

## **ADVANCED PLASMA TECHNOLOGIES FOR THE TREATMENT OF WASTE**

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PyroGenesis has developed in collaboration with the US Navy a unique technology for the destruction of waste on board ships. This system converts waste into fine lint which is then fed into a plasma fired eductor. In the eductor, the lint is exposed to the high temperature of the plasma flame (5,000 °C) which instantly converts it into a fuel gas, called syngas, which is comprised mainly of carbon monoxide and hydrogen. The syngas is then combusted in a lightweight combustion chamber. The resulting combustion gases are quenched and cleaned in a venturi scrubber and released to the atmosphere.

Because of the high intensity of the plasma flame and the lightweight construction of the combustion chamber, the whole system is extremely compact, with a one deck design, approximately five times smaller than an incinerator of comparable capacity. The technology has been selected by one of the world's largest cruise lines and is now in operation on one of their cruise ships.

A similar approach is now proposed for a land based system, with the added benefit of producing marketable products from waste: mainly syngas, used as fuel and construction materials. The Plasma Resource Recovery (PRR) system uses a graphite arc furnace combined with the plasma fired eductor to vitrify the inorganic fraction of the waste into an inert slag and the organic fraction into syngas. The syngas is then quenched and cleaned using conventional technologies. This new technology has been demonstrated at the pilot stage (1 tonne per day). The syngas has been shown to be suitable for use as fuel in a gas engine or a gas boiler and the inert slag to meet TCLP (toxicity characteristics leaching procedure) requirements. In addition, the air emissions from the overall system meet the stringent requirements imposed by an urban setting.

The PRR holds many possibilities for communities that want to handle their waste locally in an environmentally friendly and cost effective manner. The PRR system is compact, scalable and highly automated, making it perfectly suitable for relatively low tonnage applications (50 to 200 TPD). The system is also highly flexible, able to treat a wide variety of wastes, including hazardous waste, with no pre-sorting and minimal pre-treatment.