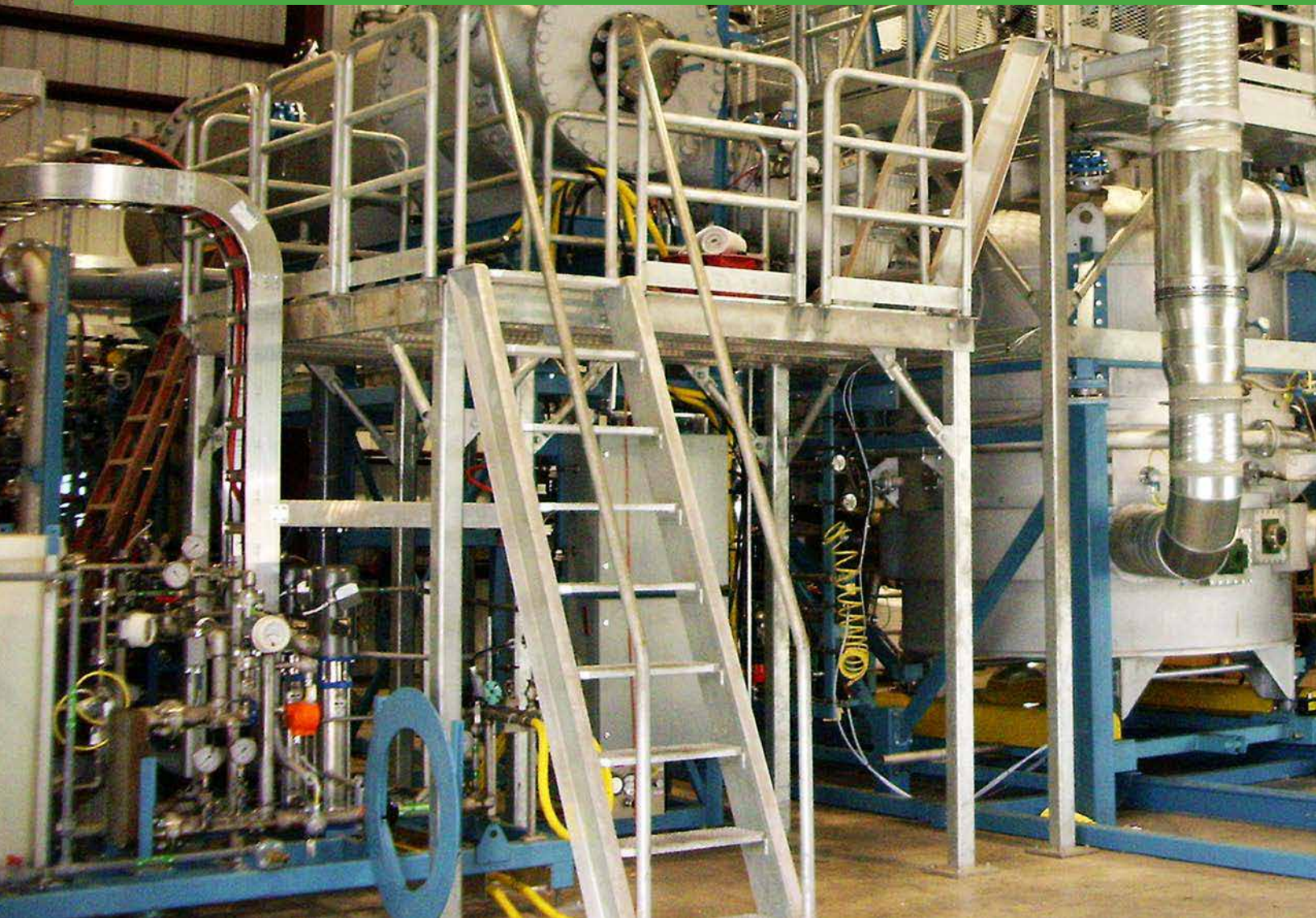


PRRS



Plasma Resource Recovery System

PLASMA WASTE-TO-ENERGY SOLUTIONS FOR
MUNICIPAL, HAZARDOUS, HOSPITAL & INDUSTRIAL WASTE



INNOVATION

IN SUSTAINABLE DEVELOPMENT

Responsible waste management is a growing concern worldwide. While landfilling is becoming increasingly difficult due to legislation or lack of space, the global community is moving towards resource recovery. This is why at PyroGenesis, we are very proud to offer comprehensive solutions to reduce pollution and to promote sustainable development.

