VARY万容

Technology·Environment·Resources

# 让垃圾变资源

Change waste into resources


HUNAN VARY TECH CO.,LTD.

Service provider of urban and rural waste resource utilization system


## 万容的使命——让垃圾变资源

Carbon is a magical element, and all life on the earth is based on it. The activities of human beings and animals emit a large amount of carbon dioxide while continuously inhaling oxygen. Plants absorb carbon-rich organic matter in the soil, and absorb carbon dioxide and water in the air through “photosynthesis”, as well as generate nutrients such as glucose necessary for living organisms and release a large amount of oxygen. Animal and plant residues return to soil again through microbial decomposition and transformation to form carbon-rich organic matter. This is the “Earth Life Cycle” composed of soil, sunlight, air, water, microorganisms, plants and animals.

Plastic is a magical thing with hydrocarbon structure. It is almost ubiquitous and omnipotent in today’ s society. Track the carbon footprint of its life cycle: upon countless physical cyclic utilization, it devotes all its waste heat to human energy application … the plastic is a friend of human beings.

What we have to solve is not the problem of waste generation, but our failure to make full use of the waste. While we have been looking for more energy for business and home applications, we ignore the huge amount of energy hidden in the waste around us.

Coping with climate change has become one of the most severe challenges faced by human society. China’ s carbon emissions account for 30% of the world’ s total, and is twice that of the United States, three times that of the European Union and four times that of India respectively, and the United States and the European Union have basically achieved the peak carbon dioxide emissions.

Founded in 2006, adhering to the ecological concept of “Harmony with All Things, and Compatibility with the Heaven and Earth”, Hunan Vary Technology Co., Ltd. is committed to the global technology research and development in the field of low-carbon environmental protection, and is a comprehensive environmental protection equipment manufacturing enterprise and solid waste resource utilization system service provider integrating the process design, technology research and development, manufacturing, sales, engineering installation and after-sales service into one body. It has developed in the field of solid waste disposal for more than 17 years, and through long-term promotion in technology research and development, investment and operation, provides the mechanical crushing and separation, anaerobic pyrolysis, rapid aerobic decomposition equipment and resource utilization system services to the world.

The anaerobic pyrolysis technology and equipment independently developed by the Company have fully met the resource utilization of organic solid wastes such as waste tire, sludge, waste plastic, domestic waste RDF, medical waste, oil sludge, hazardous waste packaging, dye and paint waste, etc., and solved the “white pollution” and “black pollution” that plagued the world, as well as been industrially applied in about 20 organic solid hazardous waste projects in Jiangsu, Hunan, Jiangxi, Hubei, Shaanxi, Shandong, Anhui, Guangdong and other regions in China.

The Company provides global customers with single-shaft, double-shaft, rough breaking, hammer breaking, vertical crushing and separation equipment, and provides targeted overall solid waste solutions according to different solid waste fields, such as waste household appliances, domestic waste, large waste and general industrial solid waste. Since 2009, Vary Technology’s waste electrical and electronic recycling and dismantling equipment has served Haier, China Recycling Resource, CEVIA ENVIRO, TCL Technology, Dongjiang Environment, BEUR, Kangwei Group, Guangxi materials Refco Group and other more than 60 brand enterprises and European and African customers. The developed solid fuel RDF preparation system service has realized the industrial application in general industrial solid waste, large waste, domestic waste and other fields.

Participation in formulation of standards
14+

Total number of patents
200+

Appraisal/evaluation of ministerial-level scientific and technological achievements
4+

Patent for invention
60+

## Equipment Manufacturing Center

The Company' s equipment manufacturing base covers a total area of 100mu and a building area of 48,000m2, equipped with workshops such as organic processing, rivet welding, heat treatment, paint spraying, final assembly and commissioning, and has passed ISO9001 quality management system certification, ISO14001 environmental management system certification and ISO45001 occupational health and safety management system certification.

