


## Towards a Low Carbon Lifestyle



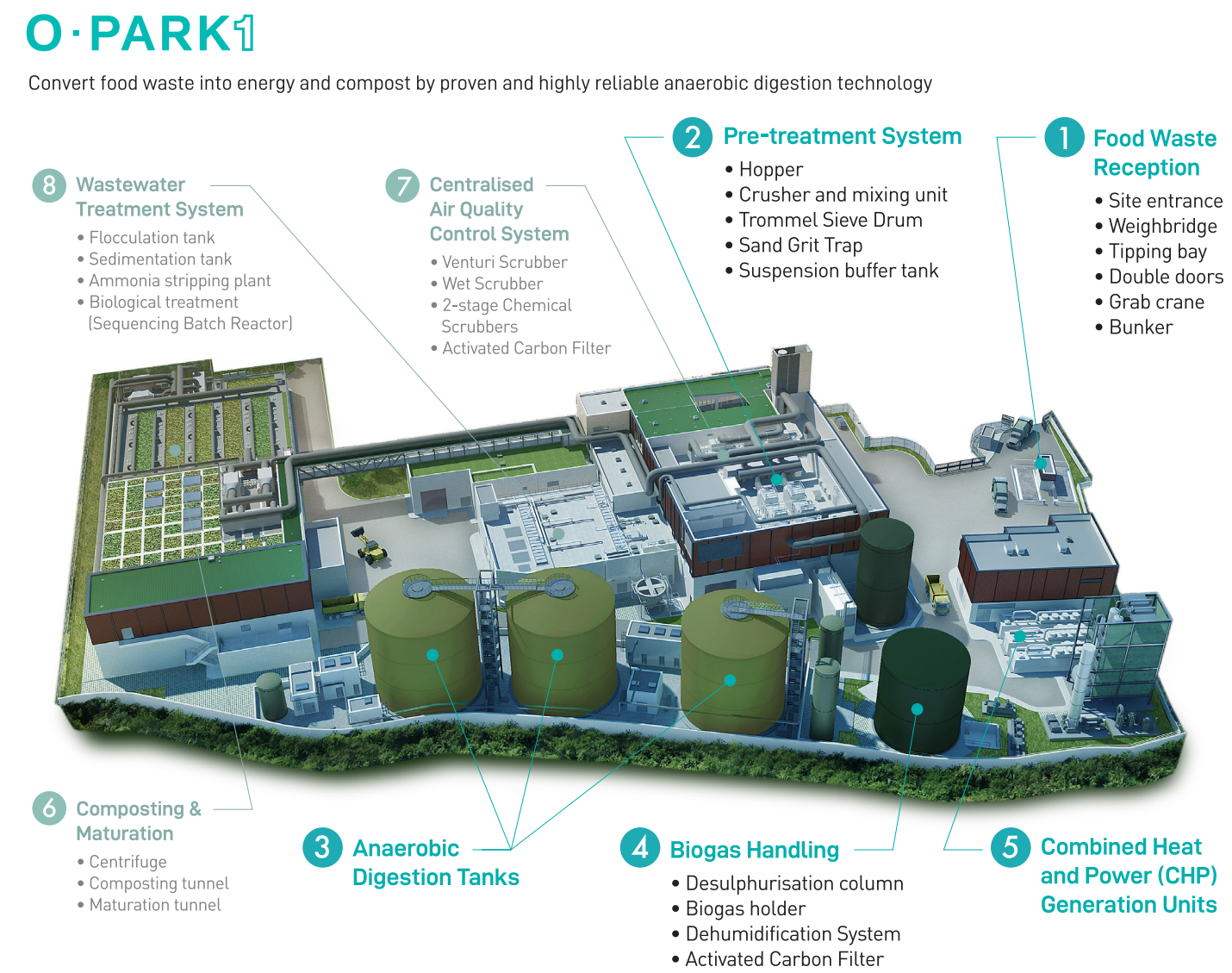
“Every single grain on the plate is the fruit of hard work.”  
Cherish food crop is a traditional Chinese virtue

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?

