3Rs (Reduce, Reuse, and Recycle) Initiatives in Asia

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The current pace of urbanization and population growth in Asia along with high resources consumption, pose a growing concern on environmental degradation and limited natural resources. At this crossroad of unplanned growth and struggle towards sustainable development, the 3Rs concept if implemented could be a practical solution to alleviate the burden on waste problems. In 2004, the 3Rs initiative proposed by Mr. Junichiro Koizumi (former Prime Minister of Japan) during the G8 summit was endorsed by the G8 leaders. The 3Rs initiative concept was formally launched at the Ministerial Conference in 2005 was considered as the first step to change the global consumption and production patterns to build a sound-material-cycle society. Moreover, the United Nations Millennium Development Goal (MDG-7) aims to "Ensure Environmental Sustainability" due to the prevalence of unsustainable production and rapid consumption of virgin raw materials and natural resources. In this case, effective and efficient 3Rs programmes are vital to reverse the trends of environmental unsustainability.

3Rs activities is widespread in many Asian countries but in most cases they are often unrecognized due to its decentralized systems and often fail to fit in the bigger picture due to lack of communication, networking and other factors. The existing complex networking of informal source separation and recycling of materials compelled to focus more on reusing and recycling of waste rather than on source reduction. Prioritizing the 3Rs among themselves may not promise a drastic change within a short period, but definitely will reap a significant reward in the long run. Thus, in order to improve and hasten the 3Rs activities in Asia, a joint effort of international agencies and institutions to fill up the gap of information and technology through dissemination and training would be of great solution.

Promoting 3Rs initiative concept and policies in Asia has been the main focus of some international agencies and institutions. In August 2006, the Asian Development Bank (ADB), Asian Institute of Technology (AIT), United Nations Environment Programme – Regional Resource Centre for Asia and the Pacific (UNEP-RRC.AP), and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) jointly established a knowledge hub at Bangkok's Asian Institute of Technology with support from UNEP-RRC.AP on Reduce, Reuse, and Recycle. The knowledge hub will serve as a core of information for technology, good practices, policy strategy and management, and issues related to 3Rs which promotes sustainable production and consumption of limited natural resources, and improved economic and environmental efficiency. The main function of 3Rs knowledge hub is to undertake research, create knowledge and disseminate new concepts, developments, and information about 3Rs on municipal solid waste, medical waste and e-waste.

‘3R Initiatives in Asia’

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3R Initiatives in Asia - TOC

- 3R Initiatives in Asia
- Sound Material-Cycle Society
- Sense of Urgency – Environmental and health impacts
- 3R Developments in Asia
- 3R – Knowledge Hub

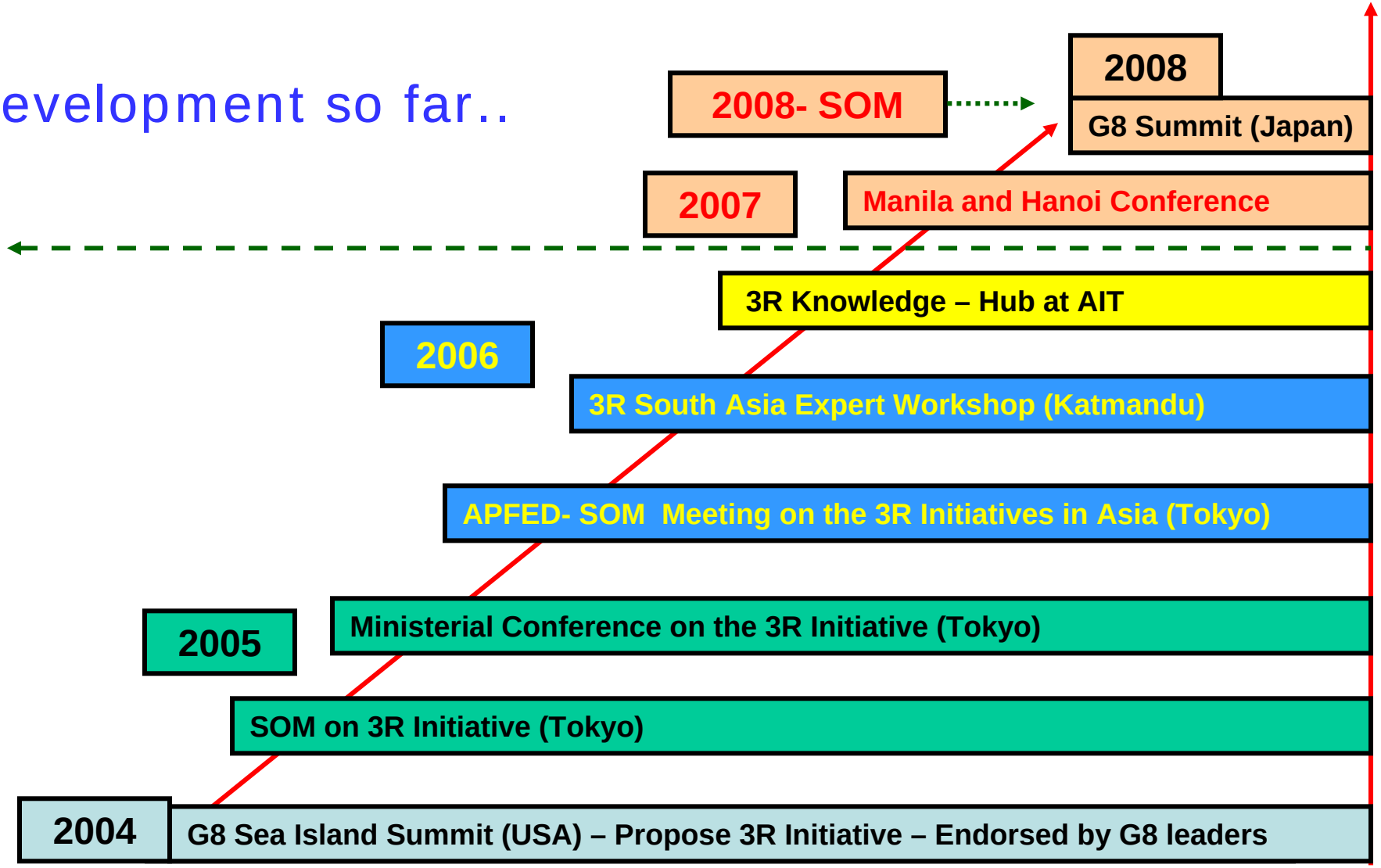
3R Initiatives in Asia

Global Initiatives to 3R

- Global 3R Initiative to promote reduce, reuse and recycle was agreed at the G8 Summit in 2004.
- Former Prime Minister Junichiro Koizumi (Japan) proposed the 3R Initiative at the G8 Summit held at Sea Island in 2004, which was endorsed by the G8 leaders.
- 3R Initiative formally launched at the Ministerial Conference on the 3R Initiative in April 2005 in Tokyo.
- It was launched to change the global consumption and production patterns to build a sound-material-cycle society.
- Credit goes to MoE-Japan and international organizations (ADB, UNEP, UNCRD, IGES, etc.) in promoting the 3R concept and policies.

3R Initiatives in Asia

Development so far..



SOM: Senior Official Meeting

APFED: Asia Pacific Forum for Environment and Development

3R Initiatives in Asia

Global 3R Initiative

- Aims to promote the "3Rs" (reduce, reuse and recycle) globally so as to build a **sound material-cycle society** through the effective use of resources and materials.
- It was agreed upon at the G8 Sea Island Summit in June 2004 as a new G8 initiative.

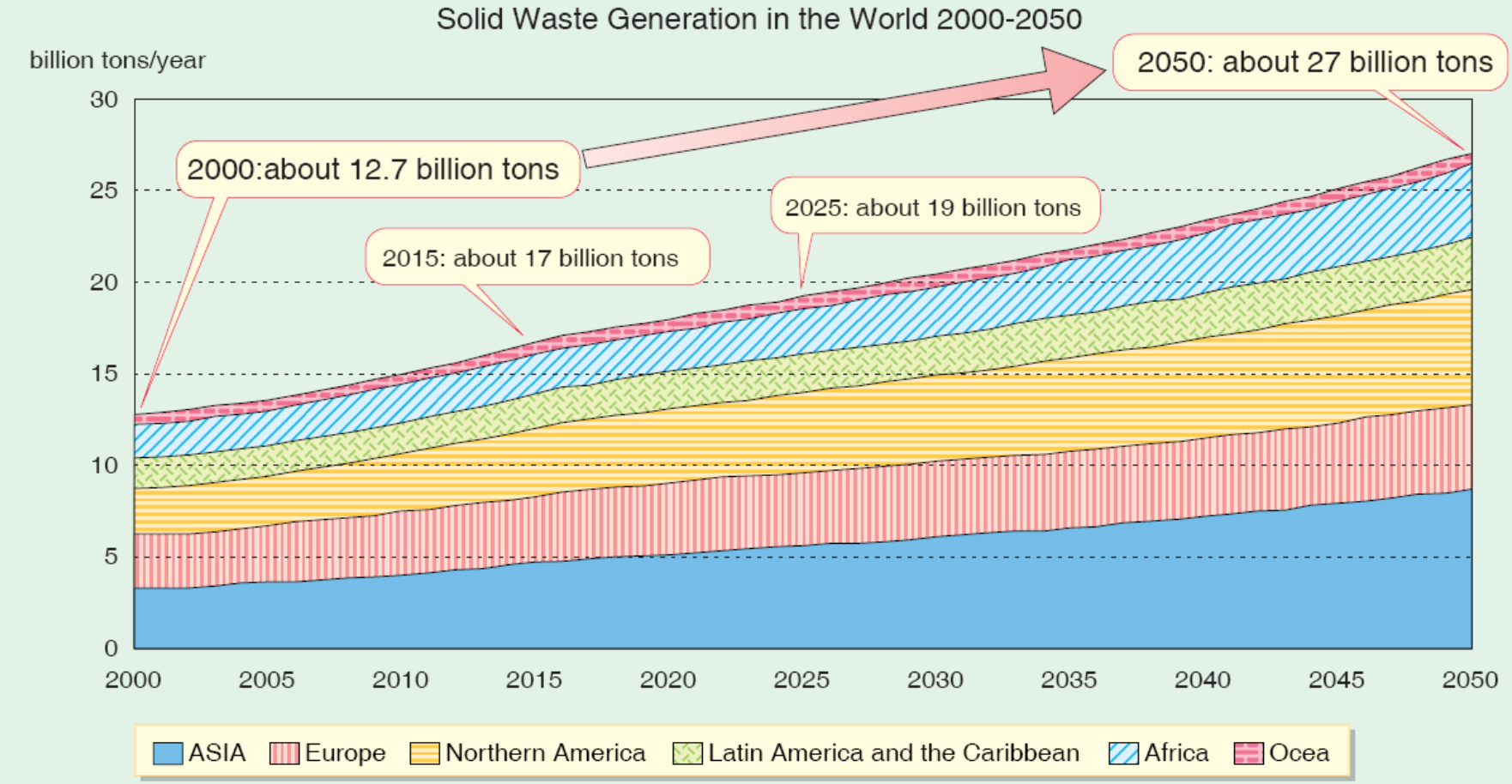
UN Millennium Development Goal and 3R:

MDG-7. Ensure Environmental Sustainability.....why?

- Prevalence of unsustainable production and rapid consumption of virgin raw materials/natural resources
- Effective and efficient 3R programmes are vital to reverse these trends of environmental unsustainability.

Business As Usual – Waste Generations

Future predictions for global waste generation levels



Source: Yoshizawa, Tanaka, et al. Research on estimation of the world waste generation amount and future prospects

3R Initiatives in Asia

Why Asia?

