



Transforming today's

WASTE

into tomorrow's

ENERGY

through the power of

PLASMA

PLASMA THERMAL DESTRUCTION & RECOVERY

Plasma, often referred to as the "fourth state of matter" is a special form of ionized gas that conducts electricity. It exists in the "white glow" that surrounds lightning bolts and is the major component in stars, including the sun. Although plasmas can be generated in a wide range of temperatures reaching millions of degrees (e.g. for fusion reactors), typical industrial uses of thermal plasmas are at temperatures in the range of 5,000 - 10,000°C (9, 000-18, 000°F).



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Technology Overview

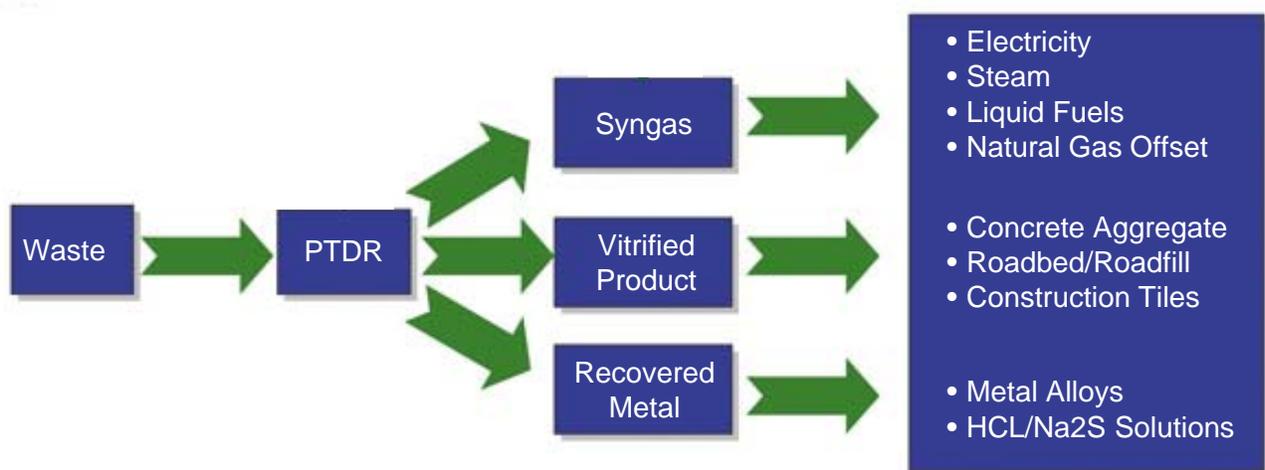


The Plasma Thermal Destruction & Recovery (PTDR) waste-to-energy technology uses the heat generated by plasma electrodes in an oxygen starved (pyrolytic) environment to first, pull apart (dissociate) the molecules that make-up the organic portions of the waste, then, depending on the composition of the waste stream, a controlled (stoichiometric) amount of oxygen (either in the form of steam or pure oxygen) can be added to reform the dissociated elements of the waste into a synthesis gas ("syngas"), consisting mainly of Carbon Monoxide (CO) and Hydrogen (H₂). This process is commonly referred to as plasma gasification.

The inorganic constituents of the waste are melted (vitrified) into an environmentally safe, leach resistant, glass matrix. The system derives its energy from plasma heat, thus wastes with little or no calorific value can be effectively and efficiently treated.

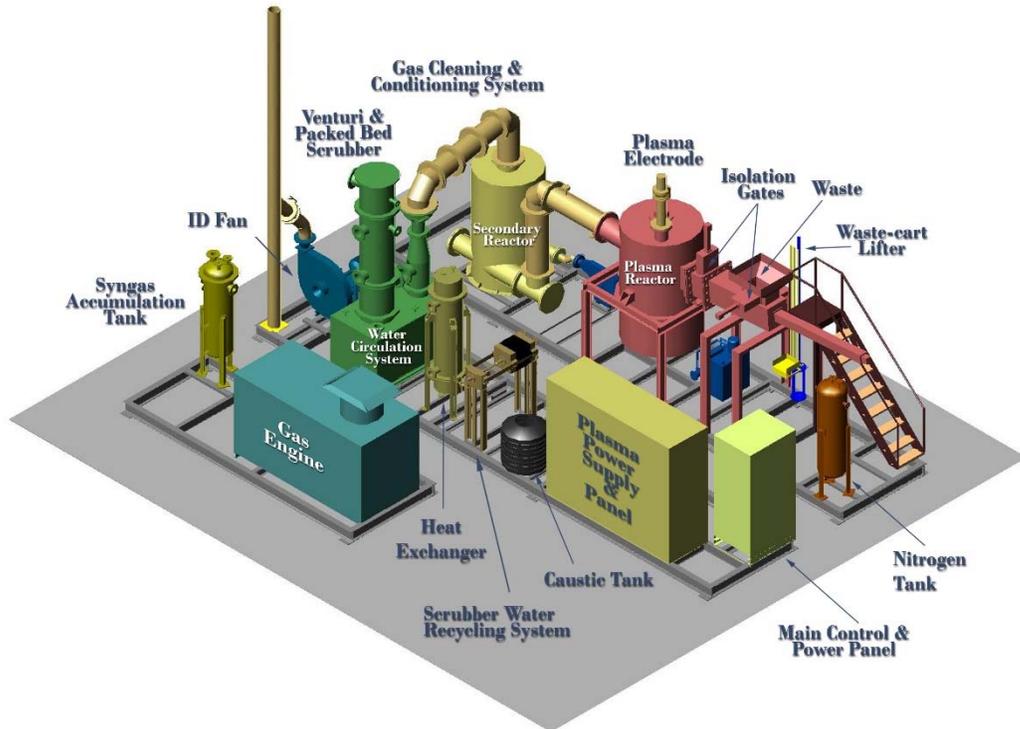
Waste, when heated to a very high temperature using plasma electrodes in the controlled atmosphere of the reducing plasma gasification reactor undergoes predictable physical and chemical changes. This high temperature generated by the heat from the plasma arc, over 1,000°C (1,800°F) prevents the formation of complex organic molecules and breaks down organics into a gas. These primary molecules are stable above 965°C (1,770°F). The formation of dioxins or furans is significantly impaired inside the plasma gasification reactor due to the unique process features, including high uniform temperatures and a lack of excess oxygen within the system.

