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Potential of Energy Resources from Solid Wastes in Nanded Waghala City Municipal Cooperation, Maharashtra, India

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Abstract: ***India's energy needs are constantly increasing, and the city of Nanded is not far from it. Solid waste is the most important source of energy in Nanded and in cities, playing a central role in the energy sector. The city of Nanded has relatively large resources of around 185.20 tonnes per day for the collection of solid waste. Approximately 88.29 tons are produced by local resources, approximately 2.52 tons are produced by commercial facilities and approximately 49 tons from street openings and sewage treatment. Urban solid waste accounts for approximately 70% of the total solid waste collection in the city. The solid waste potential in Nanded has been studied by comparing the properties of real estate waste used by different state and non-state authorities. Key issues were drafted to begin in Nanded city, based on information reported from successful field trials conducted across the city of Nanded. This work helps to use not only municipal solid waste but also other type of the solid waste in contemporary research studies.***

Keywords: Energy Resources; Solid Waste; Organic Waste; Nanded city; Potential, Municipal Solid Waste (MSW), Nanded Waghala City Municipal Cooperation (NWCMC)

I. INTRODUCTION

Waste is any substance, solution or article for which no direct use is envisaged but which is transported by re-processing, dumping, incineration or other methods of disposal. Urban industrialization, social development, and increasing populations result in rapid solid waste generation leading to serious problems (Elizabeth et al., 2003). If not disposed of properly and managed, the environmental impact from these wastes can be catastrophic (Martin, 1994). The second most important problem in developing countries is solid waste management (Tiawo, 2010).

Wastes differ in nature and weight according to the activities which generate them. Thus, wastes by weight were highest in construction and manufacturing, followed by mining and by municipal activities, agriculture in 2002. (Anonymous 2005). Municipal Solid Waste (MSW) is waste collected by, or on behalf of, a local authority. It comprises mostly household waste, but it may include some commercial and industrial wastes. European Union legislation require the pretreatment, including presorting, of waste before it is sent to landfill (Anonymous 2009).

Anything in the wrong place of the wrong density is called waste. Waste Different types of solid, liquid, semi-solid or sewage and solid municipal wastes can produce energy for their proper treatment. The Freest law of thermodynamics states: "Energy can be transformed from one form to another, but cannot be created or destroyed." This law denies the possibility of creating or destroying the power of a system.

This research work has been extensively based on this principle of thermodynamics. Renewable energy is mostly biomass based and available in unlimited quantities in nature. Since these can be renewed in a relatively short period of time, energy sources that are replenished more quickly are termed as renewable.

The aim of this study is to investigate thorough non-conventional energy resource like solid waste to energy conversion in Nanded city. As the time progress, the energy demand has been continuously increasing in the research area as the result of the developmental activities.

So, to full fill the energy demand in sustainable way this study plays a vital and important role for betterment of the society in upcoming years.

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II. STUDY AREA

Nanded is the second largest city in the Marathwada region of Maharashtra, India, having an estimated population of 08 lakes plus at present. For the present study, the Nanded city has been selected. For the present study in and around area of Nanded city is selected. Nanded city is situated on the bank of Godavari River. The total area under the Nanded Waghala City Municipal Corporation jurisdiction is 51.76 Sq.km, (5,176.66 Ha). Nanded City is divided in two parts i.e. Old Nanded (20.62 Sq.km) north of the Godavari river (on the left bank) and New Nanded (31.14 Sq.km) comprising of Waghala and six other newly merged villages and CIDCO area, south of the Godavari river (on the right bank). Nanded Waghala City Municipal Corporation (NWCMC) is the local civil body Yannawar Vyankatesh B. (2015).

