# A Clean Technology to Convert Waste Into Valuable Commodities

With
Zero Emissions
Energy
Production


www.waste2energysolutions.com

# A Waste to Energy Solution
# That Is
# Extremely Eco-Friendly
# Cost Effective and Profitable

# While Creating Valuable Commodities
# from
# Previously Unusable Resources
# with Zero Emissions

# What is Waste to Energy?

***Waste to Energy*** *(wte) is the process by which energy is generated in the form of electricity and/or heat and/or synthetic fuel from the management of waste. These technologies have the potential to produce more electricity from the same amount of fuel than is possible by direct combustion.*

***For Example****, 1000 tons-per day of waste is processed at a typical large municipality. The daily output, could be hundreds of thousands Kilowatt hours, millions of gallons drinking water and millions of cubic feet of valuable hydrogen gas for sustainable power generation.*

## 2.6 Trillion tons a year of waste and Growing!

*Source: World Bank*

## *Incineration*

*1 ton Waste = 0.55 Mw/h*

## *Plasma Gasification*

***1 ton of Waste = 1 Mw/h***

*TRANSFORMATION NOT INCINERATION*


***While creating Valuable Commodities***

# *Safely and Economically Turn Waste*

## *Any Solid, Liquid and Gas Waste Including:*

## *Bio-Hazard, toxic waste, tires, sewage, sludge –*

# *Into Clean Energy, Water and other Valuable Commodities*

## *Electricity, Syngas, Heat, Water and other valuable products*

*Electricity*

*Synthetic Gas*

*Water*

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# ENERGY Comparison

***5 to 7 cents***
***1.5 MW/ 2 acres***

***50 to 60 cents***
***1 MW/ 2 acres***


***8 to 10 cents***
***1 MW/.5 acres***

# ENERGY Comparison

***Less than 3 cents***

***10 MW/75 sq. mt.***

# *Plasma Gasification:* Two Base Systems

***We produce machines that process "materials previously regarded as wastes"***

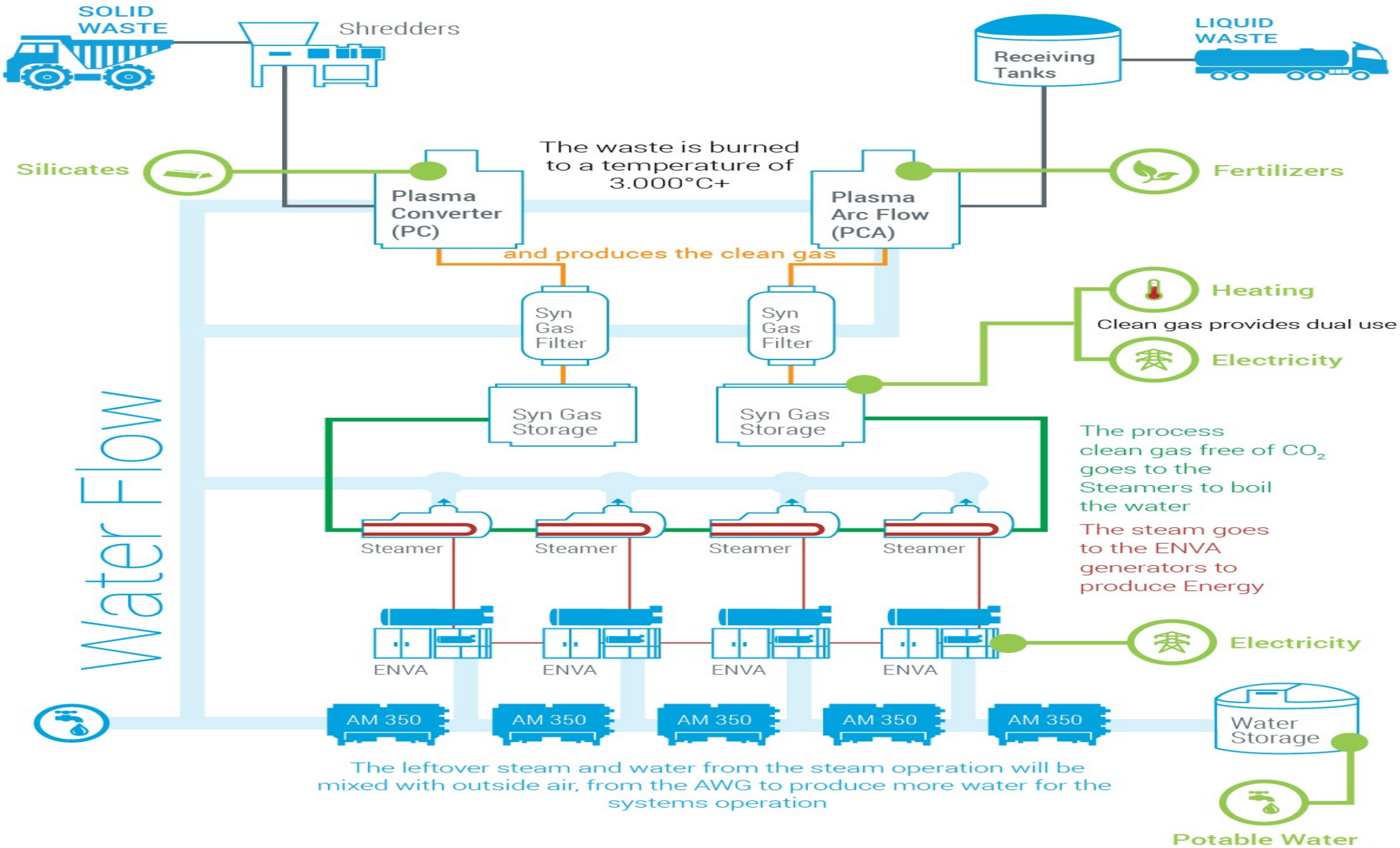
## Plasma Converter System (PCS)

