



Photographs by Gregg Segal
"7 days of Garbage

NO TIME TO WASTE

Why current waste management strategies have to change.

How the Phoenix can make that happen sustainably.

What is the value proposition of the Phoenix.

We throw away

2.12 billion tons of waste globally each year

… except there is really no “away”

The world’s trash crises is one of the most urgent environmental problems of our time.

Solid waste generation in the U.S. has increased by 73% since 1980 with each person producing 22% more waste, from 3.7 to 4.5 lbs per person per day. In cubed feet, that’s as high as a 19-story building in one year for just one person.

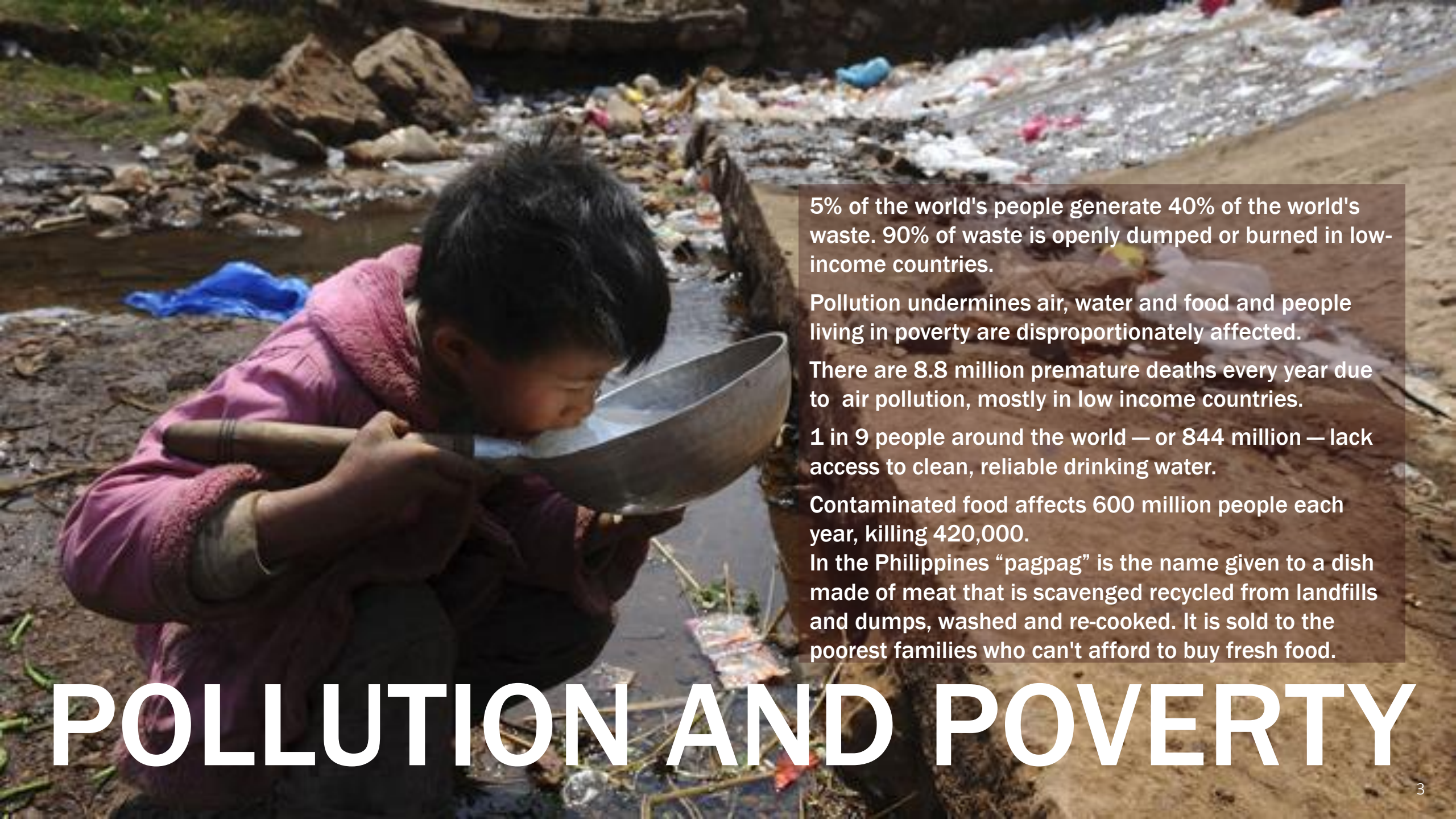


- The U.S. has 2000 active landfills which basically store trash forever.
- Nevada has 38.4 tons of waste for every person in the state in its landfills.
- One third of an average dump consists of packaging.
- Landfills are the 3rd biggest source of methane, a greenhouse gas 25X more potent than CO2
- Leachate is a threat to soil and groundwater.



- 12% of waste in U.S. is incinerated.
- Trash incinerators release 28 times as much dioxin air pollution than coal, about six times more lead and mercury, 3.2 times more Nitrogen oxides.
- 2.5 times Carbon dioxide, twice as much carbon monoxide and 20% more Sulphur dioxide.
- .For every 10,000 tons of waste processed per year, incinerators and landfills create only one job.





5% of the world's people generate 40% of the world's waste. 90% of waste is openly dumped or burned in low-income countries.

Pollution undermines air, water and food and people living in poverty are disproportionately affected.

There are 8.8 million premature deaths every year due to air pollution, mostly in low income countries.

1 in 9 people around the world — or 844 million — lack access to clean, reliable drinking water.

Contaminated food affects 600 million people each year, killing 420,000.
In the Philippines “pagpag” is the name given to a dish made of meat that is scavenged recycled from landfills and dumps, washed and re-cooked. It is sold to the poorest families who can't afford to buy fresh food.

POLLUTION AND POVERTY

Every piece of plastic ever made still exists today



It’s just one straw…

… said 8 billion people

We produce over 300 million tons of plastic every year, 50% of which is for single-use purposes.

Annually approximately 500 billion plastic bags are used worldwide, with an average “working life” of 15 minutes.

