littering must be a ground of big destruction in the future! from thereon, the company included environmental protection and the concept of Corporate Social Responsibilities (CSR). The company started to offer BIOGAS TECHNOLOGY; A BY PRODUCT OF ANAEROBIC DIGESTION to every LGU's and private /commercial establishments for solid waste management and waste water treatment system.

Mr. **TEMPLONUEVO**, is a biogas practitioner, social science instructor and **CURRENT MUNICIPAL ENVIRONMENT AND NATURAL RESOURCES OFFICER (MENRO)** and President of Association of Cavite Environment and Natural Resources Officers (ACENRO) As a Chief Consultant, Mr. Templonuevo, see to it that every projects must be aligned to the environmental principles of the company. Mr. TEMPLONUEVO has been engaged in BIOGAS TECHNOLOGY since 2014 and adopted the same as main solid waste diversion tool and waste water treatment in his own locality. He introduced revolutionary ideas in using ANEAROBIC DIGESTION not only for solid waste management program but also for the small scale waste water treatment for various piggeries and slaughterhouse.

LIST OF PREVIOUS WORKS AND LITTERATURE



The actual installation of 60 Cu. Meter Two Floating Type Biogas Digesters at Sally Villapando Slaughterhouses located at Brgy. Poblacion 5, Gen. Mariano Alvarez, Cavite. (2017)

The company also designed Three (3) Fixed Type Biogas Digesters and Five (5) IBC Water Tank Biogas Digesters to the locality of General Mariano Alvarez, Cavite under the tutelage of Mr. TEMPLONUEVO and integrated to the Solid Waste Management Program of the locality.



16 Cu.Meters (400 Kgs) Capacity Fixed Type Biogas Digester



80 Cubic Meters (2 Tons) Capacity of Biogas Digester



IBC Water Tank Biogas Digester with Communal Kitchen located at Brgy Poblacion 1, Municipal Compound, Municipality of General Mariano Alvarez, Cavite

This 2 Cubic Meter IBC Water Tank Biogas Digester was designed to accommodate 50 kilos of Biodegradable wastes mostly collected directly at household level comprising Five (5) Barangays. This communal biogas kitchen was regularly used for simple cooking activity of MRF Personnel and nearby Brgys in case of emergency. The sludge and treated waste water shall be used for plant watering. The communal kitchen biogas digester was pilot project of the municipality designed and under technical supervision of Mr. Templonuevo, to maintain its operational sustainability. Five nearby barangays delivered its segregated collected biodegradable wastes including kitchen wastes from different offices and departments of municipal hall. Logically, the municipality wants to prove that if Material Recovery Facility (MRF) will be managed effectively and efficiently, and biodegradable wastes will be collected and segregated and placed in a proper disposal system. Even, within municipal compound the establishment of MRF is possible.



This 2 Cubic Meters (50 kilos) Twin IBC Water Tank Biogas Digesters was designed specifically to treat mostly wastes from GMA Public Market and MAGRA Commercial Center. Market wastes has always been problematic especially if not collected every day. Fish gills, intestines, rotten

vegetables and even liquid wastes from wet section are very harmful and hazardous if not collected and eventually pose health risks and invite water-borne diseases. The Twin IBC Biogas Digester is capable to treat 50 kilos of similar wastes everyday and provide cooking gas for one to three hours per day.



The actual operation of Twin IBC Water Tank Biogas Digester using fish gills, rotten intestine, and vegetables and blood of fish as a substrates.

Believing the importance on environmental protection and renewable energy, the company provided technical assistance as part of its Corporate Social Responsibility to extend services to poorest communities and local government units for them to comply with environmental requirements. The company believes to the importance of environmental protection and preservation.

Others LGU's adopted biogas technology for their own solid waste management program based on the study that 50 to 60 percent of wastes came from biodegradable wastes.



Ka Popoy Piggery located at Brgy. Litlit, Silang Cavite , Five (5) IBC Water Tank Biogas Digesters capable to treat 5 cubic meters volume of waste water.



