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Vary Tech Website

Vary Tech VR

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Technology • Environment • Resources

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HUNAN VARY TECH CO., LTD.

Integrated Solution Provider for Solid Waste Resource Utilization

Turning Waste into Resources Committing to Carbon Neutrality

Vary Tech, founded in 2006, has always committed to building a low-carbon industry dominated by solid waste utilization. Vary Tech consists of a marketing center, a research and design center, an equipment manufacturing center, an engineering service center, and a number of subsidiaries that apply the company's equipment and technology for solid waste recycling, forming a complete service industry chain, opening up a low-carbon development path of "turning waste into resources".

Three core technologies and equipment developed by Vary Tech.
"Mechanical crushing and sorting" of physical recycling: Vary Tech has established physical network nodes named "Blue House" and "Blue Island", supported by a shared internet big data platform, creating a reverse logistics system. Its business covers various recyclable solid waste such as waste household appliances, waste vehicles, waste plastics, waste tires, scrap metals, and waste wood.
"Oxygen-free pyrolysis" of chemical recovery: For organic waste such as plastic known as "white pollution", waste tires and rubber known as "black pollution", industrial sludge, petroleum sludge, and hazardous waste, Vary Tech relies on its advanced oxygen-free pyrolysis technology to transform them into green energy products such as "oil", "gas", and "carbon".
"Molecular membrane fermentation tank" of biological treatment: For organic waste such as straw, kitchen waste, rural garbage, livestock manure, and municipal sludge generated by agriculture and animal husbandry, Vary Tech has introduced the "molecular membrane fermentation tank" technology to rapidly convert them into "organic fertilizer", "nutrient soil", and "RDF".

Vary Tech is shouldering the new mission of "servicing new energy" and contributing the "Vary Power" to the arduous process of "carbon neutrality". The company has developed recycling equipment for "spent li-ion battery, waste photovoltaic modules, and waste wind turbine blades" through the combination of physical recycling and chemical recovery technologies. Vary Tech company has also created a industrial system of "biocarbon-based materials" with biotechnology and chemical recovery technology.