Our technologies offer practical and effective solutions, adaptable to a wide range of wastes, using approaches that are safe, easy to use, and flexible. Our vision of being innovators in the waste-to-energy arena became a reality in 2010 when PyroGenesis Canada delivered a transportable, turnkey 10.5 tonnes per day PRRS located on a U.S. Air Force base in Florida. No other company in the world can boast of having a plasma gasification system accepted in a commercial setting by such a discerning customer, placing PyroGenesis at the forefront of this industry.

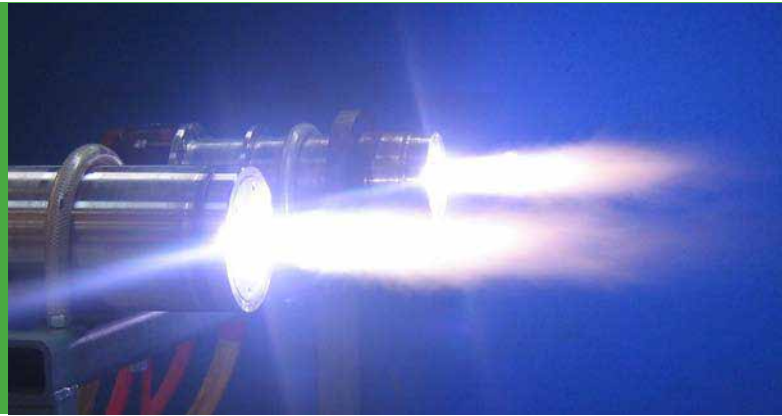
Unique and ahead of its time, the PRRS has the ability to be transportable and operate in all types of environments such as municipalities, hospitals, airports, industries, forward operating bases, or even in emergency situations (ex. petroleum, oil or chemicals spills). With the patented technology for gasification and vitrification, the PRRS is environmentally sound and a net energy producer. The system converts unsorted waste into syngas, while the inorganic portion is transformed into a vitrified, reusable slag resembling glass, thus immobilizing potentially toxic components contained in hazardous wastes.



SOUND WASTE MANAGEMENT USING PLASMA

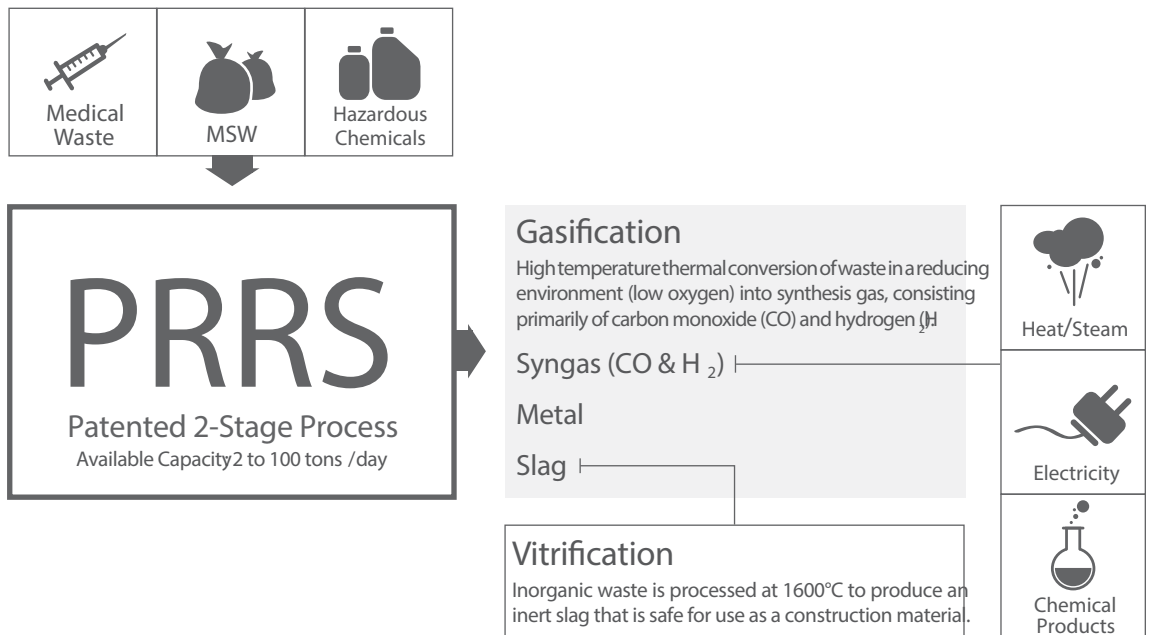
WHAT IS PLASMA?

