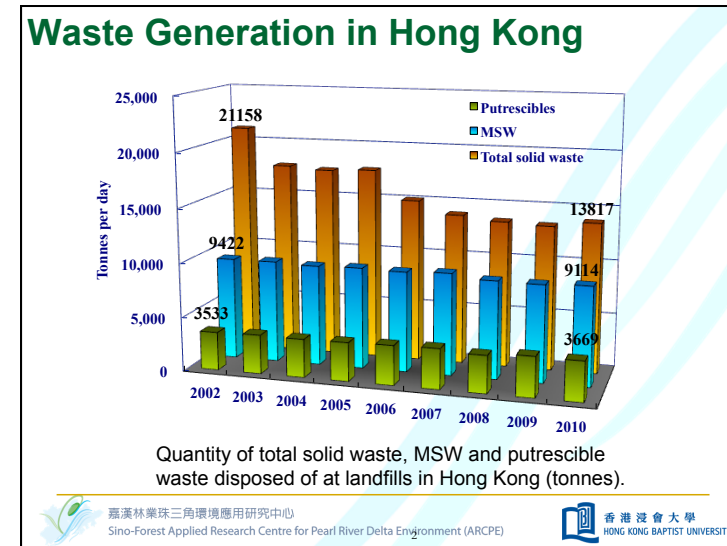




Landfilling Is Inappropriate



- **Our landfills will run out of space in 4 to 8 years !**
- **Integrated waste management facilities to divert organic wastes for biological treatment**
- **Pilot in-vessel composting plant for food waste composting**

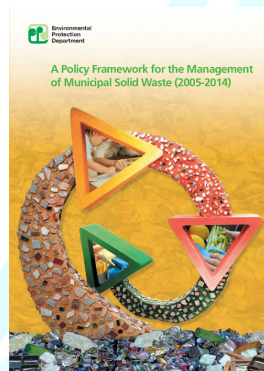
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Opportunities for Alternatives

- Running out of landfill space
- Resource conservation
- Strong objection on incineration in the public
- Global warming issues
- Increase in fertilizer price



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Challenge: Source Separation of MSW for Collection of Organic Waste

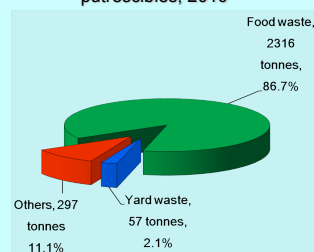


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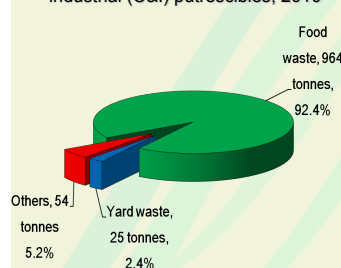


Composition of Putrescibles

Composition of domestic putrescibles, 2010



Composition of commercial and industrial (C&I) putrescibles, 2010



Food waste, about 3280 tonnes per day, consisted of 88.3% of putrescibles in 2010



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Composting Opportunities for Food Waste

Households → Domestic composter

Hotels and restaurants, etc. → Commercial composter
Centralized composting facility

Hotels, restaurants, etc. → Centralized composting facility



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Household Level Composting

Highly Populated Area

- Mechanical and biological treatment
- Effective in volume reduction (~80%)
- Enable to compost indoor
- Require efficient separation
- Control of the ingredients
- Sophisticated and low Process control
- Compost contains high salt content
- Odour control are the main hindering factors



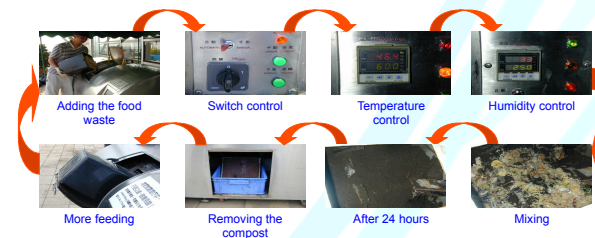
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Decentralized composting at Un Chau Estate

- ECOTECH Food Waste Processor EP50
- Treatment capacity of 50 kg per day
- Safety control system – automatic shut down sensor
- Auto mixing, temperature control, aeration, odour control, fully enclosed



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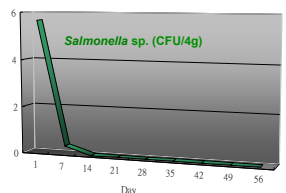
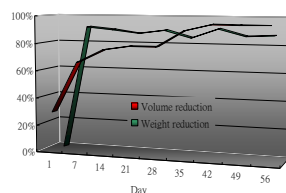
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Decentralized composting: Efficiency

Compost Quality



pH	6 - 7
Total nitrogen (%)	1.57 – 3.58
Potassium (%)	0.99 – 1.66
Phosphorus (%)	1.41 – 3.04
C/N ratio	13
<i>E. Coli</i> (CFU/g)	None
Fecal coliforms (CFU/g)	None
<i>Salmonella</i> (CFU/4g)	None
Seed germination rate (%)	90
EC (mS/cm)	10 - 12



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Decentralized composting

- A feasible mean for food waste recycling.
- Mass reduction of ~90% and 82-85% on weight and volume basis, respectively can be achieved.
- Compost product quality was similar to the other composts except EC.
- Very high EC restricted the higher levels of compost application.