## Engineering Service Center

The Company has a batch of experienced environmental protection engineering professionals, who can provide professional engineering and technical services, systematically undertake customers' project installation, after-sales service, entrusted operation, etc., and provide various series of solutions for urban and rural solid waste resource utilization in various modes such as BOT, BOO and BT.

## Dismantling of Waste Household Appliances

In 2009, the Company started independent research and development of harmless treatment and resource recycling technology and equipment for waste refrigerators. After many iterative technical updates, it developed four machines and one computer (air conditioner, refrigerator, freezer, washing machine, TV, computer), new nine categories (kitchen hood, electric water heater, gas water heater, printer, copier, fax machine, monitor, mobile communication handset, telephone stand-alone) and other electrical and electronic intelligent identification of waste, efficient separation and resource utilization technologies, and created a complete set of automatic disposal production line for dismantling of waste household appliances, which has the characteristics of large production capacity, high intelligence, multi-functional use, multiple safety protection, high product sorting rate and high cleanliness of production environment and realizes the high-value recycling of metals and non-metals.

## Dismantling of Scrapped Automobiles

For scrapped automobiles, the Company provides equipment for dismantling and resource utilization of scrapped automobiles, and can also provide one-stop system services such as project approval and environment assessment, plant design, equipment model selection and manufacturing, system integration, installation and commissioning, personnel training, operation and management services, output sales and hazardous waste disposal.

## Scrap Metal Crushing and Separation Equipment

The production line of scrap metal crushing and separation equipment is suitable for crushing and separation processing of scrap metal and alloy products such as scrap aluminum template, stainless steel, copper and aluminum, scrap metal slag, scrap steel, scrap automobile, thin-walled container, metal packing block, scrap household appliances, etc. The original first-class shredding and second-class crushing processing technology has high bulk density, high purity and high added value of products, meets the requirements of best quality of row materials for blast furnace and provides high-quality raw smelting materials for downstream smelting enterprises.

## Operation Cases>>



## Cooperative customers >>

Haier 海尔 TCL 中国供销合作社 CHINA CO-OP 中国再生资源 BEUR 北控城市資源
DJE 东江环保 DONGJIANG ENVIRONMENT 广西物资集团 GUANGXI MATERIALS GROUP 启迪环境 TUS-EST 陕西省物流集团有限责任公司 SHAANXI LOGISTICS GROUP CO.,LTD.
东方园林 Orient Landscape 康卫 KANGWEI 康卫集团 丰茂 FENGMAO 方达 FANGDA 环境·科技·资源·重环 ……

## High-quality Utilization of Waste Plastics

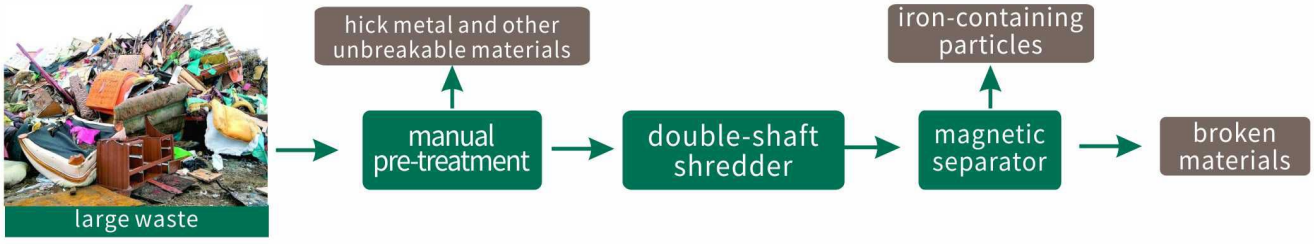
According to waste plastics with high quality and high value, such as PP, PE, ABS, PS and PET, the system processes such as crushing, cleaning, separation, modification and granulation are adopted to realize the physical recycling of waste plastics.

