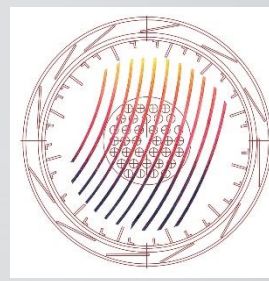


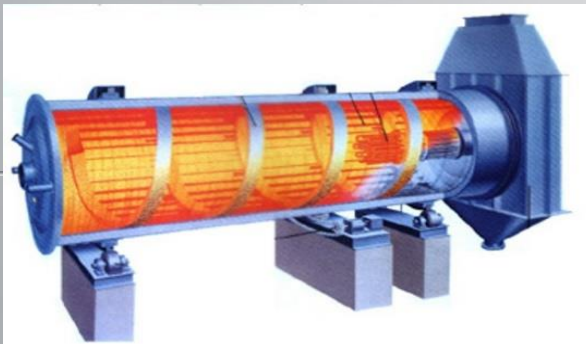
FUSION



A DIFFERENT APPROACH IN WASTE MANAGEMENT

FLEX WASTE SOLUTIONS

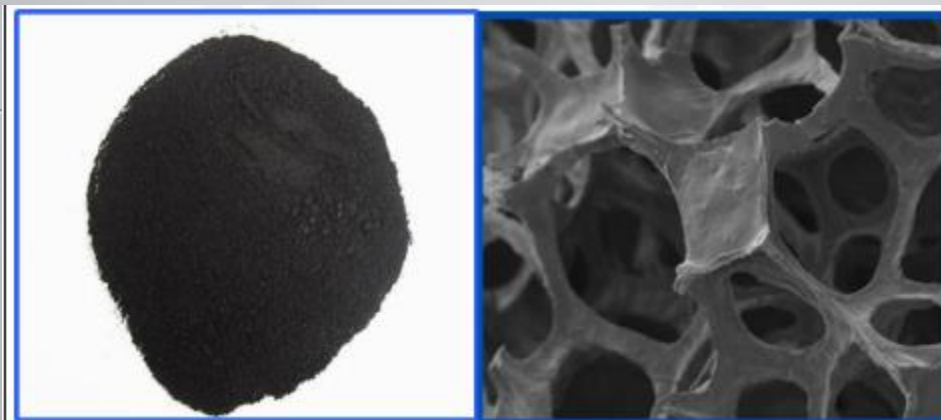
THERMAL TREATMENT OF MUNICIPAL SOLID WASTE



SMALL SCALE THERMAL TREATMENT FACILITIES FOR RENEWABLE ENERGY GENERATION

Make use of energy resources in MSW.
Stop dumping energy and other resources in the
Landfills creating methane emissions and
ground water contamination.

Turn your Biodegradable Waste into BIO CHAR.



Treatment Plant for Municipal Solid Waste :

1: Fuel preparation and Separation

2: Residual fraction/RCRV-WTE

**3: Organic fraction/Hydro Thermal
Carbonization**

Average Composition of Municipal Solid Waste

- **Glass = 4.5% SAND/SOIL = 3.3% = 7.8%**
- **Metals = 9.1% = 9.1%**
- **Food Waste =14.6% Yard trimmings/ Wood=19.7% =34.3%
with 70% moisture content**
- **Paper/Occ =27% Plastics= 12.8% Rubber/Textile=9%=48.8%
with 25% moisture content**
- **Sewer Sludge 95% water= Needs to be dewatered to 15% water
and 85% Solids prior Thermal treatment.**



Fuel Preparation Municipal Solid Waste

- 1:Pre-Shredder for bag opening and sizing
- 2:Ferrous and Non-Ferrous removal by magnet separation
- 3:Disc screen to remove inert materials
- 4:Organic Liquefying press for the separation of organic fraction and rest fraction of MSW waste.
- 5:Secondary shredder for final sizing of residual fraction of MSW.
- 6:Screw press for dewatering organic fraction

**Residual fraction
MSW**



RDF

RCRV -WTE

**Organic
fraction**



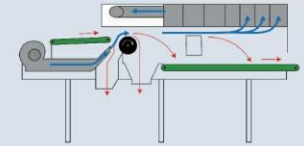
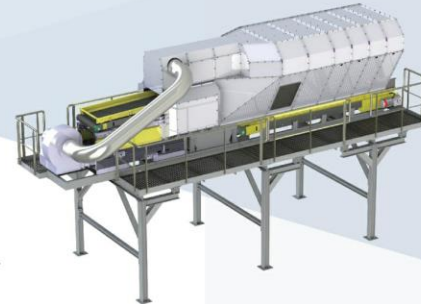
Hydro Thermal Carbonization