Contents

20+ Years
solid waste resource utilization services

20+ Subsidiaries
focusing on solid waste recycling

500+ Clients Worldwide
in solid waste recycling filed

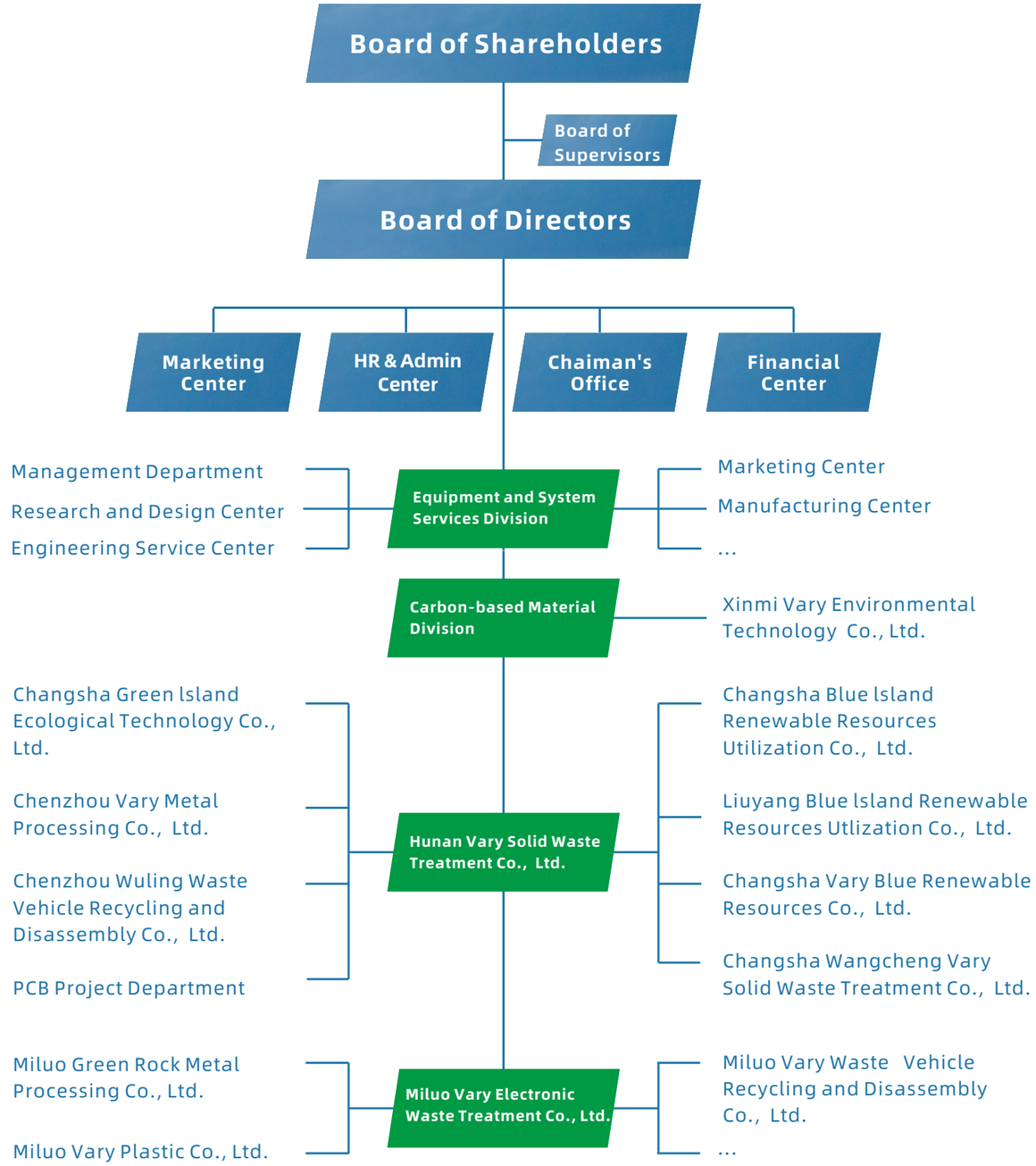
4000+ Equipment
total installed

8+ Copyrights
of system software in the solid waste recycling field

14+ Times
participation in formulation of national standard

6+ Achievements
of ministry-level scientific and technological appraisal

- National small giant enterprise
- National and local joint engineering research center
- National intellectual property advantage enterprises
- National support unit for advanced pollution control technology and equipment
- National support unit for advanced applicable technology and equipment of industrial resources comprehensive utilization



01/ Research and Design Center

Vary Tech's research and design center is consists of three professional research institutes of "physical recycling", "chemical recovery" and "biological treatment", a system planning and design institute, a comprehensive laboratory, and more than 60 full-time engineers.

Physical recycling institute has achieved a series of achievements in the recycling equipment field, including independently developed "eco-friendly equipment for waste printed circuit boards", "harmless treatment equipment for waste refrigerators", "integrated equipment for waste vehicle body crushing and scrap steel processing", which have successively passed the national appraisal, and won a lots of honors.

The "organic solid waste oxygen-free pyrolysis technology and equipment" developed by the chemical recovery institute based on domestic and foreign experience has passed the scientific and technological achievements evaluation organized by the Chinese government in 2019. With outstanding performance in single machine production capacity, key sealing technology, energy saving and carbon reduction indicators, product application fields and many other aspects, this equipment and technology is already ahead of global peers. The successful development of this "carbon sequestration artifact" will undoubtedly play an important role in "energy saving and carbon reduction", "waste treatment and new energy development", and "carbon capture".

Based on the introduction of foreign advanced molecular membrane static fermentation technology, the biological treatment institute has combined the "molecular membrane fermentation tank" and "mechanical biological treatment" technology for the collaborative treatment of rural organic waste, forming an ecological model of biomass returns to soil and carbon sequestration with low investment and low operating cost.

Vary Tech integrates the above technologies and builds a complete industrial chain of planning and design, core equipment manufacturing, engineering installation, and operation of recycling plants.

