

# Singapore's Solid Waste Management Experience

Technical Deep Dive on Solid Waste Management

24 September 2018

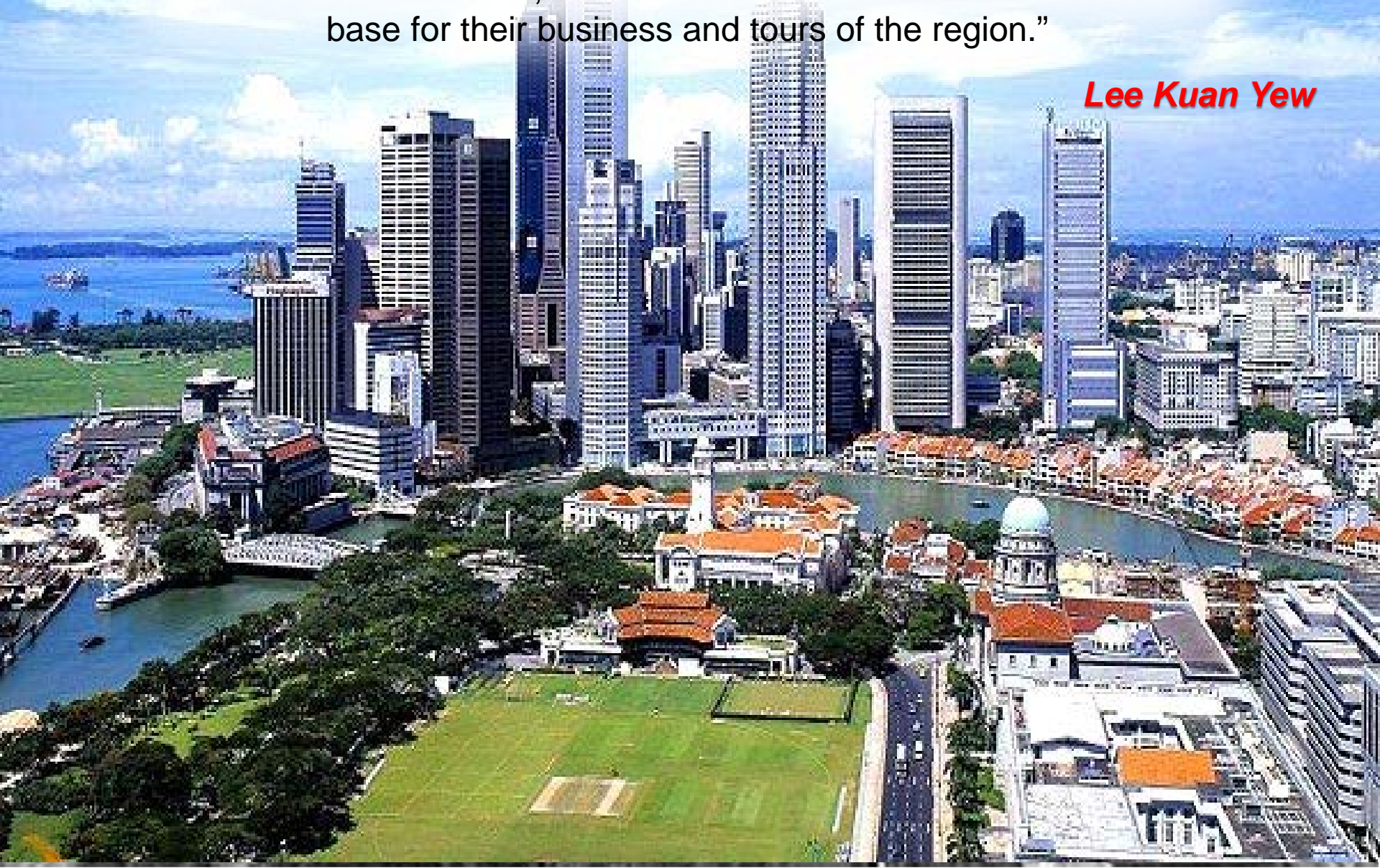
Presented by: Kwok Wai Choong

Deputy Director (Cluster Development)

Industry Development & Promotion Department

“After independence, I searched for some dramatic way to distinguish ourselves from other Third World countries. I settled for a **clean and green Singapore**. One arm of my strategy was to make Singapore into an oasis in Southeast Asia, for if we had First World standards, then businessmen and tourists would make us a base for their business and tours of the region.”