*All waste is safely and effectively destroyed by this process, no matter how hazardous, toxic or lethal they may be. It is not enough to destroy hazardous waste; hazardous waste must be destroyed irreversibly. We produce machines that process "materials previously regarded as wastes," because once those materials enter the PCS, they are no longer wastes... they are known as "feedstocks." The system turns those material feedstocks into safe, valuable products such as Plasma Converted Gas (PCG), obsidian-like silicates and recyclable metals.*

## Plasma Arc Flow Technology (PAF)

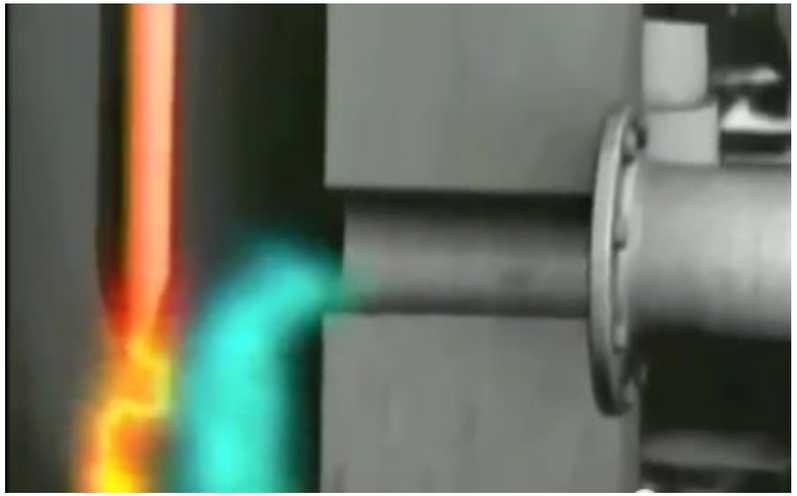
*The Plasma Arc Flow™ is a patented technology based on flowing the target liquid waste through a submerged electric arc between two electrodes. The arc decomposes the liquid molecules into atoms and forms a plasma around the tips of the electrodes at about 10,000°F / 5,500 °C. The Plasma Arc Flow moves the plasma away from the electrodes and controls the formation of Syngas1 that rises to the surface for collection.*

***Both can be configured to be mobile or stationary***


SOLID WASTE
Shredders
Receiving Tanks
LIQUID WASTE
Silicates
The waste is burned to a temperature of 3.000°C+
Fertilizers
Plasma Converter (PC)
Plasma Arc Flow (PCA)
and produces the clean gas
Heating
Clean gas provides dual use
Electricity
Syn Gas Filter
Syn Gas Filter
Syn Gas Storage
Syn Gas Storage
Water Flow
The process clean gas free of $CO_2$ goes to the Steamers to boil the water
The steam goes to the ENVA generators to produce Energy
Steamer
Steamer
Steamer
Steamer
ENVA
ENVA
ENVA
ENVA
Electricity
AM 350
AM 350
AM 350
AM 350
AM 350
Water Storage
The leftover steam and water from the steam operation will be mixed with outside air, from the AWG to produce more water for the systems operation
Potable Water

# The Plasma Arc Flow Technology

***The PLASMA ARC FLOW™ process gasifies & sterilizes a number of liquid wastes into usable byproducts.***

***The Plasma Arc Flow technology converts most liquid waste into a clean fuel called syngas or synthesis gas.***

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# PLASMA ARC PERFORMANCE

***BIOWASTE RECYCLED:*** *about 2,500 g/h or about 60,000 g/24h (about 10,000 L/h or about 250,000 L/24h) for biowastes with 1.5% to 2% TSS. A proportionately less volume is processed for biowastes with bigger TSS values or with particular contaminants;*

