SUMMARY OF HONG KONG BLUEPRINT FOR SUSTAINABLE USE OF RESOURCES 2013-2022

Targets

Vision

Use less and waste less of the Earth's resources through instilling an environmentally-sustainable culture into Hong Kong people's daily life.

Strategy

Develop a comprehensive waste management plan and promote a new social contract with the community to conserve resources and reduce waste.

Overall Target

-40%

Reduce the Municipal Solid Waste (MSW) disposal rate by 40% on a per capita basis by 2022.

Policy Directions

1 Government to take multiple, concurrent actions to prevent and reduce waste

2 Make all out efforts to mobilize the community to participate

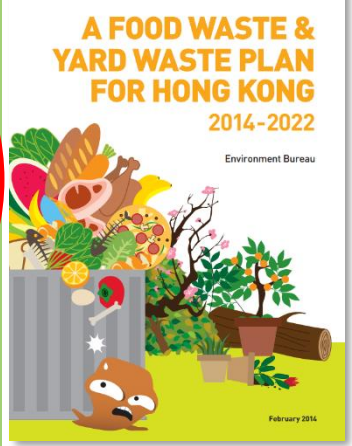
3 Fill missing gaps in Hong Kong's waste-related infrastructure

Key Actions

Drive behavioural change through policies and legislation to reduce waste, such as MSW charging and Producer Responsibility Schemes (PRS).

Mobilize the community through targeted campaigns, such as with food waste, glass beverage bottles collection, bring your own bag (BYOB), community green stations etc.

Invest in infrastructure, including Organic Waste Treatment Facilities (OWTFs), waste-to-energy MSW treatment, and landfill extensions.



T-PARK

Energy ▪ Transformation ▪ Community

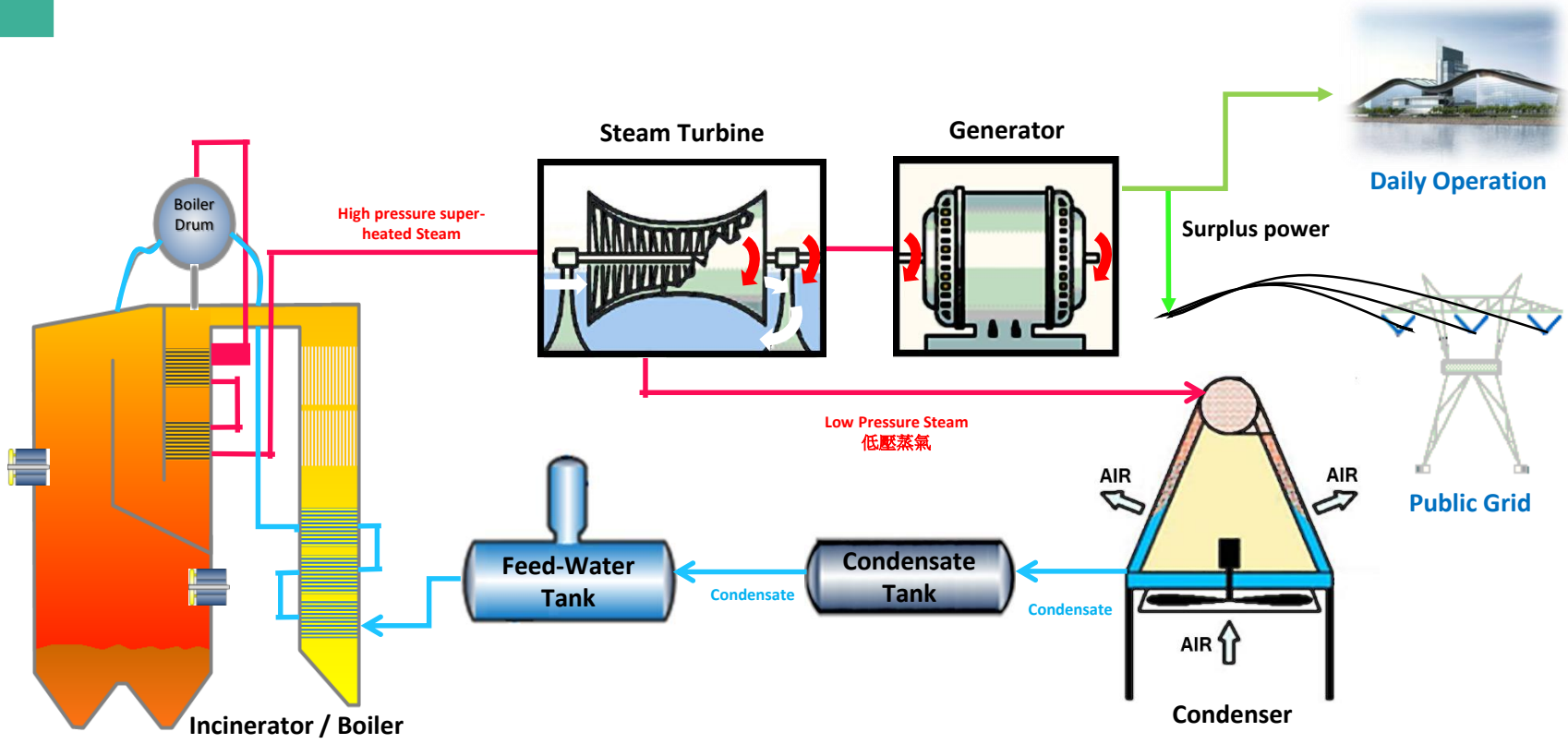
Waste-to-Energy

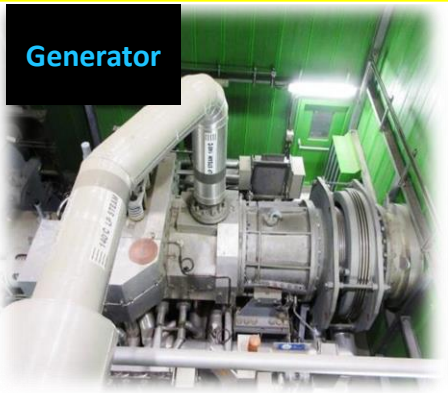
A Sustainable Approach of Sludge Disposal