BIOCHAR



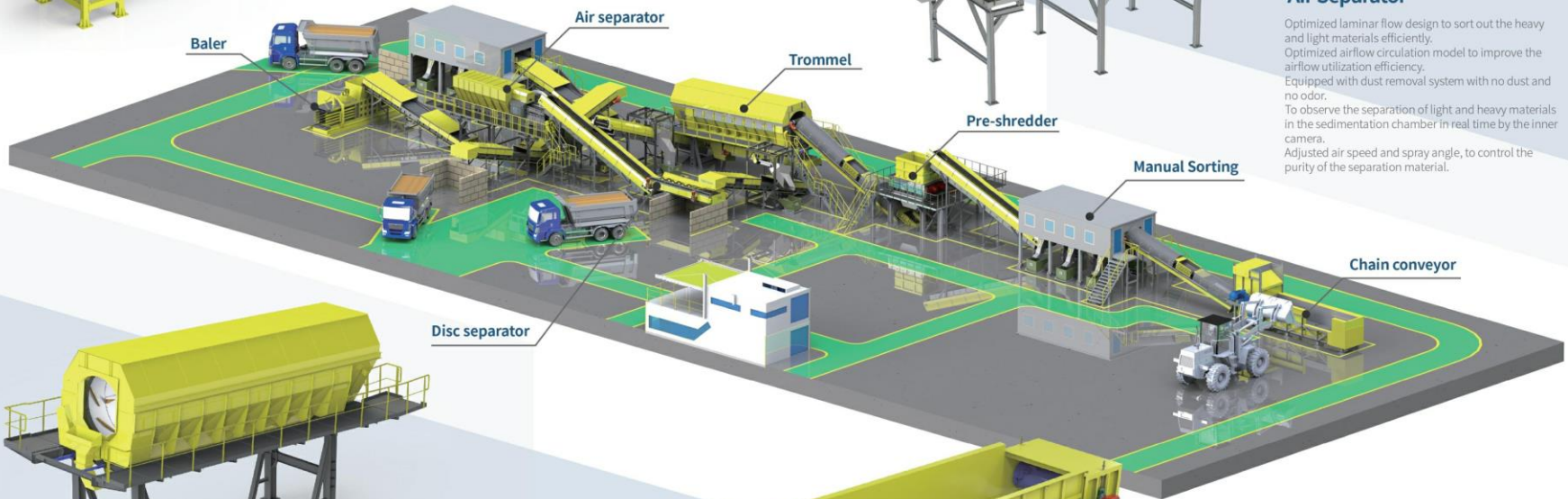
MSW Pre-shredder

Combination of broken bag and pre-shredding.
To shred the wood, plastic, fabric, furniture, metal and other material of the municipal waste.
The output size is about 200-300mm, which can solve the problem of blocking and winding, improve the sorting efficiency. Imported blade steel from Europe, which is strong and durable. Hard surfacing repairing blade, which greatly reduce the maintenance cost.
Modular design, easy for dis-assembly, assembly, and maintenance.



Air Separator

Optimized laminar flow design to sort out the heavy and light materials efficiently.
Optimized airflow circulation model to improve the airflow utilization efficiency.
Equipped with dust removal system with no dust and no odor.
To observe the separation of light and heavy materials in the sedimentation chamber in real time by the inner camera.
Adjusted air speed and spray angle, to control the purity of the separation material.



Baler

Air separator

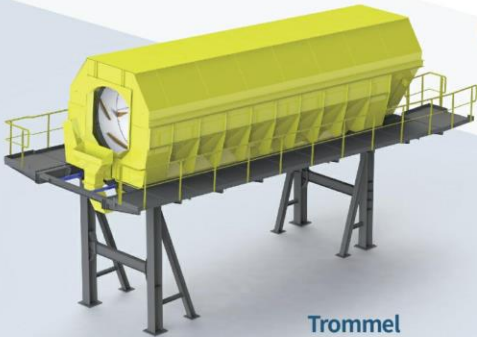
Trommel

Pre-shredder

Manual Sorting

Chain conveyor

Disc separator



Trommel

Inner broken bag blade to improve the sorting efficiency.
Four single point friction drive with supporting wheel, to ensure smooth operation and low noise.
Sealed trommel to prevent the leakage of the odor and dust.
Equipped with maintenance platform and several maintenance doors, which is easy for maintenance.

