

Overview of Industrial Waste Management

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Chemical and Process Engineering
Office of Science Technology and
Innovation

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Public

PPP

Private

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Solid

Liquid

Air

Non
Hazardous

Hazardous

An Analysis requires an in-depth look

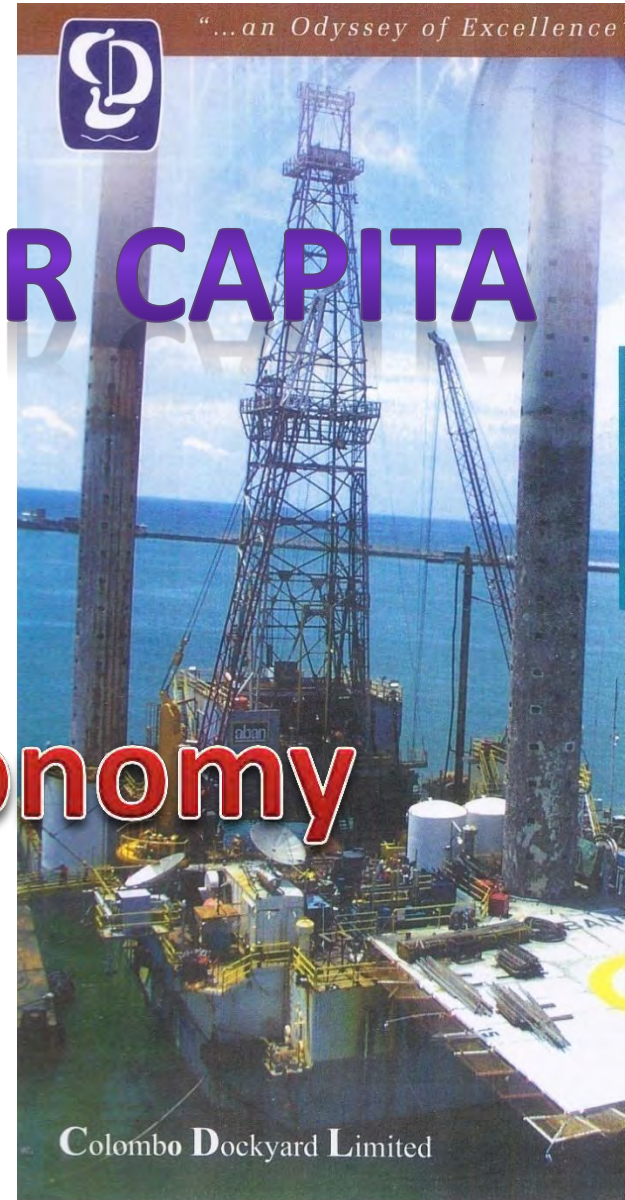
New Industries and Infrastructure

- Ports and related infrastructure
- Airports
- Highways
- Power stations – Coal
- Industrial Estates
- Export led manufacturing industries
- Food Processing
- Mineral Processing and Value Addition
- Tourism
- Urban growth - Metros
- Nanoscience Park

4000 US\$ PER CAPITA

100 bn US\$ Economy

- **Off shore Oil Exploration**



Analysis

- Policy Aspects
- **Regulatory Environment**
- Human Resources Availability
- **Planning Aspects**
- Technology Aspects
- **Industry Mentality**
- Market requirements
- **Stakeholder requirements**

**PESTEL
ANALYSIS**



Democratic Socialist Republic of Sri Lanka

**NATIONAL POLICY AND STRATEGY
FOR
CLEANER PRODUCTION**

Ministry of Environment and Natural Resources
82, "Sampathpaya" Rajamalwatte Road, Battaramulla, Sri Lanka.
2005

Policy Goals

1. Achieve Sustainable Development in Sri Lanka
2. Improve Environmental Quality throughout Sri Lanka
3. Improve eco-efficiency across all sectors of the economy in Sri Lanka
4. Alleviate Poverty and Improve the Living standards of all Sri Lankans



ශ්‍රී ලංකා ප්‍රජාතාන්ත්‍රික සමාජවාදී ජනරජය



NATIONAL ENVIRONMENTAL POLICY AND STRATEGIES

සුපිරිසුදු නිෂ්පාදනය සඳහා වූ ජාතික
ප්‍රතිපත්තිය හා උපාය මාර්ගය

පරිසර සහ ස්වභාවික සම්පත් අමාත්‍යාංශය
82, "සම්පත්පාය", රජමල්වත්ත පාර, බත්තරමුල්ල, ශ්‍රී ලංකාව.
2005

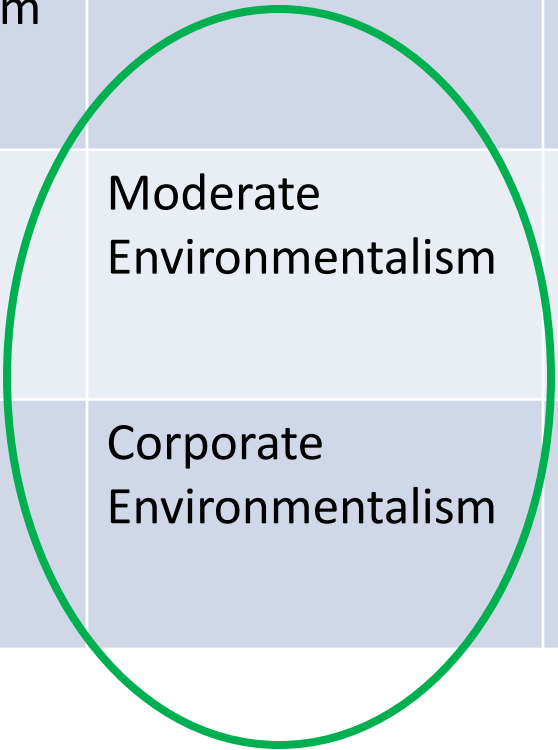
Ministry of Environment and Natural Resources
Sri Lanka
August 2003

Prescribed Projects



Approach to Environmental Protection

	Extreme Change	Moderate Change	No Change
Government more than civil society	Authoritarian environmentalism		
Government and Civil Society		Moderate Environmentalism	
Civil Society more than Government		Corporate Environmentalism	Anti environmentalism



EPL

6980 industries without an EPL

Lankadeepa

Oct 11, 2011

පරීක්ෂණ විනාශ කරන කම්හල් 7000 ක් රටපුරා

අලලන්න මධ්‍යම පරිසර අධිකාරිය සැරසෙයි

(විනිස) එම්. ගමගේ)

නියමිත පරිසර ආරක්ෂණ
බලපත්‍රයක් නොමැතිව පවත්වාගෙන
යන කර්මාන්ත 7000කට ආසන්න
ප්‍රමාණයක් රට පුරා ඇතැයි මධ්‍යම
පරිසර අධිකාරිය පවසයි.

බලපත්‍ර මෙන්ම අනුමත 'ප්‍රමිතීන්' නැතිව, කිසිදු

නියාමනයකින් තොරව පවත්වා ගෙන යන මෙම කර්මාන්ත නිසා පරිසරයට මහා පරිමාණයෙන් හානි සිදුවන බව මධ්‍යම පරිසර අධිකාරියේ සභාපති චරිත හේරත් මහතා "ලංකාදීප"යට පෙරේදා (10) පැවැසීය.

අධිකාරියේ ප්‍රධාන සහ ප්‍රාදේශීය කාර්යාල නිලධාරීන් 400- දෙනා යොදවා මෙවැනි බලපත්‍ර රහිත ආයතනවලට විරුද්ධව නීතිමය පියවර ගැනීමේ පුළුල් වැඩ පිළිවෙළක් ක්‍රියාත්මක කළ බව ද ඒ මහතා කියයි.

දැනටමත් එසේ
නීත්‍යානුකූල පියවර ගත්
ආයතන 200කට ආසන්න
ප්‍රමාණයකට විරුද්ධ පැවැරු
නකුළු අධිකරණයේ විභාග
වෙමින් පවතිනයි තේරේ
මහතා කවදුරටත්
ප්‍රකාශ කළේය.

1. කෘතියේ නම
 2. රචකයාගේ නම
 3. ප්‍රකාශකයාගේ නම
 4. ප්‍රකාශන වර්ෂය
 5. පිටුව
 6. මුද්‍රණ වර්ෂය

Oct 11 / 2011 Corby

Illegal Dumping

2010 මාර්තු මස 15 වැනිදා සඳුදා

ලංකාදිව

29

මහවිට වෙල්යායට බවුසරයකින් රසායනයක් හමුද්දී අත්අඩංගුවට

**රියැදුරු-සහායකයා සමග
බවුසරය පොලිස් භාරයේ**

(නිලධාරීන් දිසානායක -
මිරිස්වත්ත)

බියගම ප්‍රදේශයේ
කර්මාන්ත ශාලාවකින්
රසායනික ද්‍රව්‍ය සහිත
දියරයක් ඉවතලීම සඳහා

බවුසරයකින් ගෙනැවිත්,
යක්කලට නුදුරු මහවිට වෙල්
යායකට බැහැර කරමින්
සිටියදී බවුසරය සමග එහි
රියැදුරා සහ සහායකයාත්
ගම්පහ පොලිසිය සැකපිට

අත්අඩංගුවට ගෙන ඇත.

මහවිට ප්‍රදේශවාසීන් විසින්
පොලිස් හදිසි ඇමතුම්
අංශයට කරන ලද දැනුම්
දීමකට අනුව බවුසරය සහ
රියැදුරාත්, සහායකයාත්
මෙලෙස පොලිස් භාරයට ගත්
බව ගම්පහ පුරපති ඒරංග
සේනානායක මහතා
ලංකාදීප" යට පැවසීය.

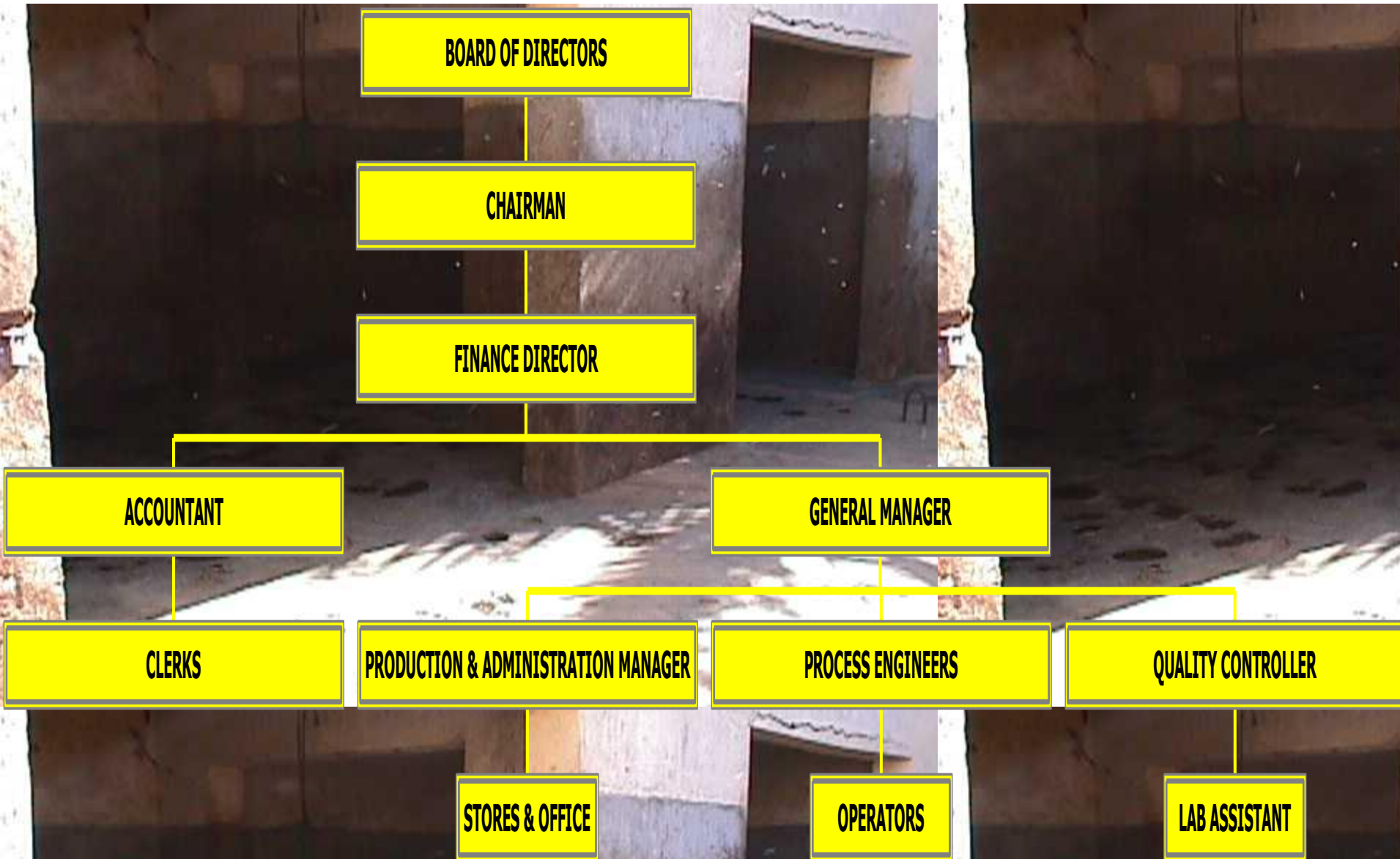
කර්මාන්ත ශාලාවකින්
ඉවතලන ද්‍රව්‍ය මෙසේ බැහැර

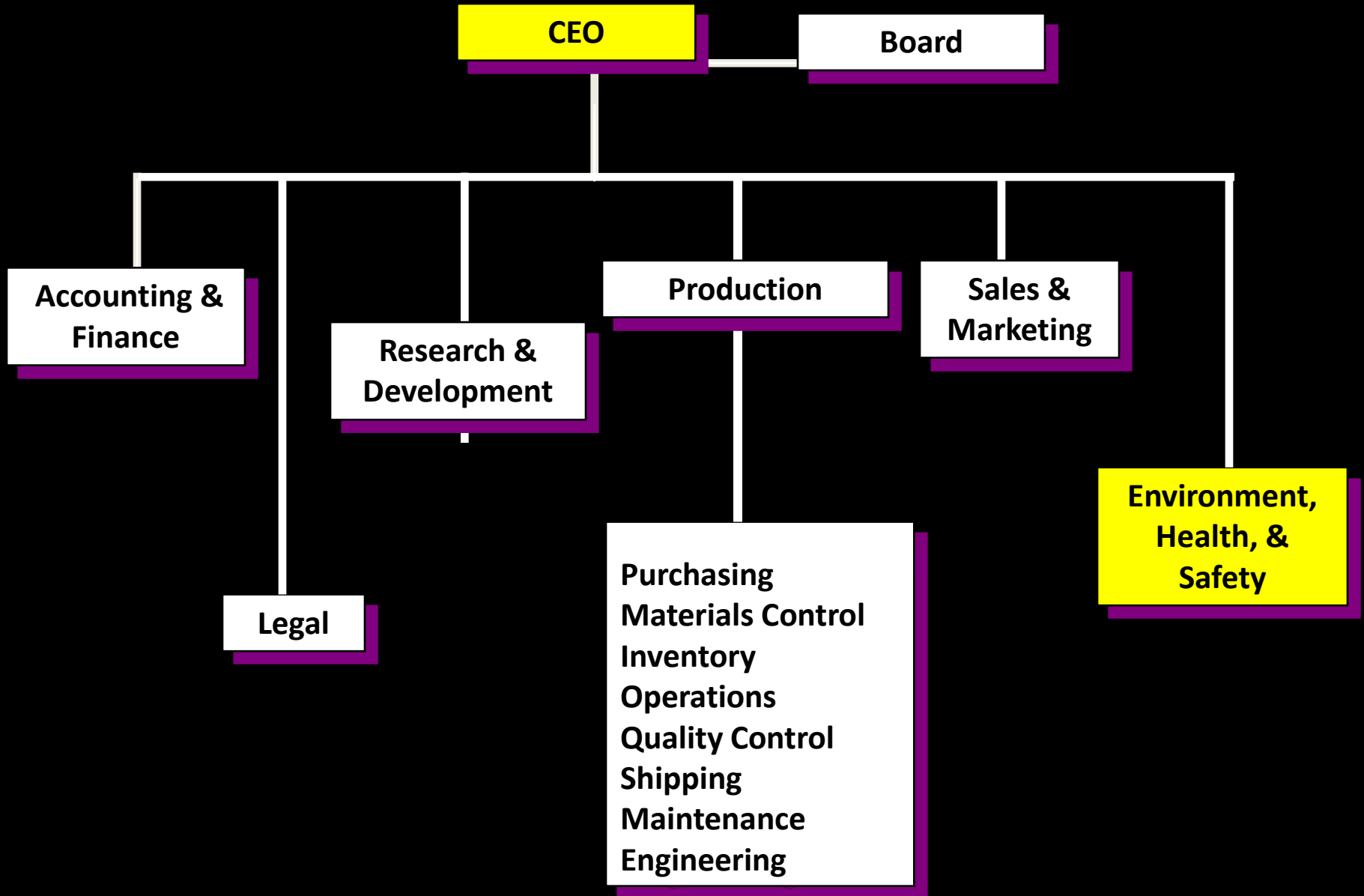
කරලීමට ගෙනැවිත් ඇති අවශ්‍ය නීතිමය පියවර ගන්නා
බවත් මේ සම්බන්ධයෙන් බවත් පුරපතිවරයා කීය.



Due Diligence & LC
Responsibility

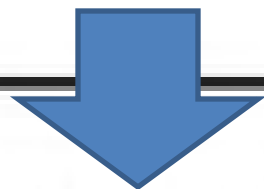
A Structural Failure !





Strategy sets the Structure

ISO 14000 - 12



Health and safety or environmental manager		Designation who is responsible for environment related activities	Certifications
	no	Ass. Manager(hr)	ISO 14001:2004,ISO 9001:2008,OHSAS 18001:2007
	no	ASS. Manager-maintenance and projects	ISO 14001:2004,ISO 9001:2008
yes		Environmental Health and safety executive	OHSAS 18001:2007
	no	Senior manager	ISO 14001:2004,ISO 9001:2008
	no	Senior maintenance manager	ISO 14001:2004,ISO 9001:2008
yes		Environmental health and safety officer	ISO 14001:2004,ISO 9001:2008
yes		Quality assurance and environment manager	ISO 14001:2004,ISO 9001:2008,OHSAS 18001:2007
	no	Director-Technical(MR)	ISO 14001:2004,ISO 9001:2008
yes		Quality environmental safety and health manager	ISO 14001:2004,ISO 9001:2008,OHSAS 18001:2007
yes		Health and safety consultant	ISO 14001:2004,ISO 9001:2008,(OHSAS 18001:2007-pending)
	no	Information and system administration manager	ISO 9001:2008
	no	Executive DUCX	ISO 9001:2008
	no	Senior manager production	ISO 9001:2000
	no	Production executive	ISO 14001:2004,ISO 9001:2008
	no	Manager quality assurance	ISO 14001:2004,ISO 9001:2008
	no	Maintenance executive	ISO 14001:2004,ISO 9001:2008



ඝන අපද්‍රව්‍ය කළමනාකරණය හඳුනා පාතික උපාය මාර්ගය



පාරිසරික සහ ස්වභාවික සම්පත් අමාත්‍යාංශය
"සම්පත් පාය" 82, රජමල්වත්ත පාර, බත්තරමුල්ල, ශ්‍රී ලංකාව

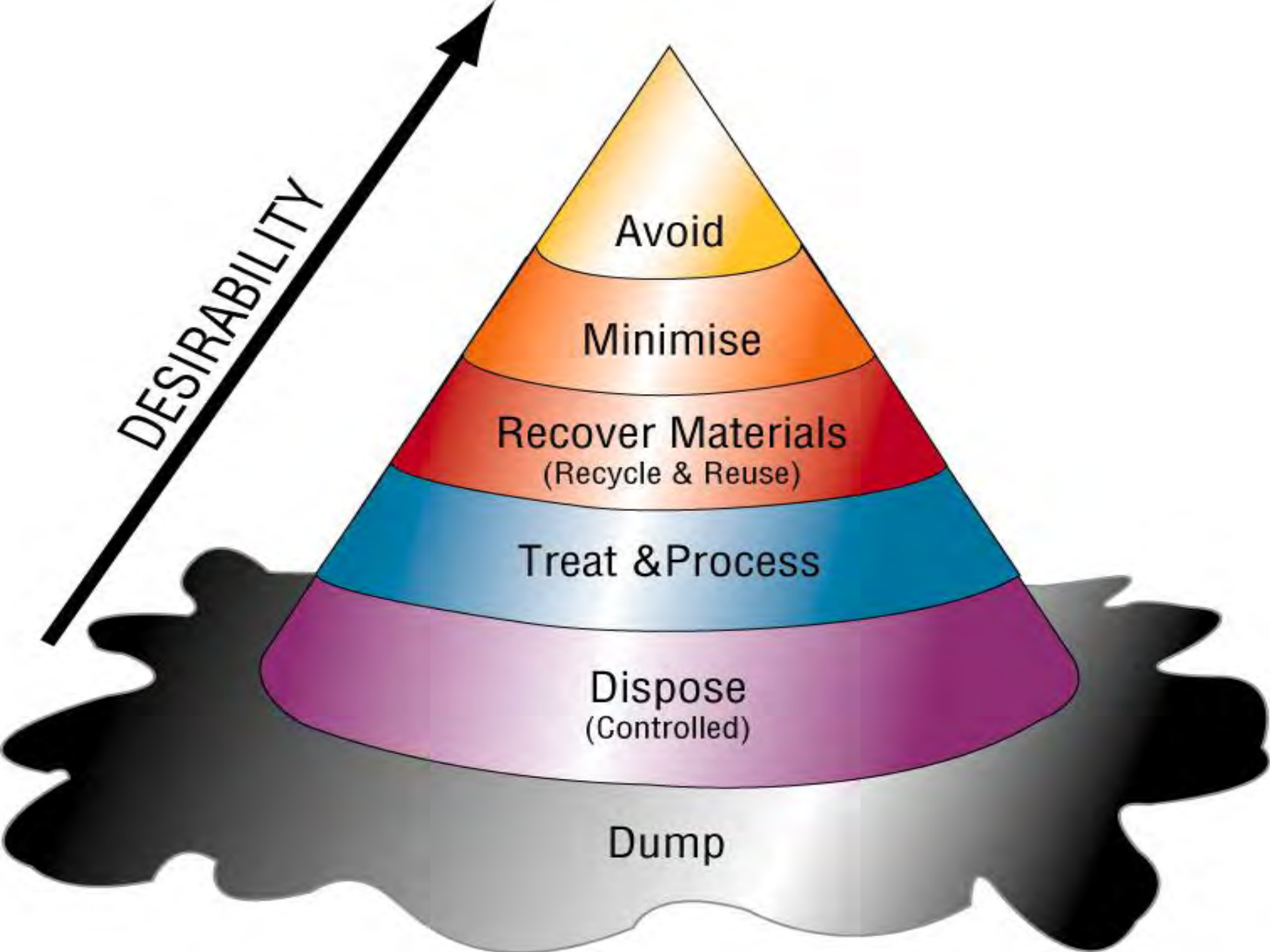
ශ්‍රී ලංකාවේ

ඝන අපද්‍රව්‍ය කළමනාකරණය
සඳහා තාක්ෂණික මාර්ගෝපදේශ



මධ්‍යම පරිසර අධිකාරිය
පාරිසරික හා ස්වභාවික සම්පත් අමාත්‍යාංශය
බත්තරමුල්ල.

2005 ජුනි



Concepts in Practice

3R

5R

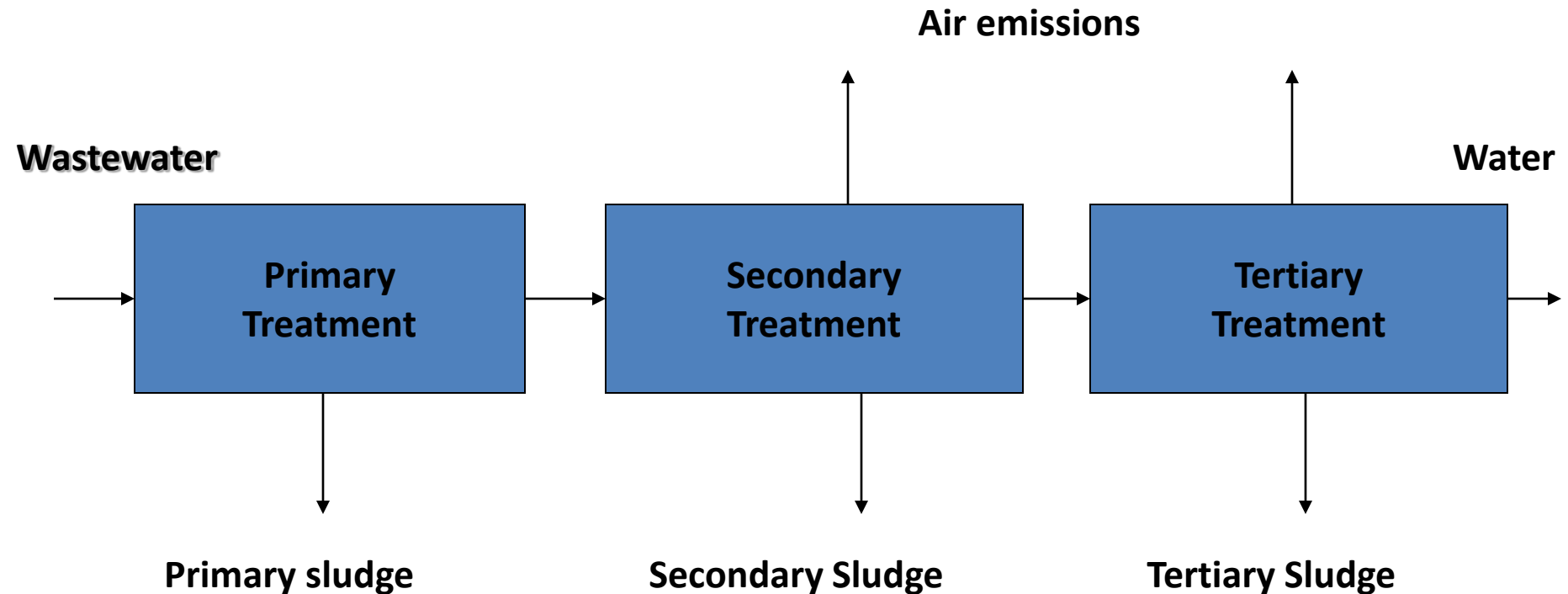
7R

SAINSBURY'S Pineapple & Coconut

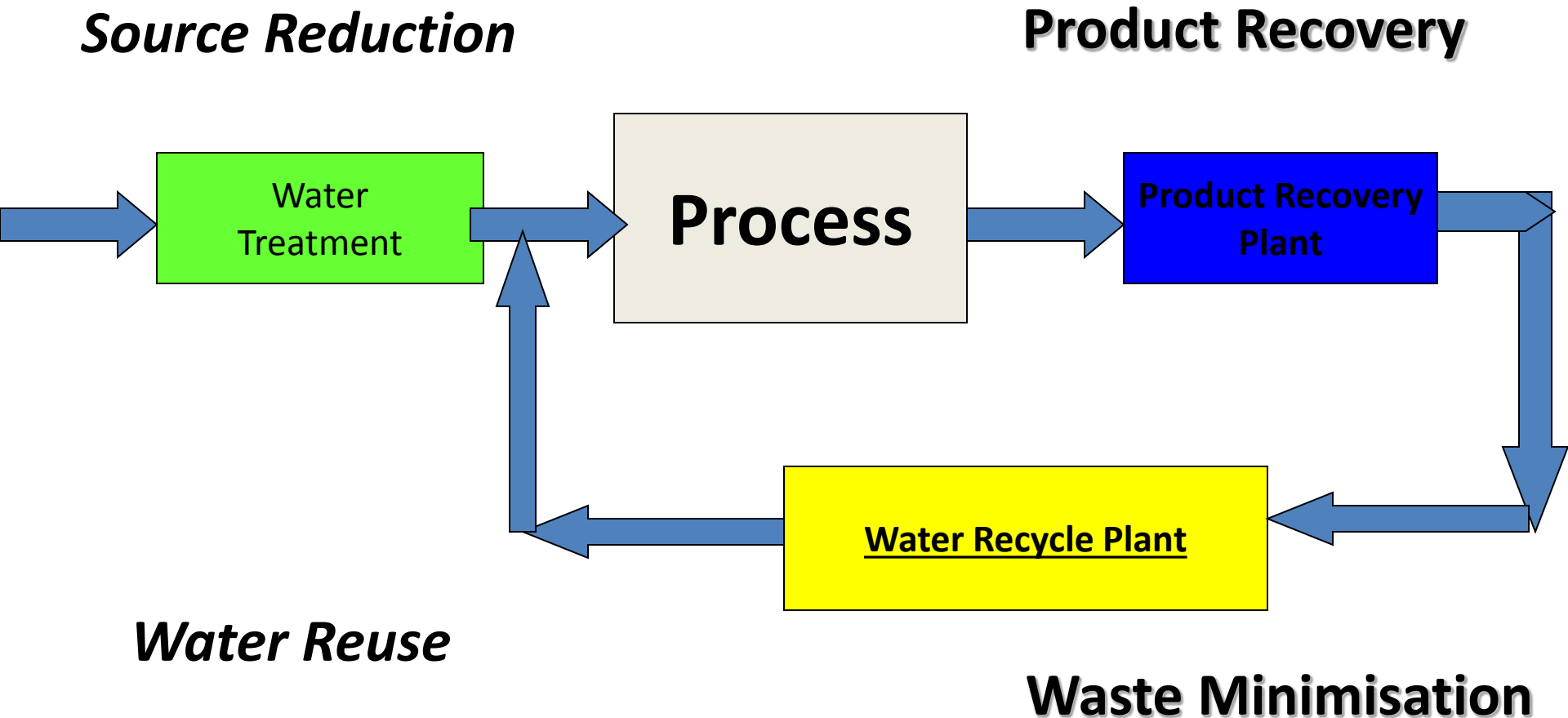
40%



Typical Wastewater Processing



Integrated Water Recycling Plant





අහසින් වැටෙන චතුරට කළමනාකරුවන් කුමට ද?