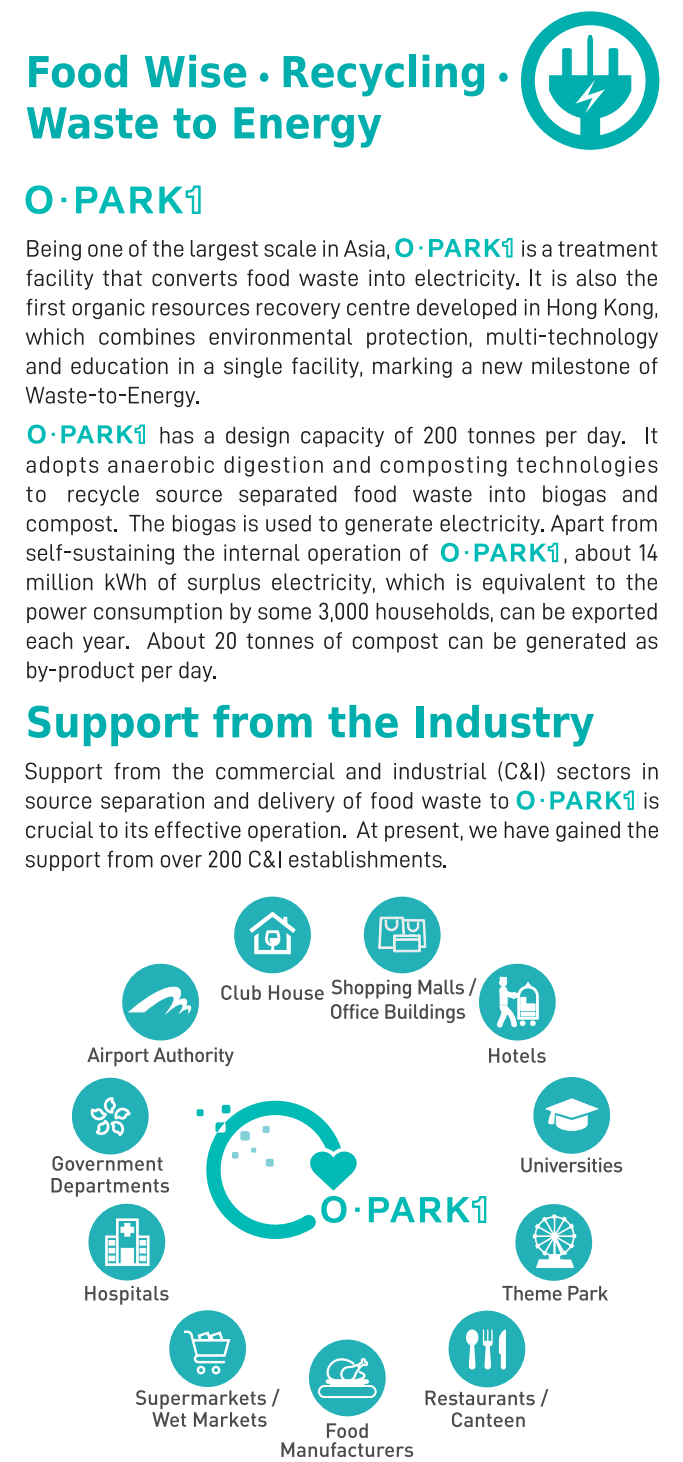
Food waste is any waste, whether raw, cooked, edible and associated with inedible parts generated during food production, distribution, storage, preparation or consumption of meals.
- ✓ Fish and poultry organs and intestine
  - ✓ Egg shells
  - ✓ Expired food
  - ✓ Tea leaves and coffee grounds
  - ✓ Soup pulp and Chinese Medicine pulp
  - ✓ Pet food etc
  - ✗ Shells
  - ✗ Large bones
  - ✗ Food packaging
  - ✗ Plastic utensil
  - ✗ Aluminum and metal can



## Renewable Energy

Energy Plus Facilities	2016 T · PARK	2016 Solar Farm at the Siu Ho Wan Sewage Treatment Works*	2018 O · PARK <sup>1</sup>
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

\* It is the largest solar farm in Hong Kong



## Food waste reduction in Hong Kong





**Aug 2008**  
Commencement of Kowloon Bay Pilot Composting Plant



**Jun 2010**  
Food Waste Recycling Partnership Scheme



**Jul 2011**  
Food Waste Recycling in Housing Estates



**May 2013**  
Foodwise Hong Kong Campaign



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



**Jul 2014**  
Food Waste Donation Project under Environment and Conservation Fund



**Nov 2015**  
Foodwise Eateries Scheme



**O · PARK<sup>1</sup>**



## 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<sub>2</sub>S), to avoid corroding the downstream system.

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

Compositions and Characteristics of Biogas inside Biogas Holder			
Biogas Holder Capacity (m <sup>3</sup> )	Methane (CH <sub>4</sub> ) Content (%)	Carbon Dioxide (CO <sub>2</sub> ) Content (%)	Relative Humidity (%)
1,500	60-70	30-40	100



Double Membrane Gas holder



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 <sub>x</sub> )	Sulphur Dioxide (SO <sub>2</sub> )	Volatile Organic Com-pounds (VOCs)	Hydro-gen Chloride (HCl)	Hydro-gen Fluoride (HF)
mg/Nm <sup>3</sup>	≤ 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 m <sup>3</sup>	~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.