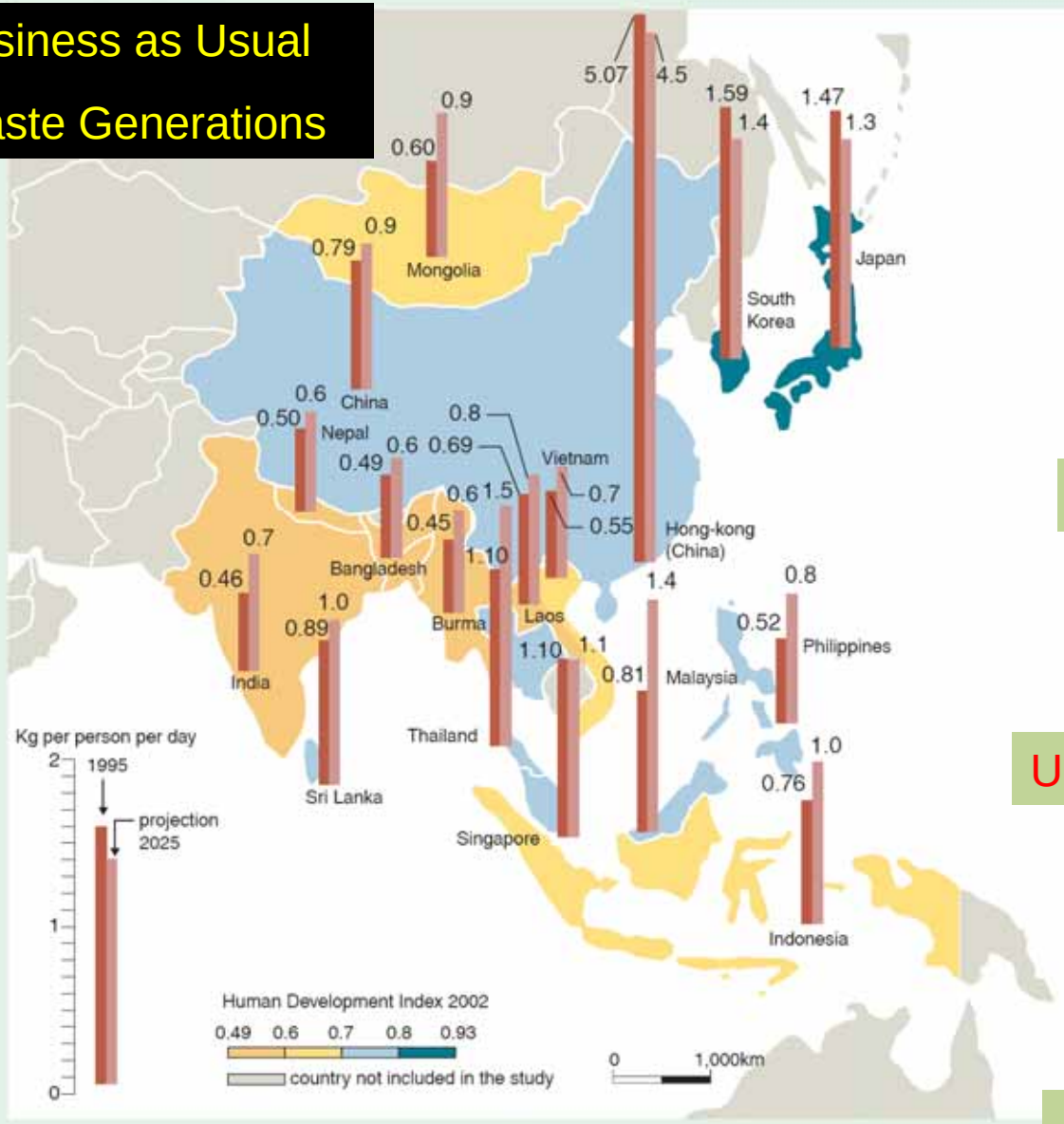
Key Trends in Asia

- Rapid economic growth (China & India)
- Increasing quantity of solid waste, in the year 2002, China generated about 945 Million tons of Industrial Solid Waste and 136.5 Million tons of MSW are collected from urban centers
- Accounts for more than 60% of the world's human population
- Diversification in solid waste
- Trans-boundary movement of 3Rs-related goods, materials and products
- Rising price of material resources

Municipal solid waste generation amount per person per day and future predictions

Business as Usual

Waste Generations



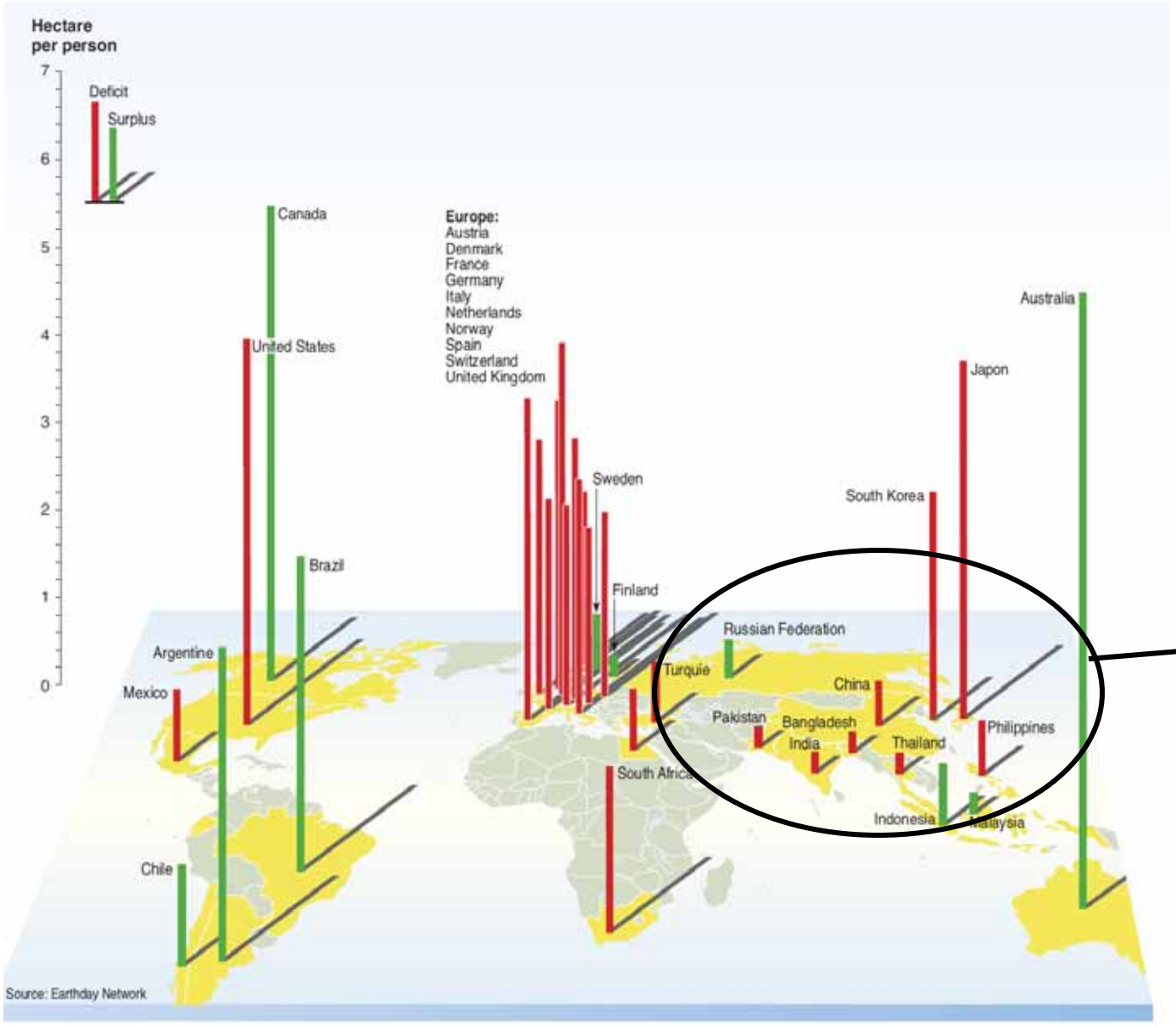
Source:the Secretariat of the Basel Convention

Rapid Economic Growth

Unplanned Urbanization

Act Now – Think Later

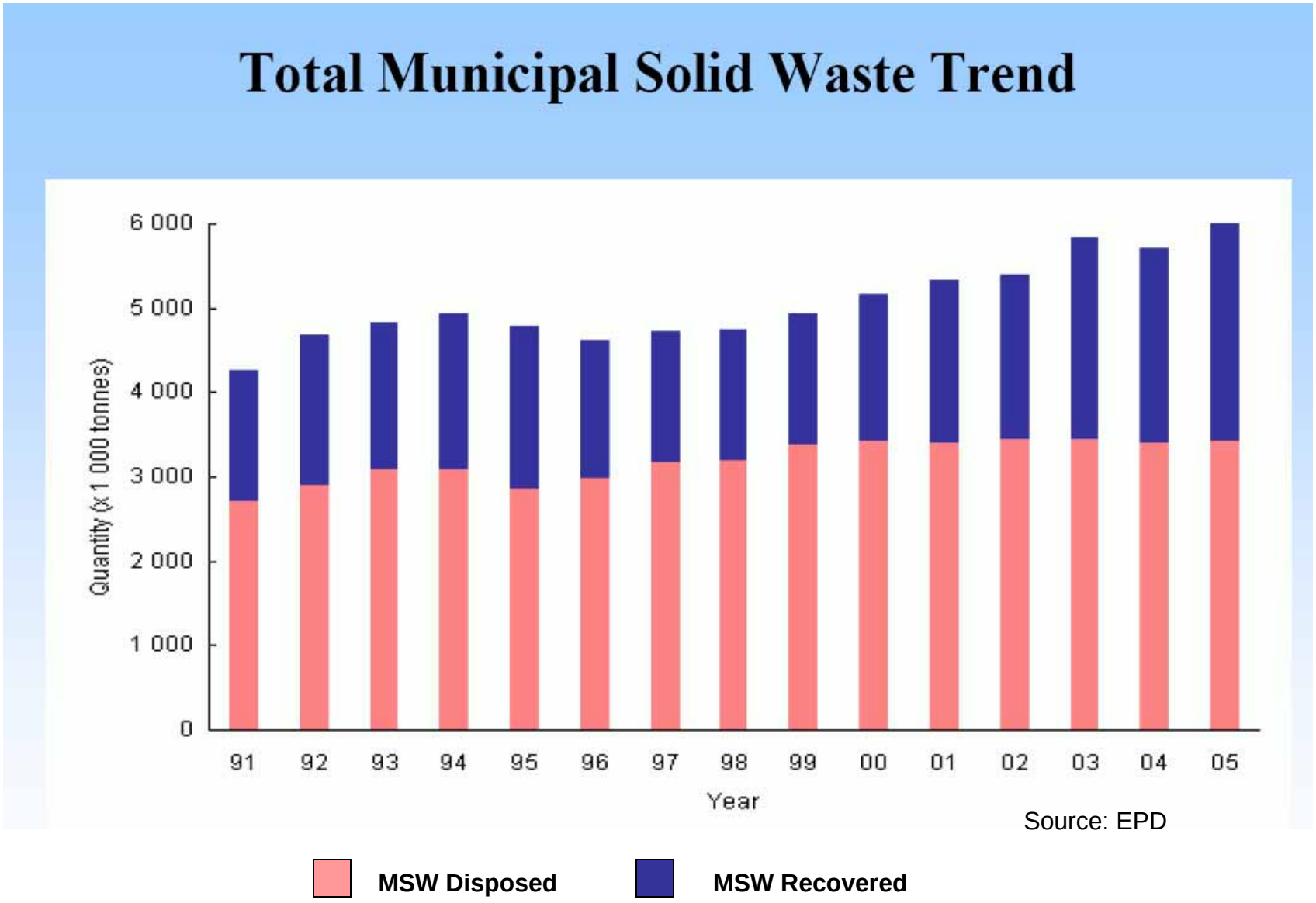
Ability of countries to support their own environment



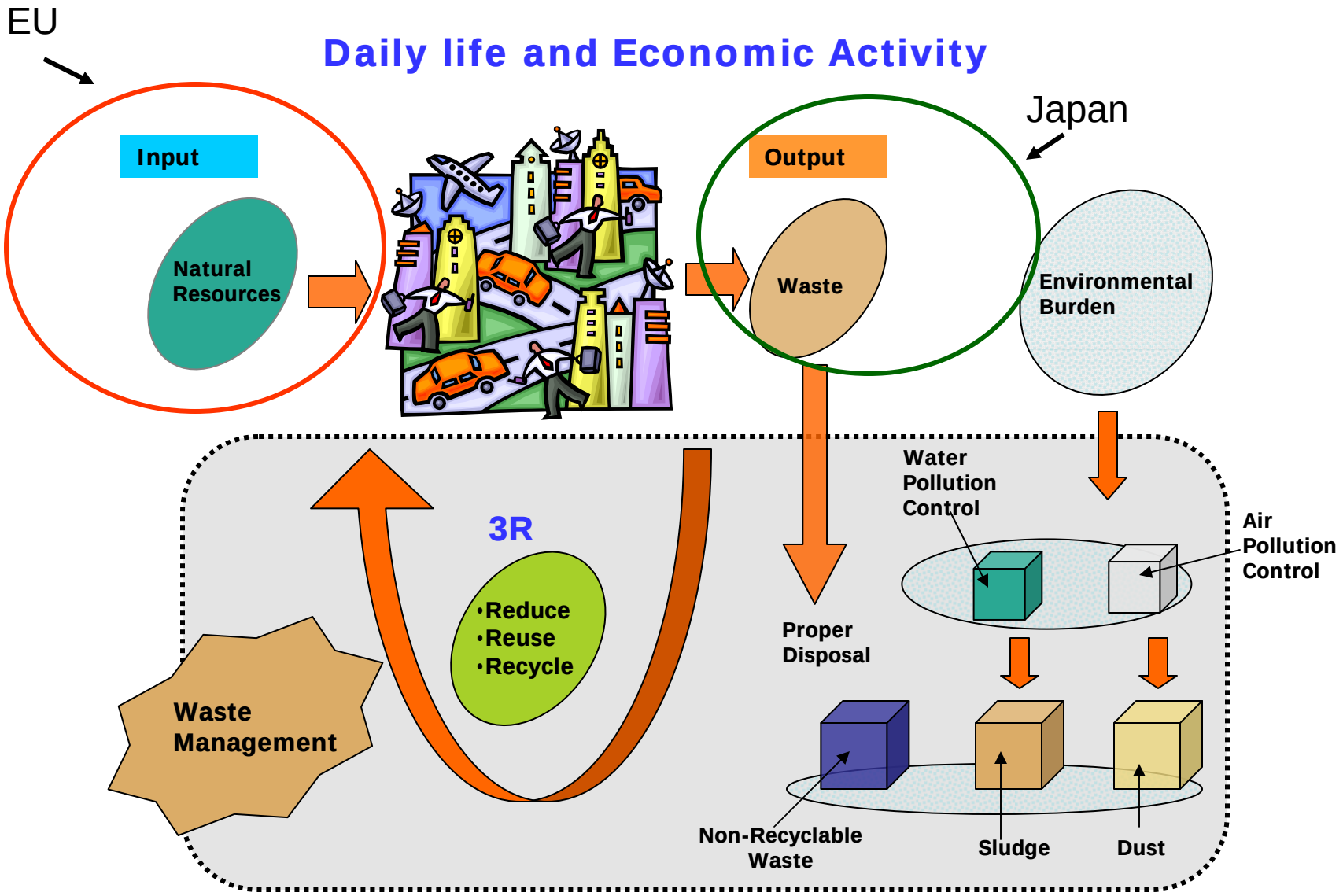
What to do?