අනෙක් අයට හානියක් නොවන පරිදි තමන් අගය කරන ආකාරයේ ජීවිතයක් ගත කිරීමට මනුෂ්‍ය කොට්ඨාස වලට ඇති තේරුම් ගණිත (නේරාගත)

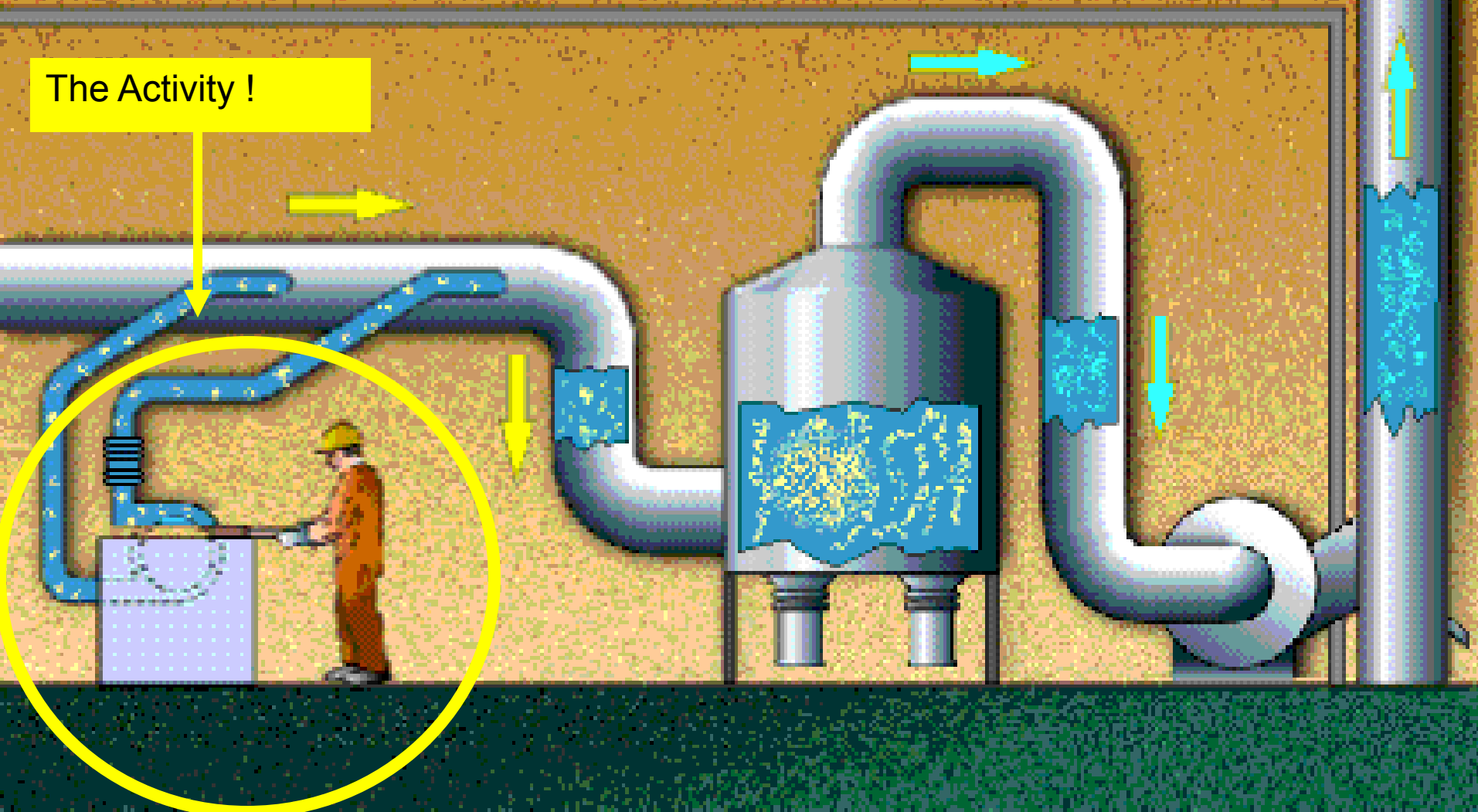
ජල කළමනාකරණය අරඹන තව තිහි රිති අවශ්‍ය බව දැනට පවතින තිහි රිති ප්‍රමාණවත් බවට ඇති මත ද මිට අයත් ය. ජල සම්පත පර්යේෂණය

1996 - වාර්තාගත වූ දරුණුම අසවහන ජලය උතුරා යාම.
කොට්ඨාස - බොලිවියාව



Air Pollution and Control

The Activity !



Proper Technology Must be utilised .

Barrel Burner



Open burning







In stone washing pebbles & silt gets mixed with Biological & chemical sludge in the sludge disposal process & goes to the dump sites.

- stone waste contributes 60% by volume of the total sludge generated in the treatment process.
- The mixture of sludge pollutes the soil and the leachate will pollute the ground water and surface water bodies.

Contaminated Primary Sludge



Fiber & Fabric Contaminated Brick



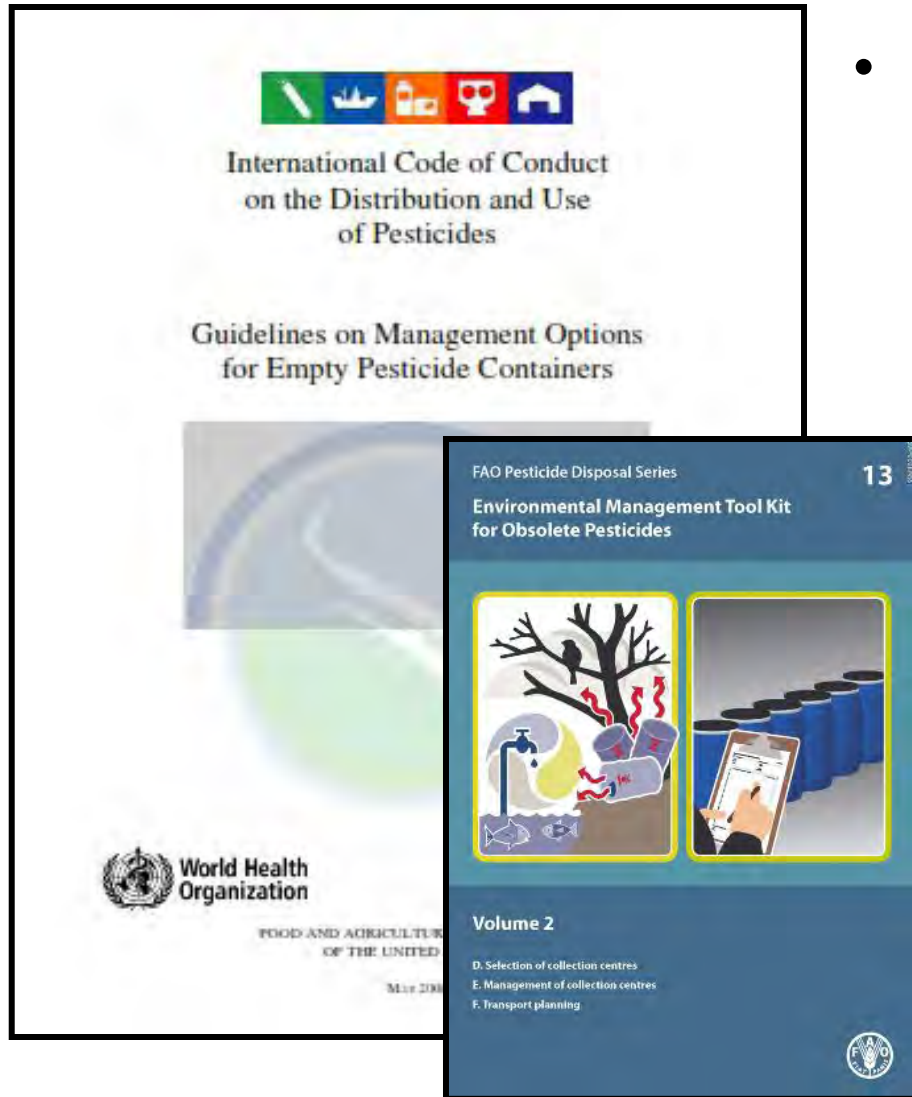
Developed Brick



Sludge brick wall



Use of Published Guidelines

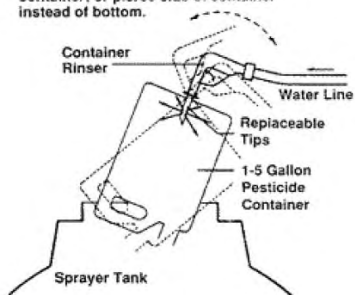


- FAO environmental management tool kits for National level management of obsolete pesticides
 - Vol I – inventory and prioritization of stores based on environmental risk
 - Vol II-selection and management of stores and collection centres and transportation

Containers – Big Demand !

- Empty pesticide container management

NOTE: Use "rocking", twisting or "wobbling" motion to make sure spray hits bottom of container; or pierce side of container instead of bottom.

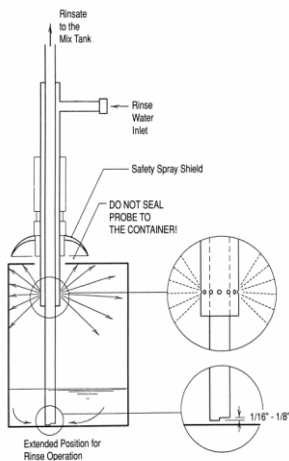


(Copyrighted by the North Dakota State University Agriculture and University Extension)



(Copyrighted by BayerCropScience)

Figure 5: Pressure rinsing in action

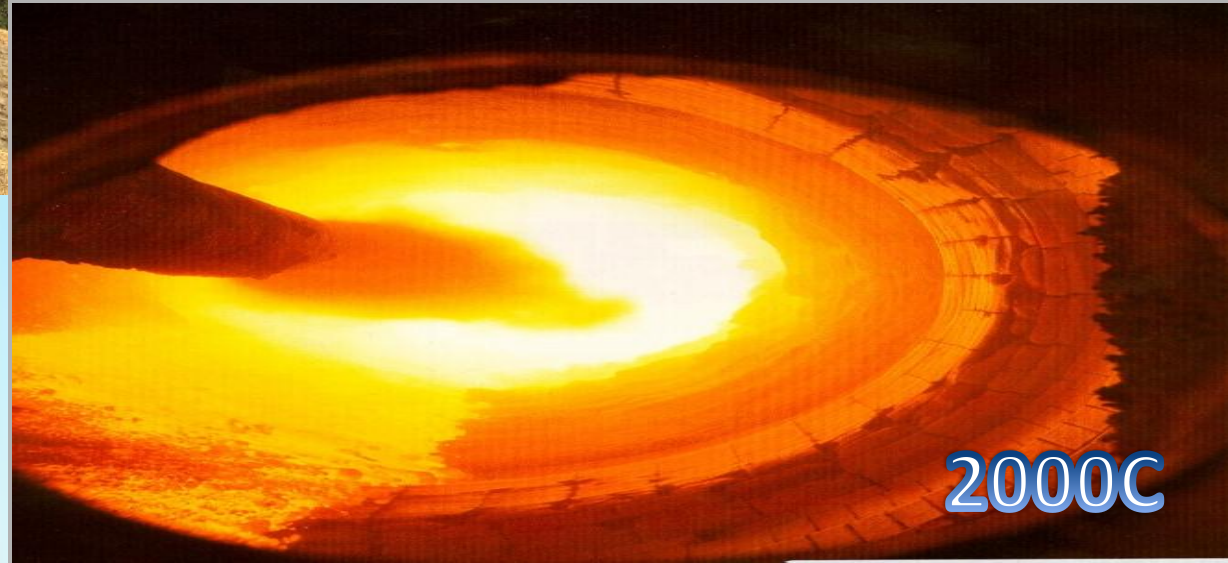


Active ingredient in 1 oz (28g) of liquid remaining in a 5 gallon (22.5L) container

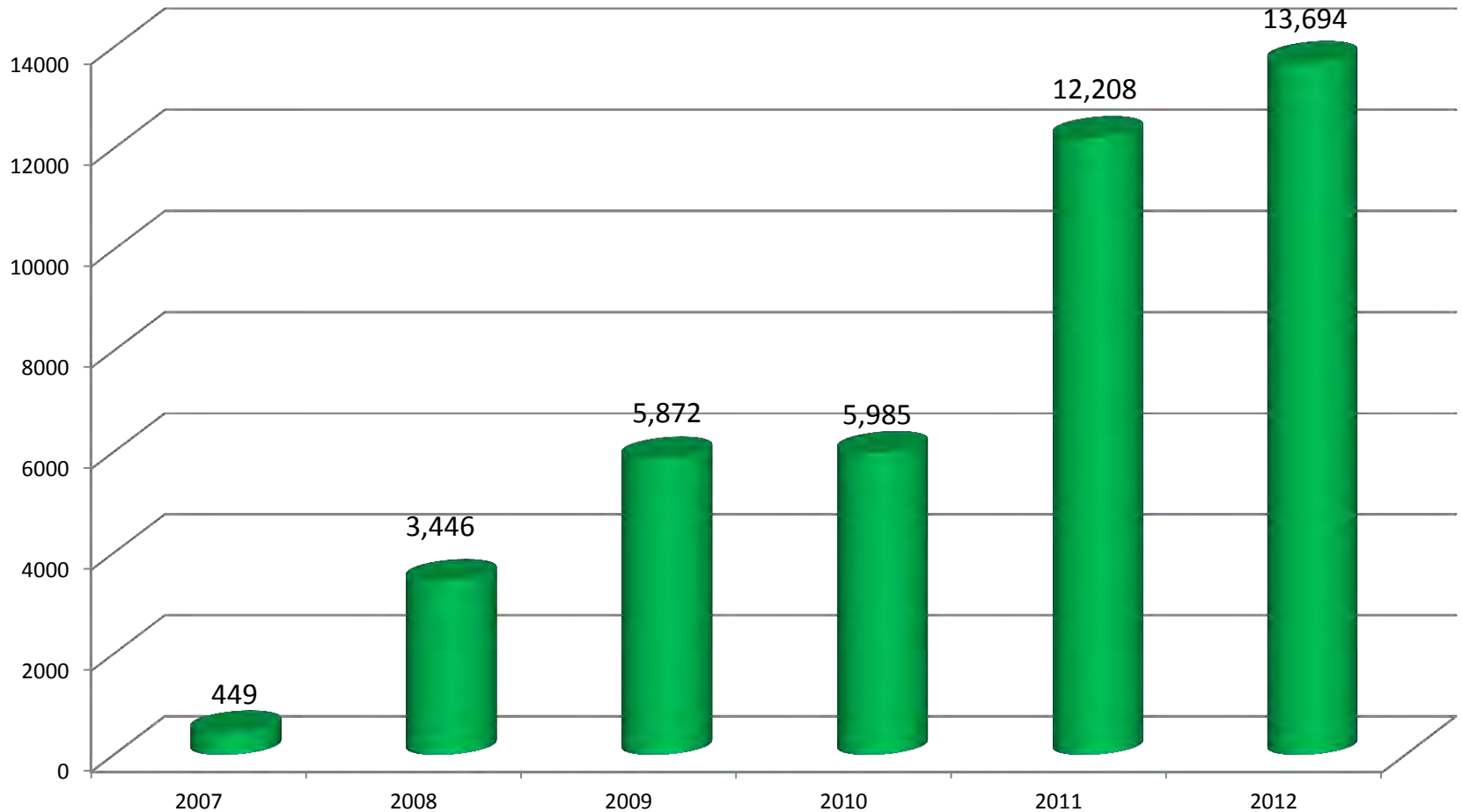
Rinsing stage	Pesticide residue	Percentage remaining
After draining	14.2 g	100.0%
After 1st rinse	0.2 g	1.4 %
After 2nd rinse	0.003 g	0.021 %
After 3rd rinse	0.00005 g	0.00035%

Triple rinsing

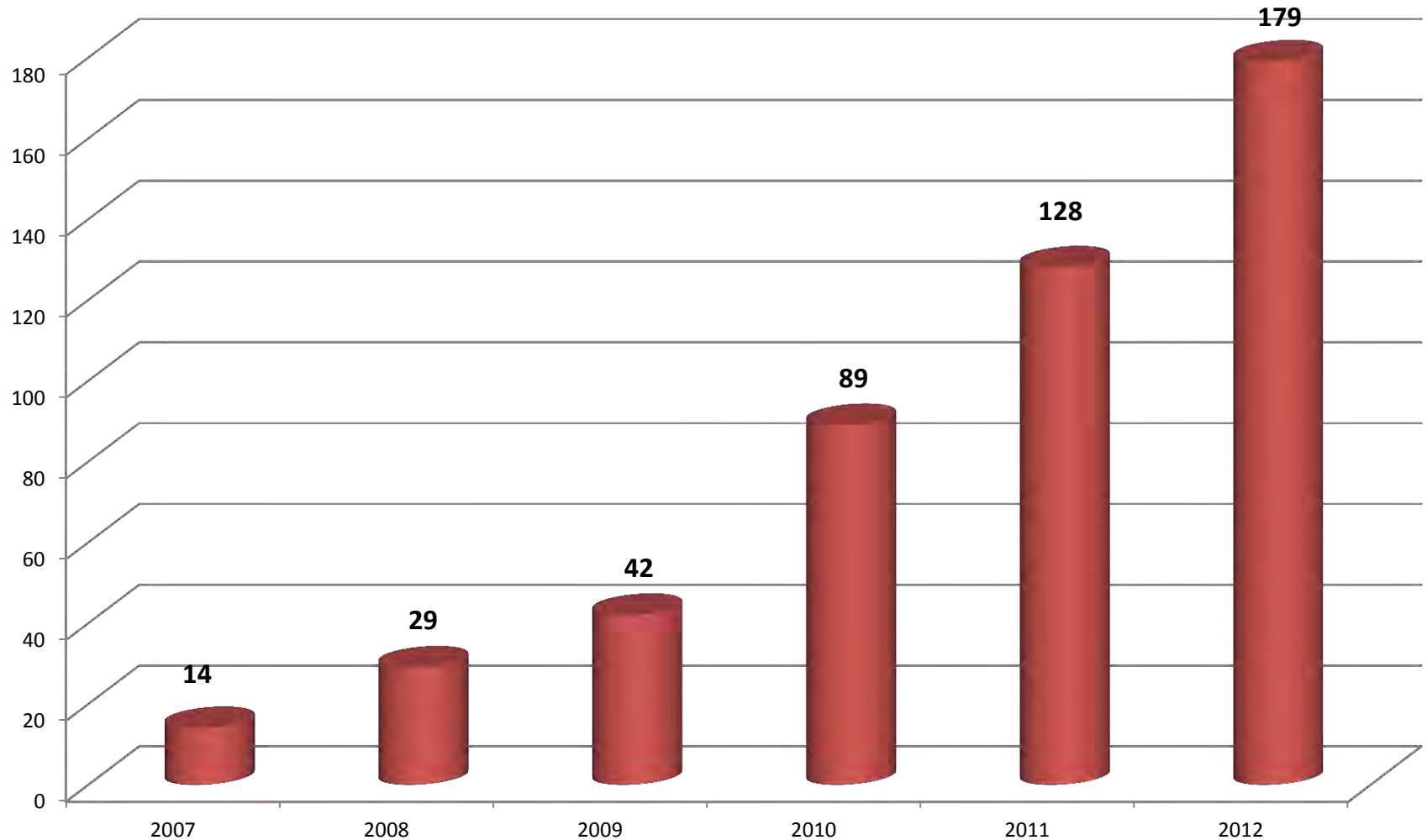
Cement Kilns as disposal option



Co-processed industrial waste volumes – @ Geocycle Holcim Lanka



Geocycle Waste Management



Mat Ex-SL

Sri Lanka Materials Exchange Programme

Waste - Problem?

අපද්‍රව්‍ය ප්‍රශ්නයක්ද?
නම්‍රිචු ඉරු පිරිස්සනෙයා?



Mat Ex-SL a Solution for
preventing Useable Material
from Becoming Waste

Enrol Today



Waste

Exchange

- Reluctance of industry – lack of pioneers
- Lack of enforcement
- Alternative options much convenient
- Organisational lethargy

National Cleaner Production Centre

- 143 Comprehensive CP Audits
- 240 Walk through audits
- 06 CP Award events
- 210 CP Auditors (100 CP auditors now in Sri Lanka!)
- Many programs to support industry





Ink waste



Thulhiriya Agalawatte Seeduwa



Jay Westerwald

Greenwashing Index

USING MY OWN SHEETS TWICE
THIRD TIME IS MORE COMFORTABLE
自己用过的被单第二次
第三次使用更舒适



CARING FOR OUR ENVIRONMENT

In our efforts to preserve the environment, we
can to minimise the use of washing detergents
that contribute to water pollution.

We would appreciate if you could:

place this card on your bed if you wish to have
your bed linen changed daily;

leave your towels or bathrobes by the edge of
the bathtub if you wish to have them replaced.
Hanging the towels or bathrobes on the towel
rack or hanger would be a good indication to
us that you wish to reuse them.

Thank you for helping us do our part for the
environment.



CONSERVE AND MAKE A DIFFERENCE
环保让生活更美好

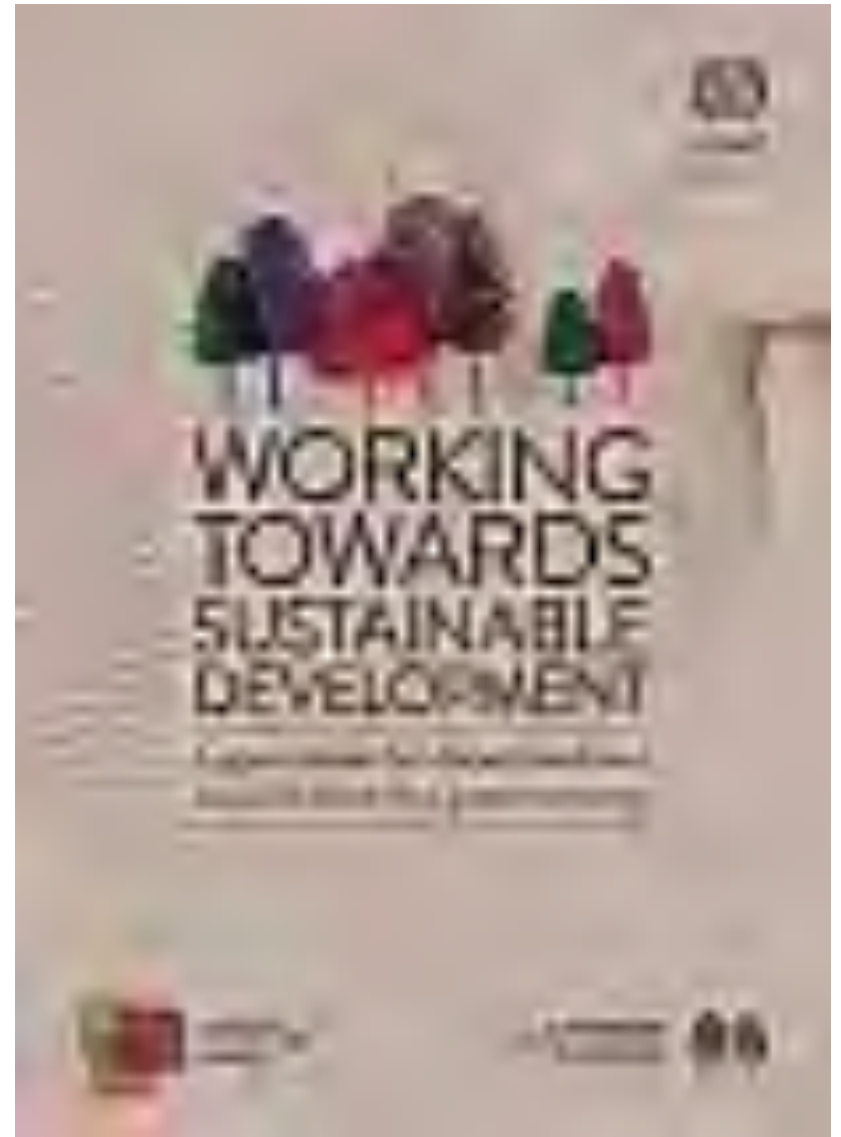
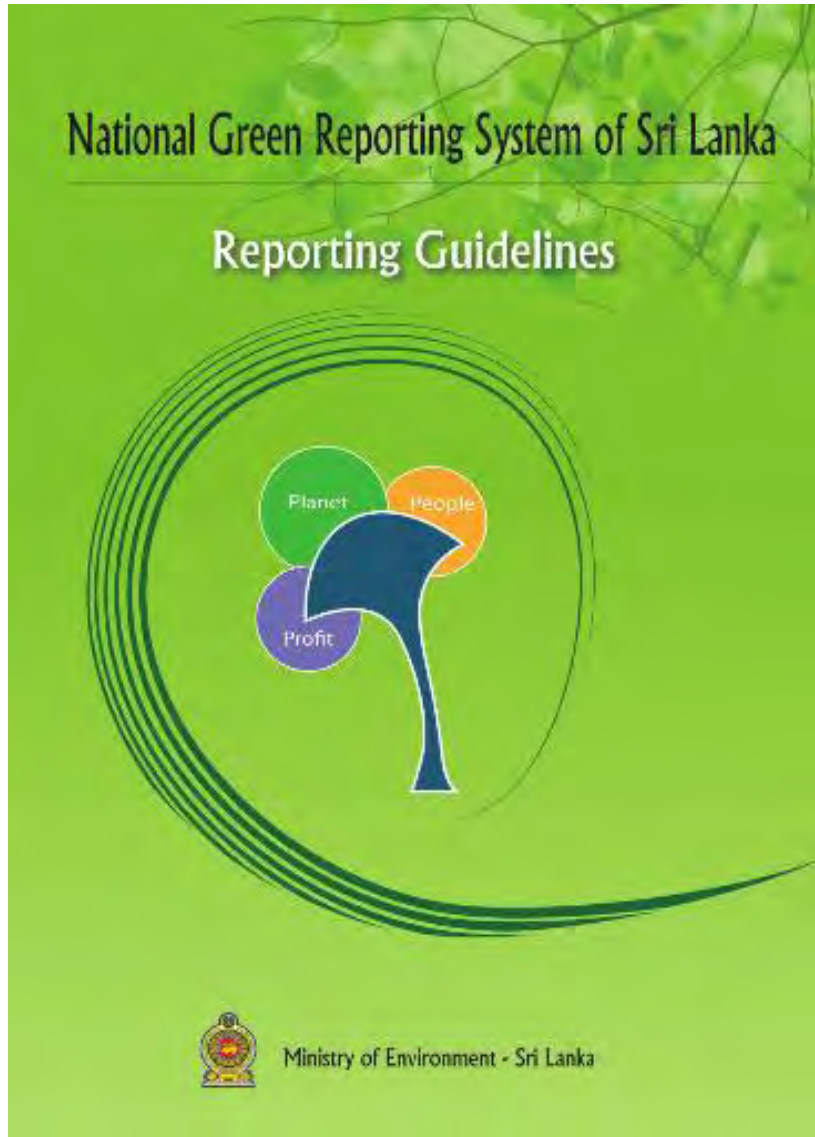
Dear Guest,

It is our pleasure to make your bed every day. Your linen will be
changed only when this card is placed on the bed in the morning.

用会污染水源

放在床边。

请将它们放在



Local to International..

Many schemes of recognition





UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

OVERVIEW OF INDUSTRIAL WASTE MANAGEMENT

Carlo Lupi

carlolupi@wasteandchemicals.eu

THE PRACTICAL MEANING OF “HAZARDOUS” WASTE.