## Sorting of Recyclable Materials

According to the attributes of renewable resources, high-value and low-value recyclable materials such as yellow paperboard, stained paper, PE plastic, PET plastic bottle, foam, aluminum, mixed plastic, mixed iron, metals and clothes are sorted twice, and there are waste plastic sorting and packing lines, waste paper sorting and packing lines, waste fabric sorting and packing lines and light and thin metals (small household appliances) crushing and separation lines for automatic transmission and classified packaging to the corresponding processing enterprises for deep processing.

## Disposal of Large Waste

The Company adopts the collection and transportation information management system to realize big data management such as residents' delivery, environmental protection supervision and real-time disposal. With the core concept of "science and technology, environment and resources", according to the characteristics of large waste, it has designed the basic disposal methods of crushing, volume reduction, sorting and transportation, and can provide the comprehensive resource utilization system services for large waste based on the principle of volume reduction, crushing and resource utilization, so as to realize the "gathering parts into a whole" of large waste and resource recovery and utilization.



## Application Case >>


Miluo Vary Plastic Industry Co., Ltd. has a high-value plastic utilization project, with an annual crushing and cleaning capability of 100,000 tons of waste plastics. At present, the first phase of the project has realized the crushing and cleaning capability of 50,000 tons of waste plastics and modified granulation. The finished products include ABS, PS, washing machine Erbai particle, black PP daily particles, daily PP crushed materials, PET packaging sheets, etc.


The Blue Island Project in Changsha County (including urban areas and towns), Liuyang City and Wangcheng District is mainly aimed at sorting recyclable materials in their jurisdictions. At present, 140,000 tons of low-value recyclable materials have been classified and recovered.


Changsha County' s large waste and garden waste resource disposal project can treat 50 tons of large waste and garden waste every day. Upon manual pre-treatment, the large waste of pure wood can be made into biomass fuel rods, and the large waste of non-pure wood is converted into broken wood after crushing, sorting and volume reduction.

# Organic Solid Waste Treatment and Chemical Recycling

## Energy Island Model

### Continuous pyrolysis equipment

It is mainly applied to the treatment of polymer organic waste, oily waste, oil sludge, sludge, waste plastic, waste tires (rubber products), domestic waste RDF, etc.

### Semi-continuous pyrolysis equipment

It is mainly used for the treatment of hazardous waste packaging/materials, medical wastes, colloidal particles of tire, oil sludge, sludge and other materials.

Four Series of Pyrolysis Equipment

### Sequencing batch pyrolysis equipment

It is suitable for thermochemical treatment of various forms of solid waste, such as waste packaging containers/materials, paint buckets, paint residues, oil sludge, sludge and other materials.

### Pyrolysis gasification incinerator

It is suitable for industrial solid wastes such as RDF (waste-derived fuel), flocculent and granular materials, medical wastes, hazardous waste packaging (plastics), paper waste residue, etc.

## Advantages of Pyrolysis System >>

- six core technologies
- stable and safe operation
- intelligent automation
- high resource utilization rate
- favorable environmental benefits
- wide application of materials
- flexible production capacity
- good investment income
- combined process
- low handling cost

oil sludge cuttings | hazardous waste packaging/material | waste tire | sludge | waste plastic | medical waste | domestic waste RDF

## Pyrolysis of Waste Plastics——Completely Eradicate “White Pollution”

Packaging waste plastics, sorted municipal waste, industrial waste plastics, agricultural film, paper mill waste and other low-value mixed plastics that can no longer be physically recycled are chemically recycled by low-temperature anaerobic pyrolysis oil recovery process, and finally products such as pyrolysis oil and pyrolysis carbon are formed.


## Chemical Recycling of Waste Tires——Solve the World Problem of “Black Pollution”

Waste tires (waste rubber products) are separated into steel wires and rubber powder through the pre-treatment system, and the steel wires are sold out, while the rubber powder is sent to the pyrolysis system through the feeding system for chemical recycling, and finally pyrolysis carbon, pyrolysis oil and non-condensable gas are formed. Pyrolysis oil and pyrolysis carbon are sold out as energy products, and the non-condensable gas is all used for combustion and self-use of the heating system.