Plasma is considered the fourth state of matter and consists of an ionized gas that conducts electricity. The temperature of thermal plasma, as found in a plasma torch, can easily exceed 10,000°C. For example, the sun and lightning are plasmas. Due to the high temperatures and high thermal capacities involved, plasma can dissociate virtually all materials, including waste, into the simplest elemental form to produce clean energy with no residual materials.



WHAT ARE THE MAIN STEPS IN THE PROCESS?

With the PRRS, it is possible to generate energy and useful materials, while responsibly managing waste and the environment, including the reduction of greenhouse gases.



COMPACT, EFFICIENT, AND ENVIRONMENTALLY FRIENDLY SYSTEM



Since the PRRS is a much more compact unit as compared to traditional waste treatment or disposal, the process offers outstanding versatility. The syngas produced by the PRRS can be used to produce electricity to power the system, steam or even biofuels. The air emissions from the PRRS complies with all current regulations, offering an environmentally friendly solution to landfill and incineration while also producing energy and construction materials.

Capacity	2 to 100 tonnes/day
Types of waste treated	Hazardous, biomedical, municipal, organic materials, low-level radioactive wastes, biomass, plastics, municipal sludge, industrial waste (all types)
Operation	Fully automated and easy to operate
Products of the process (different options available)	Syngas, steam, electricity, biofuels, hot water, slag aggregate, metal ingots
Net energy produced	Electricity from an internal combustion engine powered by clean syngas
Air emissions	No emissions of dioxins or furans, acid gases, dust or volatile heavy metals – Full compliance with global legislation
Options	Transportable system, bolt-on to an existing treatment plant, power generation with an internal combustion engine, boiler-turbine or dual-fuel engine, production of steam and hot water
Carbon credits	Yes (greenhouse gas reduction)

The PRRS is an efficient plasma gasification system that consists of four primary steps which allow for the elimination of all types of toxic compounds in the waste without emitting bio-accumulating pollutants to our environment.

UNIQUE, PATENTED APPROACH AT PYROGENESIS

01 FEEDING SYSTEM

The PRRS Feeding System can handle almost all types of liquid and solid wastes without presorting. The process can treat hazardous waste, biomedical, municipal and organic materials either from conveyed, shredded waste, or via a box feeder to the plasma furnace for gasification and vitrification.



02 GASIFICATION AND VITRIFICATION

The patented, two stage thermal section of the process begins with initially gasifying and vitrifying the waste in the patented plasma furnace. Plasma arcs, using graphite electrodes, transform the combustible waste into syngas, a fuel source to generate electricity. The furnace recovers the inorganic fraction of waste as vitrified, glassy slag which can be used as construction material, as well as metal ingots.