- ◉ Operationally,
“Hazardous waste”
means waste which
have one or more
hazardous properties.
- ◉ Risk (of an unfavorable
event) = hazard x
probability
- ◉ Risk (of an unfavorable
event) = hazard x
intensity of exposure



WAY OF DISPOSING INDUSTRIAL HAZARDOUS WASTE

- ◎ Two ways for minimizing the risk associated with Hazardous Waste:
 1. Minimize the probability or the intensity of exposure for instance, by disposing the waste in sanitary landfills specifically designed to prevent release of toxic chemicals or direct contact of this waste with the environment
 2. Eliminate the hazardous properties (for instance, by destroying the hazardous chemicals contained in the waste, the case for instance of POPs containing waste)



THE BASEL CONVENTION DEFINES CRITERIA FOR WASTE CLASSIFICATION WORLDWIDE



The Basel Convention defines wastes “substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law”;

Hazardous waste are operationally defined based on waste category, originating source, and composition

THE CLASSIFICATION OF HAZARDOUS WASTE AND ITS RELATION WITH HAZARDOUS CHEMICALS

- ◉ The Basel convention lists 3 categories of hazardous characteristics of waste which are in some way related to the content of toxic chemicals:

- H6.1: Poisonous (Acute)
- H11: Toxic (Delayed or chronic)
- H12: Ecotoxic



BASEL CONVENTION - ANNEX I AND ANNEX VIII

- Annex I: categories of wastes to be controlled, and wastes having as constituents specific hazardous chemicals
- Annex III: list of hazardous characteristics



ANNEX III OF THE BASEL CONVENTION

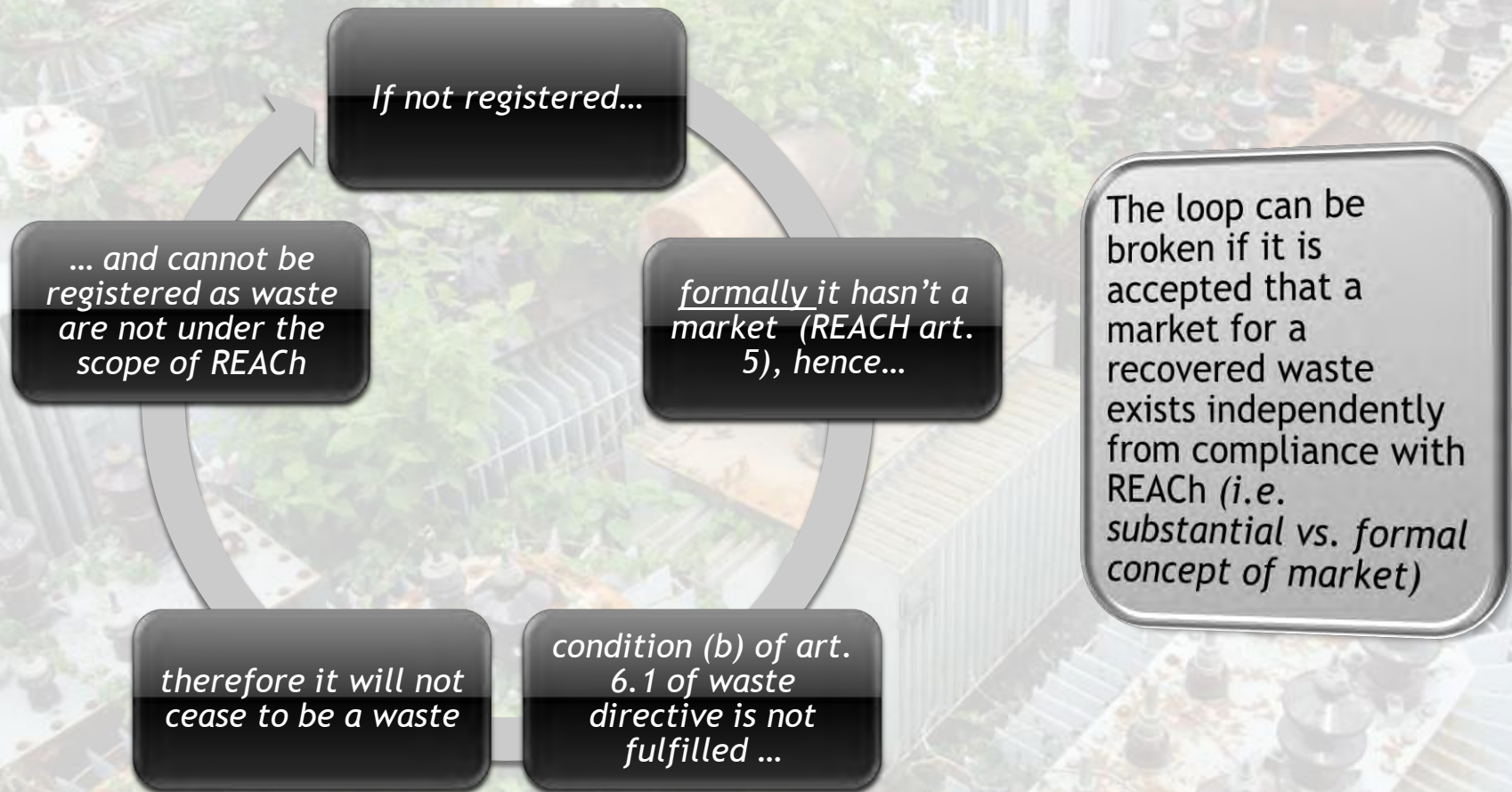
- ◉ H1 Explosive
- ◉ H3 Flammable liquids
- ◉ H4.1 Flammable solids
- ◉ H4.2 Substances or wastes liable to spontaneous
- ◉ H4.3 Substances or wastes which, in contact with water emit flammable gases
- ◉ H5.1 Oxidizing
- ◉ H5.2 Organic Peroxides
- ◉ H6.2 Infectious substances
- ◉ H8 Corrosives
- ◉ H10 Liberation of toxic gases in contact with air or water
- ◉ H12 Ecotoxic
- ◉ H13 Capable of yielding any another hazardous material

RECYCLING OF INDUSTRIAL WASTE: THE ISSUE OF “END OF WASTE”



- ⦿ Under the European regulation, a waste can only be managed within a well established system of storage, transportation and disposal
- ⦿ Currently, a system for certificating the “end of waste” status of a waste is being developed in Europe, either at UE or country level, however national legislation is still the main reference.
- ⦿ An EU regulation has been drafted for instance for regulating the end of waste of scrap metal.
- ⦿ Under certain conditions and quality criteria, therefore, waste may exit from the waste circuit and enter again the market of raw material
- ⦿ Once a waste exits from the waste circuit, an EOW has however to obey to different rules, like for instance, the registration under the REACH regulation.

A LOOP BETWEEN WASTE DIRECTIVE AND REACH



EUROPEAN LEGISLATION ON WASTE AND CHEMICALS

- ◉ Under the Directive 2008/98, are considered hazardous waste those displaying one or more of the hazardous properties listed in a specific annex (Annex III);
- ◉ The hazardous properties of a waste are attributed on the basis of the properties of the hazardous substance (classified on the basis of the regulation 1278/98 “CLP” contained therein
- ◉ The “European Waste List” (decision 2000/52) classifies as hazardous (in opposition to non-hazardous) the waste containing hazardous chemicals (the so-called “mirror codes”).

EUROPEAN LEGISLATION ON WASTE AND CHEMICALS - II.

- ◉ The Regulations and directives on hazardous chemicals and mixtures: Dangerous Substance Directive 67/548/EEC and the Dangerous Preparations Directive 1999/45/EC, which are being replaced by the Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP);
- ◉ The “Waste framework directive “ 2008/98, containing general rules on waste classification and management, and which includes the list of “hazardous properties”
- ◉ The “European Waste List” Decision 2000/532/EC of 3 May 2000, which contains the list of waste and the threshold concentration criteria for hazardous substances which, if contained in waste, trigger their classification as hazardous;
- ◉ The “POPs regulation” implementing the provisions of the Stockholm Convention;
- ◉ The “REACH regulation”, which does not apply to waste, but which regulates the registration obligation of waste which, once recovered, are not considered anymore waste but instead substance or mixtures; this regulation contain also restrictions which may apply to certain recovered waste streams.

WASTE AND THE STOCKHOLM CONVENTION

- Article 6.1 (d):
 1. high POPs content: to be irreversibly destroyed.
 2. low POPs content: disposed in an Environmentally Sound Manner

◎ What is Low or High POPs content?



STOCKHOLM AND BASEL CONVENTION AND WASTE DISPOSAL TECHNOLOGIES



Under the Basel Convention Guidance, the following provisional definitions for low POP content should be applied:

- PCBs: 50 mg/kg;
- PCDDs and PCDFs: 15 µg TEQ/kg;
- Aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, HCB, mirex and toxaphene: 50 mg/kg for each.

The Basel Convention Guidance on POPs containing waste does not establish yet what are the provisional definitions for low POPs content of the new POPs.

THE CONCEPT OF ENTROPY IN THE MANAGEMENT AND RECOVERY OF INDUSTRIAL HAZARDOUS WASTE

Industrial process producing hazardous waste is generally well known.

- (high level of information, low entropy)

In general, industrial hazardous waste may be segregated.

- (high level of organization, low entropy)

The producer of the industrial hazardous waste has the responsibility of the ESM disposal (traceability)

- high level of information and organization, low entropy)

Industries have the interest in reducing the use of hazardous chemicals, and the production of hazardous waste

- (Economic incentive for ensuring organization and preserving the information)

SOME KEY EXAMPLES



Recovery of industrial oil sludge



End of Life Tire recycling



Ship recycling



PCBs

REDUCING WASTE ENTROPY. AN EXAMPLE OF A POSSIBLE RECOVERY OF AN HAZARDOUS OIL SLUDGE

- ◉ A medium size aluminium laminating plant disposes yearly around 300 tons of a clay exhaust filter saturated with oil
- ◉ Due to the presence of spent oil (up to 60%), this waste is classified as hazardous waste under Basel and EU rules.
- ◉ The oil disposed with the waste costs around 150.000 €/Y
- ◉ The disposal cost is around 60000 €/Y

PROPOSED TECHNOLOGY FOR OIL RECOVERY

- High vacuum thermal extraction (oil recovery >99.5%) to be added to the industrial process.
- The recovered oil has high purity and can be recovered in the process.
- The oil never exits the process as a waste stream
- Clay is not anymore hazardous and can be reused as building material.
- Break even less than 3 years.
- Increased safety and job opportunities.



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

END OF LIFE TIRES



END OF LIFE TIRES

Transboundary transport as product	Yes
Transboundary transport as waste	Yes
Recyclable waste	Yes
Amount generated in some countries	20 millions tons/y world wide
Relevance of transboundary movement as a waste (Basel convention)	Not an HW
Recycling opportunities	High
Hazardous waste under BC or EU rules	No
Relevance to the Stockholm Convention	Yes (U-POPs in incineration)
Main contaminant of concern	PAH, Zn,
Subjected by regulation on hazardous chemicals	Yes (REACH, CLP)

GLOBAL FIGURES ON ELT PRODUCTION AND RECOVERY

Uses of tire granulate: energy recovery (calorific value similar to that of coal) playing fields, acoustic barriers, roads, rubber kerbstone or barriers, asphalt, etcetera.

According to ETRMA, around 20 millions tons of tires were produced in 2011 in the world

4.8 million tonnes in Europe

- 3.2 millions tons ELT
- 2.6 true ELT of which 95% recycled (energy recovery or granulate)
- 0.6 reused or rethreaded

1 millions of ELT produced in Russia - only 10% recovered.

ELT CLASSIFICATION

Under the Basel Convention criteria, ELT are not classified as “hazardous waste”

Furthermore, the European Catalog of Waste lists ELTs as “non hazardous waste “

Therefore ELT are not subjected to the Basel Convention rules concerning the transboundary movement of hazardous waste.

RELATIONSHIP OF ELT WITH REGULATION ON CHEMICALS

- ◎ Annex XVII of the REACH regulation: PAH in extender oil of new tires < 10 ppm (BaP < 1 ppm)
- ◎ A recent survey made by ETRMA showed that around 11% of the tires imported in Europe are illegal (i.e. contains PAH above 10 ppm)

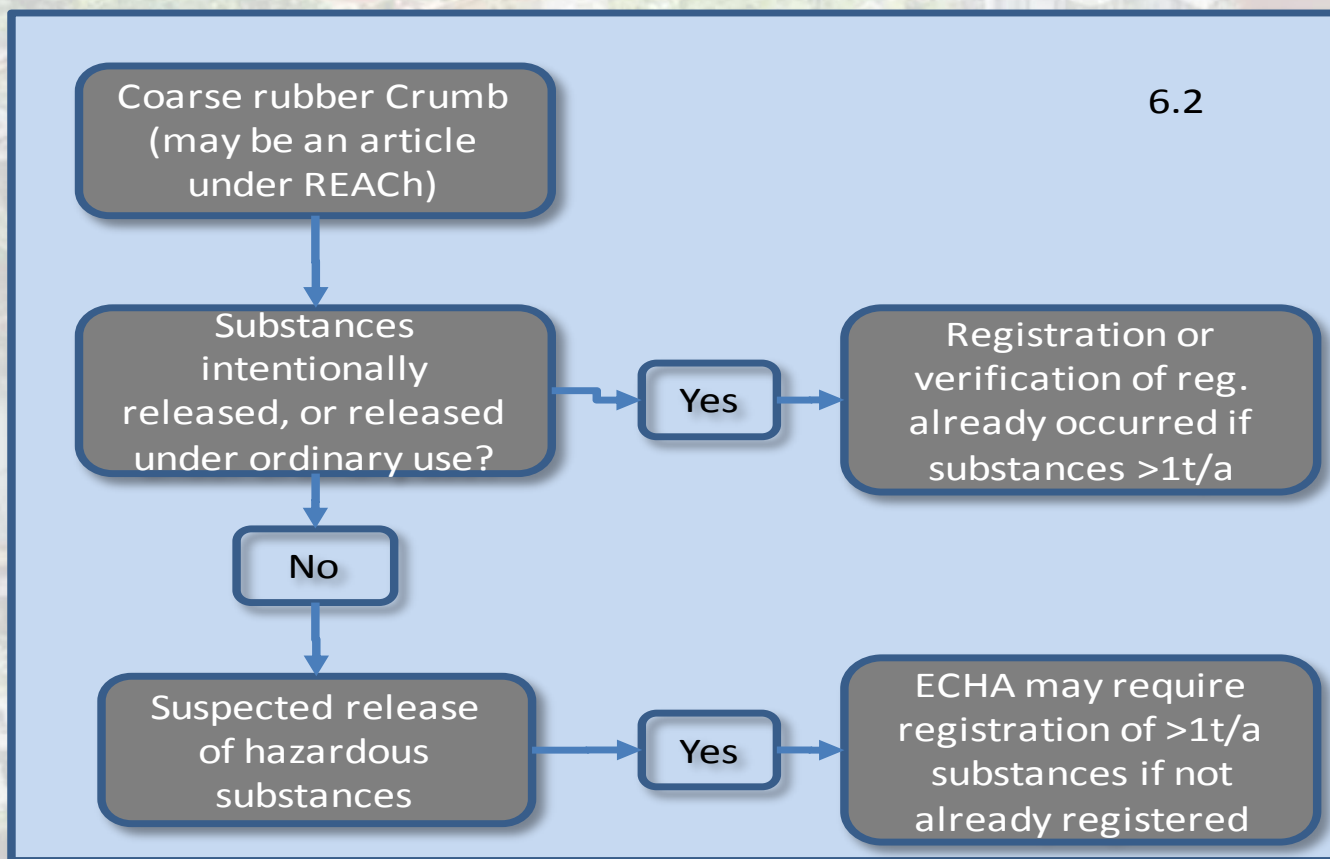
ELT AND THE ITALIAN LEGISLATION

The Italian legislation on EOW does not allow for the recovery of ELTs if these contain PAH above 10 ppm.

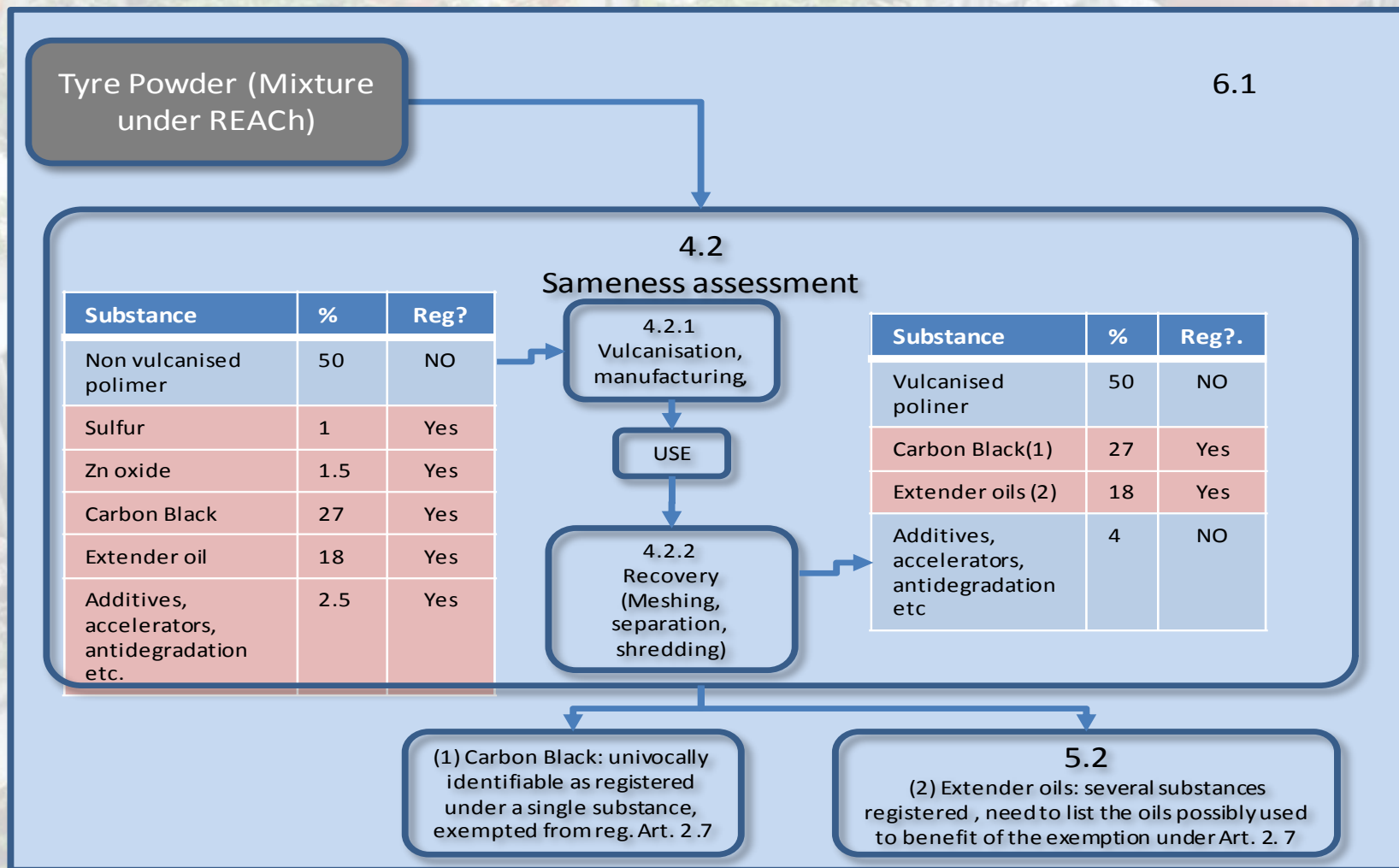
However ELT may be recycled under local permits which do not always include PAHs among the parameter to be controlled.

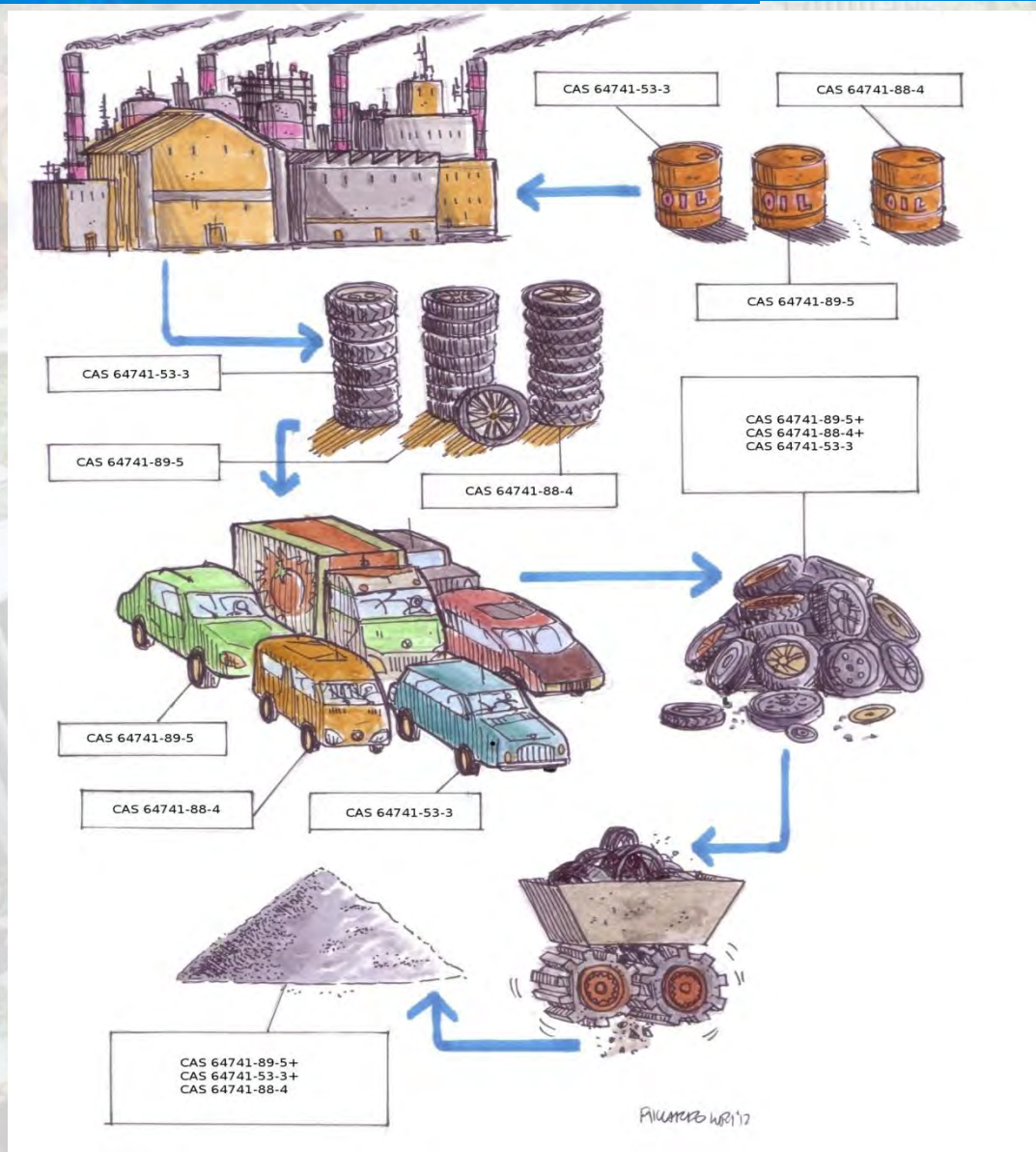
New legislation concerning very restrictive specific limits for PAH synthetic turf playing field was proposed by the Italian government, but not yet approved (need to follow REACH procedure)

EOW ARTICLES FROM ELT NEED TO BE REGISTERED UNDER REACH?



“SAMENESS” CRITERIA FOR EXEMPTION FROM REGISTRATION





THE ISSUE OF
EXTENDER OILS IN
THE ASSESSMENT
OF "SAMENESS"
FOR SUBSTANCES
RECOVERED FROM
ELT

NEEDS FOR IMPROVING THE ESM MANAGEMENT OF ELT

Ensure producer responsibility and facilitate collection and recycling champions;

Regulate clear and reasonable EOW rules covering the main markets and based on an holistic approach (an LCA assessment is always needed)

In Europe, clarify modality of registration (or exemption from registration) under REACH.

Promote the use of low PAH extender oil in the countries which are still using that

Ensure that extender oils do not contain any other hazardous substance



UNIDO AND ELT: THE RUSSIA CASE

On the 1-2nd of June in Moscow Conference “Contemporary Approaches to Rubber goods and Tires Recycling and Disposal”.

In the framework of the UNIDO/Russia project “BAT/BEP Centre for environmentally safe disposal of potentially hazardous consumer products and industrial wastes”.

According to experts about 1 million tons of tires is produced annually in Russia, and only less than 10 percent of this amount is collected and recycled.

The conference decided to appeal to the Ministry of Transport of the Russian Federation with operative proposals

- To start joint work with UNIDO and Association of Rubber Asphalt (USA) on the harmonization of the rules of Russian technical and design documentation for the application of waste rubber in road construction with international standards;
- To develop specialized independent laboratories for quality assessment of road materials derived from waste rubber in order to improve the roads quality;
- In conjunction with the representatives of the educational, scientific and contracting organizations to establish a working group to formulate proposals to the Government of the Russian federation to streamline the application of crumb rubber in road construction. .



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

SHIP RECYCLING



International Conference on Waste Management - Toward Waste Free Srilanka. Colombo 22 March 2013

SHIP RECYCLING

- ◉ “Beaching” as the most commercially successfully ship recycling modality
- ◉ Extremely unsafe from the point of view of Health and Environment (all the environmental and health costs are externalized)
- ◉ Currently occurs mainly in three places of the world (Bangladesh, India, Pakistan).



BASIC FACTS ON SHIP RECYCLING

Transboundary transport as product	Yes
Transboundary transport as waste	Yes
Recyclable waste	Yes
Amount generated in some countries	1.8 million tons yearly expected only from EU.
Relevance of transboundary movement as a waste (Basel convention)	High
Recycling opportunities	High
Hazardous waste under BC or EU rules	Yes
Relevance to the Stockholm Convention	Yes (PCBs, polybrominated compounds, incineration)
Main contaminant of concern	Asbestos, PCBs, antifouling, etc.
Subjected by regulation on hazardous chemicals	Yes (REACH, CLP)

WHEN A SHIP BECOME A WASTE?

- ◉ Ships are sailed by the ship-owners in the proximity of the “beaching” areas.
- ◉ Only once arrived there are sold by the ship-owners to the ship recyclers - either as ships or as end of life ships.
- ◉ Therefore, theoretically there is no transboundary transport of waste because the ships legally become waste only once they are sold to the ship-recyclers as end of life ships.
- ◉ The coming peak in ship recycling that will occur around the phasing-out date for single-hull tankers (2015) is expected to essentially benefit the most sub-standard facilities.
- ◉ The maximum yearly volume in the period 2012-2030 is estimated in 1,88 million LDT

SHIP RECYCLING AND INTERNATIONAL CONVENTIONS.

- ◎ The Basel Convention applies to ship recycling however it is regularly circumvented.
- ◎ The Hong Kong convention and IMO guidelines as operational solutions - however HK is not yet in force.
- ◎ Intense discussion whether the HK convention and the SC convention offer the same level of enforcement and protection for the environment.

SHIP RECYCLING AND THE STOCKHOLM CONVENTION.

- ◉ In the Bangladesh and Indian NIPs, inventory of PCBs also includes the PCBs produced in the course of ship dismantling, basically old PCBs containing transformers and oil contaminated by PCBs.
- ◉ Brominated flame retardants may also be present as contaminants in several part of the ships.
- ◉ Incineration of waste from ship recycling may generate PCDD/F if not properly conducted.



SHIP RECYCLING AND PROPOSED EU REGULATIONS

- ◉ To prevent, reduce or eliminate adverse effects on human health and the environment caused by the recycling, operation and maintenance of ships flying the flag of a Member State.
- ◉ Different mechanism are currently under evaluation:
 1. Extending the obligation (of having an inventory of hazardous substance and a dismantling plan) not only to EU ships, but also to ships calling for an EU port;
 2. Establishing a funding mechanism aimed at supporting the recycling facilities which are operating with sound environmental standards, to compensate the gap with “beaching” facilities
 3. Establishing an EU list of ship recycling facilities, not limited to EU but also including “non EU” ship recycling facilities which operate with sound environmental and health standards.
 4. The regulation also intend to go beyond the simple implementation of the SC in Europe.

NEEDS FOR IMPROVEMENT OF THE ESM OF HAZARDOUS WASTE COMING FROM THE SHIP RECYCLING

Would be “beaching ever capable to comply with ESM of waste? or this practice has to be banned?

Ensure protection of worker’s health at shipbreaking facilities.

Ensure proper traceability of waste generated, including the material which is readily recyclable.

Create a system of incentive and fines for ship-owners to promote ESM shipbreaking, avoiding at the same time the de-flagging.

