AirBurners

Air Curtain Technology

Agenda

Company overview

Explain Air Curtain Technology

Problems with wood and vegetative waste

Air Burners approach to Biomass energy

BioChar production from our machines

Air Curtain Burner

AirBurners

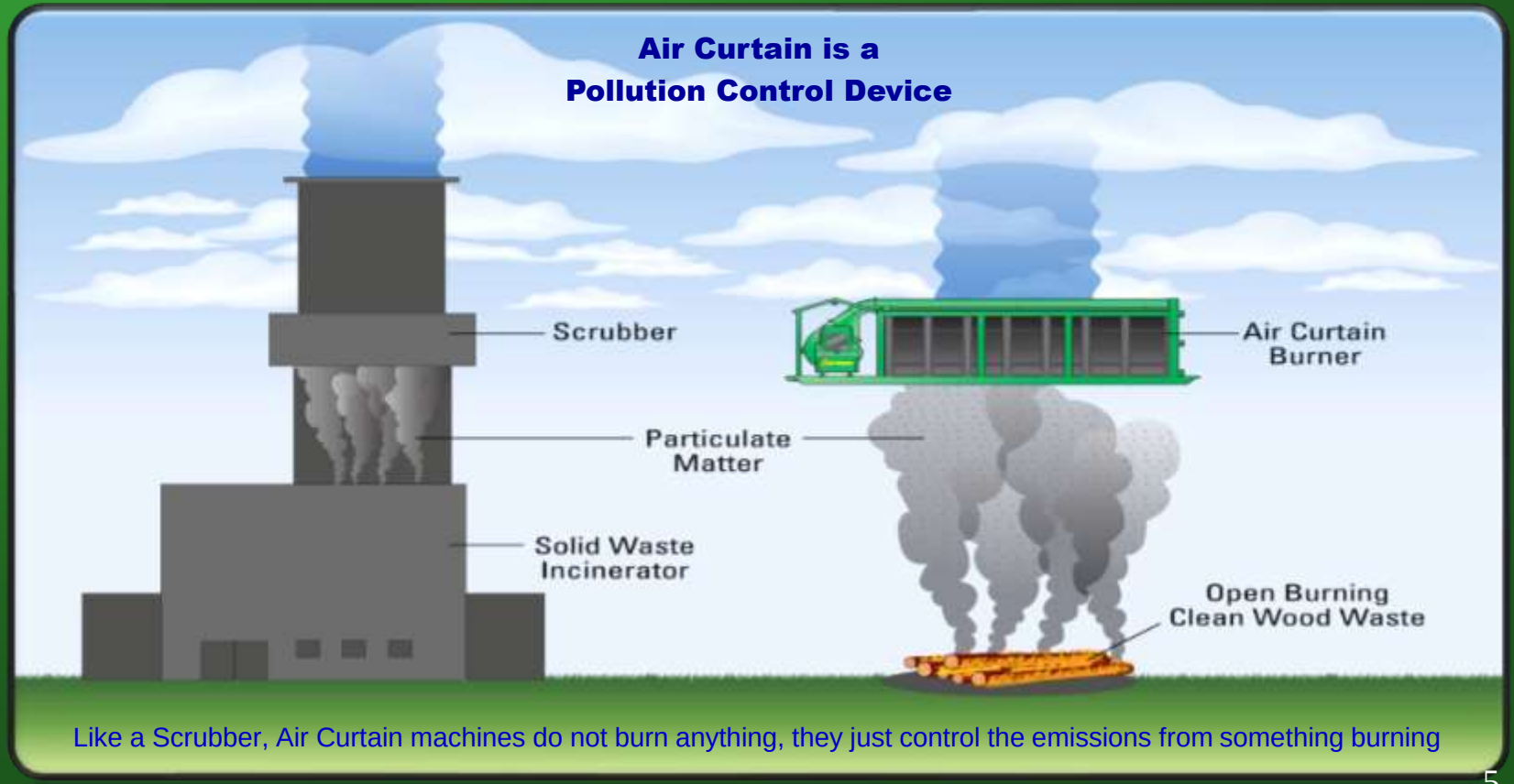
- Largest manufacturer of Air Curtain Burners
- In business over 20 years
- Primary manufacturing in Palm City, Florida
- Our machines are on every continent except Antarctica
- 15 Different models of Air Curtain Burners

Air Curtain Technology

How does it work?

