RST

Recycling Solutions Technology

Global Crisis

- Each year, nations generate 1.3 billion tons of waste. That's expected to soar to 4 billion tons by 2100
- More than half the world's population does not have access to regular trash collection, a grim statistic given the amount of garbage produced globally.
- Some experts say the globe's trash troubles are at a crisis level

Our Problems to Solve

- one of the most daunting issues facing the world is the mounting waste problem, which impairs public health, pollutes the environment and threatens to drown some poor countries in toxicity.
- The United States, China, Brazil, Japan and Germany are the leading trash generators.

Our oceans need help

- 8 Million tons of plastic is entering our ocean every year

Have you ever walked along a beautiful beach and been surprised to find a piece of plastic at your feet?


The Answer
Global Green Giving

Our mission

- Working with our partners to process MSW without polluting environment for using RST green energy gasifier
- Supply general public with electricity or steam/heat from industry standard RST gasifier
- Eliminate all landfills
- Together we can find solutions

Waste management

- Landfill and Open Burning
  - Requires large land, toxic leachate, methane and need manage 30 years
- Recovery and Recycling
  - Reduces amount of MSW but does not solve waste problem
- Waste to Energy
  - Incineration, moving grate
  - Fluidized bed: Bubbling and Circulating
  - Pyrolysis
  - Plasma gasification
  - Gasification

Waste-to-Energy

- Waste-to-energy or energy-from-waste is the process of generating energy in the form of electricity and/or heat from the primary treatment of waste

- W2E is a form of energy recovery

Terminology

- MSW: Municipal Solid Waste
- WTE: Waste to Energy
- Hopper: Giant Funnel
- Feedstock: MSW
- Tipping Fee: fee paid by anyone who disposes of waste
- Syngas: Synthetic Gas
- FRIT: Bottom Ash
- FERROUS METAL: Metals that are composed of Iron and have magnetic property

RST Low Temperature Gasifier Technology

- Initial developmental operations began in 2003
- Received final air quality and operations permit in November 2009
- Permit: Fully permitted operational facility

Patent: US 9,885,478 B1

Inez Kentucky Plant – USA (3 to 5 Acre)