***NUTRIENT RICH LIQUID:*** *about 95% of the original volume;*

***MAGNEGAS PRODUCED:*** *about 1,500 scf/h or about 35,000 scf/24h (about 50,000 L/24h or about 1M L/24h);*

***CARBONIZED SOLIDS:*** *about the original value of the TSS HEAT PRODUCED; None usable (the produced heat is used to maintain the PAF over the boiling point).*


# PLASMA ARC FLOW™
## GASIFICATION

***"STERILIZATION MODE"*** *is intended solely to sterilize target liquid wastes such as* ***sewage, agricultural wastes*** *or any effluent where eliminating bacteriological activity is beneficial to convert the waste liquid into a fertilizer and irrigation water. This results in the production of Syngas, carbon precipitates and the same quantity of sterilized liquid. In this mode the liquid is retained but completely sterilized.*

# PRIMARY MARKETS OF PAF SEWAGE RECYCLERS

***MUNICIPALITIES***

***APARTMENT BUILDINGS***

***CIVLIAN & MILITARY SHIPS***

***IPS***

***HOTELS***

***CHEMICAL INDUSTRY***

***TEXTILE INDUSTRY***

***Plasma Arc Targets Liquid Waste***

***FARM BIO-WASTE***

***ALUMINUM SMELTERS***

***STEEL MILLS***

***FOOD PROCESSING INDUSTRY***

***CARDBOARD / PAPER RECYCLERS***

***AND OTHERS INDUSTRIES***

# *100 KW TEST SEWAGE RECYCLER*

***General characteristics:***

***SEWAGE RECYCLED****: 100,000 gallons (400,000 liters) per 24 hour day depending on appropriate downstream equipment;*

***MAGNEGAS PRODUCED****: 10,000 scf/day (280,000 liters/day) corresponding to about 70 gasoline gallon equivalent (250 gasoline liters) per day;*

***IRRIGATION WATERS:*** *about 98,000 gallons (380,000 Liters) per day;*

***CARBONIZED SOLIDS:*** *about 100 pounds (50 Kg) per day.*

# THE PLASMA CONVERTER SYSTEM (PCS)

***All waste is safely and effectively destroyed by this process****, no matter how hazardous, toxic or lethal they may be. It is not enough to destroy hazardous waste; hazardous waste must be destroyed irreversibly. We produce machines that process* ***"materials previously regarded as wastes," because once those materials enter the PCS, they are no longer wastes...***
*they are known as "feedstocks." The system turns those material feedstocks into safe, valuable products such as Plasma Converted Gas (PCG), obsidian-like silicates and recyclable metals.*

***Producing Positive Cash Flow & Profits***

*The PCS will improve budgetary performance for many types of businesses, including manufacturing, government agencies and even nonprofit organizations.*

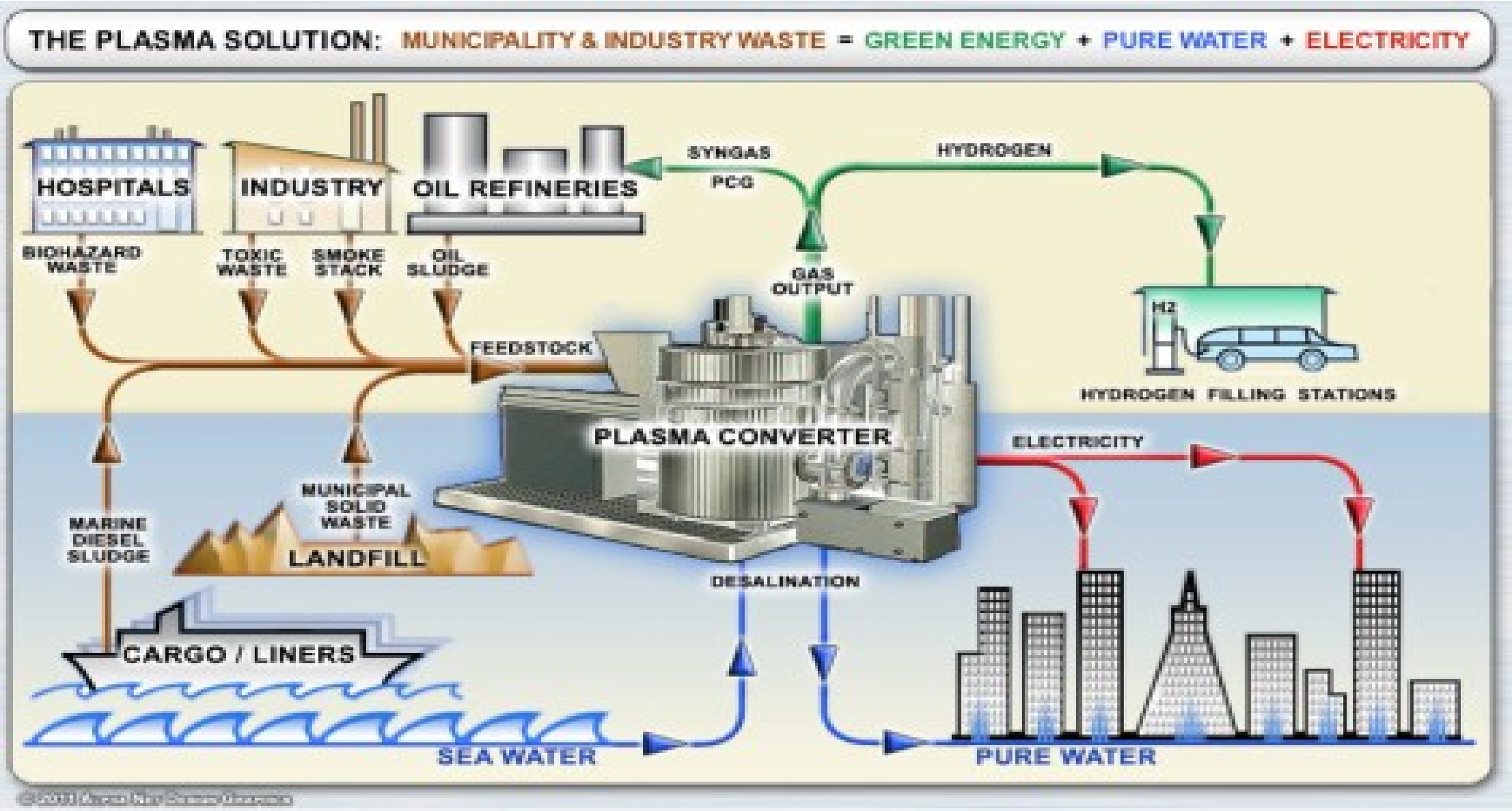
# *The Multiplication of Energy: Waste to Energy Power Plant*

