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Municipal Wastes An Excellent Source of Renewable Energy

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Abstract

Recently we all observed that India is a highly populated country; moreover, population load is increasing day by day. This is why the country is facing all sorts of problems regarding health, food and environment. In future the situation of India may go to the worst if the policy makers, politicians and implementing agencies are not serious about

the problem. However, the government has initiated in this direction.

We see the three big metros e.g., Delhi, Calcutta and Mumbai are among the 10 most polluted cities in the world. There metro cities are generating thousands of tons of city garbage per day, which ultimately contribute to the pollution and health hazards because these act as reservoirs of pathogens. The situation has continued to be serious over the last 25 years and will definitely deteriorate over the next 20 years. Environmental contamination results in increased health-care costs because many human health problems have an environmental component and according to some experts, the health-care system is already failing. In addition, the loss of biodiversity resulting from degradation of environmental health threatens multibillion dollar global industries such as agriculture, biotechnology, pharmaceuticals and nature tourism. Recent emphasis on sustainable development has focused global attention on the need to adopt environment-friendly industrial approaches, not only to maintain the Earth's life-support systems, but to ensure the future of natural resources and the economies that they support.

Varanasi is a religious city where millions of pilgrims and devotees visit the city and temples. Today's situation in the city is different from what it was about 30 years ago.

Today the city is more polluted than the earlier and is facing the problem of municipal-waste disposal. The new problems can be managed by adopting new scientific technologies, a few of them have been discussed in this paper.

From Municipal Waste To Renewable Energy

It has been found that on an average a person produces almost one ton of waste per year. These wastes are thrown nearby around the city which impart foul smell and pollute the environment. If the waste materials are thrown as such they are subjected to microbial decomposition and generate greenhouse gasses which pollute the environment. Municipal waste is a renewable energy source that shows great promise, and all waste to energy facilities follow almost the same procedures when the waste is first received. Hence, these wastes can be collected and deposited in the municipal landfills. First, the waste is sorted, with recyclable materials being set aside. Even tires and many plastics can be turned into energy but metal cans and other items that can be reused are removed and set aside. At this point, a waste to energy facility that burns the waste will put the materials into the incinerator to burn, so the released energy can be captured in the form of steam. This steam is then used to create electricity.

The landfill gas is a renewable energy that can be collected and processed to provide earth friendly energy.

Steps of processes that use municipal wastes e.g. garbage, sewage, unusable crop and other waste products to generate energy efficiently, cleanly, and cost-effectively. Overall efficiency of converting waste to energy while neutralizing any toxicity might reside in the wastes. With input from knowledgeable people worldwide the processes are the most reliable and helpful place to find solutions to waste problems, from home to industry to large cities.

Converting Municipal Wastes

Municipal waste to energy is a fantastic way to turn the garbage we discard into a renewable energy source that can help heat and power our homes. Municipal solid waste, also called MSW, can be a big renewable energy source that has other environmental benefits as well. When our garbage is turned into municipal waste energy, the benefits are numerous. There is less garbage to clutter and fill our landfills, so that fewer landfills are needed and less trash is thrown out. Municipal waste to energy programs also lessen the demand for oil and other fossil fuels, because the energy converted from the MSW is used instead of oir or other fossil fuels. There are already many municipal wastes to energy facilities located in different parts of the country, and the state of Gujarat generates enough energy from waste to energy facilities to power hundreds of thousands of homes each year.

Steps Of Municipal Waste Collections And Utilization

(Source: FIRM GREEN ™)

1. The average person produces almost one ton of waste per year.
2. Most of this waste is collected and deposited in a municipal landfill.
3. Over time, waste generates landfill gas which contains greenhouse gasses and chemicals that contribute to water and air pollution.
4. Landfill gas is a renewable energy that can be collected and processed to provide earth friendly energy.
5. Your community wins by gaining cleaner air and water, more jobs, and a local source of renewable energy.

Municipal waste to energy facilities operate in one of two ways. These facilities can burn the MSW and use the energy released to create heat and steam, which can be converted to electricity. The second way to convert waste to energy is by collecting the methane gas that is released when MSW decomposes. For every ton of municipal waste that is converted into energy, there is one barrel less of oil or about a quarter of a ton of coal that is not needed. In America alone, even with the waste to energy facilities that are already in operation, almost three hundred million tons of municipal waste is sent to the landfills in the country every year. This means that there is an enormous potential to increase the

municipal waste energy substantially. If all municipal solid waste was converted into energy instead of simply discarded, we could end up reducing our dependence on oil and coal by at least three or four percent, which translates into hundreds of thousands of barrels of oil and thousands of tons of coal.

The most efficient and effective way to convert municipal waste to energy is to use landfills created for this purpose. These landfills are designed to maximize the production and recovery of the methane gas that is created by decomposing waste in the landfill. Methane gas can be dangerous when it builds up, and some landfills will simply burn off the gas safely, to remove it and keep it from building to dangerous levels. In a waste to energy landfill however, this gas is collected, purified, and then either used or sold to utilities and other businesses. These landfills are designed to make it easier to recover the gas, and encourages the municipal waste to decompose more quickly, producing more methane gas as a result.

Municipal waste is an alternative energy source that is renewable, sustainable, and eco-friendly, and this renewable energy source may be the answer to an energy crisis. Your garbage leaves your home as trash and comes back in the form of electricity, while protecting the environment and eliminating the need for oil and other fossil fuels. Metals are removed before municipal waste is converted to energy, and

this means mining for metals will be reduced because of recycling and lower demand.