Air Curtain Burner

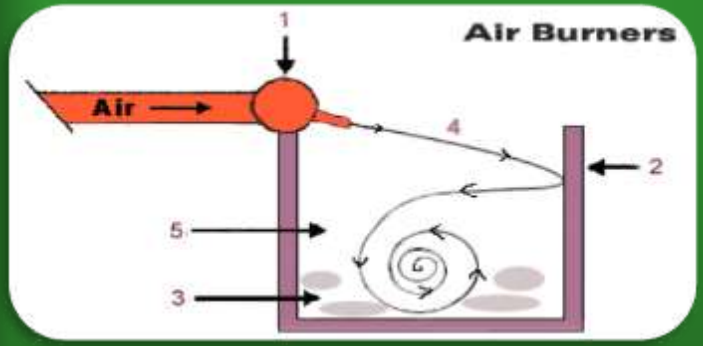
AirBurners



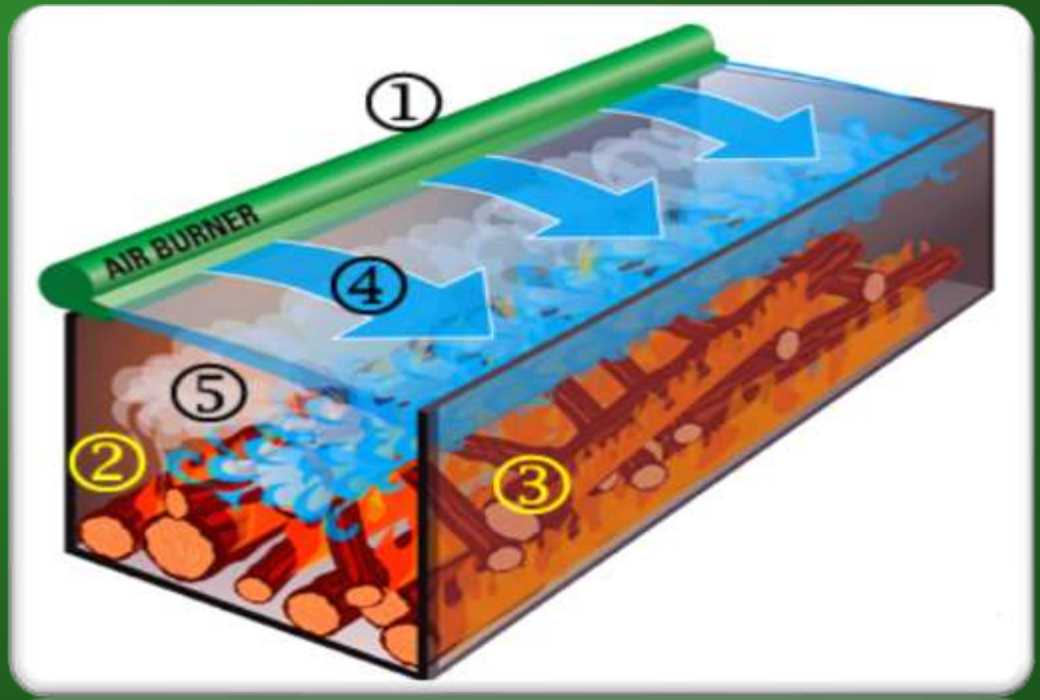
Like a Scrubber, Air Curtain machines do not burn anything, they just control the emissions from something burning