*Lee Kuan Yew*

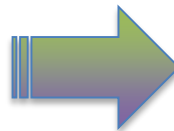


**Then**

**&**

**Now**

**Transformation of living conditions**



**From direct landfilling to volume reduction and energy recovery**



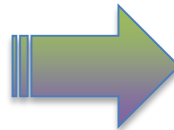
Lim Chu Kang



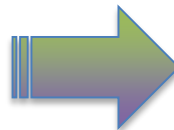
Choa Chu Kang



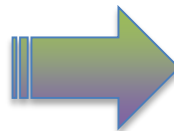
Lorong Halus



**From street hawking to al fresco dining**

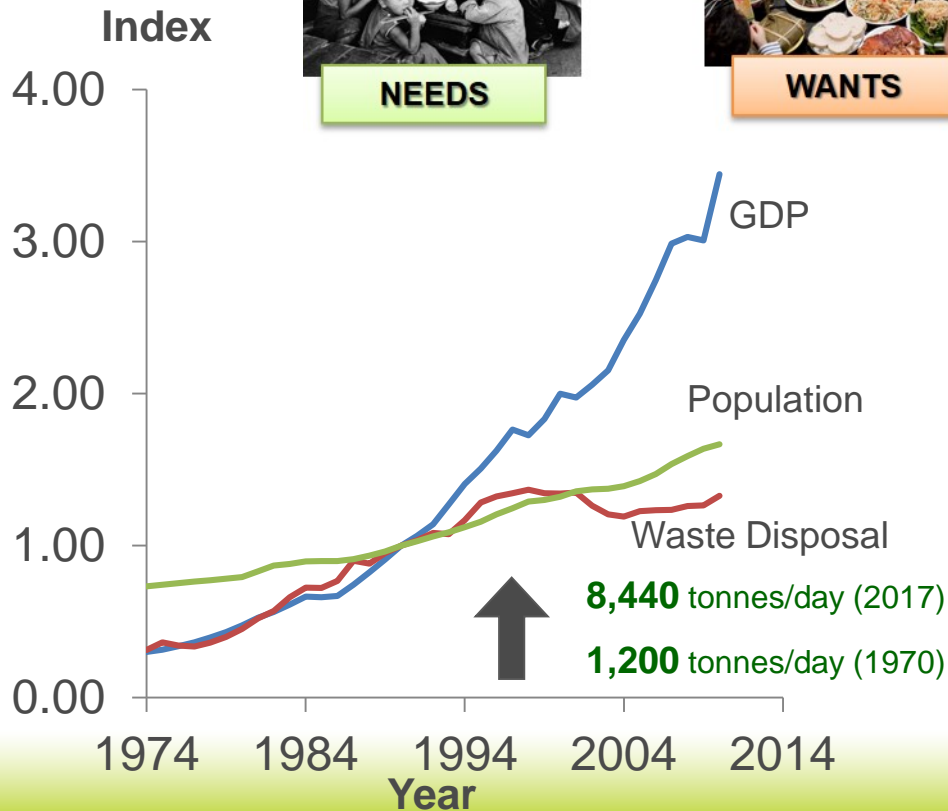
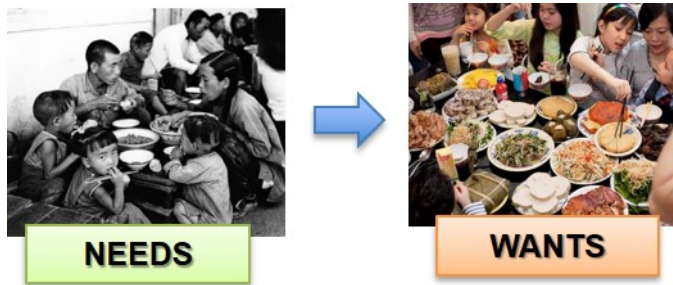