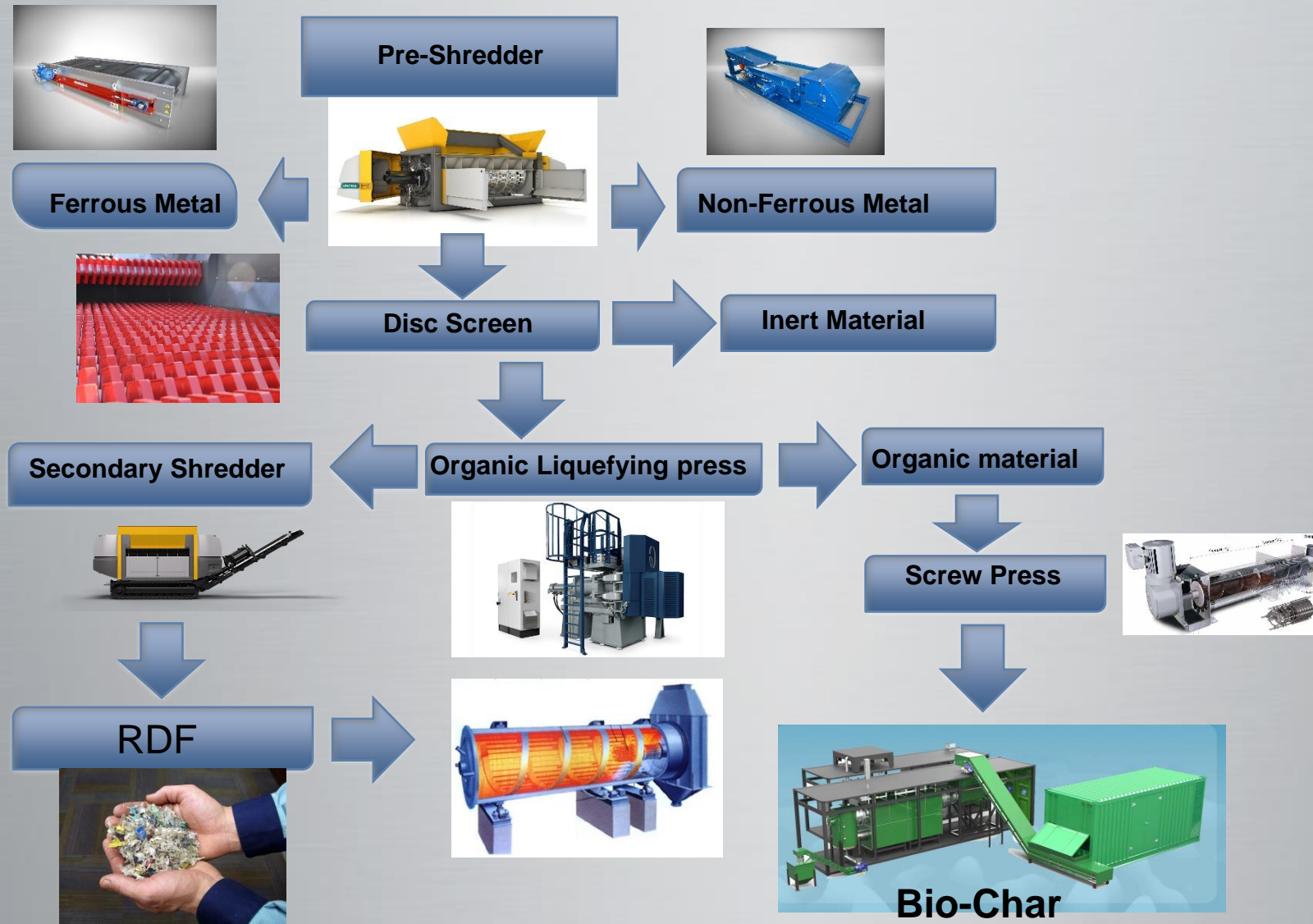


Chain Conveyor

The Dosing drum break up material
Control the inputting steam
Speed changing
Variable Frequency Control
Steel board conveyor



