



YESTERDAY'S WASTE.
TOMORROW'S WONDER.



BECAUSE CARBON IS LIFE

Let's face it, friends; we've got a problem and it's a **BIG** one...

WASTE MATERIAL and a lot of it!

Unfortunately, we've done a very poor job at managing our waste output during the past several decades. It seems we've adopted an "out-of-sight/out-of-mind" attitude in processing many of the byproducts of everyday "life" since most of these waste materials are buried in landfills which are quickly filling to beyond capacity.

Not only that, but we've also exacerbated the issue with other mass production processes which yield byproduct volumes and materials not suited for landfill disposal. Product volumes from agricultural, industrial and food processing have reached proportions in which our population is having difficulty dealing with in a sustainable fashion.

So... what's the answer to this difficult question of **MANAGING WASTE** while being a **GOOD STEWARD OF OUR ENVIRONMENT** which includes the **RESPONSIBLE USE OF ENERGY** while **PRODUCING A VALUABLE PRODUCT**?

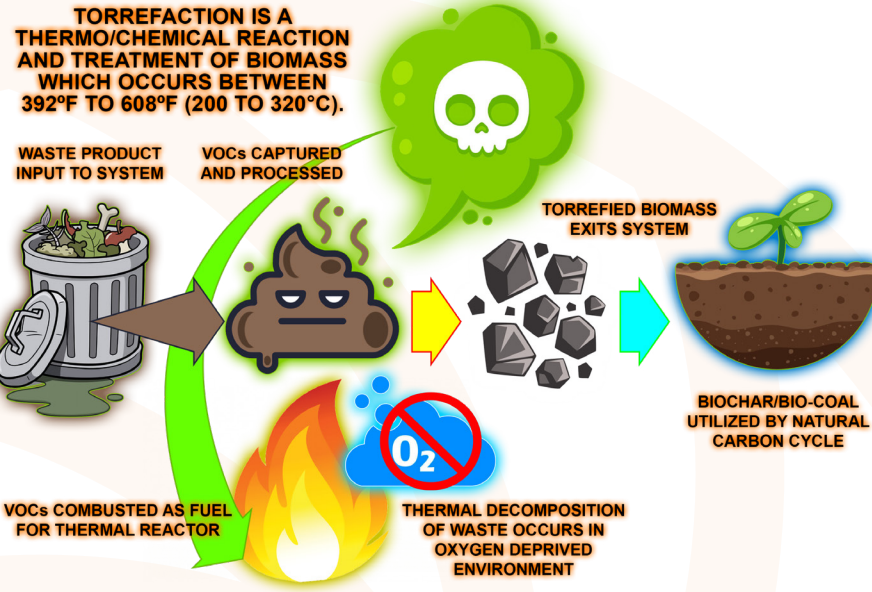
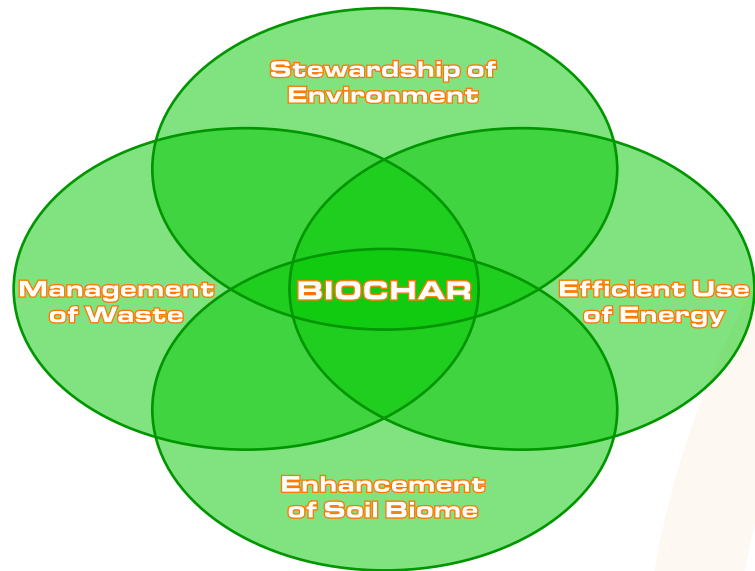
The answer is simple... **BIOCHAR.**



