Formation Of Bioenegry by Food Waste

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Abstract—Food that has been tossed out. Nearly three-fourths of the waste generated by inhabitants. In the past year, a significant portion of waste in the maximum city consisted of food, as reported in an Environment Status Report (ESR) released by the BMC for 2019-20. Officials from BMC and VVMC indicate that the average waste generated per person per day ranges from 250 to 650 grams. Waste management experts suggest that if Mumbai were to recycle this waste, it could substantially decrease the volume of garbage being transported to its already strained landfill sites. Food waste represents an overlooked energy source that often ends up decomposing in landfills, emitting greenhouse gases into the atmosphere in the process. 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.

I. 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. Rapidly increasing global population is causing a major problem: food wastage. This creates serious issues like pollution, health risks, and a shortage of places to dispose of waste. (both precooked and leftover) Biodegradable waste emanates from various sources, encompassing food processing industries, households, and the hospitality sector. According to the Food and Agriculture Organization (FAO), approximately 1.3 billion tons of food, including fresh vegetables, fruits, meat, bakery, and dairy products, are squandered throughout the food supply chain. Each year, an estimated 1.4 billion hectares of arable land (equivalent to 28% of the world's agricultural area) are utilized to produce food that ultimately goes to waste. In addition to the squandering of food and land resources, the carbon footprint of food waste is calculated to contribute to greenhouse gas (GHG) emissions, with approximately 3.3 billion tons of CO2 accumulating in the atmosphere annually. 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.

I.I. 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.

I.II. FOOD GENERATION IN INDIA

The Indian food industry is on the brink of substantial expansion, steadily boosting its share in global food trade annually. In India, the food sector has risen as a promising and lucrative domain, primarily owing to its vast opportunities for enhancing value, especially within the food processing sector. Accounting for about 32 per cent of the country's total food market, The Government of India has been instrumental in the growth and development of the food processing industry. The Indian food and grocery market ranks as the world's sixth largest, with retail accounting for 70 percent of the sales. Presently, the Indian gourmet food market is valued at US$ 1.3 billion and is experiencing a Compound Annual Growth Rate (CAGR) of 20 percent in terms of consumer base. The organic

food market in India is anticipated to triple by 2020. It contributes approximately 8.80 percent and 8.39 percent to Gross Value Added (GVA) in Manufacturing and Agriculture respectively, constituting 13 percent of India's exports and six percent of total industrial investment. In the fiscal year 2017-18, total food grain production was estimated at 275 million tonnes (MT). India holds the title of being the largest producer, accounting for 25% of global production, as well as the largest consumer, representing 27% of world consumption, and importer, with a share of 14%, of pulses worldwide.

I.III. WASTE FOOD STATUS OF MUMBAI AND THANE

The discarded food constitutes a significant portion of waste in the maximum city. According to an environment status report (ESR) released by the BMC for 2019-20, nearly three-fourths of the waste generated by residents comprised food. Out of the total 7,500-8000 metric tonnes of garbage produced in Mumbai, approximately 73 percent is organic, primarily food waste. Officials from BMC & VVMC indicate that the average waste generated per person per day ranges from 250-650 grams. Waste management experts suggest that if Mumbai were to recycle this waste, it could significantly reduce the volume of garbage transported to its overloaded landfill

I.IV. 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%

II. AIM AND OBJECTIVES

The aim of bioenergy generation is to promote the sustainable production of renewable energy from organic substances. We will collect all kinds of organic waste from as many as possible households and supply them to the nearest waste management power plant for further processing. It will help to reduce the daily households waste be and used as a renewable energy source. To reduce the organic waste in the dumping lands. To use more clear and green energy, due to there is reductant in different kind of pollution.

III. LITERATURE REVIEW

Sr. No.	Research Paper	Author Year	Conclusion
1	Genenco food waste research	Wayne boakes, Racheal creed	From simply household simply waste energy sufficient products.
2	Food Waste at consumer level	Ludovica Principiato (Year 2017)	This book present what is the state of art in field of food waste phenomenon at consumer level. In this context the present work identifier the most important definitions given to food waste and its environmental and social impact.
3	Food loss and food waste	Griffin et al hall et al	There is researchess that focus on tendency of food waste, reducing food waste.

4	Food wasteto energy	Kunwar Paritosh, Sandeep Monica year 2017	In this paper it appears that conversation food waste into energy via anaerobic process in terms of methane is economically viable.
5	Municipal solid waste management and recycling in india	A.Agarwal, A.Singhmar, A.k. Mittal (Year 2005)	In this study the food waste problem is pinpointed in detail.

IV. METHODOLOGY

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: -

1. Collection of waste
2. Transfer Station
3. Waste management plant
4. Shredder
5. Mixing tank
6. Hammer mill rotary system
7. Pasteurisation

IV.I. 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 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 kerside/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 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.

IV.II. 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 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,000 tons/year.

IV.III. 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.

IV.IV. 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.

IV.V. MIXING TANK

In a mixing tank the grinder crushes the mixture into pulp which is pumped 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 up the energy-rich organic soup.

IV.V. 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 digesters where the anaerobic biological creates a huge amount of biogas which bubbles off naturally. This gas is transferred and stored in large spherical containers.

V. FUTURE OF SCOPE

In the age of the depletion of non-renewable resources of energy its very important to find an alternative source of energy. Current situation is already bad but it is getting even worse day by day. Hence there will be great demand for bioenergy if we find a way to channel the distribution of energy in such a way that there will occur no discomfort even if the natural resources get extinct. Therefore, there will be great demand for an idea for the distribution of the renewable form of energy among the people.