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Types of Waste

- MSW

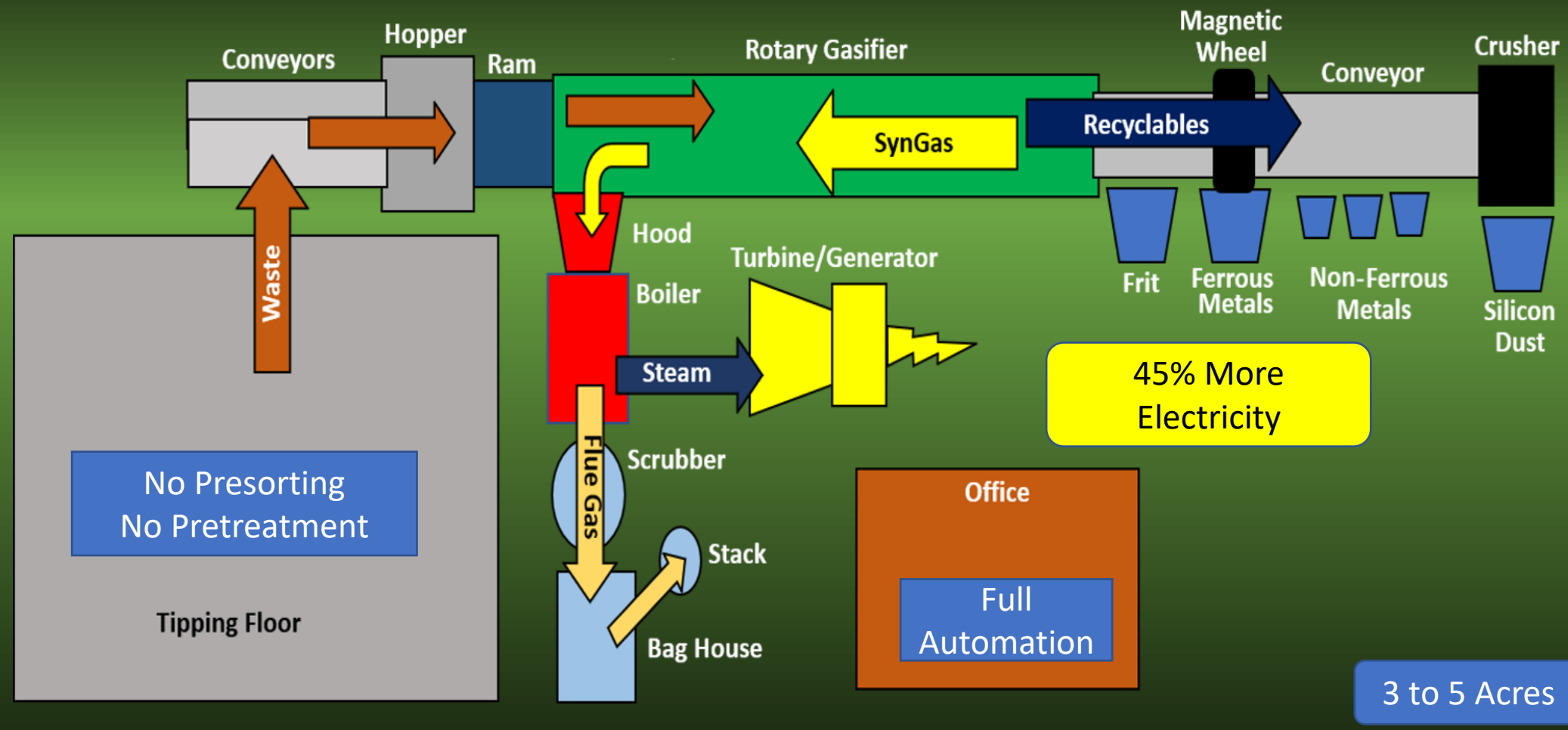
- Plastics

- Tires

- Plastic Straws

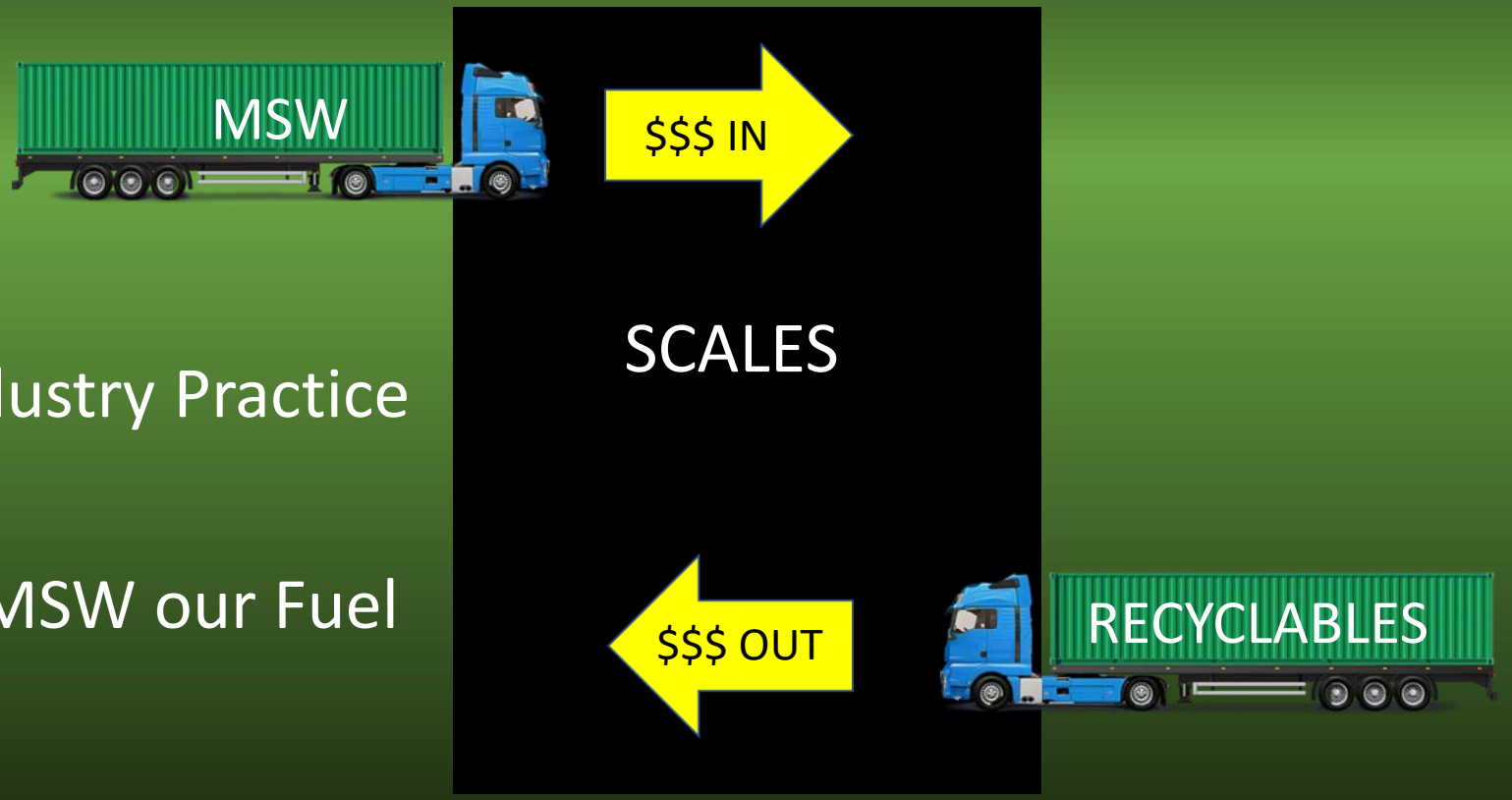
- Sludge

- Styrofoam


Conveyors
Hopper
Ram
Rotary Gasifier
Magnetic Wheel
Conveyor
Crusher
SynGas
Recyclables
Waste
Hood
Boiler
Turbine/Generator
Steam
Frit
Ferrous Metals
Non-Ferrous Metals
Silicon Dust
45% More Electricity
No Presorting
No Pretreatment
Tipping Floor
Flue Gas
Scrubber
Stack
Bag House
Office
Full Automation
3 to 5 Acres

scale

Scales—Tipping Fees(500 Ton/D)



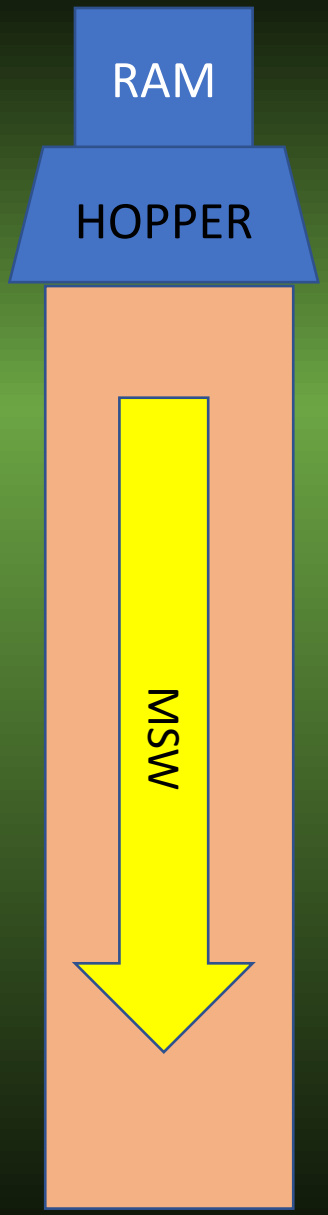
- Standard Industry Practice
- Money In—MSW our Fuel

Tipping Floor(No Pretreatment No Presorting)

- Size of Gymnasium
- Enclosed
- Sloped Floor
- ID Fans aid in drying MSW and controls smell
- Heated Floor 100°-140°F
- Moisture <25% for best result
- Front Loader Churns and moves MSW/FUEL to Conveyor or
- Use crane to pick up and load MSW into hopper

