

FORMATION OF BIOENERGY BY FOOD WASTE

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ABSTRACT

Food that has been tossed out. Nearly three-fourths of the waste generated by inhabitants of the maximum city in the past year comprised food, according to an environment status report (ESR) released by the BMC for 2019-20. According to BMC & VVMC officials, the average waste generated per person per day is 250-650 grams. Waste management experts say if Mumbai recycles this waste, it could reduce the amount of garbage transported to its overburdened landfill. Food waste is an untapped energy source that mostly ends up rotting in landfills, thereby releasing greenhouse gases into the atmosphere. It's better if we could somehow turn all the waste into clean energy and some other recyclable product. Food waste can be turned into valuable resources such as natural fertilizer, energy, and animal feed. Proper disposal of food waste has posed an environmental concern. also there is electric energy also can be made and the size of the dumping ground can be reduced.

Also, we are going to make the all food waste management process digitalized so that Consumers can track the process of food waste management through the mobile application. The mobile application will help both consumers and as well as the government to maintain a record of their waste management, and it will be easy to take the record of the process, results, or how it can get improved. As we know the future generation will be mostly dependent upon renewable energy, so this type of food waste management process can save more energy for the future and will make a more human and animal-friendly nature/environment. So we can provide a good future for the next generations.

1. INTRODUCTION

For humans dealing with waste is one of the major problems. The waste generated by humans grows with the growth of the human population on the planet earth. In most the solid waste, there is so much amount of waste that can be regenerated and it can be reused. India produces 62millions kg of waste each year but only 12 million kg of waste is of treated. In India, the household food waste estimates are 50kg per capita per year. food wastage and its accumulation are becoming a critical problem around the globe due to the continuous increase of the world population. The exponential growth in food waste is imposing serious threats to our society like environmental pollution, health risk, and scarcity of dumping land. Food waste (both precooked and leftover) is biodegradable waste discharged from various sources including food processing industries, households, and the hospitality sector. According to FAO, nearly 1.3 billion tons of food including fresh vegetables, fruits, meat, bakery, and dairy products are lost along the food supply chain. Approximately 1.4 billion hectares of fertile land (28% of the world's agricultural area) are used annually to produce food that is lost or wasted. Apart from food and land resource wastage, the carbon footprint of food waste is estimated to contribute to greenhouse gas (GHG) emissions by accumulating approximately 3.3 billion tons of CO₂ into the atmosphere per year. All this type of food waste or organic waste can be recycled or it can be treated in the proper manner that all the food waste is able to produce energy that all can use in our daily life. In this project, we going to make a waste management power plant plan for the Virar district area and how the process going to be done from collection to formation of energy and distribution of it, all will be recorded in the mobile application so the people / consumers can know more about this initiative.

2. FOOD GENERATION IN INDIA

The Indian food industry is poised for huge growth and development of the food processing industry. The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales. The Indian gourmet food market is currently valued at US\$ 1.3 billion and is growing in people/consumers at a Compound Annual Growth Rate (CAGR) of 20 per cent. India's organic food market is expected to increase by three times by 2020. It contributes around 8.80 and 8.39 per cent of Gross Value Added (GVA) in Manufacturing and Agriculture respectively, 13 per cent of India's exports and six per cent of total industrial investment. In 2017-18, total food grain production was estimated at 275 million tonnes (MT). India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the world.

3. WASTE FOOD STATUS OF MUMBAI AND THANE

Food that has been tossed out. Nearly three-fourths of the waste generated by inhabitants of the maximum city in the past year comprised food, according to an environment status report (ESR) released by the BMC for 2019-20. Of the total 7,500-8000 metric tonnes of garbage generated in Mumbai, almost 73 per cent is organic (food waste). According to BMC & VVMC officials, the average waste generated per person per day is 250-650 grams. Waste management experts say if Mumbai recycles this waste, it could reduce the amount of garbage transported to its overburdened landfill.

What Mumbai Wastes

Food waste (Organic wet waste) - 72.60%

sand, stone and fine earth (construction debris) - 17.37%

Plastic - 3.24%

Wood and cloth (organic dry waste)- 3.51%

Paper and other recyclables, including metals - 3.28%

4. BACKGROUND

There are the waste management plants in the MUMBAI and its metropolitan region (Thane), but they are not efficient for the amount of the waste generated by this city. All this system currently working are manually there is not any medium that all the data and process can be known for the people of this cities to grab.

