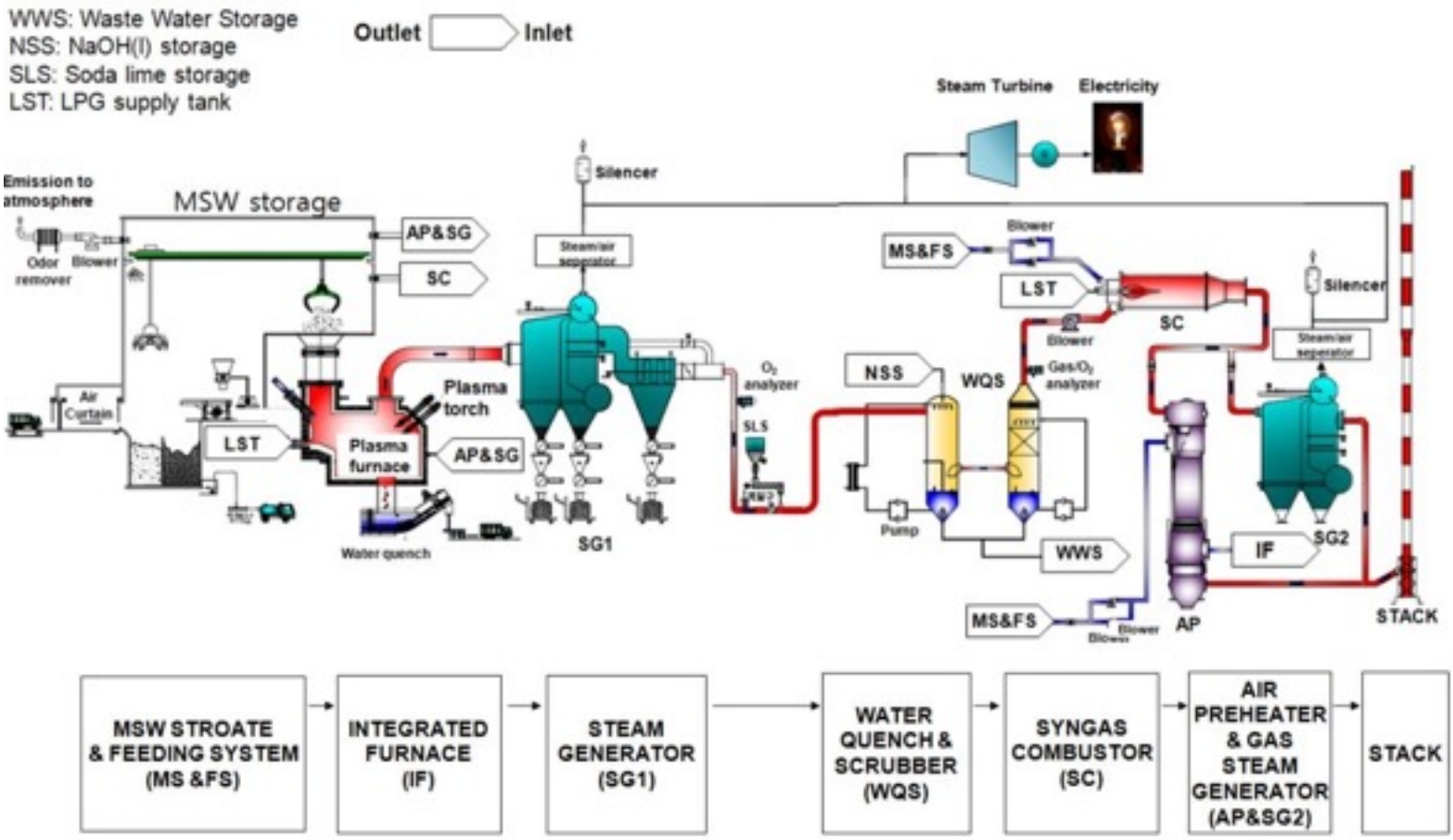

Plasma Gasification is an extreme Thermal Process using Plasma which converts Organic Matter into a Syngas (Synthesis Gas) which is primarily made up of Hydrogen and Carbon Monoxide.

