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REVIEW ARTICLE

SMART WASTE MANAGEMENT

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Abstract:

One important aspect of a smart city is systems that are sustainable and environment friendly. This paper reviews smart solid waste management system being put in place using Swiss technology at smart city where garbage will be disposed of with minimum human interference giving a strong independent system. Not only that, the waste will be recycled and recovered to make organic manure and generate power that will be consumed in smart tech city itself. The paper also revises the past experiences with disposal practices and highlights their instability.

Key words: IOT, M2M Technology, Trash Receptacles, GIFT City, Vermi-Compost Unit, Plasma Technology, Upfront Cost, Segregation, Thermal Treatment, Residual Disposition

INTRODUCTION:

Waste Management

Indians are alone responsible for producing a whopping 36.2 million tons of waste a year. Because of this fact both the government and environmental associations have developed numerous methods of dealing with the problem. Waste Management is that solution, a rather complex issue that encompasses more than 20 different industries.

Waste management is the "generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes." In other words, waste management is the process of treating solid wastes and offers variety of solution for recycling items that don't belong to trash. It's about how garbage can be used as a valuable resource.[1]

Technique

The solutions include techniques that currently part in the system of waste management. There are some major groups of waste management methods, each of them divided into numerous categories. These groups include "recycling and recovery, composting, fermentation, landfills and incineration".[2]

Fermentation

Fermentation is the most economically and ecologically viable treatment method for a range of organic waste. Clean energy is produced from the decomposed organic material and compost and, liquid fertiliser from the residual fermentation.

A smooth fermentable substrate cannot be extracted until the feedstock is subjected to selected stages of treatment. For operators of waste management fermentation plants, it is beneficial to be able to use the broadest spectrum of organic waste input material as possible.

By using the right technologies, heavily contaminated market waste and outdated food with various levels of packaging can be recycled alongside bio waste and food residues.[3]

Landfill

The landfill is the most popularly used method of waste disposal used today. This process of waste disposal focuses attention on burying the waste in the land. Landfills are found in all

areas. There is a process used that eliminates the odours and dangers of waste before it is placed into the ground. It is certainly far from the only procedure and one that may also bring with it an assortment of space.

This method is becoming less these days although, thanks to the lack of space available and strong presence of methane and other landfill gases, both of which can cause numerous contamination problems. Many areas are reconsidering the use of landfills.[4]

Incineration/Combustion

Incineration is a type of disposal method in which municipal solid wastes are burned at high temperatures so as to convert them into residue and gaseous products. The biggest advantage of this type of method is that it can reduce the volume of solid waste to 20-30% of the original volume, decreases the spaces they take up and reduce the stress on landfills. This process is also known as THERMAL TREATMENT where solid waste materials are converted by incinerators into heat, gas, steam and ash. Incineration is something that is very useful in countries where landfill space is no longer available, which includes Japan.[5]

Recovery and Recycle

Resource recovery is the process of taking useful discarded items for a specific next use. These discarded items are then processed to extract or recovery materials and resources or convert them to energy in the form of useable heat, electricity and fuel.

Recycling is the process of converting waste products into new products to prevent energy usage and consumption of fresh raw materials. Recycling is the third component of REDUCE, REUSE AND RECYCLE waste hierarchy. The idea behind recycling is reduce energy usage, volume of landfills, air and water pollution, greenhouse gas emissions and preserve natural resources for future use.[6]

Composting

Composting is a easy and natural biodegradation process that takes organic wastes that is remains of plants, garden and kitchen wastes and turns into nutrient rich food for your plants. Composting, normally used for organic farming, occurs by allowing organic materials to sit in one place for months until microbes decompose it.

Composting is one of the best methods of waste disposal as it can turn unsafe organic products into safe compost. On the other side, it is slow process and takes lot of space leading to a disadvantageous face of composting.[7]

Smart Waste Management

There are two innovative functions of smart waste management: OPERATIONAL EFFICIENCY AND WASTE REDUCTION. These functions can be studied under the following points.[8]

Reduce the amount of time and energy required to prove waste management services:

Although public services and waste management companies have been around for a long time,they have seen only limited innovation with operational efficiency-until the next few years. One problem that they've faced is that it's better to pick up trash receptacles.

Even with great route optimization, sanitation specialists must physically to the dumpster to check trash levels,which wastes both time and fuel. But with the rise of the Internet of Things(IOT), smart sensors and sensor level M2M technology have begun popping up in all kinds of places including trash receptacles. [7-9]

A great example of an innovative waste company is Enevo.

Reduce the amount of waste created:

The other side of waste management with deals with managing the sheer quantity of waste created on a daily basis. The consumers and businesses toss millions of pounds of garbage each year. Educating these entities on how to reduce waste is particularly important for municipalities, who must pay for the landfills and waste removal services.

This topic is bit more complex; it goes beyond the need for IOT-based sensors, and more towards an efficient purchasing process.

Application: From a consumer prospective, the makers of smart refrigerators and other appliances may eventually be able to bring this technology in homes.[10-12]

Making of Smart City

The solid waste from the towers will be sent to the waste collection centre, about 2km away from the buildings using vacuum suction pipes. The waste will be transported at the speed

110-140km/hour through a network of underground pipes. The speed and direction of the waste will be controlled by a fully computerised console. A trial run for the automated garbage disposal system was recently held at GIFT (Gujarat International Finance Tech) city. "The trial run was successfully. Based on the results of this trail run, further improvement will be done" said managing director of GIFT city RamakantJha.[13-15]

He explained that solid waste will be segregated into organic and non organic waste. The organic waste will be sent to a vermi-compost unit where it will be used to make manure which in turn will be used in the gardens and plantations in the city. The inorganic waste will be incinerated using plasma technology. The initial capacity of the incinerator will be 50 tonnes per day which will gradually increase to 400 tonnes per day as occupancy increases. Energy from the incinerator will be used to generate thermal power for consumption within the city.[16]

Conclusion:-

The major key of smart waste management is its implementation. Both private waste management services and municipalities can benefit from smart waste technology. For a smart upfront cost in a sensor technology, one can increase operational efficiency and cut costs in multiple areas. With the cost these technologies steadily decreasing-and plenty of wireless technologies available to make smart waste possible-one's company can stop throwing cash and efficiency in the trash and make a solid business case for this type of investment.

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