

Towards Sustainable Solid Waste Management System in Singapore

**WTERT Meeting
7 Oct 2010**

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National Environmental Agency**



Agenda

1. Background

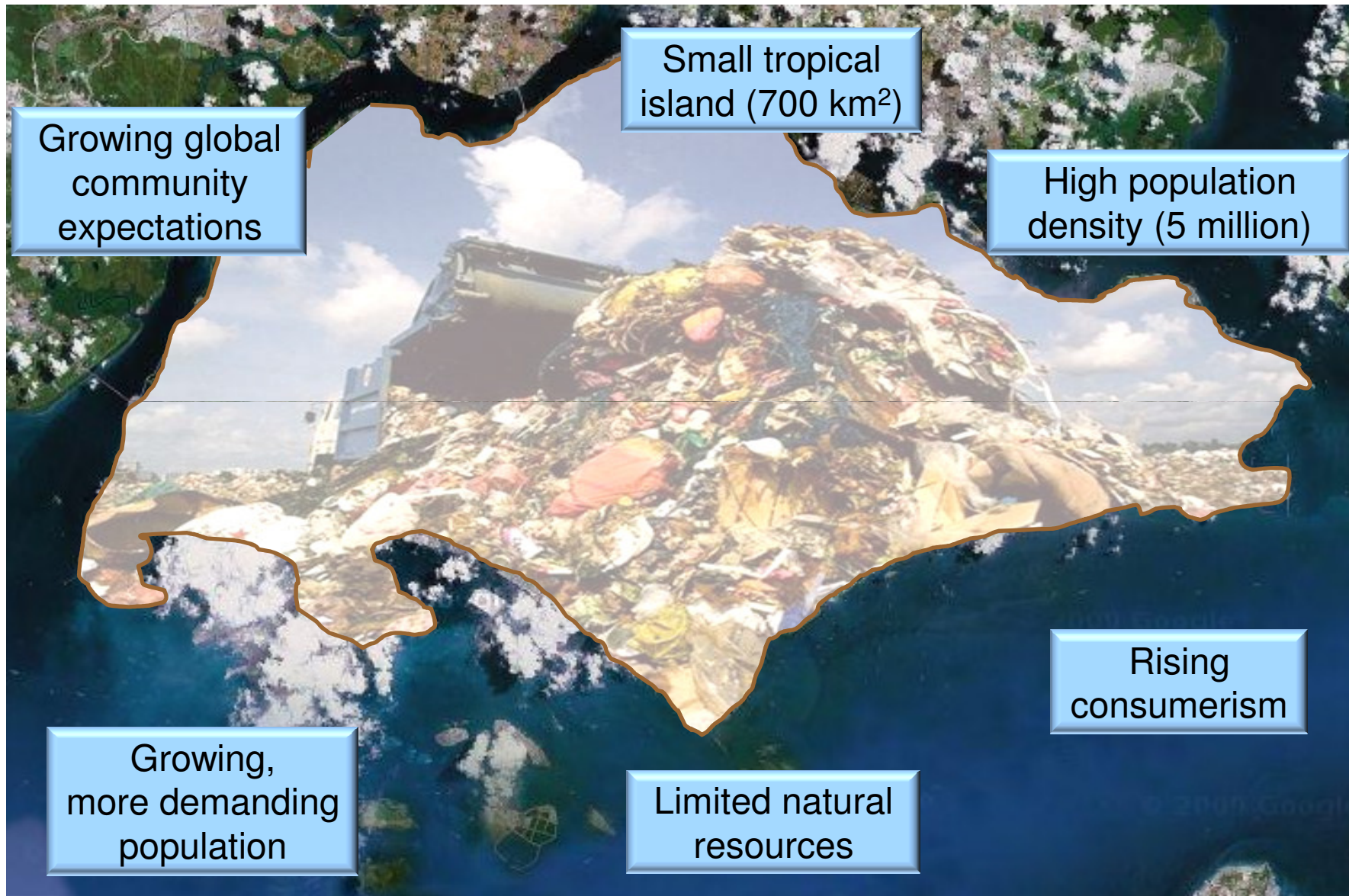
2. Waste Minimisation & Resource Recovery

