Vol 5 Issue 9 Oct 2015

ISSN No : 2230-7850

International Multidisciplinary Research Journal

Indian Streams Research Journal

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RNI MAHMUL/2011/38595 **ISSN No.2230-7850**

Indian Streams Research Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial board.Readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

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Indian Streams Research Journal
ISSN 2230-7850

Impact Factor : 3.1560(UIF)
Volume - 5 | Issue - 9 | Oct - 2015

POWER FROM THE DUSTBIN TO USEBIN [WASTE TO ENERGY]

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ABSTRACT

One man's trash is another man's treasure." Different people have different ideas about what's valuable.

The solid waste management is very important for human beings and for environmental protection. The rural and urban areas in world countries face a huge challenging sustainable solid waste management system. At the same time, these countries need more energy for development. The energy needs to be produced in sustainable way, preferably from renewable sources which have a minimum environmental pact. One possibility is to use solid waste to generate electricity in centralized plants. Increasing amounts of municipal solid waste are becoming an issue for urban and rural municipalities. One method for dealing with municipal solid waste is converting it into energy.

KEYWORDS :*solid waste management , urban and rural municipalities,Gross Domestic Product (GDP)*

INTRODUCTION :

Shri Narendra modi prime minister of India has announced Swachh Bharat Abhiyan in India. India is the second most populous country in the world with a population of 1.2 billion, has witnessed a population growth of 31.8% during the last decade.11th largest economy in the world in terms of Gross Domestic Product (GDP) and the 3rd largest economy in the world in terms of Purchasing Power Parity (PPP), is a fast developing nation. It is witnessing a boom in industrialization, urbanization and population which is putting a surmounting pressure on the nation's resources and generating a burgeoning amount of waste. The same is the case with all the remaining developing or developed nations like Malaysia, Nepal, Bangladesh, etc. The rapid increase in population witnessed by the country puts a strong declining thrust on the nation's resources. Thus, it is expected that the nation works towards optimum utilization of resources as well as recovering whatever one could out of the utilized resources. This will create a path towards attaining sustainability in terms of resource utilization. The 3Rs (Reduce, Reuse and Recycle) should be kept in mind while working towards resource utilization. On the contrary if optimum resource utilization is not supervised upon, it can lead to an increase in waste, pollution and a downfall in the economy. Not only can it downgrade the economy,

But also take a toll on the environment and the health of the citizens through harmful emissions. Thus it is of almost importance to keep a constant eye on the utilization and recovery of resources.

The uncontrolled urbanization in India has not allowed the town and cities to cope up. They lack basic amenities like a proper sewage system, drainage system, solid waste management system, etc. Changing lifestyles and fashion over the years has led to a huge change in the amount of waste generated. This has led to an increased burden on the government, local authorities and the urban local bodies (ULB) to manage the collection, processing and disposal of waste. The most common practice of managing waste today is land filling, which poses a huge threat to the environment in the form of green-house gases (GHG) leakage in the form of CO2 and CH4 and leach ate production. Thus this technique needs to be improved. Thus, there is an urgent need to come up with an environmentally, economically and socially sustainable solid waste management process. Waste to energy is one such process that has long been neglected, but holds strong potential to derive energy from the unused resource, i.e., waste.

WASTE GENERATION IN INDIA

Rural and urban Indians of Changing lifestyles and increasing PPP, has increased the per capita waste generation rate in India from 0.44 kg/day in 2001 to 0.5 kg/day in 2011. This has led to an increase of 50% in the waste generated by Indian cities in a span of a decade since 2001. India has 53 cities with a million plus population, which together account for 86,000 TPD (31.5 million tons per year) of waste generated. The total Municipal Solid Waste (MSW) generated in India is estimated 68.8 MTY or 188,500 TPD. Such an increase in the amount of waste generated has Not only laid a burden on the resources of the nation, but has also become a threat to the health, safety and environment of the nation

WASTE TO ENERGY TECHNOLOGIES AND PATHWAYS

Broadly, waste can be classified into solid waste, liquid waste and special waste. Solid, liquid and gaseous fuels can be generated from these wastes through diverse technologies. They can be used for various applications in power, transport and heating.