Ensure onsite laboratories for the identification of POPs waste

Ensure availability of on site disposal facilities for the disposal of hazardous waste

UNIDO REGIONAL SHIPBREAKING PROJECT

Objective:

- Environmentally sound management and disposal of POPs and other hazardous wastes in ship breaking industry

Countries:

- Bangladesh, India, Philippines and PERSGA

Partners

- International Maritime Organization (IMO) and Regional Organization for Conservation of Environment of the Red Sea and Gulf of Aden (PERSGA); Ministries of Environment and Maritime Authorities in participating countries



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

POLYCHLORINATED BIPHENYLS (PCBS)



BASIC FACTS ON PCBS

Transboundary transport as product	No
Transboundary transport as waste	Yes*
Recyclable waste	No (oil after dechlorination may be reused)
Relevance of transboundary movement as a waste (Basel convention)	High
Recycling opportunities	No (only non EOL transf. with low contamination)
Hazardous waste under BC or EU rules	Yes
Relevance to the Stockholm Convention	Yes (PCBs, polybrominated compounds, incineration)
Main contaminant of concern	PCBs, PCDD/F (as the result of incineration)
Subjected by regulation on hazardous chemicals	Yes (CLP, GHS)

PCB BASIC FACTS

- PCBs are classified as probable human carcinogens and produce a wide spectrum of adverse effects in animals and humans, including reproductive toxicity, teratogenicity and immunotoxicity.
- They can be transported long distances and have been detected in the furthest corners of the globe, including places far from where they were manufactured or used. They have been detected in virtually all environmental media (indoor and outdoor, surface and ground water, soil and food).
- The production of PCBs and PCB equipment has been stopped in almost all the countries of the world within the eighties, in few cases within the first year of the nineties. Therefore PCB waste are only produced as the result of dismantling of obsolete PCB equipment
- The main PCB producers were the USA (from 1929 to 1971 Monsanto produced around 310,000 tons), Russia (around 180.000 tons), Germany (76.000 tons), UK (66000 tons) France, Italy (27.000 tons).

PCB INVENTORIES

- ⦿ In several SC signatory countries, regulatory tools for inventory of PCBs are not yet in place.
- ⦿ Low awareness of the PCB issue caused improper “scrapping” of PCB contaminated equipment, cross contamination, reuse of PCB contaminated oil.
- ⦿ In these countries, securing PCB waste for future ESM disposal is one of the most important task

PCB DISPOSAL : PROS AND CONS OF DEHALOGENATION TECHNOLOGIES

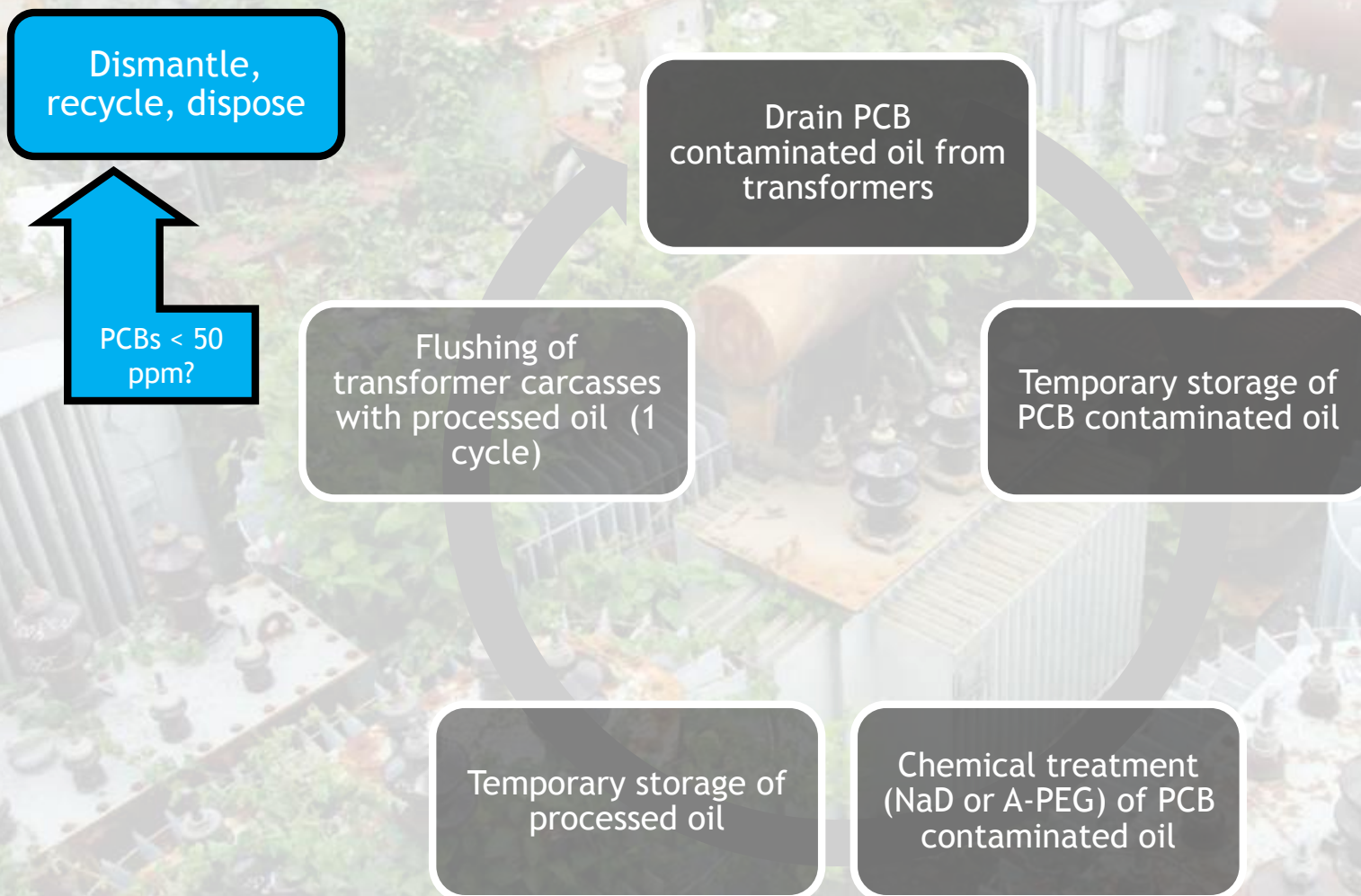
Pros:

- Allow the reuse of the decontaminated oil (4USD/Kg)
- No dioxin emission due to the low temperature and non-combustion process
- Equipment are less expensive than incinerators

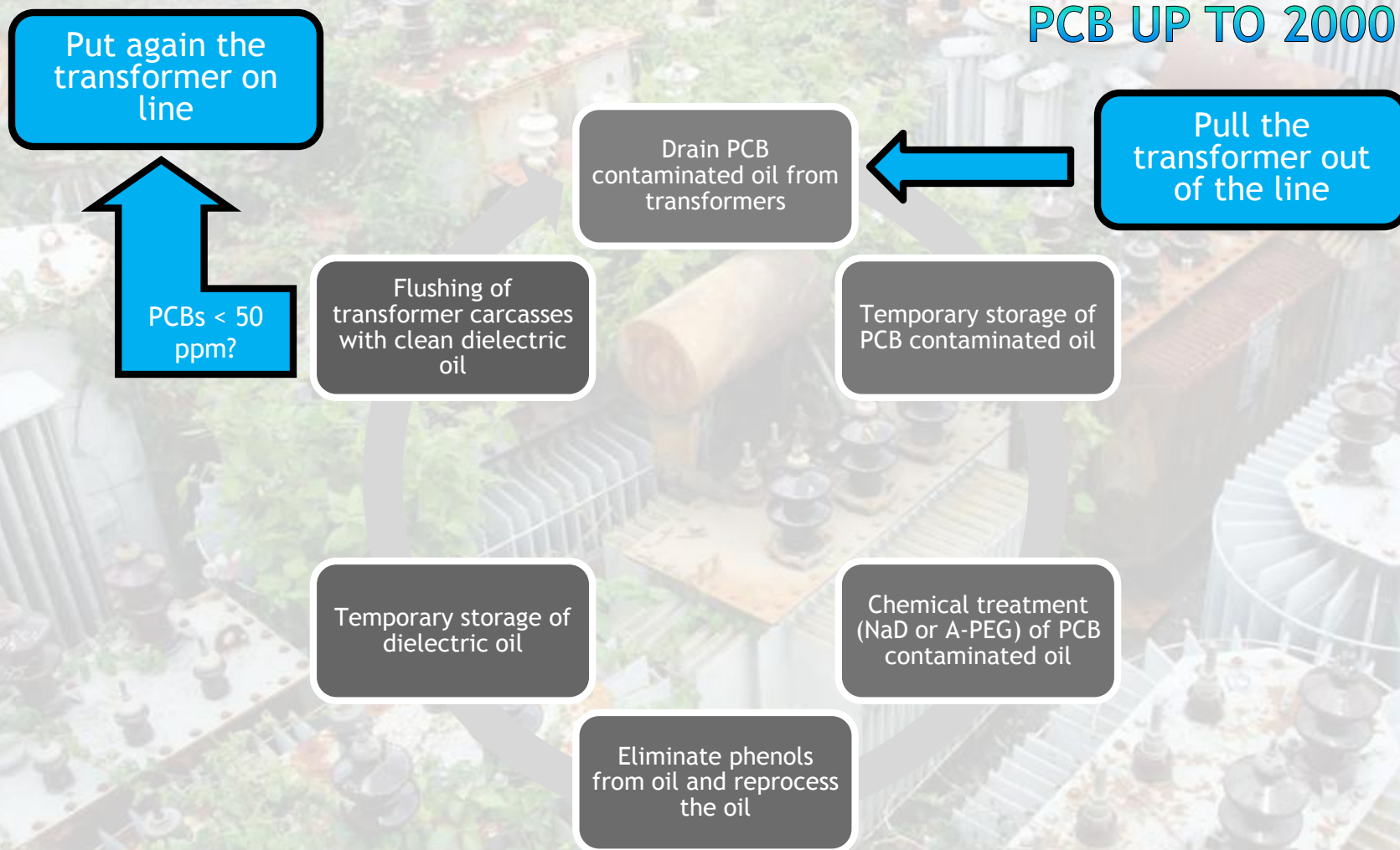
Cons:

- Economically feasible in a narrow range of PCB concentration (not higher than 10000 ppm)
- Cost strictly related to the market price of Metallic sodium or A-PEG reagents
- Metallic sodium react violently with water

OPTION 1: PHASED OUT TRANSFORMERS, PCB UP TO 2000 PPM



OPTION 2: IN USE TRANSFORMERS, PCB UP TO 2000 PPM



PCB “PACK AND TREAT”

This technology involves sending the PCBs contaminated oil drained out from the transformers, and the porous material of phased out transformers, to already existing disposal facilities.

It requires a storage facility for draining, flushing and dismantling phased out transformers, and for flushing and retrofilling in-use transformers

It may rely on the great capacity of disposal facilities located in some countries which perform thermal destruction of PCBs in compliance with SC BAT / BEP

In case of low PCBs concentration, thermal disposal cost may be low because it may take advantage of the calorific content of the oil.

PACKAGING





INCINERATION IN ROTARY KILNS





CEMENT KILNS



NEEDS OF IMPROVEMENT IN THE ESM OF PCBs

The first and mandatory aspect is to ensure PCB inventory, labeling and tracing.

Inventory must not be limited to pure PCBs equipment but must include low PCBs equipment (analysis based on statistical criteria).

Establishes since the very beginning clear rules (incentives and punishments) to avoid improper disposal or hiding of PCBs.

Ensure proper storage of PCBs pending decontamination or disposal.

Make sound and realistic management PCBs plan based on inventories.

UNIDO ACTIVITIES ON PCBS

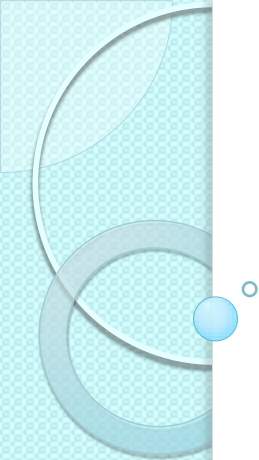
- ◉ Unido is implementing or has approved GEF projects related to the Environmentally Sound Disposal of PCBs in several country of the world.
- ◉ Romania, Macedonia, Armenia, India, Morocco, Indonesia, Lao PDR, Russian Federation, Ukraine, Azerbaijan, Algeria, Mongolia, Nepal, Peru, Bangladesh, Serbia
- ◉ PCBs projects are usually based on: upgrade of national legislations; capacity building; inventory; deployments and demonstration of PCB disposal technologies.
- ◉ Overall budget of approved projects is almost 60 M USD

GEF OPPORTUNITIES ON HAZARDOUS WASTE MANAGEMENT

- ◉ There is the need to approach the issue of hazardous substances in waste in a more integrated way
- ◉ GEF 5: *“actions taken to enhance coordination and cooperation should be aimed at strengthening implementation of the three conventions at the national, regional and global levels, promoting coherent policy guidance, enhancing efficiency in the provision of support to Parties [...]”* and invite the GEF, *“within its mandate, [...] to carry out projects aimed at cooperation and coordination in support of implementation of the three conventions[...].”*

PHASE OUT POPS AND REDUCE POPS RELEASES IN GEF CHEMICAL STRATEGY OBJECTIVE I. OUTCOMES

- ◉ (a) Production and use of controlled POPs chemicals phased out;
- ◉ (b) Exempted POPs chemicals used in an environmentally sound manner;
- ◉ (c) POPs releases to the environment reduced;
- ◉ (d) POPs waste prevented, managed, and disposed of, and POPs contaminated sites managed in an environmentally sound manner; and
- ◉ (e) Country capacity built to effectively phase out and reduce releases of POPs.



International Waste Management Conference

Financing Facilitation for Industrial Waste Management

Rita O'Sullivan
Country Director, Sri Lanka
Asian Development Bank
22nd March 2013



TERMINOLOGY

- Industrial waste can be defined as waste produced by industrial activity and will include chemical, toxic, hazardous and organic waste including waste water.
- In a Sri Lankan context, it will include waste generated from mining and quarrying, gem mining, manufacturing, processing (tea, rubber coconut), factory industries (textile, apparel and leather) and cottage industries.
- Waste produced from electricity, gas water and constructions is also covered under Industrial waste

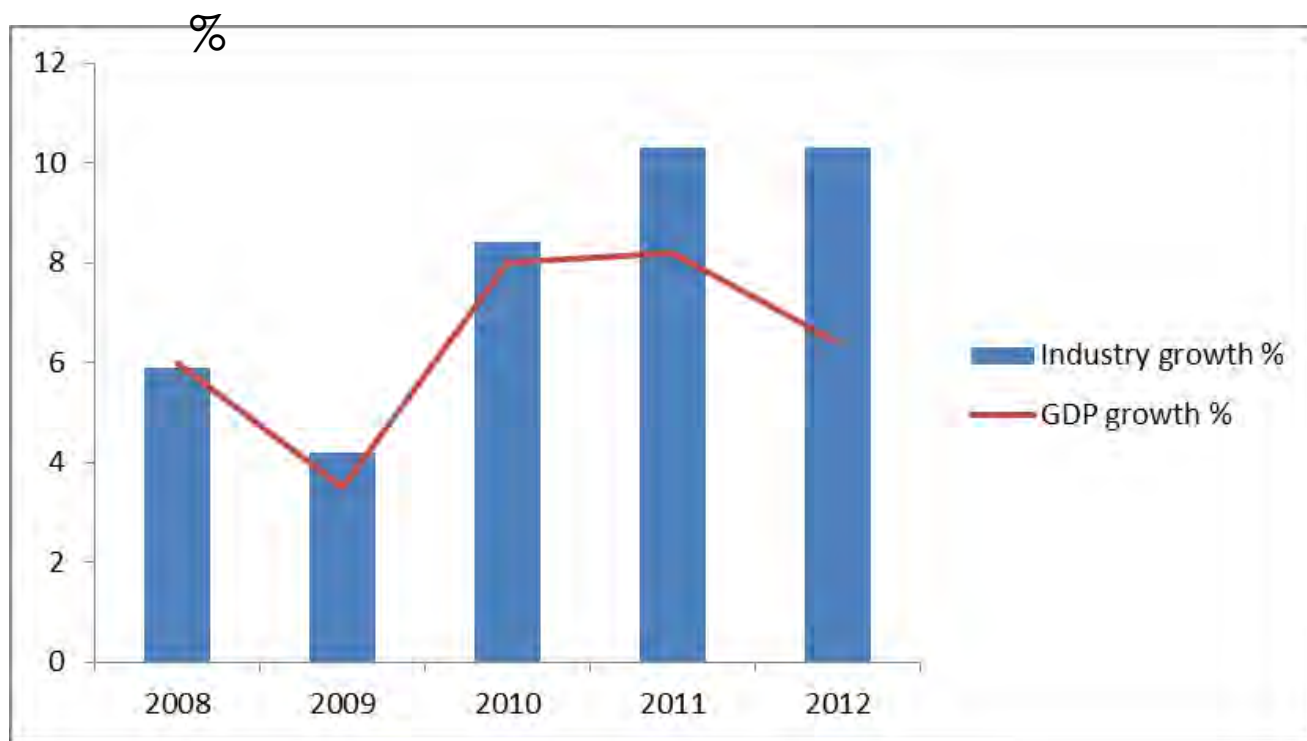


WHY WORRY ABOUT INDUSTRIAL WASTE?

- Without proper management, industrial waste could erode the achievements of decades of economic growth; and affect people's health and welfare, and environmental quality.
- Governments are responsible for industrial waste management and monitoring, in order to reduce environmental risks of illegal dumping of industrial waste, particularly the hazardous waste.
- The annual average gap in financing of solid waste management with reference to **capital investment requirements** is estimated at around \$200M, increasing to around \$250M by 2016.

GROWTH IN INDUSTRIAL WASTE

Sri Lanka's GDP growth and Industrial Sector contribution



THERE IS MONEY IN WASTE

- Population growth, rising income and urbanization all contribute to rising problem of solid waste management
- In Sri Lanka, only 30-40 percent of solid waste is being collected
- There is significant variation between rural and urban waste collection rates (estimated at 10% - 70%)
- South Asia is estimated to have a potential to produce around 8 million tones of compost, or 3,340 million kilo-watt hours / year of electricity with a market value of around \$701 million per annum
- Carbon financing could also generate up to \$218 million per annum in reduced GHG emissions

ON PRIVATE SECTOR RESPONSE

- The private participation can significantly reduce costs and enhance service delivery
- Private sector expertise can also be leveraged under Public Private Partnerships (PPP)
- Concessions and incentives can make the environment attractive for the private sector to enter
- Specific measures can include;
 - Grants
 - Advertisement rights for waste management centers
 - Unit cost payments for collection / transport
 - Making land available for disposal
 - Buy-back approaches to composting
 - Tax holidays
 - Carbon credits

Solid Waste Management

Sustainable Consumption

Waste Management

Zero Waste City

**Waste Treatment Technology:
Waste 2 Energy**



Manual MRF in an urban area



Semi-automated MRF in operation





Baled tin cans from a manual MRF



Manual MRF in an urban area



Semi-automated MRF in operation



Reduce

Reuse

Recycle

What is the Role of ADB?

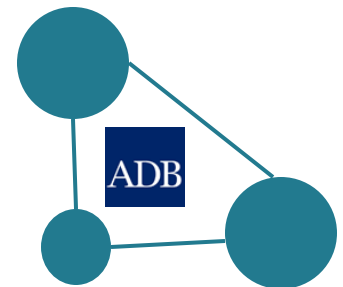
In context of \$100 b/yr funding gap

- ◆ ADB is a \$15 b/yr AAA+ rated bank
 - ◆ The 2013 urban pipeline is approximately \$3.5 billion
 - ◆ But we have limited the bulk of assistance to grants to prepare projects funded by sovereign loans
- ◆ We need
 - ◆ Partners to leverage our money – which requires better Project structuring systems to include;
 - ◎ Community, Sub-sovereign government and the Private Sector co-finance
 - ◎ Capacity to integrate knowledge and good practice into project designs
 - ◎ While preserving AAA rating

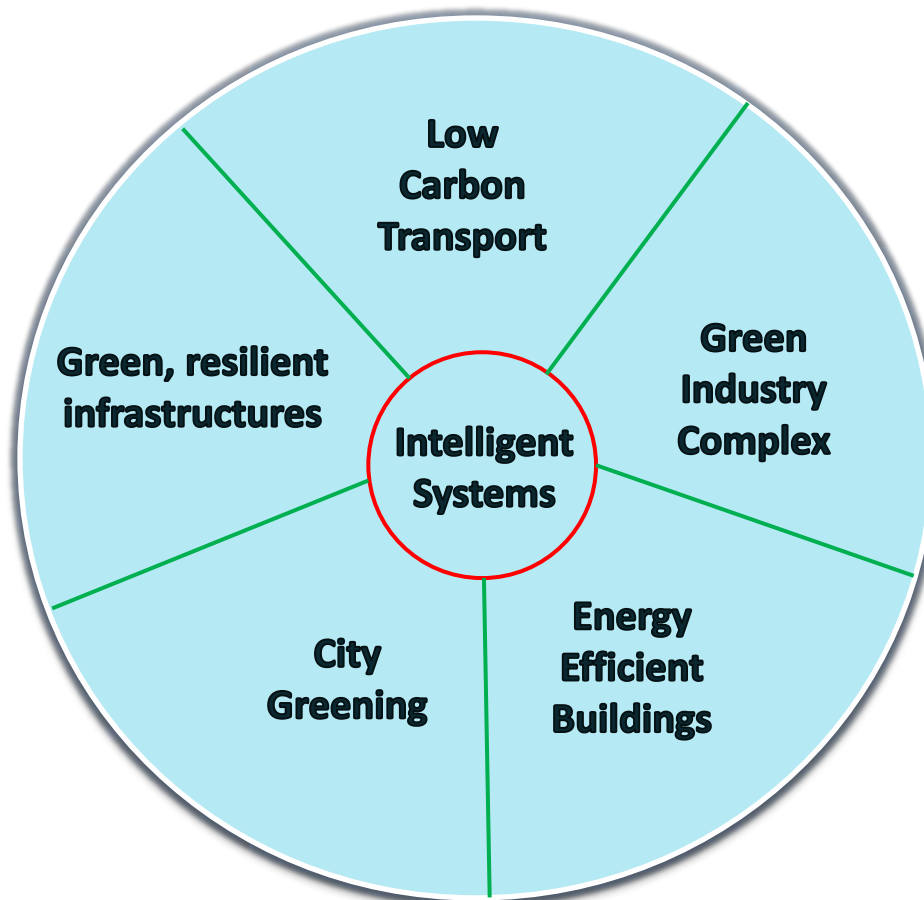
ADB's Response under Strategy 2020

Urban Operations Plan - addressing the core issues

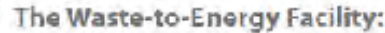
- ◆ Continuing focus on regional public goods - poverty reduction and environment
- ◆ Planning and financing integrated investments in infrastructure for
 - ◆ Inclusive economic development
 - ◆ Pro-poor interventions in basic infrastructure and slum upgrading
 - ◆ Infrastructure for local environmental improvement and GHG reduction



Investment for Green Cities



ADB



ADB

ADB's Financing Principles

- ◆ **Need to address BOTH supply and demand sides**
- ◆ **At sub-sovereign level**
- ◆ **Supply side – how to generate pipeline? how do we fund sub-sovereign governments? how do we collaborate with private sector finance? How do we leverage institutional money?**
- ◆ **Demand side – what is affordability? possible cost recovery mechanisms? Sustainable tariffs? Subsidies (and targeting)?**



Green Finance – Demand Side

1) Maximize conventional finance

- **User Charges.** Utility resources are charged for at the full cost of usage, which includes the cost of providing supply, including externality costs.
- **Emission (Effluent) Charges.** For maintaining the environment itself and are in addition to user charges for the public service provided by government or industry.
- **Tradable Rights/ Marketable Permits/ Deposit Refund Systems.**

2) Then look to leverage private sector

- Identify and unbundle potentially profitable investments

3) Then seek specialist green financing

- **CDM**
- **ADB Funds**
- **GEF**
- **CIF**
- **Export credit for new green tech**

The Supply Side – Asian Capital Markets and Green Cities

Asia's capital markets are highly liquid, but short term:

- **Asia has high levels of savings, banks and other financial institutions have money, BUT investments tend to be short term**
- **With no clear regulatory structure – high transaction costs**
- **Limited mechanisms to encourage institutions holding long term funds, such as pension funds and life insurance companies, to invest in infrastructure**
- **Lack of mechanisms for public sector debt finance and for public/ private Special Purpose Vehicles**
- **Issues of inter-jurisdictional coordination make project formulation and structuring difficult**

Developed country pension funds and life insurance companies are highly liquid and seek long term investments, BUT they are highly risk averse and have unrealistic expectations of returns

Some intensive effort is needed to structure projects for capital market participation

- **Need for project development resources**

Supply Side – International Transfers

Aid



Reducing to Asia

IFIs



Need to switch role to
catalyst and leveraging
local/private finance

Transfers



Clean Development Mechanism

Nationally Approved Mitigation Action

Constraints to Effective Finance

Enabling Policy

- ⇒ local/sub-sovereign, inter-governmental fiscal transfers capacity in mandate
- ⇒ capital markets

Project Development

- ⇒ capacity
- ⇒ institutions (eg, cross- structure)

Project Structuring

- ⇒ New Project Development Facilities

Capital Market

- ⇒ risk-return requirements
- ⇒ role of credit enhancement

Addressing the Constraints – ADB's Role

Enabling framework ➡ Policy & Green Financing Network

Project Development ➡ Cities Development Initiative for Asia

(<http://www.cdia.asia/>)

Project Structuring ➡ Project Development Facilities,
eg. Indonesia

Capital Markets

- ➡ Municipal Development Funds
- ➡ Channeling Financial Institutions
- ➡ Bonds Markets
- ➡ Credit Enhancement

Green Finance: What can ADB do?

ADB's technical assistance and sovereign loans can be used both to assist governments to address these issues and to leverage private sector finance.

ADB has a Private Sector Operations Division which can work directly with the private sector in this field.