A Plasma Torch powered by an Electric arc, is used to ionize Gas and catalyze Organic matter into Syngas with Slag remaining as a Byproduct. It is used commercially as a form of Waste Treatment and has been tested for the Gasification of Municipal solid Waste, Biomass, Industrial Waste, Hazardous Waste, and solid Hydrocarbons, such as Coal, Oil Sands, Petcoke and Oil Shale.

Small Plasma Torches typically use an inert Gas such as Argon where larger Torches require Nitrogen. The Electrodes vary from Copper or Tungsten to Hafnium or Zirconium, along with various other Alloys. A strong Electric current under high Voltage passes between the two Electrodes as an Electric arc. Pressurized inert Gas is ionized passing through the Plasma created by the arc. The Torch's Temperature ranges from 4,000 to 25,000 °F (2,200 to 13,900 °C). The Temperature of the Plasma reaction determines the Structure of the Plasma and forming Gas.

The Waste is heated, melted and finally vaporized. Only at these extreme conditions can molecular dissociation occur by breaking apart molecular bonds. Complex Molecules are separated into individual Atoms. The resulting elemental Components are in a gaseous Phase (Syngas). Molecular dissociation using Plasma is referred to as "Plasma Pyrolysis.

The feedstock for Plasma Waste Treatment is most often municipal solid Waste, Organic Waste, or both. Feedstocks may also include Biomedical Waste and hazmat Materials. Content and consistency of the Waste directly impacts Performance of a Plasma Facility. Pre-sorting and Recycling useful Material before Gasification provides consistency.

Too much inorganic Material such as Metal and Construction Waste increases Slag Production, which in turn decreases Syngas Production. However, a Benefit is that the Slag itself is chemically inert and safe to handle (certain Materials may affect the content of the Gas Produced, however). Shredding Waste before entering the main Chamber helps to increase Syngas Production. This creates an efficient transfer of Energy which ensures more Materials are broken down.

For improved processing Steam is sometimes added into the Plasma Gasification Process Yields.

Pure highly calorific synthetic Gas consists predominantly of Carbon Monoxide (CO) and Hydrogen (H2). Inorganic compounds in the Waste Stream are not broken down but melted, which includes Glass, Ceramics, and various Metals.

The high Temperature and lack of Oxygen prevents the Formation of many toxic Compounds such as Furans, Dioxins, Nitrogen Oxides, or Sulfur Dioxide in the Flame itself. However, Dioxins are formed during cooling of the Syngas.

Metals resulting from Plasma Pyrolysis can be recovered from the Slag and eventually sold as a commodity. Inert Slag produced from some processes is granulated and can be used in Construction. A Portion of the Syngas produced feeds on-site Turbines, which power the Plasma Torches and thus support the feed System. This is self-sustaining Electric Power Equipment.

Some Plasma Gasification Reactors operate at negative pressure, but all attempt to recover both gaseous and solid Resources.

The main Advantages of Plasma Torch Technologies for Waste Treatment are:

-Clean Destruction of Hazardous Waste.
-Preventing Hazardous Waste from reaching Landfills.
-Some Processes are designed to recover fly Ash, Bottom Ash, and most other Particulates, for 95% or better diversion from Landfills, and no harmful Emissions of toxic Waste.
-Potential Production of vitrified Slag which could be used as Construction Material.
-Processing of Organic Waste into combustible Syngas for Electric Power and thermal Energy.
-Production of value-added Products (Metals) from Slag.
-Safe means to destroy both medical and many Hazardous Wastes.
-Gasification with starved Combustion and rapid quenching of Syngas from elevated Temperatures can avoid the production of Dioxins and Furans that are common to Incinerators
-Air Emissions can be cleaner than Landfills and some Incinerators.