The process of producing bottled water requires around 6 times as much water per bottle as there is in the container.

14% of all litter comes from beverage containers. 100.7 billion plastic beverage bottles were sold in the U.S. in 2014, or 315 bottles per person.`

80% of all marine litter is plastic

About 8 million tonnes of plastic enters the sea every year, at this rate by 2050 there will be more plastic than fish in the sea.

90% of sea birds have plastic in their stomach.

100,000 marine mammals and 1 million sea birds die from plastic pollution every year. Most die slowly from plastic ingestion, entanglement and suffocation.

Microplastics big impact

Plastic breaks into microplastics that are eaten by small marine animals and enter the food chain.

Microplastics are even found in our table salt and tap water. In a 2017 study, 80% of water samples from 5 continents tested positive for plastic fibres.

Microplastics both absorb and give off toxic chemicals and carry harmful bacteria.

Nanoplastics are plastic particles less than 100 nm in size that are of particular concern since they are likely to pass through the blood-brain barrier.

30 – 40% OF ALL FOOD THAT IS PRODUCED IS THROWN AWAY

Food production and agriculture is deeply intertwined with the climate. As we approach climate crises, the why, what and how of this disposal must undergo a paradigm shift.

Food waste in a landfill produces methane. When it rots aerobically (composting), it produces CO2.

If food waste were a country it would be the 3rd largest greenhouse gas emitter. Agriculture is the leading cause of deforestation with 1.5 acres cut down every second.

In the US alone, the production of lost or wasted food generates the equivalent of 37 million cars' worth of greenhouse gas emissions.

Food waste in the US accounts for ¼ of all freshwater consumption and 300 million barrels of oil per year.

Agriculture produced 582 million metric tons of greenhouse gasses in 2017. 42% from livestock and 50% from crop cultivation.

More than half of the biomass that farming produces is crop residue (husks, stalks, leaves, branches) which are usually burnt or left to decompose.

Converting that biomass into biochar means that carbon is "fixed" and not released into the environment.

Biochar is one of the most viable, practical and affordable carbon sequestration techniques.