3. Solid Waste Disposal Infrastructure

4. Research & Innovation

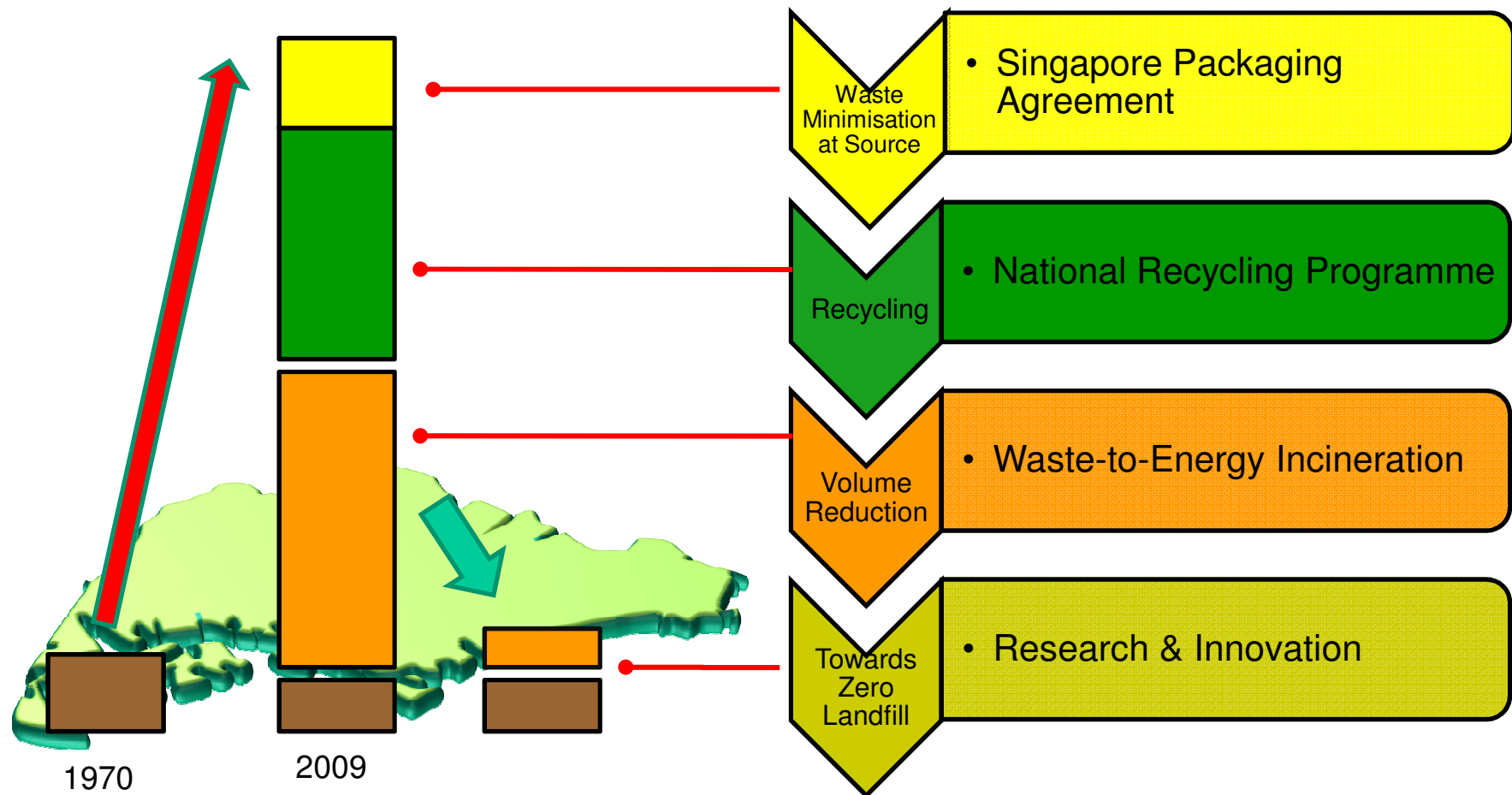


Our Challenges

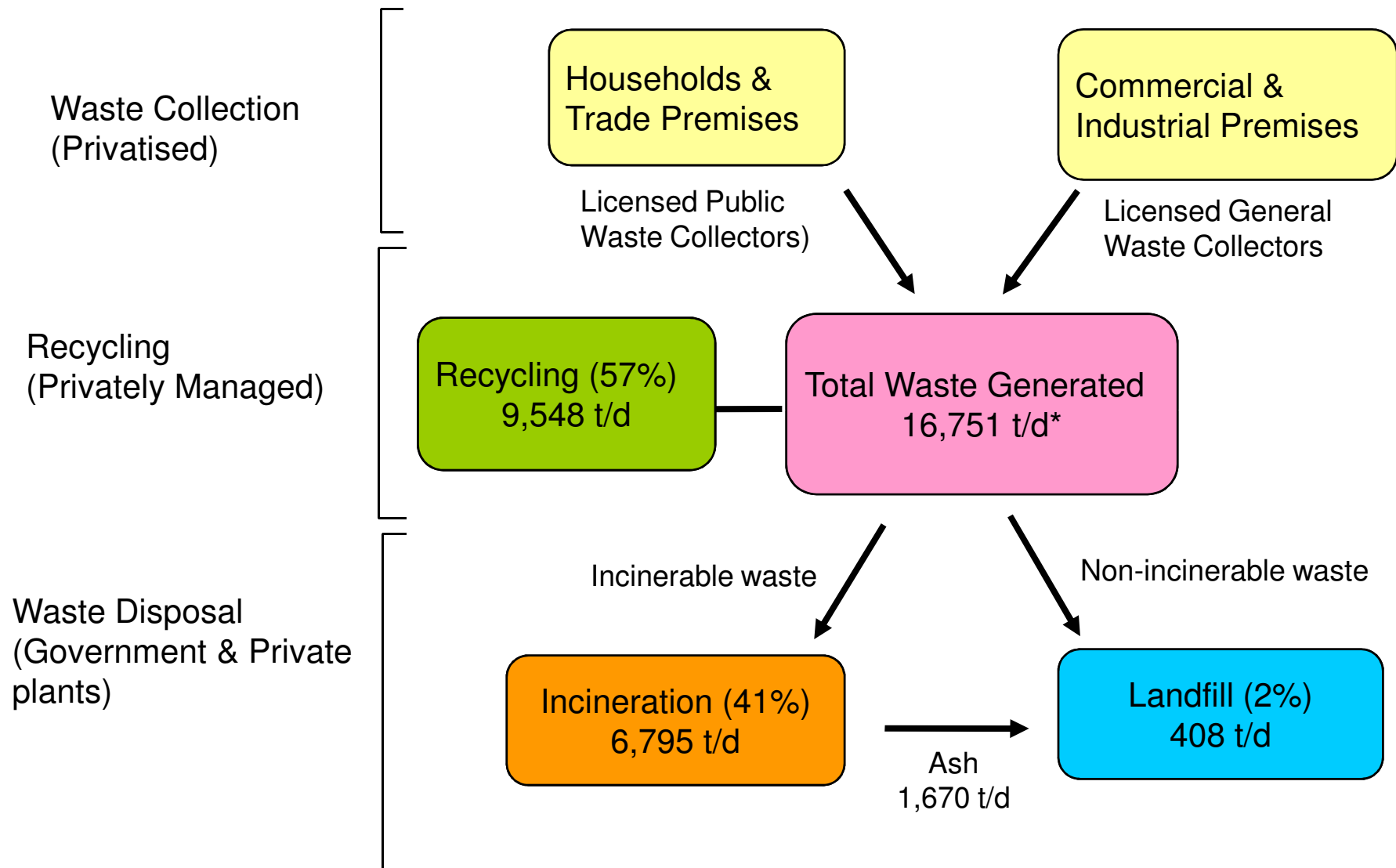


Waste Management Strategies

Vision : Towards Zero Waste and Zero Landfill



Overview of Solid Waste Management System



* Using 2009 data

Waste Minimisation & Resource Recovery



Singapore Packaging Agreement

NEA signed the Singapore Packaging Agreement with industry associations, NGOs and businesses in Jun 2007



Objectives

- Adopt cost-effective solutions to reduce packaging waste
- Foster sustainable use of resources in packaging
- Increase awareness on minimization of packaging waste

Achievements

- Averted about 1,700 tonnes of packaging waste per year
- Saved close to \$3 million in packaging cost

Awards

- 3R Packaging Awards were given out to signatories in recognition to their significant achievements and contributions to the goals of SPA



Raising Awareness & Education



**Awareness and
Publicity Activities**



Education Materials



Recycling Depositories

Recycling Programmes

National Recycling Programme (NRP)

- Door-to-door collection
- 1,600 centralised recycling depositories



Targeted Recycling Programmes

- Residential homes & apartments
- Schools and tertiary institutions
- Industrial and commercial premises
- Public Areas (>4,000 recycling bins)

