GENERATION OF ELECTRICITY BY USING WASTE MATERIAL

M. Manikanta Swamy[1]

[1] *HSE Officer, HSE Department, HEISCO, Kuwait*

ABSTRACT

In recent years, an increasing concern of environmental issues of emissions, in particular global warming and the limitations of energy resources has resulted in extensive research into novel technologies of generating electrical Power. Thermoelectric power generators have emerged as a promising unconventional green technology due to their divergent Advantages Thermoelectric power generation offer a potential application in the direct conversion of waste-heat energy into electrical power where it is unnecessary to consider the cost of the thermal energy input. The application of this Alternative green technology in converting waste-heat energy unswervingly into electrical power can also improve the overall Efficiencies of energy conversion systems in this paper, background on the basic concepts of thermoelectric power Generation with waste material, their importance and relevant .this technology is also helpful to economically improvement of country we hope this technology creating the green environmental world.

Keyword ***novel- innovative, emerged-Developed, unconventional-progressive, unswervingly –reliably,***

1. INTRODUCTION

Some cities, primarily in the northeastern and mid-Atlantic U.S., burn part of their municipal solid wastes. Hemmed in by major population centers, landfill space there is at a premium, so burning wastes to reduce their volume and weight makes sense. Combustion reduces the volume of material by about 90 percent and its weight by 75 percent. The heat generated by burning wastes has other uses, as well, as it can be used directly for heating, to produce steam or to generate electricity. In Texas, municipal waste combustion facilities have had little to no economic impact on the state as a whole. Texas had two permitted waste incinerators in 2006, and one waste-to-energy facility in Carthage. The Carthage plant is now owned by a private company that uses the facility to incinerate medical waste. Combustion reduces the volume of solid waste material by about 90 percent and its weight by 75 percent.

1.1 History:

In 1885, the U.S. Army built the nation's first garbage incinerator on Governor's Island in New York City harbor. Also in 1885, Allegheny, Pennsylvania built the first municipal incinerator. As their populations increased, many cities turned to incinerators as a convenient way to dispose of wastes. These incineration facilities usually were located within city limits because transporting garbage to distant locations was impractical. By the end of the 1930s, an estimated 700 incinerators were in use across the nation. This number declined to about 265 by 1966, due to air emissions problems and other limitations of the technology. In addition, the popularity of landfills increased In the 1970s, the Arab oil embargo and increasing energy prices encouraged the development of waste combustion. The U.S. Navy, for instance, built waste-to-energy plants at two Virginia naval stations, one of which is still in use. Federal laws and policies aided the development of the waste-to-energy industry. The heat generated by burning waste can be used directly for heating; to produce steam; or to produce electricity

Fig -1: Name of the figure

2. Economic impact

Municipal waste combustion facilities in Texas have had little economic impact on the state as a whole. Texas sole permitted waste-to-energy facility does not produce electricity. At this time, the Sharps Environmental Service Solid Waste Incineration Facility has the capability of producing steam for sale, but it is currently operating the facility only as an incinerator. A 50 MW waste-to-energy plant in Polk County, Florida, has an estimated $6 million annual regional economic impact, according to its operator, Wheel aerator Ridge Energy. A similarly-sized plant in Texas would have comparable economic impact.

2.1 PRODUCTION:

Waste-to-energy facilities tend to be constructed near the landfills of large urban centers. A few conveniences are modular units, smaller plants built off-site and transported to wherever they are needed. Waste-to-energy plants generate electricity by burning municipal wastes in large furnaces to produce steam, which in turn drives a steam turbine to generate electricity. On average, one ton of waste produces 525 kilowatt-hours (kWh) of electricity. This is equivalent to the energy produced by a quarter-ton of coal or one barrel of oil. One type of waste-to-energy plant is called a mass burn facility .These facilities use solid waste directly off garbage trucks, without shredding or processing the materials. The solid waste is then fired in large furnaces to produce steam, which turns a steam turbine to generate electricity. Less than a fifth of the U.S. municipal solid waste incinerators recover glass, metals and other recyclable materials and then shred the combustible materials before firing. This type of plant is called a refuse-derived fuel (RDF) plant. Sometimes, refuse-derived fuel is prepared at one facility and then transported to another for burning. The shredded waste also may be added as a fuel to boilers that burn fossil fuels. Mass burn and RDF plants are the most common facilities in use today. A new technology called thermal gasification, however, changes waste into synthesis gas, a mixture of hydrogen and carbon monoxide. Contaminants are removed from this gas, which can then be burned as fuel. .A typical waste-to-energy plant generates about 500 to 600 kWh per ton of waste.