## Pyrolysis disposal and utilization of dangerous packaging containers

Pyrolysis disposal and utilization of hazardous waste packaging containers are to form iron, pyrolysis oil and pyrolysis carbon through “uncapping and flattening + pyrolysis + crushing and screening” and “crushing + pyrolysis + screening”, so as to achieve the effect of resource utilization of hazardous waste packaging.

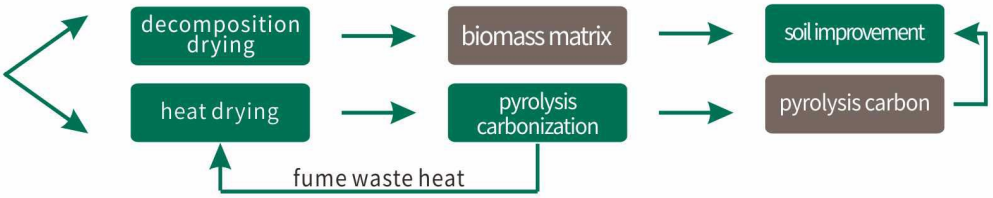

## Pyrolysis Disposal of Medical Waste

Medical waste can be treated by sequential batch pyrolysis or continuous pyrolysis, and the products including pyrolysis oil and pyrolysis carbon can be sold out as fuels.

## Pyrolysis Treatment of Municipal Sludge

Municipal sludge (mainly including sludge produced by municipal sewage treatment plants, underground pipe networks and rivers, etc.) mainly belongs to organic sludge, with high water content (80%-90%), high organic content, fine particles and a large amount of N, P, K, Ca, as well as trace elements necessary for plants. Upon compatibility, film-covered fermentation is carried out, and oxidation and decomposition occur under aerobic conditions, so as to realize the moisture content reduction of organic matter, decomposition and odor elimination. Most of the decomposed and dried sludge can be used for soil conditioning or carbonization.

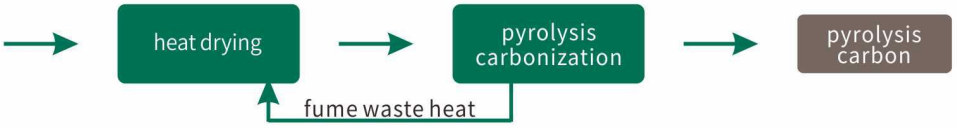
municipal sludge




## Pyrolysis Treatment of Industrial Sludge

Industrial sludge (mainly including chemical sludge, electroplating sludge, pharmaceutical sludge, leather sludge, paper-making sludge, dyeing sludge, food processing and industrial sludge, etc.) is pyrolyzed and carbonized after deodorization and moisture reduction by low-temperature drying equipment, and the rich heat energy of pyrolysis can be used for heating in drying process.