02/ Marketing Center

- Domestic Business Department
- International Business Department

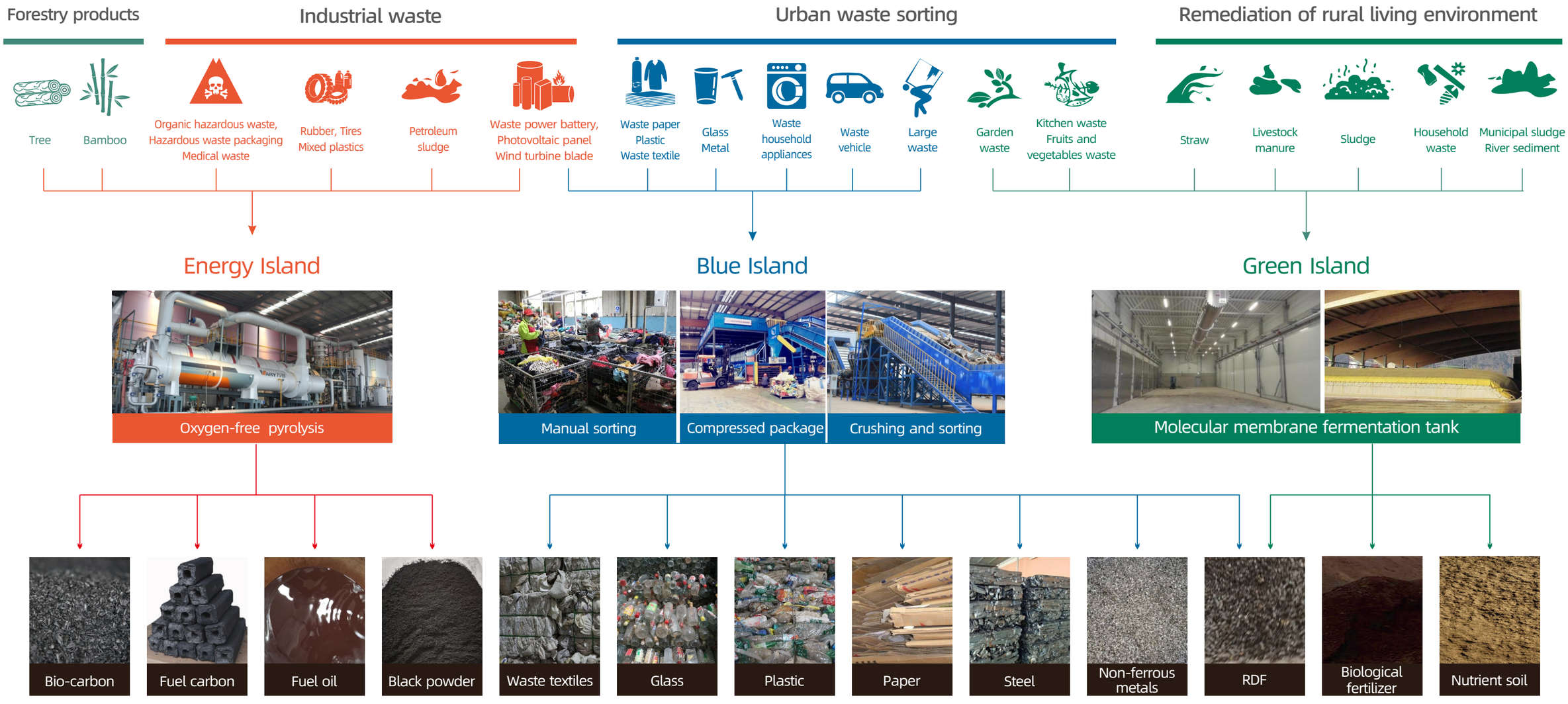
03/ Engineering Service Center

Vary Tech has second-level qualifications for professional contracting of environmental protection projects. It has a group of experienced engineering professionals to systematically undertake engineering installation, after-sales service, hosting operation and other professional engineering and technical services. It provide series of solutions to client for the utilization of urban and rural solid waste through BOT, BOO, BT and other models.

04/ Equipment Manufacturing Center

The equipment manufacturing center covers an area of 64,000㎡, equipped with automatic laser cutting machines, automatic welding machines and various large-scale processing machine tools. It has passed IS09001 , IS014001 , and IS045001 certification. It is a modern large-scale environmental protection equipment manufacturing base.

Urban and Rural Waste Resource Utilization System--"Three Islands" Model



Physical recycling of high value recyclables
Chemical recovery of low value organic waste

Perishables return to soil
RDF multipath energy source transformation

01/ Waste Household Appliances Disassembly and Recycling

Vary Tech has developed efficient disassembly and recycling technologies for waste electrical and electronic machines. The large single machine capacity, multi-functional combination application, and high product sorting rate all together enable high-value recycling of metals/non-metals.

02/ Waste Vehicle Disassembly and Recycling

Vary Tech provides complete sets of equipment for wast vehicles disassembly and recycling. Vary Tech also provides one-stop system services such as project environmental impact assessment, plant design, equipment selection and manufacturing, system integration, installation and commissioning, personnel training, operation management services, output sales, and hazardous waste treatment.