*Waste-to-energy (WtE) or Energy-from-Waste (EfW) is the process of generating energy in the form of electricity and/or heat from the management of waste.*

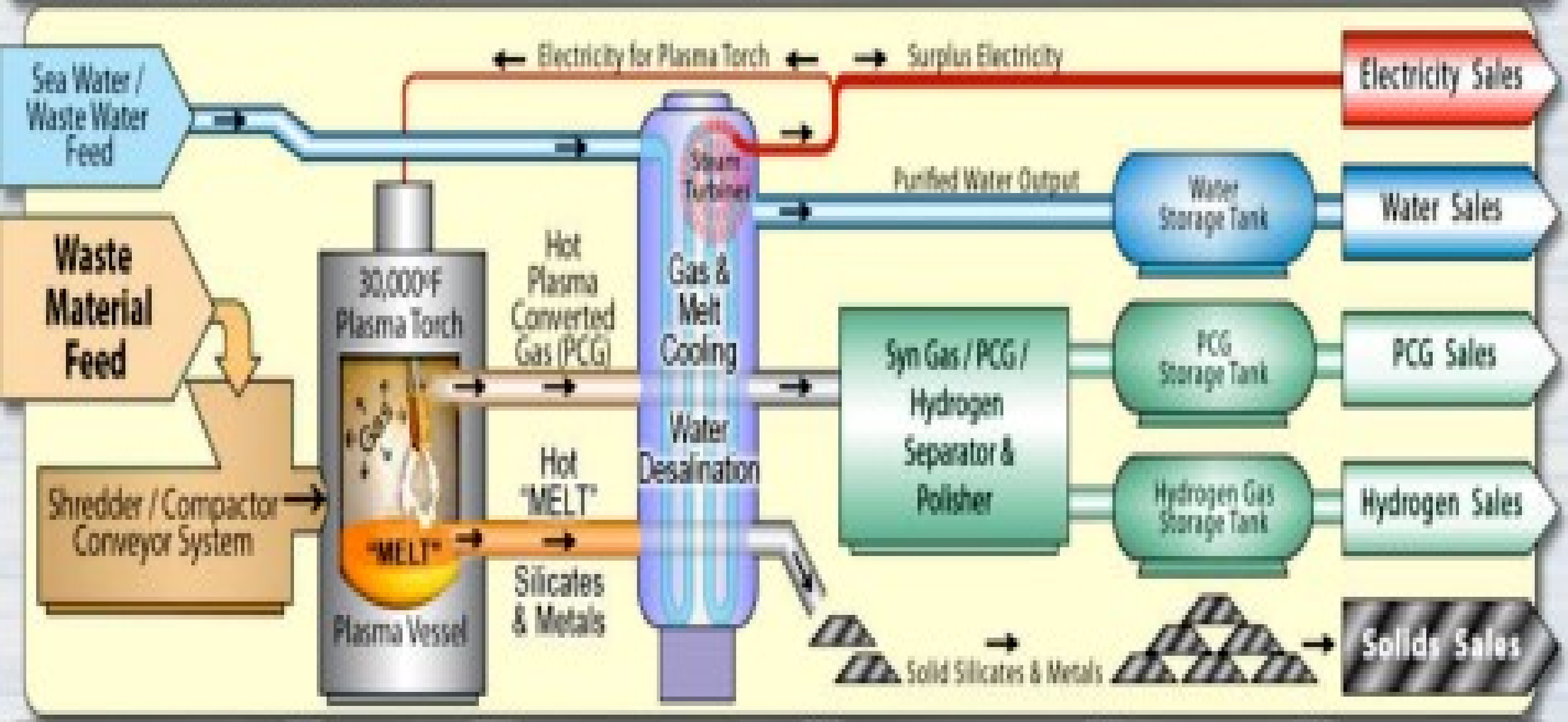
*The system is able to produce energy from waste and other fuels without direct combustion. These technologies have the potential to produce more electric power from the same amount of fuel than would be possible by direct combustion.*