Conveyor to Hopper to Ram

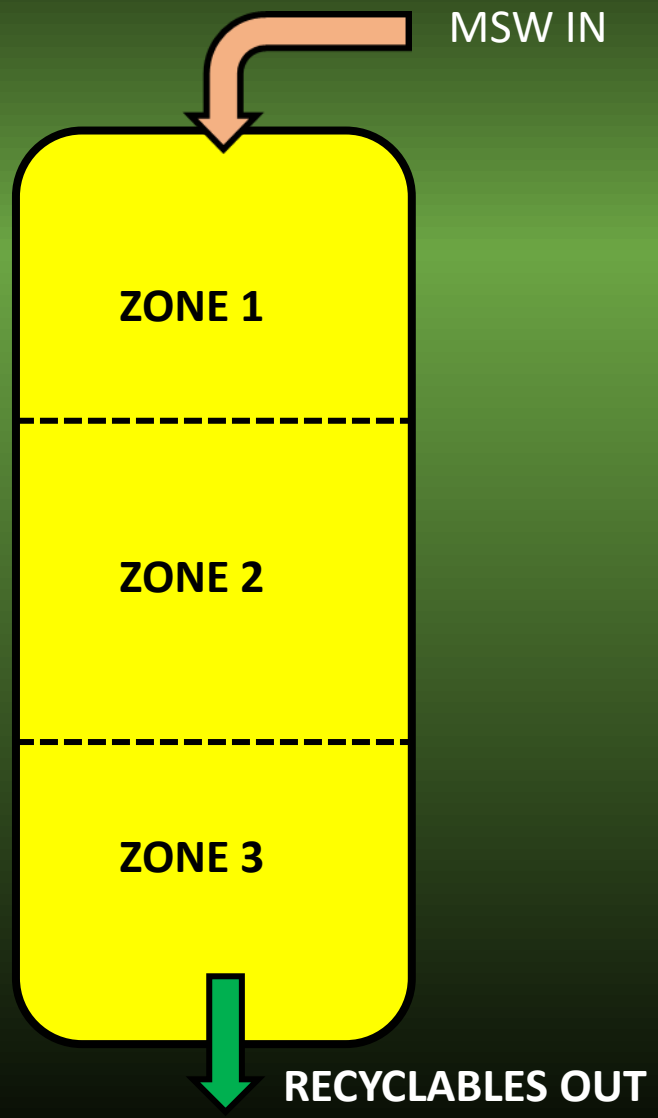
- Conveyor transports MSW to Hopper (Giant Funnel)
- Hydraulic Ram constantly loads Gasifier (5 HP) 4’H x 5’W
- MSW passes through Gate to achieve Oxygen Deprived environment (1% O2)



Rotary Gasifier

- 120ft long
- Sloped 4˚
- Rotates at 2 RPM
- No external fuel source except at initial start up
- Time: 45 mins
- Temp ranges 400°F – 850°F

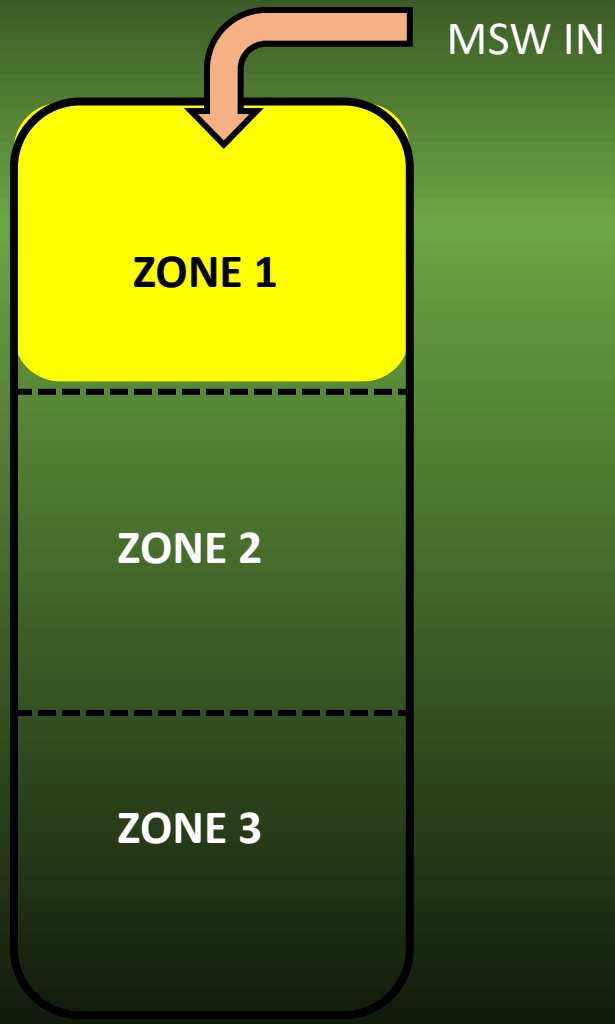
Gasifier



3 Zones in Gasifier

- Zone 1—Heating/Drying
- Zone 2—Gasification/Golden Zone
- Zone 3—Cooling

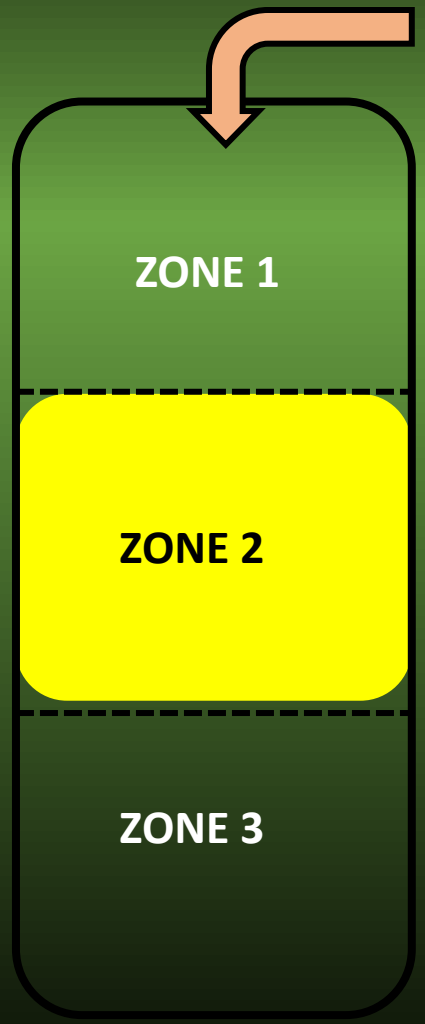
Gasifier Zone 1



Zone 1

- MSW enters gasifier
- Approximately 400 degrees
- MSW heats and dries
- Prepares MSW for Gasification