Resource Recovery

Recovery of Industrial and Commercial Waste



Construction waste recycling plant



Recycling of Horticultural Waste



Products from Recycled Wood Waste



Food Waste Recycling Plant

3R Incentive Scheme



Objective

- To reduce waste generation and increase recycling rate

Project Scope

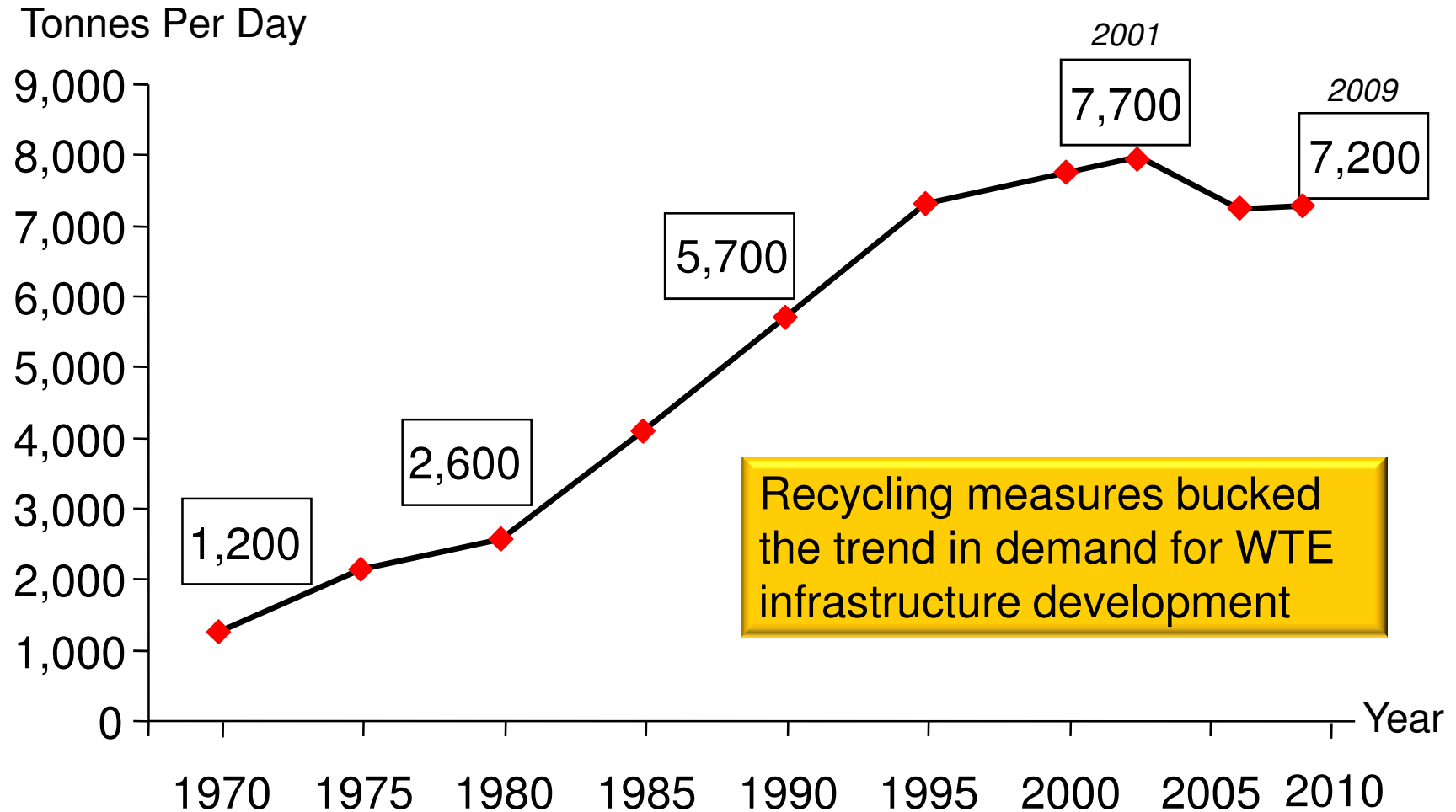
- Redesign of processes, packaging or products
- Install new waste recycling infrastructure such as separate chutes, containers or receptacles
- Install innovative waste sorting or recycling system/equipment
- Upgrade or implement of new operation/system to reduce waste or increase recycling

