



聖若瑟大學<sup>TM</sup>  
UNIVERSITY OF SAINT JOSEPH

# Legal Compliance and Implementation of the Circular Economy for Food Waste Reduction & Handling in Macau and Hong Kong

By

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**International Workshop on Food Loss and Waste Prevention targeting Southeast and  
East Asian region**

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# Personal Profile

# Warren Li

Job: General Manager – Ultra Clean Waste Services Ltd.  
Head of Project Engineering – CSR Macau & SITA Macau

Professional Qualification: Registered Mechanical Engineer

Education:

- PhD Student – University of Saint Joseph
- Master of Environmental Science & Management – University of Saint Joseph
- Master of Science in Finance – Macau University of Science & Technology
- Master of Science in Engineering (Industrial Management) – U of Hong Kong
- Bachelor of Applied Science (Mechanical Engineering) – U of Toronto

# Rebecca Sio

Job: Senior Executive – Ultra Clean Waste Services Ltd.

Education:

- MBA Student - Macau University of Science & Technology
- Bachelor of Engineering (Civil & Environmental) – National University of Kaohsiung, Taiwan

# Overview of Macau & Hong Kong

Indicators	Macau	Hong Kong
End Year Population (million)	0.667	7.483
Land area (km <sup>2</sup> )	32.9	1,106
Disposal quantity of MSW (tons)	522,548	3,920,000 (2017)
Disposal quantity of MSW (kg) per capita	2.17	1.45 (2017)
Visitor arrivals (no.)	35,803,663	65,147,555
Tourism intensity	32.1	12.1 (2017)
GDP per capita (USD) 2017	80,900	46,200

- Tourism intensity refers to the ratio of annual total number of nights spent by hotel guests to mid-year population.

# MSW Composition

Unit % by weight	Macau (2018)	Hong Kong (2017)
Wood	1.9	3.1
Metals	4.4	2.3
Glass	4.7	2.7
Fabrics	3.4	3.4
Paper	20.3	23.6
Plastics	22.5	19.8
<b>Organic Substances (Food Waste)</b>	<b>39.5</b>	<b>39.7</b>
Others	3.3	5.4
<b>Total</b>	<b>100%</b>	<b>100%</b>

# Estimated Food Waste Generation

	Total M SW Generated (tons)	% of Food Waste	Estimated yearly Food Waste Generation (tons)
Macao	522,548	39.5	206,406
Hong Kong	3,920,000	39.7	1,556,240

# Macau - Legal Requirements related to Food Waste

Law / Regulation	Outline
Lei 2/91/M LEI DE BASES DO AMBIENTE 第 2/91/M 號法律 環 境 綱 要 法	Serves as Legal Framework for all Environmental Protection laws
Regulamento Administrativo n.º 28/2004 Regulamento Geral dos Espaços Públicos 第 28/2004 號行政法規 公共地方總規章	Governs the handling of MSW, focusing on public hygiene.