Gasifier Zone 2/Golden Zone



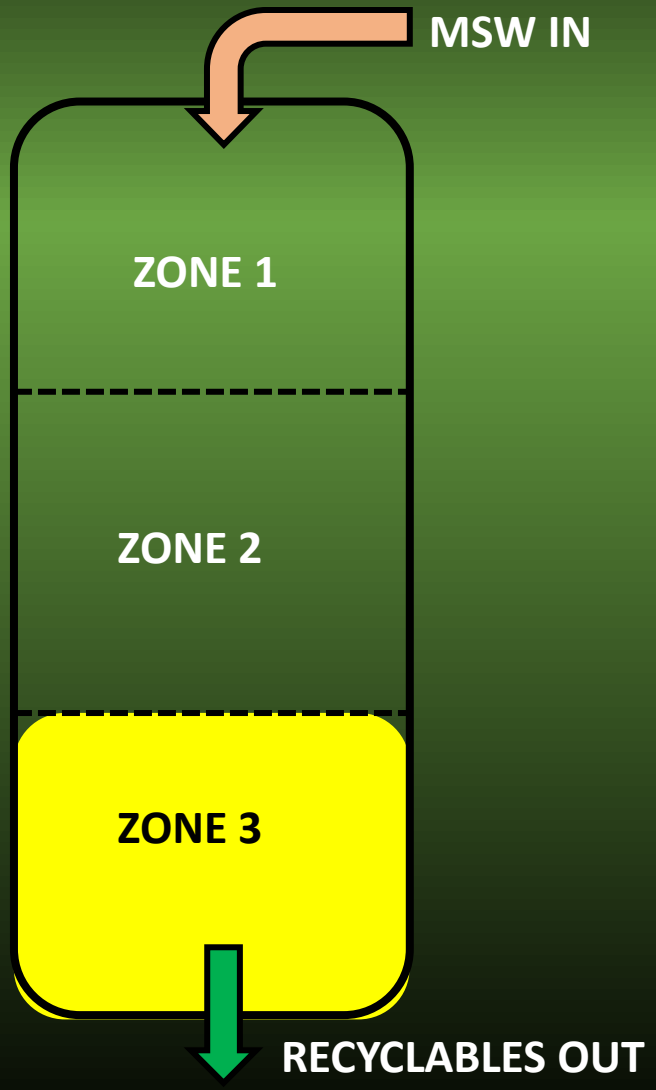
Zone 2

- All Organics are reduced to Syngas including all paper, plastics, etc…
- 1,000 standard cubic feet (SCF) of syngas produced per pound of MSW
- Syngas Composition—Nitrogen, Hydrogen, Oxygen, Methane, Carbon Monoxide and Carbon Dioxide

Raising the Calorific Value

- Our engineers will work with you to raise the Calorific Value of the MSW to reach the highest level possible