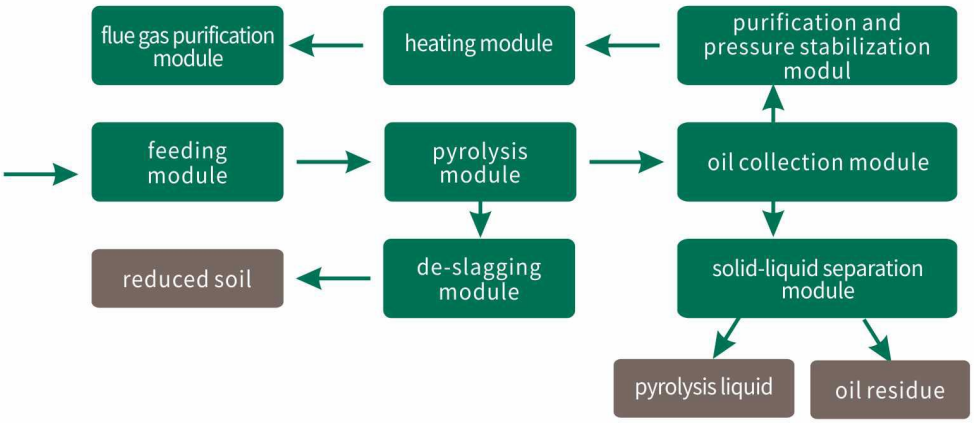
industrial sludge




## Thermal Desorption Treatment of Oil Sludge, Drilling Cuttings and Contaminated Soil

Oil sludge (oily sludge in oil field, oil sludge in refinery, oil sludge at tank bottom, oil-based drilling cuttings, oil-contaminated waste, oil sludge on the ground), organic contaminated soil, etc., which have been pre-treated, are transported into the feeding module of thermal desorption system and then sent to the pyrolysis furnace in a closed manner, and later decomposed at 400~600℃ with the air isolated to generate pyrolysis gas and reduced soil. Pyrolysis gas is condensed and separated into non-condensable gas and liquid by oil collection module; the non-condensable gas is purified by the purification and pressure stabilization module and then pressurized and sent to the hot blast stove of the heating module for full combustion to generate high-temperature flue gas for heating of thermal desorption equipment; the liquid is separated into pyrolysis liquid and oil residue by solid-liquid separation module. The reduced soil can be used to pave the well site and its road after reaching the relevant standards of local environmental impact assessment.