Now a days everything is getting digitalized so it will be easy to know about any process and working method of any system via mobile application.

By making the mobile application it will be easy to show the people the regions that their food waste is treated proper and its helping the making our city greener, more clean. Also they can get to know about how this type of waste can be converted into renewable source of energy like biogas, fertilizers, etc.

5. METHDOLOGY

In this project, we explore the study of area of Virar, where various attempts are made by citizens and organizations to make an effort to manage their waste in a decentralized manner. We are going to take the all the food/organic waste from household society, canteens, cafeterias, hotels, restaurants and from other places. From collection of food waste to the formation of energy every step will be recorded. There are steps to be followed for the process of the bio- degradation of organic waste which are as follows: -

- Collection of waste and (Data for the application)
- Transfer Station
- Waste management plant
- Shredder
- Mixing tanks
- Hammer mill rotary system

- Pasteurisation

5.1 COLLECTION

Collection method divided into two parts

- A) Collection of food/organic waste by collection bins
- B) Collection of the waste collected data for the mobile application

A. Collection of food/organic waste by collection bins

In the first process the waste food will be getting collected from the different of regions of the Virar area by the collection bins. The area is divided into the basis of their perspective wards. There are bins are also provided at a particular distance for the collection of waste. For the very respective ward there will be two collection vehicle is provided which will collect all the food waste respectively. The collection method which is going to apply is Kerbside/alley.

This is the most common collection method in industrialized countries and in the wealthier communities of some developing countries. Waste generators place the waste containers or bags (sacks) on the kerb or in the alley on a specific day (or specific days) for collection by external factors. A regular and well organized collection service is essential so that generators know exactly when to leave out their waste. When all the waste is collected by the vehicles, the vehicles Are moved toward for the transfer station for the emptying of the vehicle waste. There is two collection vehicle for every zone. Those vehicles collect the waste from different places simultaneously by their turns. Once they filled they moved out for the transfer station, at the transfer station firstly the weight of loaded vehicles is measured by weighing machine which can weigh up to 100 of tones, then the they throughout all the waste. After that the emptied vehicles against get measured from before and after weight the weight of the waste can

B. Collection of the waste collected data for the W

The waste came from the transfer station will be again measure at treatment plant then the measured weight waste from all the zones will go to admin office. At the admin office the data will have been upload at server for application then all the consumers or customers can see the updated data at intervals of time.



Fig no. 01



Fig no. 02

get collected. The remaining waste will get segregated from other waste in case of there is any metallic, hazardous and electronic waste is there. Then all the remaining waste is moved out for the treatment plant.

HOME PAGE FOR WEBSITE

The website is being designed for use of both sides (it's for admin and also for the user), so the admin can update the all the data regarding the food waste. the following data which is admin going to be update from his side it consists of the vehicle no of pickup truck, how much waste is collected, how much its's remain after the separation and also the how much amount of food/organic waste is being treated. The admin can also update the results of the process so it can be seen by the user and also the organization/handling authority can keep the recorded of their process, this type of data can be useful for many purposes like surveys, changes in sanitation system, addition of extra waste collection beans and extras. This type of data can be helpful for the government to initiate new projects, changes in some particular regions so the development of the area can be possible. Also the handling authority/organisation can use this app to sort all the data for their betterment and increase in the profit.

From opt verification page user can login in the application, if he is not the registered user he can sign up for the application and then he can login. After login the user is directly moved to the home page of the user side, from here he can check the status of the food waste collected from his region and he can also check for weekly basis adherence of the treatment progress, he also can check the treatment progress and the result of the treatment which is uploaded by the admin. And from this application user can check the history of the treatment progresses form the last months and he can raise an issue if he finds something for questionable.

5.2 TRANSFER STATION

Once all the waste is collected from the various localities it'll move to the transfer station. A transfer station, or resource recovery center, could be a building or process website for the temporary

5.3 WASTE MANAGEMENT TREATMENT PLANT

once waste gets partially sorted within the transfer station the sorted waste is stirred towards the scraps management treatment plant. during this plant, any processes were done on the organic food. during this plant, any processes happen below the device admixture tanks, Hammer mill, rotary system, sterilization. All the food/organic waste gets cultivated below the Anaerobic digestion. Anaerobic digestion is often AN seductive choice to strengthen the world's energy security by using scraps to get biogas whereas addressing waste management and nutrient utilization.