Gasifier Zone 3

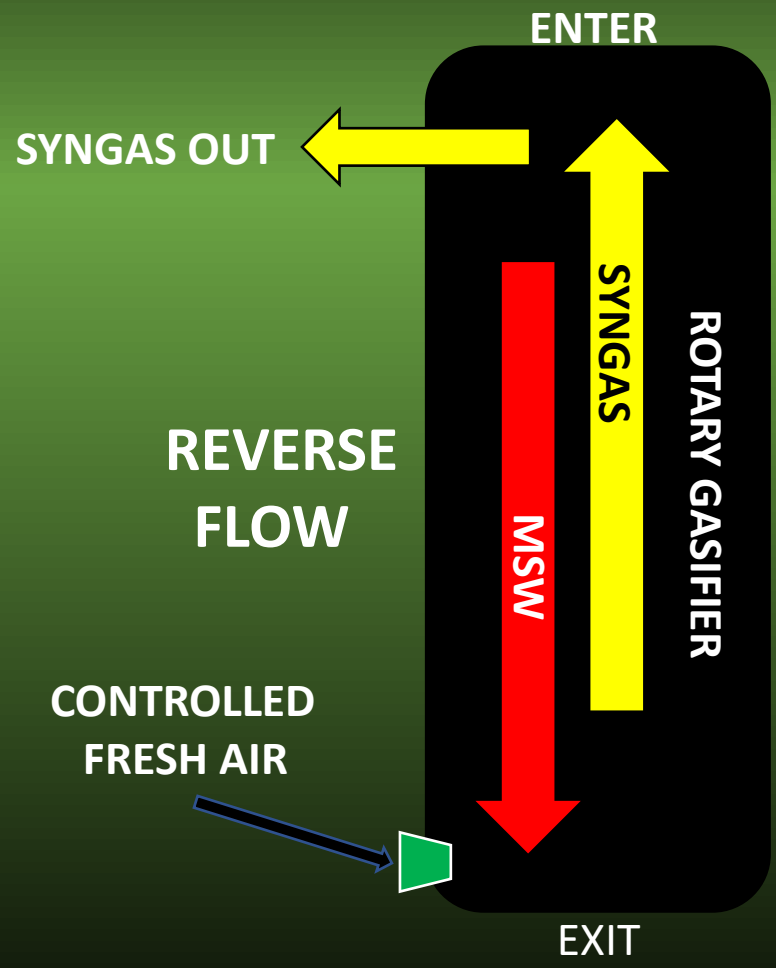


Zone 3

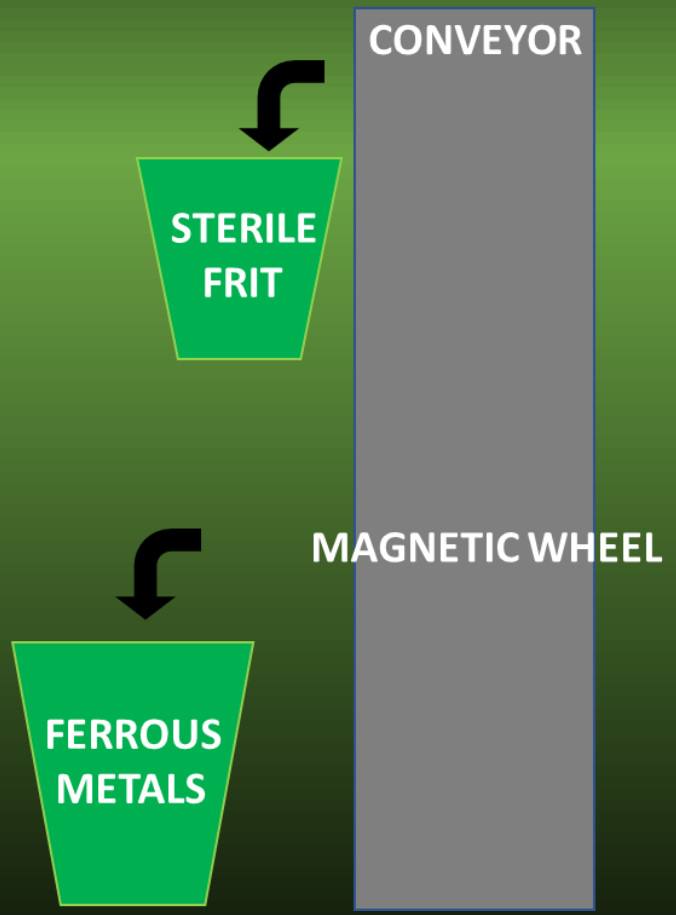
- Fresh air introduced
- Increases Syngas
- Assists Syngas in Reverse Flow
- Cools byproducts for exit from Gasifier

Gasifier(No external Fuel)

- System is Reverse Flow—As MSW works down the Gasifier, Syngas works back up to front
- Syngas helps heat MSW—Then is extracted through the Hood



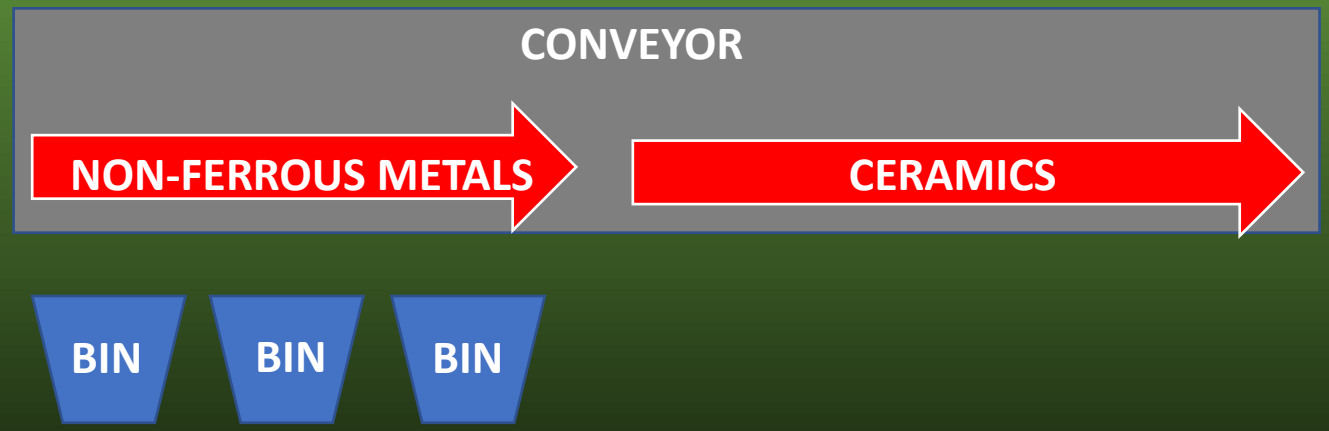
Recyclables Retrieval



- Byproducts exit Gasifier onto Vibrating Screen Conveyor Belt
- Frit (7%) passes through screen into bin for recycle—Asphalt
- Ferrous Metals removed by Magnetic Wheel to Bin for recycle

