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Smart Integrated Waste Management System

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Abstract: ***The conventional fuel required for production of electricity is decreasing day by day at an alarming rate & it's very important to find out alternative resources which can be used as the fuel for production of electricity especially for developing & under developed countries. With population of 1,34,2786,451 as on September 28 2017 based on the data of United Nation India's population is equivalent to 17.74% of the total world's population (Source: World's Population Meter) produces enough amount of waste per day to ponder about this topic .So, the need is felt to worth working in field & its high time to inject the concept of energy generation from waste in India. Firstly, a base line survey was conducted for independent research to accumulate the data of total waste to generate the electricity. This review paper & case study is encouraged to carry forward the Endeavour & to generate the electricity from municipal solid waste, cafeteria waste and different composition of various kinds of waste to make the technology locally appropriate. A model for community based small & medium energy power plant that is data-driven, sustainable & economic being developed for proper waste management & possible solution for an energy crisis in India. would like to throw some light on the New and Innovative concept which is known as "Smart Integrated Waste Management System". It is a new concept that is fully examined successfully. In world, waste production has doubled over the past 20 years. By 2050, the world may produce huge garbage at an alarming rate of 5 billion tons per year. Poor waste management in many developing or under developed countries is a threat to humanity& ecosystem. The system integrates the mechanism to uplift the garbage at dump yard on outskirts of the cities. The operational results would be obtained in the form of thin plastic sheets & power stored in batteries for later use. The whole system is designed to get maximum efficiency of work & zero pollution emission to make our environment safer. In under developed countries, waste management usually accounts for about 30-50% of municipality operational budgets. Despite these high expenses of corporation, many cities collect only 50-80% of wastes generated in the city. In some cities, 80% of garbage collection and transportation equipment is out of service or in need of immediate repair or maintenance, in absence of which the whole system may get worse***

Keywords: --Waste, Energy, Vacuum Pressure, Generator, Heavy Duty Batteries, and Compression

I. INTRODUCTION

The natural resources in the form of fossil fuels are raw materials from which power (electrical energy) is generated and day to day life of the people of today's world is solely dependent on the electrical energy. Researchers in this field say that the reserved gas will be finished soon, and usage of gas is increasing day by day. In developing countries, especially in India, there is not enough generation of electrical energy to keep up with the demand, and there is a huge scarcity of energy. Alternative resources are now explored to prepare for the future dearth of traditional energy source. The waste materials can be a good source of energy as the amount of waste is increasing every day, and can help in meeting the electrical energy not only in India but also in the world. Many countries are now switching to renewable energy source, as they are clean and suitable substitute for fossil fuel. Some part of the world has already established an energy power plants that produces power from waste but this is not enough and there is a huge scope of increasing the overall performance of the systems.

A. Waste resource in India

Due to rapid urbanization the country is facing massive waste management challenge. Over 377 million urban people live in 7,935 towns and cities & generate 62 million tons of municipal solid waste per annum. Only 43 million tons of the waste collected, 11.9 million tons is treated & 31 million tons is dumped in land fill sites. Solid Waste Management (SWM) is one among the basic essential services provided by municipal authorities. A report by IIT Kanpur (2006) found the potential of recovering at least 15% of waste generated every day.

B. Sources & Types of solid waste

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1) Domestic waste- It contains a variety of discarded material like polythene, bags, metals, cans, glass bottle, waste paper, dippers, rags clothes, waste food, electronic waste etc.
2) Commercial waste- It mainly consists of packaging materials, cans, bottles, polythene bags, peanut shells, eggs shells, tea leaves etc.
3) Biomedical waste - It is consisting of tissues, blood, cotton, bandages, out dated drugs, P.O.P. (Plaster of Paris) etc.
4) Agricultural Waste- It mainly consists of vegetable parts, leaves, branches & dead parts of plants etc.
5) Industrial Waste- It is big source of waste materials consisting of a large number of materials including packaging materials, organic waste etc. Many industries produce huge amount of waste such as polythene industries, Shoe industries, tanneries etc.