20 Cubic Meters Fixed Type Biogas Digester of Brgy. Gregoria de Jesus, GMA Cavite installed under the technical supervision of Mr. Templonuevo



Twin Biogas Digester Chamber of Brgy. Blwas, Tanza, Cavite



4 Cubic Meters IBC Water Tank Biogas Digesters of LGU Gen Trias.

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THE PROCESS

STEP 1: MANDATORY WASTE SEGREGATION. Every Local Government Units (LGU) must have an active waste segregation campaign, If not an hundred percent, but at least majority of the constituents practice wastes segregation. Waste segregation is the essential element for the success of the biogas project. Only BIODEGRADABLE WASTES will be process and convert into renewable energy.





STEP 2: ALL SEGREGATED BIODEGRADABLE WASTES MUST BE REGULARLY COLLECTED FROM HOUSEHOLDS, COMMUNITIES, BARANGAYS , COMMERCIAL ESTABLISHMENTS, AND OTHER SECTORS THAT PRODUCE BIODEGRADABLE WASTES.

STEP3: MUST BE SHRED FOR EASY DECOMPOSTION: All collected biodegradable wastes must undergo secondary sorting to ensure that only biodegradable wastes will process.



STEP 4 : FEED TO BIOGAS DIGESTER: All shredded biodegradable wastes shall be feed and put to the biogas digester with equal amount of water. Do not mix with any other chemical substances for it will compromise the performance of the methanogenic bacteria inside the chamber.



STEP 5 : LET THE METHANOGENIC BACTERIA WORKS: After the feeding the digester, regularly mix the substrate using mechanical steerer go allow the bacteria freely work. After 24 hours of operation, it will start to produce methane produce and the feestocks or biodegrdable wastes feeds inside the digester started to decopmpost.