oil sludge, drilling cuttings contaminated soi



## Operation case >>


Jiangxi Project

Jiangsu Project


Hunan Project

Hubei Project


Hunan Project


Shandong Project


Henan Project

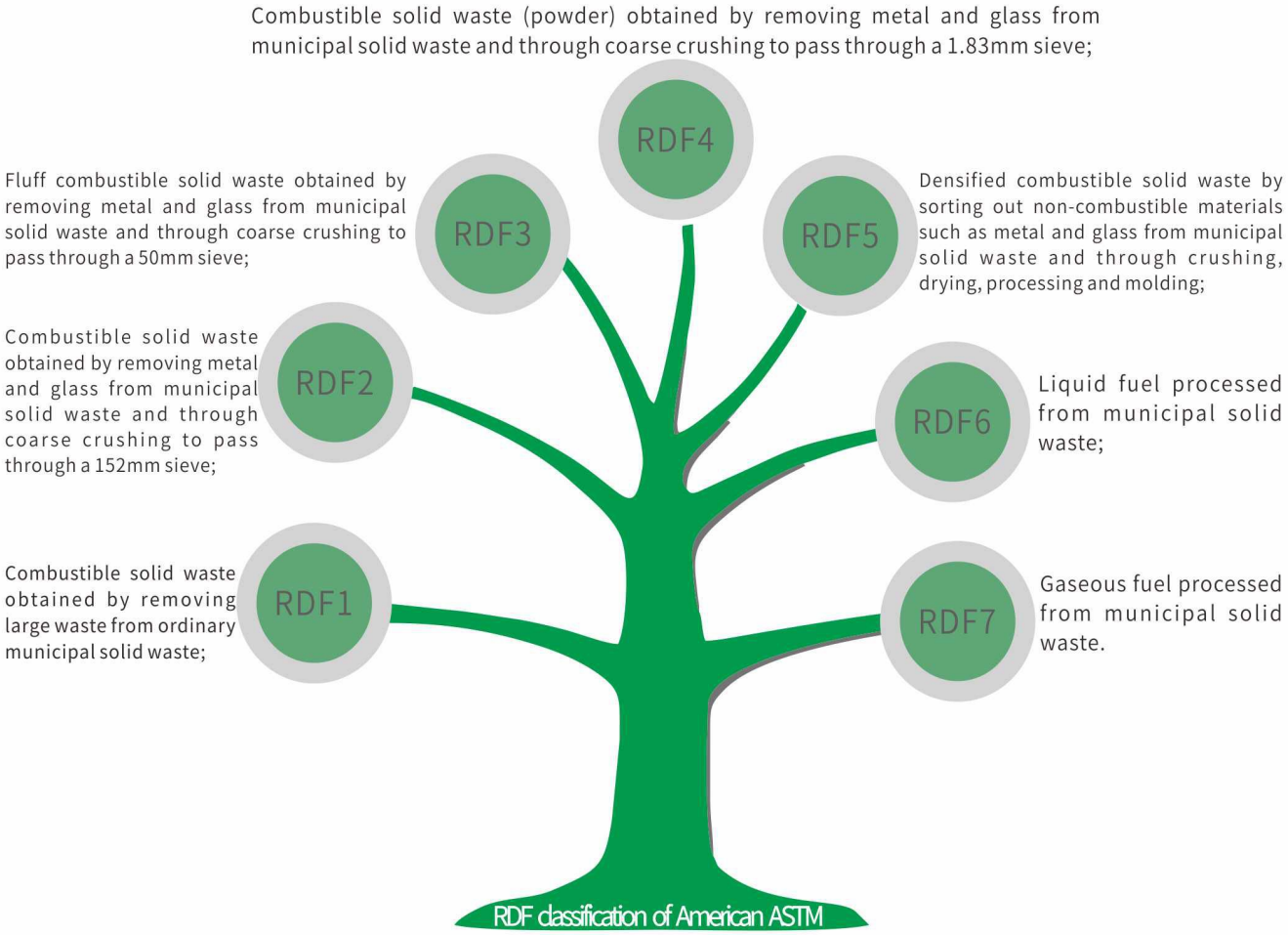

Jiangsu Project


Jiangsu Project

## RDF Green Energy Development

RDF (waste-derived fuel) refers to removing non-combustible materials such as metal, glass, sand and gravel from waste, and crushing, drying and extruding combustible components (such as plastic, rubber, wood, fabric fiber and food residue) into fuel products with certain standards.

According to different raw materials, the preparation process of RDF is different. RDF fuel has the following characteristics: ① The calorific value of RDF is higher than that of ordinary lignite; ② RDF is a low sulfur fuel, and the sulfide emission produced by combustion is less than that of raw coal combustion; ③ According to the industrial test results, the emission indexes (SO2, NOx and dust) produced by RDF and coal co-combustion meet the national environmental protection standards.





Cotton-shaped RDF (RDF-3 of American ASTM)


rod-shaped RDF (RDF-5 of American ASTM)

Development of four kinds of RDF products


pyrolytic carbon (RDF-4 of American ASTM)


pyrolytic oil (RDF-6 of American ASTM)

## Operation case>>



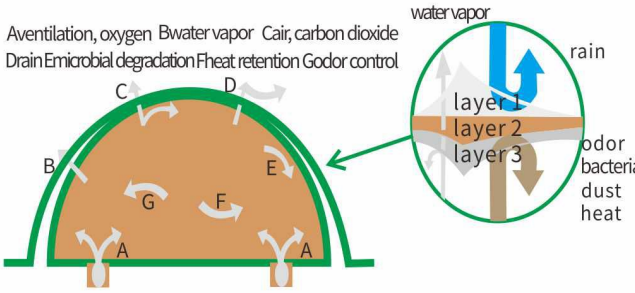

A harmless disposal project of domestic waste in Henan has a construction land of 100mu and a daily treatment capacity of 600 tons of waste (including fresh domestic waste and stale waste). The production process is “domestic waste pre-treatment + aerobic fermentation (perishable organic matter decomposes stably) + combustible material (RDF) production”.

The amount of RDF (waste-derived fuel) produced by urban, rural and industrial enterprises is not less than 1 billion tons every year, and the calorific value can reach 4,500kcal. It is widely used in cement kilns, alternative fuel and coal-fired power plants, and can also be specially used for anaerobic pyrolysis and controlled oxygen incineration for heating. It is estimated that replacing 1 ton of raw coal with 1.5 tons of RDF can reduce coal mining by 670 million tons and carbon dioxide emission by 1.73 billion tons. Such a huge amount of RDF products can be called the fourth largest energy product after coal, oil and natural gas, and it is an inexhaustible green energy product.