03/ Scrape Metal Crushing and Sorting

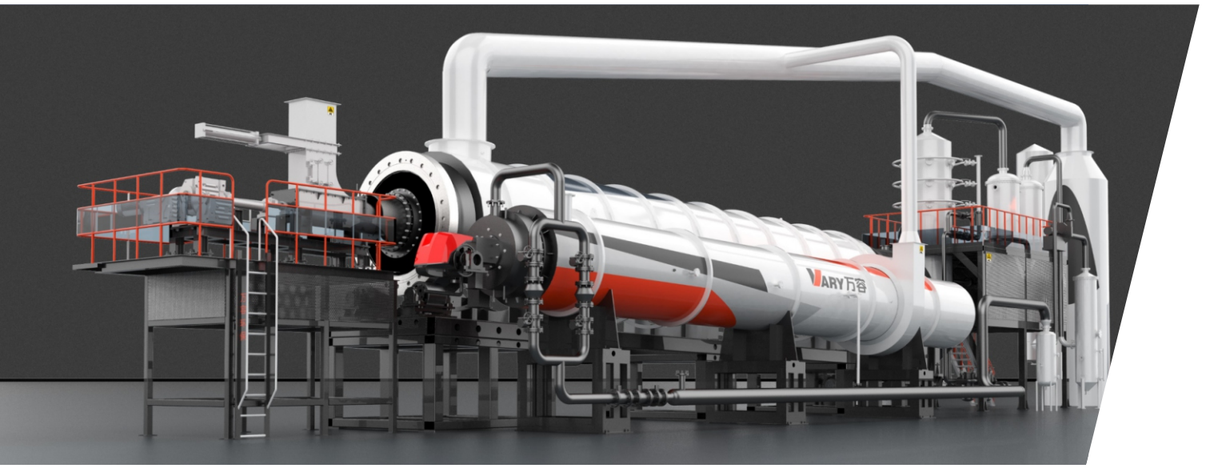
The scrap metal crushing and sorting equipment is suitable for processing all kinds of scrap metal and alloy products. The products have high bulk density and high purity, meeting the requirements of fine materials for downstream smelting enterprises.

04/ Bulky Waste Treatment

Vary Tech adopts a collection and transportation information management system to realize big data management such as resident placement, environmental protection supervision, and real-time treatment. It uses crushing, volume reduction, sorting, and resale to provide comprehensive recycling services for bulky waste.

05/ Renewable Resources Sorting Center

It is the secondary sorting of high and low value recyclables, equipped with sorting and packing lines for waste plastic, waste paper and waste fabric, crushing and sorting line of light and thin metal (small household appliances), and RDF production lines.



Comparative Advantages of “Oxygen-Free Pyrolysis”

Emission reduction	The amount of flue gas emitted by oxygen-free pyrolysis is only about 1/10 of that of incineration. The fuel gas used for heating the pyrolysis reactor is the pyrolysis gas generated from pyrolysis reaction itself, and the harmful factors (soot, SO_2, heavy metals, etc.) emitted are almost negligible.
Energy conservation	The pyrolysis temperature is much lower than the incineration temperature. The heat loss of the flue gas after multi-gradient utilization is extremely low. The energy consumed for pyrolysis of general materials is about 15% of that of incineration.
Carbon sequestration	Biomass is carbonized and stored in the soil through oxygen-free pyrolysis, which not only solves the problem of straw burning but also greatly increases the soil's carbon sequestration and fertilizer conservation capabilities.
Inhibit dioxin and heavy metal hazards	Solid waste pyrolysis inhibits the synthesis of dioxin due to the oxygen-free environment. In the reducing environment, heavy metals are converted from exchangeable states to stable forms such as residual form, and solidified in the carbon slag.
High output efficiency with flexible and versatile application	Pyrolysis equipment is more suitable for small and medium scale applications. It is more convenient for non-destructive recycling of copper, aluminum, iron and other metal materials, with high output efficiency.

Four Series of Pyrolysis Equipment

01 / Pyrolysis of Waste Tyres and Plastics to Oil

Waste tyres, low-value mixed plastics, etc., are sent to the pyrolysis system for chemical recovery after crushing and sorting. They finally form pyrolysis carbon, pyrolysis oil, non-condensing gas. Pyrolysis oil and pyrolysis carbon are sold as energy products, and non-condensing gas is self-consumed in the heating system.

02 / Pyrolysis Treatment of Organic Hazardous Waste, Medical Waste and Hazardous Waste Packaging

Hazardous waste can be processed by batch pyrolysis or continuous pyrolysis. The products pyrolysis oil and pyrolysis carbon can be sold as fuel.