Advanced incineration system, substantially reduces the loading on landfills

- T▪PARK is the 1st large scale waste-to-energy facility in Hong Kong
- Treating sludge from all major Sewage Treatment Works
- Fluidized bed incineration technology
- 2,000 tonnes of sludge handling capacity per day (largest of this kind in the world)
- 90% volume reduction
- Avoiding sludge landfilling – 1.4 million tonnes since 1 April 2015 [as at Dec 2018]

Energy Recovery and Power Generation





Power Generation

- Electricity generation to sustain the facility operation
- Surplus electricity exported to public power grid
- Total Power Generation – 170 million kWh (since 1 April 2015) [as at Dec 2018]
- Total Power Export – 8.6 million kWh (since 1 April 2015) [as at Dec 2018]

Educational and Leisure Facilities

T ▪ HALL
(Exhibition Hall)

T ▪ SPA
(Spa Pools)

T ▪ SKY
(Upcycling Products)

T ▪ THEATRE
(Theatre)

T ▪ GALLERY
(Viewing Gallery)

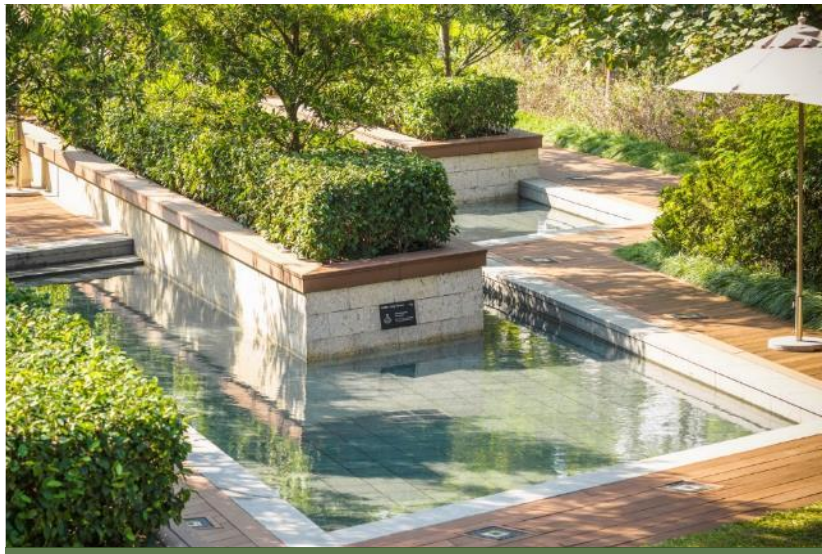
T ▪ CAFE
(CAFE)

T ▪ SPACE
(Multipurpose Room)

T▪ CORNER
(Green Info Sharing)

Outdoor Facilities

T ▪ GARDEN
(Landscape Garden)

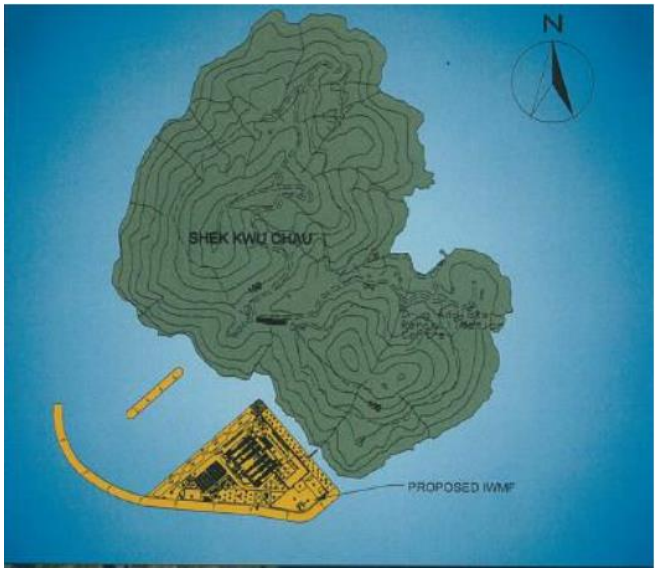


T ▪ GARDEN
(Footbath)

T ▪ ROOF
(Viewing Platform)

T ▪ HABITAT
(Natural Habitat)

