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## DESIGN OF INCINERATOR PLANT FOR VASAI-VIRAR REGION

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**Abstract:-** Nowadays one of the major difficulty which remains common in modern society is Municipal Solid Waste (MSW), after every significant efforts to prevent, reduce, reuse and recycle the waste. In most of the developed countries at present, municipal solid waste incineration (MSWI) The waste material collection is increasing every day in almost all cities in India and creating hazardous situation in form of pollution. The Vasai-Virar is small city & tehsil (sub-district) in konkan division of Maharashtra state in western India. As per the census of 2011 the population of Vasai-Virar is 12,22,390. The amount of solid waste treated is nil and MSW processing facility available here is only dumping. Due to this the average life span of living beings has degenerated to a great extent. Our main aim is to utilize these waste materials in an effective way to help humanity by the process of incineration. Incineration is the best process of combustion of organic materials present in the waste and giving useful by-products. The effective use of these by-products can be growth in production of crops generation

**Keyword:-** Waste To Energy Technology, Municipal Solid waste, Municipal Solid Waste Incineration, Hazardous Solid Waste, Microbial Fuel Cells

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### I. Introduction

Municipal Solid Waste (MSW) consists of household waste, construction and demolition debris (C & D), sanitation residue, and waste from streets, generated mainly from residential and commercial complexes. As per MoEF &CC (Ministry of Environment, Forest and Climate Change), it includes commercial and residential waste generated in municipal or notified areas in either solid or semi-solid form, excluding industrial hazardous wastes but including treated Bio-Medical Wastes.

The second category of solid waste is Hazardous Solid Waste (HSW) which is also termed as industrial waste. It may contain toxic substances which are corrosive, highly inflammable, or which react when exposed to certain elements e.g. gases. The third category of solid waste is biomedical waste (BMW) or hospital waste. Discarded medicines, chemical wastes usually in the form of disposable syringes, swabs, bandages, body fluids, human excreta, etc. The fourth category of waste is electronic waste or e-waste and includes discarded electrical or electronic devices. Used electronics which are Solid waste is classified into four different types depending on their source. The first category of solid destined for reuse, resale, salvage, recycling or disposal are also considered e-waste

### II. METHODOLOGY

#### General

This chapter presents method for Incineration Plant proposal and the method of flow of work. The methodology is carried out in three phase.

## Methodology of work

### Phase-1

- Step 1- Determination of Population up to 10-15 years
- Step 2- Calculation of Waste Generation
- Step 3- Segregation of Waste
- Step 4- Location of Plant

### Phase-2

- Step 1- Incineration Technology to be used
- Step 2- Calculation of amount of Energy by Mathematical Formula
- Step 3- Operation & Maintenance of the plant
- Step 4- Air pollution & Control Devices
- Step 5- Cost of the Incinerator Plant

## Phase 3- The Final Proposal

### Mathematical Formulas for Calculation

#### 1) Formula For calculating Amount of Electricity Generated

$$ERPI = \eta(M \times LCV) / 1000$$

E= Energy Recovery Potential From Incineration

M=Total mass of dry solid waste (kg/day)

LCV=Lower Calorific Value of the waste (kwh/kg)

$\eta$ =Process efficiency

#### 2) Formula for calculating the cost of incinerator plant given by WTE International Department

$$I = 2.0357 \times C^{0.7753}$$

I= Investment cost in million dollars

C= Plant capacity(1000 metric tons of waste/year)

### Methods of Waste Collection

1. House-to-House:-In this method the waste collectors visit each individual's house to collect the waste.
2. Community Bins:-Individuals dump their waste in community bins which are placed at fixed point in the locality. It is then picked up by MSW collectors according to their schedule.
3. Curb side pick-up:-Individuals leave their garbage outside their houses according to the garbage pick-up schedule set by local authorities.
4. Self Delivered-Generators are used to deliver or transfer the waste generated directly to disposal

- Determination of Population up to 10-15 years

**Table No.1: Population of 3 decades**

Year	1961	1971	1981	1991	2001	2011	2021	2031	2041
<b>Organic growth</b>	<b>141899</b>	<b>194262</b>	<b>256320</b>	<b>405718</b>	<b>7,02,723</b>	<b>1307405</b>	<b>2222589</b>	<b>3333883</b>	<b>4179354</b>
<b>Growth Rate</b>		37%	32%	58%	70%	90%	70%	50%	25%

The above population is estimated by Geometric Mean Method, this method is suitable for Small cities and in this method the growth rate is assumed to be constant.



**Figure No1. - Location of Plant**

While selecting location of the plant following points must be taken into consideration.

- The plant must be located away from the residential areas because it can the noise coming from the incinerator may harm the surrounding areas.
- Location must be such that it should not take more than 1 hour to drive a truck from waste generation area to plant.
- A controlled and well-operated landfill must be available for disposal residues.
- The location we have selected is Gokhivare site at Navghar measuring 19.33 ha.
- The minimum area required for incineration plant is about 15-20 km<sup>2</sup>.

The main reason for selecting this site is that it is a proper landfill site which has been proposed for making an RDF plant which can be connected to our project which can ultimately reduce the cost of project

### III. Conclusion

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- We are hereby proposing a other treatment option rather than land filling for treatment of the waste generated in Vasai-Virar region.
- We have estimated the population up to next 3 decades and also calculated the amount of solid waste generated till next 3 decades
- Today generation incineration in being widely for the reduction of the volume of MSW and produce electric energy
- As vasai virar concered is highly polluted by incineration the pollution certain amount of energy can be recorved
- The implementation of W/f technology for disposal of MSW become feasible from both environment as well as economic perspective

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