*Most of the world waste materials are rich in carbon and hydrogen. For every unit of electricity, during processing most wastes, the* ***Plasma Conversion System produces four to ten or more units of clean energy contained in Plasma Converted Gas.*** *Depending on the waste or processed materials,* ***Plasma Conversion System (PCS) produces more energy than it consumes.***

# *Creating Commodities from Previously Unusable Resources*



# THE PLASMA SOLUTION: Municipal Waste Management / Desalination / Clean Power & Gas Generation / Solids




Waste & Water Feed | Dissociation | Cooling, Water & Electricity | Filtering & Neutralizing | Storage | Product Revenue

# $CO_2$ ENERGY MODULE

*This system is used in the production of electrical energy to be fed into public grid or for individual consumption. In a world where the goal of zero carbon factories, cities and economies is a priority for individuals, corporations and governments, the Energy Module offers ZERO Carbon power generation in a simple, economical and reliable system.*


*The waste heat given off in industrial processes in the* ***low-temperature range*** *(up to 100°C) constitutes an energy potential in all industrialized countries that is substantially untapped. We offer a novel process for generating electric current from low-temperature heat, thereby capturing the untapped energy from the lost heat produced in many industrial processes capitalizing.*

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# $CO_2$ ENERGYMODULE

*In addition to its potential using wasted heat sources, the process can also utilize heat from other sources for the generation of electricity. These sources can originated from solar energy, geothermal heat, or technically conditioned waste heat flows from power stations and combined heat and power (CHP) plants. A major worldwide contribution can be made in reducing the consumption of fossil energy resources and cutting $CO_2$ emissions, through the specific utilization of low-temperature heat for the generation of electricity*


*ENVA Low-Heat Generator*

# The Advantages

***The ENVA breakthrough has been achieved to date is the use of existing resources, but currently completely neglected to produce electrical power: The low pressure steam used by the Energy Module system, until now considered a waste product in many industrial processes It is Transformed into electricity - a significant step towards generating zero emissions of carbon dioxide, with consequent economic and environmental benefits both step.***

- ***Saving fossil fuel resources***
  - ***environmental aspect***
- ***Unlimited Supply of Raw Materials***
- ***Use of clean energy, generated by yourself***
  - *reducing procurement costs of energy (fossil)*
- ***Injection of the energy produced in the power distribution network***
  - *rapid amortization costs acquisitions*
- ***Reducing $CO_2$ emissions***
  - *Certificates for emissions trading*