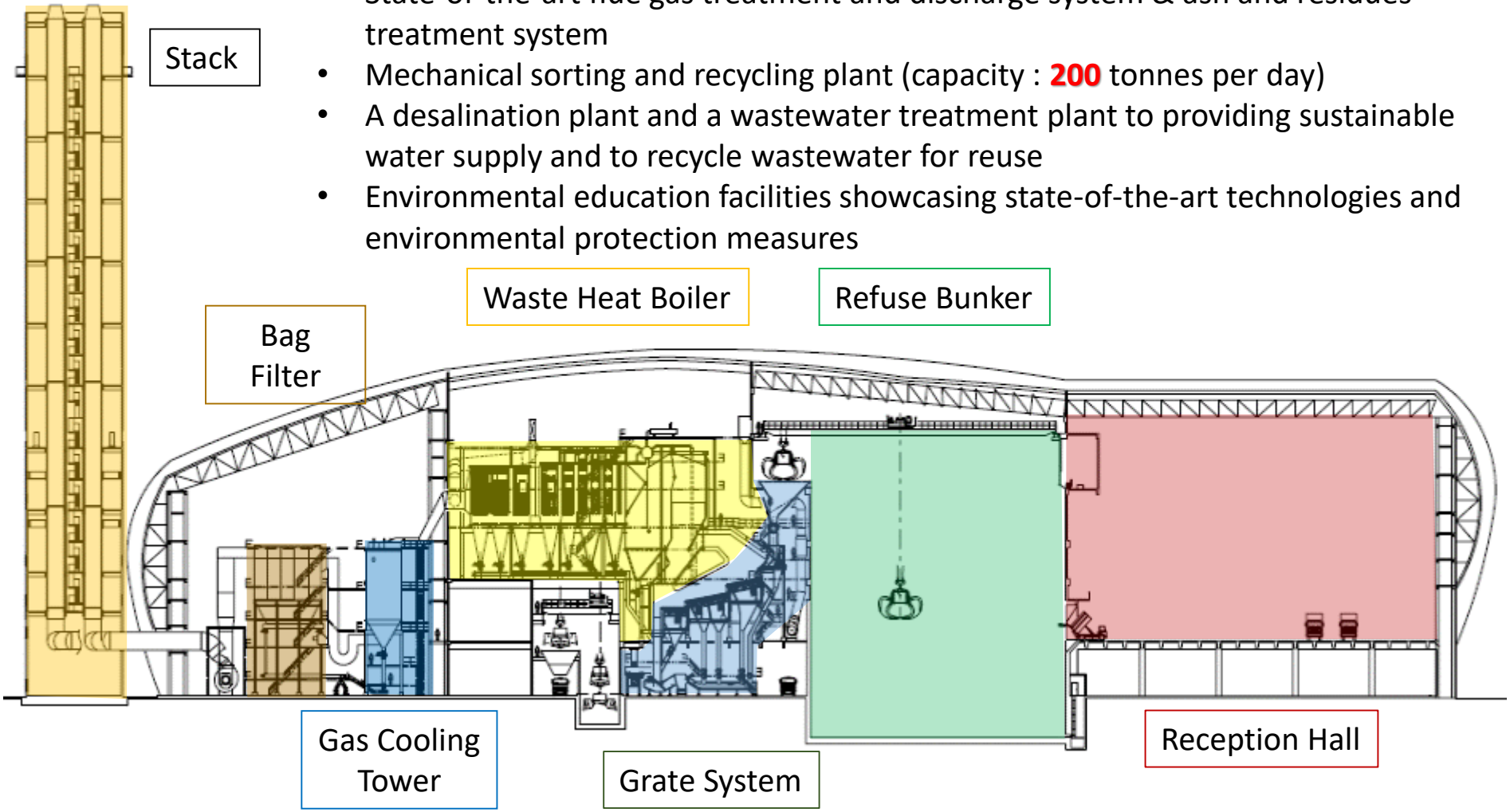
Integrated Waste Management Facilities Phase 1



Scope of Contract:	
Contract Arrangement	Design-Build-Operate (DBO)
Site Location	Artificial Island near Shek Kwu Chau
Design Capacity	3,000 tpd of Municipal Solid Waste
Treatment Technology	Moving Grate Incineration Technology
Contractor	Keppel Seghers-Zhen Hua Joint Venture
Design and Construction Period	2017 to 2024
Operation Period	From 2024 for 15 years
Capital Cost for Design and Construction	About HK$18.01 billion in MOD prices
Operation Cost	About HK$13.38 billion in MOD prices for 15 years

