

# Zero-emission Energy Recycling Oxidation System ("ZEROS")

## Introduction to the ZEROS System



Representative example of the "ZEROS" system equipment (Prior Generation shown)

Coal - Oil - Gas - Biomass - Solid Waste - Bio-refinery

Generation of Electricity, Liquid Fuels, Pure Carbon Dioxide and Distilled Water

"Without Emissions"



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The Zero-emission Energy Recycling Oxidation System (ZEROS) is a breakthrough in energy capture. The ZEROS System is a closed cycle thermal oxidation process. There is no smokestack and therefore no emissions. The ZEROS system is not an incinerator. This system processes waste and low energy value fuels, recovers and maximizes energy, produces value-added products and liquid fuels and is classified as "exempt" under current air quality regulations. The ZEROS System has demonstrated 100% destruction and removal efficiency and 0% emissions in the destruction of toxic and non-toxic waste and processing of biomass fuels.

The ZEROS System has been tested on hexachlorobenzene. Additional test results show that chlorine, hydrogen chloride gas, carbon monoxide, reformed dioxins, hydrocarbons and metals were below detectable levels or non-existent after being introduced into the process. The system is capable of disposing of toxic wastes, contaminated solids, liquid wastes stored in metal and plastic containers, asbestos, medical and bio-medical wastes, contaminated sludge, waste fuels and municipal solid wastes and agricultural biomass as well as cleaning contaminated soils in a cost efficient manner.

A major factor in the overall effectiveness of the ZEROS System is its use of pure oxygen in the processing of fuels. The two-chamber process uses oxygen with fuel to produce oxy-fuel gasification in the first chamber, then additional oxygen to complete the oxidation in the second chamber with the total result being carbon dioxide and water with much heat released.

Carbon dioxide (CO<sub>2</sub>) and distilled water are the primary commercial byproducts derived from the ZEROS System. The carbon dioxide can then be liquefied for use in the oil and gas industry or solidified as "dry ice" for cryogenic industrial applications.

Another feature of the ZEROS System is the ability to produce distilled water. The system utilizes waste water solutions as a "quench" for the primary combustion chamber. In this process, the contaminants within the water simply oxidize. The steam created can be used as make up water for scrubbing. Waste heat from the process can power a multi-megawatt power plant or drive a water distillation process and the products sold. Liquid fuels are another product produced by the ZEROS System. Agricultural biomass while being disposed of through the system can be converted to motor fuels using available technology and providing an opportunity to reduce the dependence on imported oil.

The applications for this technology are as numerous as environmental problems in existence today. To quote the Intergovernmental Panel on Climate Change, "Oxy-fuel combustion applied to power generation systems is feasible since no technical barriers have been identified."

