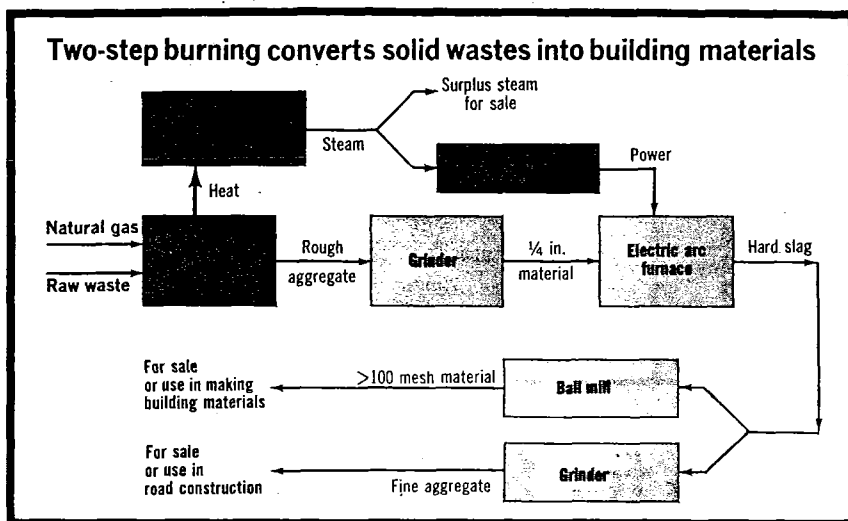




## New twist in waste use

**Philadelphia ponders a sophisticated scheme to turn its incinerator wastes into profitable products**

If Franklin Institute has its way, Philadelphia's garbage disposal plant could become a factory, turning out a variety of products, including some now made in or used by chemical process industries plants.

Starting from the assumption that incineration is the best way to dispose of solid wastes—it reduces their volume by 90%—the institute is using a \$100,000 grant from the Health, Education and Welfare Dept.'s National Air Pollution Control Administration (NAPCA) to study the feasibility of turning the remaining 10% into useful products. What products? Road aggregates for the city's paving jobs and ceramic material for building products are the most obvious (*chart, above*); but Peter Morgan, the institute's project manager, thinks that variations in the process can yield more sophisticated materials.

Use of incineration techniques can bring revenues from sale of by-products. Large municipal incinerators that sell by-product steam have been standbys in Europe for several years, but only one small plant (a 360-tons/day unit at Newport News, Va.) is doing such business in the U.S. However, one of the world's largest incineration plants—1,600 tons/day—is now under construction in Chicago, and it will generate steam for sale.

At Philadelphia, marketing the sur-

plus steam is only one part of the institute's plan. Other features under consideration: production of building and paving materials and a new technique for separating reusable materials as they enter the plant.

**Burning Issue:** Philadelphia now has six incinerators. The three largest are each rated at a refuse-burning capacity of 600 tons/day. Last year the incinerators processed almost 700,000 tons of waste. According to the city's chief sanitation engineer, David Damiano, plastic wastes have burned easily because of the high incinerator temperatures—1,000-1,200 C.

What bothers Damiano is the difficulty in disposing of the 165,000 tons of ash produced annually at the city's incinerators. Dumping sites within the city have been filled in; and plans to use abandoned strip mines have met with opposition from local residents. To haul ash away by railroad would require 3,300 gondola cars each year.

That's where the Franklin Institute's proposal comes in. By turning the waste—both heat and ashes—produced by the incinerators into useful products, the city's garbage disposal could, according to one spokesman, become a "going proposition."

**Heat to Power:** Actually, the idea of using the heat generated in the incineration process to produce steam or

electric power is now fairly common in Europe, especially in Germany.

In fact, I.B.W. Martin Co. (Munich) has designed Chicago's new \$20-million, 1,600-tons/day incinerator, expected to be in operation late this year. Its scheduled steam production: 440,000 lbs./hour, of which 200,000 lbs. will be sold and the remainder used to run plant equipment.

Costs? Still too early to be exact, according to the city's public works commissioner, Milton Pikarsky. But preliminary estimates put plant operating costs at \$5/ton. This is based on capital amortization costs of \$3.40/ton, operating costs of \$3.95/ton and income of \$2.10/ton of solid waste burned from the sale of steam, and 25¢/ton from metal salvage.

**Ambidextrous:** The proposal for Philadelphia envisions steam for sale as well as for generating enough electric power to fire an electric arc furnace. The furnace is the key to conversion of the ash to building materials.

The rough aggregate ash taken from the 1,200 C incinerator is first to be ground to a uniform 1/4-in. size and then subjected to a second firing in a 1,000 C electric arc furnace. (Morgan thinks variations in the two incineration temperatures must be experimented with to see what's best for making different kinds of end-products.)

Hard slag from the second furnace can be ground again to yield road aggregate, either for the city's own use or for sale. Or the hard slag can be ground in a ball mill to less than 100 mesh (extremely fine) size. This brick-brown ceramic powder is said to be suitable as a building material.

Also taken from the first incineration is waste heat. Heat exchangers can convert the heat into steam. And the steam can be converted into electrical energy for the arc furnace.

**Meeting Market:** Can the city sell the road aggregate to be produced in its incinerators? "No trouble at all," reports one local supplier. Use of such aggregate in Philadelphia: 250,000 tons/year.

But the institute has even higher hopes for the fine ceramic powder. In laboratory testing, the material has exhibited high tensile strength (9,000-14,000 psi.) and compressive strength (75,000 psi.). And its density is comparable to that of ceramic bodies. Major constituents: 44% silica, 33% iron oxide, almost 7% alumina. **END**