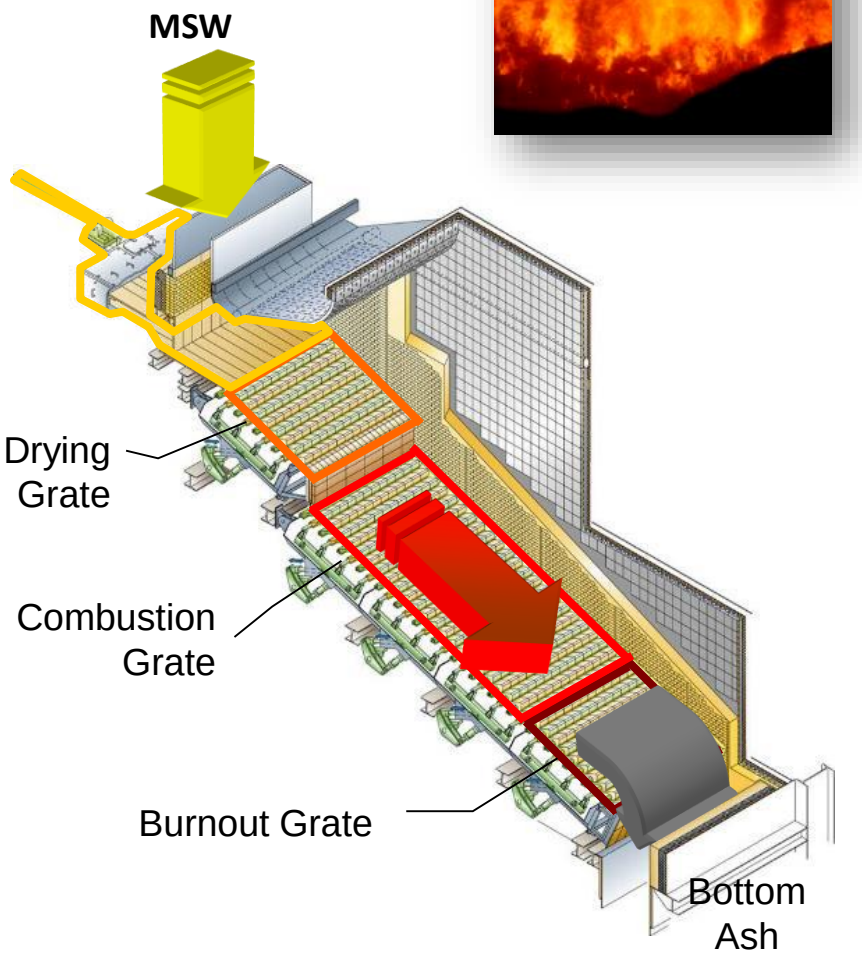
Key Features

- MSW incineration plant employing advanced moving grate technology (capacity : **3,000** tonnes per day) to substantially reduce the volume of waste by **90%**
- State-of-the-art flue gas treatment and discharge system & ash and residues treatment system
- Mechanical sorting and recycling plant (capacity : **200** tonnes per day)
- A desalination plant and a wastewater treatment plant to providing sustainable water supply and to recycle wastewater for reuse
- Environmental education facilities showcasing state-of-the-art technologies and environmental protection measures



Modern Moving Grate Incineration Technology – 3T

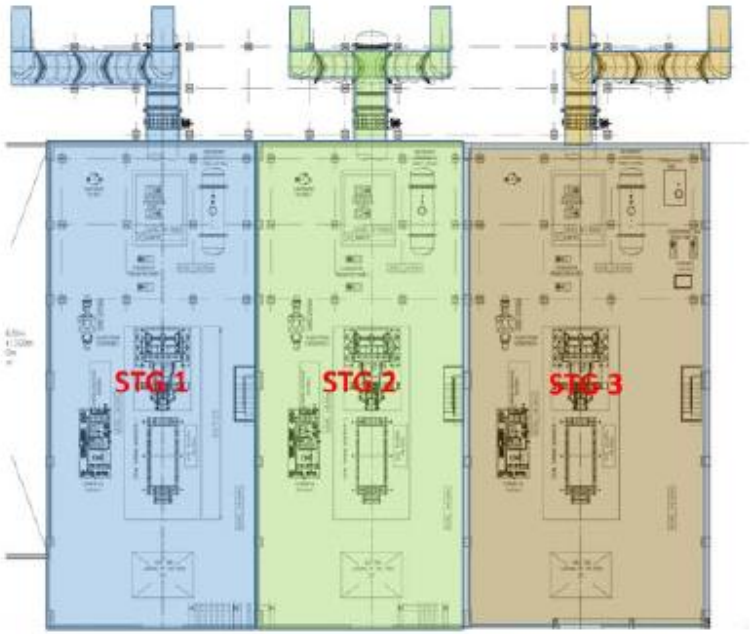
- **T**emperature at least 850°C to completely destroy organic matters
- High **T**urbulent Currents to achieve complete combustion
- At least 2s residence **T**ime at 850°C or above to achieve complete combustion



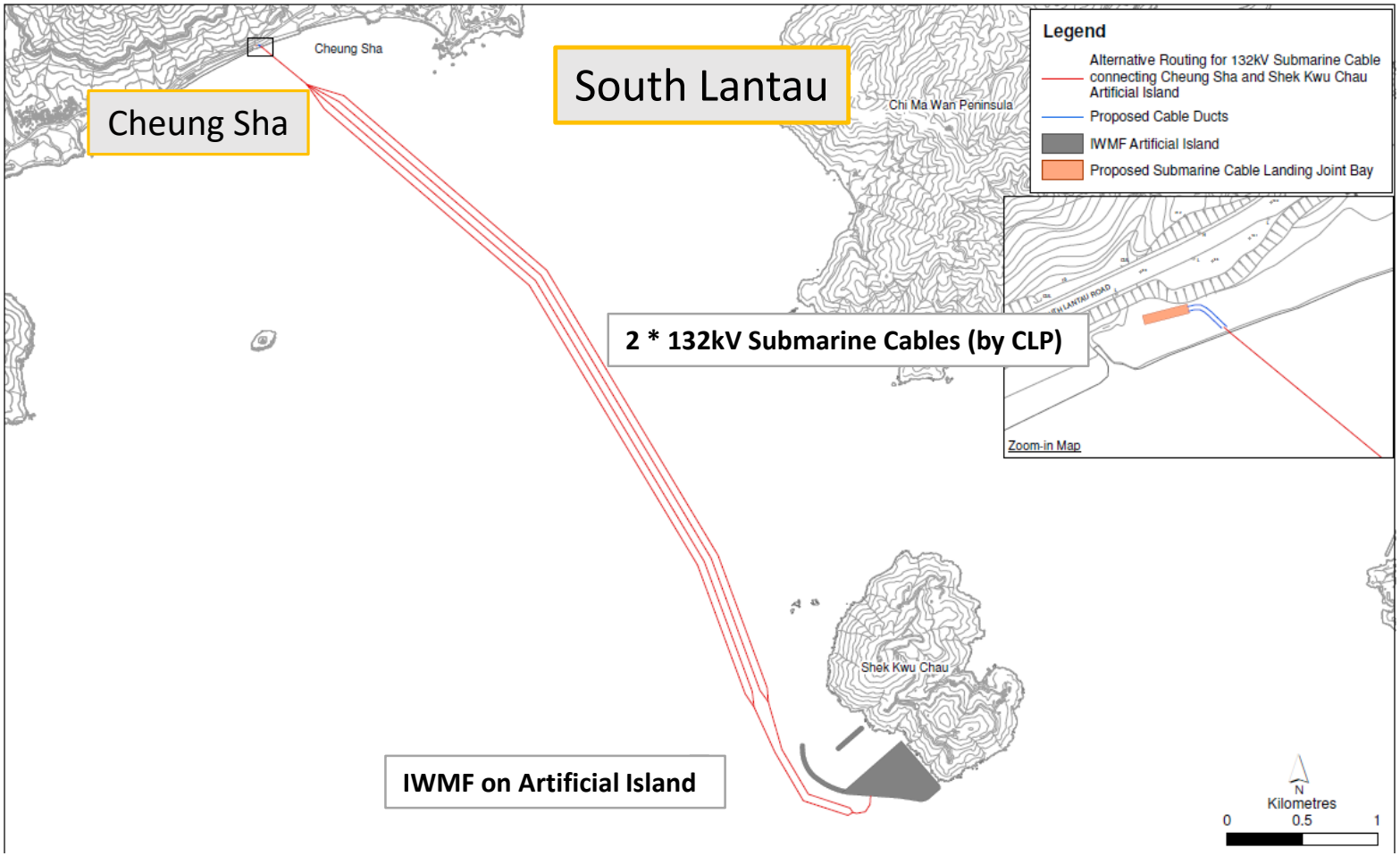
- ✓ Proven experience
- ✓ Safe and robust system
- ✓ Meeting EU Emission Standards
- ✓ Low construction and operation costs
- ✓ Small footprint

