



ATAL Organic Waste Treatment Facility 有机废物处理系统 (AOWTF)

Engineering with passion
用心創造

Introduction 简介

ATAL Organic Waste Treatment Facility (AOWTF) 有机废物处理系统

ATAL Organic Waste Treatment Facility (AOWTF) provided by ATAL Engineering Limited has two major technologies. They are **anaerobic digestion treatment technology** and **aerobic composting treatment technology**. Anaerobic digestion technology is to decompose and convert the collected organic waste to biogas as energy source, afterwards the digestates can be used as agricultural fertilisers. Composting is to accumulate garbage on the ground or put it in a certain fermentation device, then the related microorganisms gradually digest the degradable organic matter in the garbage, and finally form a stable humus.

有机废物处理系统 (AOWTF) 由安樂工程有限公司提供。它分为两大类的处理技术：**厌氧消化处理技术**和**好氧堆肥处理技术**。厌氧分解技术是先把收集后的有机废物进行分解，厌氧分解后的沼气可以转化为有用的能源，而厌氧分解后的沼渣可以用作农业肥料等。堆肥处理是将垃圾堆积在地面或置于某种发酵装置中，用微生物将垃圾中易降解有机物逐步降解，最终形成稳定的腐殖质。

Anaerobic Digestion Treatment Technology 厌氧消化处理技术

Major Features

主要特点

The anaerobic digestion treatment process of organic waste comprises pretreatment system, anaerobic digestion system, digestate treatment system and biogas purification and storage system.

有机废物厌氧消化处理工艺包括预处理系统、厌氧消化系统、沼渣处理系统和沼气净化和储存系统。

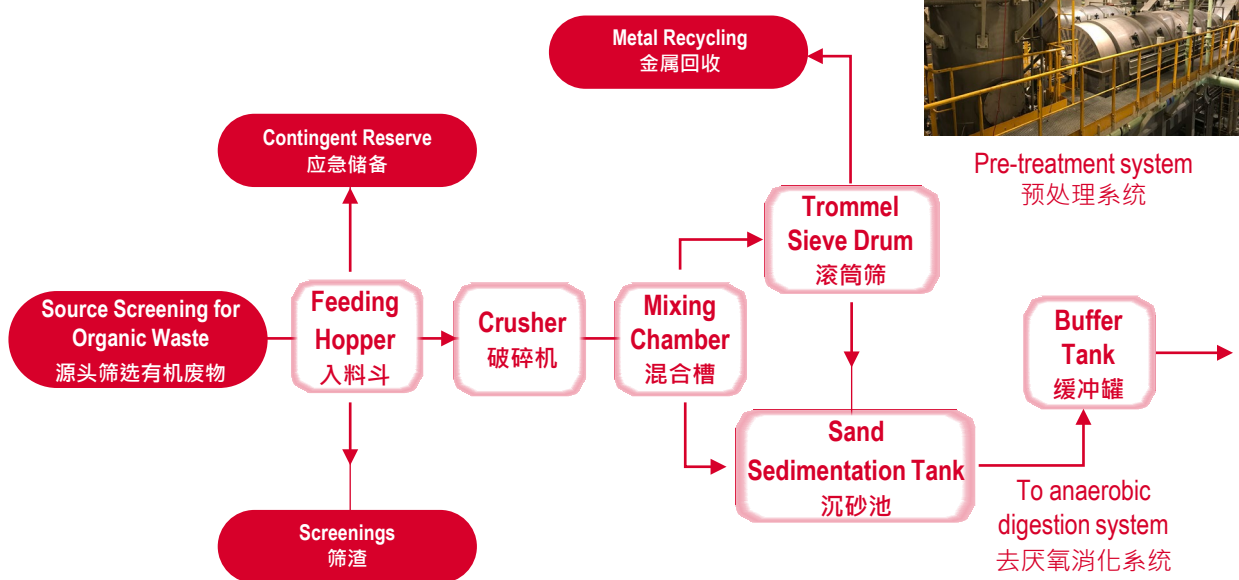
Typical Pre-treatment System 典型的预处理系统

The pre-treatment system is designed to accept and handle wastes of different compositions.