## Static film-coating aerobic decomposition technology and equipment

The equipment consists of fermentation tank, semi-permeable membrane, fan, PLC control system, detection instrument and film coating equipment.

Biomass raw materials (kitchen waste, fruit and vegetable waste, straw, domestic silt, livestock manure, etc.) are pre-treated to obtain mixed compostable materials. The mixed materials are piled into a pile with a certain height by forklift or conveyor, and the surface of the pile is covered with semi-breathable molecular membrane and fixed. Multi-point temperature sensors and oxygen sensors are used to monitor the temperature and oxygen changes of the pile in a real time. Ventilation pipes are laid at the bottom of fermentation tank. Under the condition of sufficient oxygen supply, aerobic microorganisms oxidize and decompose the materials to reduce the water content of organic matter, and at the same time, the one-time decomposition fermentation, eggs killing and odor elimination are complected. Finally, the material is sent to the secondary static fermentation reactor, and after a period of degradation and conversion, it can be further made into high-quality organic fertilizer.




### Technical characteristics:

1) Odor is controllable and no leachate is generated; 2) Fermentation efficiency is high and the cycle is short; 3) The fermentation process has a high temperature period above 70-80℃ for 4-6 days, which can effectively kill eggs and inactivate grass seeds; 4) No closed factory building and odor treatment system are needed, and the cost is low, while the investment is greatly reduced; 5) It can co-process perishable organic matters such as livestock and poultry manure, kitchen waste, fruit and vegetable waste, agricultural and forestry waste, expired food and sludge.

## Dynamic continuous aerobic decomposition technology and equipment

Continuous aerobic decomposition system is mainly composed of fermentation drum, heat preservation (or auxiliary heating) device, feeding and discharge system, air supply system and automatic control system, suitable for treating perishable organic matter with a water content of 55-65%.

Feeding and discharge mechanisms and fermentation air pipes are arranged on both sides of the fermentation drum, and a uniform material distribution device is arranged in the fermentation tank to ensure uniform material layer.

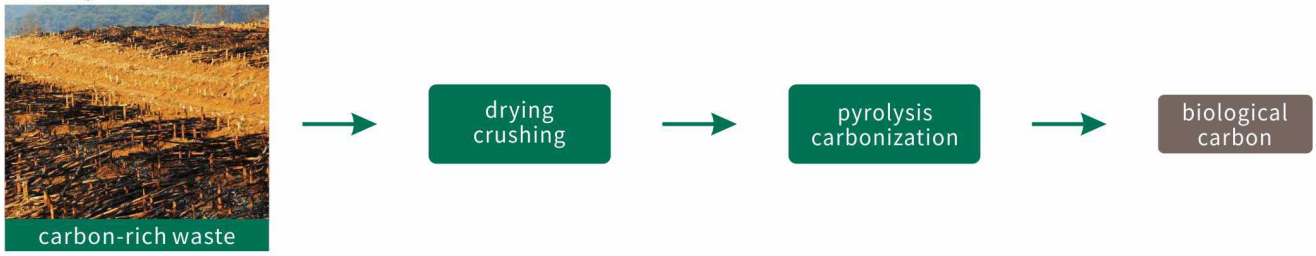
The closed aerobic fermentation system can accurately control the requirements of each strain for temperature, humidity and time, so that organic materials can be fermented rapidly. After full sterilization, disinfection and deodorization at a high temperature, the water content is reduced, and finally the purpose of efficient, rapid, reduced and stabilized treatment is achieved.