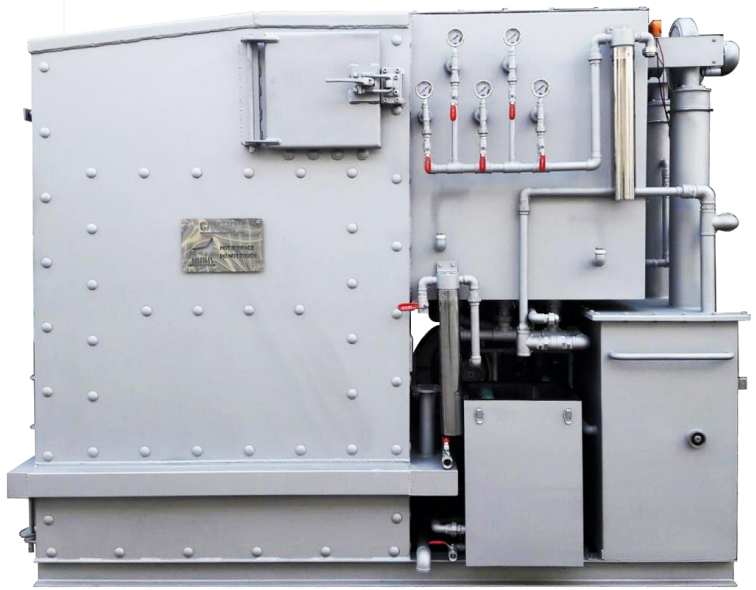
A DISRUPTIVE TECHNOLOGY

My waste, my responsibility

Upcycle what can't be recycled

PHOENIX

Small by design:
2.5 ton & 4 ton





Huge in Impact

2.5 tons or 4 tons of municipal solid waste can be treated every 24 hours at source. Eliminating bulk collection and long-haul transportation to landfills or incinerators.

Complements recycling and waste reduction programs. Community-based opportunities for sustainable and self-managed waste disposal and for beneficial reuse of the char.

ZERO LANDFILL







WASTE DOES NOT NEED TO BE SORTED
GLASS AND METAL REMAIN UNTREATED AND CAN BE RECYCLED
CHAR – BIOCHAR AND PYROLYSATES – CAN BE UPCYCLED









PHOENIX
WASTE SOLUTIONS

ZERO FUEL

THE PHOENIX IS AN INNOVATION THAT USES MAGNETIC-INDUCED PLASMA
FOR THERMAL DEGRADATION PYROLYSIS
FOR ALL KINDS OF MUNICIPLE SOLID WASTE AND OTHER WASTE STREAMS