Waste to Energy

- 3 steam turbine generators rated at 55MW (1 turbine per module of 2 incineration lines)
- Waste-to-energy system to harness the renewable energy source (**~480 million** kilowatt-hours of electricity per year for use by **100,000** households)
- Reduce greenhouse gas emission (**~440,000 tons** CO_2 /year)



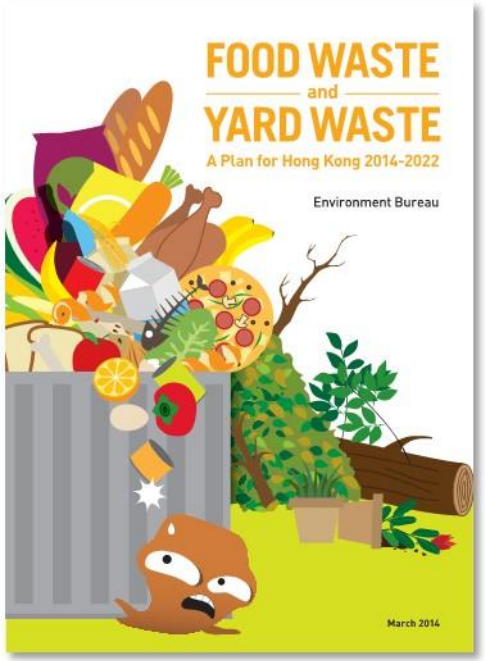
Electricity Power Export/Import

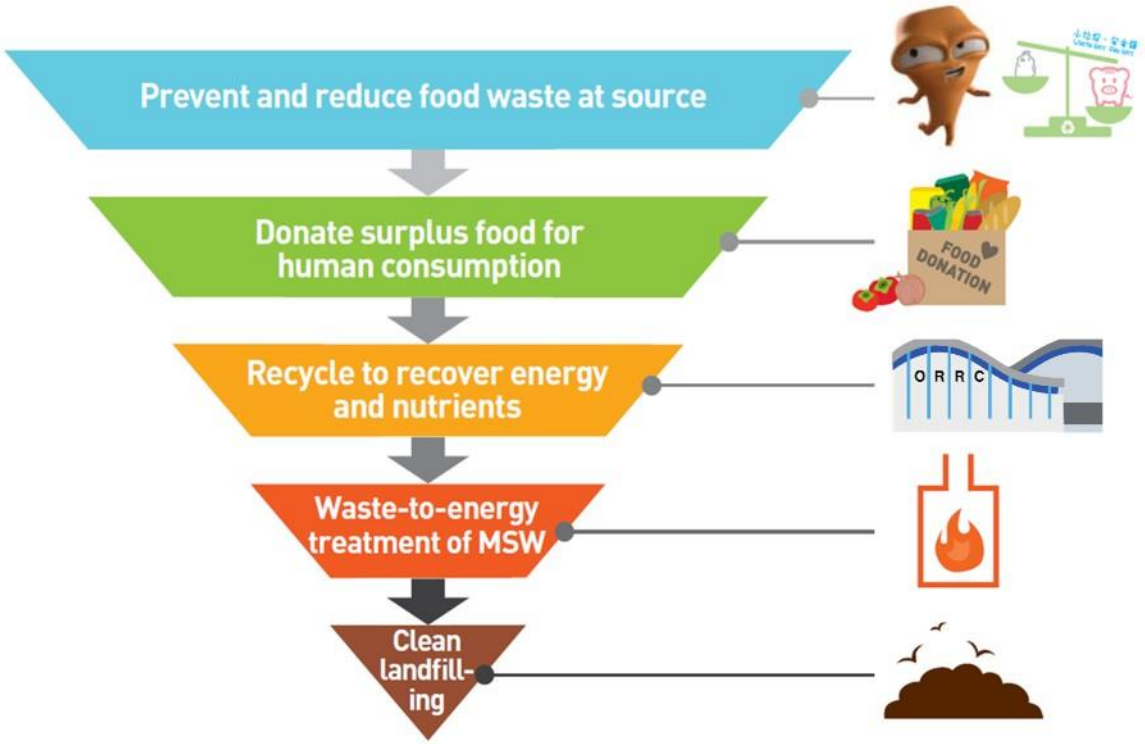


- Electricity will be generated from incineration for export to the grid.
- Electricity may be imported during start-up and emergency shutdown of IWMF
- Power cable connecting IWMF and the grid will consists of 132kV submarine cables and 132kV land cables