预处理系统是为了接受和处理不同成分的垃圾。



Pre-treatment system
预处理系统



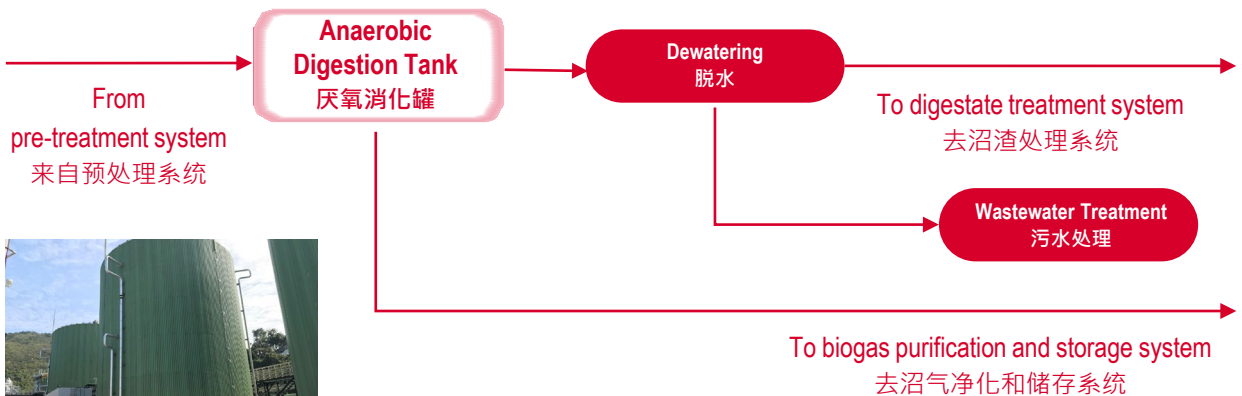
Process flow diagram of pre-treatment system
预处理系统工艺流程图

Major Features 主要特点

Anaerobic Digestion System 厌氧消化系统

The pretreated suspension passes through a centrifugal pump into the anaerobic digestion tank, in which microorganisms (bacteria and archaea) convert the organic matter into biogas. Anaerobic digestion contains four major stages: hydrolysis, acidogenesis, acetogenesis and methanogenesis. Each stage breaks down the organic matter into smaller and smaller parts until the final products are obtained: methane, carbon dioxide and water. Through anaerobic digestion process, we have biogas (mixture of methane and carbon dioxide gases) and digestate (water and solid residues). The generated biogas will go to the biogas purification and storage system. Digestate will go to the digestate treatment system.

预处理后的悬浊液经过离心泵进入厌氧消化罐，在这里微生物（细菌和古细菌）会把有机质转化为沼气。厌氧消化包括四个主要阶段：水解、产酸、产乙酸和产甲烷。每个阶段都把有机质分解成越来越小的部分，直到得到最终产物：甲烷、二氧化碳和水。经过厌氧消化过程，我们可以得到沼气（甲烷和二氧化碳气体的混合物）及沼渣（水和固体残余的混合物）。生成的沼气会去到沼气净化和储存系统。沼渣去到沼渣处理系统。



Anaerobic digestion tank
厌氧消化罐

Process flow diagram of anaerobic digestion system
厌氧消化系统工艺流程图

Digestate Treatment System 沼渣处理系统

Digestate is a nutrient-rich substance containing humic acid, micronutrients, various amino acids, enzymes and beneficial microorganisms, etc. Therefore, it can play a good role in improving soil. It also contains nitrogen, phosphorus, potassium and other elements, which can meet the needs of crop growth. Hence, in addition to incineration and sanitary landfill, digestate after dewatering can be converted into organic fertiliser by composting.

沼渣富含有机质、腐殖酸、微量营养元素、多种氨基酸、酶类和有益微生物等，能起到很好的改良土壤的作用。沼渣还含有氮、磷、钾等元素，能满足作物生长的需要。因此，除了焚烧和卫生填埋，脱水后的沼渣可通过堆肥转化为有机肥料。