LOCALIZED PROCESSING AT SOURCE

carbon

REDUCED CARBON FOOTPRINT

SMALL AMOUNT OF ELECTRICTY REQUIRED FOR PUMPS & BLOWERS

DEQ
LOUISIANA

PERMIT EXEMPTED

LOW EMISSIONS



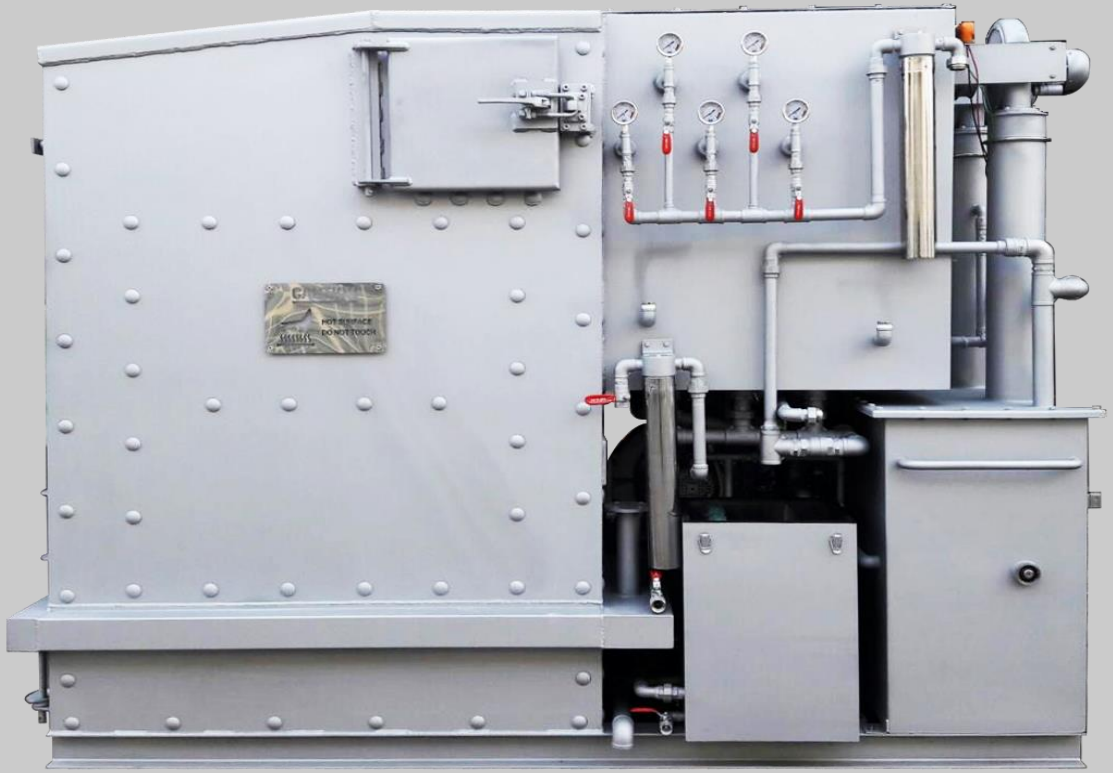
EPA COMPLIANT

#Full compliance to the US EPA Standards in air emissions
#Zero water discharge
Non-toxic carbon ash as a by-product

CLOSED LOOP SYSTEM

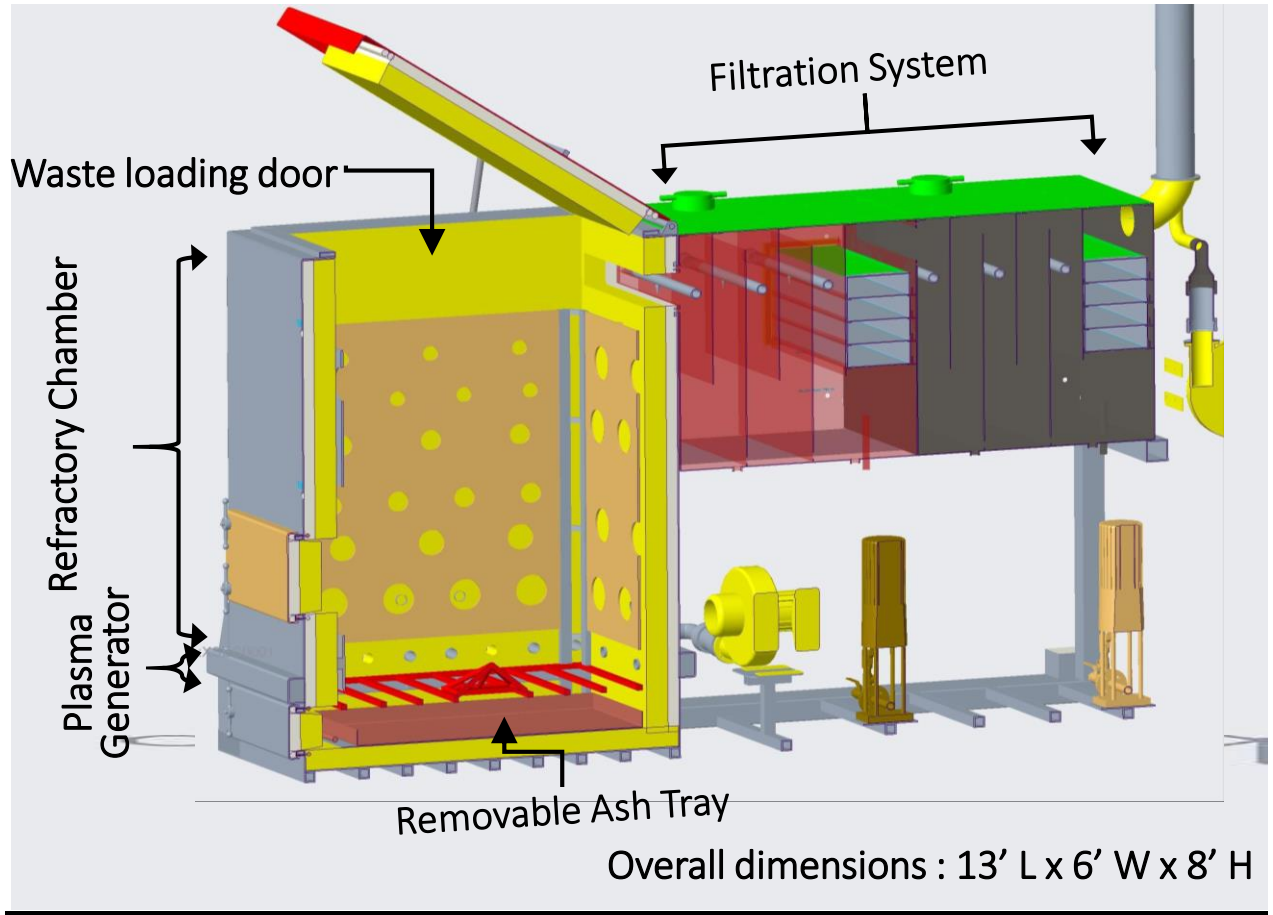
#No secondary contamination
#Treats away its filtration media (used consumables)
Pollution inhibited from forming at a molecular level

