Incinerators - 1974 Best Sellers

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With the decline in the use of incinerators for some years sanitary landfills have enjoyed the undeserved status of being THE answer to America's solid waste problems. Europeans have not been so naive. They do not have space for landfills and so they have more thoughtfully and realistically approached the problem. They have burned their waste on stokers of various designs or in separate sections of the furnace from which the gases from both pulverized coal and solid waste mix. In either case they have generated steam for industrial or electric power generation.

In America landfills were economical and were not objectionable from the standpoint of pollution regulations. We disposed of garbage in our bags or cans and a truck hauled it away. We never saw, heard, or smelt it again. But others did. Those who lived near a landfill site soon decided they did not want a dump next to them and had that "unlimited acres" closed. The towns, cities, and counties had to look elsewhere for a suitable disposal site. The price per square foot of available, useable land for landfills increased. Sites have become scarce with wetlands and "natural historical" areas suddenly replacing the name for the bug-infested marsh that was an eyesore to everyone ten years ago. Therefore, the economic advantage of even sanitary landfills is disappearing rapidly.

The idea of the recycling of the valuable scarce materials found in solid waste is becoming important more and more everyday to some manufacturers. But those who mine and sell their virgin ore do not like this idea and have Congress make high tarriffs on cars hauling recycled materials. Increased prices will compete with this situation eventually. Solid waste is becoming valuable in a number of ways. After the metals and non-metals of value are removed, most of the remaining solid waste is paper, plastic, leaves, grass, wood and packing materials. All these burn and even with the normal water which is also present this waste has 5000-6000 Btu per pound of energy which can be recovered on burning. Some are talking of passing the waste through a chemical process system and producing gas, oil and other chemicals. These procedures are possible but expensive.

One stage separation of metal from solid waste into various constituents is becoming feasible and possible. Now two-stage separation is being studied and has been found necessary because the glass left with one stage separation is wearing the conveyor pipes too rapidly. The combustible material which is left is 1½ in. x 1½ in. or 2 in. x 2 in. pieces of solid waste, mostly paper. It is sold to utilities as an auxiliary fuel for coal or oil. Solid waste is to be burned in the 10-20 percent range with 80-90% pulverized coal or oil.

In July, 1973 many former users of incinerators were told that their old incinerator did not pass EPA and State emission regulations. The incinerators were closed. Some officials were in shock. They never thought it would happen. Others waited for it to happen. Now they wonder what to do. Others have now finally commenced to use the landfill sites which they owned previously until they run out of space. These people were also in shock when they found out that their landfill did not pass the State inspection as a landfill site. Also, their method of filling the disposal area did not pass inspection. Then, the price of a landfill area really increases! For any area so design-
ated by a town council, the neighbors object. Then what does the town council do?

You and I know that there are incinerators which if they had been properly equipped with suitable burning devices, pollution emission eliminators and refuse removal means, could have passed EPA, State and local inspections and almost eliminated the solid waste problems. The ashes from the incinerator form only a small percentage volume or weight of the original solid waste. This type refuse would not fill a given landfill area for years. Also, there would be no biological deterioration problems.

The question is who pays for the system? Does the Federal Government because of EPA regulations? Does the State pay because of State Pollution Control requirements? Must the Local Government pay because it is local solid waste that must be burned? Must you or I pay and how much shall the cost be?

Certainly you can see by now that the group that comes up with the best answer will have a best seller. Many states, cities, counties and towns are now shopping for a successful and economical way to dispose of their garbage, as it is so often called, and at which everyone turns up their nose. They do not want to have to deal with it in their plants.

Connecticut has offered to take the total solid waste from all its cities, towns and counties at $10/ton cost to the local group. The waste would be separated for recycle material. They are even investigating the possibility of making oil and gas from solid waste. Connecticut will sell metal, oil, gas, and shredded refuse to anyone who will buy it and then pay the local government their share if there is a profit. This is a huge undertaking for a state so densely populated but time will tell if the venture is successful. Massachusetts is starting a similar project. Nashville, Tennessee and a number of other cities are starting downtown central heating and air conditioning systems in new rebuilt urban areas. They will use solid waste as an auxiliary fuel in steam generating incinerators.

The city of St. Louis, Missouri and the Union Electric Company with EPA Grants and company funds are recycling metals and burning shredded paper after a two-stage separation in a Combustion Engineering pulverized-coal-fired boiler to study the feasibility and effect on the boiler metal of chlorine instead of sulphur in the flue gas. They are burning 10% shredded solid waste in the pulverized-coal flame. The refuse is 50% paper, and possibly 15% water.

