

## USING PLASMA PYROLYSIS VITRIFICATION (PPV) TO ENHANCE INCINERATION WASTE ASH REDUCTION IN IRELAND

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### ABSTRACT

Ireland has been called the Silicon Valley of Europe. Like the Silicon Valley in the U.S. it has a large amount of waste created by the Microchip Industry. Ireland is also an agricultural country. A large amount of bio-waste has been stockpiled in Ireland. This is the result of recent outbreaks/epidemics of animal diseases in the EU. The current growth industry of Ireland is the chemical and pharmaceutical manufacturing industry. Nine of the top ten pharmaceutical companies are manufacturing in Ireland. Wastes from these industries are often toxic and hazardous. They can contain large amounts of combustible organic compounds depending on their source. Since Ireland is an island it has special problems disposing of waste. Waste comes in as products as packaging and it doesn't go out. The emerging solution is Incineration. Municipal Solid Waste (MSW) can contain many forms of metal and chemistry under normal conditions. When a large amount of the primary industry of a region is chemistry based and agricultural based there is the probability of more than usual amount of toxic residue in the refuse. The ash from incineration contains items such as dioxins & heavy metals that are environmental toxins. Using a Plasma Pyrolysis Vitrification (PPV) process the volume of the resultant ash from incineration can be further reduced by as much as 30 to 1. A PPV process has an added advantage of giving an incineration facility the capability of rendering ash safe for reuse as construction material and as a side benefit reclaiming many valuable elemental components of the ash. The PPV plant can be used to destroy waste directly and economically as long as the gate fees are high. One byproduct of incinerator ash smelting/destruction using a PPV process is CO gas, a combustible fuel resource for power generation. Precious metals may also be reclaimed as an alloy material by-product.

### HISTORY

The traditional form of waste management is landfill.

In an island country this is only practical as long as landfill land is available. Permitting for new sites is hard to get and the type of waste being deposited in landfills is changing. When the microchip and pharmaceutical factories arrived in Ireland they brought prosperity. They also changed the kinds of refuse created on the island. These plants produced chemical waste as well as municipal. The chemical waste is treated differently from municipal waste but some of it makes its way to landfill in the form of neutralized waste cakes made up of salts from acid and base neutralization processes and large quantities of powdered silicon and heavy metals. Conventional MSW contains large quantities of carbon compounds i.e. plastics, organic food/garden waste and industrial waste. Hazardous waste such as bio-medical waste is common in all first world countries and is created by all hospitals. Currently in Ireland the problems of hazardous waste disposal, specifically medical waste, has become a national problem. Over 100 illegal waste dumping sites are currently being investigated as of December 2001.<sup>[1]</sup> This may not seem significant but there are only 250 legal landfill sites on the island. The recent outbreaks/epidemics of animal diseases has created mountains of animal parts and carcasses (450,000 tonnes) that are presently being stockpiled.<sup>[2]</sup> Presently there are 10-11 incinerators in the Republic used for pharmaceutical waste primarily, but no municipal waste incinerators.

### PLASMA PYROLYSIS TECHNOLOGY

PPV systems use plasma technology to disintegrate waste. The plasma flame is essentially an arc, created by a cathode and an anode. In order to enhance the flame many techniques are applied to it. "A plasma is a gas which, in addition to electrically neutral species, also contains charged particles such as ions and electrons."<sup>[3]</sup>

PPV technology has been around for a long time. It was used in the middle 80's to clean up the Love Canal NY toxic waste contamination of polychlorinated biphenols