# VOLUME REDUCTION: 300 to 1

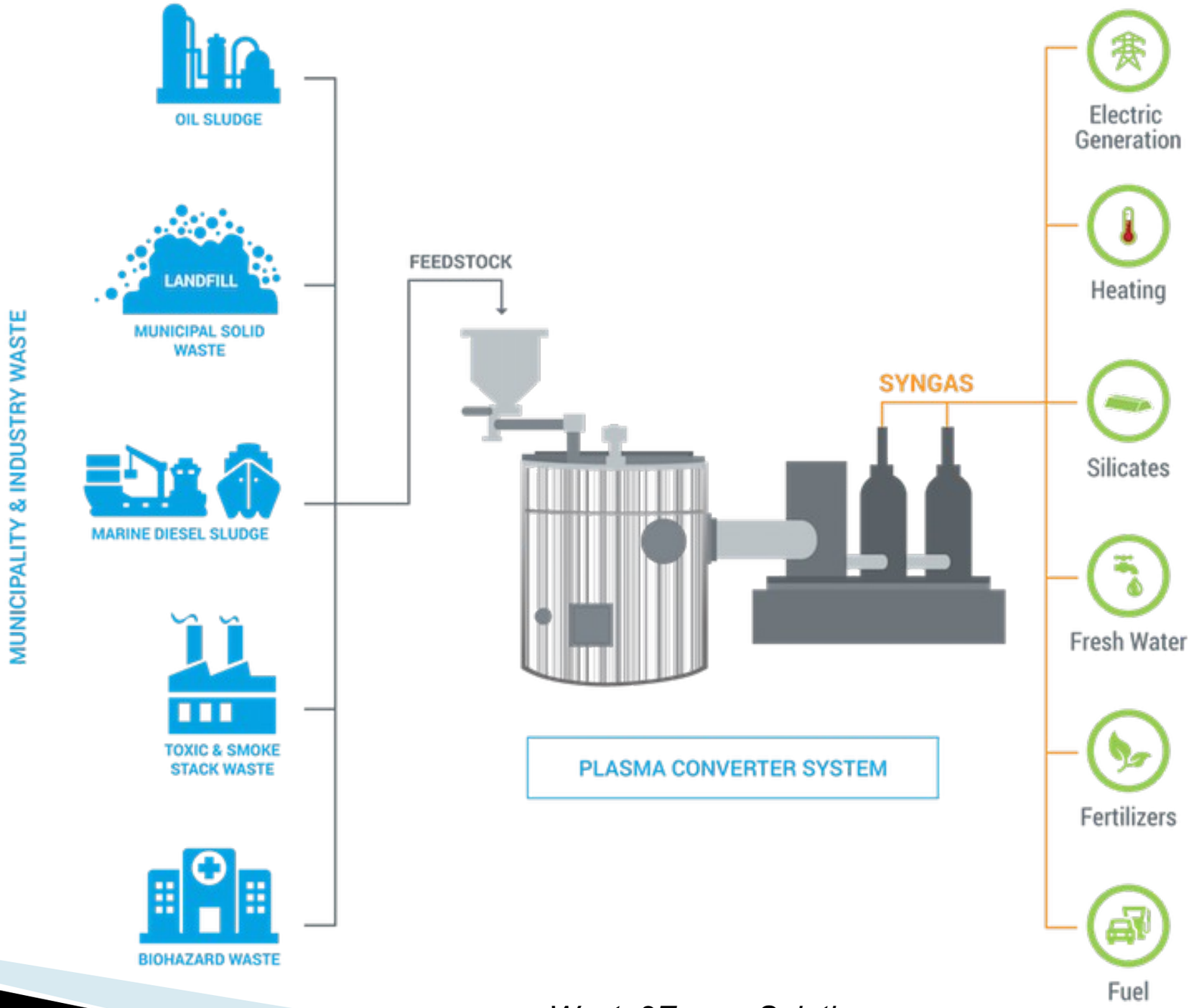
*Volume reductions of 300 to 1 and more are achieved when processing materials such as municipal solid waste and hospital waste.* ***In fact, waste feeds composed primarily of hazardous or nonhazardous paper, cloth, plastic, food, pharmaceuticals, explosives, paints, solvents, PCBs, confiscated drugs, filters, oils, old tires etc.*** *will result in virtually* ***no remaining solids****. Additionally, such materials yield Plasma Converted Gas (PCG) or syngas.*

***Example: 300 drums of hospital waste or municipal waste, stacked end-on-end, would stack 875 feet high – 300 feet higher than the Washington Monument. After Converter processing – only ONE drum of inert and harmless glass-like stone exists.***

*The PCS's environmental performance is* ***safer than the United States EPA standards*** *and regulations*

# *Producing Positive Cash Flow & Profits*

*The PCS will improve budgetary performance for many types of businesses, including manufacturing, government agencies and even nonprofit organizations.*

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# SUPERIOR ENVIRONMENTAL PERFORMANCE

***The PCS can process solids, liquids and gases all at the same time.***

***What use to be considered "waste"***
***Is now "Feedstock"***

***Restore previously unusable land***

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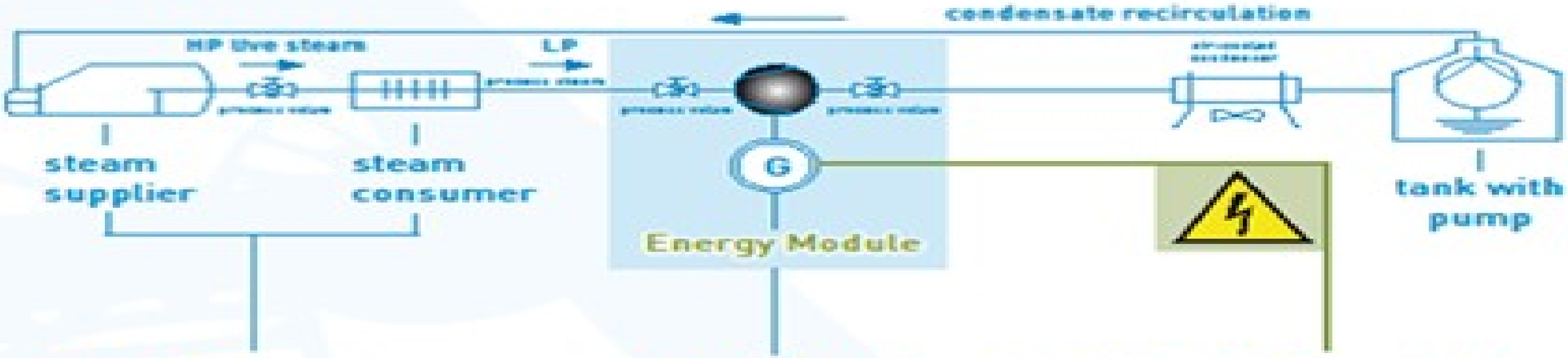
# Functional Principle of the Energy Module