A magnetic pyrolysis apparatus
that thermally decomposes mixed solid waste into char using magnetically-induced plasma and ionization techniques in an oxygen starved environment. The resultant gas by products are filtered to remove smoke, odor and pollutants.



THE PHOENIX

A REVOLUTIONARY ZERO-FUEL WASTE-TO-CARBON TECHNOLOGY



PHOENIX WASTE SOLUTIONS

Technology Brief

Manufactured in USA
Enhancing innovations developed in Asia

Key Technical Components:

- **MAGNETIC PLASMA GENERATOR :** A strong magnetic field converts air molecules into plasma. The ionized gas acts as a high energy catalyst. This exothermic reaction is accelerated in the heated refractory chamber. The highly reactive negative ions also inhibit the formation of pollutants normally associated with incineration.

- **REFRACTORY CHAMBER:** Made from a special formulated mineral material that acts to transfer high heat up to 800 Celsius to waste materials to thermally degrade them in a low oxygen environment. The pyrolysis process works on the waste to oxidize, carbonize and decompose it into char.

- **GAS STREAM FILTRATION SYSTEM:** In the two-stage filtration process, a high alkaline solution neutralizes acid gas and strips out toxins. Carbon pellets remove smoke, odor and heavy metals for clean air emissions.



WASTE IS TRANFORMED TO 4-10% NON-TOXIC CHAR

70% to 80% CARBON CONTENT

BENEFICIAL REUSE as BUILDING MATERIAL and SOIL ENHANCEMENT.

CARBON CAPTURE & DRAW DOWN.

PHOENIX
WASTE SOLUTIONS

DIFFERENT FEEDSTOCK PRODUCE DIFFERENT TYPES OF CHAR

BIOMASS→ BIOCHAR



For soil amendment :
Increases moisture, soil PH and microbial properties of soil
increases water quality due to retention of pollutants
increases crop yield and enables afforestation

Carbon sequestration
Fixes CO_2 that would be released by rotting or combustion of biomass
Promotes soil carbon storage

SOLID WASTE → CARBON PYROLYSATES





Char from solid waste can be :
made into bricks and pavers
reduce sand and cement in construction
used in road making

Reducing Carbon footprint
Cement is the source of about 8% of the world's carbon dioxide (more than aviation fuel which creates 2.5%)
Sand is world's second highest volume of raw material used after water



What is Biochar?

Biochar is wood, straw or leaves that have been heated in the absence of oxygen. Biochar and biochar-compost mixtures can improve soil fertility, restore degraded land, and mitigate the emissions of greenhouse gasses associated with agriculture.