# Hong Kong - Legal Requirements related to Food Waste

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## Ordinance

## Outline

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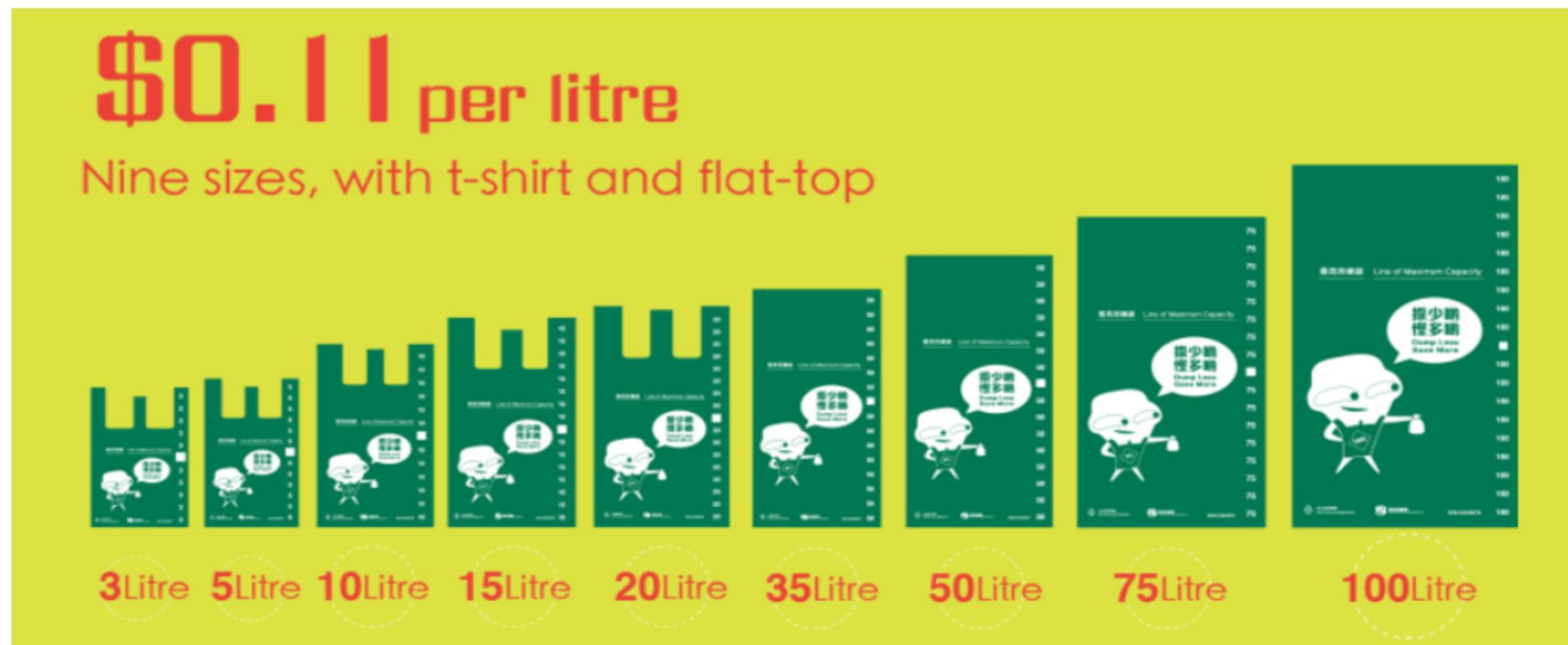
Cap. 354 Waste Disposal Ordinance

To provide for the control and regulation of the production, storage, collection and disposal including the treatment, reprocessing and recycling of waste of any class

Waste Disposal (Charging for Municipal Solid Waste)  
(Amendment) Bill 2018

1. expect to be implemented in 2021
  2. to establish a charging scheme for the disposal of municipal solid waste
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# Waste Disposal (Charging for Municipal Solid Waste) (Amendment) Bill 2018 – How to Charge?