03 / Thermal Desorption Treatment of Petroleum Sludge, Drilling Cuttings, and Contaminated Soil

Petroleum sludge from oil fields, refinery sludge, tank bottom oil sludge, oil-based drilling cuttings, oil contaminated waste, organic contaminated soil, etc. can be processed by pyrolysis reactor after pretreatment to obtain pyrolysis liquid, oil residue and reducing soil.

04 / Pyrolysis Carbonization Treatment of Municipal and Industrial Sludge

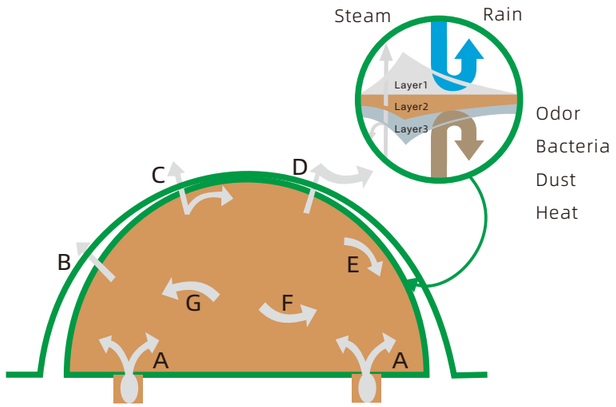
Sludge produced by urban sewage treatment plants, underground pipe networks and rivers can be used for soil conditioning or be carbonizated after being decomposed and dried.
Chemical sludge, electroplating sludge, pharmaceutical sludge, leather sludge, papermaking sludge, printing and dyeing sludge, food processing sludge, etc. to be processed by low-temperature drying equipment to achieve deodorization and moisture reduction , and then to be processed by pyrolysis and carbonization treatment.

Green Island is a co-processing plant for organic waste such as town fruit and vegetable waste, catering kitchen waste, farm manure, sludge, and straw. Through preprocessing, rapid composting, and screening technology, the organic matter in waste is biodegraded, matured, deodorized, and dried, ultimately transforming organic waste into nutrient soil or organic fertilizer, which is used for landscaping and soil improvement. Plastic packaging, etc. are made into RDF and sold to coalburningpower plants and cement plants as alternative fuel.

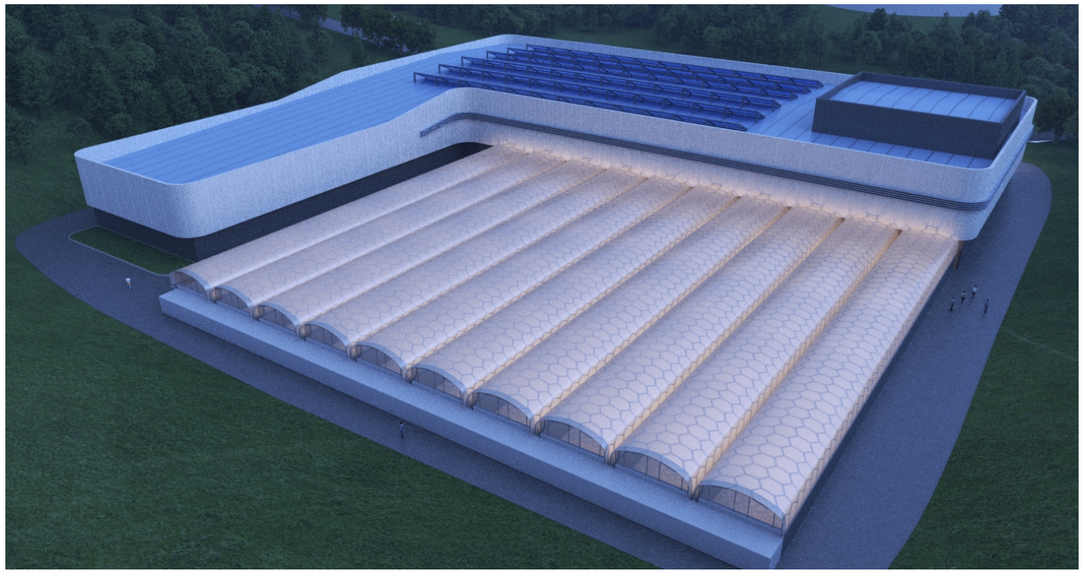
01 / Molecular Membrane Fermentation Tank

The molecular membrane fermentation tank is made of concrete warehouse-type wall + grade A acid-alkali-resistant sealed door + airtight molecular membrane warehouse roof + ventilated floor + dynamic intelligent control. It is commonly used in the fermentation and deodorization of mixed garbage and sludge, the killing of bacteria and eggs, and the drying.