- Solid fuels refer to various types of solid material that are used as fuel to produce energy usually by the process of combustion or gasification. Solid fuels include briquettes, charcoal, pellets and solid recovered fuel (SRF).
- The most important liquid fuels include ethanol, biodiesel, bio oil, synfuels and other hydrocarbon bio fuels.
- Gaseous fuel, apart from being used for power is also increasingly being used for transport and heating. Some of the gaseous fuels include biogas/methane, syngas/producer gas etc.

There are a number of new and emerging technologies for producing energy from waste without direct combustion. While it is difficult to summarize all the technologies in a single flow diagram, we have attempted to compile the main categories and processes for waste to- energy generation.

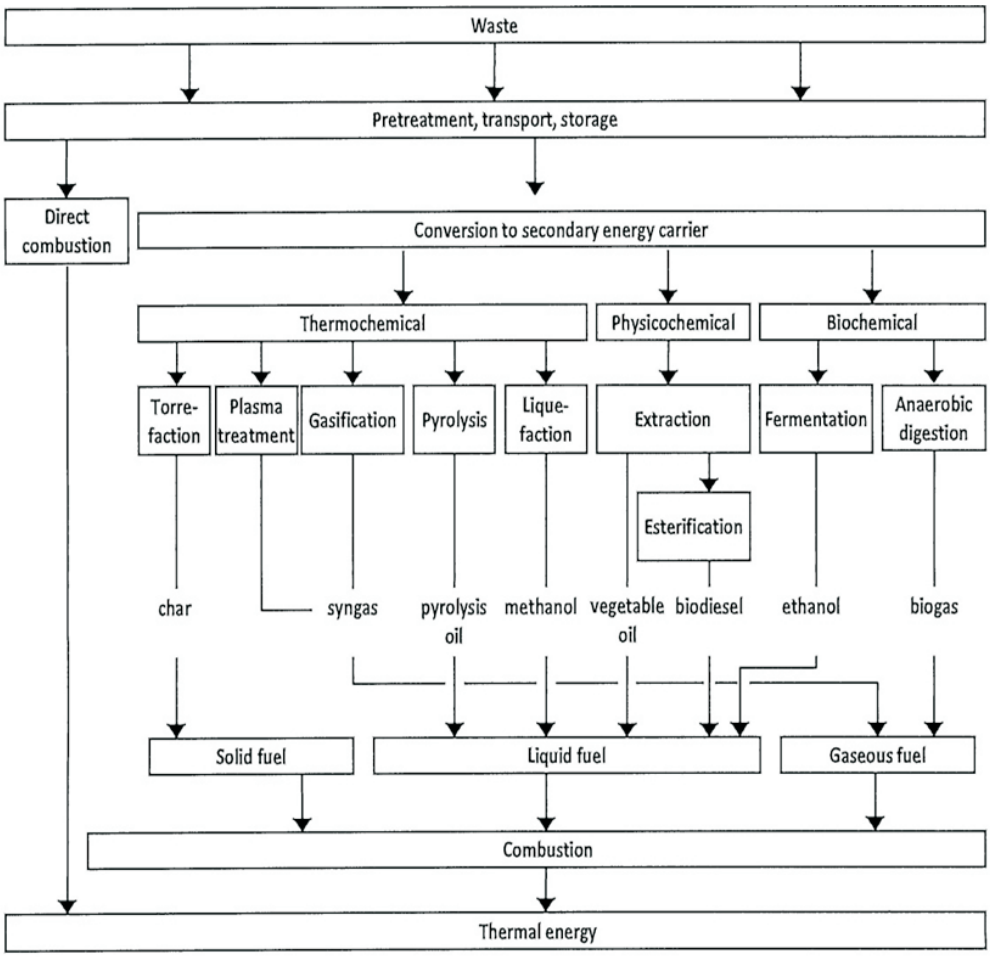

Figure 1: Waste to Energy Technologies and Pathways

Technological Options for Waste to Energy

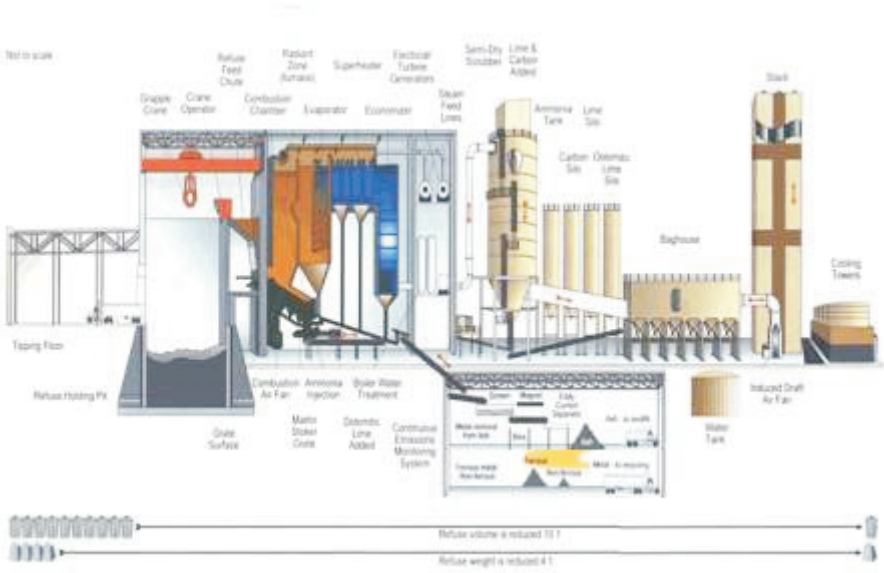

Figure2: Technological Options for Waste to Energy

Combustion/Incineration

In the modern waste management industry, combustion is the mere burning of Waste without the recovery of energy or materials. As such, combustion / incineration is increasingly being banned in OECD countries due to environmental impacts. There are a number of other new and emerging technologies that are able to produce energy from waste without burning the waste directly. These technologies are considered to generate renewable energy and are widely perceived to be more acceptable than incineration.

Landfill with Gas Recovery

These systems have been widely used in developing countries for over two decades having overcome the concerns associated with atmospheric emissions and leachates, now that there are adequate controls in place. The present emphasis is on material recovery facilities with limited land availability for new LFG facilities in the urban centers and the fast filling up of the sites currently in use. This would require only a limited quantity of recalcitrant waste to be sent to landfills as a repository.

Gasification

Gasification is the process of partial incineration with restricted air supply to create An air-deficient environment, can be used to convert biomass and plastic wastes into synthesis gas with a heating value 10-15% that of natural gas. When integrated with electricity production it can prove economically and environmentally attractive, though it appears better suited for clean biomass wastes. The synthesis gas in turn can be converted to methanol, synthetic gasoline, or used directly as a natural gas substitute and even blended with it in a gas supply line.