Fig -2: waste to electricity production plant system

2.2 STORAGE AND AVAILABILITY:

The energy or hot gas produced by waste-to-energy plants is not stored. It is used to produce energy, either to sell to an electric company or business or to produce steam for other purposes. The nation's 87 waste-to-energy facilities are mostly located in the Northeast, but 25 states have at least one. Their generating capacity is a total of 2,720 megawatts of power, enough electricity to power all the homes in Maine, New Hampshire, Vermont, Rhode Island and most of Massachusetts. They can process 28.7 million tons of waste each year. Most sites burn all types of solid waste, but some burn material separated from the main waste stream, such as tires, wood or paper. According to a Columbia University survey published in *Bio Cycle* magazine, the U.S. generated about 388 million tons of municipal solid waste in 2004. Of this amount, about 28.5 percent was recycled and composted; about 7.4 percent was burned in waste-to-energy plants; and the majority, 64.1 percent, was put in landfills The U.S. Environmental Protection Agency (EPA), using a different methodology, estimates that the U.S. generated 251.3 million tons of garbage in 2006. Of this amount, 81.8 million tons (32.5 percent) were recycled and composted; and 31.4 million tons (12.5 percent) were burned for energy production. The remaining 138.2 million tons (55 percent) were placed in landfills

3. RENEWABLE RESOURCE:

Should waste-to-energy be regarded an renewable source of energy? Fifteen states have categorized waste-to-energy as a renewable resource in their renewable portfolio standards and some federal laws have categorized it as a renewable resource. On the other hand, some federal and state tax advantages given to other renewable resources are not available to waste-to-energy facilities. In Texas, some consumer groups have opposed including waste-to-energy in Texas's renewable energy goals

3.1 ENVIRONMENTAL IMPACT:

Burning solid waste produces nitrogen oxides and sulfur dioxide as well as trace amounts of toxic pollutants such as mercury compounds and dioxins. The nature of the waste burned affects the composition of its emissions. If batteries or other materials containing heavy metals are burned, particularly toxic materials can be released into the air. Some of these materials, such as dioxins, furans and metals, do not degrade quickly when released, and may be deposited on plants and in water. Animals and fish may absorb them, and humans may be exposed if they eat the contaminated animals or fish. Particulate matter, hydrogen chloride, carbon monoxide and nitrogen oxides also can be released into the air and absorbed into the environment. Waste-to-energy power plants use water in boilers and in cooling. When this water is discharged, its higher temperature and pollutants it contains can harm aquatic life and reduce water quality. Scrubbers – devices that use a liquid spray to neutralize acid gases – and filters to remove particles are used to treat the emissions created when solid waste is burned. Ashes representing about 25 percent of the weight of the original combustible material are generated when waste is burned. Metals must be removed from this ash, and the ash must be tested to ensure that it meets environmental standards before it is recycled for use in roadway construction or placed in a landfill. Ash may be used as daily cover at landfills, but its disposal still represents a considerable operational cost for most waste-burning facilities Federal and state pollution laws regulate waste-to-energy power plants. As mentioned previously, EPA ordered waste-to-energy facilities to reduce their emissions of dioxin, mercury, lead, cadmium, hydrochloric acid and particulates significantly. These facilities are also regulated under Texas' environmental pollution laws in the Health and Safety Code, which establishes air quality and environmental standards to protect public health and the environment. *The primary advantage of waste-to-energy plants is that they consume wastes from highly populated urban areas, relieving the burden on landfills*

Fig -3 Environmental Impact

4. CONCLUSIONS

The potential pollution problems of waste-to-energy facilities involve perceptions as well as realities. The public is likely to perceive these facilities as more polluting than other types of energy. Any new waste-to-energy plant would require zoning, air and water permits, and many communities might reject such a proposal on the basis of air pollution, noise or odors. Many urban areas in Texas already have air pollution problems, and a new waste-to-energy facility could add to them. Yet, new waste-to-energy plants must be located near large cities, because they require large amounts of waste, and the cost of transporting waste from remote locations would be prohibitive. Also, increases in recycling could affect the financial viability of waste-to-energy facilities, which depend upon dumping fees from users. In all, the outlook for waste-to energy plants in Texas is challenging. The expense of building plants, the availability and lower costs of landfill space, air pollution problems and other issues pose considerable obstacles we hope this technology creating green environment

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