Are we too late to act?

Hong Kong Waste Scenario: Business As Usual

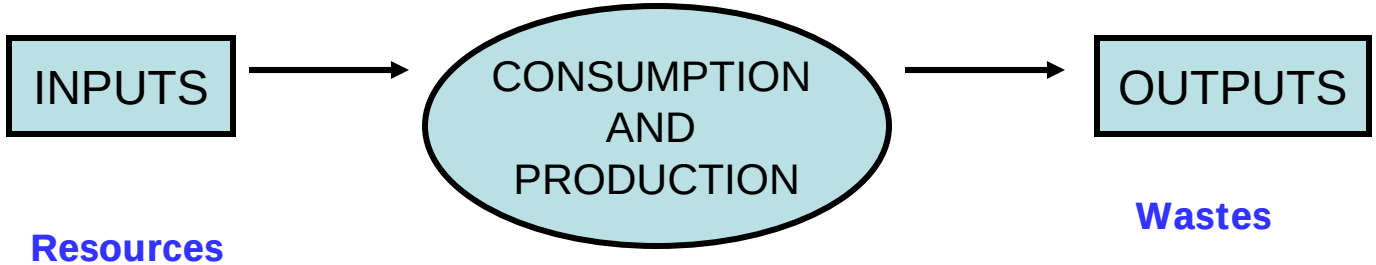


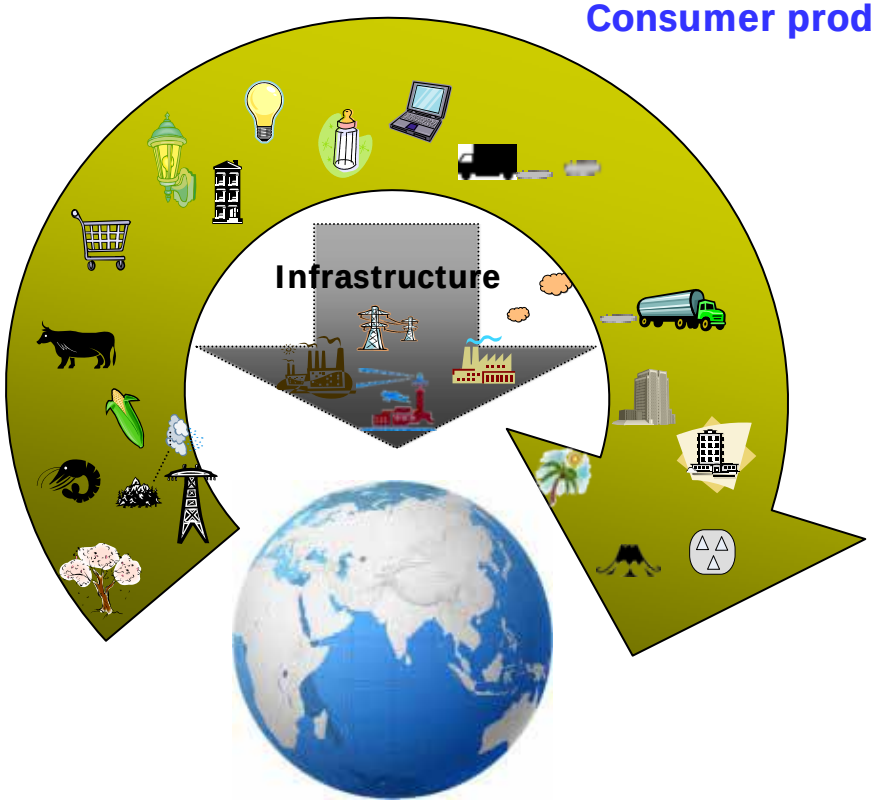
Sustainable Society and Waste Management



Sound Material-Cycle Society

Increased Consumption and Production

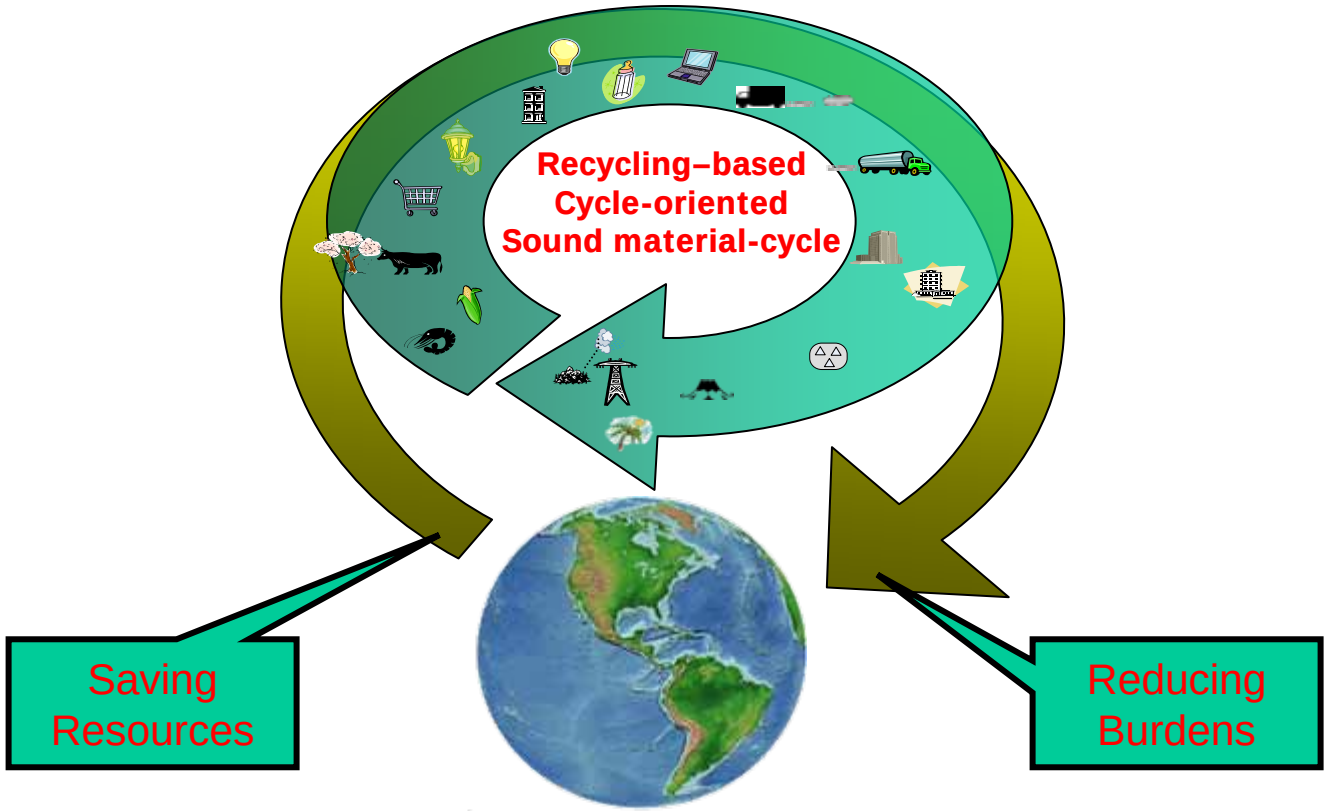




Asia-Pacific Region: Per person ecological footprint has risen to 130% since 1961!!

Sound Material-Cycle Society

A 'Sound Material Cycle Society' is defined as a society in which the consumption of natural resources is minimized and the environmental load is reduced as much as possible.



Prevailing Waste Management Strategy

Asia and Pacific region, 20 – 30 % of generated waste is recycled by Informal Sector

Main actors/ contributors to 3R & SWM

- Informal sector
  - –2R – Reuse & Recycling
  - –Scavengers, middle-man, waste dealers, cottage or small-scale recyclers

HAND IN HAND – let's clean up this mess!

Free Trade in Waste

E-waste recycling circus

Who gets the trash?

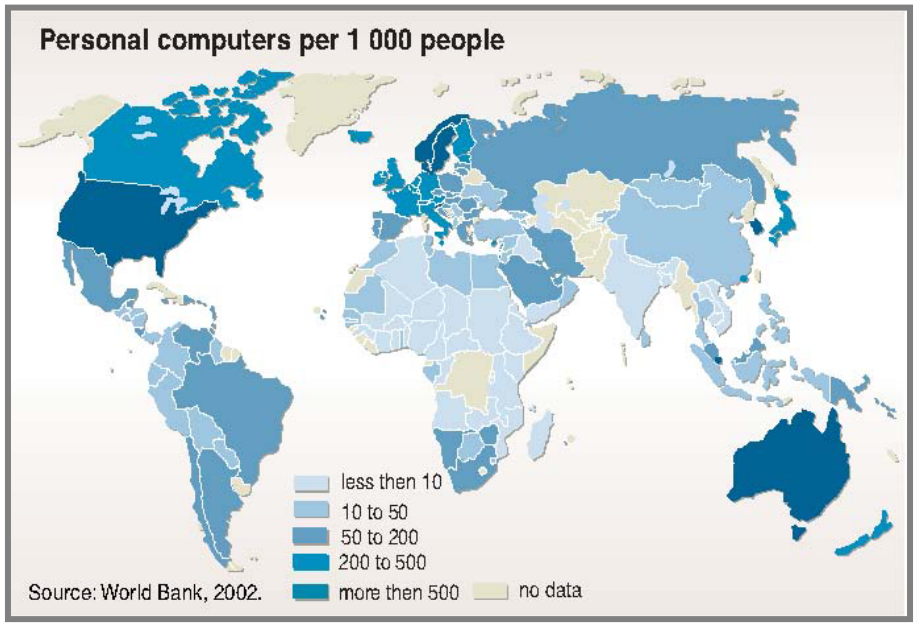
Free Trade in Waste

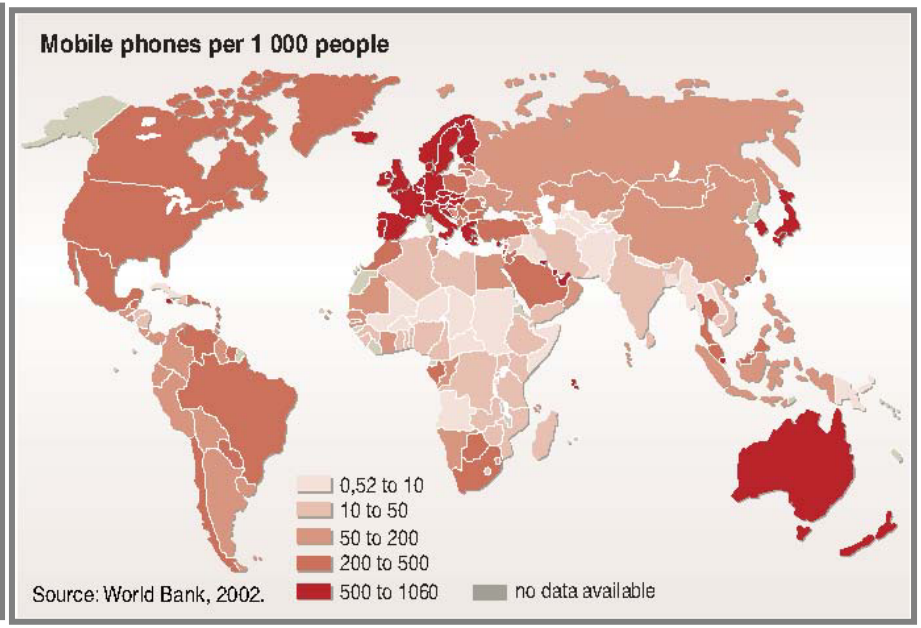
E-waste / Toxic waste recycling: How informal it could get?

Most of these (future E-waste) waste will finds its way (sooner or later) in Asian Countries; India, Pakistan, Bangladesh, China, Sri Lanka.

80% of E-waste from US shipped to India, Pakistan & China (2005)

- **Cheap labor & poverty**
- **No stringent law on imports**
- **Lack of Healthcare awareness and easy income**





China: Banned the imports of such goods (legally), but still it is getting through…!

Sense of Urgency, Health impacts

Chemical stripping operation (computer chips)

E - gold rush !

Dismantler cracking a monitor to remove the copper yoke

Sense of Urgency, Health impacts

- In developed countries, electronics recycling takes place in purpose-built recycling plants under controlled conditions.
- In many EU states for example, plastics from e-waste are not recycled to avoid Brominated Furans and Dioxins being released into the atmosphere.
- In developing countries however, there are no such controls. Recycling is done by hand in scrap yards, often by children.