FLOW CHART FUEL PREPARATION



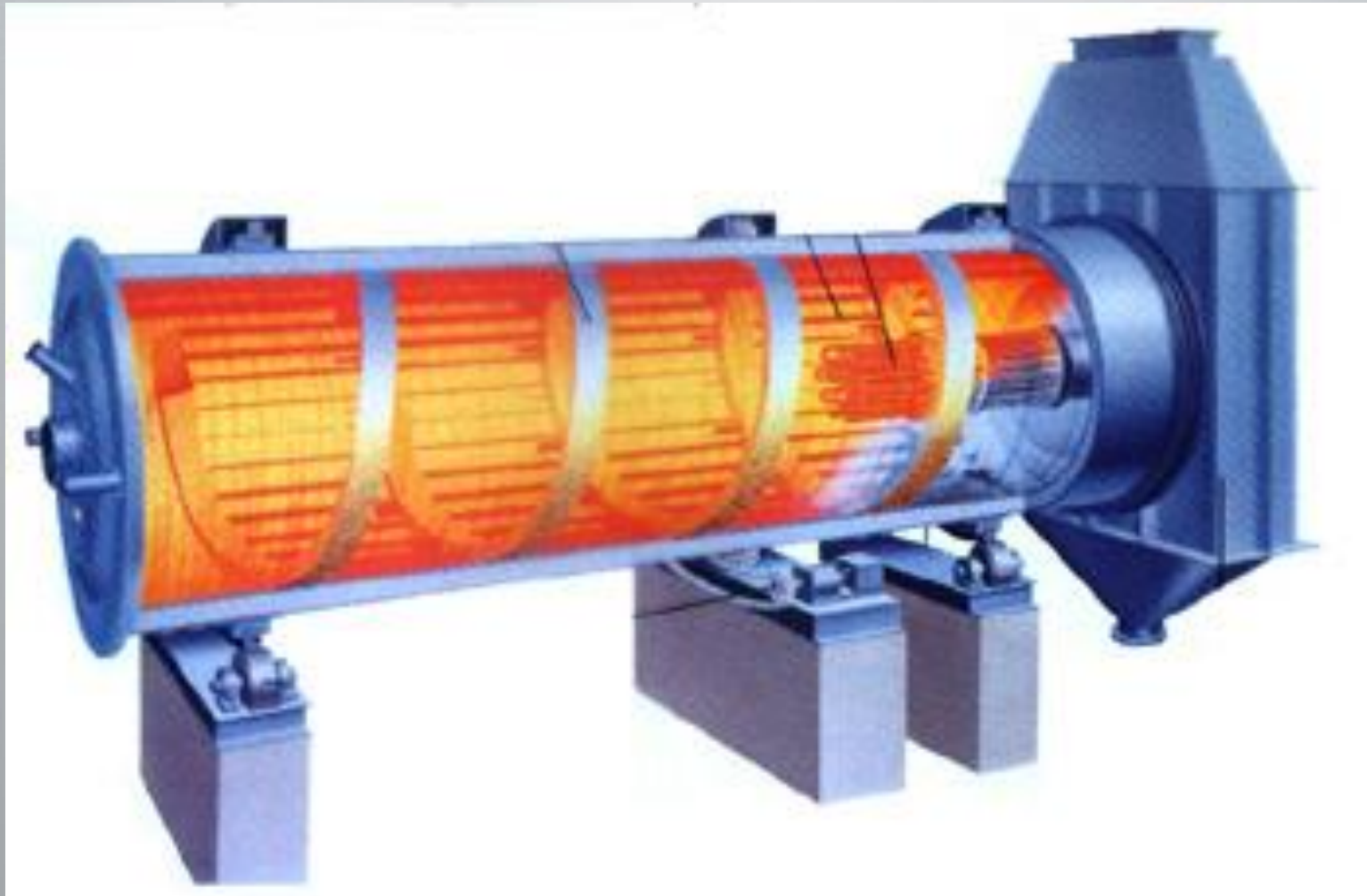
ACCEPTABLE WASTE FOR RCRV

- Non-Hazardous combustible materials that have a minimum blended BTU/lb value between 5000 Btu/lb – 9000 Btu/lb.
- Waste from C&D waste processing, Mixed Municipal Solid Waste, Bio-mass, Commercial & Industrial waste.
- Ideal blended moisture content <30%.
- Glass, Stones, Inert and hazardous materials excluded.
- Auto Shredder Residue.

Material size after fuel preparation <3”