This hot gas is then fed through a gas cleaning and conditioning system, where it is rapidly cooled and cleaned to remove any entrained particulate and/or acid gases prior to potential re-use.



PEAT International designs advanced waste-to-energy & resources systems. The company's principal mission is the deployment of its proprietary Plasma Thermal Destruction Recovery ("PTDR") technology for toxic waste treatment and hazardous waste treatment. The technology can treat a wide range of waste feedstocks, including industrial, industrial process, biological/medical and universal waste streams. The PTDR is a proven, cost-effective, environmentally clean and commercially viable solution for toxic waste treatment and hazardous waste treatment.

PTDR Process Overview



The PTDR process is a unique, cost-effective and virtually emissions-free technology that is superior to other mainstream methods of waste treatment. PTDR waste-to energy systems are driven by a proprietary, state-of-the-art instrumentation and computerized control systems.

PTDR Advantages

Can treat nearly any type of waste, including:

- ETP Sludges from Chemical manufacturing
- Crude Oil sludge residues – from storage tank cleaning
- Distillation residues from Chemical mfg
- Pharmaceutical wastes – liquid, solids or sludge
- High Sulfur and High Chlorine Industrial Waste
- Waste from Chemical manufacturers – Dyes, Paints
- E Waste
- Thermal Batteries
- Pyrotechnic – High Phosphorus waste
- Military Waste
- Incinerator Fly Ash
- Bio Medical Waste

Organic and inorganic waste can be processed together

Does not create any secondary wastes that requires further treatment or landfilling

PEAT Regulatory Approvals

Taiwan:

Taiwan Environmental Protection Agency
Taiwan Department of Education
Kaohsiung Department of Env. Protection

USA:

Virginia Department of Env. Quality
Alabama Department of Env. Management
City of Huntsville Natural Resources Division
Sacramento Air Pollution Control District
San Diego Air Pollution Control District
Indiana Department of Env. Management
Michigan Department of Env. Quality *
California Department of Public Health *
* - Certified as Alternative to Incineration

INDIA:

Ministry of Env. & Forests

Converts Waste into Valuable End-products

- A clean synthetic gas ("syngas") that is a valuable source of alternative energy (Approximate heat value: 8 to 10 MJ/Nm³ (225 MMBTU/SCF);
- An inert vitrified glass that has excellent applications in the construction industry, including: (1) Concrete Aggregate, (2) Roadbed/fill and (3) Sandblasting
- Recovered metals & alloys

PTDR Systems & Solutions

	PTDR-100	PTDR-200	PTDR-500
			
Average Capacity	60 kg / hr	125 kg/hr	350 kg / hr
Plasma Heating System	100 KWe	100 KWe	400 KWe
Syngas Recovery (Optional)	25-50 KWe Engines/ Steam Boiler/ Hot H2O	25-50 KWe Engines/ Steam Boiler/ Hot H2O	~500 KWe Engines or Steam Boiler
Utilities	Max Power : 150 KWe , Water: 150 liters / hr	Max Power: 200 KWe Water: 300 liters/hr	Max Power : 750 KWe , Water: 2 m3 / hr
Labor	1 per shift	1-2 per shift	2-3 per shift
System Footprint	50 m2	75 m2	750 m2
Application	On-Site	On-Site	On-Site/Centralized
Syngas Generation (medium carbon-based waste)	775,000 BTU/hr	1,500,000 BTU/hr	5,000,000 BTU/hr

Recent Project Experience



SHANGHAI, CHINA

In August 2013, PEAT International successfully commissioned and sold a PTDR-100 System in Shanghai China. The 60 kg/hr system was designed for medical waste and purchased by an Asian-based renewable energy project developer. This is first commercial operating plasma gasification system in China.

In 2010, a PTDR-100 system was commissioned at a commercial R&D foundry. Locating and permitting a system in California - the most stringent air emission state - illustrates the minimal environmental footprint associated with the PTDR technology.



SACRAMENTO, CA / USA



TAICHUNG, TAIWAN

In 2008, a PTDR-100 system was commissioned in Gujarat, India. The system processed a wide range of solid waste streams, including hazardous waste, medical waste, industrial waste and pharmaceutical waste. The system was re-commissioned in Taichung, Taiwan in 2011.