The history of Biochar

In the Amazon forest, people added biochar to soils over thousands of years to help grow food in the poor tropical soils. These soils continue to "hold" carbon today and remain so nutrient rich that they have been dug up and sold as potting soil in Brazilian markets.

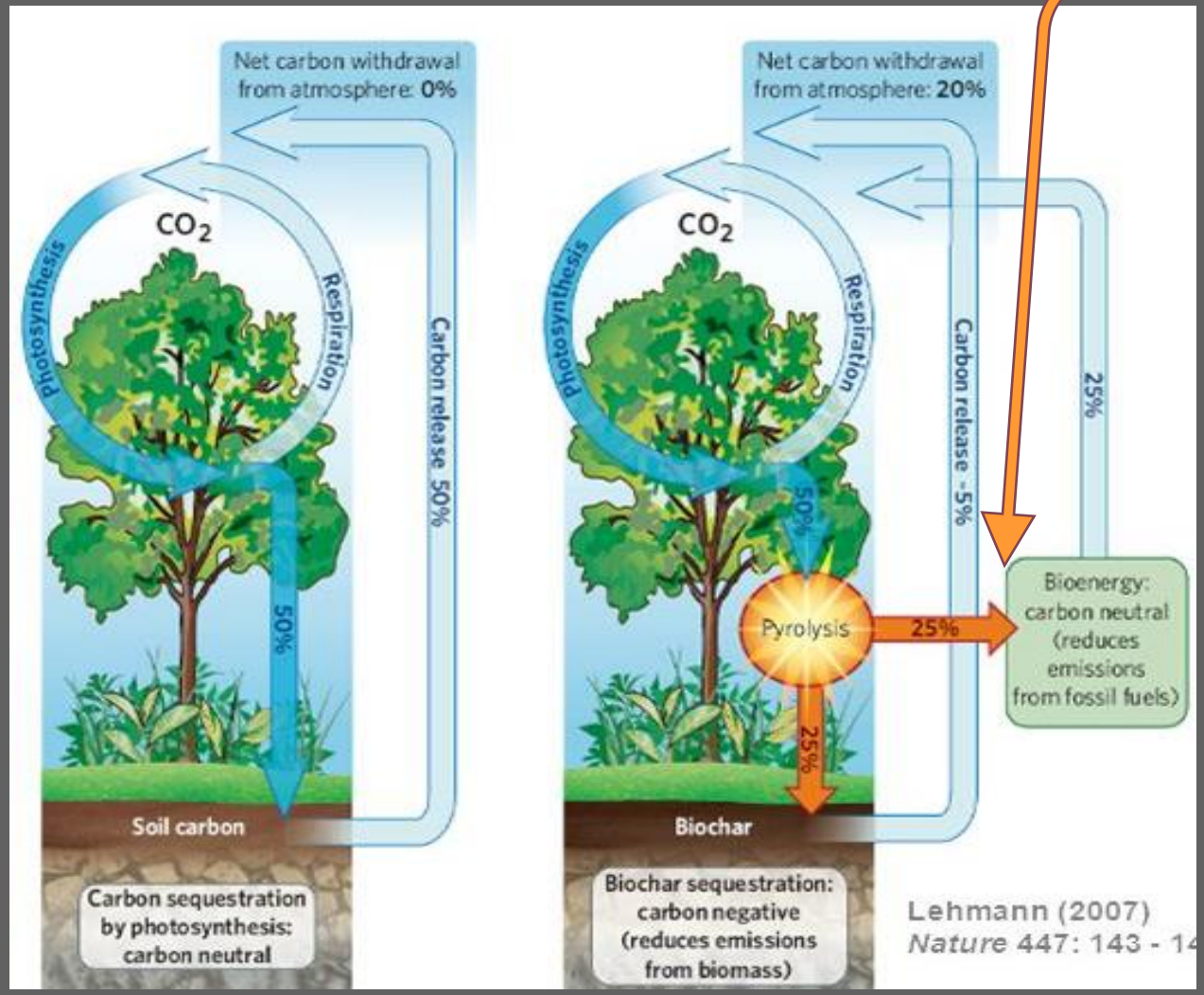
Benefits of Biochar to soil

- Enhances plant growth and crop yields.
- Increases water and air holding quality.
- Carbon's immense surface area provides a secure habitat for micro-organisms and fungi.
- Biochar enhanced soils reduce carbon dioxide (CO2) and nitrous oxide (N2O) emissions by 50-80%, and runoff of phosphorous into surface water.
- Reduces the need for fertilizers.
- Reduces soil acidity.