The RCRV System

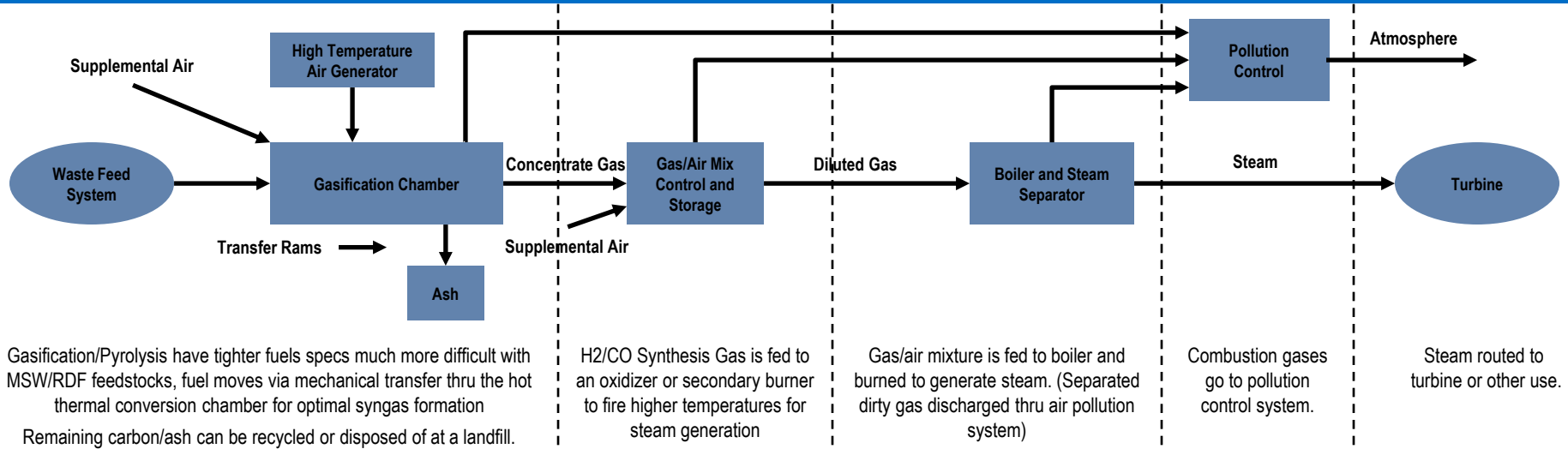


RCRV Current Options

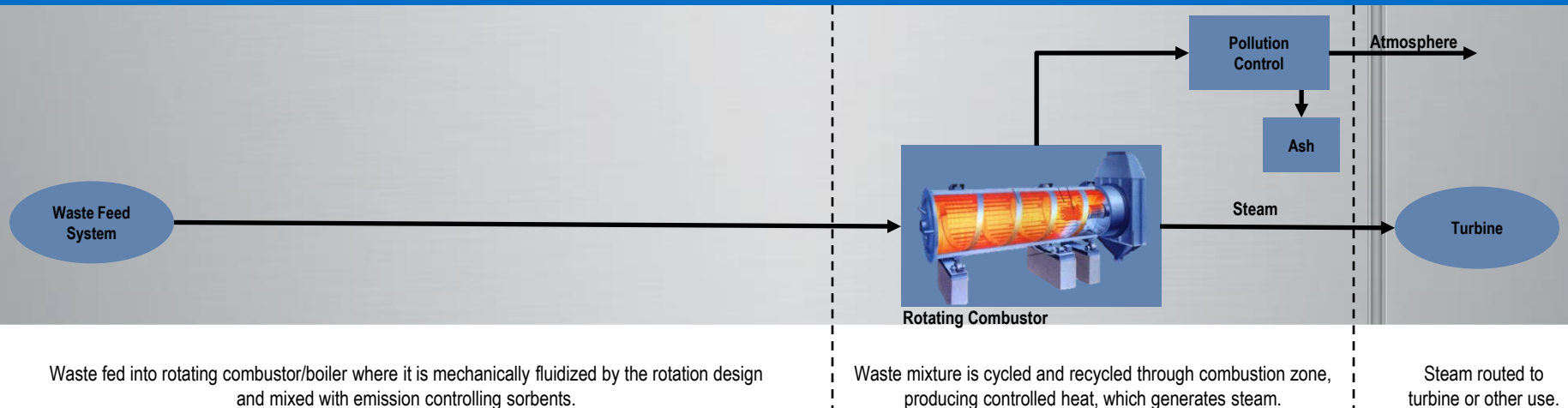
Length (feet)	45	Typical Fuels <ul style="list-style-type: none"> • High Sulfur Coal • Coal Wastes • Refuse Derived Fuels • Municipal Wastes • Semi-Densified Refuse Derived Fuels • Fluff • Carpet and Carpet Scrap • Wood Wastes • Tires and Rubber Wastes • Oils, Solvents, and Industrial Sludges • Mixtures of Above
Internal Diameter (feet)	12	
Nominal Capacity (pounds steam/hour x 1,000)	15, 30, 60	
Steam Temperature (degrees F)	825	
Steam Pressure (psia) or Saturated Steam (psia)	865 250	
Feedwater Temperature (degrees F)	240	
Maximum Combustion Gas Temp (degrees F)	1,650	
Combustor Discharge Temp (degrees F)	1,400	
Discharge Temp to Baghouse (degrees F)	300	
Combustion Gas Flow Range (pounds/hour)	70,000 – 95,000	

Complex vs. Simple with MSW/RDF

Typical Gasification System



The RCRV System



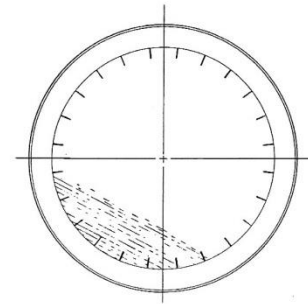
The RCRV Thermal Treatment Features

- ◆ Simple - Proven rotary design used in cement kilns and dryers
- ◆ Efficient – Total Combustion with Maximum Thermal Extraction
- ◆ Variable – Auto-adjust RPM for wide range of fuels variability
- ◆ Scalable – Similar to Peaker Plants, modular design
- ◆ Benefits:
 - No fuel costs; rather, fuel may constitute additional income stream
 - Flexible fuel requirements: municipal waste, biomass, coal, wood, etc.
 - No moving parts within high-temperature zone (minimal maintenance)
 - Technology facilitates near-total waste reduction, near ZERO landfill
 - Reduced greenhouse gas emissions relative to landfilling of waste
 - Ash has beneficial uses (soil augmentation; construction materials)
 - Large or Small systems, high efficiency at low waste volumes