Horizontal Air Curtain

Creates secondary burn chamber



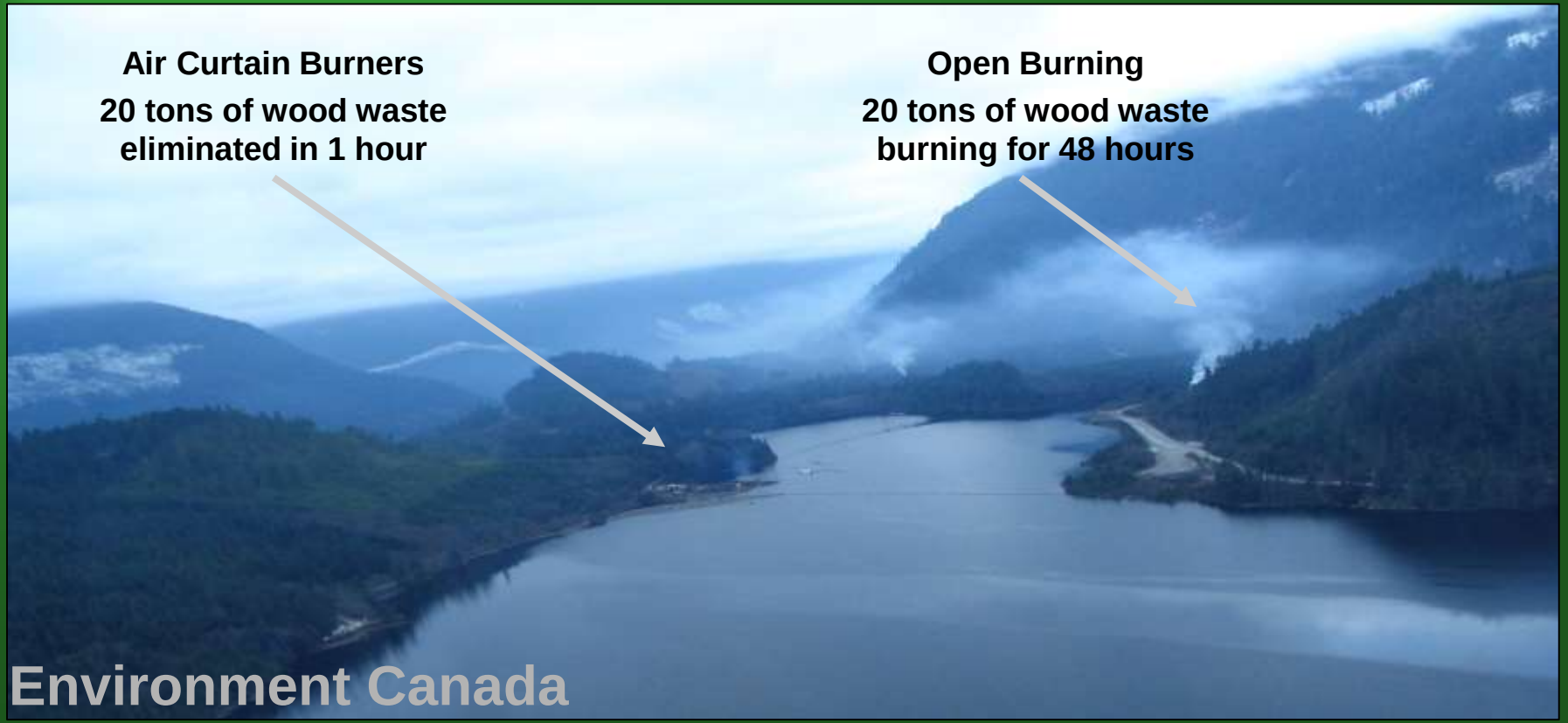
1=Air Manifold
2=Firebox Refractory Wall
3=Wood Waste or Wood Fuel
4= Air Curtain (left to right)
5=Smoke (PM)