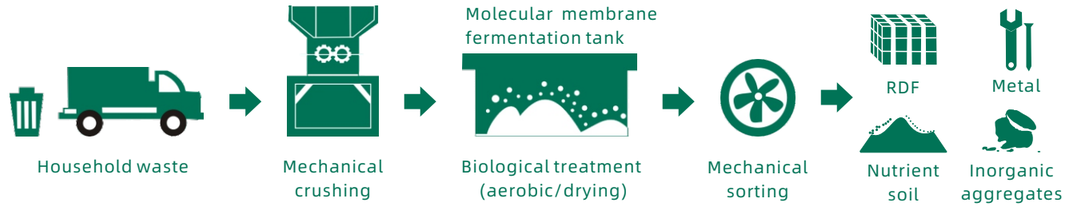
The tank top is composed of oxford cloth + semi-permeable molecular membrane + oxford cloth, which has the functions of windproof, waterproof and heat preservation. It has a unique molecular filtration microporous structure (pore diameter 0.2 micrometers), not only allows the water vapor to penetrate smoothly, but also prevents bacteria and odor aerosols from passing through. The permeable gas emissions comply with the relevant standard.



A-Ventilation Oxygen
B-Water Vapor
C-Air and Carbon Dioxide
D-Rain
E-Microbes Degradation
F-Thermal Insulation
G-Odor Management



02 / Rural Household Waste MBT



MBT consists of mechanical (crushing, sorting) and biological treatment. The mechanical part mainly uses equipment such as crusher, airflow sorter and screen to crush and separate high calorific value components in garbage, (such as plastics, paper, leather, wood, etc.), and then use them to prepare RDF (refuse-derived fuel). The biological treatment part mainly relies on aerobic fermentation technology, which involves sterilization, deodorization, and drying treatment through molecular membrane fermentation tanks. After MBT treatment, household waste will eventually form nutrient soil, inorganic aggregates, metals and RDF. Nutrient soil is consumed on site, inorganic aggregates are utilized locally or land-filled, metals are transported and sold, and RDF is transported to large coal-burning power plants and cement plants for intensive energy conversion.

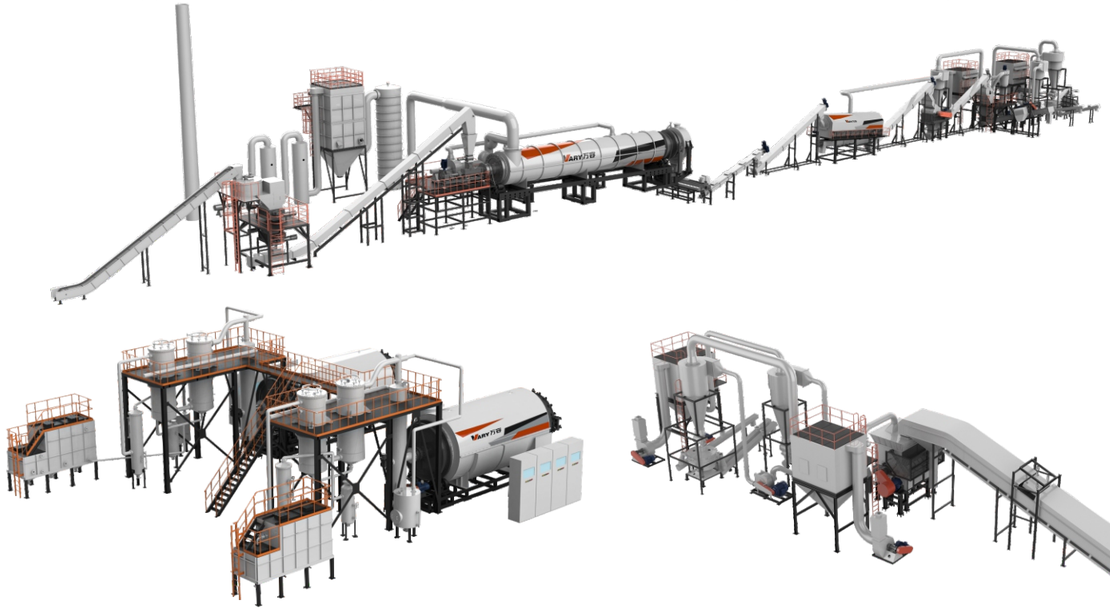
03 / RDF Green Energy Development

RDF (Refuse Derived Fuel) refers to the process of removing non-combustible materials (like metals, glass, and stones from waste) such as metals, glass, and stones from waste, and then transforming the combustible components (like plastics, rubber, wood, textile fibers, food scraps) through processes such as crushing, drying, and compacting into fuel products that meet certain standards.