Bioremediation: Avery Useful Process

Increases in environmental contamination lead to a progressive deterioration of environmental quality. This condition challenges our global society to find effective measures of remediation to reverse the negative conditions that severely threaten human and environmental health. Bioremediation generally utilizes microbes (bacteria, fungi, yeast, and algae), although higher plants are used in some applications. New bioremediation approaches are emerging based on advances in molecular biology and process engineering. Bioremediation continues to be the favored approach for processing biological wastes and avoiding microbial pathogenesis. Bioremediation may also play an increasing role in concentrating metals and radioactive materials to avoid toxicity or to recover metals for reuse. Microbes can biodegrade organic chemicals; purposeful enhancement of this natural process can aid in pollutant degradation and waste-site cleanup operations. Recently developed rapid-screening assays can identify organisms capable of degrading specific wastes and new gene-probe methods can ascertain their abundance at specific sites. New tools and techniques for use of bioremediation in situ, in biofilters, and in bioreactors are contributing to the rapid

growth of this field. Bioremediation has already proven itself to be a cost-effective and beneficial addition to chemical and physical methods of managing wastes and environmental pollutants. We anticipate that it will play an increasingly important role as a result of new and emerging techniques and processes.

The increased need for remediation of diverse classes of waste and waste sites has created a demand for improved remediation techniques and for techniques that are applicable to a wider variety of cases. As an emerging technology, bioremediation is poised for rapid development. A second motivation for bioremediation is the dramatic increase in the cost of traditional waste treatment methods, especially bulk disposal by incineration or landfill. Bioremediation is, in many situations, a more cost-effective approach than containment or treatment by traditional chemical, physical, or thermal processes. For complex mixtures of waste, bio degradative treatment offers a typical savings of 60 to 90% over landfill disposal costs. Accurate financial comparisons between waste treatment techniques require analysis of specific processes and specific waste compositions. Whether the method is biological or nonbiological, the possibility of incomplete remediation exists. Toxic by-products or residues of primary treatment (incinerator fly ash, chemical sludge, spent filters and scrubbers, etc.) may themselves be subject to a final disposal step. Such costs must be included in

comparisons. Since bioremediation can ideally destroy organic wastes without creating adverse residues, such considerations may favor bioremediation over nonbiological alternatives.

Bioremediation Of Municipal Wastes Through Vermi-Composting

Earthworms have been regarded as farmer's friends since the time immemorial because they turn down the soil and make it agriculturally more nutrient-rich and more fertile. The cities and/or religious cities which are generating huge amount of city garbage in various forms such as house generated solid wastes, dona and pattal from dharamshalas and small sweatshops, flower and coconut wastes from temples, paper wastes from mills, etc. can be utilized through earthworms. This method of treatment is called vermin-composting. For decomposition of 1 kg of solid waste, a similar amount of earthworms is required. Some of the cities in India like Shanti Kunj (Haridwar) and municipal boards have adopted this technique of bioremediation of solid wastes. The vermicompost can be utilized in gardens, kitchen gardens or agricultural fields.

Syngas

Syngas is created via a thermo-chemical conversion. Biomass is converted to a synthetic gas called Syngas, which can be used in place of natural gas or changed to make

biofuel. It can also be used with turbines to produce electricity. Syngas is a synthetic gas mixture that is made up of carbon monoxide, hydrogen, and carbon dioxide. It is produced in a process called gasification, usually. Gasification can be conducted using coal and it can convert waste into Syngas. It can also be done using steam reforming to create hydrogen.

The process of gasification can be used to change any matter that contains carbon into a synthetic gas. This gas can then be used to manufacture electricity or steam, or used as a building block to manufacture more complex products in refining and petrochemical industries. Materials used for gasification are materials that would be considered waste and would otherwise be discarded. A feedstock is constructed of waste materials and is put into the gasifier. This is an oxygen-starved environment, so when the feedstock is added, the end result is steam and oxygen at an elevated temperature and oxygen level. This process creates Syngas, which is an 85 percent mix of carbon monoxide and hydrogen. It also contains carbon dioxide and methane in smaller amounts. Producing Syngas usually means turning up the heat from 1,200 to more than 2,500 degrees Fahrenheit.

If the Syngas is going to be used to produce electricity, steam reforming would be the thermochemical reaction used. This may also be called high temperature

pyrolysis. In this process, the biomass is heated to temperatures that reach between 750 to more than 1,500 degrees Fahrenheit. This is done in an oxygen-starved reactor. In a method called fast pyrolysis, the time the biomass is heated is limited and the temperature is kept close to a 1,000 to 1,100 degree range.

There are two different ways that heating can be done; through indirect heating and direct heating. With indirect heating, a number of methods are used that result in indirect heat transfer and can include alloy heat exchangers and hot sand circulation, among others. Direct heating is done by adding a small amount of oxygen to the reactor. If a gas is composed of more than 90 percent oxygen, the Syngas produced will be extremely rich with hydrogen and carbon monoxide.

Syngas is a synthetic gas that is more environmentally friendly than fossil fuels. These gasses burn cleaner and have much fewer harmful emissions than greenhouse gasses and particulates. Syngas has the ability to replace natural gas and to provide basic building blocks for all the chemicals and products the petrochemical industry generates currently. Syngas is just one of the many alternative renewable energy sources that are being locked at with regard to many of the energy and fossil fuel issues of today. This fuel burns much cleaner and reduces air pollution.

It is renewable and does not depend on fossil fuels, and Syngas may be one of the alternative energy sources that will end U.S. dependence on foreign oil and other resources. Syngas can be produced domestically and the production of plants to produce these alternative energy sources would help local economies. They would generate jobs, revenue, and growth for the areas where the plants are built. By providing cleaner, more efficient energy sources, Syngas can be one component in a combination of energy sources that cause fossil fuels like oil and natural gas to become obsolete.

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