Table: (a) - Cities of huge waste generation in India.

II. BACKGROUND OF THE SYSTEM

One of the major issues in the 21st century is garbage dumping & waste management. People using various utilities care little of proper waste disposal. Using the existing technologies, we have designed the integrated system to destroy the waste at an instant at a place saving many other costs. We just tried to move this discrepancy using engineering & electrical methods incubating modern scientific techniques into it.

III. OBJECTIVE OF THE INTEGRATED SYSTEM

1) To reduce / abolish garbage from the society
2) To reduce air pollution
3) To maintain air level & standards
4) To control air borne diseases in humanity
5) To get multiple output benefits
6) To make easy setup to work on efficiently
7) To reduce the soil pollution

IV. FIELD OF THE SYSTEM

Our integrated system belongs to Social Engineering field. Waste management is a major issue in today's era, keeping in mind the same we framed & examined the system to put forth "Smart Integrated Waste Management System". It would readily help the ways out to deal in with the existing garbage disposal techniques &waste management system.

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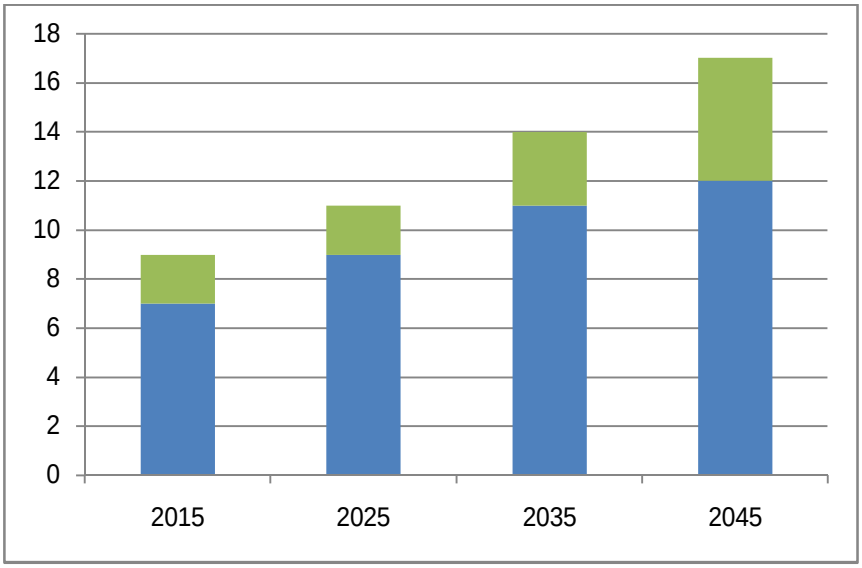
Table:(b) -Waste Generated Dally in Major Indian cities

S No.	City	Garbage generated (tons/ day)	Calorific value (Megajoules/kg)	Power Production Potential(MW)	Coal Substituted (tons/Year)
1	Greater Kolkata	11520	5	129.9	1445194
2	Greater Mumbai	11124	7.5	186.6	2075263
3	Delhi	11040	7.5	186.8	2078043
4	Chennai	6118	10.9	149.0	1657716
5	Grater Hyderabad	4923	8.2	91.0	1012526
6	Greater Bengaluru	3344	10.0	74.9	833427
7	Pune	2602	10.6	61.8	687908
8	Ahmedabad	2518	4.9	27.9	310362
9	Kanpur	1756	6.6	25.9	288159
10	Surat	1734	4.1	16.1	179314

Table:(c) Case study of land requirementin India



As we are seeing developing country India waste materials such as plastics, papers, rappers and many other waste which cannot be automatically biodegradable so dumping process is not suitable for land because of continuously requirement of land is increases day by day due to increasing population of India on this case study our review paper “Smart Integrated Waste Management System” reduce the problem of land requirement.