① The calorific value of RDF is higher than that of ordinary lignite;
② RDF is a low-sulfur fuel, and the sulfide emissions from combustion are less than that of raw coal combustion;
③ According to industrial test results, the emission indicators (SO_2, NO, and dust) produced by blending RDF with coal (<20%) are in line with national environmental protection standards.

01 / Integrated Equipment of Continuous Pyrolysis and Comprehensive Recycling for Spent Batteries

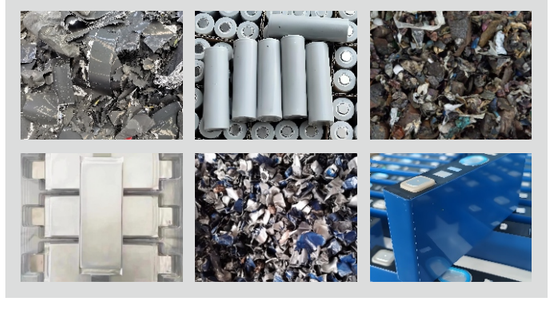
Application scope: All types of cylindrical batteries, small prismatic batteries, pouch batteries



Pyrolysis Recovery Equipment for Spent Batteries and Lithium Battery Industry Waste

Classification and processing of positive and negative electrode slices to maximize the recycling value

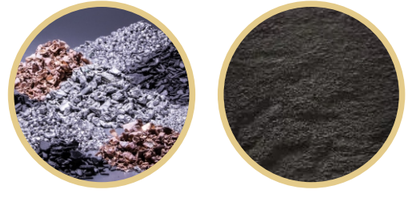
A multi-use reactor with high flexibility, suitable for prismatic batteries, pouch batteries, electrode slice, slurry, separator, packaging waste and etc



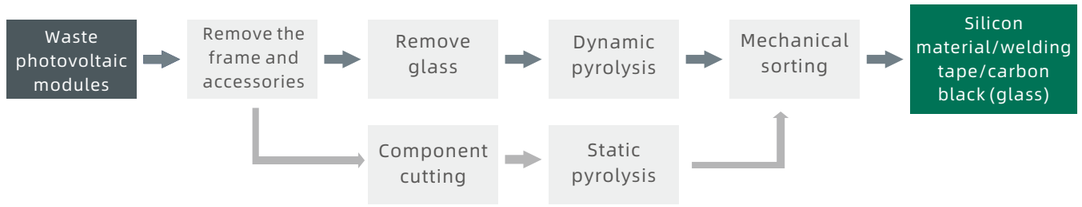
Electrode Slices Physical Recycling Equipment

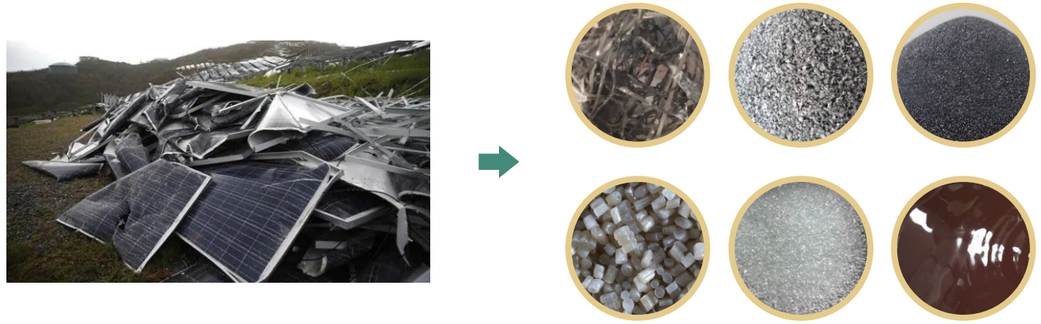
Reduces maintenance cost by 50% and operating cost by 20%

Suitable for crushing and powdering of positive and negative electrode slices and scraps of various lithium batteries