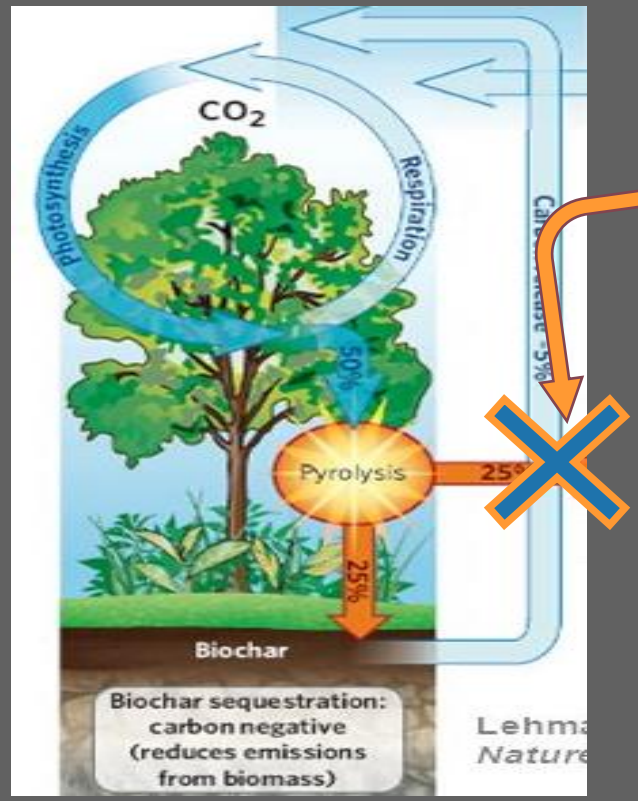
BIOCHAR Value Proposition

BIOCHAR IS A CLIMATE SOLUTION

Carbon is captured in solid form instead of being released as CO2 when biomass is burnt or rotted.



Biochar produced by conventional pyrolysis involves generating heat by burning bioenergy (usually firewood or syngas which is self-generated by the conventional pyrolysis process).
While bioenergy is carbon neutral because it is not fossil fuel based, it still releases CO2 into the atmosphere.



The Phoenix uses magnetic pyrolysis.
Heat is generated from magnetically induced plasma.
No fuels are burnt to create the thermal degradation.
No CO2 is produced.
Potentially more efficient carbon drawdown.



Phoenix upcycles **mixed waste** into **char** that can be made into bricks, plaster and paving material.

According to the United Nations, buildings account for 48% of all warming emissions worldwide, producing more greenhouse gasses than either the transportation or industrial sectors.

Char from treated waste can be added to sand and cement 5- 20% of volume

Cement creates 8% of the world's carbon dioxide.
That's more than from aviation fuel

To make 1 tone of cement, 1.8 tons of limestone (calcium carbonate) is turned into lime (calcium oxide) at temperatures topping 1000 °C. That conversion releases 0.8 tons of CO2. 40% of cement's total emissions come from fossil fuels used to heat cement kilns, while 10% is from transportation and quarrying. 4 billion tons of cement are produced each year. By 2030, demand would have quadrupled from 1990 levels.

The biggest mining industry you have never heard of

Sand is the second most widely consumed resource after water. Sand mining is destructive to the environment, destroying aquatic habitat, lowering water tables and eroding fertile land..



One km of road requires 30,000 tons of sand.
One house might contain 200 tons.



Bricks made from char have better insulation quality and are lighter. This means more energy efficient homes that use less power for heating and cooling.

PHOENIX

The Pollution Solution

A new green technology that balances:

- Thriving Environment
- Equitable Society
- Ample Economy

The Phoenix is an enabler of sustainable development goals that address People, Planet, Prosperity
Peace and Partnerships.



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Thank You

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Nomad Adventure Earth Camp 2019