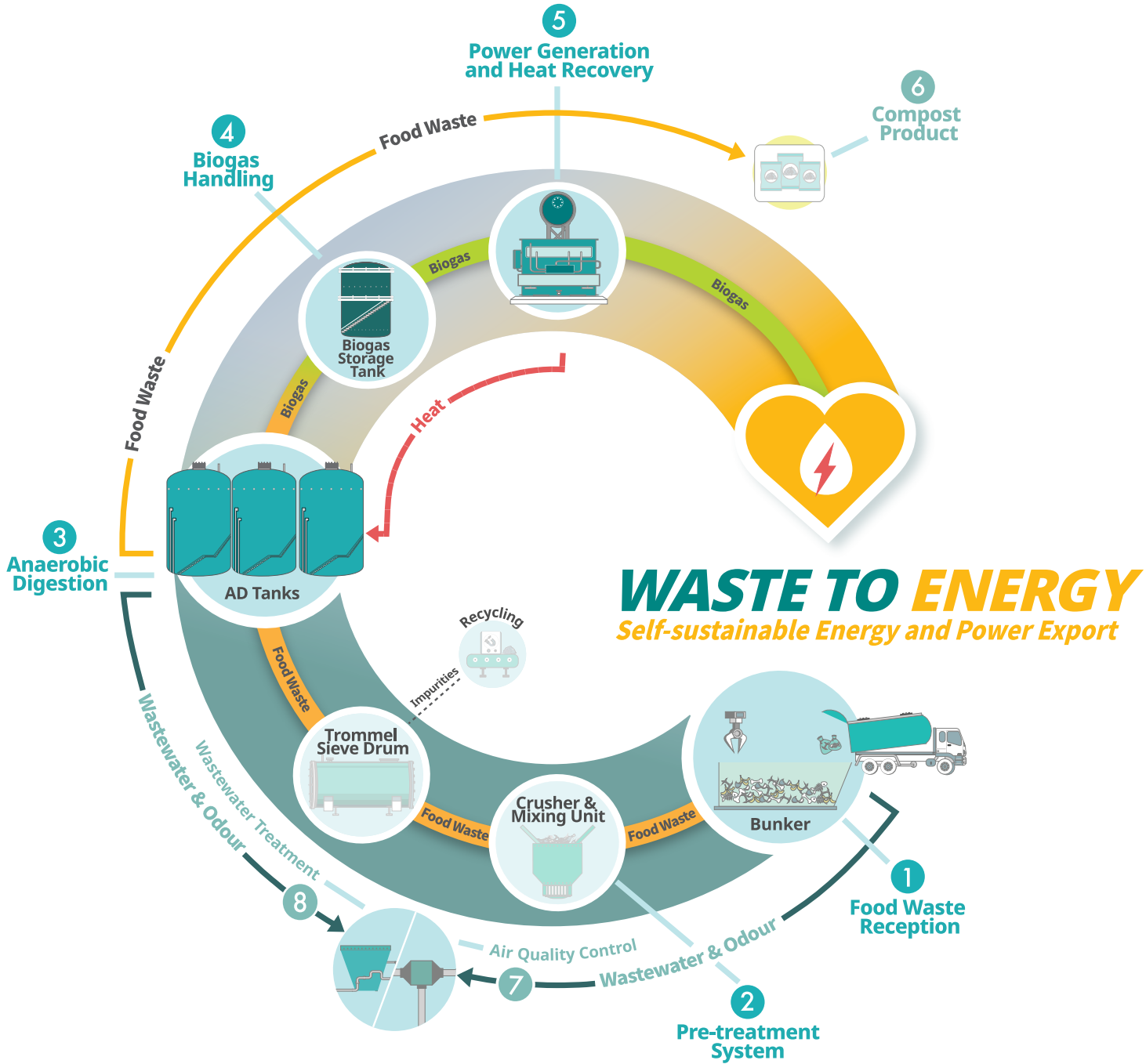
Production Quantity (t/y)	pH	Moisture Content (%)	Organic Matter (% of dry weight)	Carbon to Nitrogen Ratio
~6,500	5.5-8.5	25-45	> 20	≤ 25:1



Composting Tunnel

# WASTE TO ENERGY PROCESS

Simplified version of organic resources treatment process



## 7 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 Substance	Average Concentration	Maximum Concentration	CAPCS	
			Removal Efficiency	Discharge Quality
Hydrogen Sulphide (H <sub>2</sub> S)	5 ppm	10 ppm	≥ 99 %	≤ 0.1 ppm
Odour Unit	10,000	20,000	≥ 98.9 %	≤ 220

(1) The odour unit is odour unit/m<sup>3</sup>



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-treatment	Waste-water after Ammonia Stripping Plant	Waste-water after Biological Treatment	Discharge Standard
Biochemical Oxygen Demand (BOD)	2,500	1,630	1,550	400	≤ 800
Total Nitrogen (TN)	4,000	3,450	345	100	≤ 200



Ammonia Stripping Plant