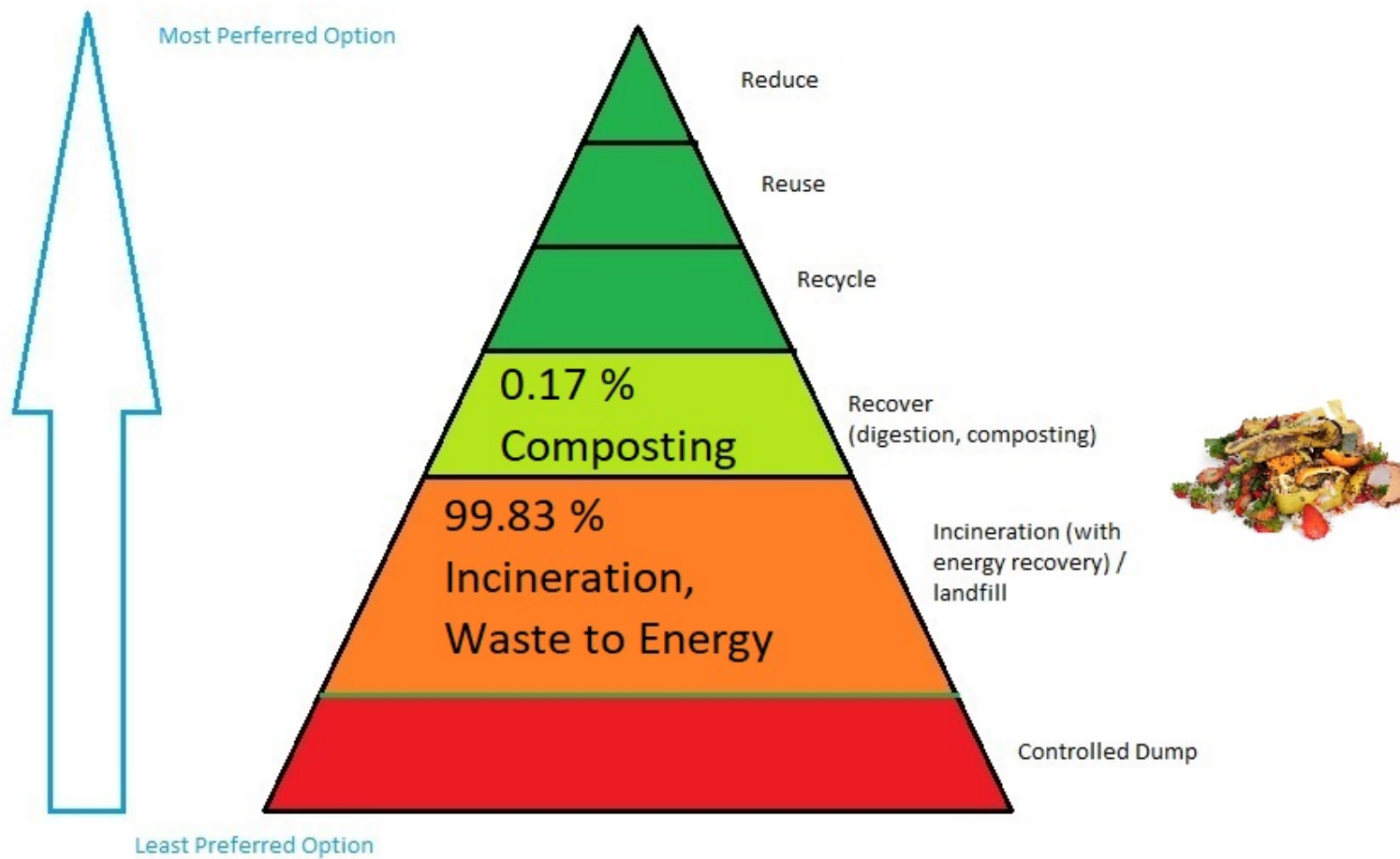


- By Designated Garbage Bag
- HKD 0.11 = USD 0.014