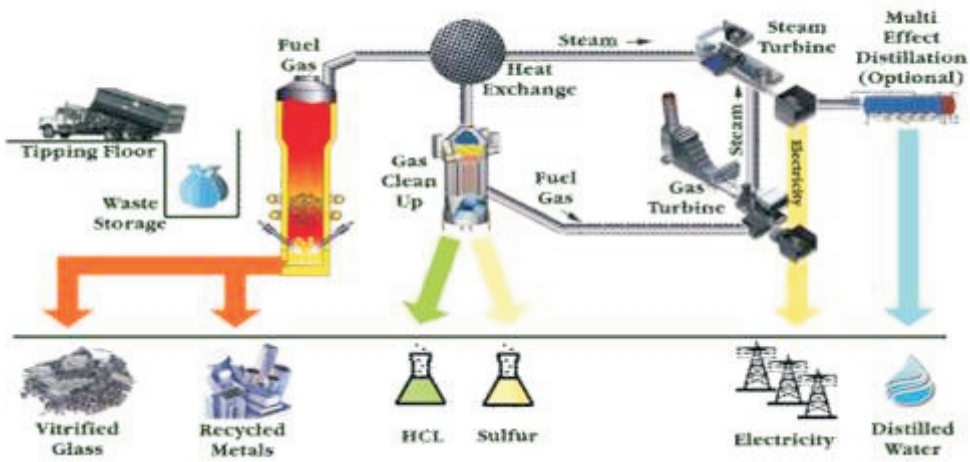

figure 3: Way of Technological Options for Waste to Energy.

Pyrolysis

Pyrolysis / Thermal De-polymerization are the chemical decomposition of waste by the Heating in the absence of the oxygen or any other reagents except possibly steam. It is another option for waste to energy that is being investigated. Pilot projects using pyrolysis for plastic wastes, and for mixed municipal solid waste potentially have demonstrated very high energy efficiencies. This technology is

increasingly moving towards commercial sale.

Refuse Derived Fuel (RDF)

Using raw unprocessed MSW as a fuel is problematic due to the heterogeneous in the Nature of material, which varies according to region and season. It also has a low heat value and high ash and moisture content. This makes it difficult for plant designers and operators to always provide acceptable pollution free levels of combustion. Processing of the waste to refuse derived fuel (RDF) partially overcomes these problems. Waste with high organic (carbon) content is suitable for briquetting and pelletizing after noncombustible and recyclable materials have been separated. These processes involve the compaction of the waste at high temperatures and very high pressures.

Plasma Arc Waste Disposal

Plasma arc gasification is a method of waste management that uses high electrical Energy and high temperature created by an electrical arc to break down waste materials primarily into elemental gas and solid waste.

Anaerobic Digestion (Bio methnation)

Anaerobic digestion takes place where the waste has restricted aeration, such as in The later stages of the decomposition of municipal solid waste (MSW) or in the digestion of sludge or wastewater in enclosed digestion vessels. Anaerobic digestion produces methane and water, and also some carbon dioxide and hydrogen supplied. The gas produced by anaerobic digestion can therefore be combusted and used, either to produce electricity or heat, thereby converting the methane gas to carbon dioxide

Hydrolysis and Fermentation

Organic wastes can be converted to ethanol, the alcohol found in beverages, through bacterial fermentation (enzymes may be used to speed up the process), which converts carbohydrates in the feedstock to cellulosic ethanol. Feedstock's predominantly used; include forestry and agricultural wastes, such as molasses or waste starch, with more recent developments focusing on municipal organics, including food and sewage sludge.

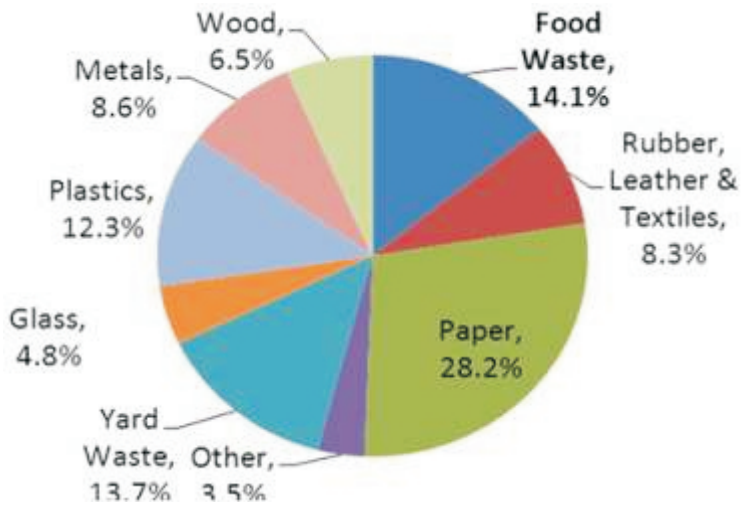

Figure 5: municipal solid waste in India

Key Strategies to Overcome Challenges in Solid Waste Management

Challenge #1 - Issues in Household (Source) Storage and Segregation of Waste

Solution:

Citizens must be informed and motivated not to litter

• the streets so they develop the habit of storing their waste at its source in at least two separate bins (one for biodegradable waste and one for recyclable waste).