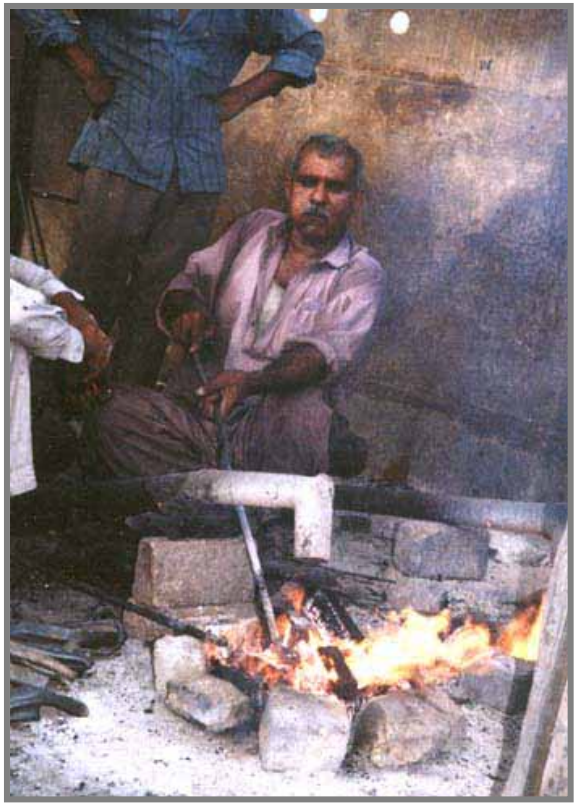
Sense of Urgency, Env. & Health impacts

Recycle: Although recycling can be a good way to reuse the raw materials in a product, the hazardous chemicals in e-waste mean that electronics can harm workers in the recycling yards, as well as their neighboring communities and environment.

Sense of Urgency, Env. & Health impacts

All that glitters is not Gold!

Delhi:
25,000 workers in scraps yards,
10,000 – 20,000 tons of E-waste handled every year



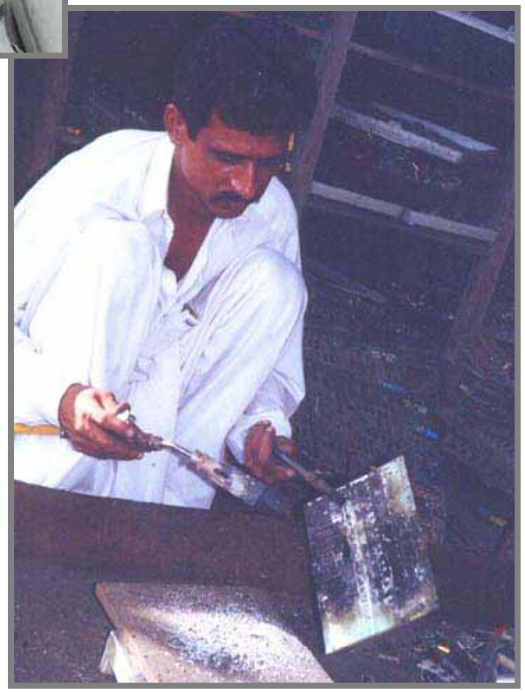
Circuit board:

Gold recovery - acid treatment,
Copper recovery - heating,
Crushing of boards by custom-made crushers

Sense of Urgency, Env. & Health impacts

Just another fine business day!! Techno-trash

Monitor: Dismantling using screw drivers
(the broken CRTs are dumped)



Cables and wires : Burning or stripping

Sense of Urgency, Env. & Health impacts

Pakistan: Recycling by Informal Sector

- Separated at source by housewives 800 tons per day
- Recycled by Informal Sector 1,500 tons/day
- 21,000 waste pickers (young Afghan boys)-Karachi neighborhood

A typical recycling shop in Karachi

Sense of Urgency, Env. & Health impacts

Bhutan:

- Waste/ E-waste disposal Emerging problem in Thimphu (UNEP)
- Existence of informal recycling system
- 70 – 80 % solid waste is domestic
- Per-capita waste generation about 0.3 kg/day (increasing)

Sense of Urgency, Env. & Health impacts

Bangladesh: Recycling by Informal Sector

- Recycling of 4- 15 percent of the total generated waste
- E-waste recycling picking its pace!

Sense of Urgency, Env. & Health impacts

Informal Resource Recovery and Recycling: (same everywhere)

INDIA

THAILAND

Sense of Urgency, Env. & Health impacts

Chennai (Open dumping)

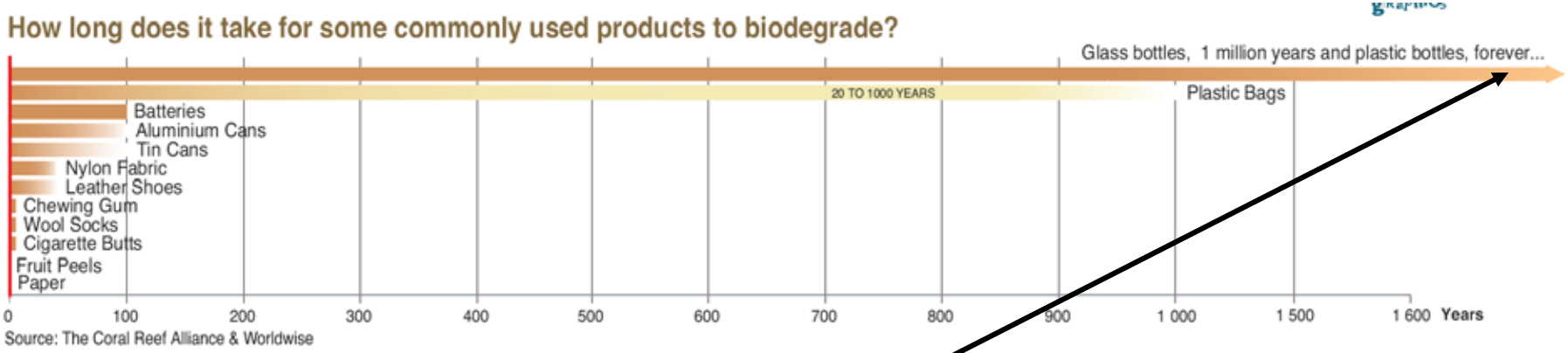
Perungudi dumping ground (PDG)

Kodungaiyur dumping ground (KDG)

Sense of Urgency, Env. & Health impacts

Informal Resource Recovery and Recycling: (same everywhere)

A Plastic is a plastic is a plastic – Mother Earth *et al*.!



Glass bottles, 1 million years and plastic bottles, FOREVER!

3R Developments in Asia

3R Development in Asia

Japan, Taiwan, Hong Kong, Singapore, Korea...how were they successful in 3Rs implementation and waste reduction?

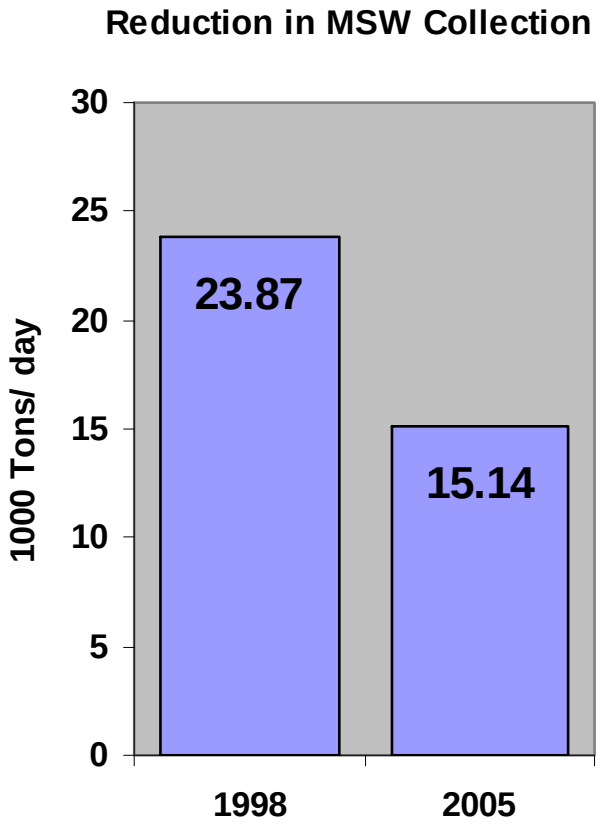
- (Effective) National Framework and its implementations
- Support from common people and other stakeholders
- Civil responsibilities and Stringent Laws

Developments in Asia

Taiwan (2005)

MSW generated 5.49 Million tons

78.7% - Incineration; 20.5% - San. Landfill;
0.7% - Regular Landfill; 0.1% - temporary storage



Taiwan EPA:

New reduction targets for Organic waste:

2007 – 25%

2011 – 40%

2020 – 75%

Reduction in Per-capita waste generation

1996 – 1.13 kg/person-day

2005 – 0.67 kg/ person-day

Developments in Asia - Taiwan

- Targets and Current Status
- The Four-in-one Recycling Program
- Control Measures:
  - Restricted use of plastic shopping bags and disposable plastic tableware
  - Excessive Product Packaging Restrictions
  - Garbage Sorting Requirement
  - Restriction on production, import and sales of mercury-containing dry cell batteries

Targets for MSW reduction

- Reduction targets for organic garbage:
  - 2007: 25%
  - 2011: 40%
  - 2020: 75%
- After 2010, no garbage will enter landfills In Taipei City.

The Evolution of Resource Recycling System in Taiwan

- Before 1988:
  - Recycled by private sector (such as waste paper and metal scrapes dealers), without governmental intervention and management.
  - Items low in market price were not recycled.
- 1988-1997:(Extended Producers' Responsibility)
  - Waste Disposal Act was amended to require producers and importers to shoulder the responsibility of recycling their post-consumption products.
  - Problems of then EPR programs include:
    - Lack of credible certification of recycling rates reported by producers.
    - Free riders were not effectively penalized
    - Monopolized recycling systems

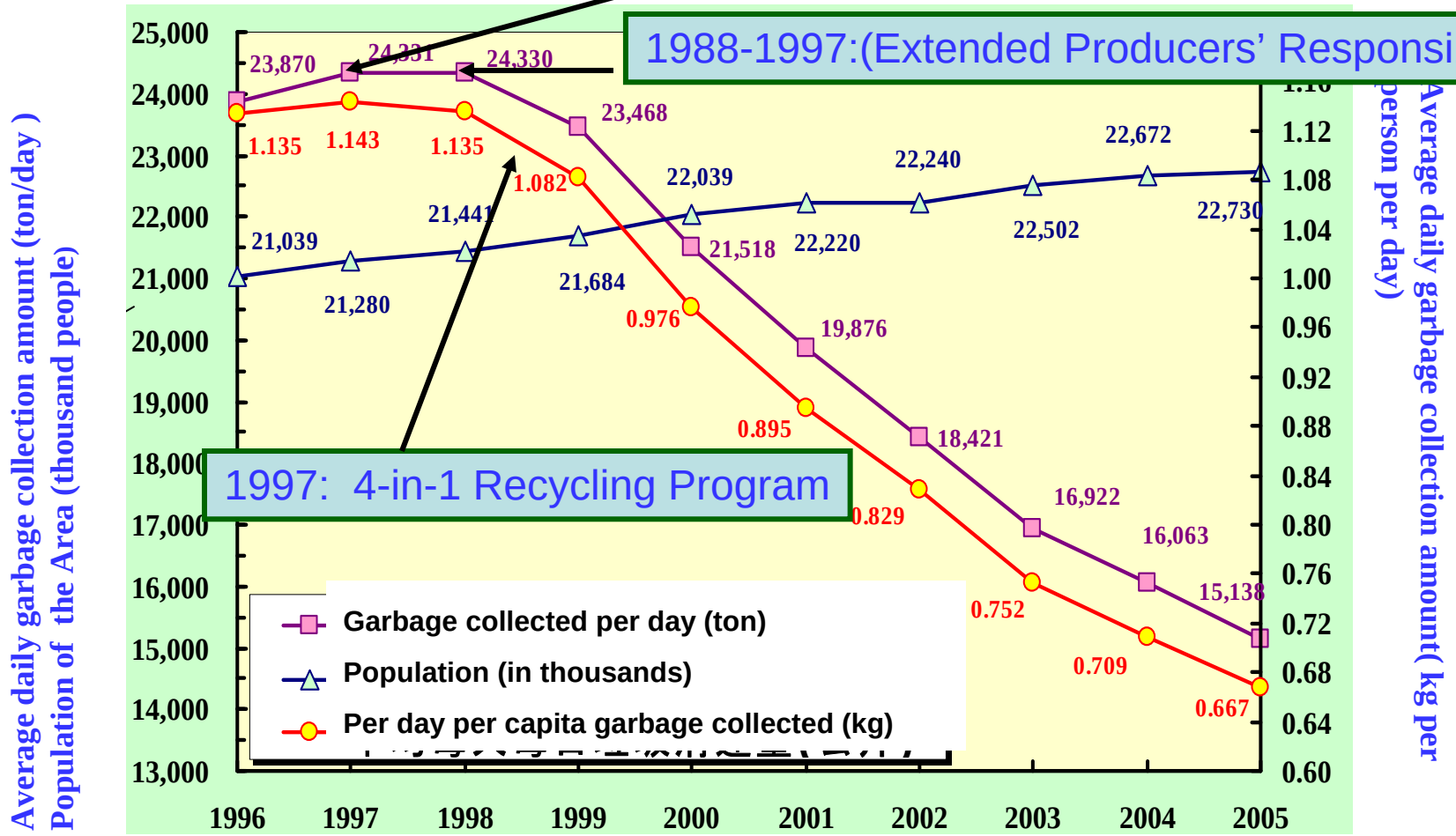
The Evolution of Resource Recycling System in Taiwan (Cont')

- From May 1997: 4-in-1 Recycling Program
  - Producers are required to pay recycling fees to Resource Recycling Management Fund monitored by EPA.
  - 8 Funds were set up in 1997, and then merged into a single fund under the supervision of EPA in 1998.
  - Key points of the program:
    - Producers & importers pay recycling fees to Resource Recycling Management Fund.
    - Recyclables are collected and sorted by households, communities and municipalities, and then sold to collectors for further sorting and recyclers for recycling.
    - Funds were used to subsidize collectors or recyclers in accordance with their certified recycling amounts.