Solid Waste Disposal Infrastructure



Waste Disposed

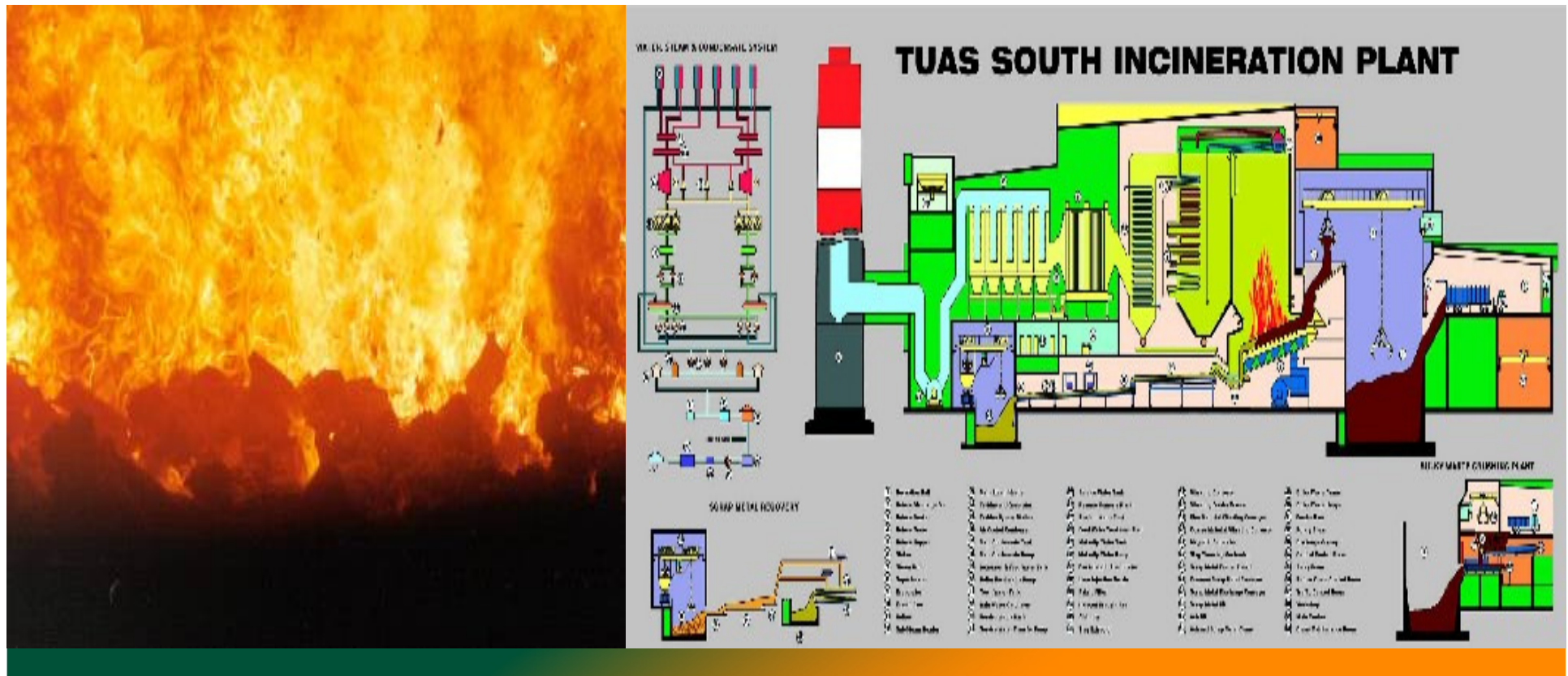
(Daily Average 1970 – 2009)



Main Disposal Method : Waste-to-Energy

Advantages : A Cost-Effective Method of Waste Disposal

- Volume reduction by 90% (small land space requirements)
- Recovery of heat energy for power generation
- Recovery of scrap metal



Waste Disposal Strategy

Solid Waste Collected
for Disposal

Incinerable Waste (92%)

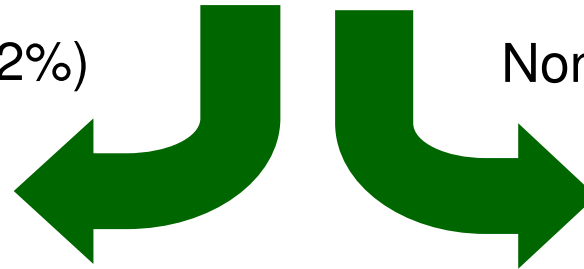
Non-Incinerable Waste (8%)