"MADE IN AMERICA" REAWAKENED
FORGED IN THE CRUCIBLE OF LIBERTY
POWERED BY THE FUEL OF FREEDOM

Biomass Torrefaction - 101

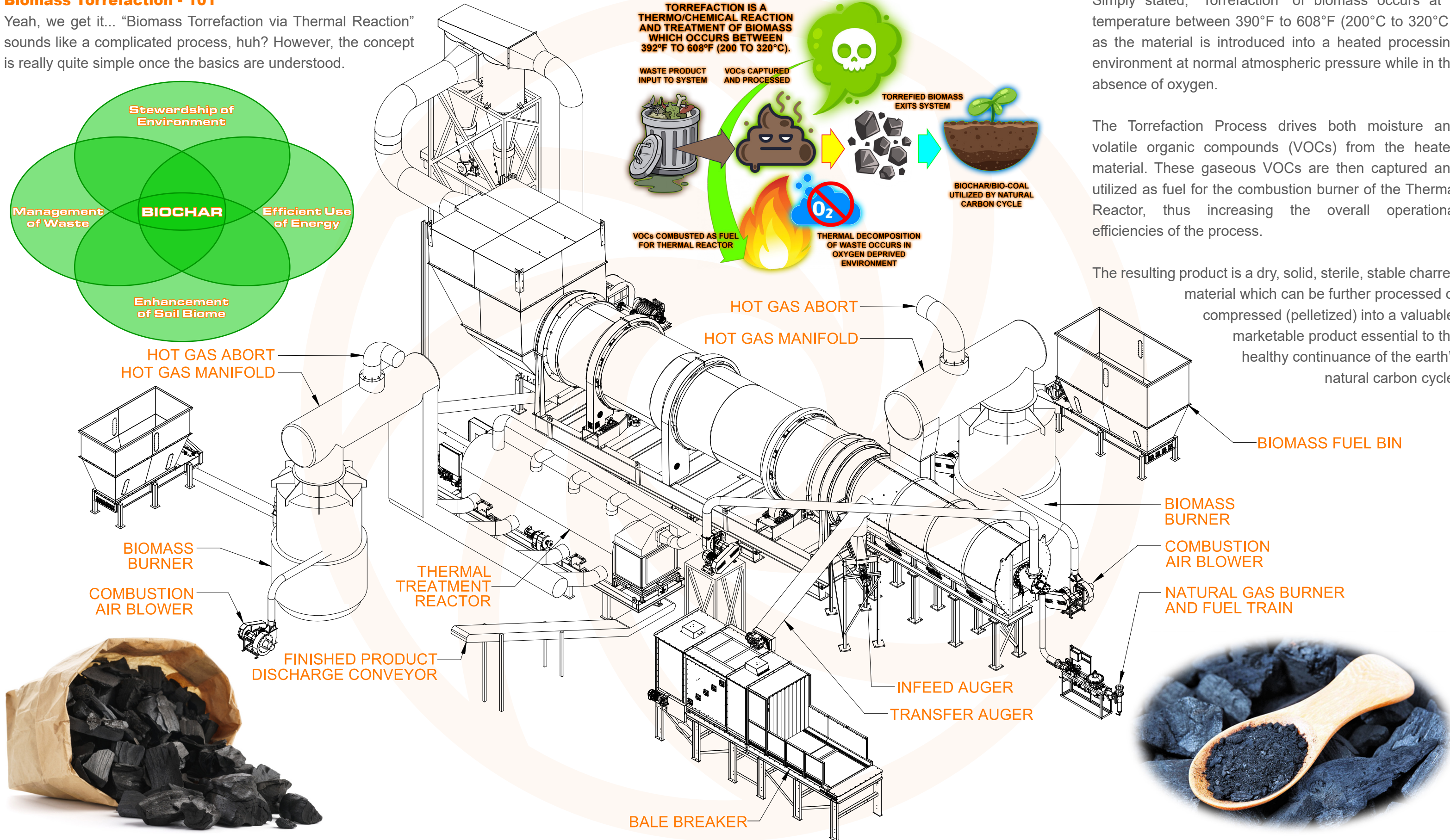
Yeah, we get it... "Biomass Torrefaction via Thermal Reaction" sounds like a complicated process, huh? However, the concept is really quite simple once the basics are understood.



Simply stated, "Torrefaction" of biomass occurs at a temperature between 390°F to 608°F (200°C to 320°C) as the material is introduced into a heated processing environment at normal atmospheric pressure while in the absence of oxygen.

The Torrefaction Process drives both moisture and volatile organic compounds (VOCs) from the heated material. These gaseous VOCs are then captured and utilized as fuel for the combustion burner of the Thermal Reactor, thus increasing the overall operational efficiencies of the process.

The resulting product is a dry, solid, sterile, stable charred material which can be further processed or compressed (pelletized) into a valuable, marketable product essential to the healthy continuance of the earth's natural carbon cycle.



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Production Waste Management

Waste Biomass from volume production, agricultural or materials processing has introduced additional pressures into our waste management systems. Furthermore, this type of biomass often contains volatiles or biopolymers which may be hazardous if released into the environment.

Cellulose, hemicellulose and lignin partially decompose during the Thermal Reaction process, however, these VOCs are captured and used as fuel for the torrefaction transformation.