Developments in Asia - Taiwan

Without governmental intervention and management – till 1988.

1988-1997:(Extended Producers' Responsibility)



The Garbage Collection Amount Over the Years

Developments in Asia

Korea:

- Increase the Municipal waste recycling rate from 44% to 50% (2002 – 2008)
- Per-capita waste generation reduced: 1.3 kg/person-day (1993) to 1.04 kg/person-day (2002) further aiming to reduce to 0.9 kg/person-day till 2008.

(Sets target): Year 2011

- Reduce MSW generation by 12%
- Waste incinerated/ landfilled by 22%
- Increase recycling by 53% -> Will invest (1.13 Billion USD)
  - Expanding recycling facilities, developing recycling technology, fostering recycling industry
- Industrial waste generation to reduce by 8%
- Industrial waste recycling to increase by 80%

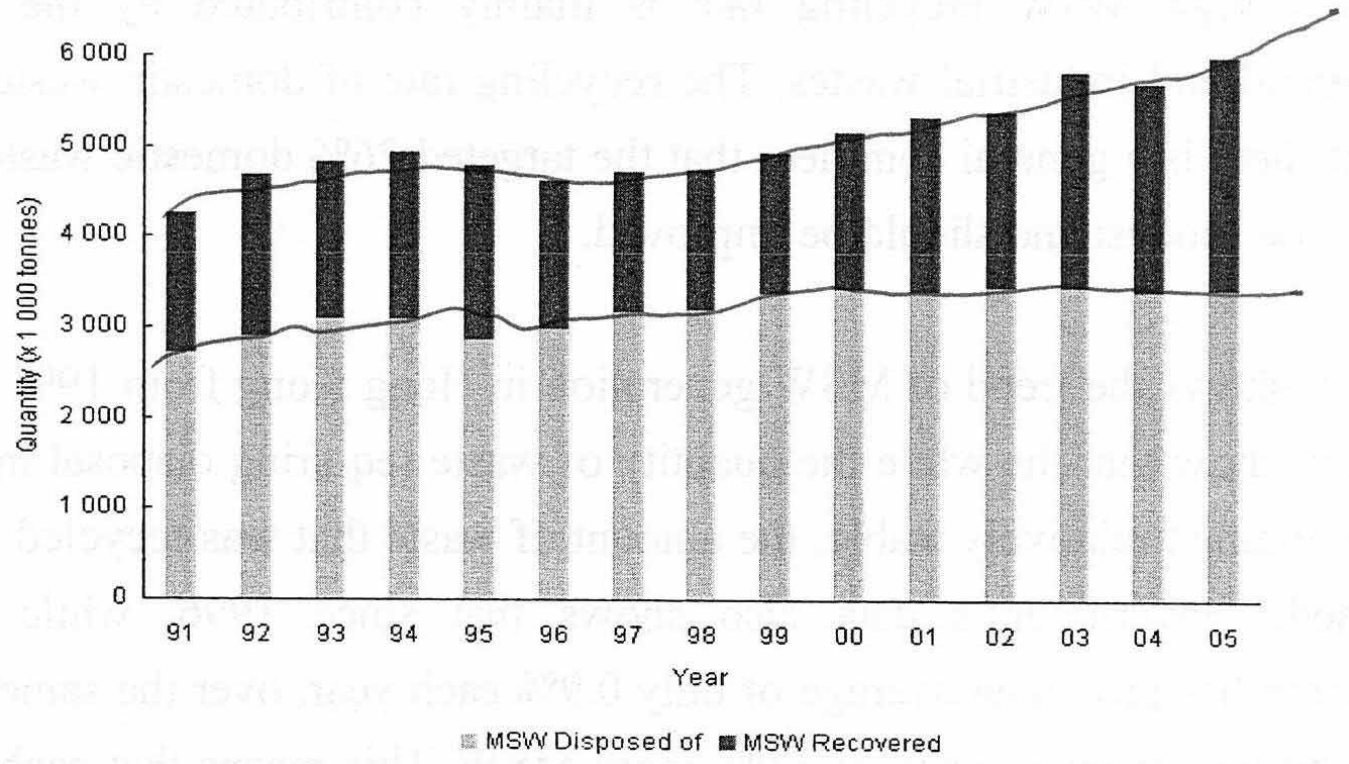
Developments in Asia

Hong Kong (2005)

MSW generated 6 Million tons:

43% - Recovered; 57% -Landfill;

- More Recycling of Waste – More Waste Generated!
- (50- 60)% MSW Recycling rate seems to be the limit



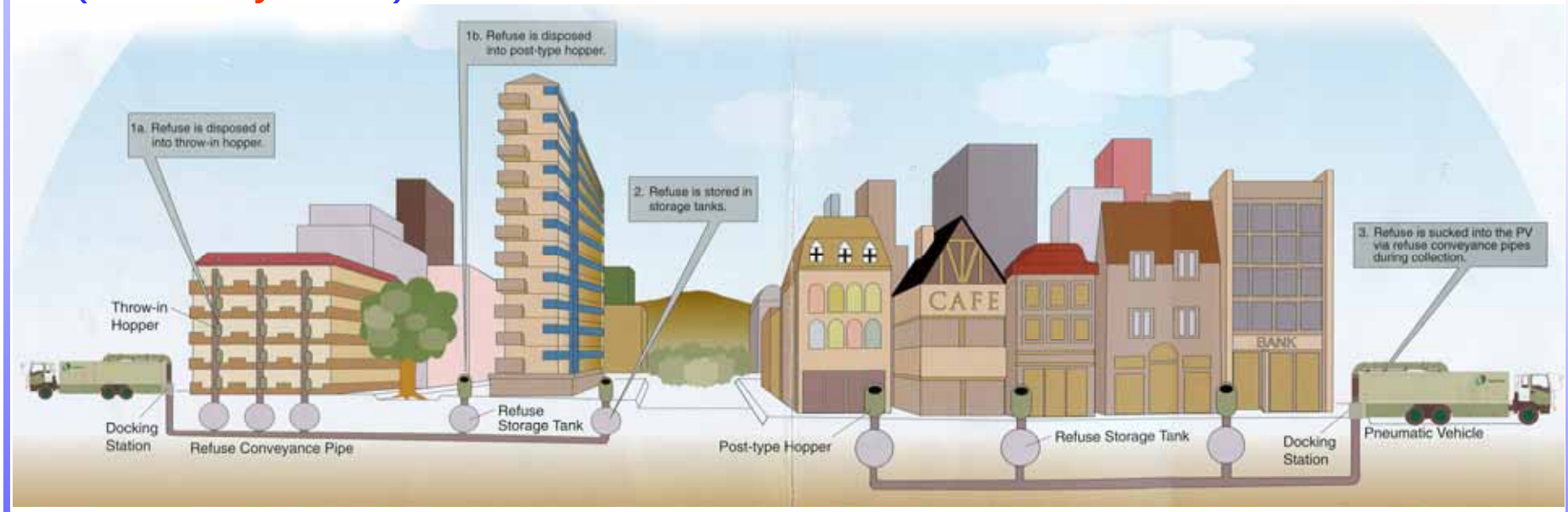
Developments in Asia

Singapore

- Singapore Green Plan (SGP) 2012.
- 10-year blueprint for environmental sustainability and was launched by the Singapore's Ministry of the Environment and Water Resources (MEWR) in 2002.
- Recycling rate increased from 44% in 2002 to 48% in 2004 targeted to 60% by 2012.
- Research and Technology Development: Set up an 13 million USD "Innovation for Environmental Sustainability (IES)" Fund to provide financial support for companies to carry out test bedding projects.
- Household Recycling: Participation rate by households increased from 22% in 2001 to 54% by end 2004.
- Additional 5,200 recycling bins for paper, plastic, metal cans and glass bottles set up at public places
- National Environment Agency (NEA) sets up a 0.6 million USD Partnership fund - to foster environmental awareness and ownership of the environment.

Developments in Asia - *Singapore*

Recyclable Intermediate Chute Storage System (RICH System)



System Brief:

- Used in High-rise buildings, offices, multi-storey housings
- Refuse thrown into common/ individual chutes
- Channeled to common storage tank
- Sucked out by a Pneumatic system
- No need for manual transfer of refuse

Courtesy: SembWaste Consultancy & Technology, Singapore

Developments in Asia - *Singapore*

Recyclable Intermediate Chute Storage System (RICH - System)

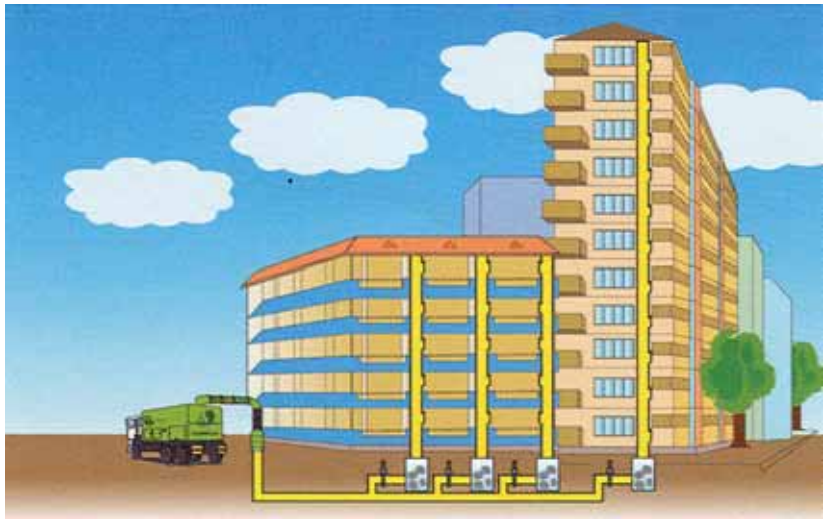
- **Innovative method for storing recyclables within the chute**
- **RICH System - Helping to reach the recycling target of 60% by 2012**

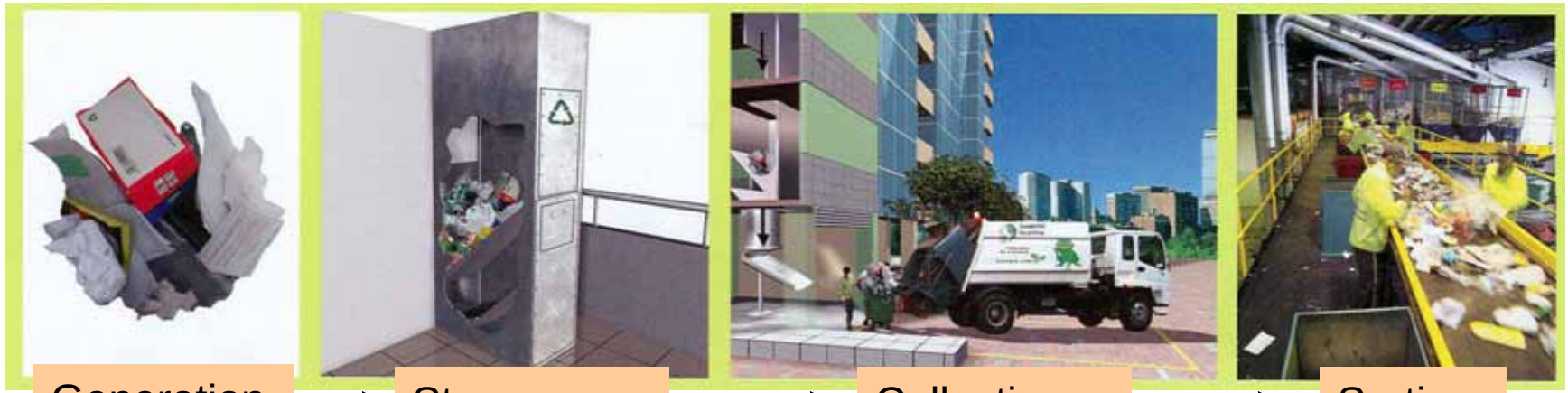
Courtesy: SembWaste Consultancy & Technology, Singapore