V. DETAILED DESCRIPTION OF INTEGRATED SYSTEM

In this project, we are trying to give the integrated system for waste management in engineering concepts & techniques that would readily help in efficient disposal of garbage lying openly in dump yards. Our system is also more significant as producing zero carbon emission. In this system, the garbage will be picked through vacuum pressure as the setup for it will be already installed near the dump yard. Approximate pressure for the purpose can be taken as 2 bar. Heavy metal objects will not be picked as it is non-biodegradable. The material which rotten & pollutes the environment by its foul smell is taken into consideration. The garbage so lifted will be transferred to garbage storage chamber, which may be approximately can hold 100 kg waste (extendable) at a time, where it will be divided again on basis of biodegradable & non-biodegradable waste. The pre-installed robotic arm will do the job on the basis of installed sensors that would identify the modules with ethane molecules & separate them at an instant to signify the workouts of two categories. Thus, we would get two categories of waste – (a) Non-biodegradable (Plastics etc.) and (b) BiodegradableNow the non-biodegradable waste is compressed (by mechanical means) at an instant to convert them into sheets of

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mass, that can be used in various industrial purposes. By doing so, we can even save the environment of filthy air pollution and also the compressed sheets can be used as required. Also, it can be used on roof tops of poor people. It would be also used on pavements to make the walk able streets that would be economical & easily available. Now, the biodegradable waste that is so compressed & dried with different temperature variations of atmosphere & also temperature released during compression of waste, is gets sudden increase in its ignition temperature. By adding some flammable substance to it, easily the waste can be fired & turned into ashes. Thus, the smoke thus generated could be passed through a duct of small diameter to increase its pressure. The high-pressured smoke steam would rotate the suitable sized mechanical turbine type wheel to in turn rotate the shaft of small generator installed aside. The so power generated is stored in adjacent battery for later use. The power stored in batteries for further use is used as with different requirements & uses. This system will be completely pollution free running on electrical system& would again produce the power in electrical means. Thus, it can be an innovative step taken in the history of waste management & disposal system

A. Vacuum Cleaner Setup

The dirt is collected by either a dust bag or a collection storage area. Huge stationary industrial vacuum cleaners can handle several hundred liters of dust before being emptied. The suction pressure is the maximum pressure difference that the pump can create. The higher the suction rating, the more powerful will be the cleaner. For our motive, we can use a vacuum cleaner of having a pressure of at least 2 bar to lift up the dirt or the garbage particles. This technology will reduce the labor force & in a single time installation, it will have long term benefits in both technological advancement & financially.

B. Heavy Duty Batteries

Heavy Duty Batteries have a high source of potential voltage to serve the purposes. It can give long working hours to fulfill the needs. Nowadays it's being effectively used to run heavy vehicles too.

VI. ADVANTAGES

Using this technology, one can get the following benefits

A. It will help in increasing the air quality
B. Reduce / abolish waste
C. Easy to use
D. Economic & effective
E. Single time installation cost

VII. APPLICATIONS

A. It can be used in garbage dump yards to clean the filthy dirt off there.
B. Roadside garbage can be cleaned of efficiently & the streets of cities can regain its glory.
C. Small scale installation anywhere as required, mainly in small scale industries or workshops.
D. Near sea port units to treat the garbage at an instant.
E. In industries, etc……...

VIII. RESULTS

Using the above explained integrated system, many costs can be optimized effectively such as labor cost etc. Also people this days avoid working in stinky places & foul working conditions. This problem can be effectively neutralized and the work of cleaning can be done in efficient manner. The waste will be treated off and we can be ensured to get a cleaner environment. It will be very beneficial for all living organisms & ecosystem. In addition to, the problem of soil pollution can be minimized to an effective extent and proper disposal of waste at time will ensure the harmony in society.

IX. CONCLUSION

It is concluded that the waste will be treated and vanished off in above laid criteria's effectively with less loses & higher outputs of work. The waste will be drained off. We can even take a step forward to reduce & curb the soil & air pollution. Designing a system to be introduced effectively into an existing, socio-economic structure is a challenging practical hurdle. Will communities actually accept and use our integrated system? We believe a well potential to minimize authorities work pressure and allow for potential to minimize authorities work pressure and allow for efficient municipal services in developing it be for the purpose of garbage collection, garbage removal or ensuring a suitable & beneficial environment for residents.