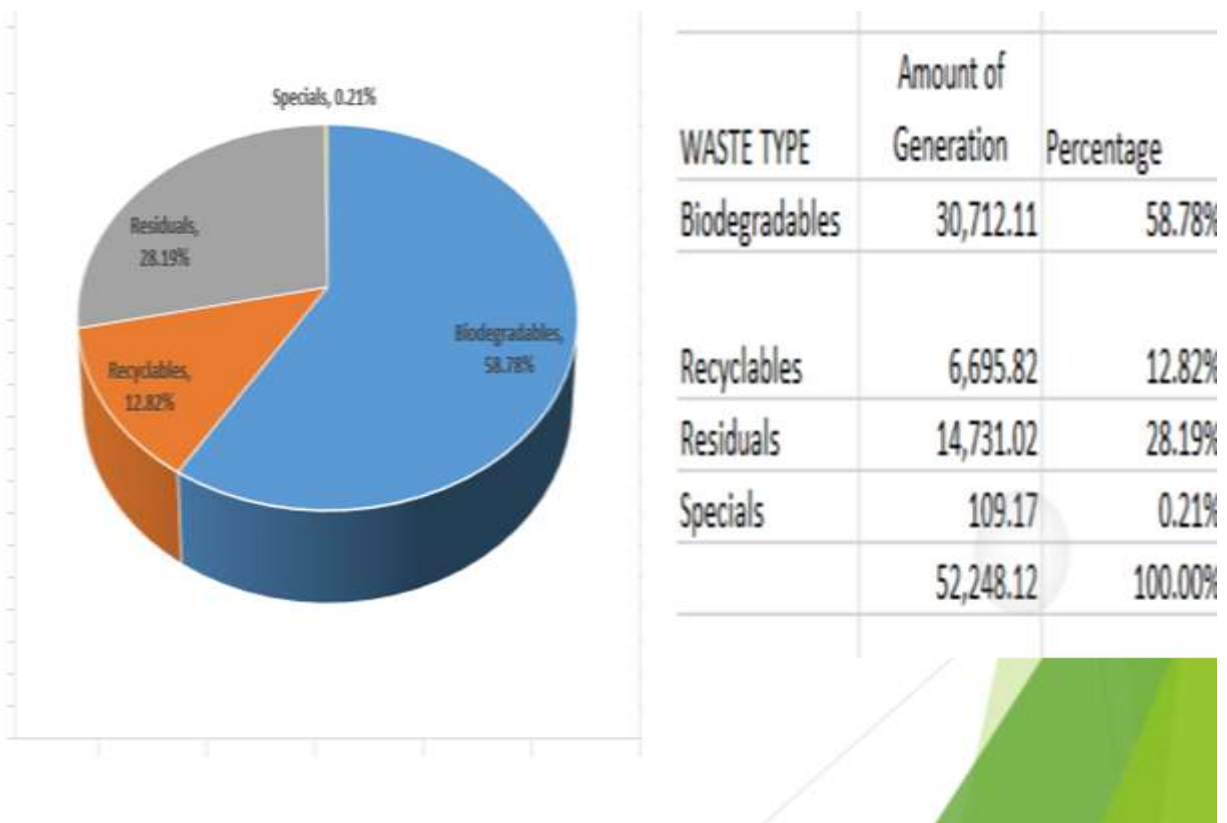


ANTICIPATED BIO-WASTES DIVERSION

FOR BIODEGRADABLE WASTES THAT CAN BE ADOPTED BY THE LOCAL GOVERNMENT UNITS (LGU's), BRGYS. COMMUNITIES, COMMERCIALS AND INDUSTRIAL ESTABLISHMENTS (FAST FOOD CHAINS, RESTAURANTS, MARKET, TALIPAPA's, PIGGERIES AND SLAUGHTERHOUSES AND OTHER SIMILAR ESTABLISHMENTS THAT PRODUCE BIODEGRADABLE WASTES

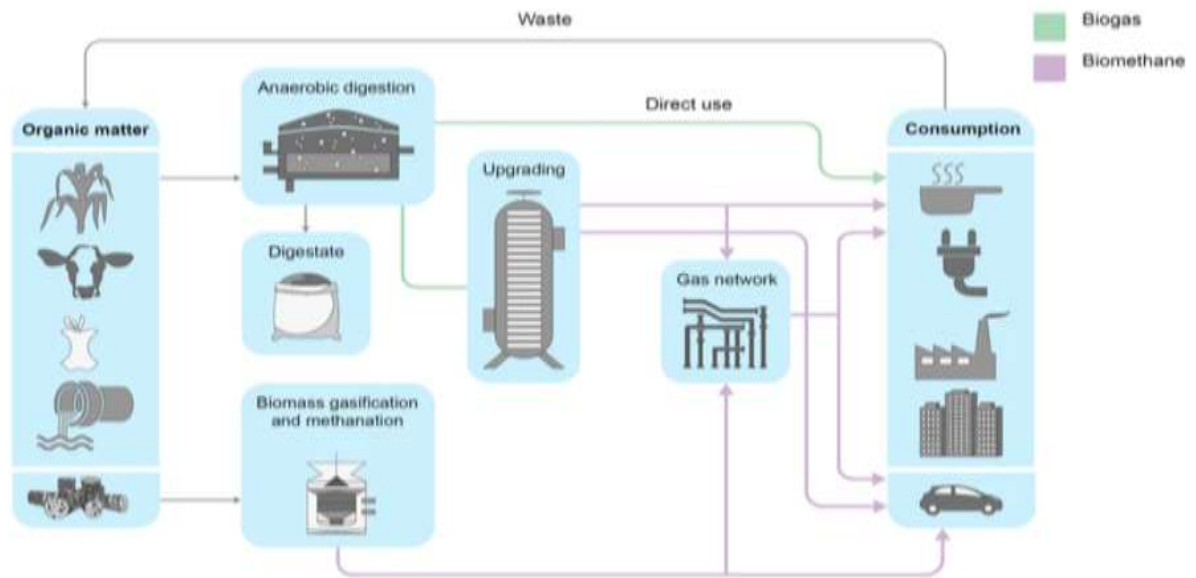
Waste Assessment and Characterization Study (WACS) CONFIRMED that BIODEGRADABLE WASTES is the BIGGEST VOLUME OF WASTES GENERATED. This type of wastes if not addressed properly can cause diseases secondary to the existing COVID -19 virus. It also source of bad odor and produce harmful greenhouse gas if allow to decompose to an open area like open dumpsite or sanitary landfill. Wastes must be treated according to the demand of its production. The wastes generated every day, every hour and every second, it requires revolutionary ideas and quick response and number of technologies ready available.