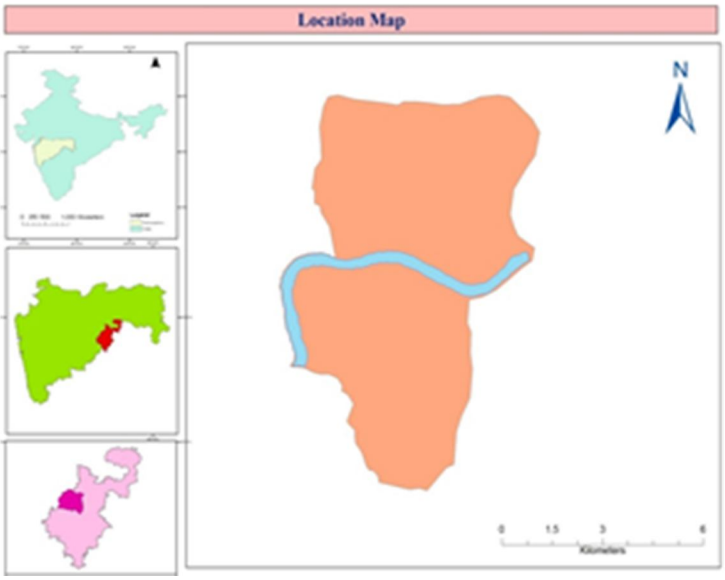


Figure 1: Showing location map of study area in Maharashtra State

III. MATERIAL AND METHODS

The all type of the material and methods of the data collection in this research is majority done by all major types like primary data, Secondary data collection and written surreys. Are explained in the detailed as underneath systematically.

1) *Primary Data:* Principal data collection has been done in two major ways similarly as follows:
2) *Written Surveys:* This method provides immediate results; the involuntary nature of an in-person written survey makes this medium prone to response biases. This method is used to collect data from all sites of study area.
3) *Secondary Data:* The secondary data was collected from Gram Panchayat, Nager parishad & municipal cooperation's. Survey Questions**.**

IV. RESULT AND DISCUSSION

According to the types of wastes and their potential the consequences are categorized and discussed underneath thoroughly. These are as shadows:

A. Municipal Solid Waste

Millions of tonnes of household waste are collected each year with the vast majority disposed of in open fields. The biomass resource in MSW comprises the paper and plastic and averages 80% of the total MSW collected. Municipal solid waste can be converted into energy by direct combustion, or by natural anaerobic digestion in the engineered landfill in the surrounding areas. On the landfill sites the gas produced by the natural decomposition of MSW (approximately 50% methane and 50% carbon dioxide) is collected from the stored material and scrubbed and cleaned before feeding into internal combustion engines or gas turbines to generate heat and power Zafar (2009). The organic fraction of MSW can be anaerobically stabilized in a high-rate digester to obtain biogas for electricity or steam generation. Sewage is a source of biomass energy that is very similar to the other animal wastes. Energy can be extracted from sewage using anaerobic digestion to produce biogas. The sewage sludge that remains can be incinerated or undergo pyrolysis to produce more biogas.

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The above discussion and compiled data clearly imply that large scope exists for the exploitation of bio-crops for their conversion to bio-fuels e.g. ethanol and bio-diesel, by thermo conversion as well as bio-chemical conversion routes. Apart from these energy crops, a huge potential exists for energy generation from the various industrial wastewaters by bio-chemical routes. Similarly, other biomass wastes e.g. wood wastes, crop residues, animal manures, and municipal wastes also bear a large potential for energy generation using bio-chemical as well as thermochemical routes. For best and efficient planning need, some more geoenvironmental investigation for site development. There is need to make compulsory the process of segregation at source for solid waste collection. The landfill area for disposal of solid waste in the study area is mostly observed within the study area. However, non-incineration cases under such conditions often fill up existing landfills quickly by increasing solid waste and make it difficult to set up new sites. Landfill re-establishment is used for composting and incineration, and the amount of landfill is very small. The cheapest way to get energy from waste is incineration. However, implementing this idea requires more work to move forward with a more detailed context and perceived attitude Kelkar Gautam (2020).

The dumping of solid waste has different effects on the physicochemical and biological properties of soil and groundwater. Water pollutants in all samples indicate an empirical relationship between solid waste, leachate and groundwater. To minimize the impact of such landfills on ground water quality and the environment in general, it is necessary to properly design and build these facilities to prevent pollution Shaikh et. al., (2012).

B. Agricultural Waste

Agricultural waste is another major non-commercial fuel consumed in the domestic sector. Nanded district and their tahsils are completely rural in character. So, there is solid waste generation rate is low as compare to other urban areas of Nanded Waghala Municipal cooperation. There is enormous scope for agricultural waste collection and its probable for its energy conversion in the comparative area.