1. High velocity curtain (4) traps particles under the curtain
2. Particles under curtain (5) are reburned

Actual Comparison Testing To Open Burning

Lowest Cost and Fast



Particulate Matter release for 20 tons of wood waste

Primary Purpose

Controlling Particulate Matter – Smoke – Black Carbon

Proven Technology

Well tested technology in the US and other countries

Air Burners, Inc. is a proud CRADA partner with the USEPA and the USDAFS

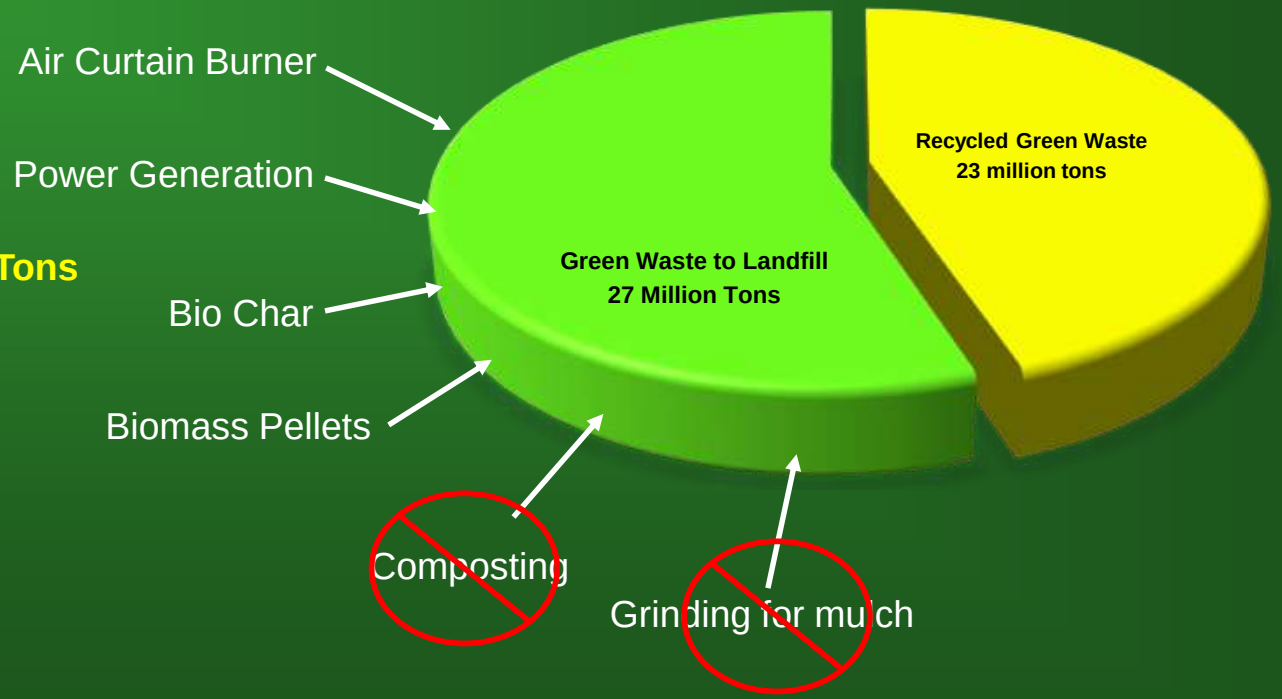
Why is Veg Waste an important issue?

- **Approximately 20 percent of the World's waste is vegetative (World Bank)**

- **There are very few opportunities to recycle vegetative waste**

- **Most Numbers on vegetative waste do not include <u>Tree Mortality</u>**

We are losing the battle in the US
We need more options



US collected green waste 50M Tons
Recycling less than half
Does not include:
- **Tree Mortality**
- **State and National Parks**
- **Agriculture**
- **Invasive species**