- Sub-sovereign loans to national/local banks or private sector
 - Guarantees for green architecture programs
 - Private sector projects (loans/guarantees/equity investment)
- Sovereign loans to public sector:
 - Clean Energy
 - Green transport
 - Other infrastructure for resilience

ADB's and Other Official Financing

Mitigation

Clean Energy Financing Partnership Facility
(\$95 m)

Carbon Market Initiative Funds

- **Asia-Pacific Carbon Fund**
(\$151 m)
- **Future Carbon Fund**
(target \$200 m)

Adaptation

Small Grants for Promoting Climate Change Adaptation
(\$1.2 m)

Water Financing Partnership Facility
(target \$65 m, including adaptation)

Poverty and Environment Fund
(\$3.6 m, including adaptation)

Both

Climate Change Fund
(\$40 m)

Urban Financing Partnership Facility
(\$15 m in grant, \$75m guarantees)

Global Environment Facility (GEF) Climate Change Focal Area
(\$250 m/ year)

Clean Technology Fund of the Climate Investment Funds
(WB as Trustee)
(target \$5 b)

Least Developed Countries Fund
(GEF as administrator)
(\$189 m)

Strategic Priority on Adaptation
(part of GEF Trust Fund)
(\$50 m)

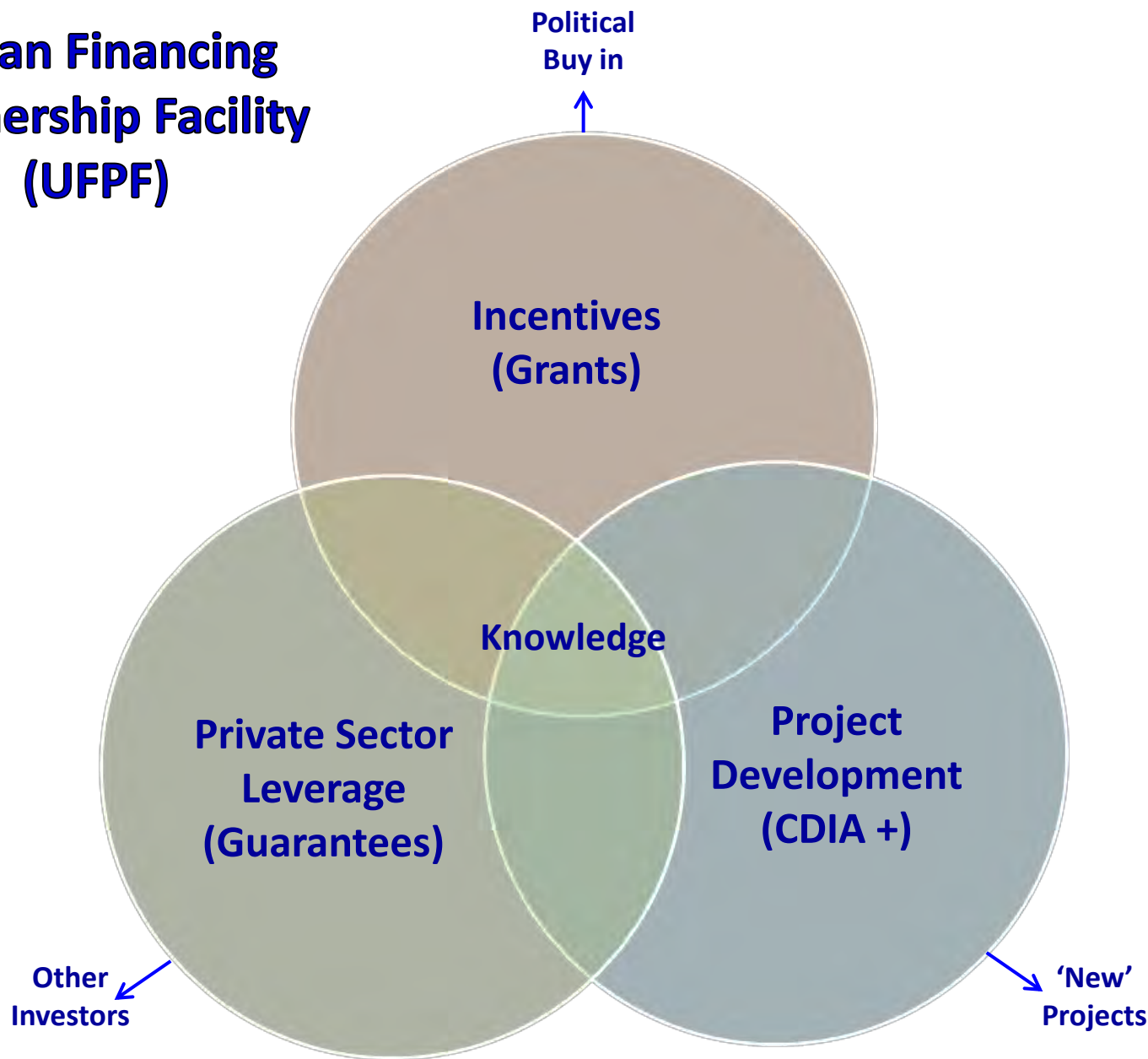
Adaptation Fund
(GEF as administrator in cooperation with UNFCCC Secretariat) (\$100 m by 2009)

Special Climate Change Fund
(GEF as administrator)
(adaptation priority, target \$75 m; mitigation, target \$15 m)

Strategic Climate Fund of the Climate Investment Funds
(WB Trustee) \$6.1 b
Target:

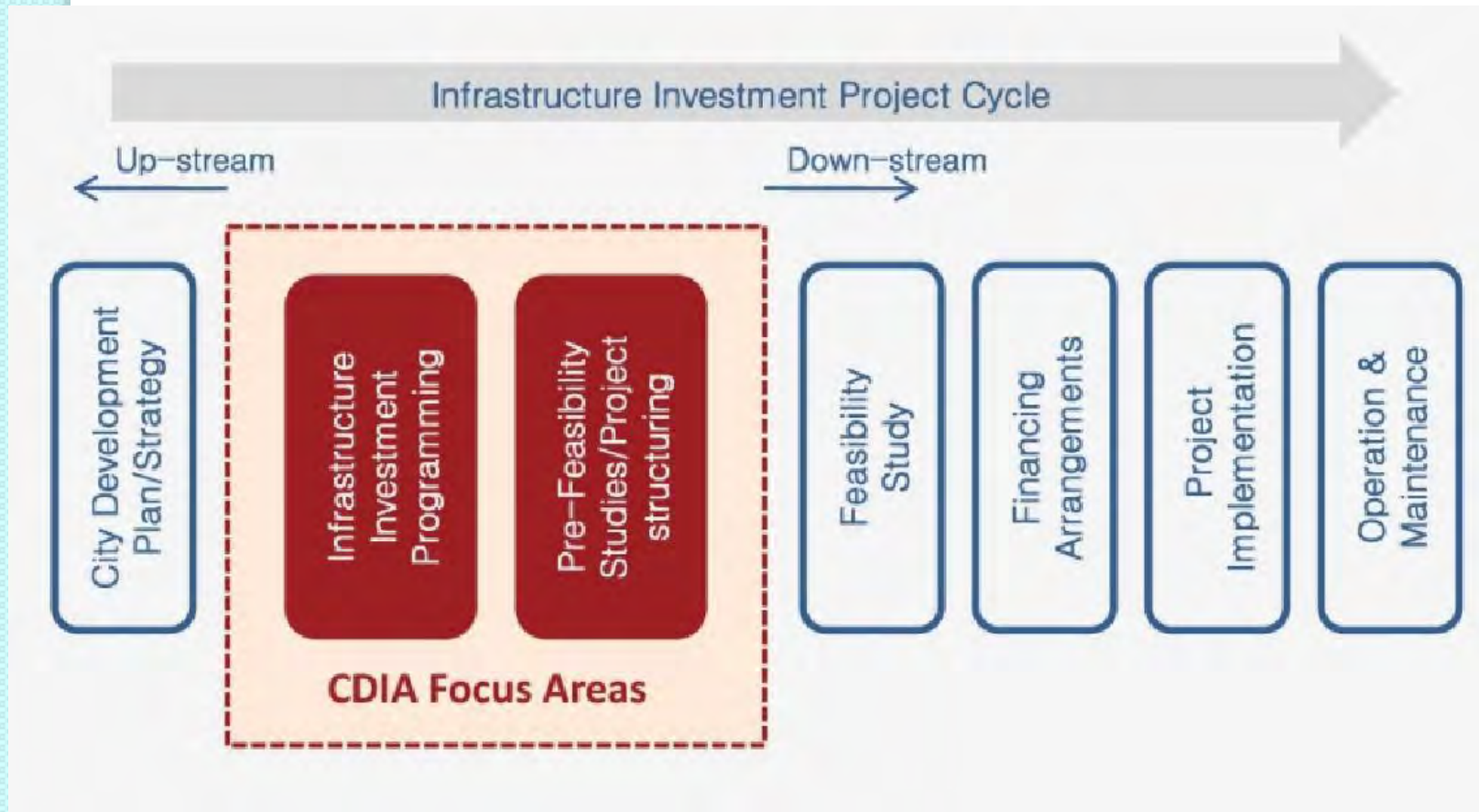
- Pilot Program for Climate Resilience \$500 m
- Forest Investment Prog. \$500 m
- Greening Energy Access \$500 m

Urban Financing Partnership Facility (UFPF)



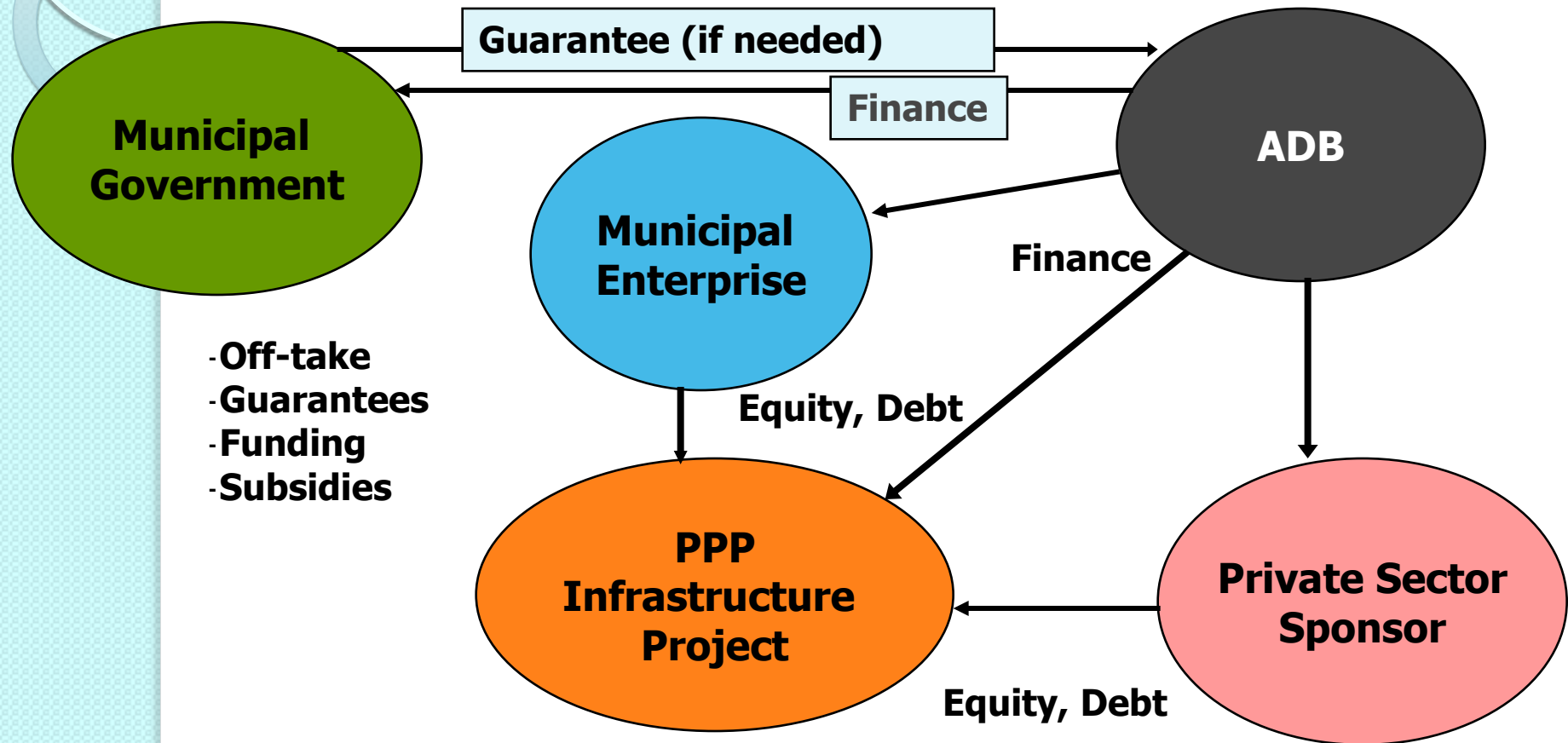
Cities Development Initiative for Asia (CDIA)

Focus Areas of Intervention in the Project Implementation Process



Can be “parallel” financing.

ADB Financing Options



Example Green City Investments: Tianjin and its Eco-city Integrated Transport and Land Use

Green Transportation

An efficient and easily accessible public transport system focusing on 'Green trips', which include public transportation, cycling and walking. The target is for at least 90 per cent of the trips within the Eco-city to be via walking, cycling, or use of public transport.

Use of Clean, Renewable Energy and Ecologically Friendly Waste Management

Particular emphasis on the "3Rs" of waste management

- Reduce, Reuse and Recycle.

Balance of Economic and Social needs

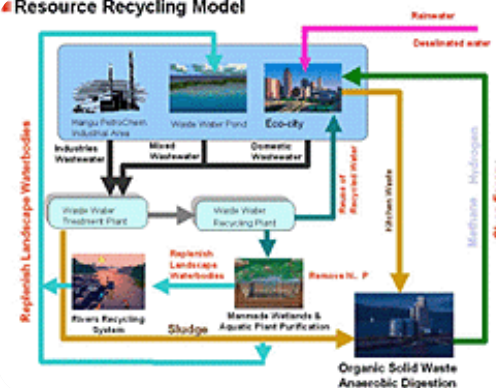
– Preservation of Heritage

Conservation through adaptive reuse or partial rebuilding.

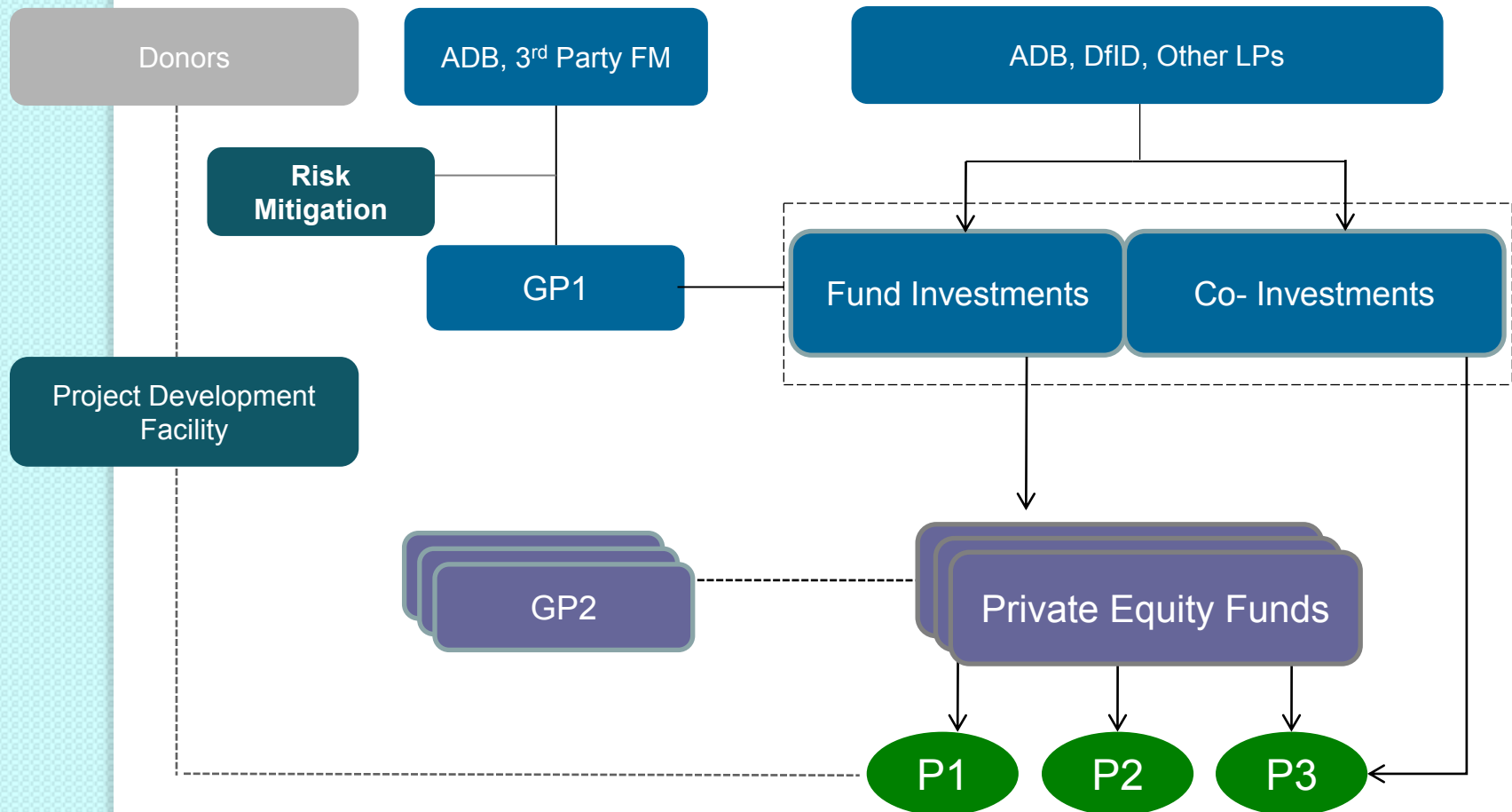
Cross subsidy of low income housing. But needs incentive finance.



Resource Recycling Model



CP3 Fund – Leveraging Private Funds



- <http://www.adb.org/projects/44158-072/details>
- <http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/7082.pdf>

Technology for change

- Waste to Energy:
 - Climate change mitigation
 - Generates renewable energy
 - Synergies with transport sector
 - Income generating opportunities
 - Harvesting nutrients (for fertilizers), methane and biogas (for energy and carbon credits), and water (for irrigation, power cooling, industrial and other non-potable uses)
 - Biosolids as safe, organic soil conditioners



Metro Vancouver's Waste-To-Energy Facility: steam line carries steam to adjacent paper recycling mill and displaces their use of fossil fuels



Thank You



ADB

- www.adb.org

- Google: ADB, Industrial Waste Management

How global strategies could localize in industrial
waste management with success stories

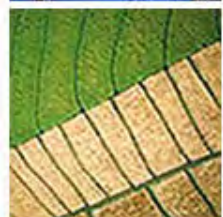
Strategy for Industrial Eco Town

Dr. Mushtaq Ahmed Memon

Programme Officer, UNEP IETC

Dr. Stefanos Fotiou

**Senior Regional Coordinator, Resource Efficiency,
UNEP ROAP**



Overview of the Presentation

- Paradigm shift in waste management – resource efficiency
- Basic definitions
- IETC Activities on ISWM and eco towns
- Case study of Wuxi New District ISWM
- International experiences in Eco Towns
- Conclusions

Turning Challenges into Opportunities



20th CENTURY

**WASTE
MANAGEMENT**

“How do we get rid of our waste efficiently with minimum damage to public health and the environment?”



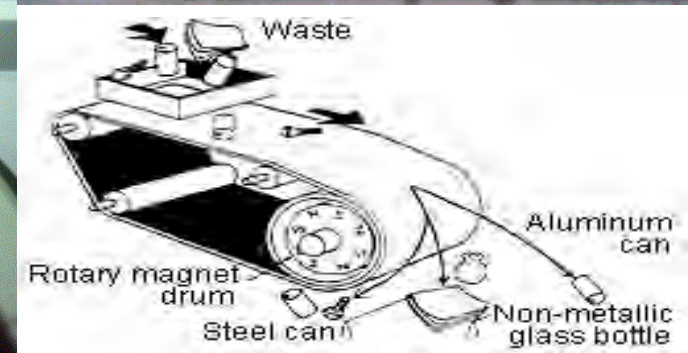
21st CENTURY

**RESOURCE
MANAGEMENT**

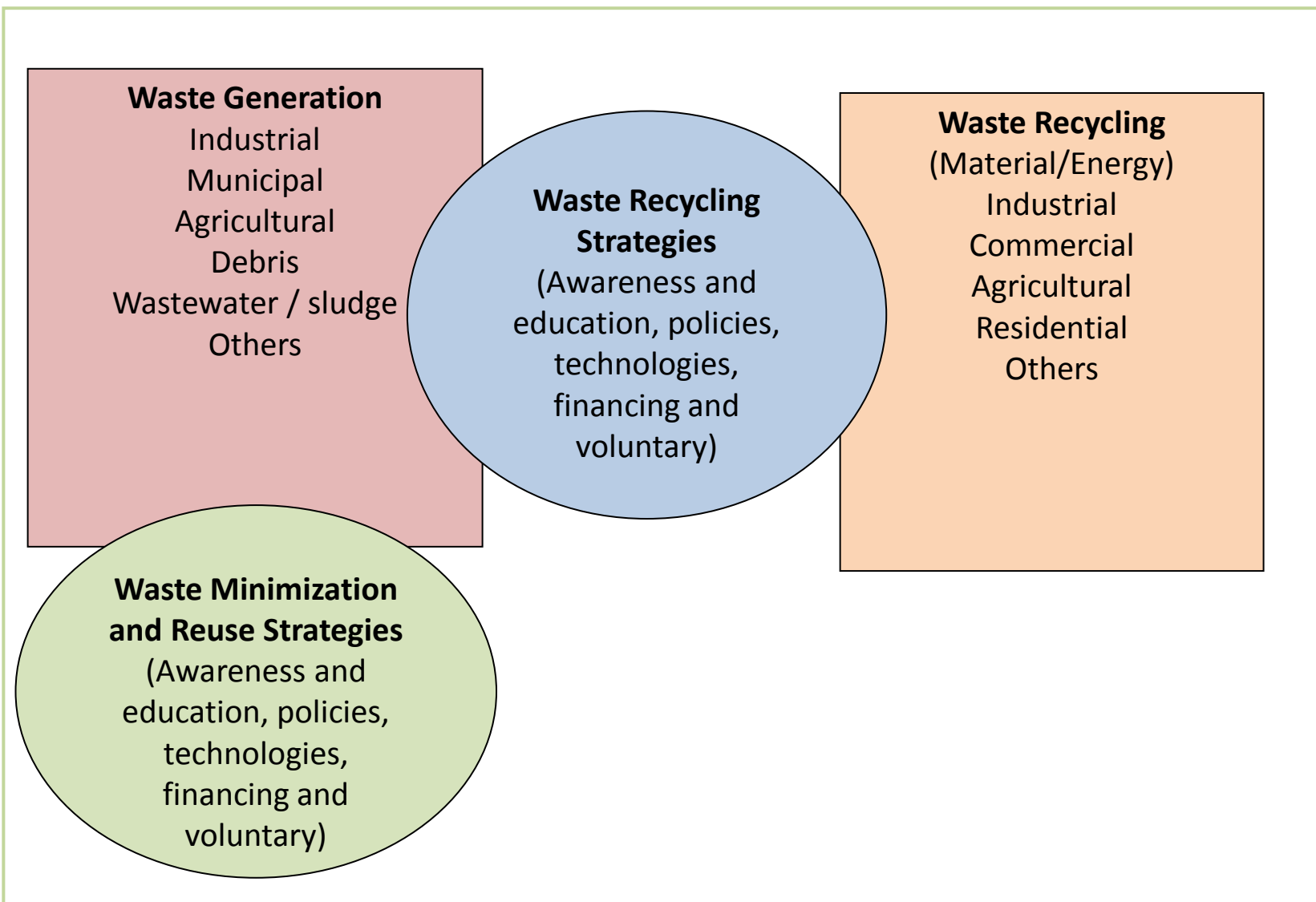
“How do we handle our discarded resources in ways which do not deprive future generations of some, if not all, of their value?”



Source: Dr. Paul Connett, Zero Waste, Power Point

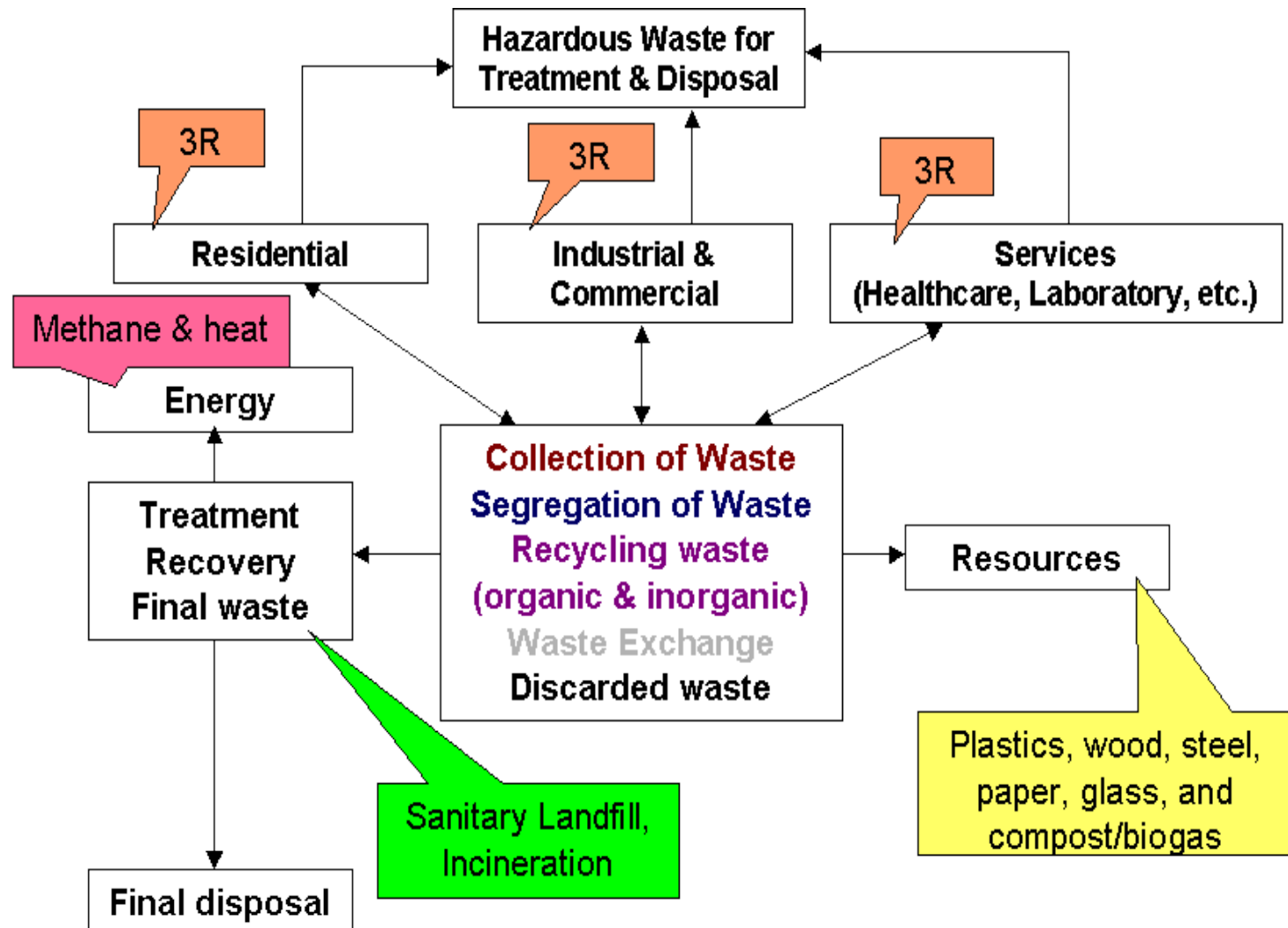


Eco Town Concept

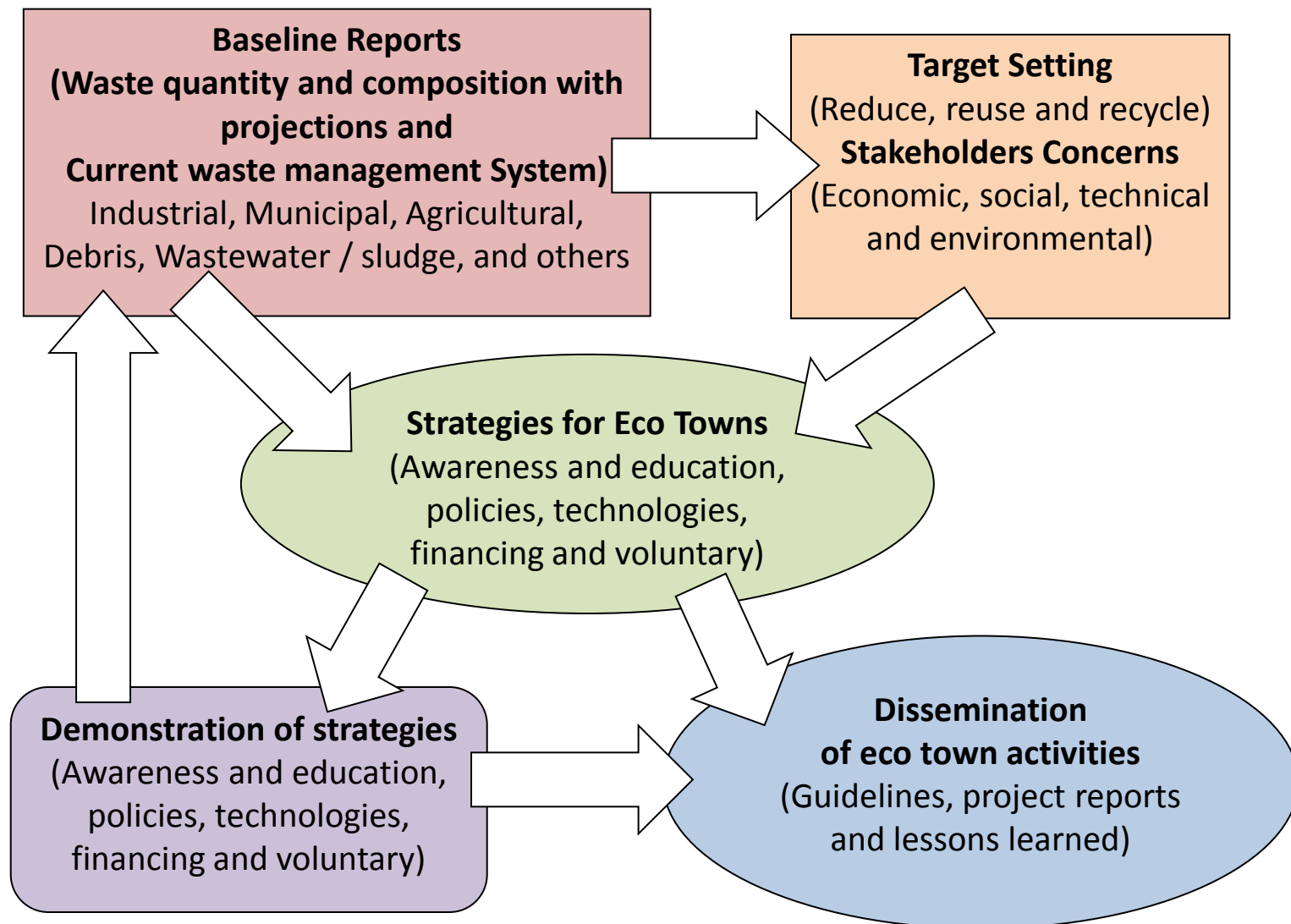


Integrated Solid Waste Management

**3R (reduce, reuse and recycle) –
Resource conservation and resource efficiency**



Eco Town Project Cycle



Main Considerations for Eco Towns

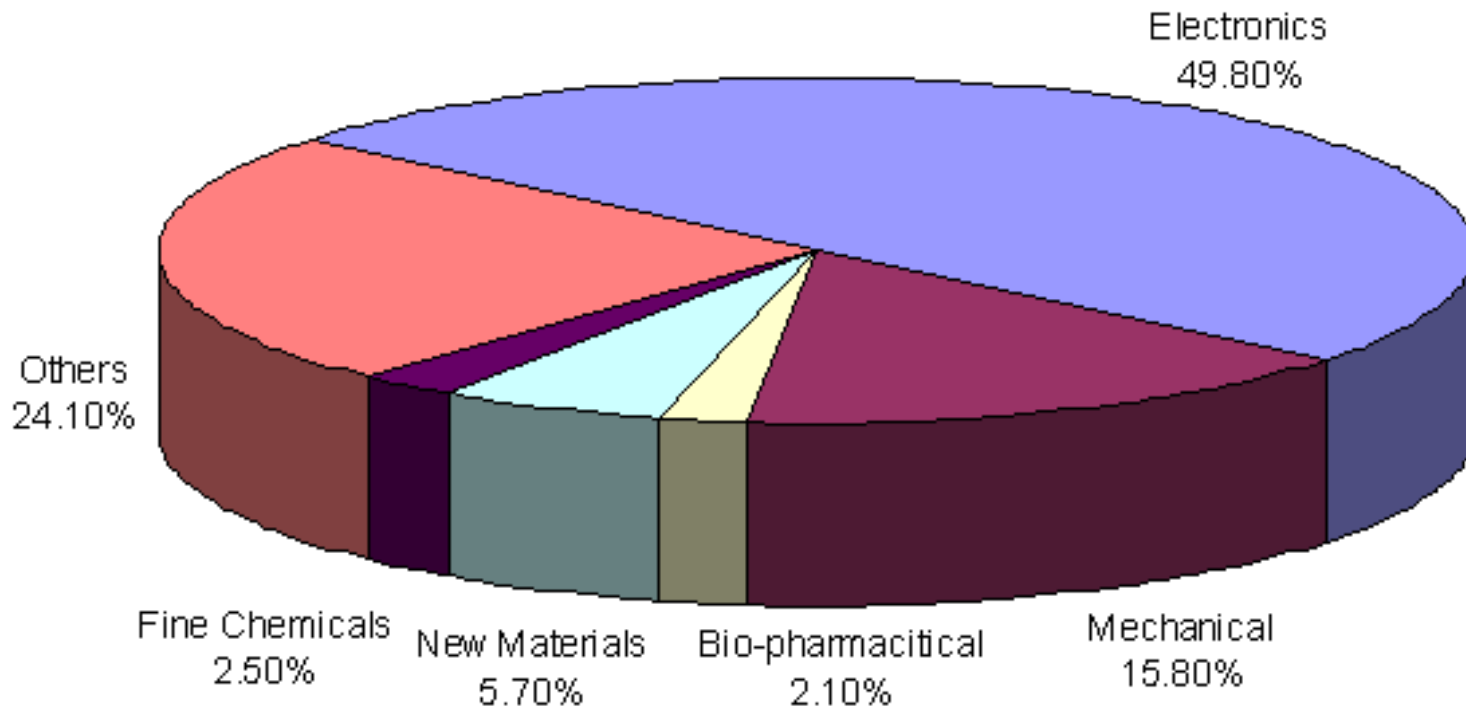
1. Costs and benefits of technologies and affordability of users (current and future with new financing mechanisms including user fees, clean development mechanism (CDM) projects, or earnings by converting waste into a resource)
2. Technical capacity to adapt, operate and maintain technologies (roadmap to develop technical capacity)
3. Policy support for technological solutions
4. Social perspectives including employment and income distribution (for example informal sector), gender, and awareness and continuous learning