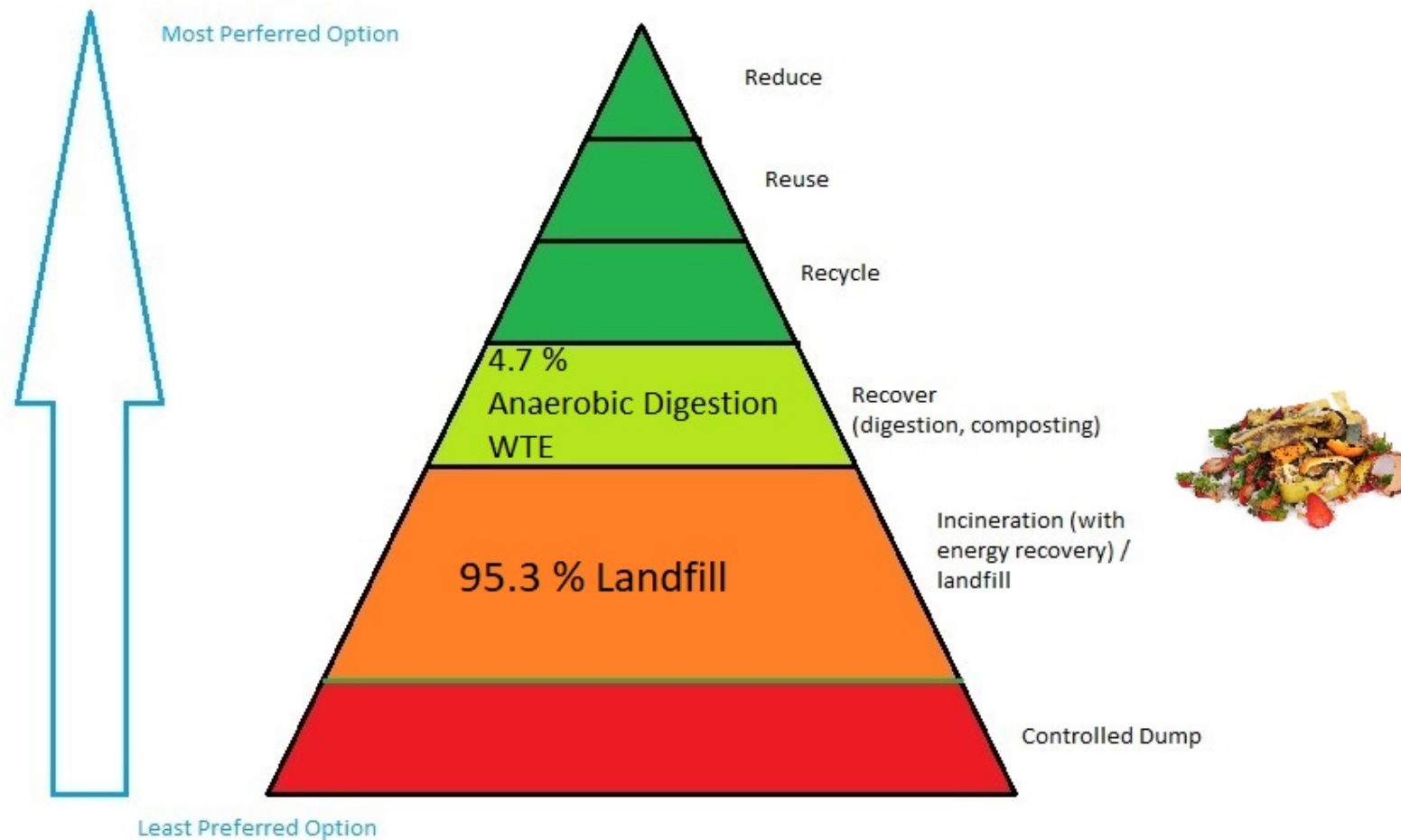
<https://www.mswcharging.gov.hk/how.php?lang=en>