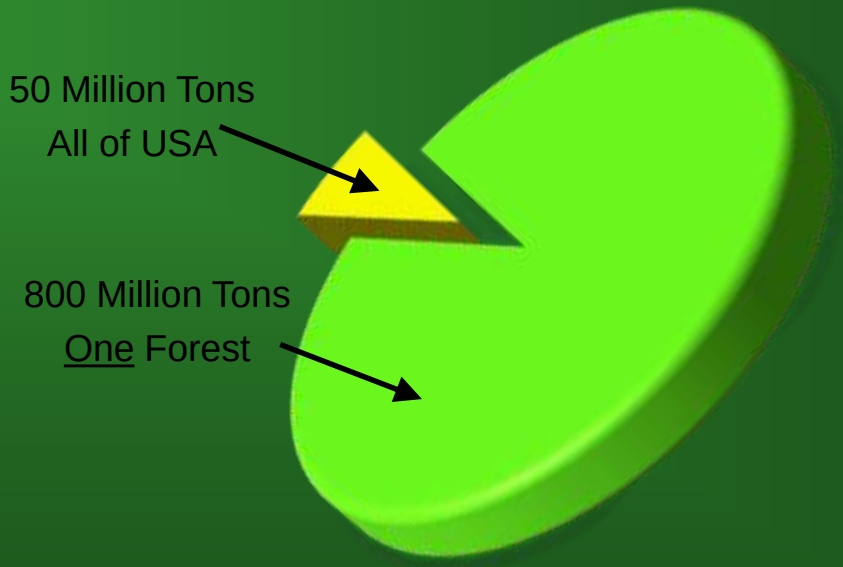
2014 data from USEPA and World Bank

The Mulch and Compost markets are currently over supplied

Tree Mortality is a major issue

Total collected Vegetative waste in the USA is **50** million tons
(USEPA 2014)

Sierra Nevada Mountains Tree Mortality
102 million dead standing trees
800 million tons (USFS 2016)