ISWM Plan for Wuxi, China

Wuxi is one the ten biggest industrial hubs

- Project team training
- Data collection and analysis
- Baseline reports
- Target setting and stakeholder consultations
- ISMW Plan

Industrial Composition Based on Production Value



Total Industrial Output Value in 2005: 12,090.00 million Yuan

Intervention for industrial waste

- **Waste Exchange Platform:**

An online platform to post all the information regarding waste generation from different industries and also from communities to enable waste buyers (industries) to buy and utilize waste as a source of energy or materials for industrial production

- **Recycling industry**

To convert waste into an energy or material source, promote recycling industry through regulatory and financing incentives

- **B2B partnerships:**

To promote business to business partnerships to ensure waste at one point (industry) turns into a resource at next point (industry)

- **Research:**

To help industries to appreciate the resource efficiency by minimizing waste in the production process and also to reuse waste within the process to reduce the reliance on virgin material also to increase secure flow of energy and material (such as rare earths from e-waste)

Outcomes of Projects

- Local capacity building on:**
 Baseline studies, assessment of gaps, target setting, stakeholders consultations, development of plans, identification of environmentally sound technologies and implementation & review
- Enabling environment:**
 Policy recommendations (regulatory and financing) based on learning from international experiences
- Tangible outcomes:**
 Resource augmentation and resource efficiency to support economic activities without putting pressure on environmental resources
- Partnerships:**
 Multi-level government, private sector and civil society partnerships

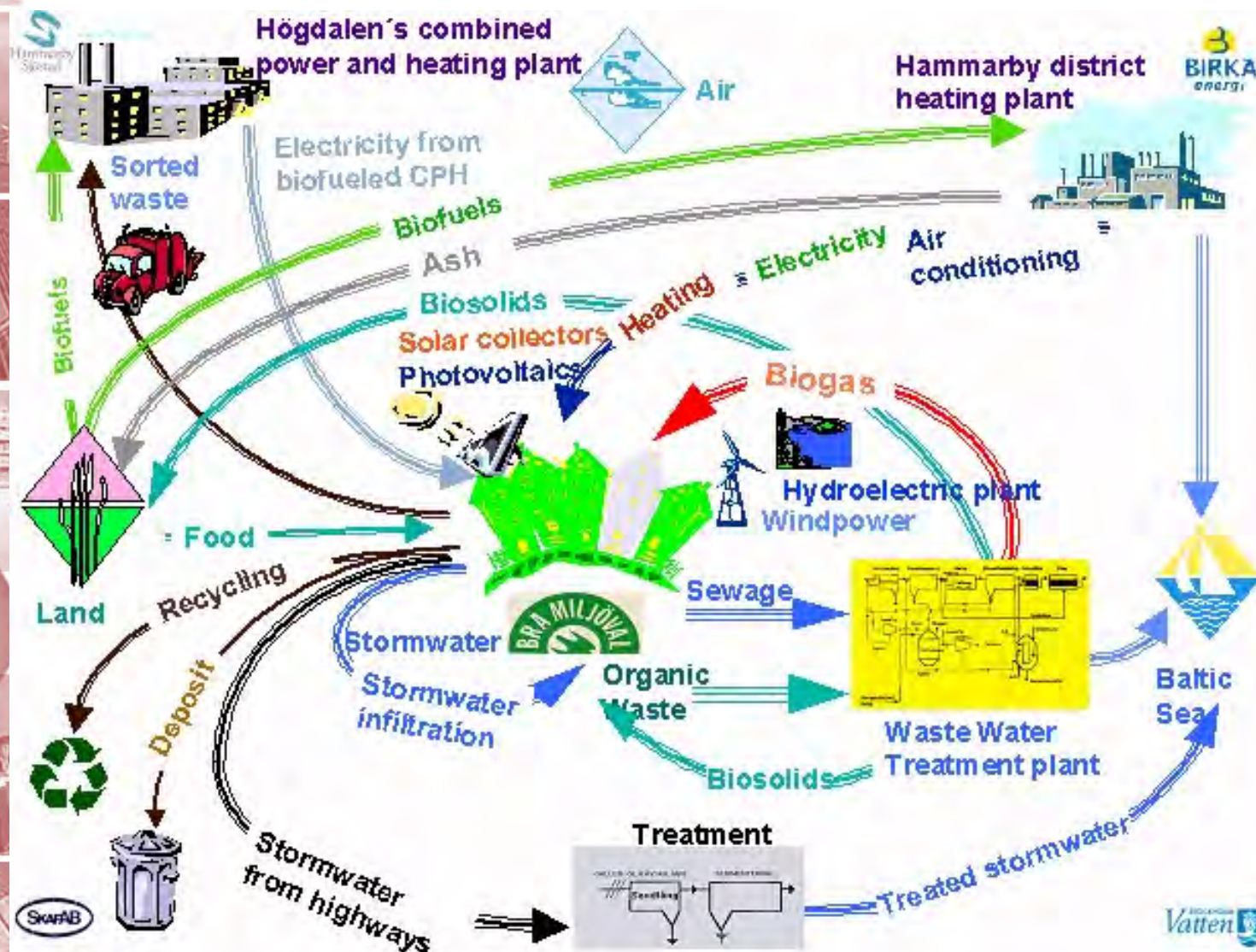


Lessons learned!

- Local project teams and local political support is vital to implement pilot projects
- Active cooperation between national and local government is essential to create an enabling environment for pilot projects
- Stakeholders' participation is key during planning process to ensure successful implementation
- The major setback was the slow implementation of the ISWM plans due to lack of coordination
- The local partners need support on periodic basis to discuss the implementation of ISWM plan and to re-align the activities in line with ground realities
- Many countries do not have national waste strategy and this makes it difficult for local governments to develop policy framework for waste management



Hammerbay Sjostad Eco town



Hammerbay Sjostad Model Details - I

- The natural cycle should be closed at as local a level as possible.
- Consumption of natural resources should be kept to a minimum.
- Total energy consumption should be reduced and energy utilization increased.
- Consumption of clean water should be reduced.
- Sewage is to be utilized for energy extraction, and its nutrient salt content returned to farm soil.
- Building materials are to be renewable or recyclable.

Hammerbay Sjostad Model Details - II

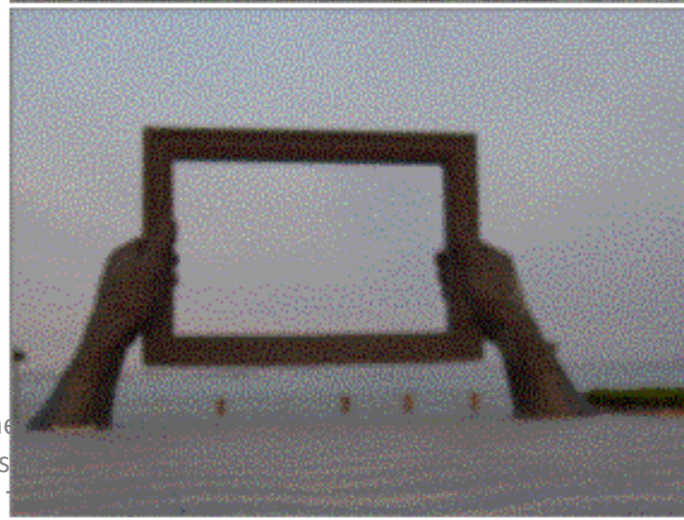
- All solutions are to be adapted to the needs of local residents, (feeling of community; ecological responsibility.
- The participation and requirements of the residents should be taken into consideration.
- Implementation is to be used as a lever for the development of new sustainable solutions for resource consumption.
- The solutions and measures used are not to result in increased costs that are so high as to inhibit widespread diffusion of the ideas and principles involved.

Elements for success localisation

- **C**ommunities
- **L**ow impact
- **I**nnovation
- **C**ost
- **K**nowledge



Thank You...



Extended Producer Responsibility **in minimizing wastes:** **in consumer perspective**

Dr. (Mrs) Ajantha Perera,
Consultant , Consumer Affairs Authority

Extended Producer Responsibility (EPR)

EPR is a mandatory type of product stewardship that includes, at a minimum, the requirement that the producer's responsibility for their product extends to post-consumer management of that product and its packaging.

There are two related features of EPR policy:

- (1) shifting financial and management responsibility, with government oversight, upstream to the producer and away from the public sector; and
- (2) providing incentives to producers to incorporate environmental considerations into the design of their products and packaging.



Product Stewardship

It is the act of minimizing health, safety, environmental and social impacts, and maximizing economic benefits of a product and its packaging throughout all lifecycle stages.

The producer of the product has the greatest ability to minimize adverse impacts, but other stakeholders, such as suppliers, retailers, and consumers, also play a role.

Stewardship can be either voluntary or required by law



The goals of product stewardship and extended producer responsibility:

- **Encourage manufacturers to develop & design products containing fewer toxic and virgin components,**
- **Encourage source & waste reduction,**
- **Make products more environmentally favorable by encouraging increased durability, reusability, and recyclable,**
- **Increase use of recycled materials in product manufacture,**
- **Educate all stakeholders about the environmental and health impacts of the entire life cycle of products,**



The goals of product stewardship and extended producer responsibility

- **Educate consumers about the environmental impacts of their purchases and encourage them to consider these impacts when making purchasing and end-of-life management decisions,**
- **Provide a level playing field for all product producers,**
- **Shift costs of end-of-life product management from tax payers to consumers and product manufacturers,**
- **Be results oriented,**
- **Be transparent and accountable to all entities,**

PRODUCT STEWARDSHIP & EXTENDED PRODUCER RESPONSIBILITY POLICY STATEMENT

Revised & Adopted November 22, 2012

Product Stewardship & Extended Producer Responsibility policies are being adopted and implemented nationally and internationally. In general terms these policies mean that, whoever designs, makes, sells, distributes, uses or manages a product at the end of its useful life, is responsible for minimizing its environmental impact. This responsibility spans the product's entire life cycle.

- **CT Product Stewardship Council (adopted: April 2010)**
- **National League of Cities (adopted: November 2009)**
- **Solid Waste Association of North America (adopted: October 2001)**
- **Carolina Recycling Association (adopted: August 2003)**
- **Northeast Recycling Council (adopted: Spring 2003)**
- **Southern California Association of Governments (adopted: January 2003)**
- **Environmental Council of the States (adopted: October 2002)**
- **California Resource Recovery Association (adopted: November 2001)**
- **North American Hazardous Materials Management Association**

Responsibility

- **The responsibility for reducing product impacts should be shared among industry (designers, manufacturers, and retailers of products or product components), government, and consumers.**
- **The greater the ability an entity has to minimize a product's life-cycle impacts, the greater is its degree of responsibility, and opportunity, for addressing those impacts.**
- **Manufacturers have the greatest ability, and responsibility, to reduce product impacts.**

Internalize Costs

- All product lifecycle costs – from using resources, to reducing health and environmental impacts throughout the production process, to managing products at the end-of-life – should be included in the total product cost.
- Manufacturers should have a direct financial incentive to redesign their products.



**Extended Producer
Responsibility
in minimizing wastes:
in consumer perspective**

**Dr. (Mrs) Ajantha Perera,
Consultant , Consumer Affairs Authority
ajantha_prr@yahoo.com
0776978569**

Hazardous Wastes Management in Korea

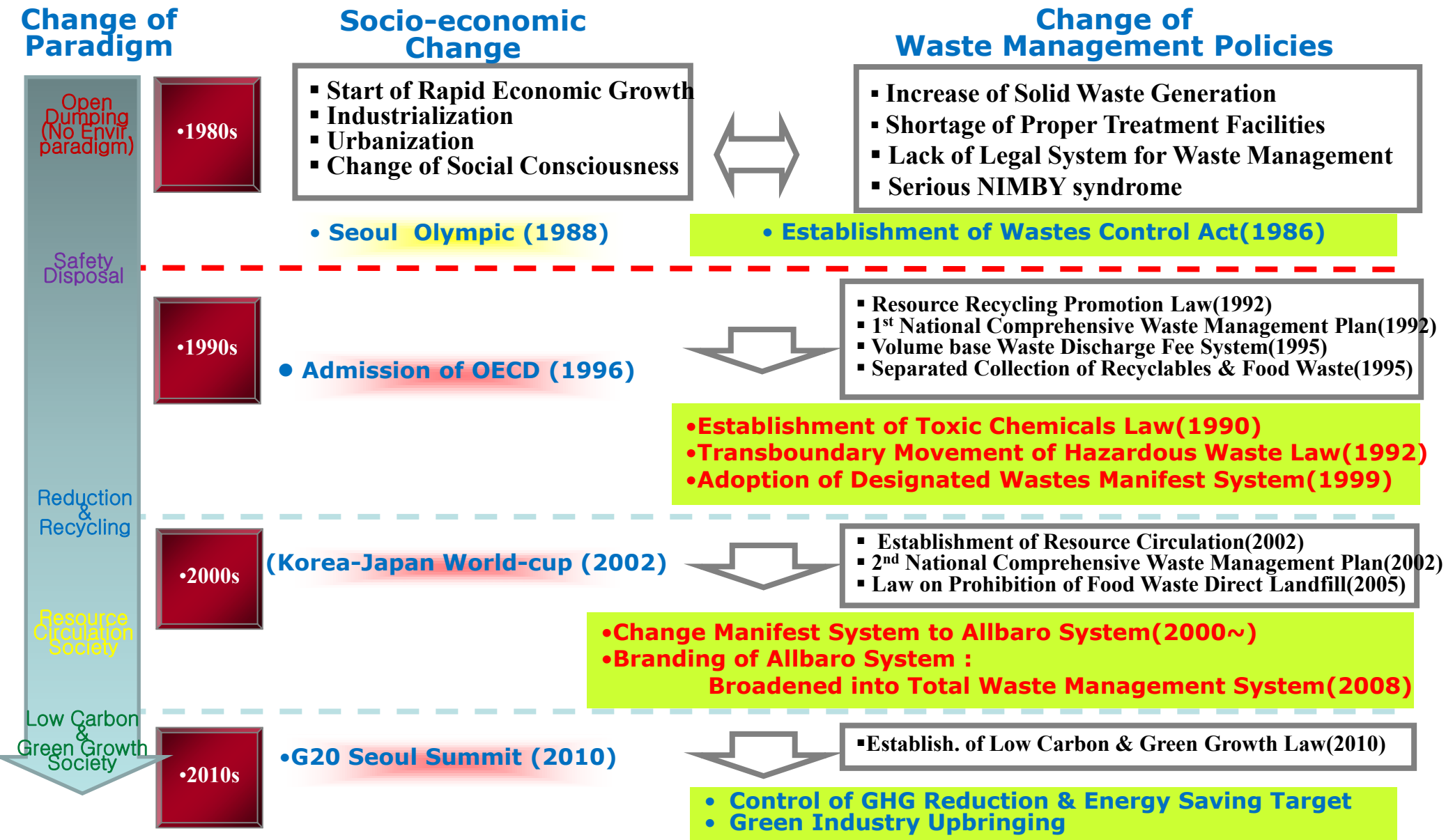
Prof. Dong-Hoon Lee (University of Seoul)

Prof. Sung-Chul Hong (Pusan National University)

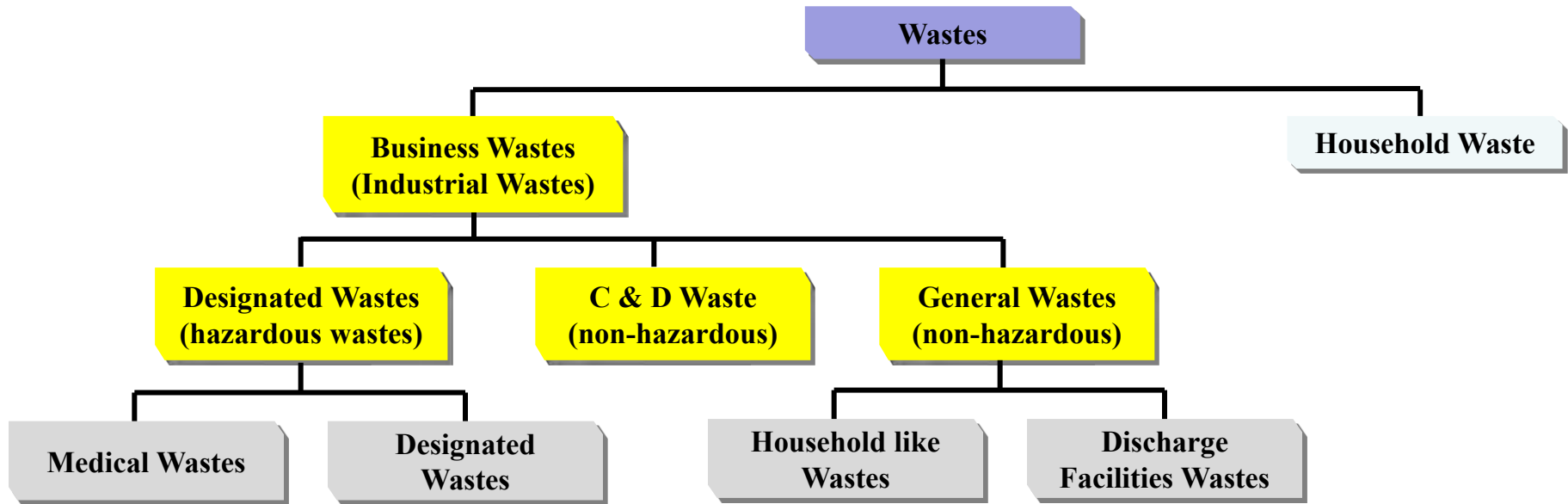
Dr. Joong-hi Ryu (Esri Korea)

2013. 3. 22

Socio-Economic Development & Change of Waste Management Paradigm



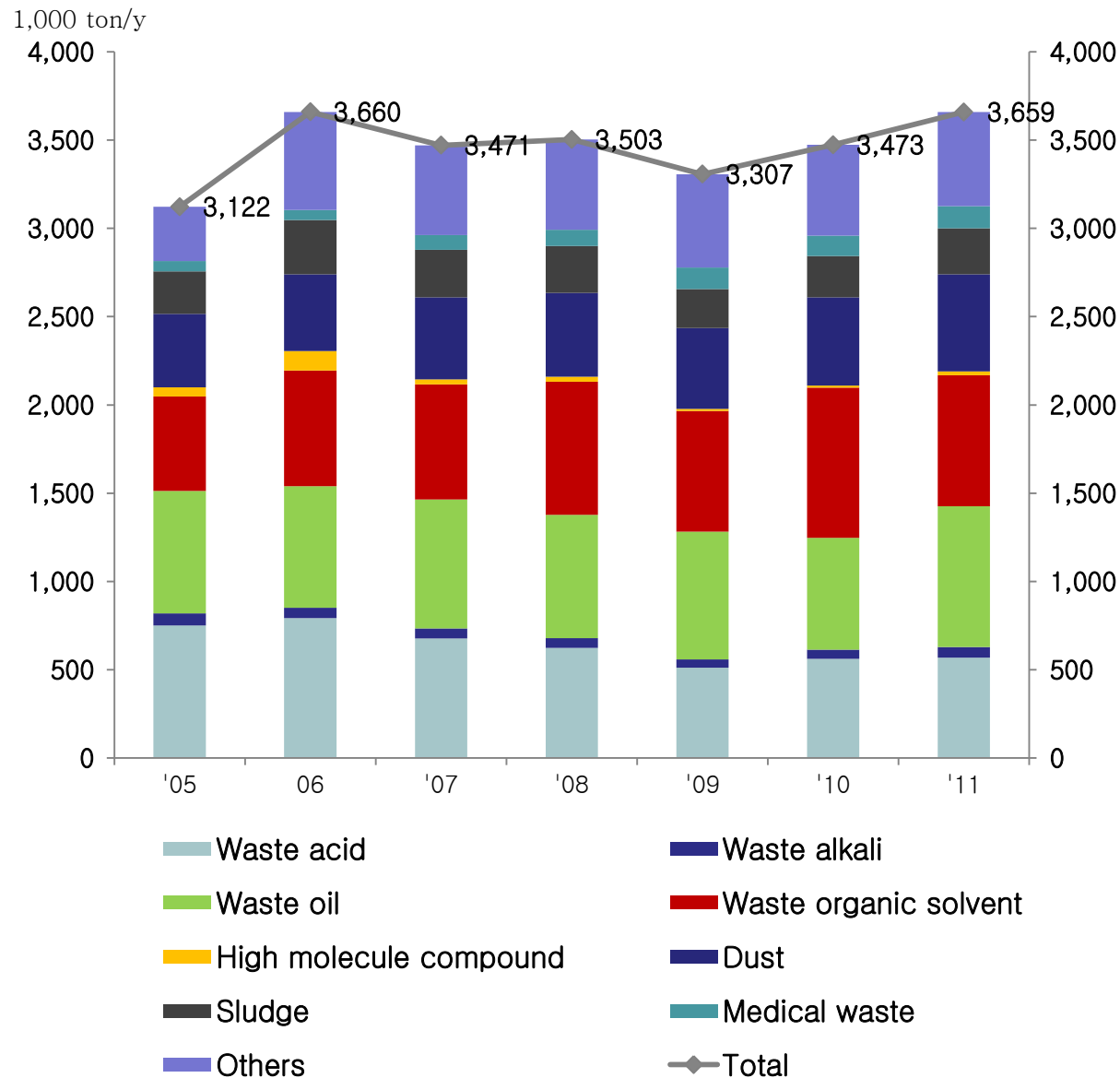
Legal Taxonomy of Wastes & Designated(Hazardous) Wastes in Korea



Macro-Classification			Mid-Classification	No. of Micro-Classification
Business Wastes (Industrial Wastes)	General wastes	Household	Recyclables(16), Commingled garbages(10), Food waste(1)	27
		Discharg facilities	Organic & inorganic sludges(11), Waste synthetic polymers(3), Slags(3), Molding sand(2), Fireproof materials(2) etc(48).	69*
	C & D waste		Combustible(4), noncombustible(10), mixed waste(3), etc(1).	18*
	Designated wastes (hazardous wastes)		Wastes from specified facilities(15), Corrosive(4), Wastes contains hazardous materials(24), Waste organic solvent(2), Waste paint & lacquer(3), Waste oils(8), Waste asbestos(5), PCBs contained wastes(4), Waste toxic(1), etc.(1)	67*
			Isolative medical waste(1), Hazard medical wastes(6), General medical waste(1)	8*

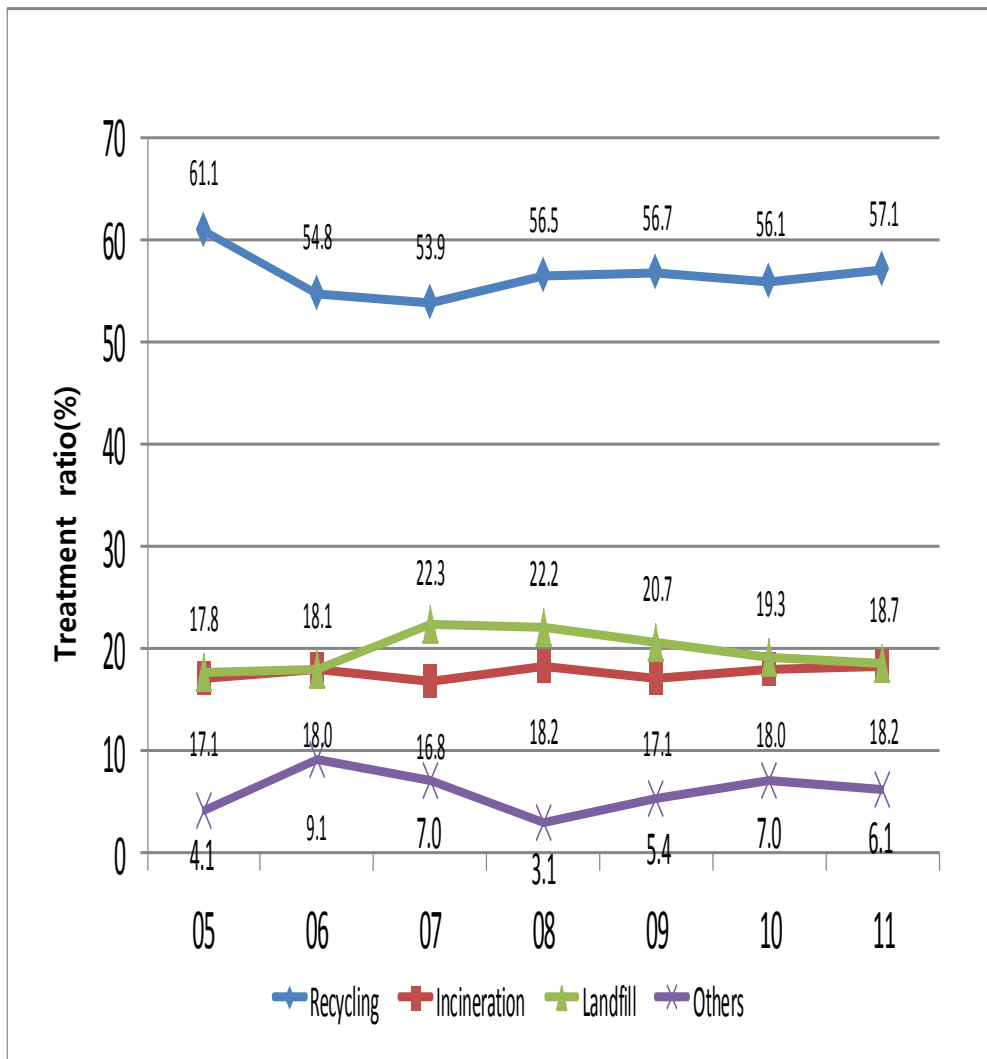
* :No. of items to be controlled

Generation of Designated(Hazardous) Wastes



- **Total annual generation amount of designated wastes are in the range of 3.1~3.6 mil. ton/year and has a slow increasing trend.**
- **Waste acids, waste oils, waste organic solvents comprise more than 50% portion of total designated wastes but have highly recyclable demands.**
 - Waste acids :86.1%
 - Waste oils : 64.5%
 - Waste organic solvents : 81.0%
- **Medical wastes comprise only a few %(1.5~3.7%) portion of total designated wastes, but increased annually.**