## MBT Treatment of Rural Domestic Waste


Mechanical biological MBT consists of two parts: mechanical treatment (crushing and separation) and biological treatment. The mechanical treatment is mainly to use crushing, sorting and screening equipment to crush and separate the high calorific value components in waste, such as plastic, paper, leather and wood, and then use them to prepare RDF. The main equipment consists of crusher and combined screening system. Biological treatment mainly depends on aerobic fermentation technology, and the tank-type film is for biological drying or the drum-type film for biological drying and deodorization. The domestic waste is disposed by MBT, and finally forms nutrient soil, inorganic aggregate, metal and RDF (waste-derived fuel). Nutrient soil is consumed locally, and inorganic aggregate is utilized or land filled locally, while metals are transported for sale, and RDF (waste-derived fuel) is transported to the back-end disposal center of domestic waste for intensive energy conversion and coupling application, so as to realize reduction, harmlessness and resource utilization.

## Preparation of biocarbon from agricultural and forestry residues

Carbon-rich wastes (plant wastes such as straw, halm, branches, grass and algae, organic wastes such as feces and excess sludge, and industrial wastes such as bagasse and beet residue) are used as substrates, and enter the pyrolysis system after the corresponding pre-treatment processes such as crushing and drying are used, and the biomass carbon is obtained after cracking.




Biomass carbon is a multifunctional material, which contains a lot of carbon and plant nutrients. It can be used as soil conditioner to improve the soil fertility and further improve the crop yield. It has a large specific surface area and contains more oxygen-containing active groups on the surface, and can adsorb heavy metals and organic pollutants in the soil or sewage. The raw materials have good fixation effect on carbon and nitrogen. When applied to soil, it can reduce the emission of greenhouse gases such as $CO_2$, $N_2O$ and $CH_4$, and slow down global warming, and has broad application prospects in agriculture and environment.

[202207]

与万物和 与天地宜
Harmonize with Everything
Coexist with the World

# Determined to Reach the Top of the World with Low-carbon Technology

## Comparative Advantages of "Anaerobic Pyrolysis" under the Background of Carbon Peaking and Carbon Neutrality

| | |
|---|---|
| √ "Emission reduction" | The amount of flue gas emitted by anaerobic pyrolysis is only about 1/10 of that of incineration, and the fuel used for heating in pyrolysis furnace is pyrolysis gas upon multi-stage purification, and its hazard factors (smoke dust, $SO_2$, heavy metals, etc.) emitted are almost negligible. |
| √ "Energy saving" | The pyrolysis temperature is much lower than the incineration temperature, and the emission heat loss of flue gas of hot-blast stove upon multi-gradient utilization is extremely low, while the energy consumed by pyrolysis of general materials is about 15% of incineration. |
| √ "Carbon sequestration" | The biomass is carbonized and stored in the soil by anaerobic pyrolysis, which can solve the problem of straw burning and greatly increase the ability of soil carbon sequestration and fertilizer conservation. |
| √ Inhibiting the harm of dioxin and heavy metals | "High flexibility, multi-purpose, and high output benefit" - the pyrolysis furnace is more suitable for small- and medium-sized applications, and the project site selection is easy, so it is more convenient for recycling of copper, aluminum, iron and other metal substances without damage, and the resource output benefit is high. |
| √ High flexibility, multi-purpose, and high output benefit | The pyrolysis furnace is more suitable for small- and medium-sized applications, and the project site selection is easy, so it is more convenient for recycling of copper, aluminum, iron and other metal substances without damage, and the resource output benefit is high. |


**HUNAN VARY TECH CO.,LTD.**

Add.: No.1310 Liangtang East Road, Changsha Economic and Technological Development Zone, Hunan, China
Website: www.vary.net.cn www.varygroup.com
Tel.: (+86) 0731-82791010 0731-82790123 Fax: (+86) 0731-82791100

**Hunan Vary Solid Waste Treatment Co., Ltd**
Add.: Leiming Road, Changsha Economic and Technological Development Zone, Hunan, China
Tel.: (+86) 0731-88215677

**Miluo Vary Electronic Waste Treatment Co., Ltd.**
Add.: Tongli South Road, Circular Economy Industrial Park, Miluo City, Hunan Province, China
Tel.: (+86) 0730-5631190


WeChat official account

Official website