2014…

…2022





Current Status:

Composition	Domestic Waste	Commercial Waste	Total
Food Waste	~ 2,300 tons/day	~ 1,300 tons/day	~3,600 tons/day (~35% of MSW)

Waste Avoidance & Food Donation

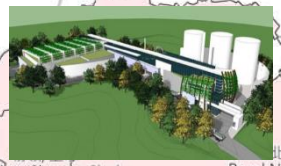
惜食香港
Food Wise Hong Kong

Food Wise Eateries
咪嘥嘢食店

- The Food Wise HK Campaign aims to promote public awareness and instill behavioural changes in various sectors to reduce food waste generation.
- Through the Environment and Conservation Fund (ECF), we have supported 34 projects for NGOs with HK$60 million for the collection of 5000 tonnes of surplus food for donation to about 5 million people.

Organic Resources Recovery Centres

ORRC1 - Siu Ho Wan
200 tonnes/day
Commissioned in July 2018



We plan to build 5 – 6 ORRCs in the territory for turning food waste to energy

ORRC2 – Sha Ling
300 tonnes/day
To be commissioned in 2021

ORRC3 - Shek Kong
300 tonnes/day
Conducting engineering feasibility study

O·PARK1

Organic Resources Recovery Centre Phase 1

HONG KONG 1st

Start intake food waste from 1 July 2018

Highlights:

- Design Capacity : **200 tonnes/ day**
- Surplus Electricity : **14 million kWh (~3,000 households consumption)**
- By-products: **6,500 tonnes/ year compost products**
- Capital Cost: **$1,589.2M**

Benefits:

- Divert **73,000 tonnes** of food waste from landfills every year
- Reduce **25,000 tonnes** of greenhouse gas emission

Food Waste to Energy Journey

Composting Hall


Mixing Unit


Composting Tunnels


Centrifuge

Pre-treatment Lines


Trommel Sieves


Crusher

1000 m^3 Waste Bunker

5 Tipping Bays

Waste Water Treatment Plant

Ammonia Stripping Plant


Anaerobic Digestion Tanks


Desulphurisation

3 nos. 1.5MW CHPs

Flaring System

Organic Resources Recovery Centre Phase 1
Siu Ho Wan, Lantau Island

Commissioned in July 2018

Anaerobic Digestion

- Food Waste is pre-treated to remove impurities, then the suspension is pumped into the Suspension Buffer Tank
- Food waste undergo anaerobic digestion (AD) process to produce biogas
- Biogas extraction at the top of the AD tanks

Suspension Buffer Tank	
No. of tank	1
Capacity	~1,200 m^3
Mixing system	Jet Mixing

SBT

Anaerobic Digester	
Type	Wet type AD
No. of stage	One
No. of tank	3
Capacity per tank	4,300 m^3
Operating Temperature	35 – 38°C
Retention Time	23 days
Mixing system	Jet Mixing

AD Tanks

Electricity & Heat Generation

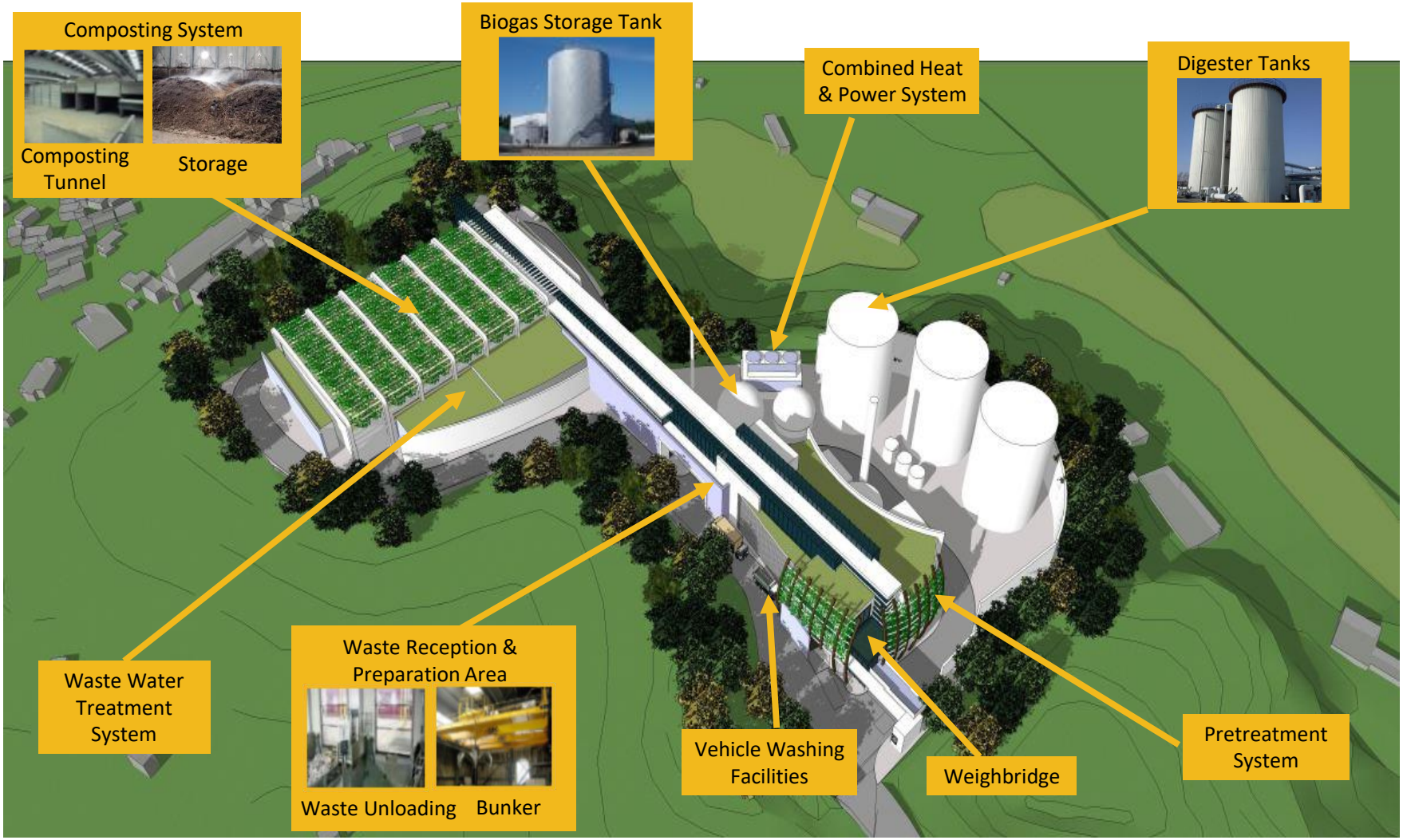
- 3 nos. Combined Heat and Power generation units to combust treated biogas to generate electricity and heat
- Electricity capacity: 1500kW / unit;
- Heat capacity: 1600 kW / unit
- Electricity & Heat generated is used for the operation of O · PARK 1.
- Surplus electricity is exported to the power grid