1) *Agricultural Energy Crops:* A large population in Nanded district is dependent on agriculture as their livelihood. Therefore, the potential of various kinds of biomass availability exists in Nanded and surrounding villages. Crops that have been used for energy include: sugarcane, corn, sugar beets, grains and many others. There are several factors, which determine whether a crop is suitable for energy use.
2) *Agriculture residues:* A large amount of agriculture residues is produced in agriculture-based districts like Nanded. These constitute a potential biomass feedstock for energy conversion. The term agricultural residue is used to describe all the organic materials which are produced as the by-products from harvesting and processing of agricultural crops. These residues can be further categorized into primary residues and secondary residues. Agricultural residues, which are generated in the field at the time of harvest are defined as primary or field-based residues (e.g. rice straw, sugar cane tops), whereas those co-produced during processing are called secondary or processing based residues (e.g. rice husk and bagasse). Availability of primary residues for energy application is usually low since collection is difficult and they have other uses as fertilizer, animal feed, etc. However secondary residues are usually available in relatively large quantities at the processing site and may be used as captive energy source for the same processing plant involving no or little transportation and handling cost.

C. Biomass Wastes

A potential feedstock for anaerobic digestion and pyrolysis A huge quantity of various biomass wastes are generated in Nanded city and surrounding areas. These wastes can be converted to the energy fuels by bio-chemical as well as thermo-chemical conversion routes. Many of these wastes are being successfully utilized in various bio energy applications across the Nanded district.

1) *Agro-industry Wastes:* Apart from the residues from the agricultural farms and fields in urban areas certain other residues and wastes also constitute a potential source of the energy. The Agro-processing industries, urban vegetable market places, road sweepings and road side plantations are some areas which generate significant biomass
2) *Animal Wastes:* Animal manure is principally composed of organic material, moisture and ash. Decomposition of animal manure can occur either in an aerobic or anaerobic environment. Since the quantity of animal manure produced annually can be substantial for a district like Nanded, the potential for CH4 production and hence energy potential of animal manure is significant in biogas production in the local areas of the districts. Moreover, the material from which biogas is produced retains its value as a fertilizer and can be returned to the soil. A Bio Gas Plant serves many purposes such as: Generation of high-quality manure, which would be weed less and an excellent soil conditioner.

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D. Processes for Biomass Conversion

It is evident from the above discussion that a variety of feedstocks are available for exploitation for conversion to the bio-fuels as well as for power generation applications. In view of this a variety of processes exists for biomass conversions. The most used of these are thermal conversions, bio-chemical and chemical conversions and direct combustion. The thermal conversion processes consist of fast and slow pyrolysis and biomass gasification; the bio-chemical conversion is fermentation and anaerobic digestion; chemical conversions are trans-esterification and other processes to convert plant and vegetable oils to biodiesel, and direct combustion of wood and another biomass is being used for a very long.

1) *Thermal Conversion Processes:* The main thermal conversion processes known for biomass conversion are liquefaction, slow and fast pyrolysis, and gasification. The presence of large amounts of oxygen in plant carbohydrate polymers means the pyrolytic chemistry differs sharply from these other fossil feeds. Wood and other plant biomass is essentially a composite material constructed from oxygen-containing organic polymers. The plant biomasses mainly consist of low molecular weight organic extractives and inorganic minerals, and Macromolecules like polysaccharides e.g. cellulose and polyoses and lignin (1984) Rowell R.M. The species undergoing chemical change during thermal conversion are cellulose, hemicelluloses, and lignin. The percent of these components vary in different varieties of woody biomass. Various biomass feeds transform to bio-oil and char to various extents, depending upon their chemical composition as well as moisture contents. Jasvinder Singh and Sai Gu (2010), Given the availability of waste biomass, agricultural waste, food waste, large amounts of industrial waste, household waste and anaerobic digestion, these are good choices. These types of systems not only solve the problem of electrification in remote villages where traditional electrification infrastructure is very expensive, but they also have lower power generation costs. Bio-oil production by rapid thermal decomposition is quite possible for power generation applications and is not very difficult to overcome even with certain limitations. The town of Nanded was rebuilt for urban use without a systematic development plan and without adequate infrastructure investment. Due to the fact that most of the population is concentrated in the central part of Nanded Waghala township, most of the public services are established in the same location. Likewise, most solid waste is generated and collected in the same area in Yannawar et. al. (2013). Most energy needs are concentrated in the city center and vice versa.

V. CONCLUSION

Traditional methods of solid waste management like composting, landfill and incineration are not very helpful to completely eradicate the problem of solid waste management.

Various waste management methods are used such as landfill, incineration and composting, but none of them fully meet the growing need for waste management in large cities.

In this paper, we compare several waste management methods and propose a relatively good measure of plasma gasification, in which solid waste pyrolysis occurs at extremely high temperatures, producing syngas.

Creates. NG not only recycles all types of waste, but also produces many useful products and electricity. The configuration provides a closed loop that reduces pollution and meets the needs of developing countries, and could be a potential HTS mechanism in the near future cities like Nanded Waghala municipal cooperation.