Annual Trend of Treatment Ratio for Total Designated Wastes

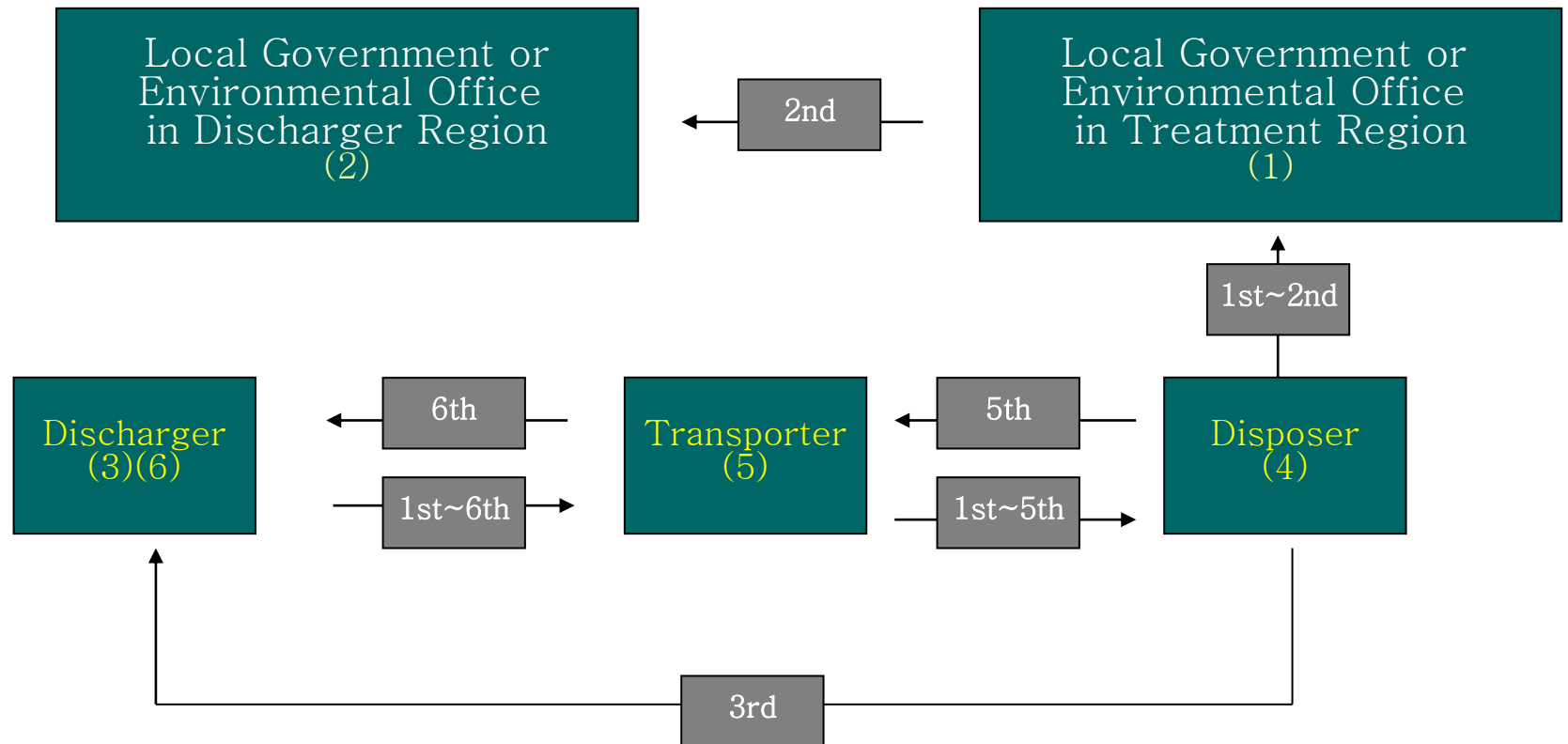


- Designated wastes are to be treated by business manager but controlled by the government.
- Self-treated ratio :12.8%,
Commissioned treated ratio : 87.2%
- Recycling 59.1% (57.1%)
Incineration 15.4% (18.2%)
Landfill 19.4% (18.7%)
※ () including medical wastes
- Higher than 90% of medical wastes was landfilled in the closed type engineered landfills abide by the legal guideline.
- 65% of sludge(organic and inorganic) from the discharged facilities was landfilled in the controlled type engineered landfills abide by the legal guideline.

Waste Manifest System

Waste Manifest System (6 Sheet-Manifest System)

- Adopted at 1999 to certify the legal treatment
- System of transportation and receipt certificate using six sheets of receipt slip
- Complicated and excessive work in all sites and administration
- Failures and mistakes in illegal waste treatment prevention
- Excessive administration cost



Allbaro System (so called E-manifest System of Wastes Management)

❖ IT/GIS-based waste management system developed by KECO in 2001

- 2001~2002 : System development and pilot operation
- Sep. 2002 : Started the normal operation of Allbaro System
- 2003 : Established waste authorization and waste handling permission function
- 2003 : Developed the statistical analysis function of waste
- 2004 : Establishment of disaster recovery center to cope with system failure
- 2006 : Built and operated ARS for users who have difficulties in using the Internet
- 2007 : Launched “Allbaro” a general waste management brand
- 2008 : Announced the compulsory use of Allbaro by MoE
- 2010 : Announced the compulsory use of Allbaro by MoE for C&D waste
- 2011 : Announced the compulsory use of Allbaro by MoE for all kind of Industrial Wastes

❖ The system controls the entire process of handling wastes from waste discharging step, through transporting step to final treatment in transparent and real-time by on-line.

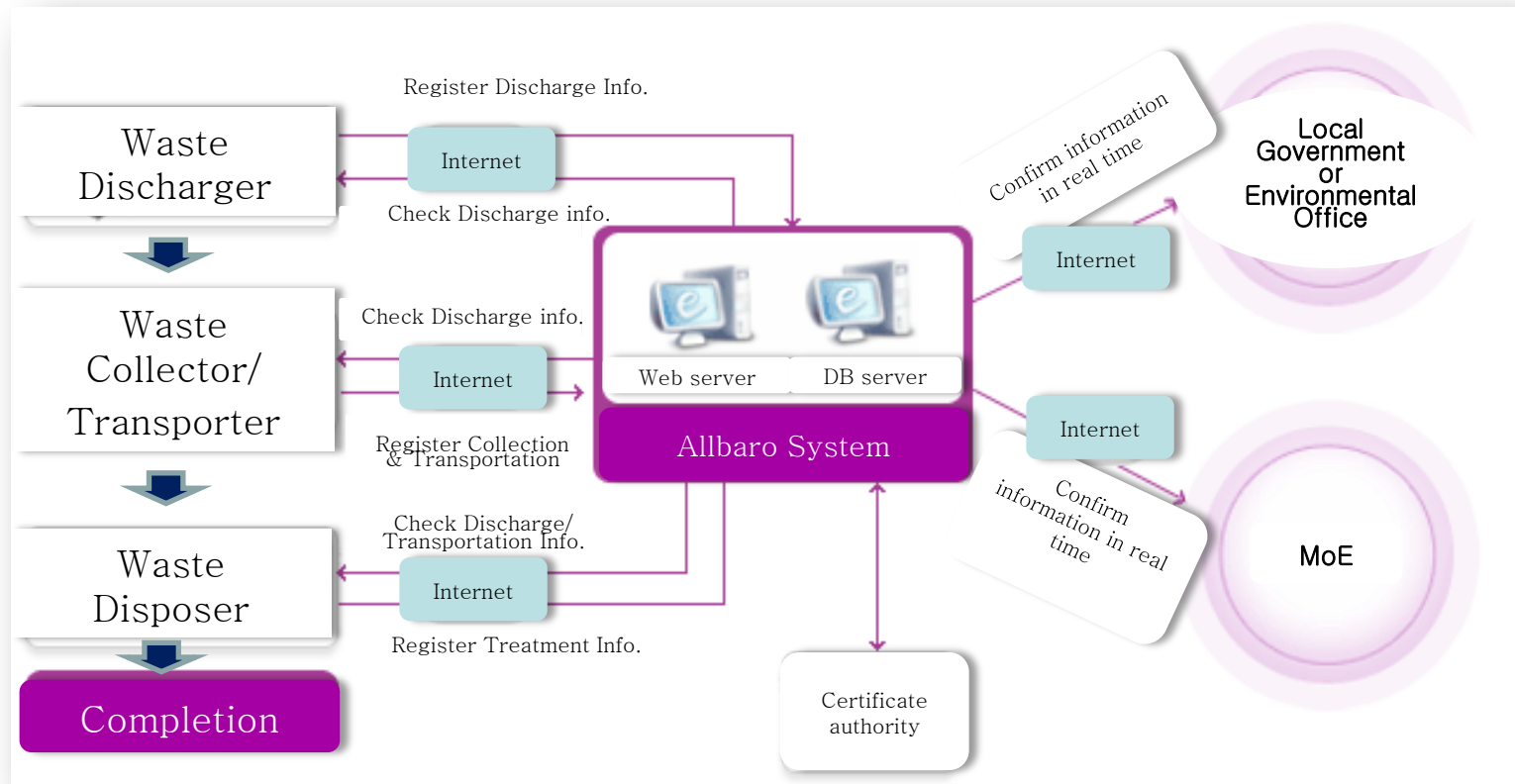
❖ Modules in Allbaro System

- 1) Allbaro Transfer Information Management System
- 2) Allbaro License/Approval System
- 3) Allbaro GIS(Geographic Information System)
- 4) Allbaro Wastes Statistical Analysis System

Modules in Allbaro System

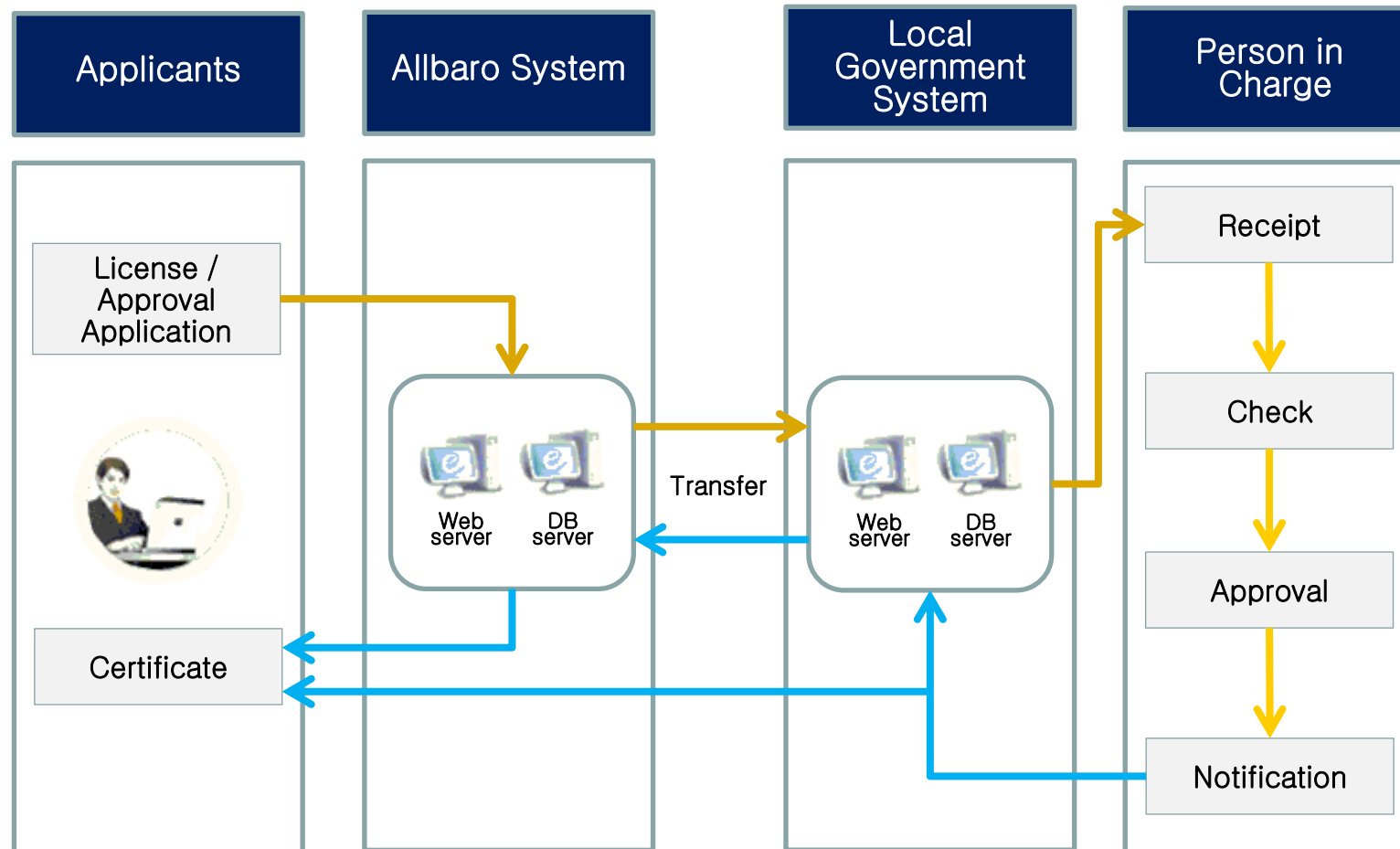
1) Allbaro Transfer Information Management System

- draws up the list of transfer/acceptance of wastes in the IT based systems (e.g., online, RFID, IVR).



2) Allbaro License/Approval System

- processes the license/approval of wastes treatment plan from application to final disposal by online to simplify the process for the private applicants.



-

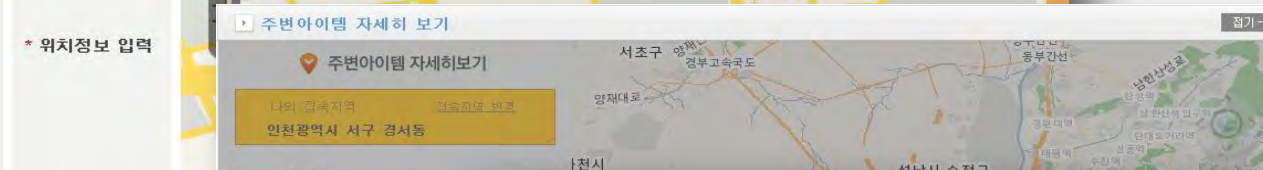
Modules in Allbaro System

3) Allbaro GIS(Geographic Information System)

- provides the location based information about circulation resource exchange



•Location registration for member



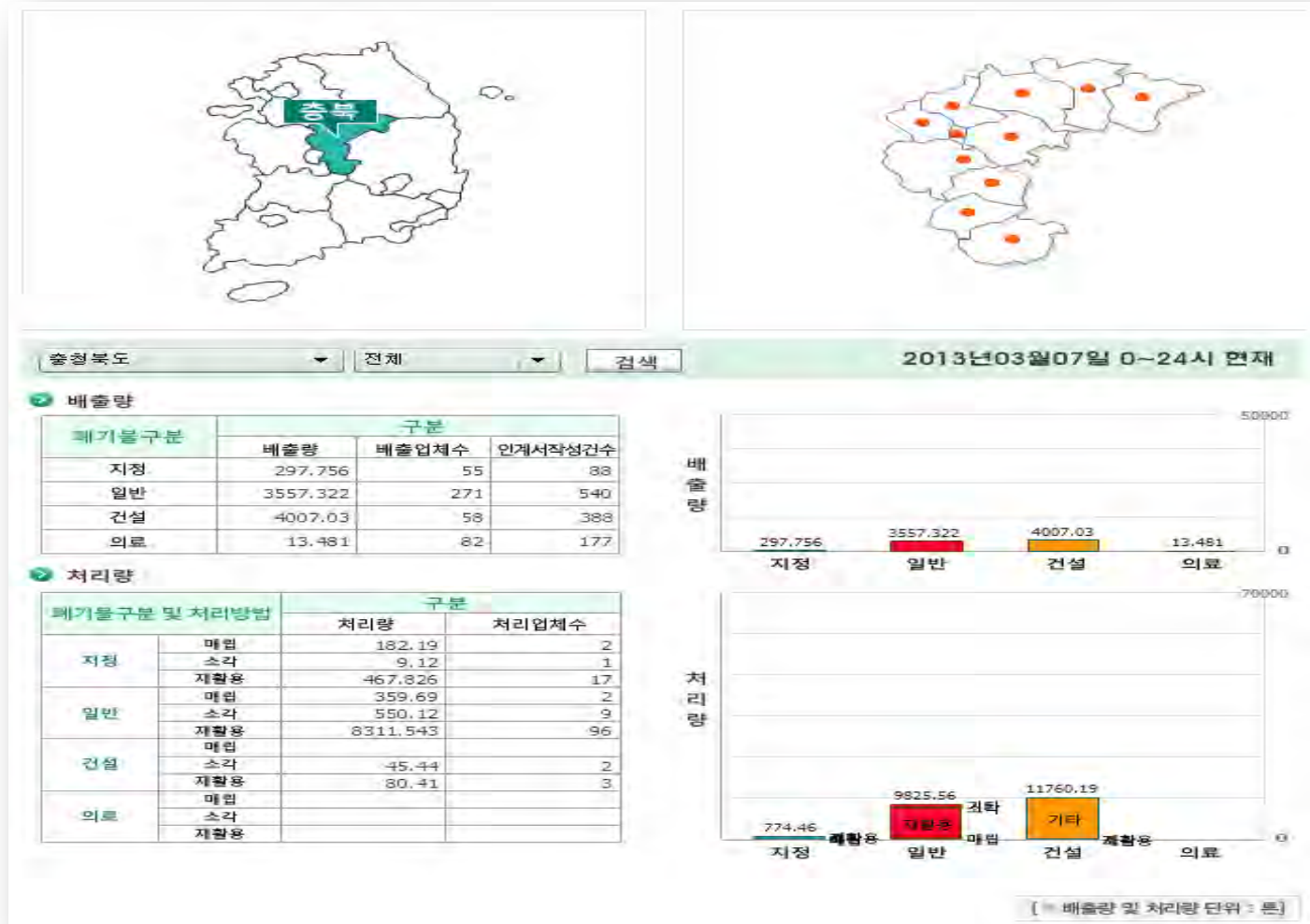
•Conditional Location Search



•Detail informations for peripheral items

4) Allbaro Wastes Statistical Analysis System

All information recorded in the Allbaro System is analyzed to create the statistical data of wastes in the region for the supervision of the jurisdiction.



Current Management Status of Allbaro System

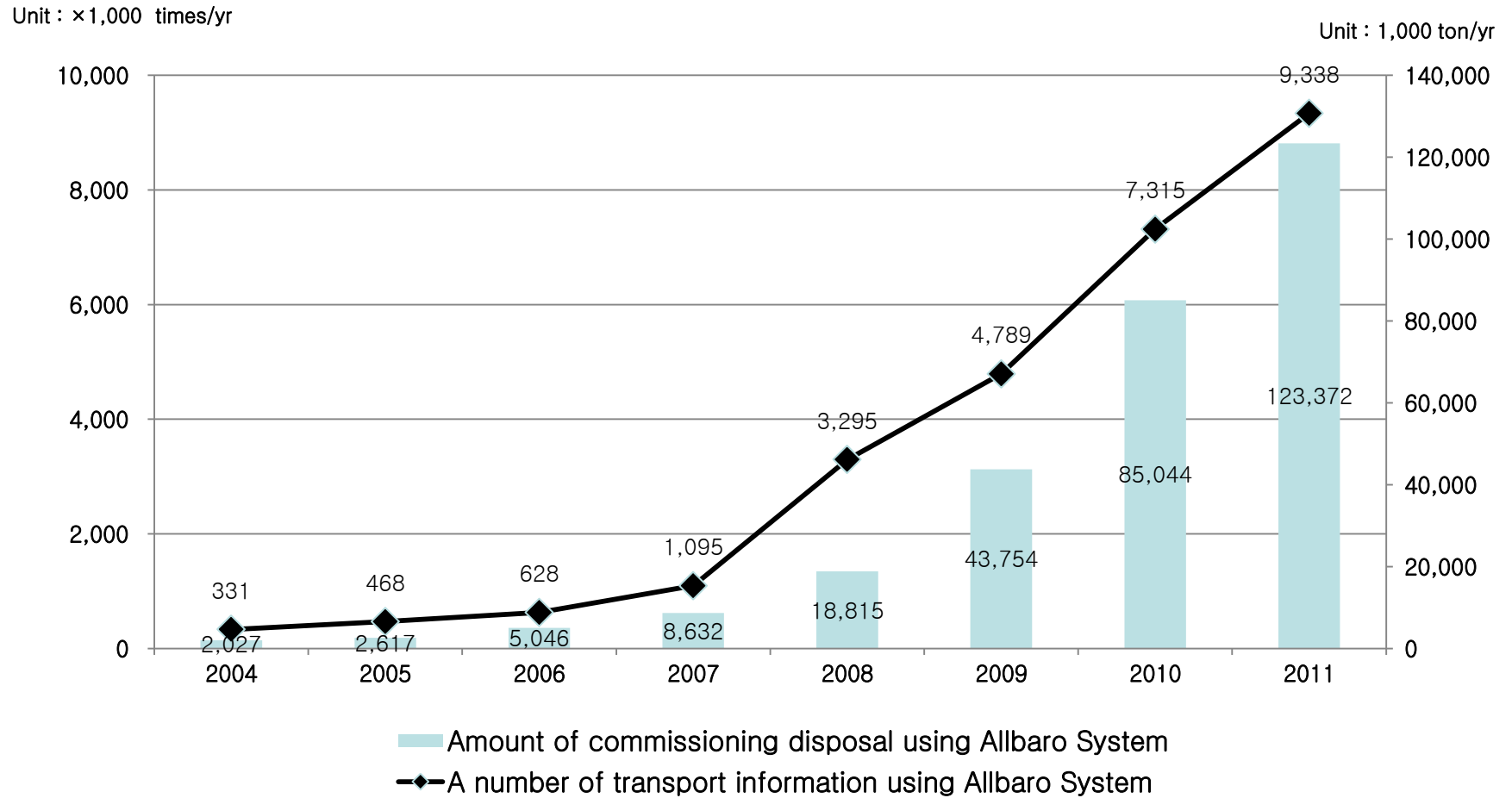
1) Current status of E-manifest system(Allbaro System)

- Allbaro system was developed for business waste management in September 2001.
- For pilot operation stage(1 year), 1500 businesses(large quantity discharge) were participated in the system.
- For 1st legislation stage(optional participation stage) between 2003~2007, participants were increased slowly to 22,000 businesses.
- For 2nd legislation stage(compulsory participation stage) after 2008, rapid increase of participants to 320,000 businesses in 2009 was shown.
- Usage numbers of Allbaro system were 9.38 million in 2011, which is 31 times(331,000) of 2004.

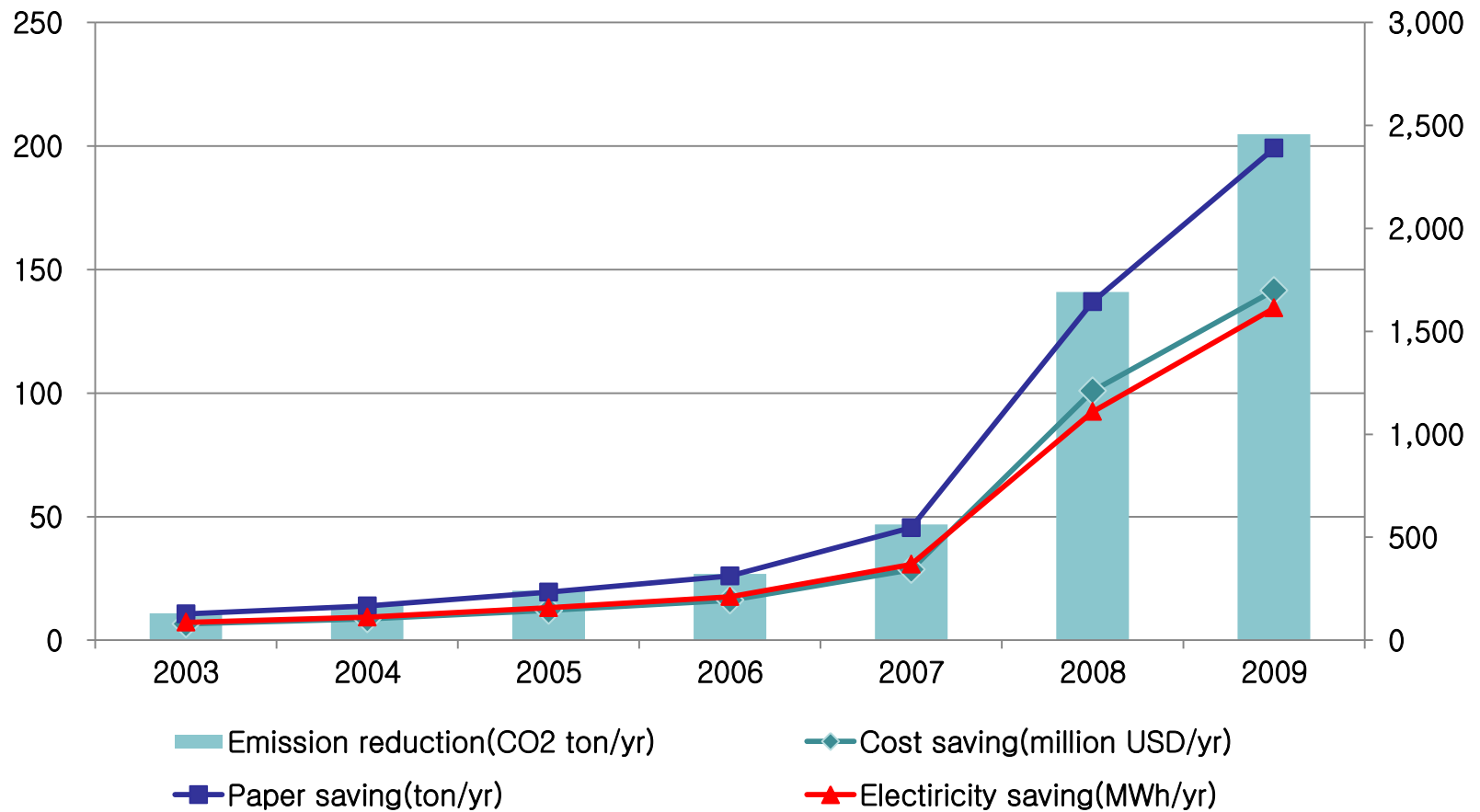
2) Outcomes of Allbaro system in the effect of environment, economy, and GHG reduction

- Time saving to treat one case was achieved from 120.4 min. to 5.9 min. compared with the paper manifest system.
- Economic saving was achieved by saving papers, postages, and labor.
- Reduction of illegal dumping amount was estimated by 8.8% during 2007 ~ 2009.
- Mass quantity of GHG reduction effects were achieved by paper saving, reduction of illegal dumping, waste reduction, and etc.

Usage status of Allbaro System



Economic & environmental effect by Allbaro System



Improvement plans of Allbaro System

- RFID system for medical wastes should be developed for cost cutting and upgrade of management and maintenance.
- To solve the left waste treatment problems at the recycling business failure sites.
- To reduce the problems of household like waste of business wastes illegally treated with real household waste mixed.
- Integrated management of Allbaro system and EPR system for more effective control the wastes flows.
- To improve the abilities of analysis and monitoring for the illegal treatment of business wastes.
- Application of GPS system
- Construction of information network for business waste supports.
- Improvement of the business waste classification system

- Keco (Korea Environment Corporation)
 - <https://www.keco.or.kr/02en/>
- Allbaro System
 - <https://www.allbaro.or.kr/index.jsp>

Thank You for Your Attention!

