

## **BRAIN – TEASERS ? AND – EASERS ? ON WASTE-TO-ENERGY PROJECTS**

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01) What is Waste ?

Waste is defined as the useless materials which are thrown away because they are not wanted.

02) What is Urban Waste?

The urban waste also known as Municipal Waste are the solid or liquid rejected due to household and other social activities such as Municipal Solid Waste and Municipal Sewage.

03) What is Industrial Waste?

Industrial wastes are the solid or liquid materials rejected after the process of industrial activity such as Distillery waste, Dairy waste, Food processing waste etc.

04) Can all the Industrial Waste Materials produce Energy?

No. Only those industrial waste materials can produce energy which has organic matter available in them.

05) Can Municipal Waste produce Energy?

Yes. Municipal Solid Waste (MSW) has generally in a typical Indian City 40% to 60% organic matter and hence are useful for generating energy. As regards the Municipal Sewage have just 2-4 % of solid content and further less organic matter and hence can generate energy to the extent much less as compared to MSW.

06) Is it true that the waste to Indian cities are different from those of Western Countries?

Yes. In most of the developed Countries, the MSW has organic matter in the range of 70% to 80% while Indian Cities have only 40% to 60%. Hence, the MSW of Western Countries are more energy rich. As regards Municipal Sewage, they are practically of same quality.

07) Why the characteristics of MSW vary form city to city?

The characteristics of MSW depend upon the nature of household and other social activities. For example the city of Solapur in Maharashtra has higher organic matter due large number of "Bidi" cottage industries and rejection of large quantity of "Tendu" leaves.

08) Are the Indian Cities managing their waste effectively?

No. Most of the cities collect only 60% to 70% of waste actually produced. The collect waste is dumped at the dump yard in unscientific manner (as it is). As a result, there is problem of environmental pollution and public protests. As regards liquid waste, hardly any city has environmentally safe Sewage Treatment Plant.

09) What is Landfill?

Landfill is another name of dump-yard, which is a wasteland, creak, small valley, trench etc.

- 10) Are the Landfill sites sufficient to take care of dumping the MSW daily?

Most of the cities have insufficient Landfill sites and they are finding it difficult to locate new sites at affordable transportation distance. In some cities such as Ulhasnagar in Maharashtra has the situation at alarming stage.

- 11) Why new alternative sites are not easily available?

Nobody wants dump-yard in his backyard and real estate value of land drastically reduces near new Landfill site besides having future problem of obnoxious smell, rodents, pests and flies.

- 12) How are the Municipal Sewage managed?

The Municipal Liquid Waste generated largely due to bathing, washing and sanitary activities is collected through open or underground drainage systems to a central place. Barring few cities which have Sewage Treatment Plants most of them release the waste without treatment to open fields or river.

- 13) Why all the cities do not treat the liquid waste in Sewage Treatment Plants?

Most of the cities have sewage treatment plant (STP) with 20-30 years old technology. They need the revamping and modernization which requires large investment. For other cities, having new STP is a costly affair that the local Government with limited funds can not afford. Moreover, having underground drainage network is the pre-condition to have STP.

- 14) How to estimate the waste generated in a particular city?

Although the estimate varies from city to city, in general Indian cities have similar waste generation pattern. For an Indian city, one can safely consider the solid waste generation of 0.5 kg per person per day and liquid waste 110 liters per person per day on an average. Thus a city of population 1 lakh will produce 50 tonnes per day (TPD) of solid waste and 11 million liters per day (MLD) of liquid waste.

- 15) What is the quantity of MSW generated in major cities of Maharashtra?

Based on the above estimate of per person per day, MSW generation would be as follows: Mumbai (5000 TPD), Pune (1100 TPD), Kalyan (600 TPD), Solapur (350 TPD) and Aurangabad (300 TPD)

- 16) What are the major options for effective MSW treatment?

There are two major options for effective MSW treatment namely composting and power generation. The composting plant generates organic fertilizer and power plants generate electricity.

- 17) What are the ways of composting?

The simplest way is "Vermiculture" wherein the organic part of segregated waste is spread over the soil having earthworms that naturally converts it into compost and improves the solid structure to hold water and nutrients.