Waste-to-Energy Plants



Electricity + Ferrous Metal



Ash

Volume reduced by 90%



Offshore Landfill

WTE Plants in Singapore



Tuas Plant



Senoko Plant



Tuas South Plant



Keppel Seghers Tuas Plant

WTE Plants in Singapore

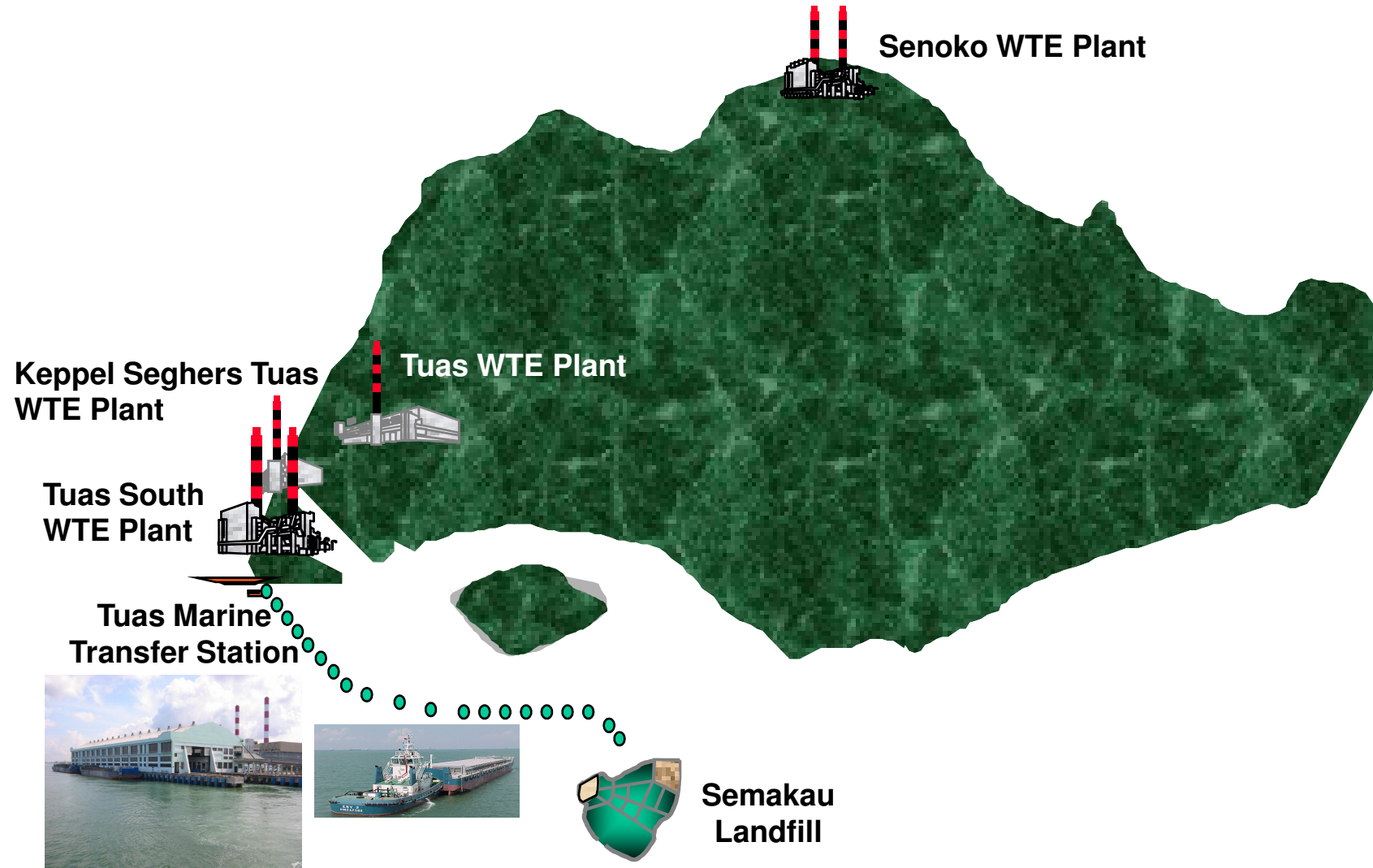
Plant	Commissioned	Capacity (tonnes/day)
Tuas	1986	1,700
Senoko	1992	2,400
Tuas South	2000	3,000
Keppel Seghers	2009	800
Total		7,900



In 2009

- Waste incinerated: 2.48 mil tonnes (6,800 tons/day)
- Electricity generated: 1 billion kWh (2 to 3% of Singapore's electricity demand)
- Scrap metal recovered: 16,000 tonnes

Solid Waste Disposal Infrastructure



Semakau Landfill

A unique environmental solution created entirely out of the sea space



Commenced operation on 1 Apr 99

Area : 350 hectares (ha)

Capacity : 63 mil cu. M

Cost : SGD 610 million

Estimated lifespan : till 2040

Received:

- 400 t/d non-incinerable waste
- 1,400 t/d incineration ash

Waste Transfer to Semakau Landfill

At Transfer Station



**Loading Waste
Into Barge**



**Receiving Waste at
Reception Hall**



**Weighing in at
Weighbridge**

**Barging Waste
to
Semakau
Landfill**



At Semakau Landfill

**Unloading of
Waste
From Barge**



**Loading Waste
onto Dumptruck**

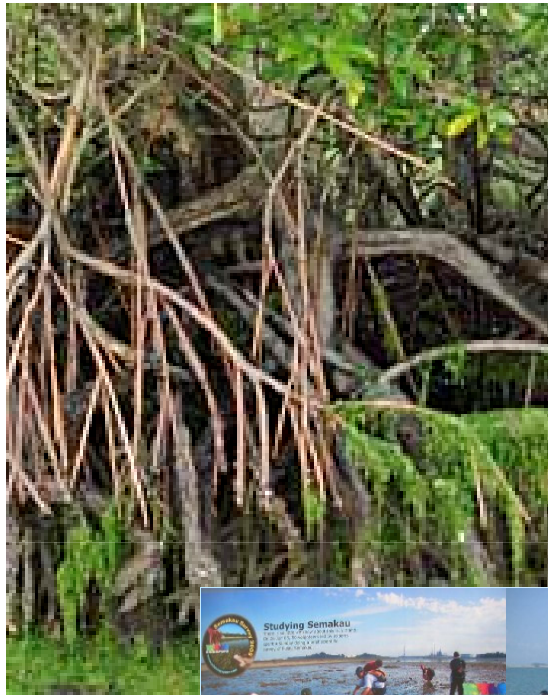


**Tipping of
waste at
landfill
site**



Semakau Landfill – Land Re-use

Conserved
Natural
Ecosystem



Garnered
International
Attention

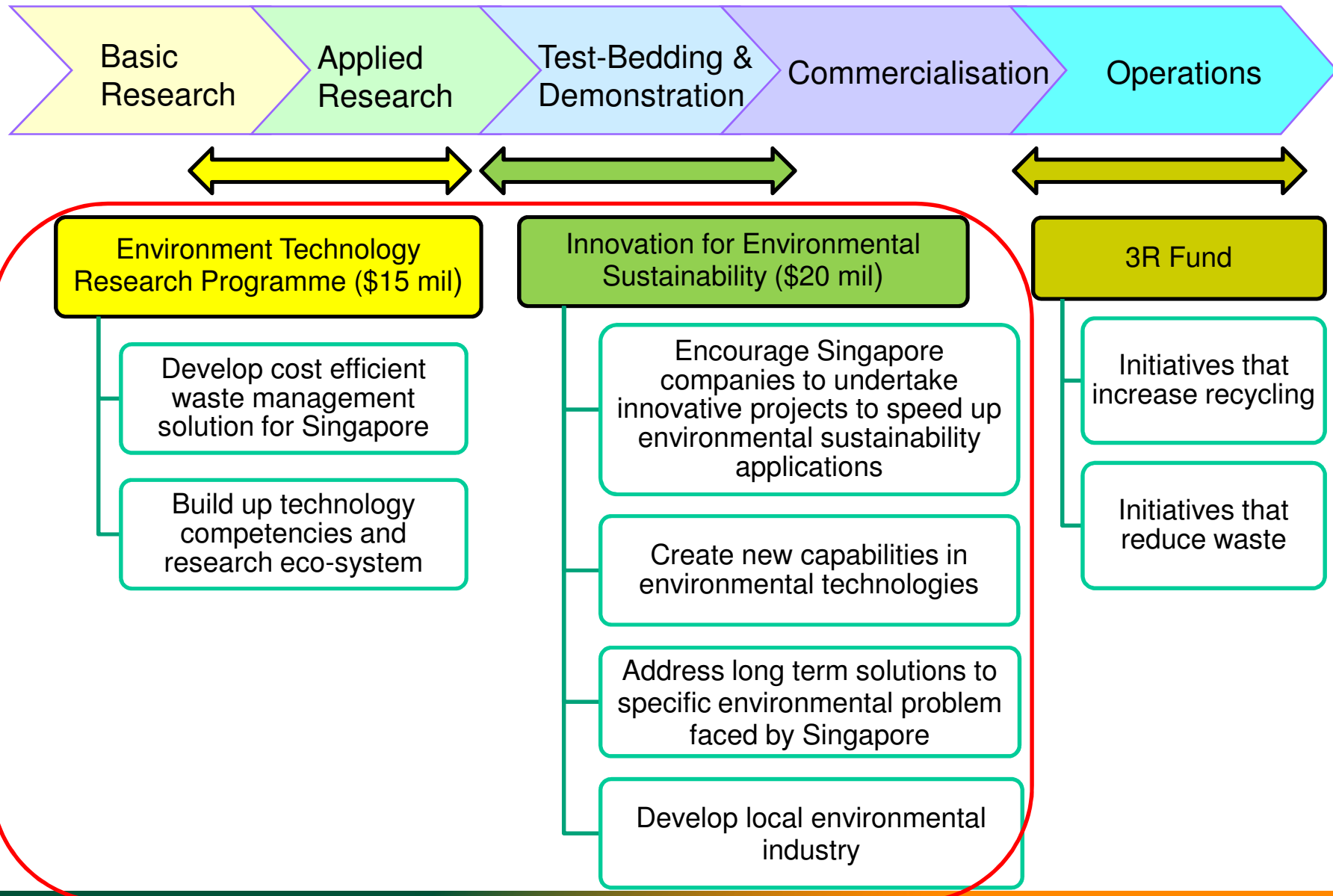
Opened for
Recreational
Activities



Research and Innovation



Funding Schemes in Waste Management



Environment Technology Research Programme



Focus

- \$15M seed fund over 3 years on waste management R&D

Strategy

- Fund R&D projects with commercial and industrial applications through competitive Request-for-Proposal (RFP) calls