Developments in Asia - *Singapore*

Singapore: RICH System

High-rise buildings, offices, multi-storey housings



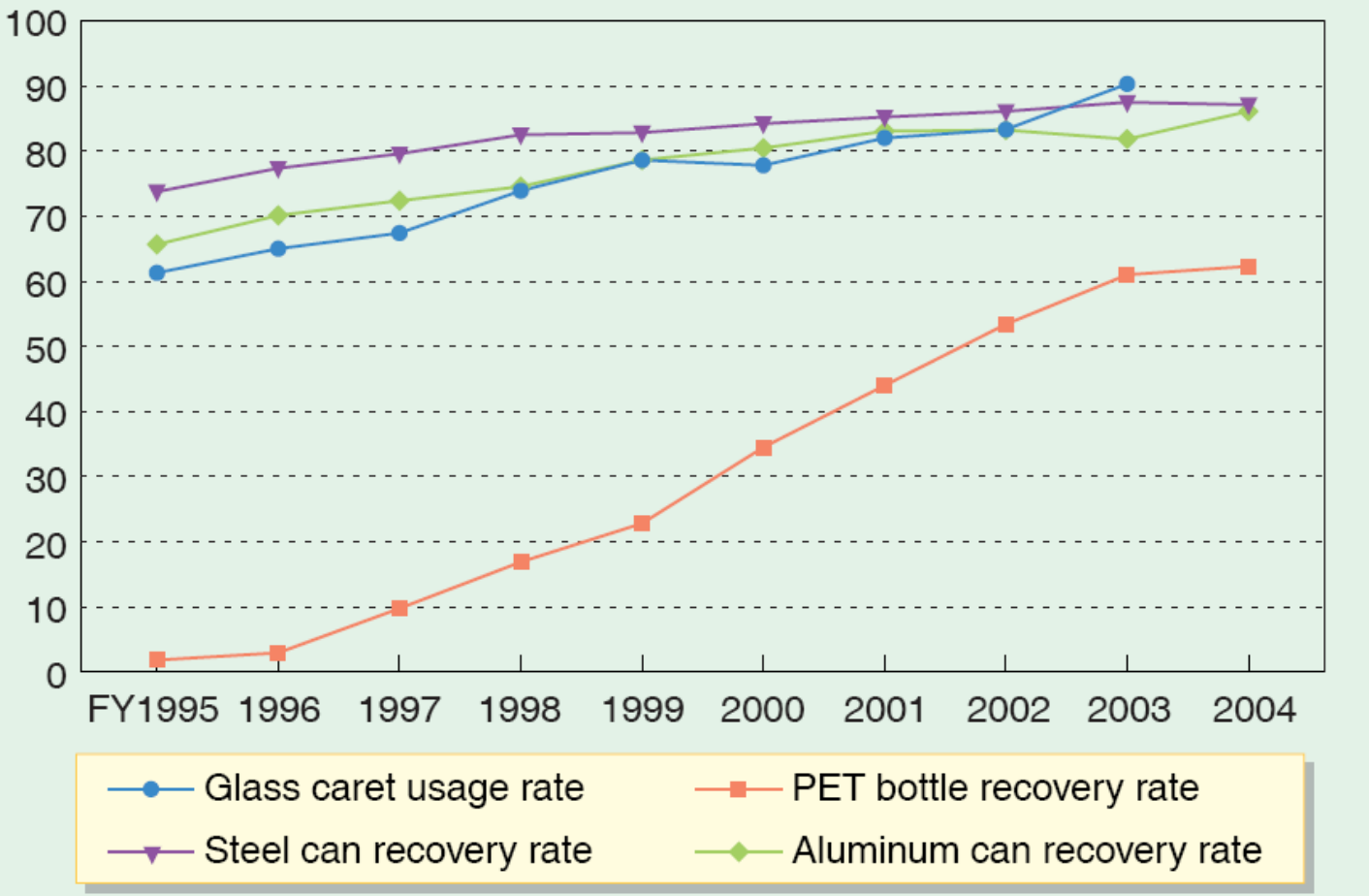


Generation → Storage → Collection → Sorting

Courtesy: SembWaste Consultancy & Technology, Singapore

Developments in Asia

Japan

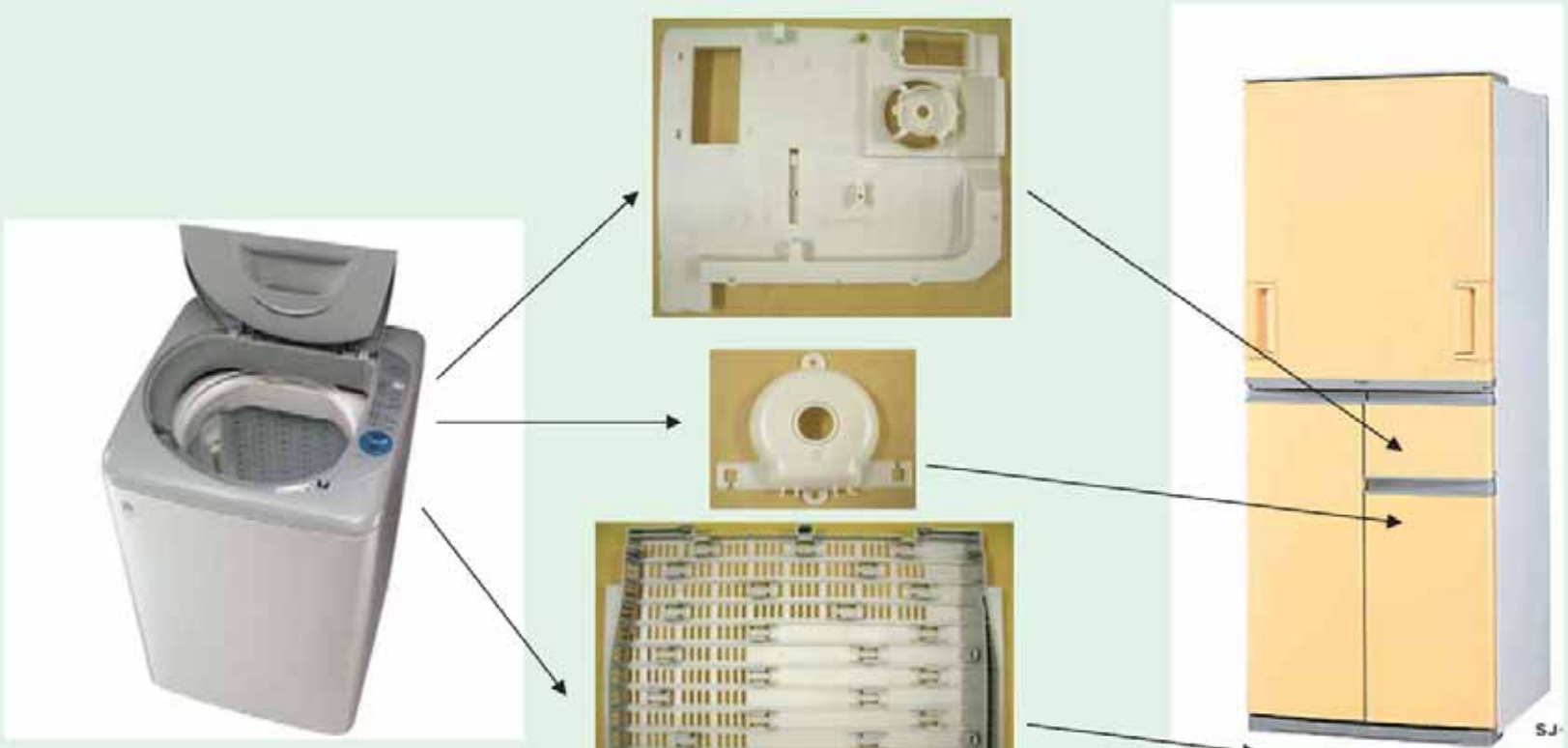


Source: Ministry of the Environment

Developments in Asia

Japan

Example of Design for the 3Rs : Washing machine



Post-consumer use washing machine

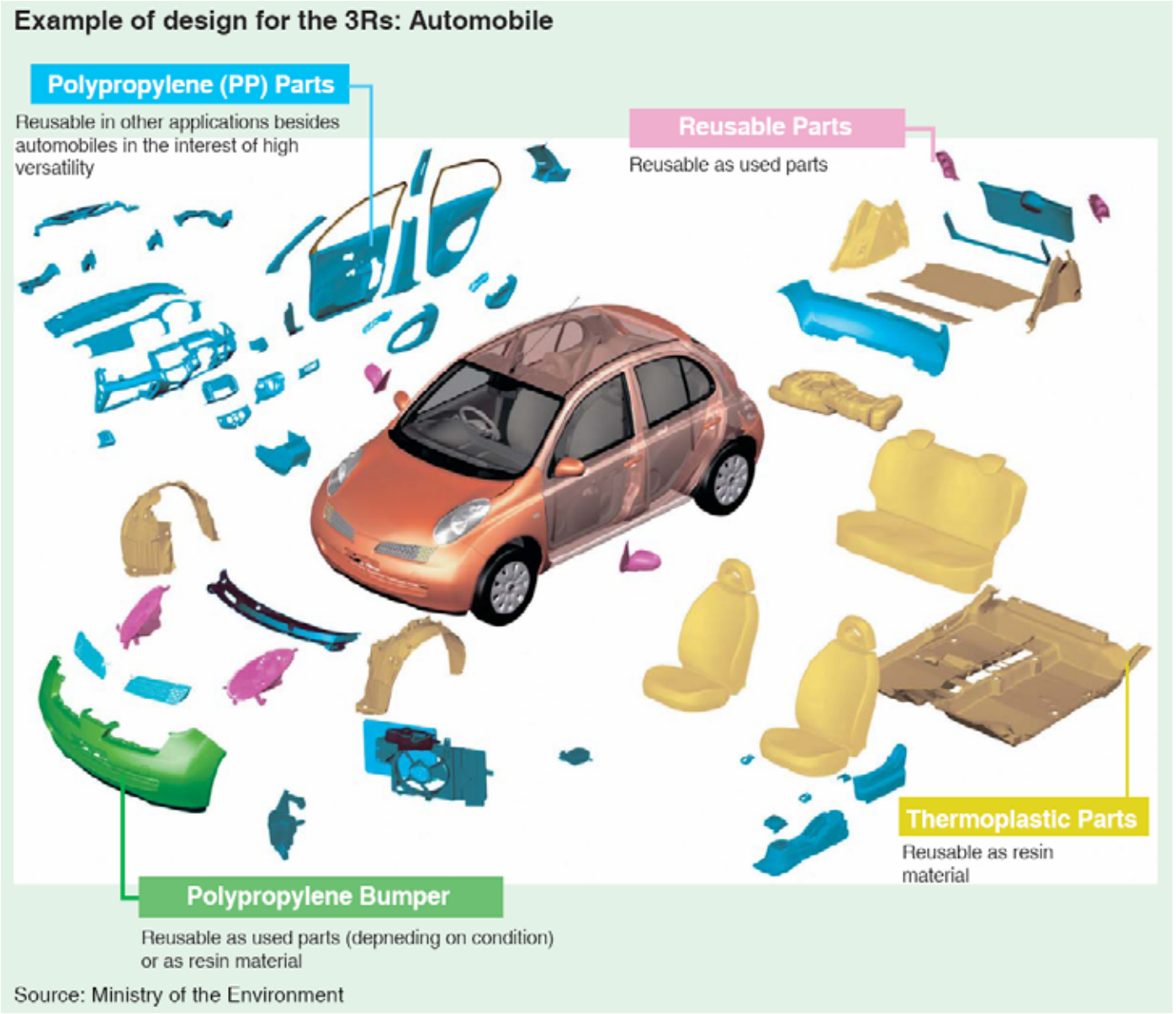
Recyclable parts as resin material

Refrigerator

Source: Documents of SMS planning division of the Central Environmental Council

Developments in Asia

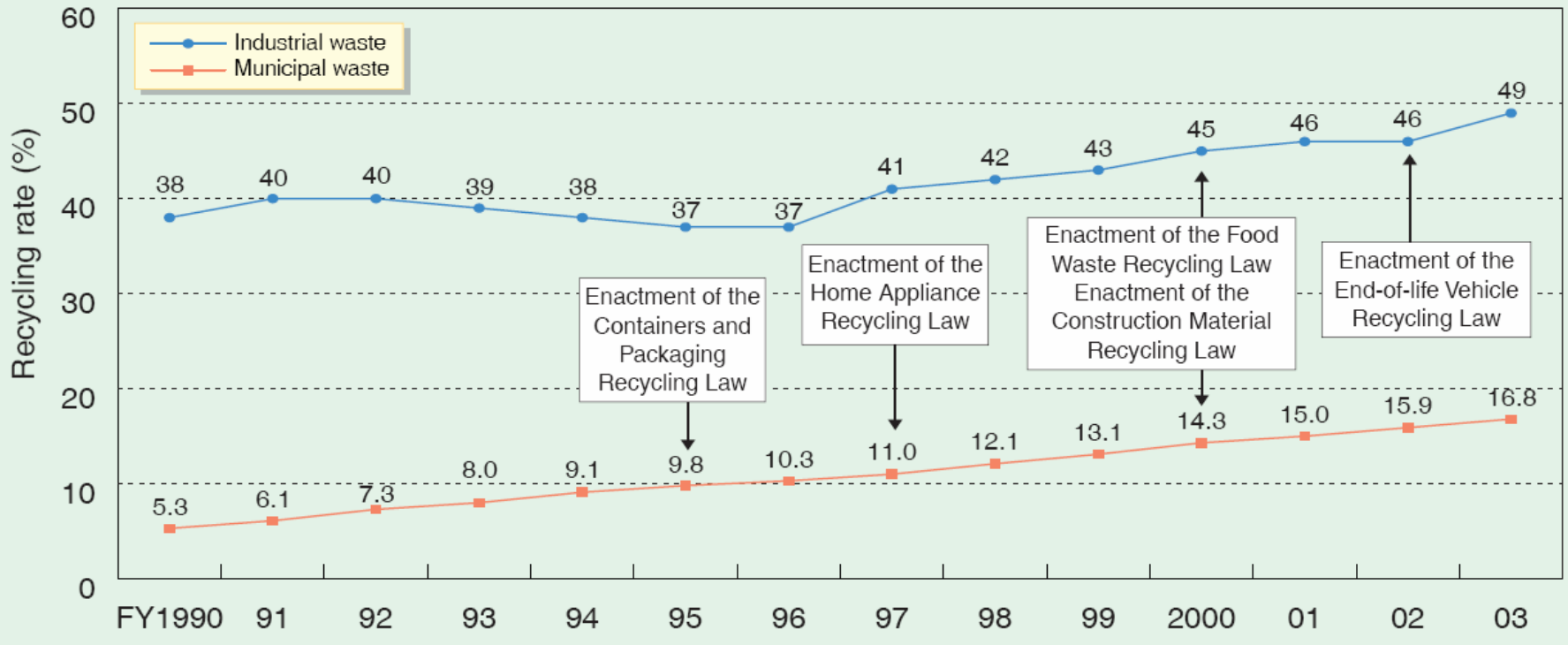
Japan



Developments in Asia

