

Towards a Low Carbon Lifestyle

"Every single grain on the plate is the fruit of hard work." Cherish food crop is a traditional Chinese virtue

Unfortunately, the rate of food waste generation increases along with the rising living standard.

Actually, food waste contains precious organic resources which can be recycled and even turned into energy.

What is classified as recyclable food waste?

Food waste is any waste, whether raw, cooked, edible and associated with inedible parts generated during food production, distribution, storage, preparation or consumption of

- Fish and poultry organs and intestine
- Egg shells
- Expired food
- ✓ Tea leaves and coffee
- ✓ Soup pulp and Chinese Medicine pulp
- ✓ Pet food etc
- X Shells
- X Large bones
- **X** Food packaging
- X Plastic utensil
- X Aluminum and metal can



O·PARK1

Convert food waste into energy and compost by proven and highly reliable anaerobic digestion technology



- Pre-treatment System

 - Crusher and mixing unit • Trommel Sieve Drum
 - Sand Grit Trap
 - Suspension buffer tank
- Food Waste Reception
 - Site entrance
 - Weighbridge
 - Tipping bay • Double doors
 - Grab crane
 - Bunker

5 Combined Heat

and Power (CHP)

Generation Units

O-PARK1 has a design capacity of 200 tonnes per day. It adopts anaerobic digestion and composting technologies to recycle source separated food waste into biogas and compost. The biogas is used to generate electricity. Apart from self-sustaining the internal operation of O.PARK1, about 14 million kWh of surplus electricity, which is equivalent to the power consumption by some 3,000 households, can be exported each year. About 20 tonnes of compost can be generated as by-product per day.

Food Wise · Recycling ·

Being one of the largest scale in Asia, O · PARK1 is a treatment

facility that converts food waste into electricity. It is also the

first organic resources recovery centre developed in Hong Kong,

which combines environmental protection, multi-technology

and education in a single facility, marking a new milestone of

Waste to Energy

O·PARK1

Waste-to-Energy.

Support from the Industry

Support from the commercial and industrial (C&I) sectors in source separation and delivery of food waste to O.PARK1 is crucial to its effective operation. At present, we have gained the support from over 200 C&I establishments.



Club House Shopping Malls /

Airport Authority









Theme Park









Commencement of Kowloon Bay Pilot



Food Waste Recycling in Housing Estates



Feb 2014 A Food Waste & Yard Waste Plan For Hong Kong 2014 - 2022



Foodwise Eateries Scheme





O·PARK1

Renewable Energy

3 Anaerobic

Digestion Tanks

6 Composting & -

Maturation

Centrifuge

Composting tunnel

Maturation tunnel

	2016	2016 2016	
Energy Plus Facilities	T·PARK	Solar Farm at the Siu Ho Wan Sewage Treatment Works*	O·PARK1
Surplus electricity generated (million kWh / year)	~17.5	~1.1	~14
Approximate power consumption by households (no. of households/ year)	~4,000	~230	~3,000

Carried March Strains

* It is the largest solar farm in Hong Kong

Biogas Handling

Biogas holder

Desulphurisation column

Dehumidification System

Activated Carbon Filter



Partnership Scheme

Food waste reduction in

Hong Kong



May 2013 Foodwise







1) Food Waste Reception

Receiving Food Waste from (C&I) Sectors

Weight of food waste received are recorded at the weighbridge. It is then unloaded at the bunker of the Waste Reception Area. Grab crane is used to mix and transfer the food waste into hopper, entering the Pre-Treatment System. The enclosed tipping bays are equipped with double doors to prevent odour from escaping from the plant.



Bunker

4 Biogas Handling

Desulphurisation and Purification of biogas

Biogas is diverted to the desulphurisation column for biological oxidation of Hydrogen Sulphide (H_2S) , to avoid corroding the downstream system.

Production	Hydrogen Sulphide (H ₂ S) Concentration (ppm)			
Quantity (m³/hr)	Raw Biogas	Cleaned Biogas		
~1,500	~3,000	≤ 300		

Compositions and Characteristics of Biogas inside Biogas Holder						
Biogas Holder Methane (CH4) Carbon Dioxide Relat (CO2) Content (%) Humidit						
1,500	60-70	30-40	100			



Double Membrane Gasholder Desulphurisation Column

2 Pre-Treatment Facilities

Separating Inert Materials and Recyclables

Crushers tear up the packaging materials, smash and turn the food waste into suspension with the addition of process water. Suspension is then transferred to the trommel sieve drums and sand grit traps to remove impurities, e.g. glass, stone and sand. Metals are also separated for recycling.