5.4 SHREDDER

Once it comes to planting the first step is to chop up larger vegetables and larger food waste into a conveyer belt. Some vegetable waste is spoiled which is collected from the markets and the hotels. After the separation and chopping of the food were moved to a conveyer belt, the conveyer belt carries the material to a shredder which further breaks down the food into smaller and more uniform particles .in a single day it can handle the same amount of vegetables that a family Indian family eat in a year.

5.5 Mixing tank

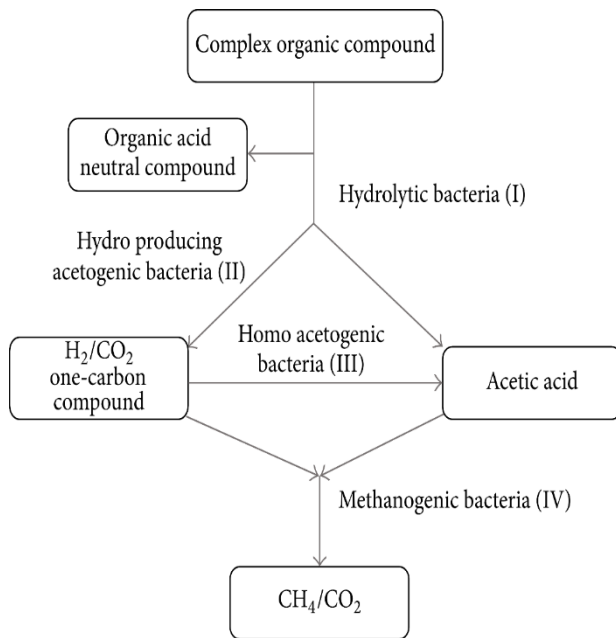
In a mixing tank the grinder crushes the mixture into pulp which is pump through underground tanks and into two digesters. In the mixing tanks, the waste is stirred with other liquid food waste to create the recipe-controlled slurry mixture or soup that can be easily separated from any packaging. The whole process just works like the human digestive system. Next, it is fed into the rotary screen and a hammer mill to the moving plastic and clean the energy-rich organic soup.

5.6 Pasteurization

The energy-rich soup is pasteurized for an hour at 71 degrees centigrade to kill off any pathogens. The soup then spends three weeks in larger digest

deposition, consolidation, and aggregation of waste. Transfer stations vary considerably in size and performance. Some transfer stations permit residents and businesses to drop off a little many waste and utilization and will perform some preliminary sorting of fabric. Transfer stations are often publically or in private closely-held. They vary in size, from little regional websites managing but one thousand tons/year to giant sites managing over two hundred year. where the anaerobic biological creates a huge amount of biogas which bubbles off naturally. This gas is transferred and stored in large spherical containers. The solid material left behind is a nutrient-rich fertilizer that can be safely applied to farmland. In the digesters, the mixed soup goes through different types of Anaerobic digestion which are

Biogas potential of the dry fraction from pre-treatment of food waste from households has been evaluated by Murto. A higher methane yield (m^3/ton) was obtained from digestion of the dry fraction alone. Dry fraction mixed with structural material produced lower levels of biogas (m^3/ton) compared to digestion of dry fraction alone. Food waste was autoclaved at 1600°C , 6.2 bar. It has been reported that methane yield at all the loading rates (2, 3, 4, and 6 $\text{kg-VS}/\text{m}^3/\text{d}$) was 5–10% higher for untreated food waste which was $0.483 \text{ m}^3 \text{ CH}_4/\text{kg VS}$ as compared to $0.439 \text{ m}^3 \text{ CH}_4/\text{kg VS}$ obtained from autoclaved food waste.



Fjg No. 3

environmental concern. It appears that conversion of food waste into energy via anaerobic processes in terms of methane is economically viable. However, difficulties accompanying the collection as well as transportation of food waste should also be considered. Nevertheless, the stumpy or no cost of food waste along with the environmental aids considering the waste discarding would balance the initial high investment costs of the bio refineries. Moreover, the efficacy and cost base of the generation could be upgraded by intensifying research and optimization studies on assimilating different value-added product manufacturing processes.