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Centralized Composting

- Food wastes from C&I sector – clean feedstock
- Potential for commercialization
- Suitable for IWMMF
- Key problems
 - Acidity
 - Odour



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Sources of C&I Organic Waste

Waste Generator	Type of waste	Fraction of non-organic waste	Moisture Content (%)	Organic matter (%)	Total NPK (%)
Bakery industry	Bread and cake pieces	minimal	~34.0	~98	< 3%
Bean curd industry	Bean residues	none	78.7-93.3	93.5-95.9	> 3%
Beverages industry	Plant residues	none	78.2-91.3	95.0-96.3	> 3%
Catering industry	Mixed food waste	Up to 20%	62.9-90.9	90.8-97.1	> 3%
Food production industry	Pre- consumption food waste	Up to 29.7%	54.8-66.3	88.7-97.1	> 3%
Hotel	Pre and post-consumption food waste	13.8-31.6%	65.0-74	92.3-96.8	> 3%
Sauce industry	Plant residues	none	~26.9	~98.5	< 3%
Shopping malls	Pre- and post-consumption food waste	72.6-74.7%	57.8-78.1	58.1- 96.9	> 3%
Superstores	Mixed food waste	Up to 22%	60.4-67.5	84.9-94.9	>or < 3%
Wet Markets	Mixed food waste	10.6-39.0%	62.5-88.3	83.9-92.7	>or< 3%
Wholesale market	Mixed food waste, mainly vegetables	none	~92.9	~78.9	> 3%
Yard waste	Yard waste	none	54.2-61.4	50.5-85.1	> 3%
Miscellaneous	Mixed organic waste	~12%	48.6-80.6	91.1-98.4	>or< 3%



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Application: In-vessel Food Waste Composting

Parameter	Lunch box caterers	Hotel	Shopping mall	In-flight catering service	Wet Market
Moisture content (%)	66.0	76.0	74.8	78.2	67.0
Bulk density (kg/L)	0.54	0.67	0.63	0.51	0.77
C:N ratio	18.0	10.3	14.2	10.3	9.9
Contaminants (%)*	0	1.1	0	4.6	8.5

* Contaminants include different kinds of recyclables or refuses



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Education for source separation of food waste



Contaminants: up to 8.5% by volume – wet market
up to 4.6% by volume (others)

Training improved the quality of feedstock



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Source Separation of Food Waste



Two to three 60-L plastic bins were placed in the kitchen of each of the participating tenants for food waste collection.



Food waste in the 60-L bins was transferred to the labeled 240-L bins located outside the tenants' premises.



The 240-L bins containing food waste were collected and then transferred to the Pilot Plant daily by the contractor.

A strategy based on stakeholders' involvement - is the key



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In-vessel Food waste composting

Handling & Operation: Key for the success & Acceptance



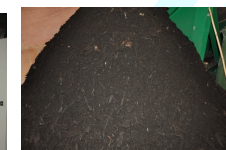
Compost mix preparation



Loading mix to composter



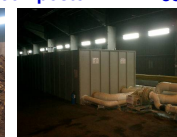
In-vessel composting



Partially mature compost



Compost curing



Biofilter



Composting piles containing sieved compost

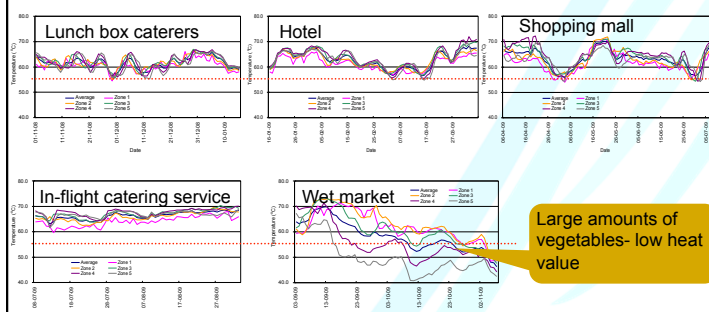


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Composting Performance of Food Waste from Various Sources



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Decomposition during Food Waste Composting

Sectors	By volume (%)	By fresh weight (%)	By dry weight (%)	Compost product from each tonne of food waste (tonnes)
Lunch box caterers	58.2	71.3	55.5	0.19
Hotel	54.3	63.9	44.1	0.23
Shopping mall	68.5	71.4	63.1	0.20
In-flight catering service	58.6	46.8	37.3	-*
Wet market	70.4	46.0	46.0	-*

* Compost from this two sectors had not sieved by the end of the project. Therefore no data is available



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