Japan

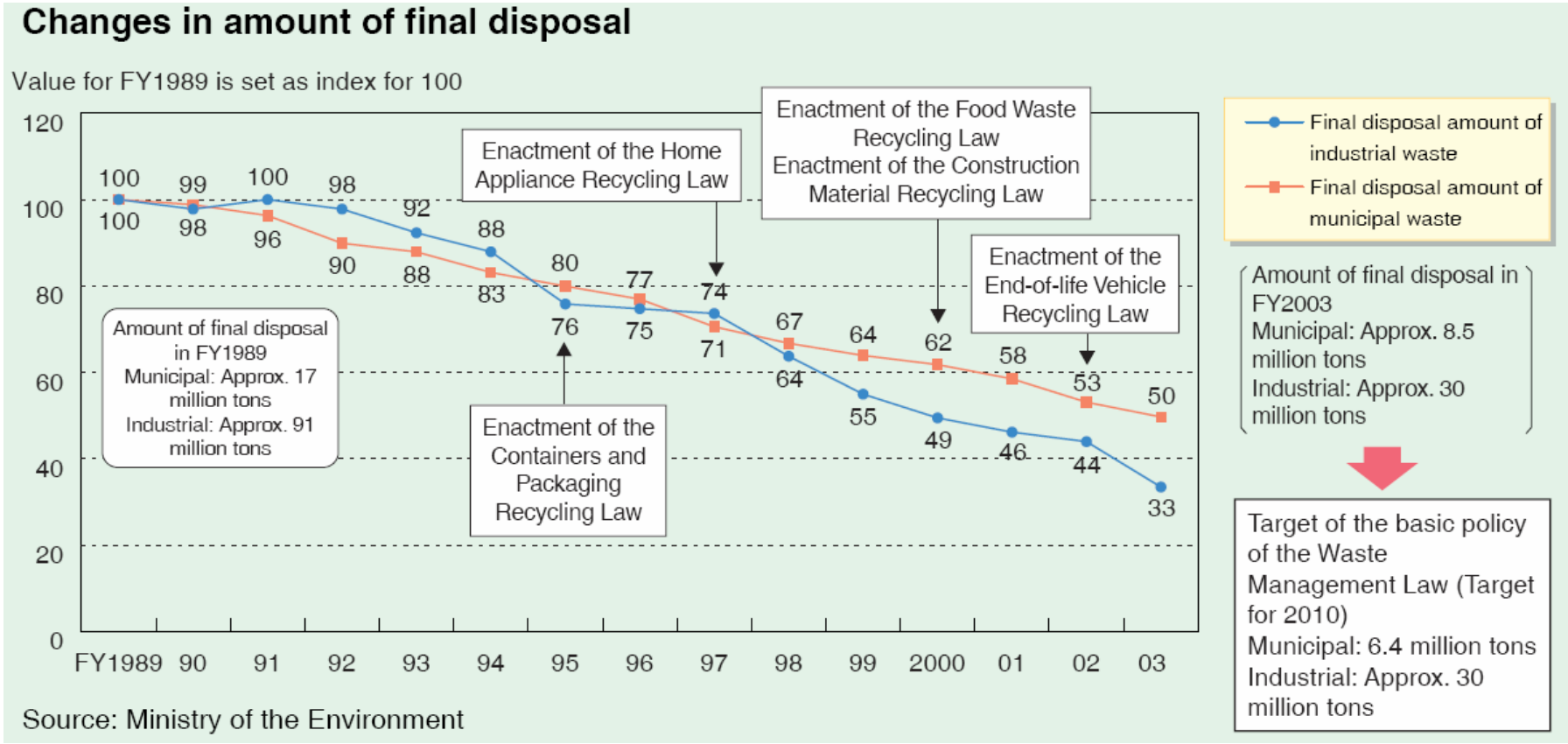
Changes in the recycling rate



Source: Ministry of the Environment

Developments in Asia

Japan



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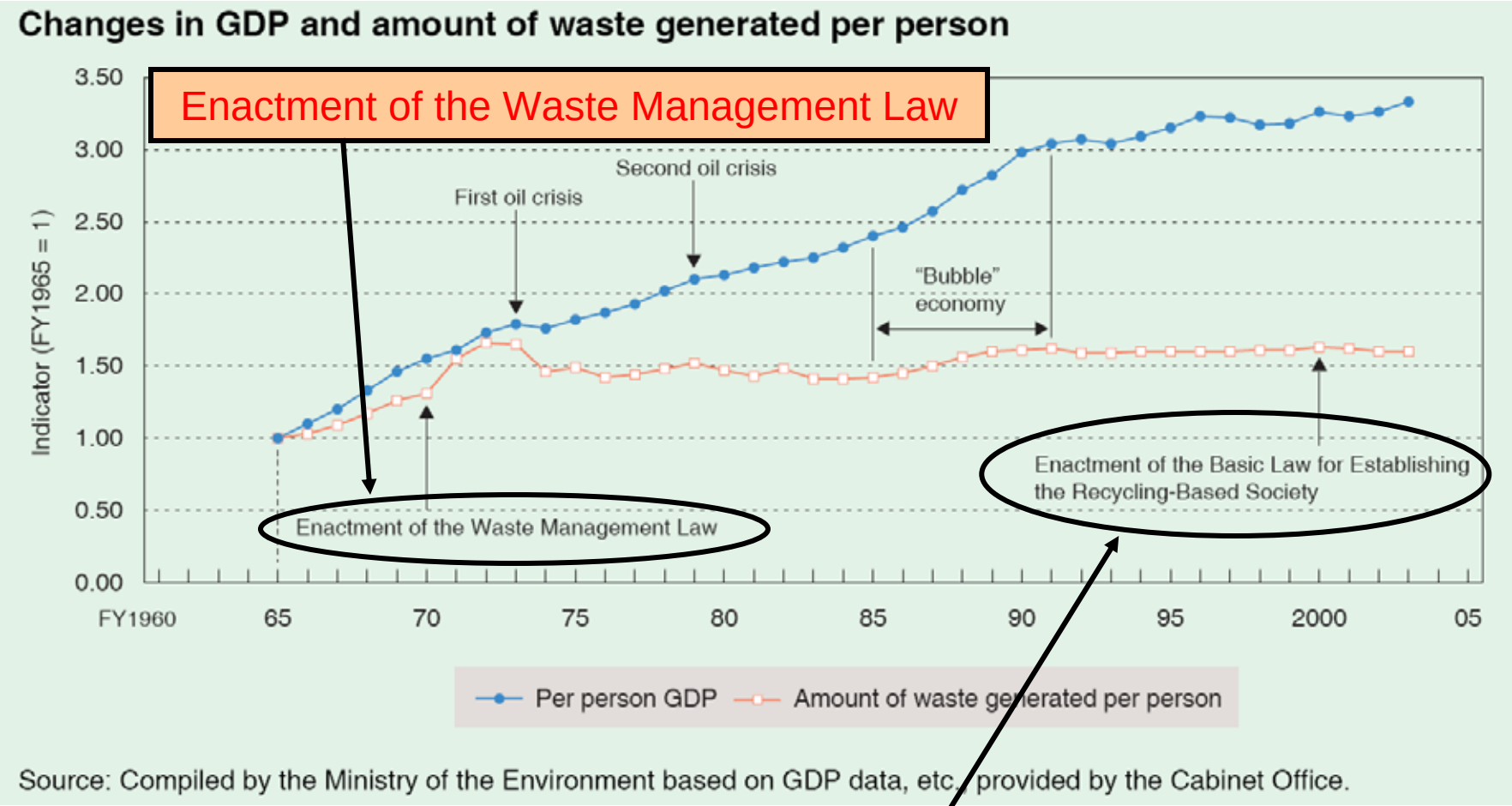
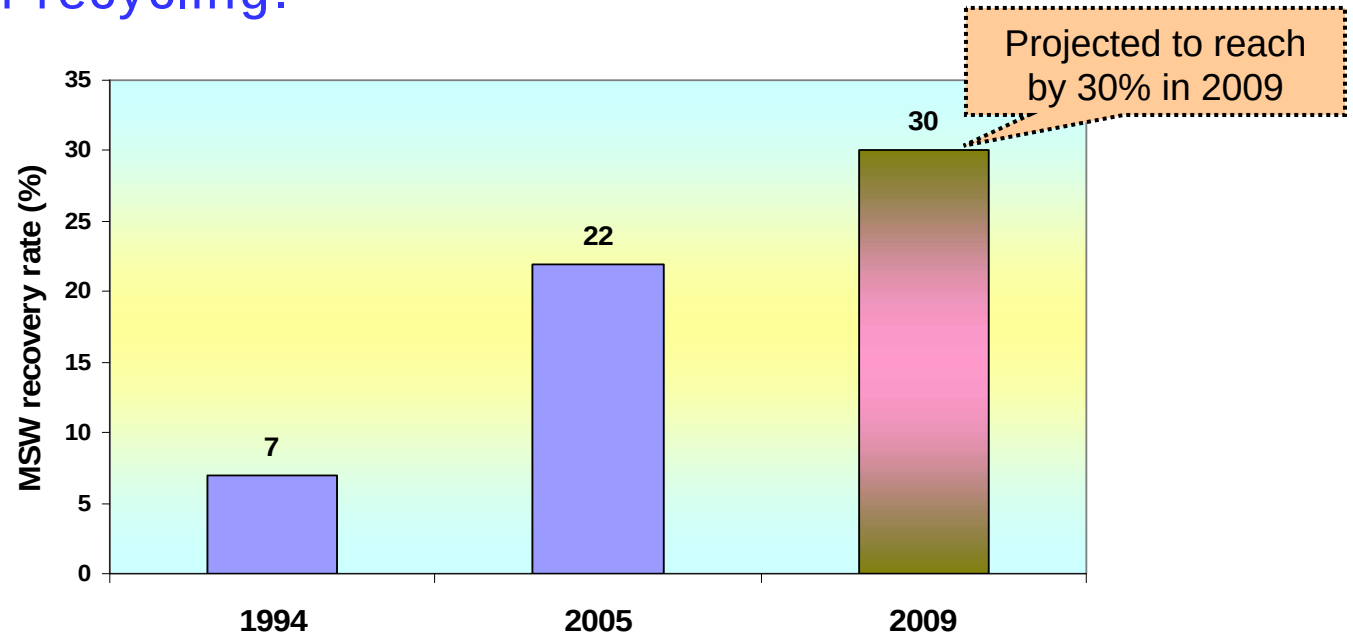


Enactment of the Basic law for Establishing the Recycling-Based Society

3R Initiatives in Asia

- Waste Recovery (Thailand): 3R program, introduced in 1994, involves the public in solutions through campaigns, seminars, training and guidelines.
- To further promote 3R, Thailand has conducted a pilot project on Waste Exchange Program.
- As of 2005, 450 industries are registered on the waste exchange database to explore better waste utilization through recycling.