Compost
堆肥



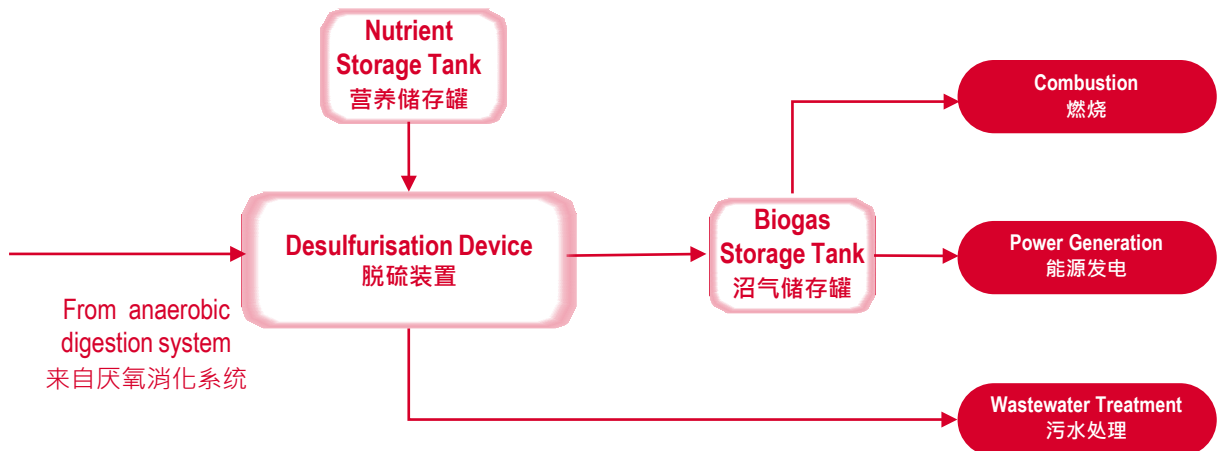
Composting tunnels
堆肥隧道

Major Features 主要特点

Biogas Purification and Storage System 沼气净化和储存系统

High concentration of hydrogen sulfide gas is produced during the anaerobic digestion of organic waste. Therefore, biogas collected is diverted to the desulfurisation device for desulfurization and purification, protecting downstream equipment from being corrupted. Cleaned biogas is then stored in the low-pressure biogas storage tank for further use of electricity generation. The electricity generated can be supplied to facilities in the plant, and the surplus electricity can be exported to the power grid. Cleaned biogas can be burned to produce heat only.

有机质厌氧消化过程会产生高浓度的硫化氢气体，因此收集到的沼气会被输送到脱硫装置进行脱硫净化，保护下游的设备不受腐蚀。脱硫后的沼气会贮存在低压沼气储存罐以用于发电。生产出的电力可供给厂区内设施，剩余电力还可输出至电网。脱硫后的沼气也可以直接燃烧产生热量。



Desulfurisation Device
脱硫装置

Biogas purification and storage system
沼气净化和储存系统



Biogas storage tank
沼气储存罐



Combined heat and power (CHP) generator
热电联产发电机

Advantages 优点

- High methane production
- Direct use in production of high-quality fertilisers
- Continuous, automated and full-process operation
- High flexibility to handle various feedstocks such as municipal, industrial and agricultural waste
- 甲烷产量高
- 直接用于生产高质量的肥料
- 连续化、自动化和全流程的运作
- 高度的灵活性，能处理各种原料如市政、工业和农业废弃物

Aerobic Composting Treatment Technology 好氧堆肥处理技术

Major Features

主要特点

Aerobic composting is a biological process, in which aerobic microorganisms convert biodegradable organic matter into stable residue that can be used as fertiliser or soil conditioner. In this process, fresh air is transported to the compost bins and the temperature and humidity are maintained within the optimal range for microbial activity to accelerate the degradation of organic matter, thereby stabilising the organic matter. This process produces odours, so deodorisation is required.

好氧堆肥是一个生物过程，好氧微生物把可生物降解的有机物质转化为可用作肥料或土壤改良剂的稳定的残余物。在这个过程中，氧气被输送到堆肥仓，温度和湿度被保持在微生物活动的最佳范围，从而加速有机质的降解，使有机物达到稳定化。这个过程会产生异味，所以需要除臭处理。

In-vessel Composting 密封式堆肥

In-vessel Composting is carried out in a fully sealed rotary composter. It occupies a small footprint and enables better control of moisture content and temperature during the composting process, producing compost with a higher quality. The sealed design can also effectively control the overflow of the odour generated during the composting process, and odorous air from the process can be easily collected for treatment.

After the organic waste is delivered to the composting plant, it will be pre-treated, including moisture content testing, sorting and crushing. Pre-treated organic waste will then be sent to a rotary in-vessel composter for about 10 days of biodegradation, and after the organic waste has stabilized, it will be transferred into bunkers for curing about 30 days. Mature compost is ready for use when tested to meet the requirements.

密封式堆肥是在一个完全密封的转动装置内进行。该装置占地小，而且可以有效地控制堆肥过程中的水分含量及温度，制造更高质量的堆肥。密封式设计也能有效控制堆肥过程中产生的臭味溢出，并易将产生的臭味收集进行处理。

有机废物输送到堆肥厂内后，会先进行预处理，包括含水量测试、分选及破碎。然后送到密封式滚筒堆肥机进行约十天的生物降解处理，待有机废物变得稳定后，会运至堆棚进行约三十天的熟化程序。成熟的堆肥经测试符合要求就可以投入使用。