Recyclables Retrieval

- Non-Ferrous Metals are handpicked and sorted for recycle



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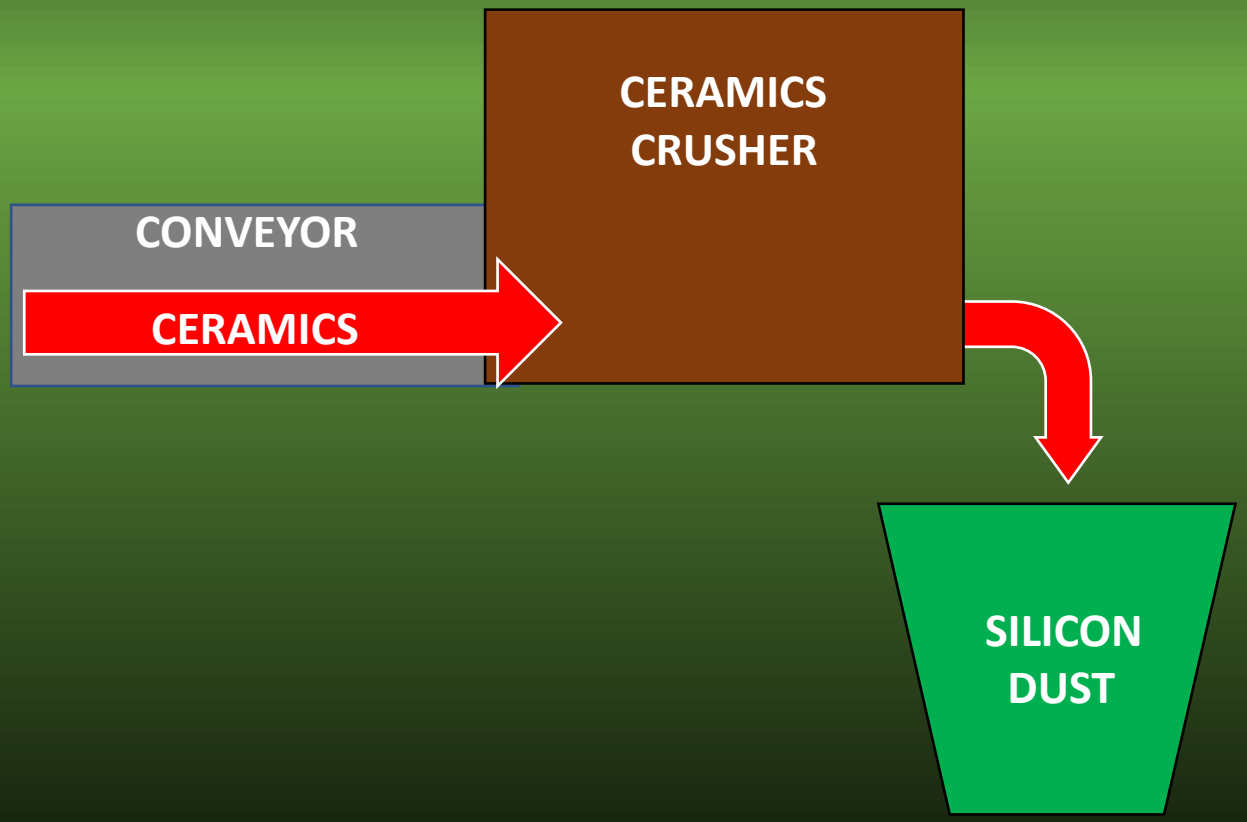
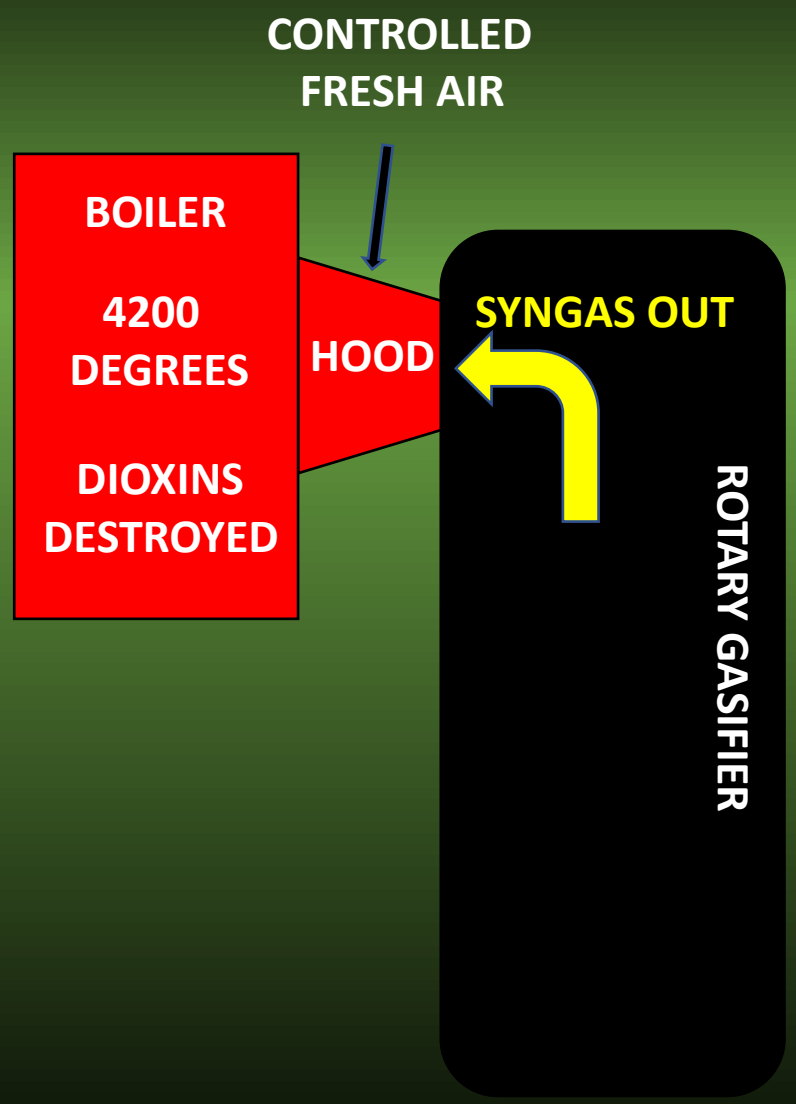


- Ceramics & Glass continue to crusher—Pulverized to Silicon Dust and collected in Bin for recycle—Concrete additive

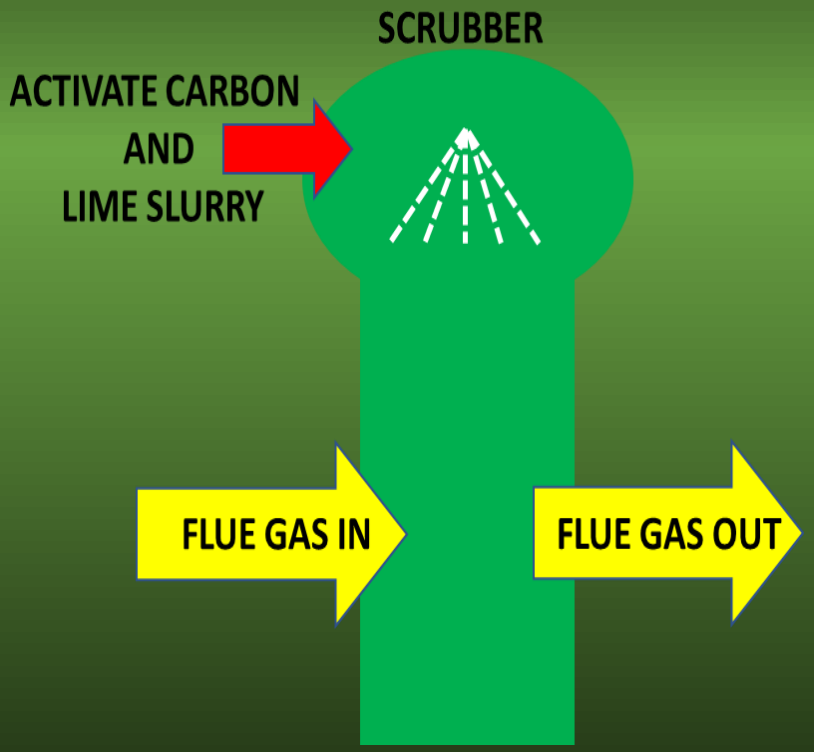
- All materials are free of toxins and safe
- 100% Recyclable
- No landfill