03 CLEAN SYNGAS PRODUCTION

The 2nd stage polishes the soot & tar-laden gas exiting the furnace with our Air Plasma Fired Eductor and Secondary Gasification Chamber. This patented, 2-stage process, followed by a quench, transforms the dirty gas into a clean and useful syngas, while preventing the formation of dioxins and furans. The remaining gas cleaning unit operations are designed to remove primarily acid gases, volatile metals and particulates.



04 ELECTRICITY

The clean syngas can be used to generate electricity in an internal combustion engine. The system also allows for the production of heat in a cogeneration system. Moreover, the production of biofuels and chemicals are also potential uses for the syngas.



The energy produced can be recovered by various means depending on your needs and your technological goals

THE ADVANTAGES OF PPRS

EASY TO OPERATE

- Minimal sorting required
- Fully automated system
- Onsite or remote operation/troubleshooting
- Operators do not require a high level of schooling

ECONOMIC

- Significantly smaller footprint as compared to conventional incineration technologies
- Impressive ROI for both small and large capacities
- Production of energy and useful construction materials, with no secondary waste to treat

FLEXIBLE

- Can handle all types of waste including hazardous, biomedical, municipal, organic, low-level radioactive, biomass, plastics, sludge, industrial waste
- Available in many turnkey configurations

ENVIRONMENTALLY CONSCIOUS

- Clean resource recovery technology
- Electricity from waste without dioxin and furan emissions
- Significant, positive impact on greenhouse gas reduction



100 METRIC TONS /DAY OF MUNICIPAL
WASTE CAN SUPPLY ENOUGH ELECTRICITY
TO OPERATE THE PPRS, PLUS 1850 HOMES



x 1850

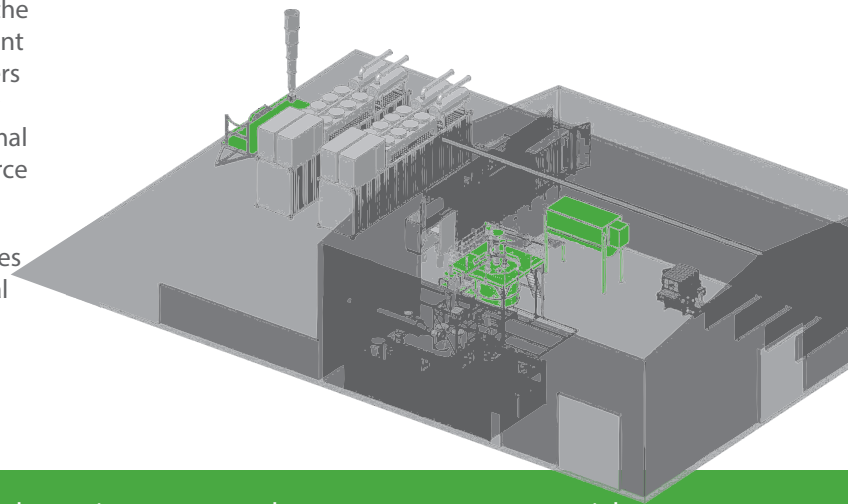
TECHNO -ECONOMIC FEASIBILITY STUDY

At PyroGenesis, our multi-disciplinary team of engineers, scientists and technicians are motivated to provide our customers with the best and most economical solution to their waste management problem. Because of this commitment, we offer our customers the option of performing a techno-economic feasibility study of their waste management challenge, providing the optimal solution for efficient waste destruction which maximizes resource recovery at the lowest possible cost.

Our technology and solutions enable industries, municipalities and governments to benefit from cost-effective environmental solutions for converting waste into energy.

Our techno-economic feasibility studies address several areas, including

- Understanding waste feed sources and composition to determine energy and resource recovery potential
- Estimated capital costs and project viability
- Simulation models of plasma gasification process (METSIM[®], HSC)
- Determination of potential carbon credits
- Integration of environmental solutions to existing sites and facilities
- Recovery of energy into useful materials and electricity





At PyroGenesis, we redefine the box.

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