CHP Units

Standby Flare

Electricity Generation at O · PARK 1	
Annual electricity generation	~26 million kWh / yr
Annual electricity export to the Grid	~14 million kWh / yr

ORRC2 – Main Component



Summary of ORRC Phases 1 & 2

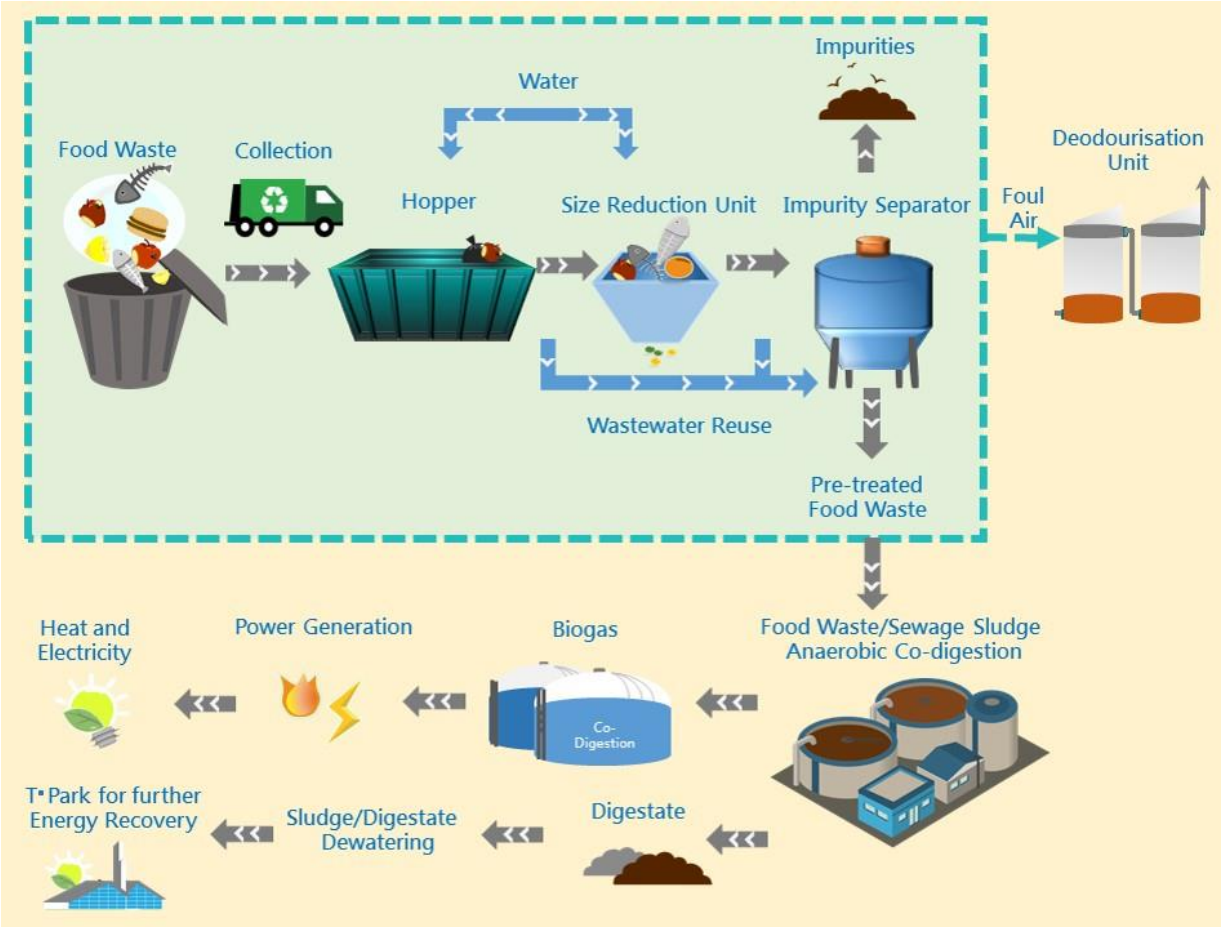
	ORRC1 (2018)	ORRC2 (2021)
Food Waste Recycling Capacity	200 tonnes/day	300 tonnes/day
Capital Cost	HK$1.5B	HK$2.5B
Running Cost	HK$72M/yr	HK$100M/yr
Biogas Generation	20,000 m^3/day	30,000 m^3/day
Biomethane Production	--	5 million m^3/yr*
Surplus Power Generation	14 million kWh/yr (~3000 households)	24 million kWh/yr* (~5000 households)
Compost Generation	6,500 tonnes/yr	10,000 tonnes/yr