Likewise, as any animal waste products (manures) are heated, the naturally occurring off-gassing of VOCs contained within these materials during the torrefaction process is captured and consumed as fuel by the Thermal Reactor's burner combustion.



Landfill Waste Management

Biomass Torrefaction of Landfill Waste is of particular concern as we are rapidly consuming the dwindling space within these strained facilities. Those who endeavor to create a valuable product from this waste material will be considered the true pioneers of waste management in the future.

After this biomass has been torrefied, it may be further densified or refined into pellets or briquettes for utilization in countless processes involving energy consumption. Biochar has an energy density of 18–20 GJ/m³ – compared to the 26 to 33 gigajoules per tonne heat content of natural anthracite coal.

Biochar is the transformation of yesterday's waste into tomorrow's wonder and we're here to help you squeeze profit from trash.



What about that "other waste."

Yeah, the kind of waste material that no one wants to talk about but is piling up fast with fewer and fewer places to put it. Agricultural waste products are a rapidly growing concern for all, including those who don't actually "till the ground."

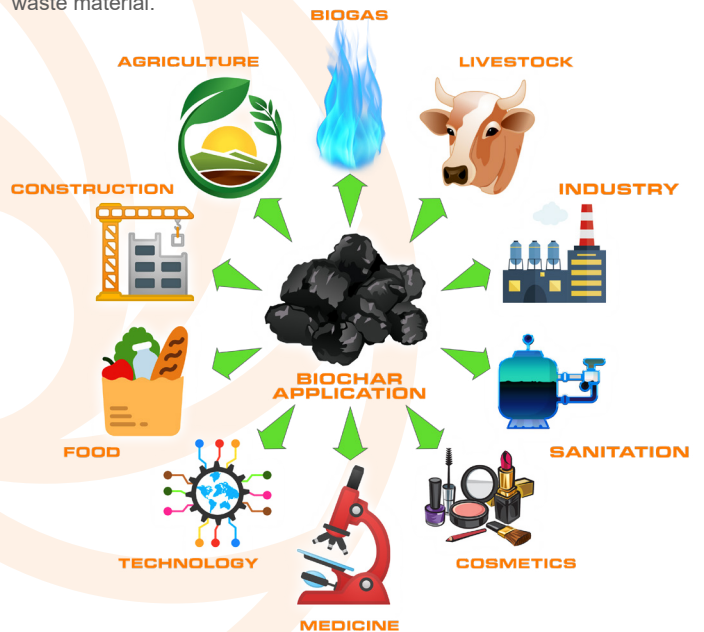
The Biomass Torrefaction process is ideal for manures and waste animal bedding products since the temperatures integral to the biochar process eliminate the organics present.

What does this mean? Well, should the torrefied manures ever become wet post-processing, the odor and health hazards have been completely eliminated and removed from the sterile biochar which may now be marketed as a viable and valuable product with a multitude of applications.

Biochar Application

The most common and current uses and applications for biochar cover a broad spectrum of possibilities. As we've all been called to be responsible caretakers and stewards of our earth and our environment which are carbon-based, a diverse and expanding number of biochar applications is currently in use or are being developed to assist us in doing so.

So, just what can be done with biochar after it comes out of the thermal reactor? The possibilities are almost endless since the world in which we live in is carbon-based. Simply stated, the carbon is being returned to its origination point with a responsible use of energy in management of waste material.



Biochar Just Makes Good Sense... both for your business operations and in being a good steward of natural resources.

- ⊗ **Energy** - Biocoal, Biogas, Syngas and other synthetic fuel possibilities may be derived from the biochar and pyrolysis processes.
- ⊗ **Agriculture:** The "soil biome" is enriched with the use of biochar which aids in moisture retention and facilitates water drainage.
- ⊗ **Construction:** Synthetic building materials utilizing biochar products are far superior in strength and longevity to conventional materials.
- ⊗ **Food Production:** Utilizing biochar in the soil reduces acidity while improving microbial properties and electrical conductivity of surrounding soil biome.
- ⊗ **Technology:** Biochar applications in technology includes applications in semi conductors, batteries and electromagnetic shielding.
- ⊗ **Medicine:** May be used in detoxification or a carrier for active pharmaceutical ingredients, cataplasm or poultices, insect bites, abscesses or eczema.
- ⊗ **Cosmetics:** Biochar is currently being used in soaps, skin cream and therapeutic bath additives.
- ⊗ **Sanitation:** Current applications include exhaust filters for controlling emissions, room air filters, micro-filters and macro-filters for water purification.
- ⊗ **Industry:** Industrial materials such as carbon filters, plastics, paints, fabrics and thermal insulation are being employed today.
- ⊗ **Livestock:** Numerous applications for livestock enrichment are possible including a silage agent, litter additive and water treatment products.