**Improvement in refuse collection methods**

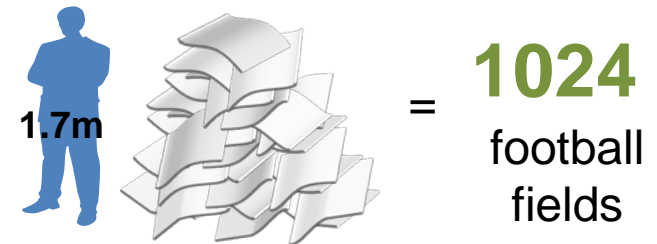


# Key Challenges

- Increasing waste output due to population & economic growth
- Scarcity of land



Refuse Generated in 1 year....



At this rate of waste growth, will need to build...



Semakau Landfill



# Our Waste Management Strategy

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## *Waste Minimisation / Prevention*

Right-pricing of waste disposal fees  
Promote efficient use of resources



## *Recycling*

Maximise resource recovery from waste  
Adopt viable & efficient recycling methods to sustain clean environment



## *Waste-to-Energy / Volume Reduction*

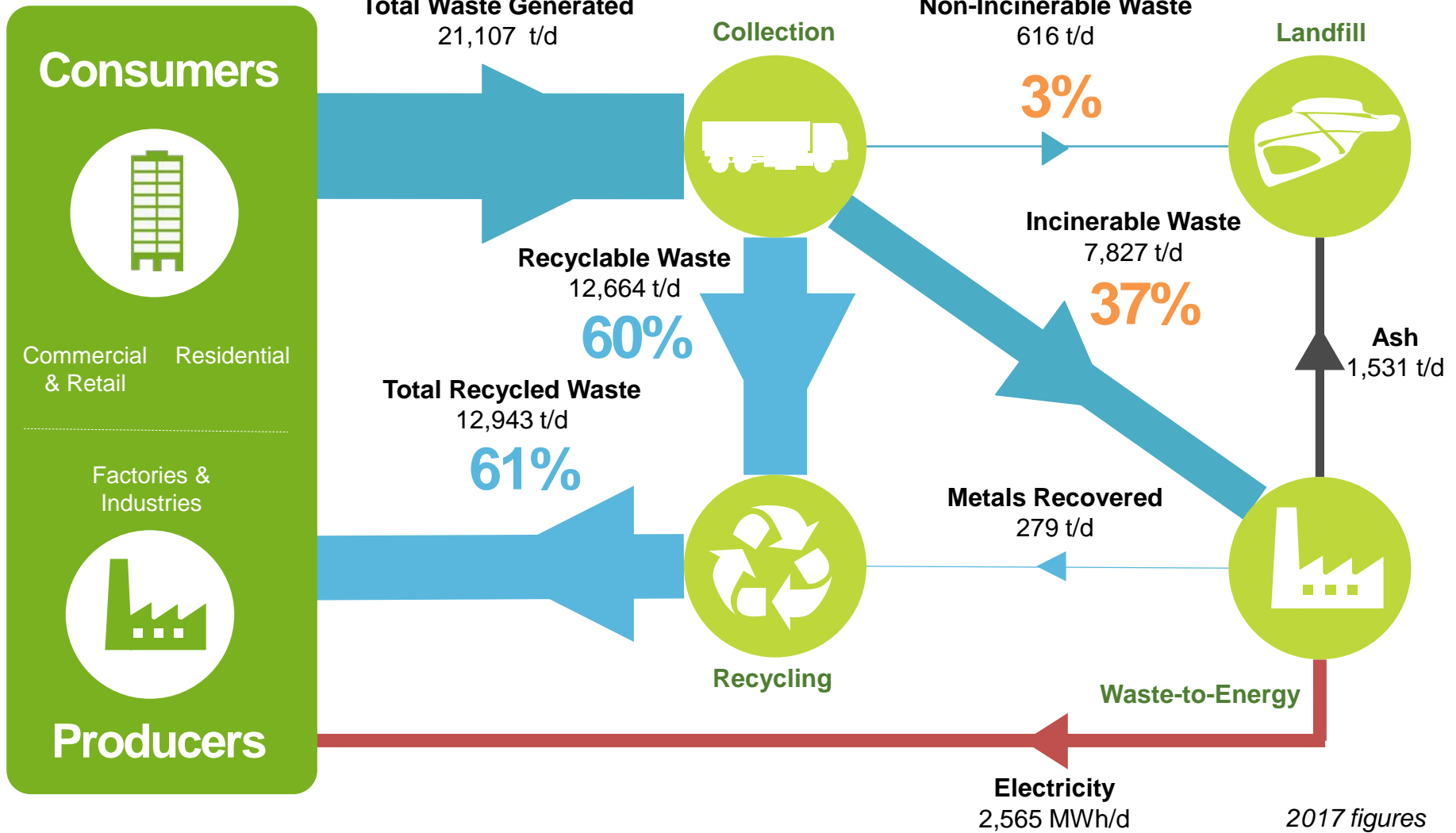
Adopt innovative technologies to maximise energy recovery,  
and minimise land-take & ash residue