Syngas

- Reverse Flow allows Syngas to increase heat to 1800˚F
- Syngas is ignited as it enters Boiler—This is the only Flame in the entire process
- RST patented technology allows combusted Syngas to reach 4200˚F
- High temp destroys Syngas and 95% of toxins including Dioxins



Scrubber



- Remaining Flue Gas moves to Scrubber
- Flue Gas is sprayed with Activated Carbon and Lime Slurry to remove Acidic Gasses and Heavy Metals
- Rapid cooling to 290° F prevents Dioxin reformation
- Uses 20,000 Gallons of water per day

Baghouse

Bag House filters small particulates remaining in Flue Gas

Intermittent shaking allows Fly Ash to drop from Filters (Socks)

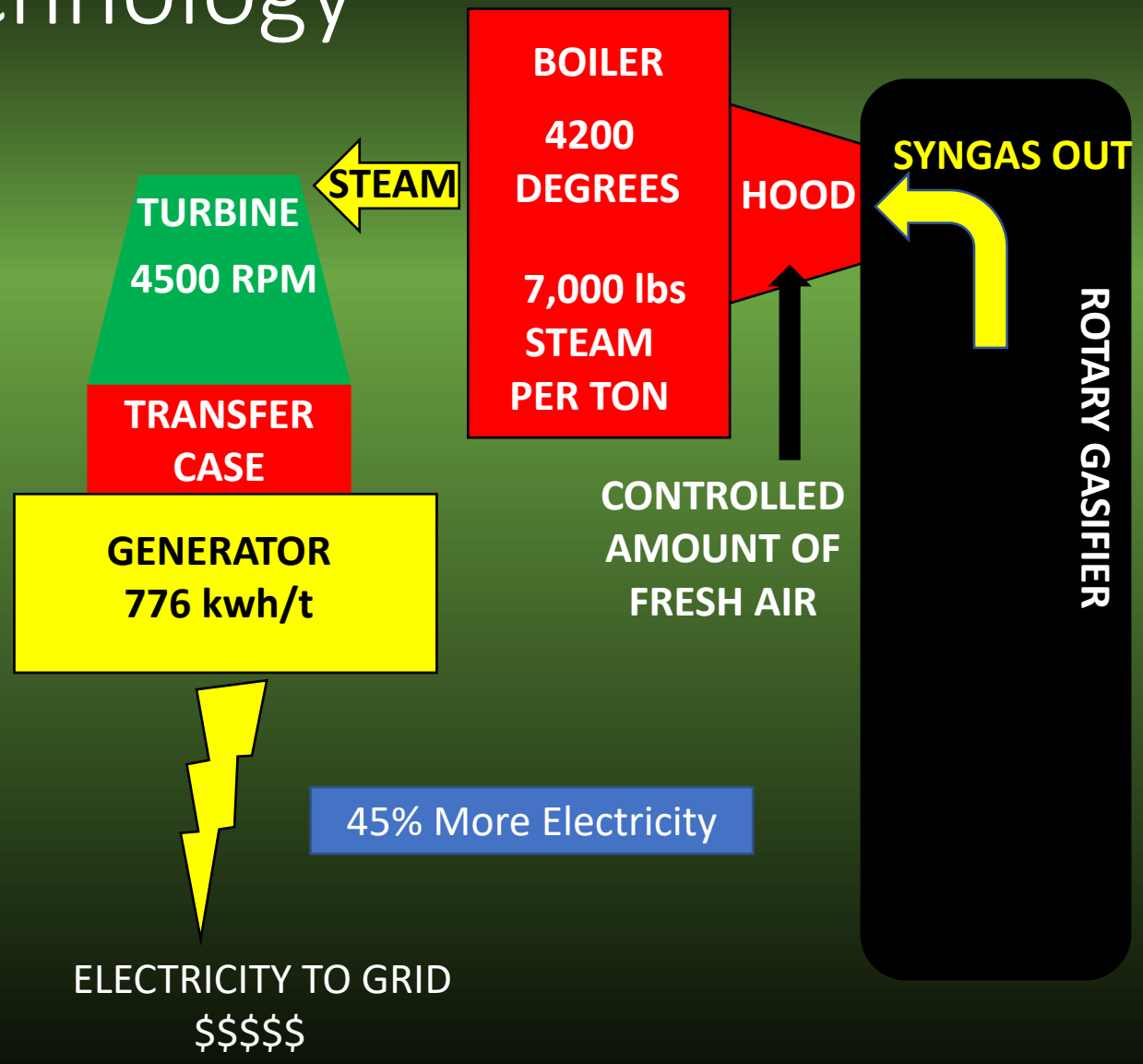
Fly Ash (2%) is deposited in Bin for recycle—Mixed with Frit for Asphalt

Flue Gas—Stack

- Flue Gas travels from Bag House to Stack
- Stack releases clean and cooled Flue Gas to the atmosphere
- Constant Emissions Monitoring System (CEMS) assures our exhaust meets all EPA standards
- Every 3 seconds digital update
- Every 7 minutes paper read out
- 3.2ng/DSCM

