

Zero Waste Newsletter

January 2010

Last month, Scientific American was looking ahead to new technologies (see the box at the bottom of this page) and included a story about an abortive scheme to destroy everything that gets put into a plasma chamber by turning it into hardly more than bare atoms. Of course they want to use it to destroy that mounting pile of garbage coming from our wasteful society. In my book, **Getting To Zero Waste**, I detail a number of these kinds of crazy schemes for destroying garbage that have surfaced over the last decades. This is not the last one that some otherwise reputable magazine will be featuring, lending its reputation to the promulgation of transitory nonsense, presumably because the editors also suffer from the same popular delusions concerning garbage as everyone else.

Let's take a look at what the assumptions are that might be objected to:

- **Trash:** This is taken to be an elemental absolute. It exists! It is there! Nothing can eliminate that comforting fact. We can even predict a million tons a year in a decade from now.



- **Destroying trash is a social good:** In their eyes, who could argue against this proposition. Revamping the system of production according to Zero Waste principles is not on their radar.
- **Trash contains energy:** Nowhere do they admit that it might contain any other resources, which are being destroyed, such as high function assembly of microchips or the molecular crafting of pharmaceuticals or polymers.

- **Trash contains molecular bonds:** Cool high tech talk sets the stage for embracing cool high tech methods.
- **Destroying trash is the alternative to dumping:** No other alternatives are considered. Dumping is the natural fate of trash which is not otherwise destroyed, and the cost of dumping is the sole economic standard for comparison. The far greater savings accessible through designing to avoid discard are not mentioned.
- **Pilot plants in several states:** Usually invoked to give an appearance of large scale investment and inevitability.
- **Destroying high-function discarded products** to create low function, cheap generic fuels and slags is presented as progress.
- **Between 5 and 8% of our total electrical needs:** The gigantic input of energy for creating a plasma out of tons of matter, always a serious drawback, is conveniently overlooked. I doubt that the most optimistic of energy rich inputs would show a positive energy result. And even though the cost of energy to heat tons of matter to the temperature of the surface of the sun has skyrocketed, somehow we are expected to believe it is now cheap to create this heat.
- **Millions of tons of garbage every day – too important to pass up:** Destroying garbage is a savior for the world, a savior for energy sources and a huge technical advancement. All delivered with a straight face.
- **Georgia Tech Research Agency:** The appearance of intellectual respectability by some persons or group who accept all the above assumptions uncritically in hopes of linking up with investment funding.

In order to better understand what lies behind this latest boondoggle, I went to the InEnTec website and learned:

The PEM™ system uses heating from electrically conducting gas (a plasma) to convert waste feeds to valuable products. PEM™ systems are highly effective in processing a wide variety of waste streams, including hazardous, medical, radioactive, industrial, municipal and tire wastes; transforming them into valuable commercial products including energy (ultra-clean power generation or transportation fuels production, using the syngas) and industrial materials (chemicals from the syngas; roofing tiles, insulating panels, sand-blasting media and other construction-related products from the glass; and recoverable metals). The PEM™ system is environmentally attractive based on its minimal environmental impact and ability to provide near-total destruction of organic materials (providing large volume and weight reduction).

What this tells us is that there is nothing new being trotted out other than the same devices that were discarded every ten years for decades now. What is new though, is that there is a whole new crop of city councilpeople, of county supervisors, of state legislators and bright eyed academics who have forgotten all about the previous plasma boondoggles and can be counted on to vote for bond issues based on tired and failed assumptions about the perpetual creation of garbage. There are also new bebies of hopeful investors who can be counted on to substitute hope for due diligence.

Organic matter is singled out for particular destruction. No recognition is given to the notion that a proper fate for organic matter lies in closing the nutrient cycles of agriculture and soil by the method of composting and recreating fertilizer. So the more this plasma device operates (assuming it would ever be built) the more that synthetic fertilizers intensively consuming natural gas for energy and molecules would need to be synthesized instead. The destruction of organic matter by expensive, high tech methods, is always an energy and soil disaster.

This is just one in a long, long series of treatments of resource destruction and its opposite, conservation, by willowy, enticing siren songs to understanding garbage, managing it, recycling it, destroying it, making cartoons about it and guffawing over it, but always taking its continuous generation for granted. The garbage industry has endless funds to sink into these promotions so long as there is still one naïve legislator left to buy into their promise of destroying “all garbage”.

Beware! A scheme like this may be pitched to your very own legislature as you read this.

The reason for sending out these newsletters is to inform an advanced group of conservation enthusiasts about the promises of redesign along the lines of Zero Waste principles and methods. It is not important, or desirable, or futuristic to envisage new ways to destroy or manage garbage. It is important, and long overdue, to change the design of products and the processes that create them, so that discard never takes place and garbage no longer exists to bedevil this wasteful society.

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Trash is loaded with the energy trapped in its chemical bonds. Plasma gasification, a technology that has been in development for decades, could finally be ready to extract it. In theory, the process is simple. Torches pass an electric current through a gas (often ordinary air) in a chamber to create a superheated plasma – an ionized gas with a temperature upward of 7,000 degrees Celsius, hotter than the surface of the sun. When this occurs naturally we call it lightning, and plasma gasification is literally lightning in a bottle; the plasma's tremendous heat dissociates the molecular bonds of any garbage placed inside the chamber, converting organic compounds into syngas (a combination of carbon monoxide and hydrogen) and trapping everything else in an inert vitreous solid called slag. The syngas can be used as fuel in a turbine to generate electricity. It can also be used to create ethanol, methanol and biodiesel. The slag can be processed into materials suitable for use in construction.

In practice, the gasification idea has been unable to compete economically with traditional municipal waste processing. But the maturing technology has been coming down in cost, while energy prices have been on the rise. Now 'the curves are finally crossing – it's becoming cheaper to take the trash to a plasma plant than to dump it in a landfill' says Louis Circeo, director of plasma research at the Georgia Tech Research Institute. Earlier this summer, garbage disposal giant Waste Management partnered with InEntec, an Oregon based start-up to begin commercializing the latter's plasma gasification processes. And major pilot plants (capable of processing 1000 daily tons of trash or more are under development in Florida, Louisiana and California.

Plasma isn't perfect. The toxic, heavy metals sequestered in slag, pass the Environmental Protection Agency's leachability standards (and have been used in construction for years in Japan and France) but still give pause to communities considering building the plants. And although syngas generated electricity has an undeniably smaller carbon footprint than coal – "For every ton of trash you process with plasma, you reduce the amount of carbon dioxide going into the atmosphere by about two tons" – Circeo says, it is still a net contributor of greenhouse gases.

"It is too good to be true" Circeo admits, but the EPA has estimated that if all the municipal solid waste in the US were processed with plasma to make electricity we could produce between 5 and 8 percent of the total electrical needs – equivalent to about 25 nuclear power plants or all of our current hydropower output. With the US expected to generate about a million tons of garbage every day by 2020, using plasma to reclaim some of that energy could be too important to pass up.

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