Trommel Sieve Drum

5 Heat and Power Generation

Self-sustained Operation and Power Export

Electricity is generated through the combustion of biogas for self-sustaining the operation, and surplus electricity is exported to the power grid. Heat recovered from the system is consumed by the heat demanding processes within the facility.

Emission Level of Generation Units	Total Sus- pended Particu- lates (TSP)	Carbon Monox- ide (CO)	Nitro- gen Oxides (NO _x)	Sulphur Dioxide (SO ₂)	Volatile Organic Com- pounds (VOCs)	Hydro- gen Chloride (HCl)	Hydro- gen Fluoride (HF)	
mg/Nm³	≤ 15	≤ 650	≤ 300	≤ 50	≤ 150	≤ 10	≤1	



Combined Heat and Power Generation Units

3 Anaerobic Digestion

Anaerobic Digestion and Waste-to-energy

Make use of the microorganisms to convert the organic matter contained in the pre-treated food waste suspension into biogas, waste-to-energy.

Number of Anaerobic Digestion Tank	Capacity per Anaerobic Digestion Tank	Operating Temperature	Retention Time
3	~4,300 m³	~35°C	~25 days



Anaerobic Digestion Tank

6 Composting

Dewatering and Composting

Digestate is first dewatered by the centrifuge, then mixed with bulking agent. After 14 to 20 days of composting process reaching a temperature over 55°C, the organic residuals will be converted into compost.

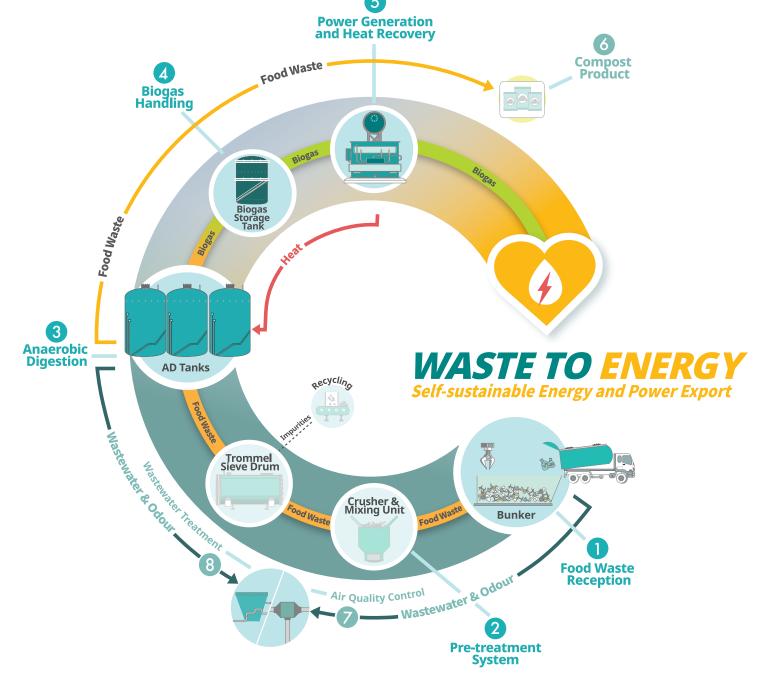
Production	рН	Moisture	Organic Matter	Carbon to
Quantity (t/y)		Content (%)	(% of dry weight)	Nitrogen Ratio
~6,500	5.5-8.5	25-45	> 20	≤ 25:1



Composting Tunnel

WASTE TO ENERGY PROCESS

Simplified version of organic resources treatment process



Air Quality Control

Highly Effective Deodorisation System

Facilities are confined and maintained at negative pressure to avoid odour dispersion. The odorous gases are extracted to the deodorisation system to remove dust particles, odorous compounds (mainly hydrogen sulphide and ammonium).

Odorous	Avenage	Maximum	CAPCS		
Substance	Average Concentration	Concentration	Removal Efficiency	Discharge Quality	
Hydrogen Sulphide (H ₂ S)			≥ 99 %	≤ 0,1 ppm	
Odour Unit	10,000	20,000	≥ 98.9 %	≤ 220	

(1) The odour unit is odour unit/m³



Centralised Air Quality Control System (CAPCS)

8 Wastewater Treatment

Purify Wastewater for Reuse

The system can remove a majority of total suspended solids, phosphorus, ammonia, organic substances and nitrogen. Treated effluent is reused within the facility, and the excessive volume is discharged to public sewage treatment works for further treatment.

Parameters (mg/L)	Raw Waste- water	Waste- water after Pre-treat- ment	Waste- water after Ammonia Stripping Plant	Waste- water after Biological Treatment	Discharge Standard
chemical Oxygen Demand (BOD)	2,500	1,630	1,550	400	≤ 800
al Nitrogen (TN)	4,000	3,450	345	100	≤ 200



Ammonia Stripping Plant