Money—Boiler Technology

- RST Patented Technology combusts Syngas to 4200˚F using a controlled amount of Fresh Air and an Eternal Flame
- Boiler creates 7,000 Lbs of steam per ton of MSW
- Steam reaches 750˚F at 750 psi
- The Steam powers the Turbine
- Turbine powers Generator
- Electricity is sold to Grid



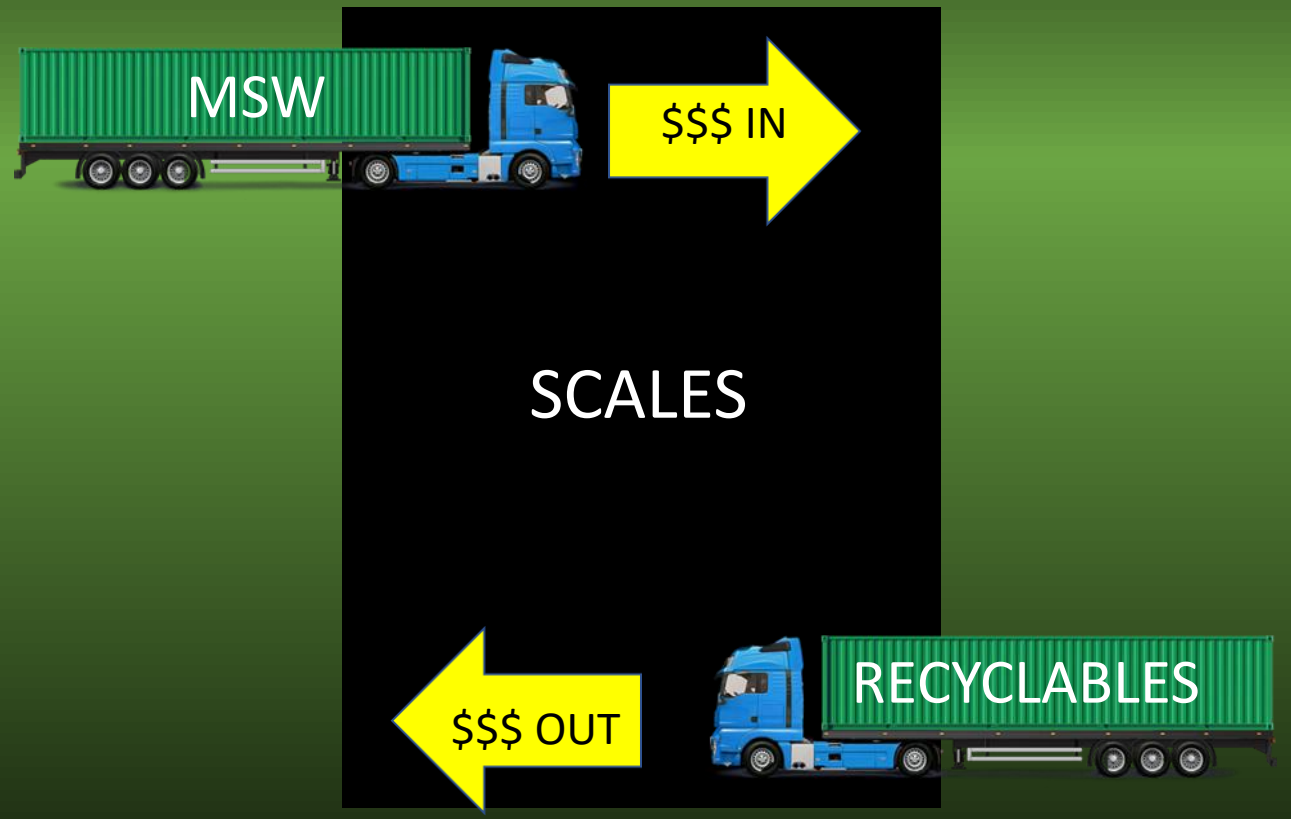
500 Ton plant = 16 MW

- Can power 12,000 – 16,000 U.S. homes

Tipping Fees(500 Ton plant)

- $20 USD x 500tpd=$10,000/Day
- $10,000 x 335 days= $3,350,000 USD generated per year in Tipping Fees

- Money Out—Byproducts are 100% Recyclable



Gold—500 Ton Per Day Plant

- 776kwh/t x 500t = 388,000 kwh per day
- 388,000 x .10 PPA = $38,800 USD per day
- $38,800 USD x 335 days of operation = $12,998,000 USD per year
- $12,998,000 + $3,350,000 = $16,348,000
- O&M = $2,500,000 USD per year
- $ 16,348,000 - $2,500,000 = $13,848,000 USD Profit Per Year

Total Revenue

- $13,848,000

  +

- Profits from recyclables depending on MSW composition

RST Package Includes(Scalability)

- RST Technology Rotary Gasifier
- RST Technology—Boiler Burner Control System
- RST Automated System Control
- Blueprints
- Drawings for Potential Plant Configurations
- Specs on all needed equipment
- Our team will work hand-in-hand with your providers to assure Specs are met
- We also offer our I.T. team familiar with our process to assist with monitoring of data and storage for an extra fee

Maintenance

- Maintenance is required biannually (2 times per year)
- Plant will be shut down for 8 days and 14 days to perform required maintenance
- Plant run time expectancy—90-92% (335 days)
- Refractory repair anticipated every 8 years

Continued Support

EPC RESPONSIBILITIES

- EPC builds plant
- Installs technology
- Trains operators—stays for 1 year
- 1-time training at KY plant if needed
- EPC starts up plant when ready

RST WARRANTY

- 2-year warranty of gasification technology
- 1-year warranty on boiler technology
- Expected life of technology 20 years

- Produces **45% more electricity** than any other WTE technology with comparable feedstock
- Feedstock requires **no pre-treatment or pre-sorting**
- **100% recyclable** byproducts—**NO LANDFILL**
- Small foot print—**3-5 acres**
- Requires **no fuel** other than MSW
- **Scalability**—Grows with your needs
- Meets **Clients' needs** to handle feedstock

QUESTIONS?