* For ORRC2, we are yet to decide on whether the surplus biogas would be used to produce biomethane or electricity.

Food Waste/Sewage Sludge Anaerobic Co-digestion Trial Scheme

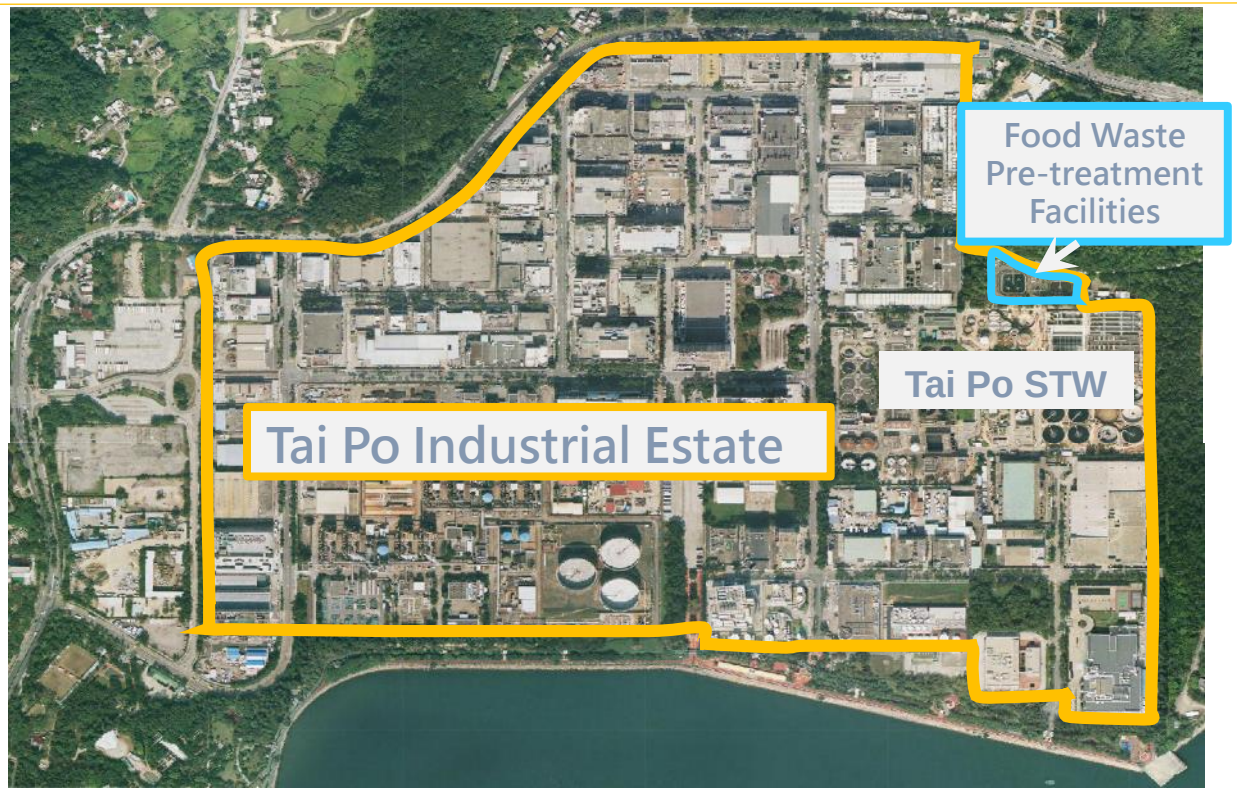
- Food waste sourcing
- Food waste pre-treatment
- Delivery of pre-treated food waste to the Sewage Treatment Works;

- Modification of existing digestion facilities
- Co-digestion operation
- Electricity generation for internal power consumption



New initiative in using the existing sewage treatment works for turning food waste into energy.

Food Waste/Sewage Sludge Anaerobic Co-digestion Trial Scheme



Scope of Contract:	
Contract Arrangement	Design-Build-Operate (DBO)
Design Capacity	50 wet-tonnes per day
Contractor	ATAL Engineering Limited
Design and Construction Period	2017 to 2019
Operation Period	From 2019 for 6 years

Benefits of the Trial Scheme

Synergy of Co-location and Co-treatment

- Utilize the existing anaerobic digestion system
- achieve synergy in co-location and co-treatment of different waste types

Turning Waste to Energy

- Improve nutrient balance and enhance the biogas yield

Reduction of Greenhouse Gas (GHG) Emission

Food Waste / Sewage Sludge Co-digestion

Pre-treated food waste will be transferred to the sewage treatment plants (STW) for co-digestion with sewage sludge. The digested sludge will then be incinerated at the T-Park. We plan to extend this operation to other STWs in HK to help reducing space and cost requirements for food waste recycling.

Waste-to-Energy Facilities

We will continue to develop more waste-to-energy facilities, including ORRCs, IWMF and co-digestion projects.