***Conversion of Low-Pressure Steam (0.6 – 5 bar) into Electric Energy ($CO_2$-free)***

## Usage Scenario:




## The Source + The Unit = The Product

+

=

# CARBON MARKETS


***$CO_2$ tax exempt***

*Using our technologies power module, as the residual energy or by evaporation, using renewable energy instead of fossil fuels. This not only saves energy costs, but allows the creation of carbon credits to reduce ($CO_2$) in the atmosphere. The sale of carbon credits is an additional means to address climate change.*

***Take action is needed to limit the greenhouse gas (GHG) effect so as to help avoid the impacts of climate change. Carbon Offsets are created by finding ways to reduce GHG.***

# 20 REASONS WHY PCS IS THE BEST TECHNOLOGY CHOICE:

1. *The price of the PCS and its operating costs are significantly less expensive than many of the present costs being experienced by industry.*

2. *Hazardous and nonhazardous wastes (solids, liquids, sludges and gases) can be safely and economically processed without producing harmful, illegal or noxious emission, effluents or residues.*

3. *The volumetric waste reduction for most solid wastes is approximately 300 to 1.*

4. *The PCS's environmental performance is safer than the United States EPA standards and regulations.*

# 20 REASONS WHY PCS IS THE BEST TECHNOLOGY CHOICE:

5. *The PCS can do on-site remediation of toxic "hot spots" (contaminated properties) and landfills, and return those properties to the market for sale in a safe and habitable condition. Landfills contain resources that can be safely processed and recovered as commodity products by the PCS.*

6. *The PCS will improve public health and safety, and will not produce the harm that arises from incinerators and landfills.*

7. *For many wastes, the PCS produces commodity products for sale or use, such as metals, specialty inorganic and a clean synthesis gas (Plasma Converted Gas).*

8. *The PCS reduces the cost and risk to the corporation, agency and organizational entity from the "perpetual liability" that accompanies hazardous waste generation, treatment, storage, disposal and transportation.*

# 20 REASONS WHY PCS IS THE BEST TECHNOLOGY CHOICE:

*9. The PCS can be produced in various configurations that allow them to be used aboard ships for marine applications, in a truck for mobile applications and in stationary configurations ranging in capacity measured from hundreds of pounds per hour to hundreds of tons per day.*

*10. The PCS can be operated intermittently a few hours a day as needed, or around the clock, without many of the difficulties and costs that arise in other technologies when operated in the same manner.*

*11. When processing high-energy content waste such as plastics, solvents, and tires, a unit of material that requires one kilowatt of power to process will produce enough PCG and recoverable heat to produce up to 2.5 kilowatts of electrical power.*

*12. Unlike other technologies, no catalysts are required by the PCS.*

# 20 REASONS WHY PCS IS THE BEST TECHNOLOGY CHOICE:

13. *The PCS can process low-level radioactive waste. Although the system does not reduce radioactivity, it can reduce its volume by factors of hundreds to one.*

14. *The PCS can achieve "total and irreversible destruction" of hazardous and toxic compounds and wastes, lethal viruses, bacteria and prions.*

15. *Resource Conservation Recovery Act recycling exemptions may be available where the resultant products produced are being used in an industrial process or to make a product.*

16. *The employment of the PCS will allow the user to conform to Zero Discharge criteria, serving to enhance the good environmental community relations of the user.*

# 20 REASONS WHY PCS IS THE BEST TECHNOLOGY CHOICE:

17. *Because the PCS is electrically driven, unlike incinerators, its operation can be stopped immediately by shutting off the electricity, and it is therefore controllable and "inherently safe."*

18. *The PCS is computer controlled, easy to use and operates at normal atmospheric pressure, very safely and quietly.*

19. *The PCS can process solids, liquids and gases all at the same time.*

20. *The PCS directly couples to co-generation and power systems.*

# Equipment Cost Example 12 Mw/h/Day *(US. Dollars)*

| Equipment | Technology | Quantity | Price | Total |
|---|---|---|---|---|
| *Solid PCS* | *Plasma Torch* | *1* | *$3'900'000* | *$3'900'000* |
| *Liquid PCS* | *Plasma Arc* | *1* | *$1'900'000* | *$1'900'000* |
| *Steamer / BOSCH* | *Boiler* | *4* | *$798'000* | *$3,192,000* |
| *ENVA/generator* | *Power Unit* | *4* | *$3'100'000* | *$12,400,000* |
| *UTHA* | *Shredder* | *1* | *$360'000* | *$360'000* |