A New Design Approach for Biomass Energy

Air Burners Priorities in Biomass Power Generation

#1 - Eliminating Wood and Vegetative Waste

#2 - Make electrical and thermal energy

Difficulties with Biomass Energy Today

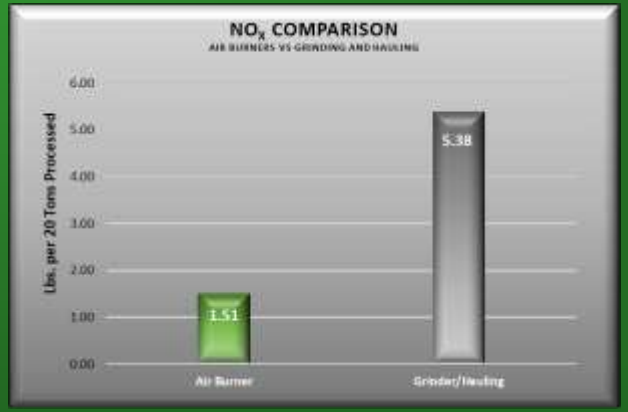
Inefficient waste elimination option

Systems are designed to extract maximum energy from veg waste

High preprocessing costs and environmental impact

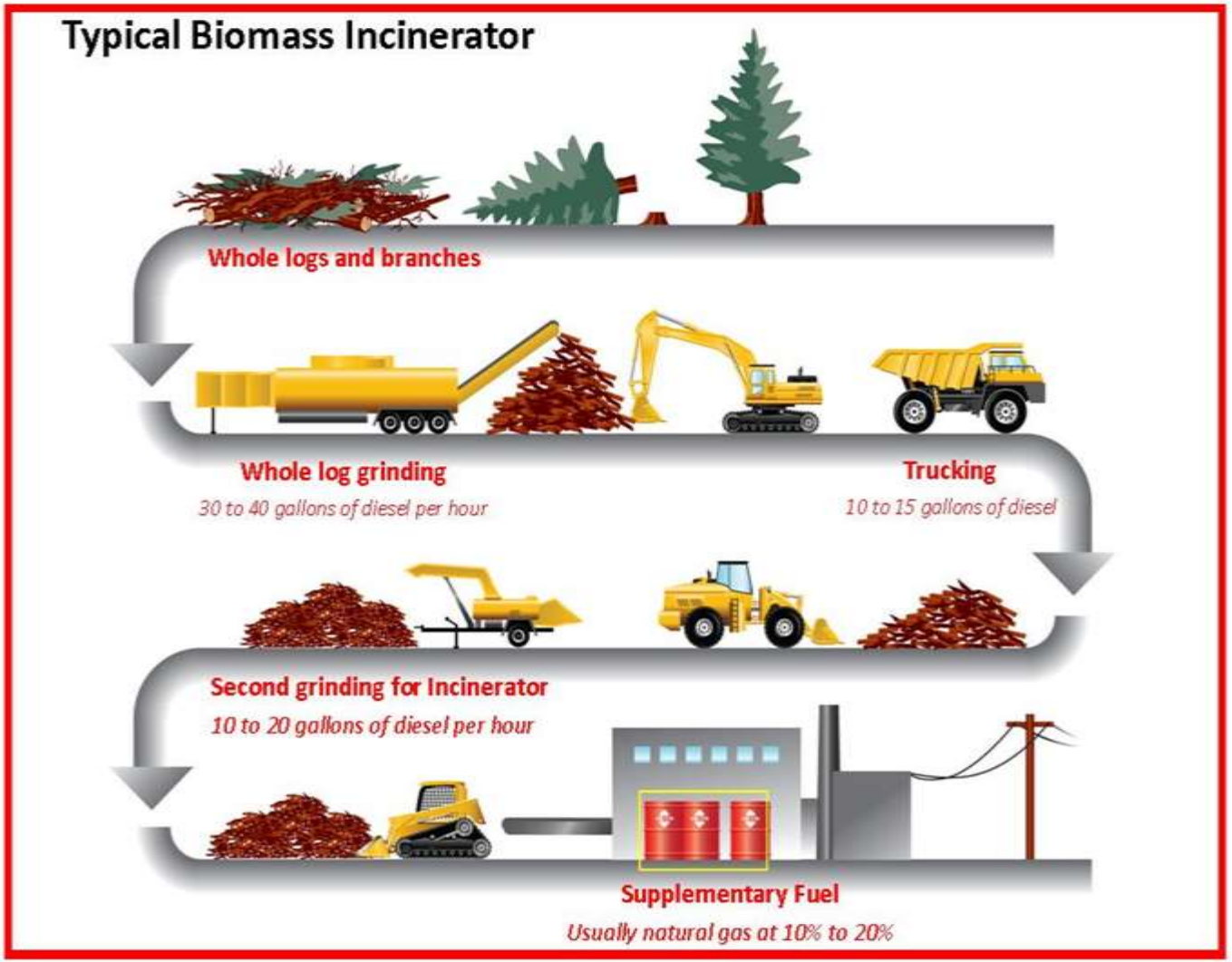
Most systems require double grinding as preprocessing

Air Curtain Burner vs Grinding and Hauling



Most common veg waste disposal method is Grind and Haul to landfill

Same grinding process is needed for most Biomass power systems



AirBurners

The Difficulties

Current Biomass Processing

- Expensive
- High Emissions
- Supplemental fuel
- High capital costs
- Permanent structure
- Focus is on efficient energy production not waste elimination

AirBurners

The Solution

PGFireBox

- No processing
- Whole logs and root balls
- No supplemental fuels
- Movable system
- Lowest emissions
- Easy installation
- Focus is on waste elimination with energy production as an added benefit

Our Approach

Combines Air Curtain Technology and ORC

ORC = Organic Rankine Cycle

PGFireBox

AirBurners

Cooling Module

FireBox Module

Power Module

100kW Electrical
1 MegaWatt Thermal

PGFireBox

AirBurners

500kW Electrical
2.5 MegaWatt Thermal

PGFireBox

AirBurners

1 MegaWatt Electrical
5 MegaWatt Thermal

PGFireBox

AirBurners

What are the advantages of this system?

