



Maharashtra Cosmopolitan Education Society's

**M. A. Rangoonwala Institute of Hotel Management & Research, Pune.**

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## CRITERION – 7 INSTITUTIONAL VALUES AND BEST PRACTICES

<b>Key Indicator</b>	<b>7.2 Best Practices</b>
<b>Metric No.</b>	<b>7.2.1</b>

- Describe two best practices successfully implemented by the Institution as per NAAC format provided in the Manual

# Biogas Plant

## **Research proposal submitted to Savitribai Phule Pune University by Assoc.Prof. Imran Sayyed**

**Title of Research project:** Bio-Gas Plant: Converting Kitchen Food Waste to Energy.

**Introduction of Research Proposal:** The growth of population has led in enormous increase in food waste particularly in colleges of Hotel management. There is a great challenge concerning appropriate food waste management in order to minimize the risk to Human health and avoid environmental degradation. The municipalities struggle to provide sufficient and adequate food waste management programs, and considering the fact that largest fraction of waste in developing countries is of food waste and therefore, amendable to Anaerobic digestion.

**Origin of Research Problem:** Urban food waste management process is inadequate for food disposal in particularly. These are considered to be the most immediate and serious environmental problem in Hotel management colleges of developing cities. In Pune city, physical composition of food waste is collected and disposed of unhygienic and unsanitary manner. Inadequate management like uncontrolled dumping bears several adverse consequences. It normally leads to unhygienic living area and would also lead to polluting surface and ground water, further leading to promote the breeding of flies, mosquitoes and rats. In addition, it emits unpleasant odours and methane, a major greenhouse gas contributing to global warming. Regarding the enormous food waste problem in hotel management colleges, the question arises whether anaerobic digestion is appropriate and substantial matter to treat food waste.

**Interdisciplinary Relevance:** If the processing method of food waste would be successful in production of methane gas, it could be utilized for various food related industries and projects.

### **Review of Research and Development in the subject:**

**International Status:** Currently there are nearly 240 AD facilities around the world operating of capacity over 2,500 metric tons of organic waste per year. The total installed capacity of these plants is over 11 million metric tons per year (IEA 2008). This plants process not only the organic fraction of the municipal solid waste but also organic waste from the food industries and animal manure, countries such as France, Germany, Tanzania, Spain, U.S., Italy, Greece etc. The EU is a world leader in the field of biogas, with a production of 10,085.8 ktoe y<sup>-1</sup> (in 2011) in terms of primary energy, accounting for about 60% of the world's production.

Germany is the EU country that has made the greatest progress in this field with a production of as much as 5,067.6 kt<sub>oe</sub> y<sup>-1</sup>, of which a share of 4,414.2 kt<sub>oe</sub> y<sup>-1</sup> results from anaerobic digestion (and co-digestion) processes of selected organic matrices. UK is the second largest producer with 1,764.8 kt<sub>oe</sub> y<sup>-1</sup>, determined for 84% by landfill biogas and the remainder by biogas produced in sewage treatment plants (sludge digestion). Italy (1,095.7 kt<sub>oe</sub> y<sup>-1</sup>) and France (349.6 kt<sub>oe</sub> y<sup>-1</sup>) follow in the list of the largest producers. The trend of biogas production, in accordance with the action lines of the EU, is characterized by a progressive increase from anaerobic digestion (and co-digestion) of selected organic matrices and a progressive decrease from landfills. Production in 2020 is estimated at 28.0 Mtoe y<sup>-1</sup> in accordance with the EU Renewable Energy National Plans. The uses of biogas are mainly directed to the production of electricity and heat. There are, however, several cases of conversion of biogas into biomethane injected into the natural gas grids or used as biofuel in vehicles. In this last direction, worthy of note are a few north-central EU countries which have implemented an effective policy to promote the use of biomethane for public and private transport. In some parts of Europe, source separation of the organic fraction of municipal solid waste (OFMSW) is common and even mandatory, which contributes to the growth of biological treatment industries. Regions outside of Europe are also enacting more stringent waste disposal regulations, leading to the development of new AD and other MSW conversion plants. Although the U.S. has a long history of treating agricultural and municipal wastewater with anaerobic digesters, no commercial-scale solid waste digesters are operating despite several favorable (though economically marginal) feasibility studies and laboratory findings.