There has been talk of a possible paper shortage. If EPA says paper must be recycled this will seriously effect the combustion of the shredded product which remains. The St. Louis tests will have to be run all over again to revalue the effect on the boiler tubes.

There is also the substantial deterioration regulation. Depending on whichever plan is selected, and whatever Congress does to change the Clean Air Act, this will affect the ease of securing a permit for a solid waste burning unit approved to operate.

If all these obstacles are overcome, then the economy of how much who will pay for the solid waste still remains. Naturally, all the collectors want to sell garbage for $X/ton and all buyers want to be paid $Y/ton to burn it!

Seriously, if the utility has to modify its boiler to burn the shredded waste it will have to build a receiving house and bin, conveyors, feeders, and silos or storage bins which are closed and pressurized and designed for minimum storage. The deeper refuse is packed, the denser it becomes and the harder it is to loosen. It takes auxiliary power to do this. A silo with 1500-ton (three day) capacity for a 100 MW plant is 80 ft. in diameter and 60 ft. tall. Foundations cost money and so do silos. They may cost $500,000 or more. Fans, conveyors, piping, piping support, boiler modification—all these cost money, too. If one modifies an existing 100MW unit to burn 1000 ton per day it may cost $2,000,000 or more. For 500 tons delivered in five sixteen hour work days per week, you must unload a 20 ton truck at least every 20 minutes. There must be no delays or there is no “cheap” fuel! Then there must be storage for the other two days because if EPA holds a 100 MW unit to 50% capacity and 10% solid waste burning with coal or oil as is now done at St. Louis, then you must operate 24 hours per day, seven days per week to burn 500 to 1,000 tons per day. Utilities have electrical demand rates with peaks when they want to operate at full capacity. They also have low dips in demand when they want to shut down inefficient units. The person who wants their waste burned must pay the penalty for the unit which must operate at 2 a.m. on Saturday and Sunday as well as Tuesday or Wednesday!

It appears that if EPA does not require that old boilers must add dust collectors, flue gas recirculation and burn expensive low sulfur fuels, utilities may be able to pay as much as $2.50/ton for solid waste auxiliary fuel to burn in a modified unit good for 15 years.

Of course, this is the utility cost. The town, city or government agency providing the shredded refuse must spend $3,000,000 to secure the processing equipment where the solid waste is separated into burnable material, magnetic metal and glass and nonmagnetic material. Naturally, the preparer of the materials wants to make at least enough to cover the cost of the separation equipment. He looks at the heating value of the refuse, 5,000 Btu per pound and says the utility should pay $3 per ton or more for his fuel. A number of $250/ton for aluminum
scrap has been mentioned. An added cost is the conveying equipment, trucks or train cars, which either or both the town and the utility must share or bear.

Therefore, it appears that the solid waste fuel supplier and the utility must arrive at an agreeable price to both to make the burning possible.

A complete incinerator with dust collector, auxiliary separation plant etc. at Harrisburg, Pa., in 1969 cost $12,000,000. The Harrisburg unit is designed to sell steam to a nearby user. In 1974 this cost might be $15,600,000. The unit burns 360,000 tons per year. At 15% annual charge this equals approximately 66¢/ton. Say other costs (land, transmission, cooling towers) are 1.00/ton. 360,000 tons refuse with 5000 Btu per pound are equivalent to X barrels of $3.00 oil with HHV of 148,000 Btu/gal. This means $4.70/ton minus the cost 1.66 or $3/ton that a utility can pay for solid waste to burn at a new location suitable for a town collection if there is no walloping cost of operating the unit at 2 a.m. which prohibits economical operating. Otherwise, if the state or town wants the waste burned it pays the price to operate at such odd times. This is agreed on in an original contract. Of course, the municipality can run the plant itself and sell the steam or heating or air conditioning, heated or chilled water as the Nashville Project will do.

One most interesting area which I found in studying the problem would be a natural for solid waste combustion, was that of using the 900°F exhaust from industrial gas turbines. In many cases this hot exhaust is now exhausted to the atmosphere as a loss or into a heat recovery boiler (HRB). Between the turbine and the HRB there are now proposed oil or gas supplementary burners to increase capacity of HRB unit or to increase the superheat temperature from it.

It would be a natural engineering design to include a furnace 20 x 20 ft. x 30 ft. tall between the turbine and the HRB and admit either oil, gas or coal as a main fuel to burn with 10-20% solid refuse in the presence of more than enough 900°F air with sufficient oxygen already available in the gas turbine exhaust. This should really be studied by the incinerator designers and manufacturers as a real saleable unit.

A number of companies are in the pollution-free incinerator business now but the price will be high. We must pay the price for clean air. The day of the incinerator has arrived again!