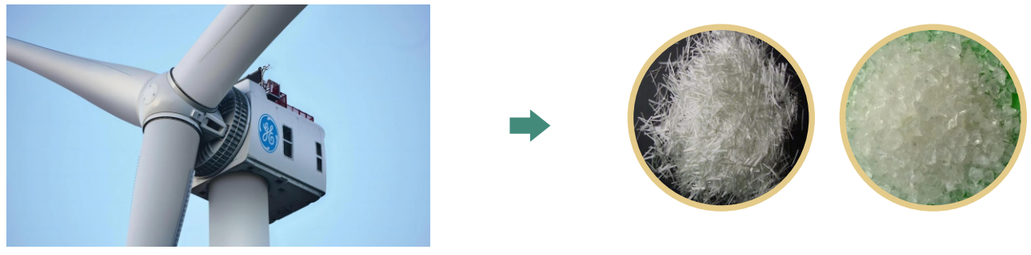
02 / Recycling of Waste Photovoltaic Power Generation Modules





03 / Recycling of Wind Turbine Blade

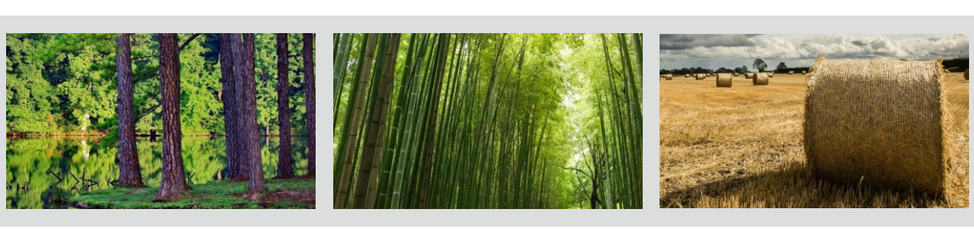
Waste blades are usually made of composite materials, including glass fiber, carbon fiber and other materials that are difficult to decompose naturally. According to different parts of the blade (such as root, tip, middle) and material properties (such as FRP, FRP + foam, FRP + wood material), the separation of glass fiber and cured resin can be achieved through mechanical separation and medium-temperature pyrolysis. These materials can be comprehensively utilized with high value. The blade roots can be used as reinforcing fibers for anti-cracking mortar, asphalt pavement paving, gypsum blocks, etc. The blade tips are mainly used for building insulation light weight materials. The middle blades are mainly used in magnesite cement-based products.



04 / Biocarbon Industry Development

There are diverse utilization modes for biomass energy, such as power generation, heating, gas production, and bio-carbon production... At the same time, it can also be highly integrated with fossil energy and other new energy sources and complement each other. It can greatly improve global energy structure and reduce dependence on petrol and natural gas. It will form a new "green energy" system with new energy sources such as photovoltaic and wind power to completely solve the key issues for energy security and green development of the world.

The "continuous rotatory drying and carbonization equipment" developed by Vary Tech on the basis of "oxygen-free pyrolysis technology" completely subverts the traditional carbon production process, shortening the carbonization cycle from 23 days to 2 day and reaching 50 tons/day production capacity of a single-line. It is fully automatic, saving energy and reducing carbon, eliminating environmental pollution, and solving problems such as "low energy density, high transportation costs, and unstable calorific value" that have long restricted the development of biomass energy. Compared with coal and biomass pellets, biocarbon products have significant advantages in energy saving and carbon reduction, which is the true "green coal".



Fuel carbon series	Smelting carbon series	Carbon-based fertilizer carbon series	Carbon-based material series

Heating carbon

Industrial smelting carbon

Nursery substrate carbon

Activated carbon

BBQ carbon

Sodium ion battery materials

Miluo Operation Base

It covers an area of 174000㎡. It annually recycles 2,000,000 pcs waste electrical and electronic machines, 20,000 pcs waste vehicle, and 30,000 tons of scrapped agricultural machinery and various types of mechanical equipment. With an annual output of 50,000 tons of PCR plastic, it is one of the first batch of urban mineral demonstration bases in China.

Xinmi Operation Base

Operated by Xinmi Vary Environmental Technology Co., Ltd., the project is located in Laiji Town, Xinmi City, Henan Province, with a construction land of about 66,600㎡, an annual processing capacity of 100,000 tons of agricultural and forestry waste, and annul yield 30,000 tons of bio-carbon.

Chenzhou Operation Base

It has set renewable resource sorting centers in 11 counties and cities. The business covers disassembly and recycling of waste electrical and electronic machines and waste vehicle, waste material recycling and reuse, scrap steel processing, waste plastic processing, and etc.