The next way is to keep the organic part of the segregated waste in Windrows, treat it with bacterial culture and mix them at regular intervals for good aeration.

Another sophisticated way is to complete the bacterial activity in closed vessel with partially aerobic condition known as closed composting.

- 18) Which composting technology is the most suitable for a local self Government?

“Vermiculture” is manageable in smaller scale only hence, for the city with MSW up to 50 TPD, this technology is advisable.

The open windows composting can be used for larger quantities such as 100-200 TPD. However, it is difficult to control the obnoxious smell due to volatile acids during the mixing process.

The closed vessel technology is odour proof and suitable for higher quantities. However, they are comparatively costly and their viability under Indian condition is yet to be proven.

- 19) How much organic fertilizer could be produced from MSW?

A plant with 100 TPD of raw MSW can produce ready-to-use organic fertilizer up to 40 TPD.

- 20) What are the ways of producing power from waste?

Some of the technologies known for power generation are Sanitary Land filling, Incineration, Pyrolysis, Bio-methanation, Gasification, and Plasma-vitrification.

- 21) How much power could be produced from MSW?

A 100 TPD raw MSW power plant can produce 1 MW equivalent power as a general estimate. However, some technologies claim more power generation per 100 TPD.

- 22) Which power generation technology is the best?

The technological viability of all the technologies have been proven, however the choice depends upon the site condition and cost factor. Recent trend in world does not favour Sanitary Land filling and Incineration due to the environmental considerations. Plasma vitrification and pyrolysis are yet to be proven at large scale. Biomethanation is popular in the European countries for larger plants.

- 23) Out of the two major options composting and power generation, which one should be preferred?

Composting has the inherent problem of foul smell during treatment that attracts public litigation. They are not pathogen free completely, hence hazardous for the health of workers. They are unmanageable in rainy season. Moreover, it is energy consuming process rather than generating. Power generation is environmentally safe and well-established state-of-art technology.

The organic fertilizer from MSW is devoid of NPK in the required proportion and additional nutrients need to be added to be acceptable. Even then there is no established market for organic fertilizer which make the project of uncertain viability.

On the other hand power has always a ready market for power hungry country. Hence, power generation is better option.

24) Does that mean that all the cities should go for power generation?

No. Power projects are comparatively costly and are viable for plants with more than 200 TPD only. Therefore, for smaller quantities of MSW, composting may be opted as good compromise. However, the market availability must be established first.

25) What is the cost of MSW treatment plant in general?

The composting commercial plants have the cost of Rs. 3-4 crores per 100 TPD while the power generating commercial plants cost Rs. 8-10 crores per 100 TPD. Even then power plants are claimed to be commercially viable due to higher returns and ready market.

26) What should be the mode of implementation?

MSW treatment plants are cost intensive. It is difficult for the local self governments to run a commercial plant besides fulfilling the social obligations of health, basic amenities and hygiene. Therefore, it is advisable that above plants may be run through private professional organisations with suitable agreements on Build Own and Operate (BOO) basis with their own investment.

27) Why should private investors invest in such plants?

The experience at the Municipal Corporations of Nagpur, Mumbai, Pune, Solapur, Kalyan & other cities have shown that private promoters find the above projects financially viable. Moreover, State and Central Government have announced attractive policies for private participations by providing fiscal and financial incentives.

28) Are the fiscal and financial incentives available for industrial waste also?

Yes, Industrial waste power project also attract the above facilities.

29) Which industrial wastes are capable of producing power?

Mainly the industrial waste from distillery, food processing, abattoir, dairy, starch factory, antibiotic manufacturing plant, paper mill etc. are capable of producing power. The extent of power depends upon the solid percentage in the waste.

30) Who can implement the industrial waste power projects?

The private industry owner can implement the power project as part of compulsory pollution control measure. The co-operative distillery plant can invite a private promoter with suitable agreement as commercial venture.

31) Are the industrial power projects or STP based power projects commercially viable?

STP based power projects are not commercially viable. For example, a 30 MLD STP can produce power only up to 0.75 MW. The industrial waste power plants with waste of high solid content only are commercially viable. Moreover, power generation component helps recovering some of cost of pollution control process.