Objectives

- To build R&D capabilities in Institutes of Higher Learning, Research Institutes and the industry
- To develop innovative cost-efficient waste management technology
- To develop sustainable waste management solutions for Singapore

Innovation for Environmental Sustainability Fund

- Encourage Singapore companies to undertake innovative environmental projects to speed up environmental sustainability applications
- Create new capabilities in environmental technologies
- Looking for long term solutions to specific environmental problem faced by Singapore

Basic Research

Applied Research

Test-Bedding &
Demonstration

Commercialization

Operations

Focus Areas



Clean Energy &
Energy Efficiency



Waste Minimisation
& Recycling



Pollution
Control



Water and Waste
Water



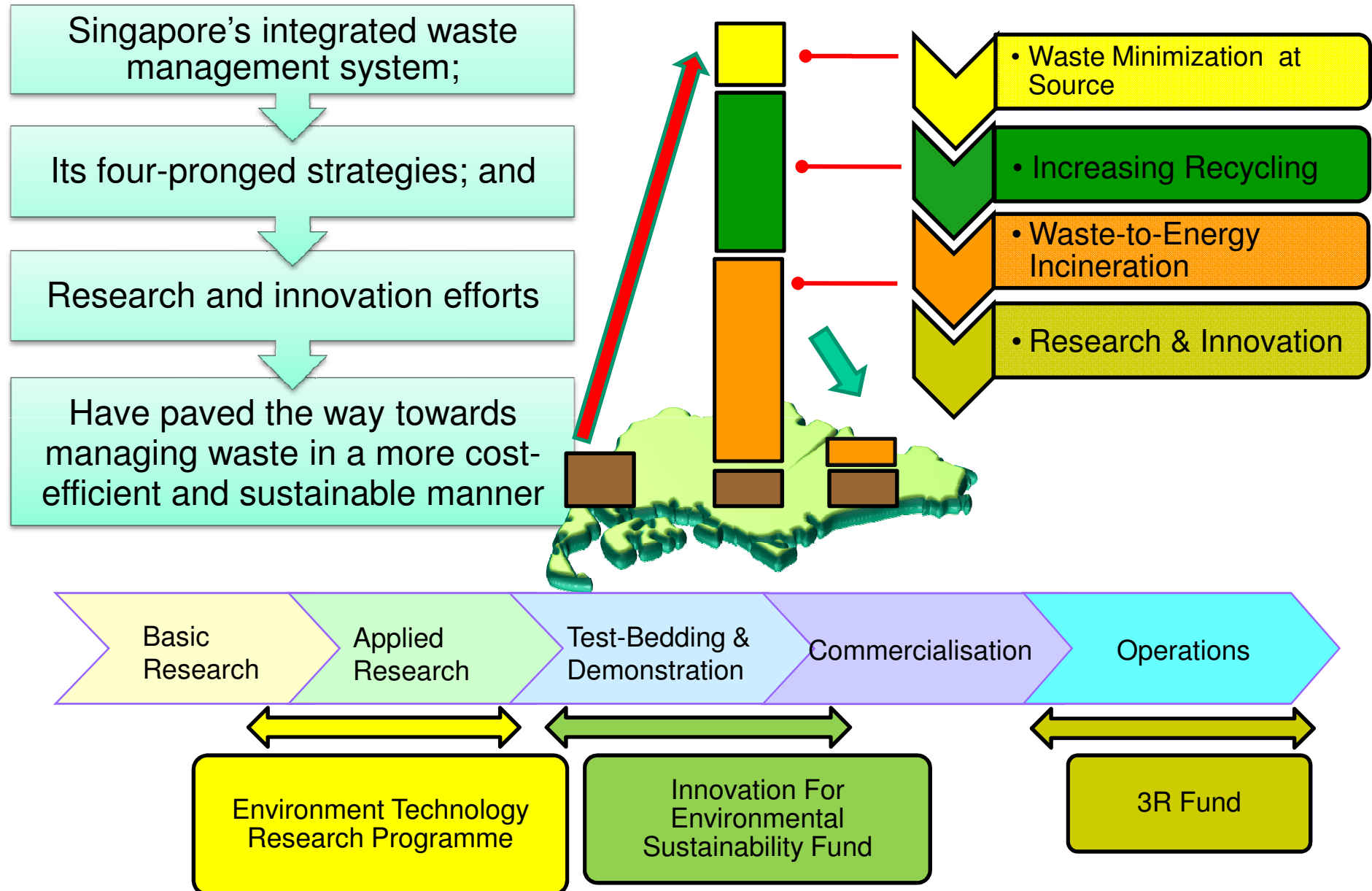
Public
Health

Summary : Sustainable Waste Management in Singapore



Our approach is to tackle every stage of the waste value chain

Conclusion



Thank You

**Please refer to www.nea.gov.sg
for more information**