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X. ACKNOWLEDGEMENT

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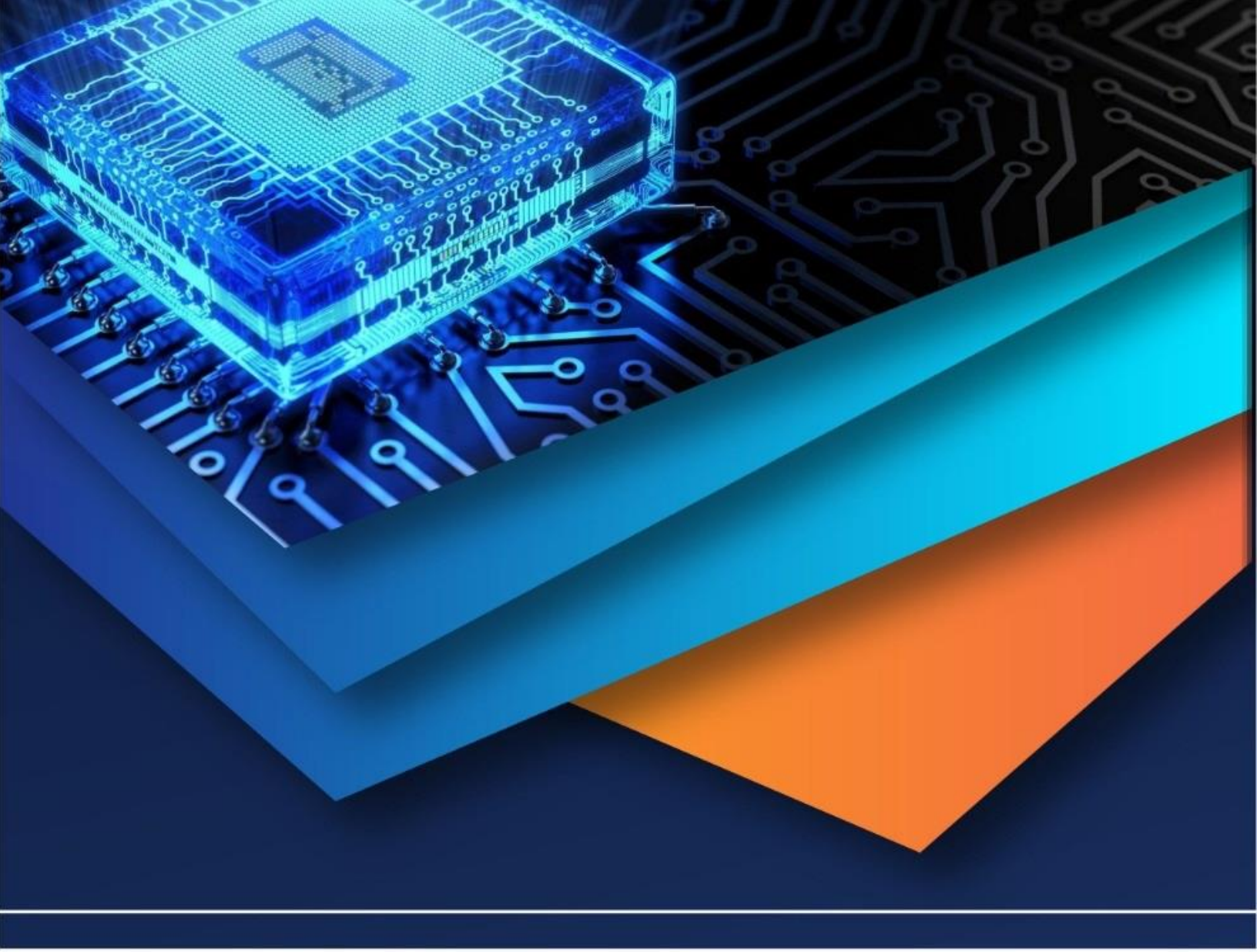

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