• Citizens also need to be educated about risks to human health and the environment and taught to separate domestic hazardous waste and infectious waste.

• Municipal authorities must take concerted efforts to convince all classes of citizens to store and segregate their waste properly.

Challenge #2 – No system of Primary Collection

Solution:

• An assessment of the housing situation, street conditions, and geographic and topographic situation is always prerequisite for efficient planning and decision making for primary collection equipment.

• According to the Municipal Solid Waste (Management and handling) rules 2000, there are two options for primary collection: door-to-door collection at preset intervals or community bin collection (known as the bring system).

Challenge #3 – Irregular Street Sweeping

Solution:

A schedule of street • cleaning that indicates which roads require daily cleaning and which ones need to be cleaned periodically.

• A program for street cleaning, keeping in view the norms of work (yardsticks) prescribed

• A timetable for cleaning of open public spaces daily or periodically

Challenge #4– Issues in waste Transportation

Solution:

• The longer the distance to the landfill site, the more volume should be transported with each load. In case of long haul distances to the landfill site, transfer stations are found to be most efficient.

• Vehicles should be selected according to capital costs, carrying capacity, life expectancy, loading speed, local spare part availability, speed, fuel consumption, and maintenance costs.

Challenge #5 - Inappropriate Disposal of Waste on Open Dumping Grounds

Solution:

• The state pollution control boards are required to prescribe the criteria for site selection in terms of distance to be maintained from habitation, water bodies, highways, railways, and so forth.

• The municipal authorities should follow the rules carefully when constructing an engineered landfill.

Strategic and Financial Benefits from Waste to Energy Business

Profitability –

If the correct technology is used with optimum processes and every one parts of waste ar wont to derive worth, waste to energy can be a profitable business. When government incentives ar factored in, the attractiveness of the business will increase more.

Government Incentives –

the govt of Asian nation already provides important incentives for waste to energy comes, within the style of capital subsidies and introduce tariffs. With issues on global climate change, waste management and sanitation on the rise (a results of this increasing concern is that the freshly fashioned ministry solely for drinkable and Sanitation), the govt incentives for this sector is simply set to extend in future.

Related Opportunities –

Success in municipal solid waste management could lead on to opportunities in different waste like waste matter waste, industrial waste and unsafe waste. Depending on the technology/route used for energy recovery, eco-friendly and ,green?co-products like charcoal, compost, nutrient wealthy biological process (a fertilizer) or bio-oil will be obtained. These co-product opportunities can change the enterprise to expand into these connected product, demand that ar increasing all the time.

Emerging Opportunities –

With distributed waste management and waste to energy changing into necessary priorities, opportunities exist for firms to supply support services like jailor solutions. additionally, waste to energy opportunities exist not simply in Asian nation however everywhere the globe. Thus, there can be important international enlargement prospects for Indian firms, particularly enlargement into different Asian countries.

CONCLUSION:

The business of generating energy from solid waste (especially municipal solid waste from urban areas) is getting into a amount of rise in Asian nation. the twin pressing desires of waste management and reliable renewable energy supply ar making engaging opportunities for investors and project developers. Early movers United Nations agency have known the correct technologies ar poised to grow during this promising trade. The complexity of navigating through these challenges calls for a clear understanding of the stakeholders and technologies behind the waste-to-energy solutions. Given the need for critical knowledge on the viability of waste to energy projects before venturing into this niche sector, assistance from an advisory and research firm is imperative.

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