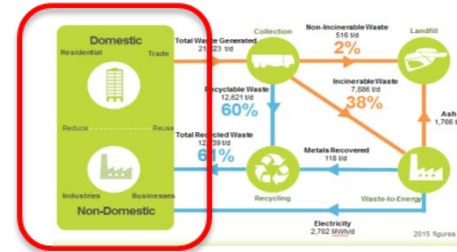
## *Landfill*

Minimise landfilling demand and maximise landfill lifespan

# ... to Close the Waste Loop



# Waste Minimisation / Prevention



## Businesses

### Launch of 2<sup>nd</sup> Singapore Packaging Agreement



Voluntary industry-government platform to promote packaging waste 3Rs

1<sup>st</sup> SPA started in 2007,  
renewed in 2012

39,000 tons of packaging waste avoided & SGD93 mil saved

## Commercial Premises

### Mandatory Reporting Requirement

Hotels with >200 rooms; malls with net lettable area >50,000 sq ft

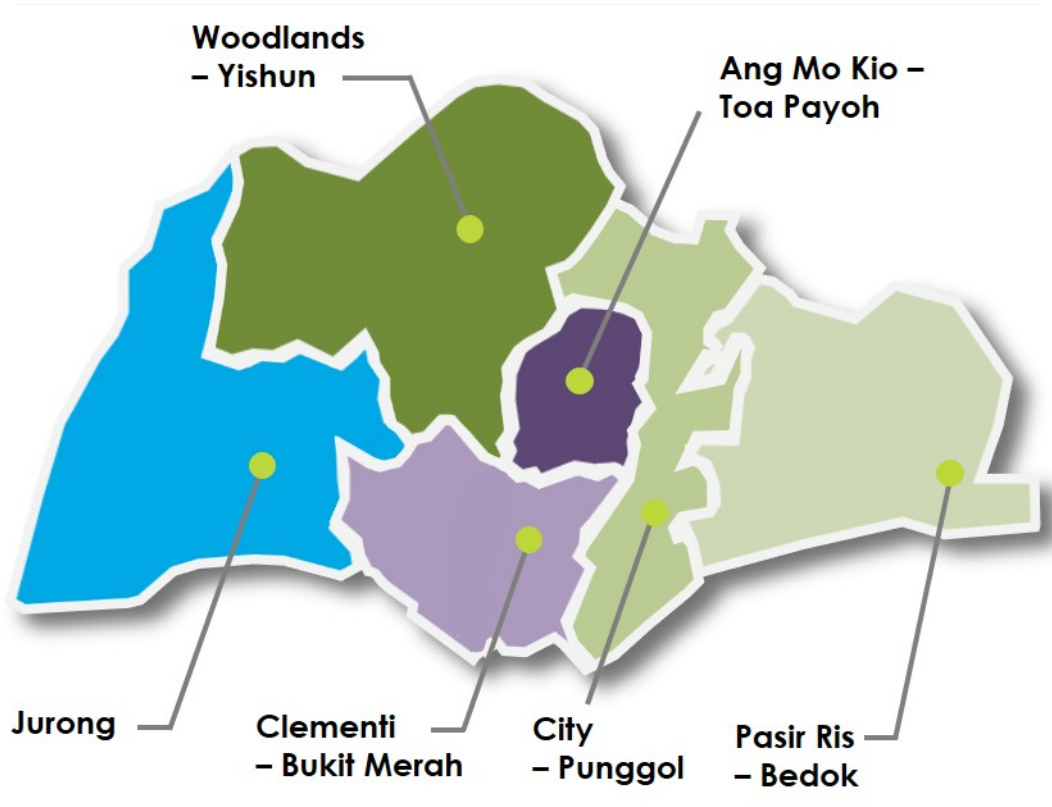
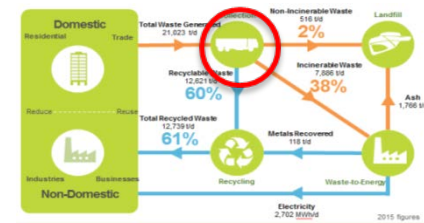


Commercial premises can benefit by recycling more & saving on waste disposal cost

Owners and operators of large hotels & malls are required by law to submit waste disposal and recycling data, waste reduction plans & targets from 2015



# Public Waste Collection



## Uniform Fee for domestic premises:



HDB and condominium households ~ \$8/mth  
Landed premises ~ \$23/mth

## Trade Premises:

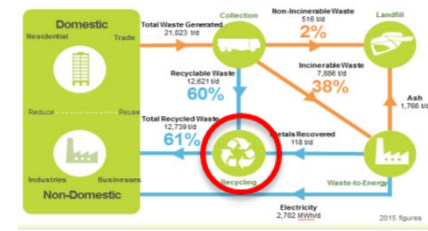