Cascading Bed Combustor – Patented Magic

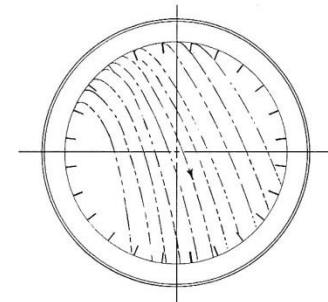
- ◆ Fuel prep for ideal moisture dispersion and sizing
- ◆ Drying and Ignition occur in the rotating cylinder
- ◆ Variable RPM allows the fuel to cascade, facilitating the mixing of air, fuel and hot char resulting in more complete and faster combustion
- ◆ Reverse Archimedes Screw design is recursive returning hot fuel from back to front (up to 300x)
- ◆ Fuel and sorbents are recycled internally to help obtain greater carbon utilization and acid gas capture
- ◆ Designed for maximum thermal extraction or complete carbon burnout with integrated boiler or Heat Recovery Steam Generators

STAGES OF CASCADING



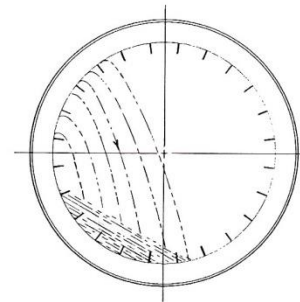
KILN ACTION

$G = 0.05$ or less



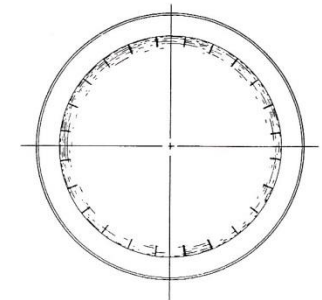
MAXIMUM CASCADING

$G = 0.5$



INTERMEDIATE CASCADING

$G = 0.25$



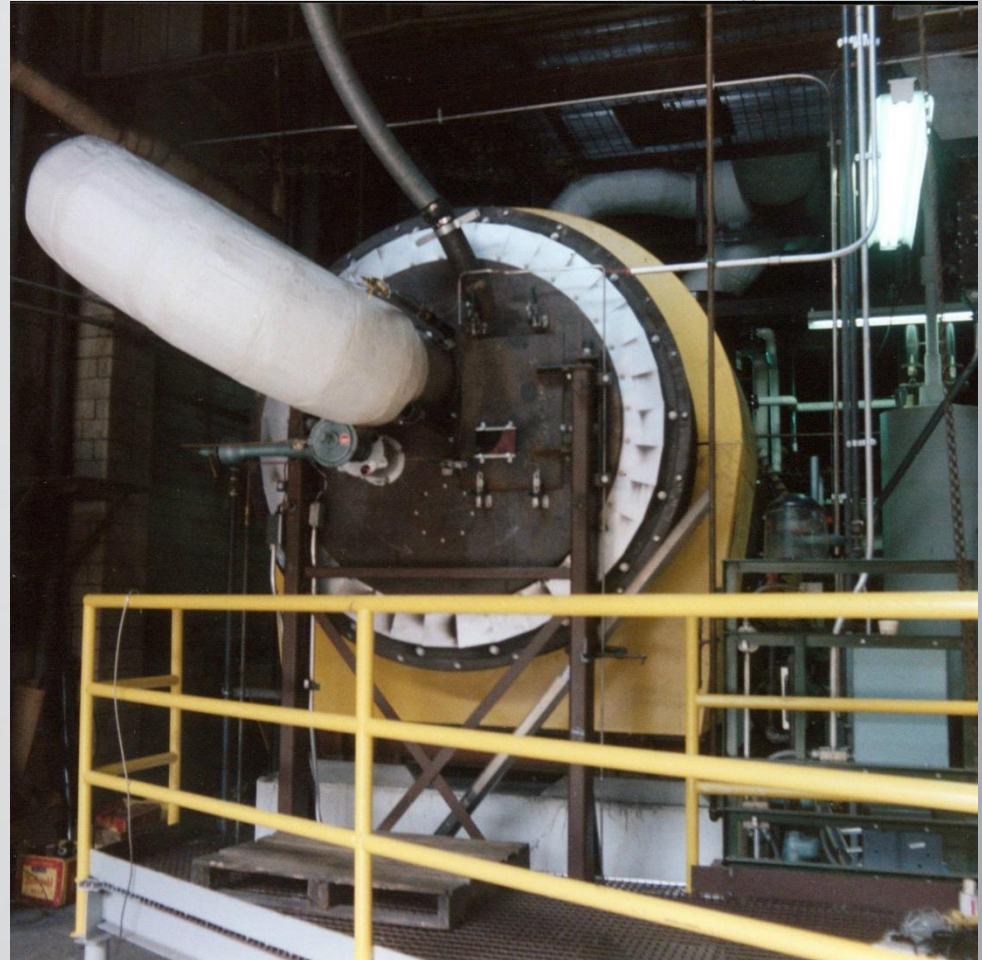
$G = 1$ or greater

(no cascading)