# Food Waste Handling & Treatment (Macau)

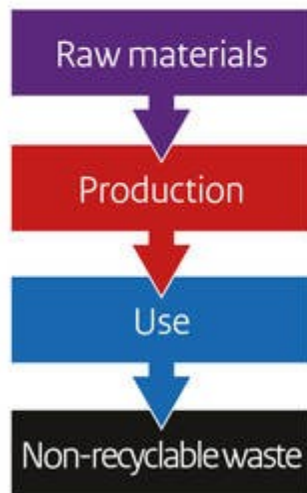


# Food Waste Handling & Treatment (Hong Kong)

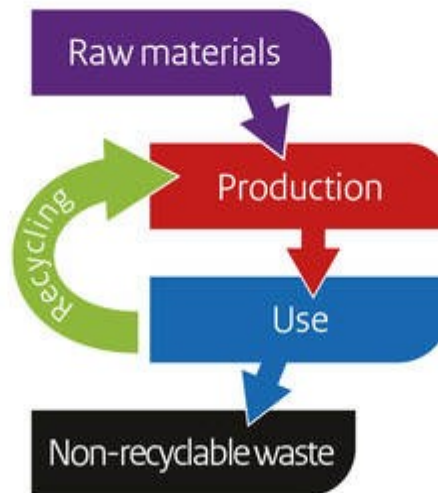


# From a linear to a circular economy

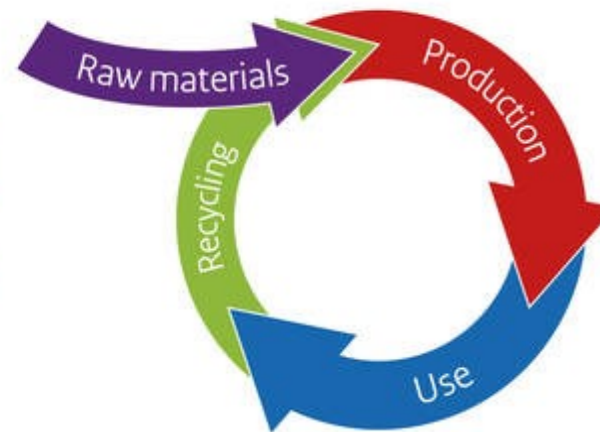
Linear economy



Reuse economy



Circular economy



<https://www.government.nl/topics/circular-economy/from-a-linear-to-a-circular-economy>

# Circular Economy – Cost Structure (Macau Model)

<b>Food Waste Handling Method</b>	<b>Collection cost</b>	<b>Treatment / Disposal cost</b>	<b>Revenue from end product?</b>
Household food waste (Incineration)	By Government	By Government	Yes, from electricity generated
<i>Commercial food waste (Incineration)</i>	<b><i>By Producer</i></b>	<i>By Government</i>	<i>Yes, from electricity generated</i>
Commercial food waste (Government composting facility)	By Government	By Government	No, due to lack of Agriculture industry in Macau

## Circular Economy – Cost Structure (Hong Kong Model, without waste charging)

<b>Food Waste Handling Method</b>	<b>Collection cost</b>	<b>Treatment / Disposal cost</b>	<b>Revenue from end product?</b>
Household food waste (Landfill)	By Government	By Government	No
Commercial food waste (Landfill)	<b><i>By Producer</i></b>	<b><i>By Producer</i></b>	No
Commercial food waste (Government Anaerobic Digestion facility)	By Government	By Government	Yes, from electricity generated.

# Circular Economy – Cost Structure (Hong Kong Model, with waste charging)

<b>Food Waste Handling Method</b>	<b>Collection cost</b>	<b>Treatment / Disposal cost</b>	<b>Revenue from end product?</b>
Household food waste (Landfill)	<i><b>By Producer</b></i>	<i><b>By Producer</b></i>	No
Household food waste (Government Anaerobic Digestion facility)	By Government	By Government	Yes, from electricity generated.
Commercial food waste (Landfill)	<i><b>By Producer</b></i>	<i><b>By Producer</b></i>	No
Commercial food waste (Government Anaerobic Digestion facility)	By Government	By Government	Yes, from electricity generated.

# Food Waste Composting Machine in Macau

- Small scale composting machine;
- Approx. 60 units in Macau;
- A number of Machines owned and operated by Macau Government;
- Others being used by Hotel, School, Institutions;
- Difficult to create value for the compost generated, due to lack of Agriculture Industry in Macau, also the relatively high salt content.
- Due to China Green Fence policy, the generated compost are not allowed to enter mainland China, even under One Country Two System framework.

# Macau Government Composting Machine



[http://www.dspa.gov.mo/richtext/foodwasterecycling.aspx?a\\_id=1528441001](http://www.dspa.gov.mo/richtext/foodwasterecycling.aspx?a_id=1528441001)





# Food Waste Anaerobic Digestion Facility in Hong Kong – O PARK 1

- The **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 will be used to generate electricity and apart from the internal use within **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.
- In Operation from early 2019.
- Government owned facility.
- Operator: SUEZ NWS

# Future Development

## **Macau**

- Establish Centralized Food Waste Treatment Centre (in operation 2022, likely Anaerobic Digestion);
- Implement waste charging scheme (2025).

## **Hong Kong**

- Implement waste charging scheme (2021);
- Total 5 Food Waste Treatment Centre will be established (O Park 1 ~ 5).



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Thank You for Listening!!!

Q & A