A. Recommendations for Implementation

The following general recommendations are nevertheless made to guide decisions, based on the findings of this study.

1) Apply realistic standards and regulations for energy conversions from solid wastes.
2) Best treatment for organic waste you can use in vermicomposting that can give you good quality organic manure for agriculture, or gardening.
3) Organic waste can also treat with traditional methods like composting and biogas.
4) The remaining biomedical, infectious or hazardous waste can be treated as incineration.

B. Acknowledgment

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C. Declaration

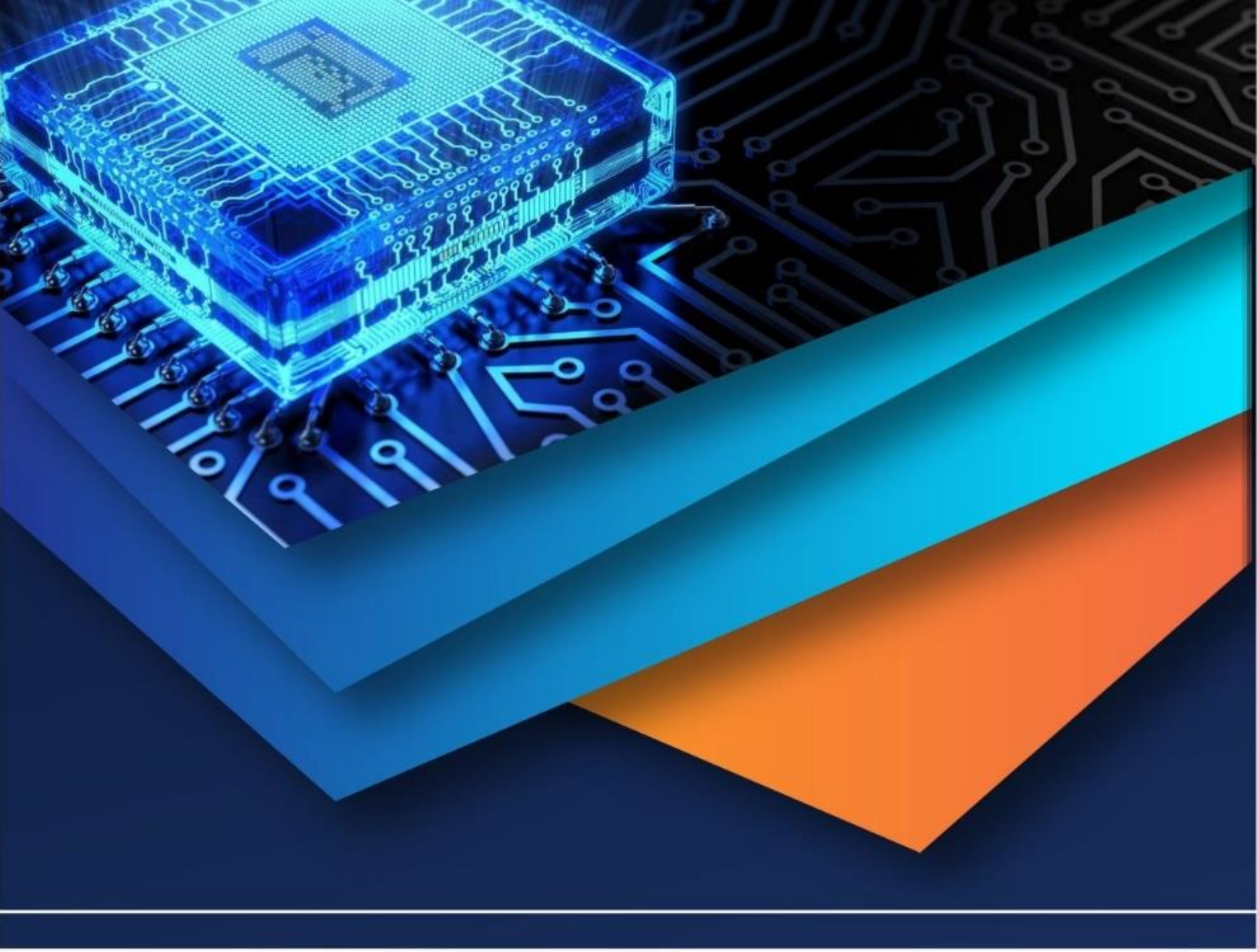
The authors of this manuscript do not oppose the interest.

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