Biogas Technology is not a new technology but it provide promising and potential system for wastes diversion at promote renewable energy.



**MUNICIPALITY OF GENERAL MARIANO ALVAREZ, CAVITE
WASTE ASSESSMENT AND CHARACTERIZATION STUDY
(WACS) 2018**

THERE ARE MULTIPLE PRODUCTION PATHWAYS FOR BIOGAS AND BIOMETHANE



Based on this framework, biodegradable wastes are the primary feed-stocks to produce energy and address definitely the big volume of wastes of every local government units.

ANTICIPATED WASTE DIVERSION

90 CUBIC METER FIXED TYPE BIOGAS IDEAL FOR LOCAL GOVERNMENT UNITS (LGUS) WITH CAPACITY OF 3,600 KGS PER DAY



90 CUBIC METER FIXED TYPE BIOGAS DIGESTER WITH SHREDDER			
Day	Week	Month	Year
3,600 Kgs.	25,200 kgs	108,00 kgs	1,314,00
INVESTMENT COST - 850,000.00			

160 CUBIC METER FLOATING TYPE BIOGAS DIGESTER for LGUs WITH CAPACITY OF 6,400 KILOS PER DAY



160 CUBIC METER FLOATING TYPE BIOGAS DIGESTER			
Day	Week	Month	Year
6,400 kgs	44,800 kgs	192,000 kgs	2,336,00 kgs
INVESTMENT COST - 3.5 MILLION PESOS			

12 CUBIC METER FIXED TYPE BIOGAS DIGESTER WITH CAPACITY OF 300 KGS PER DAY



12 CUBIC METER FIXED TYPE BIOGAS DIGESTER WITH SHRDDER			
Day	Week	Month	Year
300 kgs	2,100 kgs	9,000 kgs	109,500 kgs
INVESTMENT COST - 750,000			

TWIN IBC WATER TANK BIOGAS DIGESTER for LGUs WITH CAPACITY of 50 kgs PER DAY



2 CUBIC METER FIXED TYPE BIOGAS DIGESTER WITH SHREDDER			
Day	Week	Month	Year
50 kgs	350 kgs	1,500 kgs	18,250 kgs
INVESTMENT COST - 250,000			

IBC WATER TANK BIOGAS DIGESTER for LGUs WITH CAPACITY of 25 kgs PER DAY IDEAL FOR BRGY HALL AND HOUSEHOLDS



25 CUBIC METER FIXED TYPE BIOGAS DIGESTER with SHREDDER			
Day	Week	Month	Year
25 kgs	175 kgs	750 kgs	9,125 kgs
INVESTMENT COST - 180,000			

EDUCATIONAL, TRAINING AND COMMUNITY IMMERSION PROGRAM

As part of the Corporate Social Responsibility (CSR), Mr. Templonuevo, provided Community Training Program on Waste Management and Biogas Digester to Members of the community and will equip a necessary knowledge and understanding on how important caring the environment and the potential of biogas digester for renewable energy and livelihood opportunity.



Brgy Biwas , Tanza Cavite



Brgy G. de Jesus, GMA Cavite



IIRR Personnel



Mr. Templonuevo demonstrated the actual pouring of feedstocks



Visited by PG ENRO ANA LOYOLA and group of International Non-Governmental Organizations involving waste management and renewable energy