Developments in Asia

Bhutan: Private Sector participation

- Environmental Education & public campaign
- Promoting recycling and source separation
- Ban on use of plastic reinforced (2005)
- Maximum effort paid for recycling either locally or to be transported to India for recycling

School Children participating in waste segregation campaign

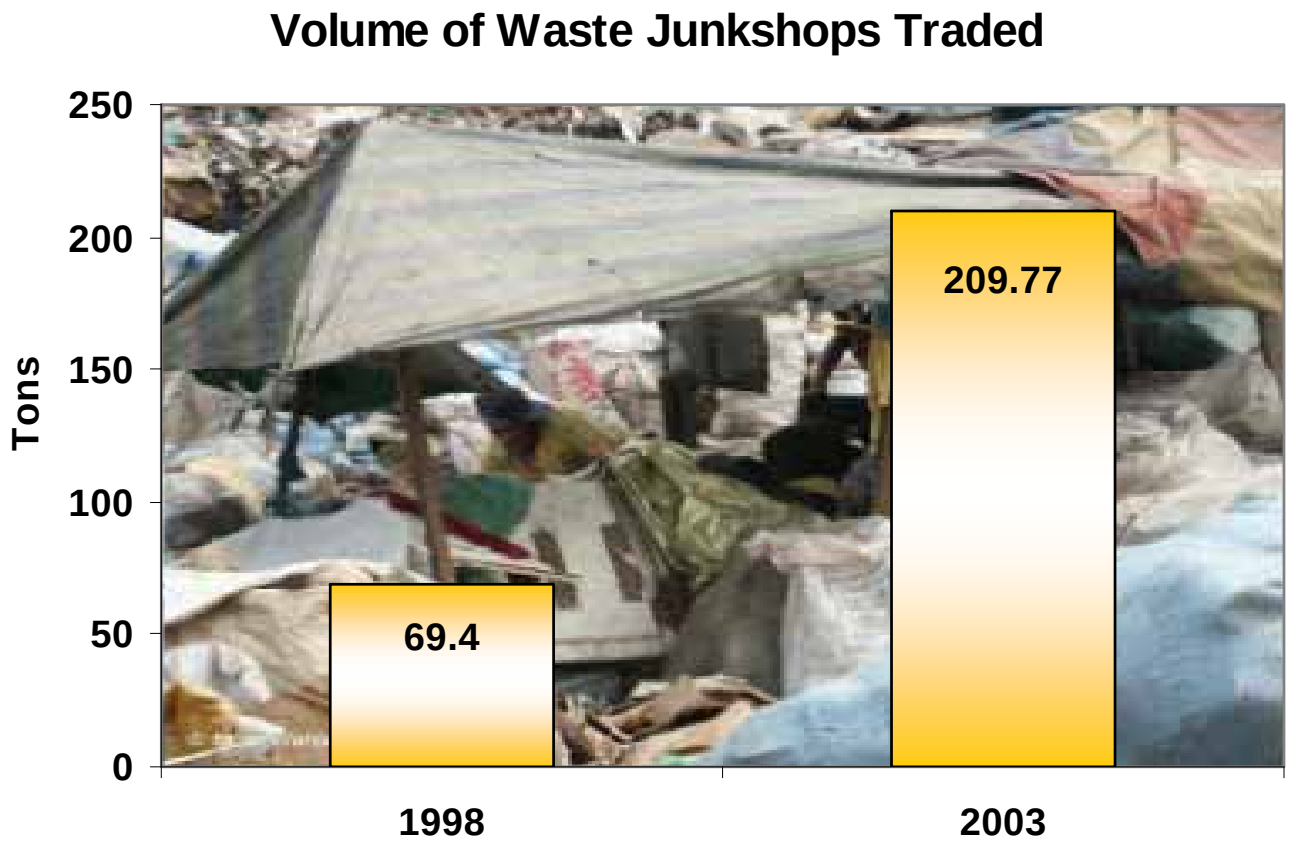
Team In Action

- NGO, Royal Society for Protection of Nature
- Japan International Cooperation Agency – JICA
- United Nations Children's Fund - UNICEF
- United Nations Environment Programme (UNEP)

Developments in Asia

The Philippines:

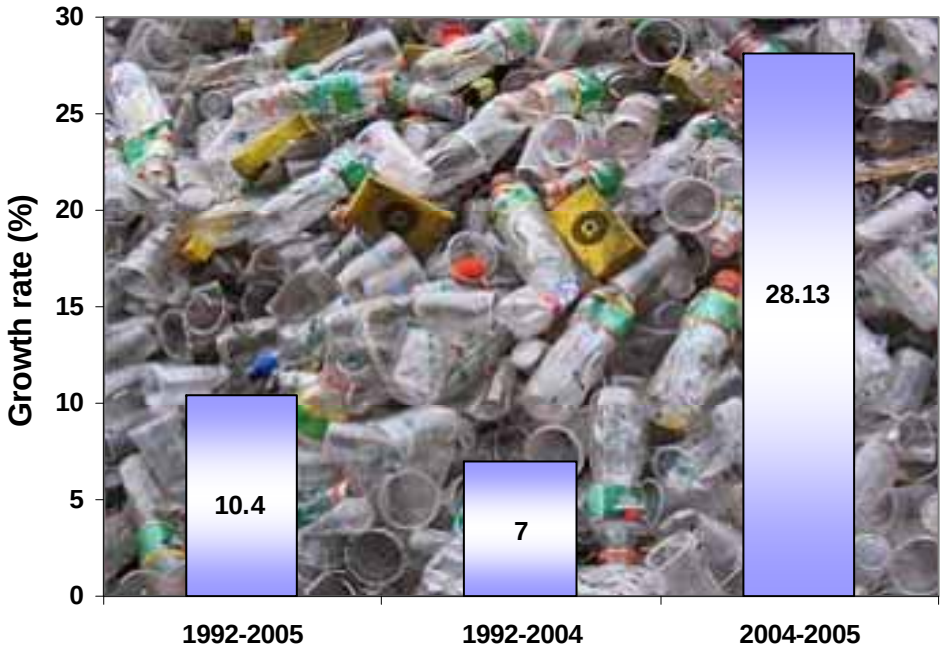
Volume of the waste junk shop traded increased by 3 folds in 5 years



Developments in Asia

Bangladesh

- Variation in waste generation; Wet season (more) and Dry season (less) (almost 30-40 %)
- Municipal waste dominated by organic fractions - composting
- Increase in Plastic waste (Dhaka) - recycling



Plastic waste growth rate over ten years (Dhaka)

Developments in Asia

P.R. China:

- Initiating the concept of circular economy with “3R” principle as its core and enhancing the awareness of decision-makers in governments at all levels, of corporate entities and the general public.
- Establishing and improving laws and policies on circular economy
- Promoting trial and demonstrations of circular economy at local levels
- Carrying out study on the formulation of circular economy planning
- Actively exploring international cooperation in the realm of circular economy
- Fostering professionals on the scientific and technological study on circular economy

Developments in Asia

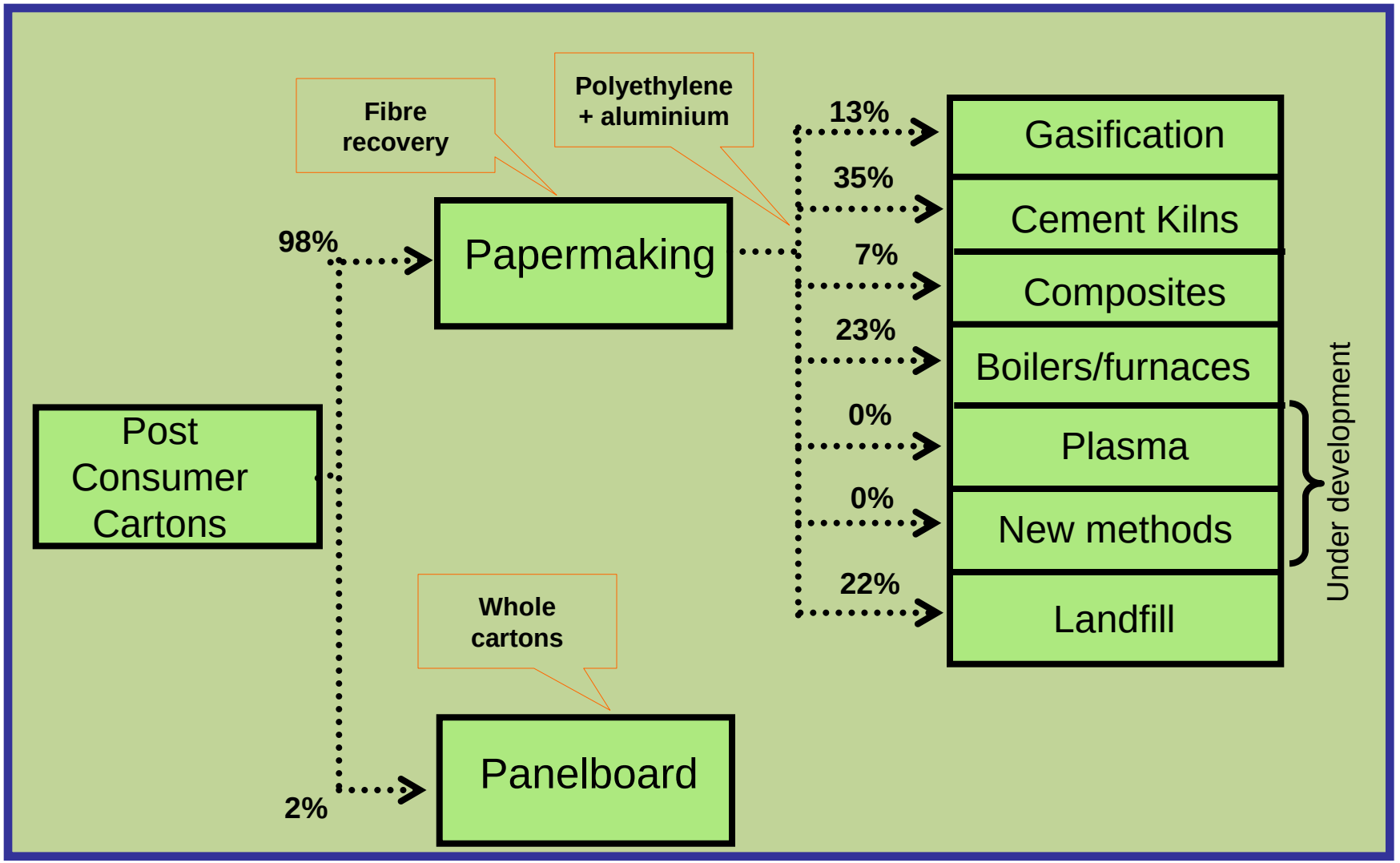
P.R. China: Circular Economy

The accepted working definition may be interlinked to manufacturing and service businesses seeking the enhancement of economy and environmental performance through collaboration in managing environmental and resource issues.

The theme of the CE concept is the exchange of materials where one facility's waste, including energy, water, materials - as well as information - is another facility's input. The new term that is also used widely is the 'Eco-Industrial Cluster' or Industrial Symbiosis.

Developments in Asia

PRIVATE SECTOR INITIATIVES: TETRA PAK



Recycling of Beverage Carton in 2004 Worldwide

Developments in Asia

PRIVATE SECTOR INITIATIVES: TETRA PAK

TETRA PAK (THAILAND) – Collection and Sorting

Developments in Asia

PRIVATE SECTOR INITIATIVES: TETRA PAK

Baled material From GGT

Hydrapulper

Pulp recovered from hydrapulping

Poly – AL residuals

Tetra Pak - Thailand
(Pulping at Fiber Pattana Paper Mill)

Developments in Asia

PRIVATE SECTOR INITIATIVES: TETRA PAK

Pulp from Beverage Cartons

Paper Roll for Boxboard Manufacturing

Recycled Products

Developments in Asia

PRIVATE SECTOR INITIATIVES: TETRA PAK

Developments in Asia

3R Legislation:

Country	Laws, Policies & Acts
Bangladesh	Urban Solid Management Handling Rules of Bangladesh' (under preparation)
Bhutan	Environmental Codes of Practice for Solid Waste Management
China	Circular economy policy is incorporated in China's eleventh 5-year national development plan. Cleaner production and waste management integrated into legislation.
India	National Environmental Policy 2005, which incorporates the 3R concept, is currently under consideration.
Indonesia	Pre-Inception meetings for the Formulation of National 3R Strategy for Indonesia conducted in September, 2006 organized by Ministry of Environment-Indonesia, UNCRD, and IGES
Japan	Amendments of the 'Containers and Packaging Recycling Law'.

Developments in Asia

3R Legislation:

Rep. of Korea	Volume based waste collection, EPR implemented with mandatory targets for product recovery and recycling, regulations for promoting recycling of construction waste, reduction of food waste.
Nepal	Local Self Governance Act, 1999
Pakistan	No national quality standard for MSW, NEP-National Environmental Policy, 2005
The Philippines	The Ecological Solid Waste Management Act.
Singapore	The National Recycling Program launched in 200, Zero Landfill and Zero Waste Strategy.
Sri Lanka	NSSWM -National Strategy for Solid Waste Management
Thailand	National Integrated Waste Management Plan.
Vietnam	The Law on Environmental Protection, The National Strategy for Environmental Protection. The National 3R Strategy is being developed in collaboration with JICA, UNCRD, IGES/ Ministry of Environment of Japan and ADB

News Release…August, 2006

- Partnership Launched to Create '3R' Knowledge Hub (3RKH) in Bangkok (7 August, 2006) – funded by ADB
- UNEP, UNESCAP and AIT will jointly work on promoting the 3R activities in Asia and Pacific Region.
- Project Kick-started formally on 21st November, 2006
- Focus on 3R issues (technology, policies, good practices) related with Municipal Solid Waste, Medical waste and E-waste

Main Activities

- Create, collect and capture 3R knowledge
- Storage and retrieval of 3R knowledge
- Share, enrich, and disseminate 3R knowledge
- Monitoring and management of 3RKH

UNEP, AIT, ADB, ESCAP

Thank you all

Lets act soon for 3Rs