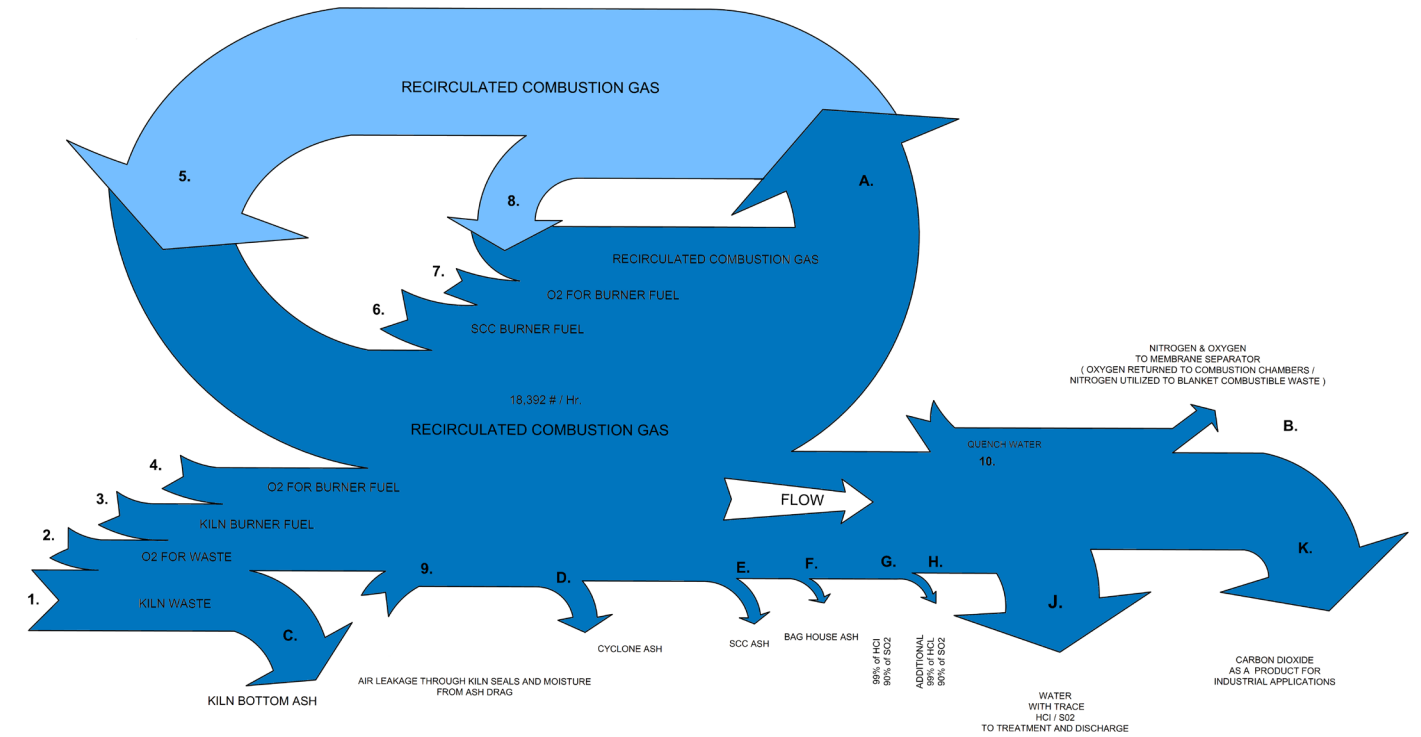
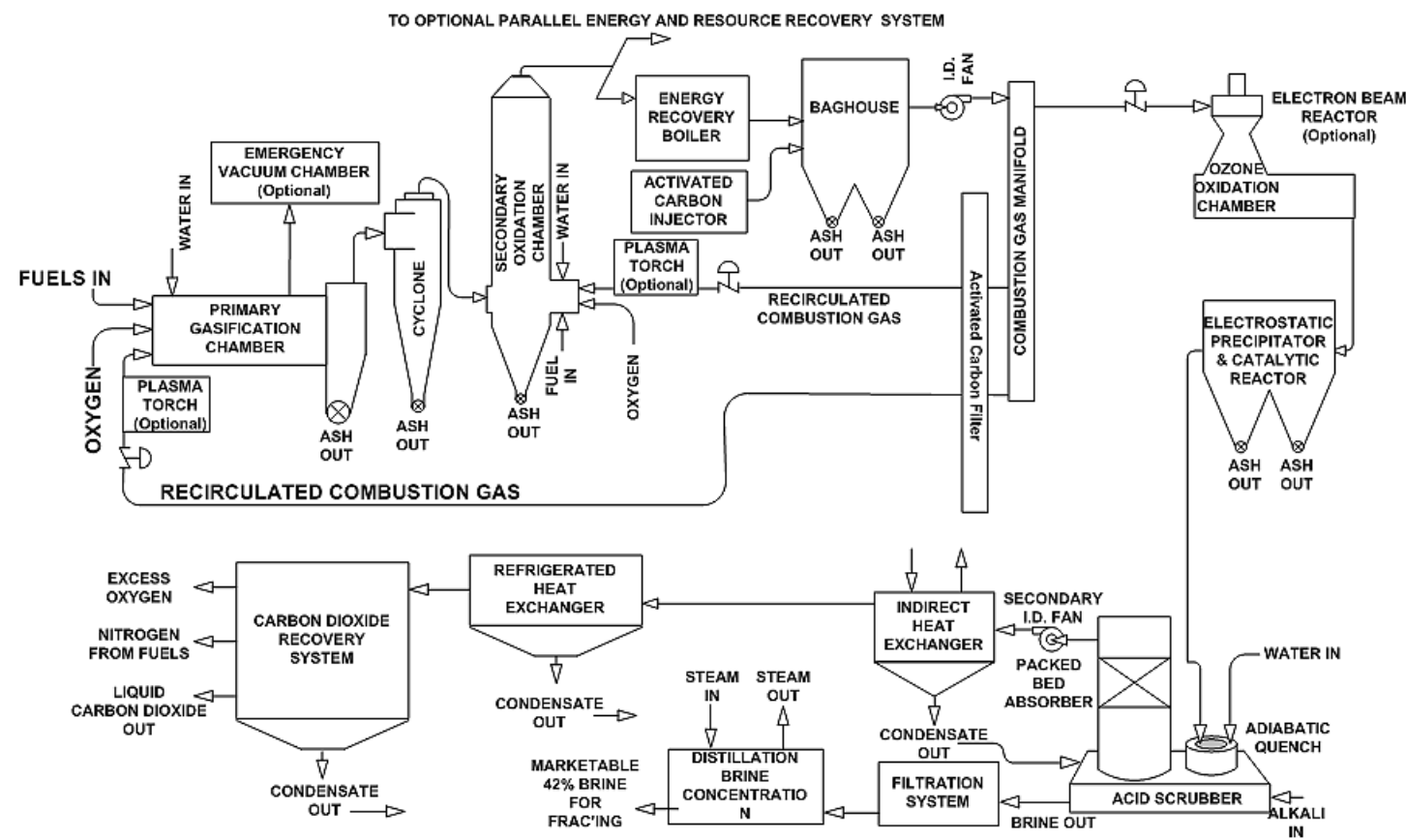
### Environmental Impact Statement for ZEROS

The Zero-emission Energy Recycling Oxidation System is a closed, thermal oxidation process for energy recycling. There are ZERO "smokestack" emissions; therefore the remaining effluents from the process can be easily contained. These products can either be re-introduced into the system process or sold as clean, commercial byproducts. The specific byproducts depend on the nature of the material being processed.



# Schematic of the ZEROS System

## Mass Balance Mass In = Mass Out



### Mass In

1. Kiln Waste
2. Oxygen
3. Primary Burner Fuel
4. Oxygen
5. Recirc Combustion Gas
6. Secondary Fuel
7. Oxygen
8. Recirc Combustion Gas
9. Kiln Air
10. Quench Water

### Mass Out

- A. Recirc Combustion Gas
- B. Nitrogen & Oxygen
- C. Kiln Bottom Ash
- D. Cyclone Ash
- E. SCC Ash
- F. Bag House Ash
- G. 99% of HCl, 99% of SO<sub>2</sub>
- H. Water
- I. Carbon Dioxide as a Product