**Estimated Total: $21,752,000**

# *Cumulative Revenue – Estimated*

*A Waste to Energy (WtE) power plant would generate more than 100 million Cubic Meters of Syngas and 12 Mw/h/day and more than 60,000 liters of water*

***Approximately $64 Million** Cumulative Revenue in Less than **39 months.***

*Requires less than 100 sq. Meters (1,076 sq ft)*

# ATMOSPHERE WATER GENERATOR (AWG)

*With the application of the Atmosphere Water Generator (AWG), water is produced from a hitherto unused resource; the air. in order to conceptualize this, it is important to consider that the humidity in the air contains 10 times more water than all rivers of the World put together and that this water is distributed widely across all regions.*

*The basic technology used for the AWG originally came from the mining sector and utilizes the humidity borne in the air to produce drinking water by means of condensation. While the machines used in the mining sector were primarily designed for cooling down the air, the resulting condensation produced water as a by-product. The machines employed draw in huge volumes of air, cool it down to the dew point and collect the resulting condensed water, which is then filtered and mineralized. Through this process, pure drinking water is obtained and that meets the quality standards of the WHO. In regions with high temperatures and high humidity levels, a single machine can generate up to 10,000 gallons of water per day, thus potentially providing the water supply for entire villages.*

# PRODUCTION OF WATER FROM THE AIR

***Mode of operation***

*The water production process:*

- *Utilization of the atmosphere as a water reservoir*
- *Production of water through the use of highly-effective refrigeration technology to condensate the humidity in the air*
- *Treatment of the water produced with the application of water recycling technology*

*Further potential uses of the process:*

- *Utilization of the heat generated from the operation of this system to provide electricity*
- *Utilization of the cooled air produced by the system for air-conditioning of interior rooms and/or buildings*

# Uses and Benefits

*The ability to produce water from the air is of benefit wherever drinking water is in short supply. Potential benefactors are therefore primarily the following:*

- ***Governments of countries with a limited supply of water***
- ***Humanitarian organizations***
- ***Armed forces, on mobile assignments***
- ***Hotels in areas limited in a supply of water***
- ***Farms***
- ***Construction industry; to provide an autonomous water supply for housing projects and/or industrial parks***

# Uses and Benefits

*The AWG technology allows water to be produced at any location in the World. It is independent of stationary water resources. The economic benefit is enhanced by the fact that cold air generated in the condensation process can be used for the air-conditioning of buildings. On account of its decentralized manner of producing water, diseases borne by existing water sources cannot contaminate the water produced and therefore are unable to spread. The process has the advantage of having no negative impact on the environment. There is no need to transport and store water at great expense as the water is produced when and where it is needed.*

# Practical Example: AM-25

*For the AM-25 the aqua-mission system is integrated into a small transportable unit.*
*Ideal for humanitarian and military applications and disaster relief.*
*All models are provided with generators.*

***Performance:*** *50 liters/hour (at 75% relative humidity and 23°C ambient temperature)*
***Air Circulation:*** *7500 m3/hour*
***Energy:*** *18.5 KW*
***Size (LxWxH):*** *2m x 1.5m x 1.5m*
***Refrigerant:*** *R-134 A / R-404 A*

# Some facts about Water:

- *Only 1% of total water resources on earth are available for human use, while 70% of the earth's surface is covered with water, 97.5% of this water is saline. Of the remaining 2.5% is fresh water, almost 68.7% is frozen in ice caps and glaciers.*

- *Up to 30% of fresh water is lost due to leakage in developed countries, and in some major cities, losses can be up to 40% to 70%.*

- *About 90% of sewage and 70% of industrial waste in developing countries is discharged into rivers without treatment, often polluting the usable water supply.*

- *A person living in sub-Saharan Africa uses about 10 to 20 liters (2-5 Gallons) of water per day on average, a Canadian uses 326 liters (86 gallons) per day.*

# Timing and Technology

## Technology is Changing the Way the World Works

*"Someday I'll harness that power", Said Nikola Tesla as a young boy after seeing a picture of Niagara Falls. Soon after, in 1895 the world's first large-scale central generating power station opened at Niagara Falls.*

*Some 120 years later, time and technology has arrived again for a revolution in energy production. Together we can change the way the world works .*

- Eco-Friendly
- Eco-Nomical
- Eco-Intelligent

- *Lower Energy Cost*
- *Job Creation*
- *Carbon Credits*
- *Clean Energy Production*
- *Increased Community Pride*
- *International Recognition*


Join the Revolution
for a
Cleaner – Greener
Sustainable
Future

# Contact information

***For more information and a full presentation please kindly contact:***


***Randy Bean***
***U.S.A. Tel: 954-557-4774***
***Email: randybean10@gmail.com***

***Christopher Finnegan***
***U.S.A. Tel: 786-514-8099***
***Email: chris@nationsmarketing.com***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