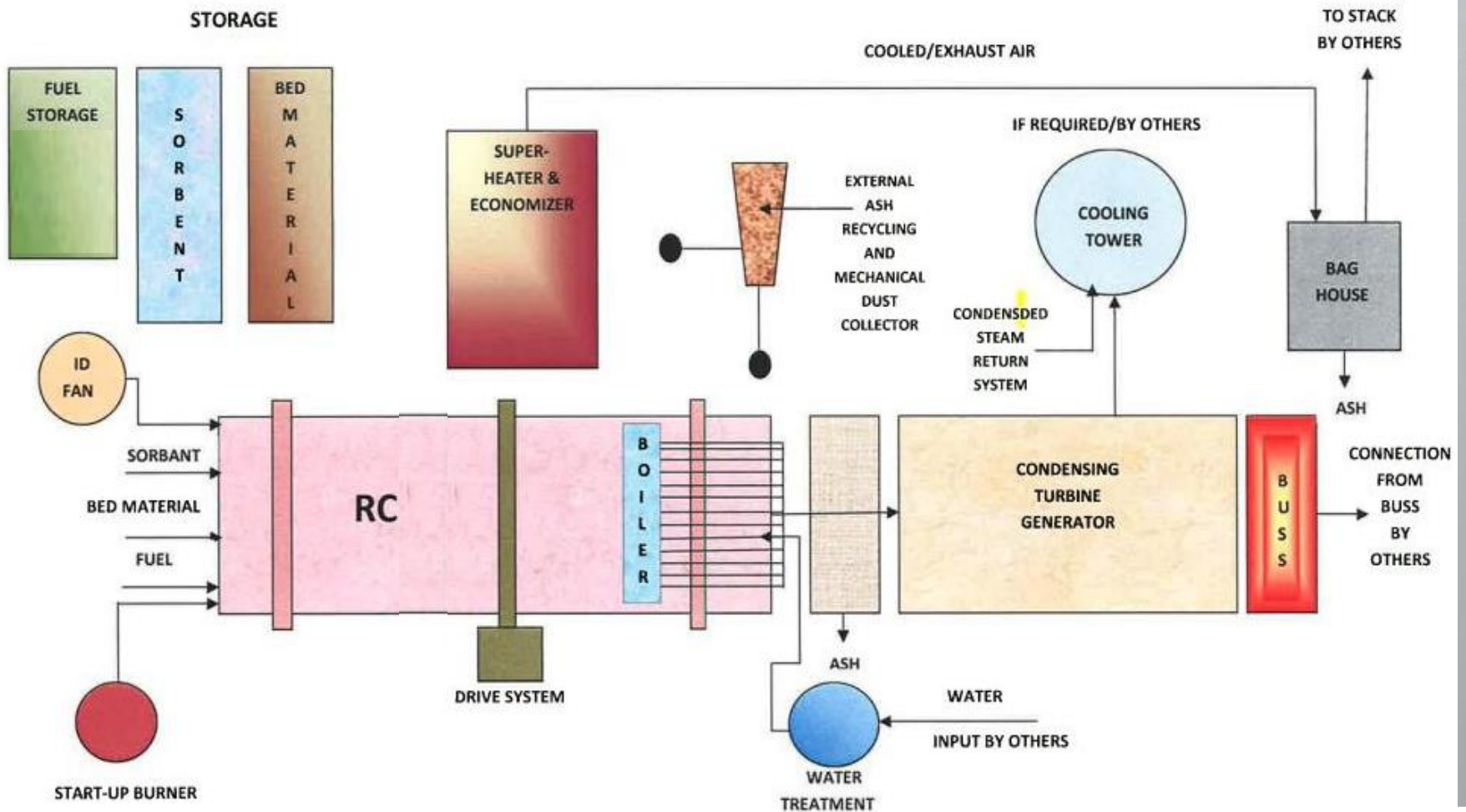
RCRV

Easy Operations for Fast and Effective Burnout

- ◆ Rotational speed of the cylinder varies 8-20 RPM based on btu, volume, moisture, airflow, temperatures and desired carbon/ash ratio
- ◆ Limestone (Calcium Carbonate) is added to control acid gases
- ◆ Combustor temperature is monitored and controlled by adjusting fuel and air injection rates
- ◆ External heat exchanger (super-heater) to transfer additional heat for steam and reduce temperature of exhaust gas



Rotating Combustor - Thermal Treatment Process



The Most Efficient, Economically and Ecologically Sensible Thermal Treatment Solution on the U.S. Market

◆ Low Capital Cost:

- Simple Design (Boiler Reactor with an Archimedes Screw)
- Low Temperature Process
- No Complex or Costly Chemical Scrubbing Equipment for Exhaust Gases Required Unit Meets EPA Standards and Regulations Regarding Air Quality Requirements for Emissions and Particulate Matter

◆ Ultra-Low Operational Cost:

- Input Feeder Fuel May Vary “On The Fly” without Shut-Down or Batch Changes
- No Costly Chemical Scrubbing Agents, Electrodes or Specialized Parts
- Burner Contains Zero Moving Parts– Results in Less Repair / Maintenance Down Time

◆ The Most Efficient and Complete Burn of ANY Process:

- 98% Carbon Destruction possible
- Ash Residual Use Potential in Paving, Construction Blocks, Soil Augmentation

Acceptable Waste for Hydro Thermal carbonization

- The carbonization system can handle a variety of biomass, as long as following requirements are met:
- Size below 2 cm/ 0.78" #Moisture <15%

Biomass # Waste wood, Garden waste, Wood chips, Food waste, Fermentation residue, Manure, Sludges, Organic Waste.



HYDRO THERMAL CARBONIZATION

Carbonization is the Thermal decomposition of organic material without the addition of additional oxygen, as you would recognize in the natural environment. This process occurs at 500-800 degrees Celsius and can produce two products at the same time: Syngas and Biochar.

The fine recovery of Biochar and nutrients of different quality levels can be achieved by controlling the parameters of the corresponding reaction process. In addition, most of the carbon in the input material is stably stored and not released into the atmosphere as carbon dioxide.

High value output materials; Renewable energy and Biochar

Carbonization

With the carbonization equipment you can obtain biochar from biomass with clean, porous structure and high biological value. Depending on the degree of finishing, the resulting biochar can be marketed as:

Natural soil conditioner. Improve soil nutrient absorption and water holding capacity, and promote soil microbial/humus accumulation.

As activated carbon or active biochar for WTE applications.

The carbonization equipment is a modular container system with small foot print and low inatallation cost.

Waste biomass

HTC treatment



Combustion



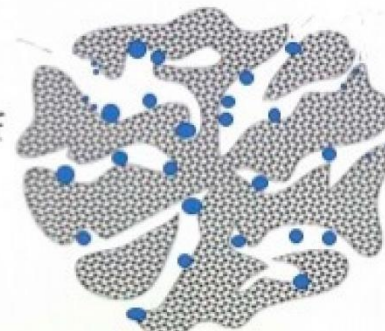
Supercapacitors and batteries



Soil amender



Adsorption of contaminants

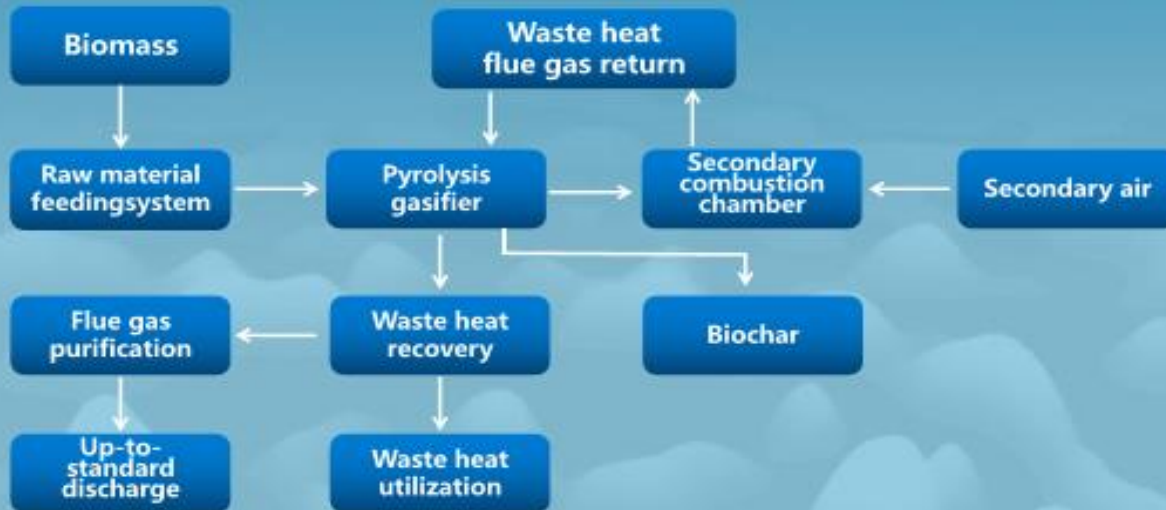


Hydrochar

SYSTEM OVERVIEW BIO CHAR



FLOW CHART



System Overview SynGas

— Combustible gas
— Hot water
— Cold water



- | | | |
|-----------------------------------|--|---------------------------------|
| 1. Discharge system | 5. Combustible gas purification system | 9. Flue gas purification system |
| 2. Intelligent control room | 6. Combustible gas test port | 10. ID fan chimney |
| 3. Pyrolysis carbonization system | 7. Engine waste heat utilization system | 11. Automatic feeding system |
| 4. Biochar discharge system | 8. Combustible gas power generation system | |



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