Rotary in-vessel composter
密封式滚筒堆肥机



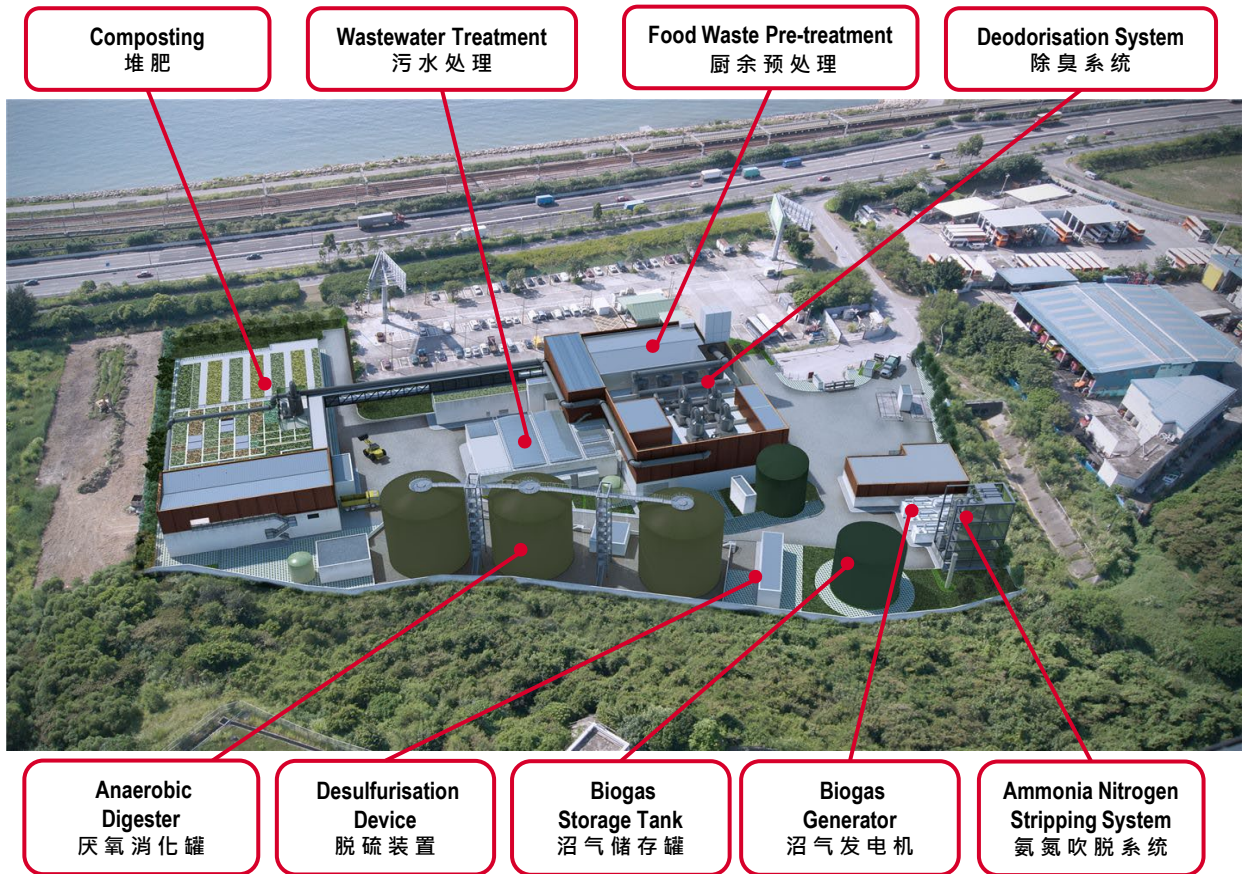
Biochemical filter system
生化过滤系统

Advantages 优点

- Reduce landfill/incineration waste
- Reduce environmental pollution
- Generate renewable energy
- Treated decomposition can be used as fertiliser
- Save energy
- Reduce the emission of greenhouse gas
- 减少堆填/焚烧废物量
- 减低环境污染
- 产生再生能源
- 处理后的分解物可作肥料
- 节省能源
- 减少排放温室气体

Job Reference 案例

O · PARK1, Hong Kong 香港O · PARK1厨余处理厂



- The first Organic Resources Recovery Centre in Hong Kong
- Capable of handling 200 tonnes/day of food waste
- A renewable energy generation plant by turning Waste-to-Energy
- Export about 14 million kWh of surplus electricity each year
- Generate about 20 tonnes of compost per day
- Decrease the emission of around 42,000 tonnes of greenhouse gas each year
- 香港首个大型有机资源回收中心
- 一个能够处理每日200公吨厨余的设施
- 一个转废为能的可再生能源系统
- 预计每年亦可输出约1,400万度的剩余电力
- 每日产生约20公吨的堆肥
- 每年可减约4.2万吨的温室气体排放

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