#### **National Status:**

Financial and fiscal support available, e.g., subsidy – (capital / interest), tax and duty exemptions, CDM etc

Financial support from MNRE • Small biogas plant ( 1 cum to 6 cum) – Rs 2100 to Rs 11,700 per plant depending on geographical location • Toilet linked biogas plant – Additional amount of Rs 500 per plant to above cost. Sewage treatment plant 40% of project cost subject to max of Rs 2,00,00,000 • Large plant (Biomethanation of urban wastes) – For thermal use: Rs 1,00,00,000 per MWeq (i.e. for 12000 cum of biogas ). – For power generation: 50% of project cost subject to max of Rs 3,00,00,000 • Biogas bottling plant – 50% subsidy on project cost (gas enrichment equipment and compressor) • Power generation based on high rate biomethanation technology – Rs 2,00,00,000/MW • Preparation of DPR – Rs 1,00,000 • Training program Loan facility: NABARD – IREDA – KVIC Other initiatives • Financial incentives – Ministry of non-conventional energy sources • Capital subsidy • Interest subsidy – Indian Renewable Energy Development Agency and state nodal agencies • Legislations – Ministry of Environment and Forests (Solid wastes management and handling rules), 2000 • Biodegradable wastes for generation of useful resources.

Landfill sites for inert wastes • Public private partnerships – Municipal corporations (Delhi, Surat, Ahmedabad) • Schemes initiated for collection and segregation of biodegradable and non-biodegradable waste at source involving cooperation of the residents and private institutions. Government Support for Biogas Programmes: CFA/ Subsidy for installation – 20-50% of cost Administrative costs, Capacity building through training of officials, plant operators/users, Information dissemination, sponsorships for research and development, provisions in the electricity Act 2003, open access to grid for RE power, Preferential tariffs by State regulators, Target for RE power, introduction of renewable energy certificates, captive generation decontrolled

**Significance of the study in the context of current status:** Our study will help us in understanding the shortcoming of running projects and to develop it for the use of colleges, Institutions and small establishments, which produce food waste and can use it for minimizing garbage and simultaneously producing fuel for use and reducing waste.

**Objectives:**

To study and make use of Food waste in Hotel management colleges, so as to assess suitability of Compact Biogas plant as a treatment option of organic Food waste.

To observe the daily gas production and its suitability of consumption.

To see that hazard imposed on health of the operator through toxic substances produced by anaerobic process is assessed as well as the risk of attracting disease vectors by the system.

**Methodology:**

An extensive literature review on solid waste management and energy utilization, specifically for cooking purpose. Moreover, research report and general literature on anaerobic digestion of food waste are reviewed.

Installation, startup and operation of Biogas plant.

Inspection of Biogas plant in and around Pune and interviews with operators.

**Year wise plan of work and targets to be achieved (expected time schedules for the various activities of the proposed investigation)**

Sr. No.	Expected Target to be achieved	First Year			Second Year		
		4 month Sept-Dec'201 5	4 month Jan-Apr'201 6	4 month May-Aug'201 6	4 month Sept-Dec'201 6	4 month Jan-Apr'201 7	4 month May-Aug'201 7
1	Area allocation for Food wastedigester plant						
2	Analysis & record keeping of dailygarbage collection						
3	Field work for various anaerobicdigesters available in the market						
4	Analysis & comparative study ofavailable digesters						
5	Installation of Anaerobic digester						
6	Daily analysis & record keeping ofMethane produced						
7	Based on project analysis, demonstration to other colleges &Institutions						
8	Project Assistance to interestedcolleges & Institutions						

## Activity Report

### Visit of students of BVPU IHMCT for Anaerobic Digesters Plant

20<sup>th</sup> February 2019

Students and faculty Members of Bharti Vidyapeeth Deemed University Visited the Anaerobic Digester Plant of M.C.E Society's M.A. Rangoonwala Institute of Hotel Management & Research, Azam Campus, Camp, Pune, to understand the working of the Biogas plant .

Asst Prof Imran Sayyed Who is the Principal Investigator of the research made the Students understand Biogas is primarily Methane and Carbon dioxide. This energy release allows biogas to be used as a fuel; it can be used for any heating purpose, such as cooking. It can also be used in a gas engine to convert the energy in the gas into electricity and heat. Producing biogas gives many advantages for the environment, companies and people involved.



Students of Bharti Vidyapeeth University on a visit for  
Anaerobic Digester plan

## Activity Report

### Visit of Teaching staff of BVPU HMCT to Biogas Plant

16<sup>th</sup> December 2019

M. A. Rangoonwala IHMR Pune had organized Training session for the Teaching staff of Bharti Vidya Pith College of Hotel Management for the operating method of anaerobic food Digester. Asst Prof Imran Sayyed the Principal Investigator of the research explained the process of biogas plant, use of the methane gas in cooking and the use of slurry as manure.



BVPU IHMCT faculty visit to biogas plant