Lowest environmental impact

Easy placement, not a permanent structure

High throughput compared to other schemes

Can be relocated to accommodate the “waste travel zone”

No supplemental fuels needed

It’s a machine not a building, easier finance and resale

No expensive pre-processing operations like grinding/sorting

Ideal support for “Distributed Power Generation”

PGFireBox

AirBurners

PGFireBox

AirBurners

Heat and Power

Eliminate 7 tons per hour

Generate 100kW electricity

Generate 1 MW Thermal Energy

Up to 10 CY of BioChar per day

MSRP $860,000 USD

PGFireBox

AirBurners

PGF100
100 kW system

Self-Powered system

20 Tons per hour burning

Power for all three FireBoxes

Not a permanent structure

No grinding or preprocessing

MSRP $933,000 USD

BioChar Production Air Burners Customer in the Southern US

- Averaging 10 Cubic Yards per day using a Model S327 FireBox
- Sell through a broker, $120 for 1 cubic yard
- Market varies throughout the country
- Most of our customers can sell 25% to 75% of their BioChar

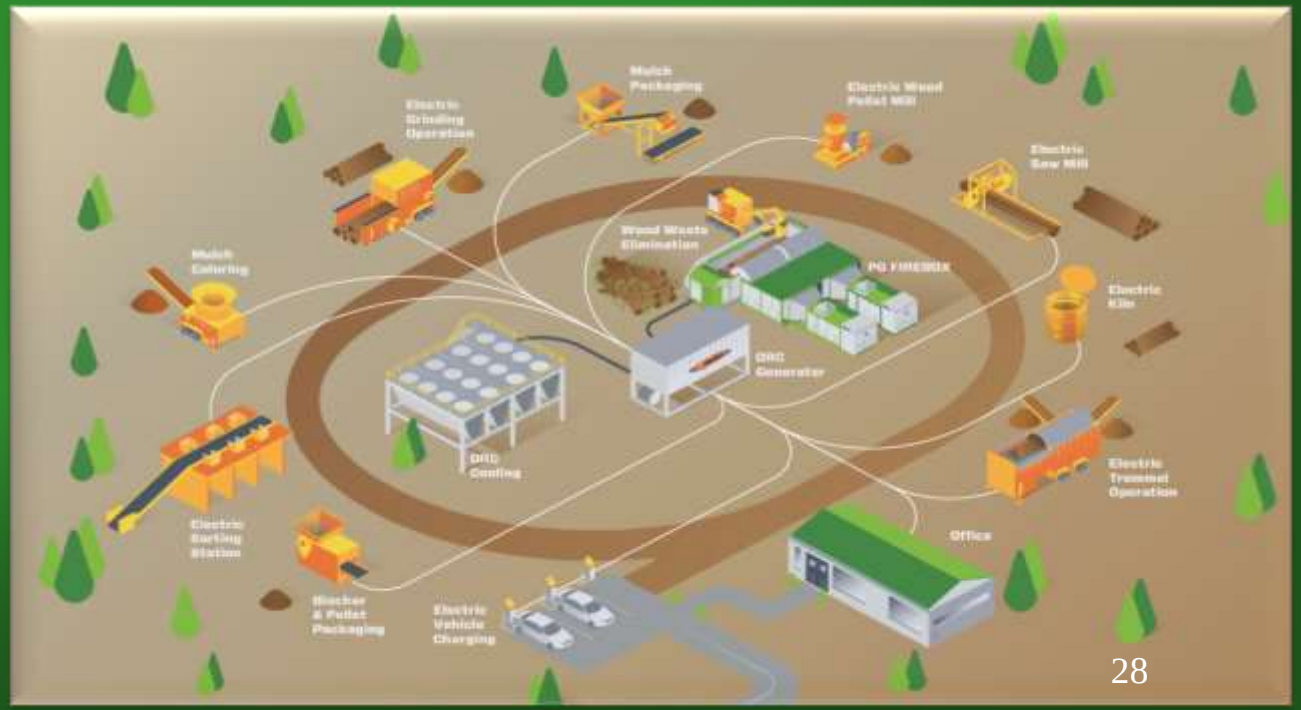
Rake Ash

1 Rake out the ash
2 Quench with water
3 Screen to size
4 Bag and ship

BioChar

Closed Circle Recycling

- 1 Megawatt PGF in the center eliminating waste and generating power
- Power is distributed to other waste recycling machines
- Lowers production cost of recycled product
- Does not consume any outside power



LAST SLIDE

THANK YOU

www.AirBurners.com