Monthly rate based on volume of waste generated

For premises not covered under PWC scheme, Refuse collection fees charged by licensed GWCs are market driven



# Recycling



## Businesses & Industries

## Homes

## Schools

### Recycling by Businesses & Industries



- Pay-as-you-throw encourages reduction in waste disposed
- Segregation of waste at source for recycling

### National Recycling Programme



- Implemented island wide
- Recycling bins conveniently located near every block of flats

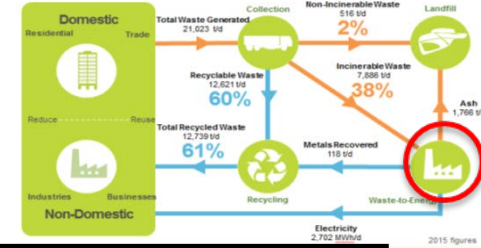
### Recycling Programmes in Schools



- 100% of primary & secondary schools have recycling corners
- Students volunteer as “Green Ambassadors”
- Builds awareness & promotes action from young



# Waste-to-Energy / Volume Reduction



Keppel-Seghers Tuas South WTE Plant  
 800 tonnes/day; 22 MW  
 Keppel-Seghers Belgium  
 Stoker Technology

Tuas WTE Plant  
 1,600 tonnes/day; 30 MW  
 Mitsubishi Heavy Industries -Martin  
 Tehnology

Senoko WTE Plant  
 2,100 tonnes/day; 2 x 28MW  
 Mitsubishi Heavy Industries -Martin  
 Technology