VI. ADVANCE SEQUENCING

High-throughput next-generation sequencing (HT-NGS) technologies generate significantly more data compared to capillary sequencing methods. The sequencing technology revolution commenced with the Roche 454 GS FLX+, which currently produces relatively lengthy read lengths (approximately 700 bp) and a modest number of reads (around 1 million reads/run). It finds application in various domains such as analysing 16S variable regions, targeted amplicon sequences, microbial genomes, BACs, and plastids. Illumina stands out as a major player in the sequencing market, offering a diverse array of instruments ideal for genome sequencing and resequencing, transcriptome sequencing, SNP detection, and metagenomics studies. The read length of Illumina sequencing (ranging from 50–300 bp) and read number (ranging from 25 million to 6 billion per run) vary depending on the platform. Ion Torrent technology, including Ion PGM and Ion Proton, represents a relatively new semiconductor-based sequencing platform. Its potential varies according to the semiconductor chip used—Ion 314™ Chip v2, Ion 316™ Chip v2, and Ion 318™ Chip v2—offering read lengths of 200–400 bp and reads/run ranging from 500K to 5 million. It caters to various sequencing applications such as amplicons, small genomes, and targeted genomic sequencing. The platform's automated workflow, from sample preparation to analysis, renders it ideal for smaller-sized studies and routine practices. PacBio RS, utilizing single-molecule real-time sequencing technology, is renowned for its long read lengths, capable of generating reads from 1 kb up to 60 Kb. Each SMRT cell can produce approximately

50,000 reads. Its extended read length makes it well-suited for sequencing small genomes like bacteria or viruses, regions with high G/C content, DNA with modified bases, resequencing projects, among other applications.

VI.I. METAGENOMIC TOOL AND ADVANCE PRACTICES

In a rapidly advancing world, the issue of food wastage and its management poses significant challenges to society, posing risks to human health and escalating environmental burdens. Employing strategic biodegradation processes on food waste holds promise for yielding multiple societal benefits. For instance, harnessing biogas from food waste biomass offers a viable energy source, facilitating convenient storage and transportation. Moreover, it mitigates environmental hazards by implementing comprehensive food waste processing and management strategies. Another advantage lies in the production of soil amendments and liquid fertilizers from organic food waste, directly stemming from effective waste management practices. Researchers have conducted numerous studies utilizing 16S and 18S rRNA-based approaches to explore waste management treatments, unveiling microbial communities across the three taxonomic domains: Archaea, Bacteria, and Eukarya.

VI.II. BIOINFORMATICS RESOURCES

In 1970, Pauline Hogeweg and Ben Hesper coined the term “bioinformatics” to describe the study of information processes in biological systems. Since then, bioinformatics has become deeply integrated into nearly all biological disciplines. Its success owes much to recent advancements in computational resources and infrastructure worldwide, which have facilitated research into complex biological systems. Understanding the diversity of microbial communities is a relatively new field, as prior to 1975, limited methods, tools, and techniques were available. The advent of sequencing and computational technologies spurred metagenomics research, expanding the reach of bioinformatics into microbial informatics and experimentation. Subsequent advancements in bioinformatics methods led to the creation of numerous databases, tools, and data formats for analysing microorganisms and microbiome-related studies, thereby enhancing our understanding of microbial populations. In recent years, the evolution of high-throughput next-generation sequencing (NGS) platforms has enabled large-scale sequencing endeavours for exploring microbial ecosystems. As a result, future microbial ecological analyses will require a shift from simply generating data to managing and sharing it, as well as engaging in hypothesis-driven and targeted data generation. This will involve leveraging in silico knowledge encoding, mining, and networking to refine our models and facilitate new knowledge discovery. In this context, we have reviewed major microbial databases and tools that can be valuable for microbial research applications in emerging fields like food waste management and other applied disciplines

VII. CONCLUSION

From households of and its nearby restaurants from Virar, we receive an average of 1kg of food waste.1kg/day * 100 households = 100kg/day. There are approximately make 7000 houses near these wards, so the amount of food waste is can get collected is huge, this much amount of food waste can produce biogas that can full fill the necessity of cooking gas of approx. 1000 people per day and also it can produce pretty much amount of electric energy. In the age of the depletion of non-renewable resources of energy, it is vital to search for another supply of energy. The current scenario is already dangerous however it's paying back worse day by day. thence there'll be nice demand for bioenergy if we discover the way to channel the distribution of energy in such a way that there'll occur no discomfort though the natural resources get extinct. The proper disposal of food waste presents significant economic and environmental challenges. Converting food waste into energy through anaerobic processes, such as methane production, appears to be financially feasible. However, challenges related to the collection and transportation of food waste must also be taken into account. Despite these challenges, the low or no cost associated with food waste, along with its environmental benefits compared to conventional waste disposal methods, can help offset the initial high investment costs of establishing bio-refineries. Furthermore, the efficiency and cost-effectiveness of energy generation from food waste can be improved through ongoing research and optimization studies aimed at integrating various value-added product manufacturing processes. Overall, while there are hurdles to overcome in the effective management of food waste, investing in bio-refineries and exploring innovative approaches to utilize food waste for energy production and other valuable products holds promise for addressing both economic and environmental concerns

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