

Plasma Arc Waste Treatment



What is it?

Although there are several forms of plasma arc technologies, the process essentially uses electrical energy to heat plasma gases to super hot temperatures to melt and decompose solid materials into molten rock and gases. Solid material is fed into an arc furnace where an electric current is directed through a gas stream creating a thermal plasma field. Temperatures in the furnace can range between 1000 and 15,000 Celsius. The extreme heat vaporizes organic materials. Inorganic materials and metals are melted together into a molten bath which produces lava-like chunks of rock when cooled.

The technology came into use in the 1960s by the U.S. space agency, NASA, which used plasma torches to test heat shields on space crafts. Plasma arc technology has been used in a limited way to attempt to destroy nuclear waste, toxic military waste and hazardous industrial waste. Although there have been attempts to commercialize this technology for use in municipal solid waste management in the U.S., there are no full scale commercial plasma arc facilities operating in the U.S..

What Are the Claims of Proponents?

Proponents claim that plasma arc technology is cleaner and safer than incineration. They claim that because the process is powered by electricity and not combustion, dioxin is not produced. Only gases and molten rock are produced. Air pollution control devices can defuse harmful off gases. The molten rock, called slag, encapsulates hazardous compounds making it leak proof. The gases can be harnessed to make electricity and the slag can be used to make bricks, gravel or asphalt.

What do Critics Say?

Plasma arc technology is still largely a laboratory experiment and is unproven in real-world situations. There are no full-scale municipal solid waste plasma arc facilities in the U.S.. Nor are there independent studies that demonstrate that the technology is safe or cost effective on a commercial scale. A Georgia Institute for Technology report acknowledged that more work needs to be done to better understand what plasma arc technology is capable of doing. The report recommended that a one ton per eight hour day prototype should be designed and serve as a long-term study of its workings and its economics.¹

Critics maintain that plasma arc is merely incineration at higher temperatures. It produces toxic air emissions very similar to incinerators, including dioxin. In the plasma arc process, dioxin will be formed in the smokestacks when chlorine is present, regardless of whether the process is fueled by combustion or electricity. A Greenpeace report reviewing the various technologies for destroying

ESSENTIAL ACTION

PO Box 19405, Washington, D.C. 20036

Tel (+1) 202.387.8030; Fax (+1) 202.234.5176

action@essential.org

www.essential.org/action/waste/

stockpiled toxic chemicals concluded that during the plasma arc process: Dioxins have been identified in process residues. ²

The intense heat from plasma arc will not destroy heavy metals. Heavy metals, such as lead, cadmium, mercury and chromium, will be vaporized. It is very difficult and expensive to trap heavy metals once they are in vapor form. There is no known air pollution device that can monitor toxic metal emissions on a continuous basis. So, heavy metals invariably will be released through the smokestacks endangering the public's health and the environment.

The life-span of the left over slag is uncertain since there have been no studies on how long the slag will keep its structure. Without testing for harmful leaching of heavy metals and other toxics in the slag, knowledge about the public health impact of plasma arc technology is incomplete and inadequate.

Because of the absence of full scale operating facilities, cost projections must be based on small-scale designs which cannot be expected to be reliable. A United Nations review of disposal technologies for obsolete pesticides found that for plasma torch The technology is complex and still very expensive. ³ It is known that because the technology uses a lot of electrical energy, it will be expensive to operate. And given the complexity of the process, it will require high quality operators, adding to its expense.

Multiple studies have shown that up to 80 percent of municipal solid waste is recyclable or compostable. Yet, plasma arc treats all waste the same and destroys recoverable wastes. The potential high cost of plasma arc technology will undermine waste reduction and recycling efforts. The money spent on plasma arc, like money invested in incinerators, will guarantee that community recycling efforts will be tabled.

The argument that gases can be used for electricity makes for good sales promotion, but the reality is that if saving energy is the goal, then more energy can be saved by reusing and recycling objects and materials than can be recovered by plasma arc technology.

1. Plasma Technology for the Treatment of Solid Wastes In Georgia, Georgia Institute of Technology, 1997. p.29.

2. Technical Criteria for the Destruction of Stockpiled Persistent Organic Pollutants, by Pat Costner, presented to the Intergovernmental Forum on Chemical Safety (IFCS) meeting, Yokohama, Japan, December 1998. www.who.int/ifcs/isg3/d98-17b.htm

3. Disposal of Bulk Quantities of Obsolete Pesticides in Developing Countries, United Nations Food and Agriculture Organization, 1996, p.23, www.fao.org/ag/agp/agpp/pesticid/disposal.

ESSENTIAL ACTION

PO Box 19405, Washington, D.C. 20036

Tel (+1) 202.387.8030; Fax (+1) 202.234.5176

action@essential.org

www.essential.org/action/waste/