Tuas South WTE Plant  
 3,000 tonnes/day; 80MW  
 Mitsubishi Heavy Industries -Martin  
 Technology



**TuasOne WTE Plant**  
 Hyflux - MHI

- 3,600 tonnes/day, commissioned by 2018

**Incineration Bottom Ash Metal Recovery Facility**  
 Remex

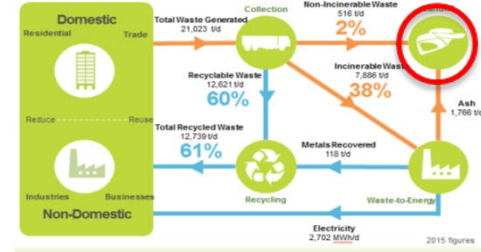
- 1,800 tonnes/day

Incineration ash

Tipping fee:  
 S\$77 – S\$81 per tonne

Semakau

# Semakau Landfill



*A unique environmental solution created entirely out of sea space*

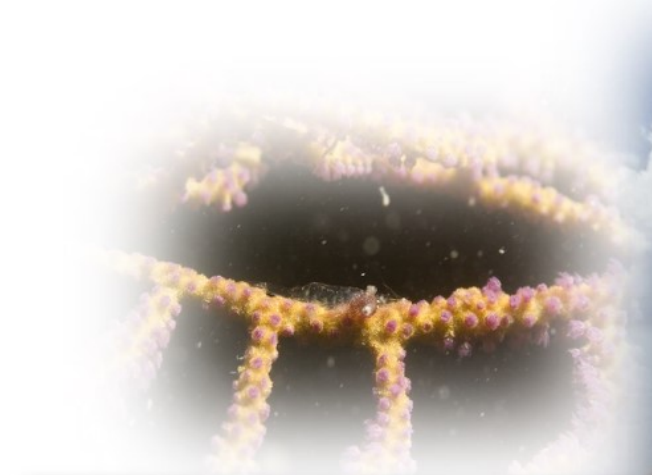
Commenced operation on **1 April 1999**

Area : **350 hectares**

Capacity : **63 million m<sup>3</sup>**

Cost : **S\$610 million**

Estimated lifespan: **till 2035**



## NATURE JOURNEYS

with Zeb Hogan

Join **Zeb Hogan** as he shares his exciting experiences on being a National Geographic Explorer, Ecologist, Photographer and Host of **Monster Fish** on National Geographic Channel. Be enthralled by the beauty of Semakau Landfill through Zeb's eyes, as he provides an eye-opening introduction on the rich bio-diversity of flora and fauna that can be found on this little island off Singapore.

**Date:** 9 June 2012, Saturday  
**Time:** 10am - 12pm  
**Venue:** Republic Polytechnic, Lecture Theatre W2

Visit [www.naturejourneys.com.sg](http://www.naturejourneys.com.sg) to register



# What's Next?

## Environment Services Industry Transformation Map

*A Vibrant, sustainable and professional environmental services industry for Singapore and growing cities*

### INDUSTRY TRANSFORMATION

Industry transformation will ensure that the industry remains competitive and attractive

#### DRIVING INNOVATION AND WIDESPREAD TECHNOLOGY ADOPTION

- Creating opportunities for technology collaboration and adaptation
- Helping companies access ready technology to develop new capabilities and address manpower challenges



#### IMPROVING PRODUCTIVITY

- Encouraging adoption of outcome-based contracts
- Driving procurement practices to focus on quality, technology use and productivity



#### UPSKILLING WORKFORCE TO TAKE ON BETTER JOBS

- Promoting a self-service culture and waste minimisation mindset to reduce service demand
- Improving work tasks through job redesign and use of technology
- Developing internship, apprenticeship and scholarship programmes to attract talent to the industry



#### CAPTURING VALUE OVERSEAS

- Enhancing export capabilities and market access
- Working with partners to offer integrated solutions



# Our Environment

Safeguard • Nurture • Cherish