Paradigm shift in industrial waste management

Randeewa Malalasooriya
22nd of March, 2013

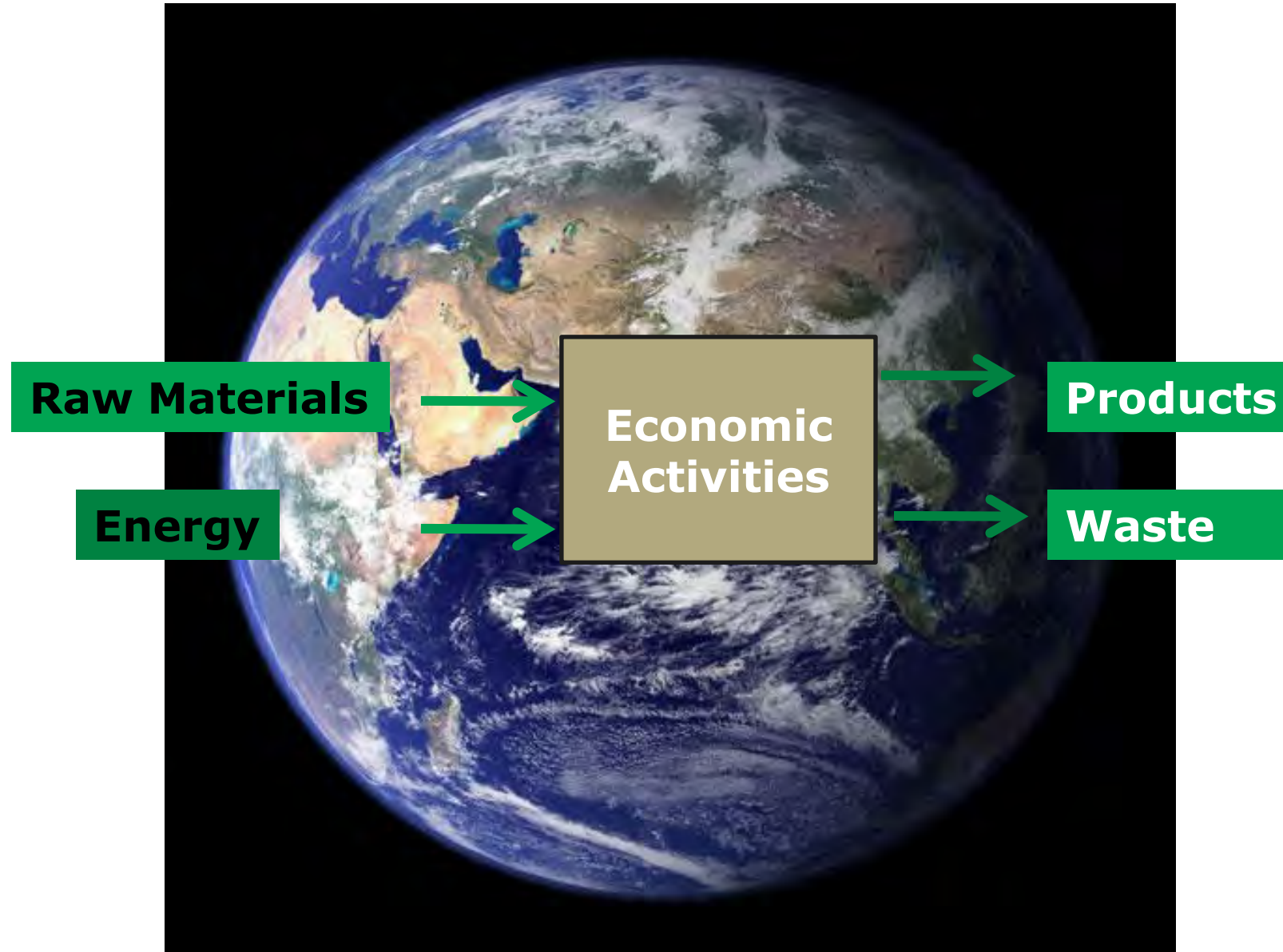
© 2012 Holcim/Switzerland



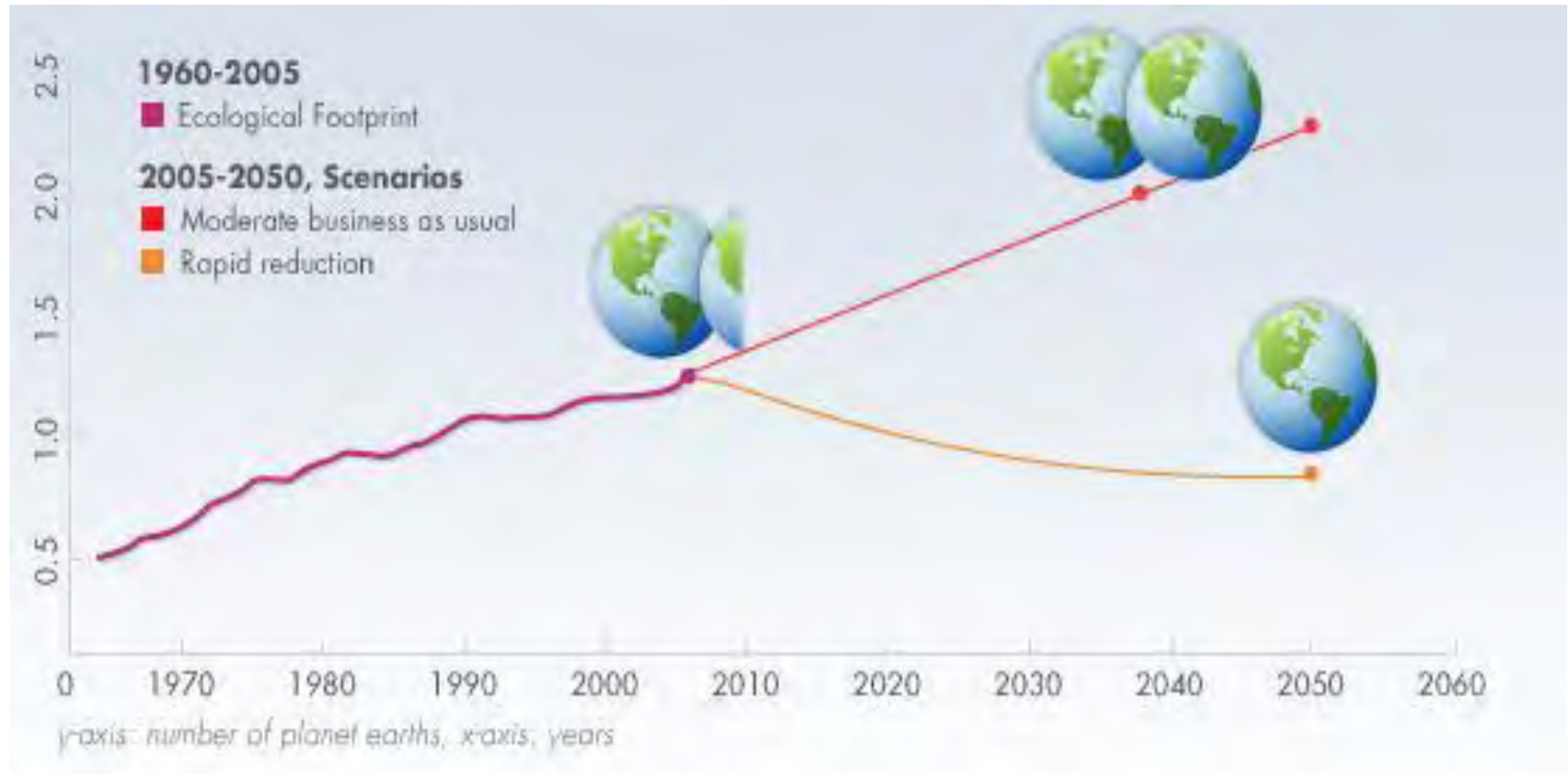
Content

- Ecological misbehavior due to waste
 - In global context
 - In local context
- Waste management
 - Traditional waste management approach
 - Paradigm shift in waste management
- Features of professional waste management
- Annexures
 - I. Geocycle company profile
 - II. Case study : Total waste management at Colombo Dockyard
 - III. Holcim commitment to sustainability in brief

Ecological misbehavior



Lack of focus on sustainable consumption



- Ecological footprint in 2050- need more than 2 planets (Rio + 20, 2012 summit)

Ecological misbehavior : elaboration

During 10 seconds

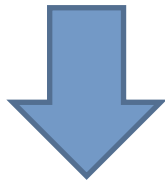
- 119 MT of hazardous substances are added to the environment
- 3,716 MT of fossil fuels are consumed
- 2,000 MT of Carbon is added to the atmosphere from the burning of fossil fuels
- 2 die from drinking of polluted water
- The world lost an unknown amount of biological diversity

Source – UNEP



Ecological misbehavior: The Sri Lankan context

- No. challenges identified – 23
- **Critical issues**
 - Land degradation due to soil erosion
 - Depletion of coastal resources
 - Inland water pollution
 - Loss of biodiversity
 - Waste disposal



- Contribution of corporations
 - Resource extraction
 - Disposal of waste
 - Discharges to environment
 - Emissions

Source – Ministry of Env.



Content

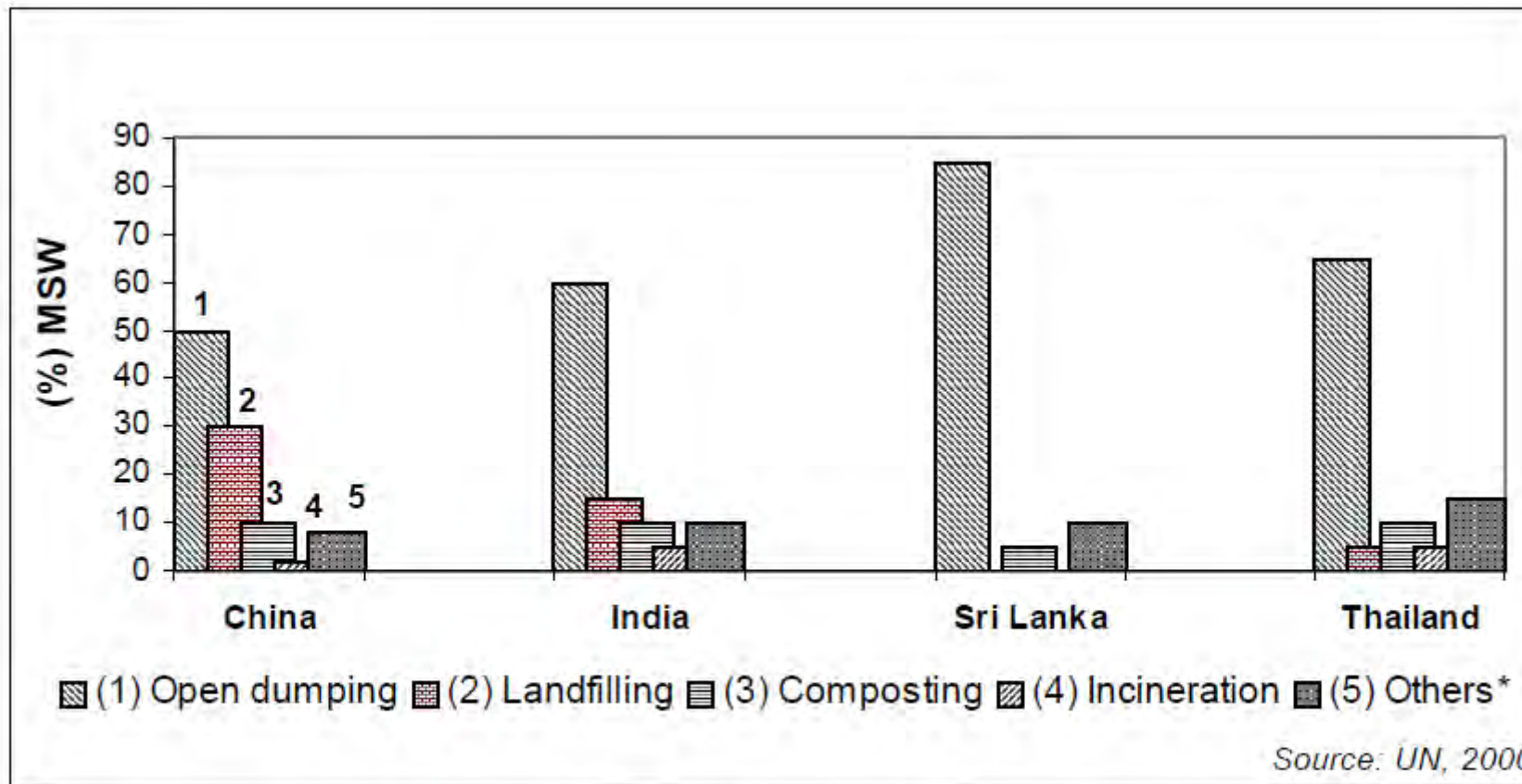
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Typical waste management in Sri Lanka

- Open dumping, open burning
- Less segregation of waste
- Backyard operator's decision
- Mixed wastes sent with MSW, not aware of the fate of our wastes ?
- Very sizeable footprint
- Layman's job



Waste crisis : popular disposal mechanisms



**Feeding of animals, dumping in water and open burning*

Source : Asia Regional Research Program on Environmental Technology, 2004

Paradigm shift in waste management industry in Sri Lanka

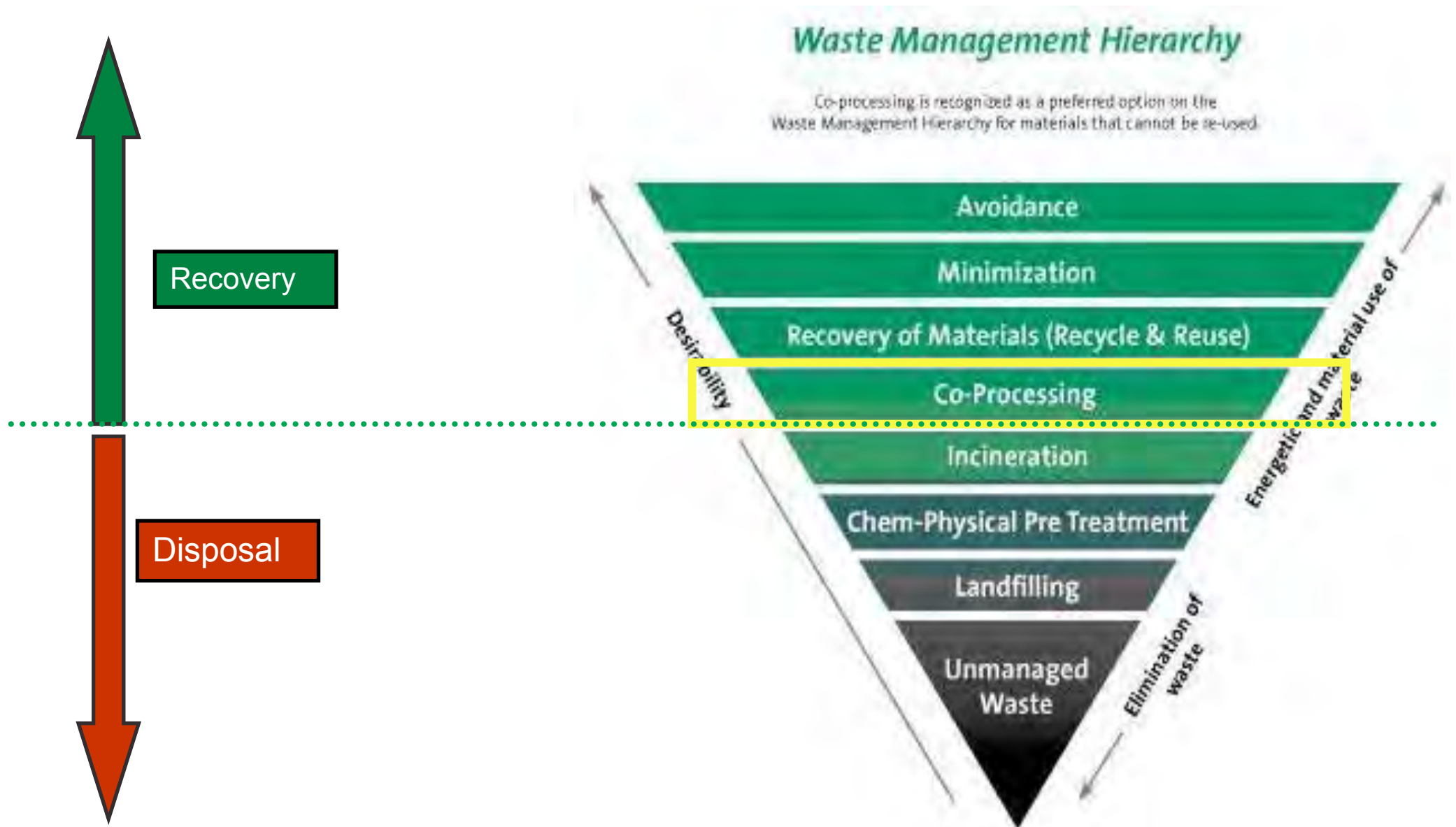


- End to end solution
- Segregation at point of generation, know the fate & final disposal
- Business decision
- Be a strategic partner for waste disposal
- Reduce carbon footprint
- Professionalism

Peace of mind



Sustainable waste management approach



Cement kiln co-processing

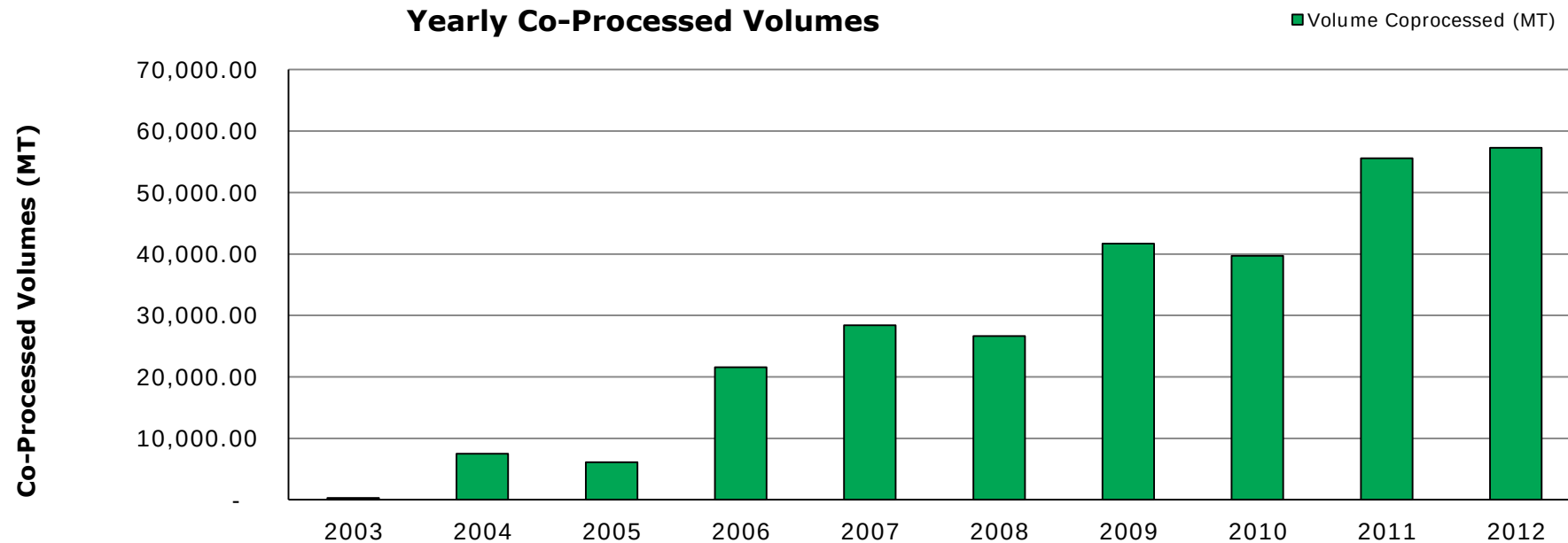
Using the cement manufacturing process to destruct waste while simultaneously manufacturing clinker in a single combined operation

Features

- ✓ Flame temperatures 1800- 2000 °C
- ✓ Residence time 4-6 s
- ✓ Total destruction of material under controlled conditions
- ✓ No organic residue from the process



Progress of waste material co-processing



- 2003 & 2004 started with rice husk, sawdust & used oil
- 2007 onwards, shredded material started
- 2009 Higher AF volume co-processed with clinker capacity increase
- 2010 Moving from agro waste to industrial waste *eg: expired pharmaceuticals, sludge, pesticide waste etc.*
- 2013 stepping in to municipal solid waste

Value created through sustainable waste management

- Benefits of sustainable waste management to the industry & community are,
 - Provides a permanent solution to waste management problems
 - Reduces emissions and greenhouse gases
 - Lessens reliance on fossil fuels
 - Preserves natural resources



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Professionals for each job



Highly competent team



Waste prequalification



Customize service



Close supervision

Professionals for each job



On-site waste management



Waste transportation



Sampling of incoming waste



Waste pre-processing

State of the art facilities : Pre-processing facility, KEPZ

- Lorry washing facilities to avoid pollution



- 24 hrs Security Camera system to ensure the material security



- Environmental protection precaution



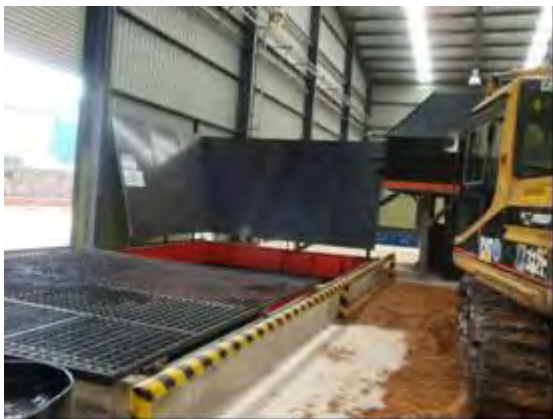
- Spill Preventive Storage and handling area



Use best available technologies



Use best available technologies



Feeding Sludge from Sludge Pits



Feeding Saw Dust by Excavator



Mixing Saw dust and Sludge in Sludge Mixer



Final Product

Use best available technologies



Textile Waste Stock Pile



Textile Waste Transferring



Textile Waste Feeding



Shredder



Docking Station



Shredded Material



**Shredded Material
Conveying**



Main Burner

Use best available technologies



Oil Unloading Bay



Intermediate Tank (Day Tank)



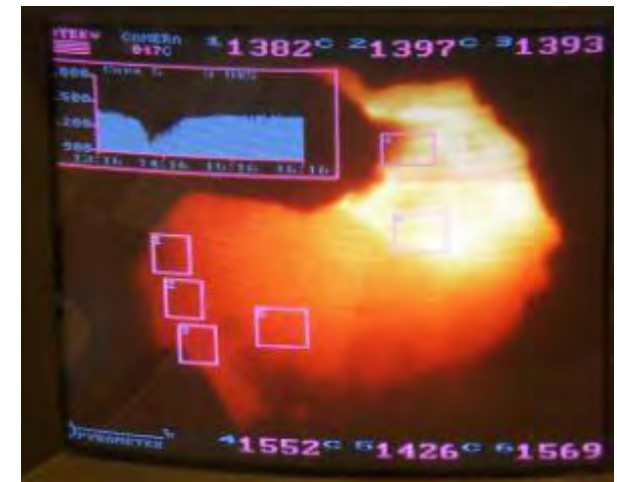
Pre-Heater



Oil Feeding Pump



Main Burner



Main Flame

Emergency preparedness

- A dedicated emergency unit was established to attend emergency situations in waste handling
- Emergency drills are conducted regularly in each Geocycle site
- Waste handlers are fully trained with all possible emergency incidents



Awards and recognitions



Contribution for e-waste



Being a CEA e-waste partner



Green Awards 2011



Gold Award in Green Award 2012

Extended commitment



Encourage continual improvement



Objective

To give due recognition to Geocycle customers, as they were the first group of companies who came forward voluntarily to manage their wastes in an environmental responsible manner.

Assistance to reduce footprint further

- Encourage Corporate Environmental leadership
 - Guidance on optimum / effective resource consumption
 - Waste reduction and recycling
 - Sustainable waste disposal
 - 100% compliance
 - Knowledge sharing
 - Health and safety measures
 - Good governance



Commitment to reduction of corporations footprint



“ We must be the change we want to see ”

Mahatma Gandhi

Date of Birth: October 02, 1869 **Date of Death:** January 30, 1948



geocycle

Because tomorrow matters

Randeewa Malalasooriya

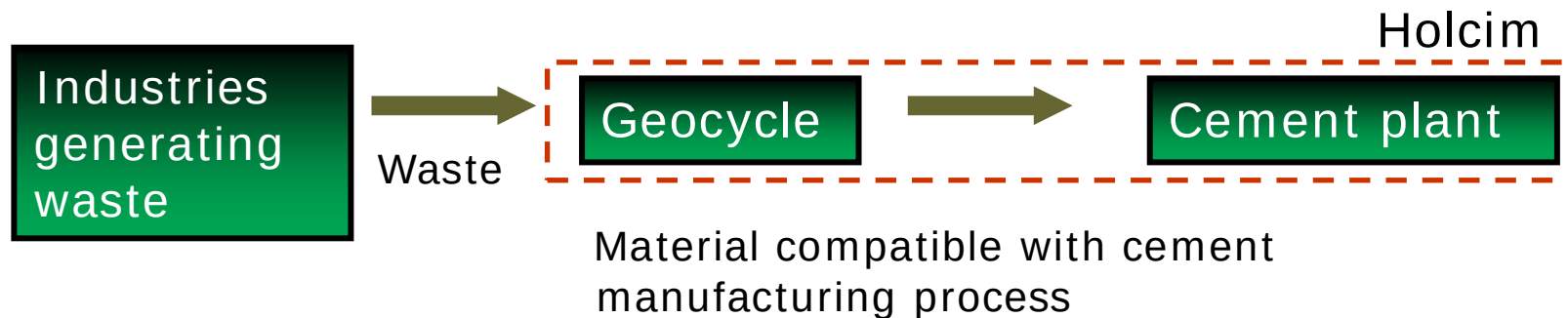
randeewa.malalasooriya@holcim.com

+94772538771

Annexures

Introduction to Geocycle

Geocycle is a business unit of Holcim (Lanka) Limited, established to provide professional waste management solution to the industrial waste generators.



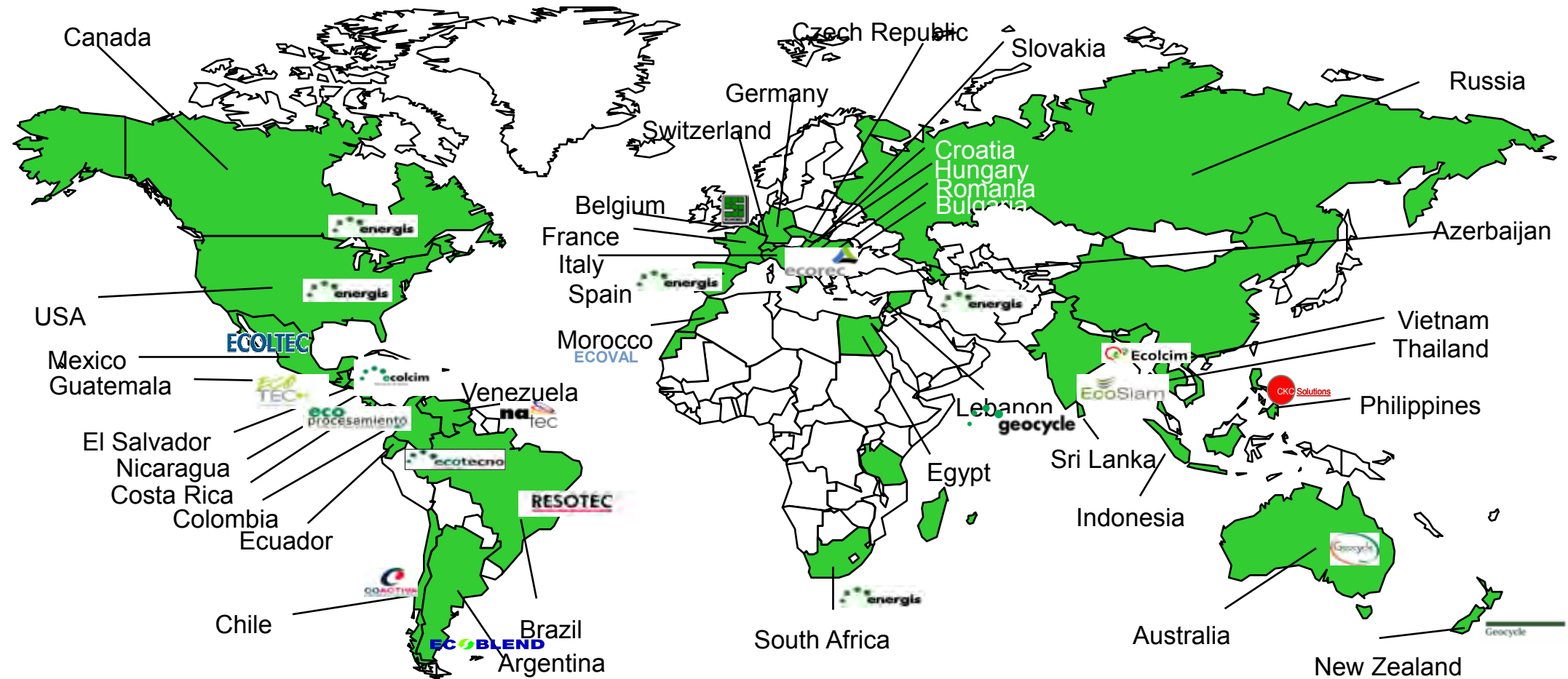
Our Mission

To provide **Industrial waste generators** a sustainable final destination to their waste by converting diverse waste streams into a compatible material for the cement production process, in Sri Lanka

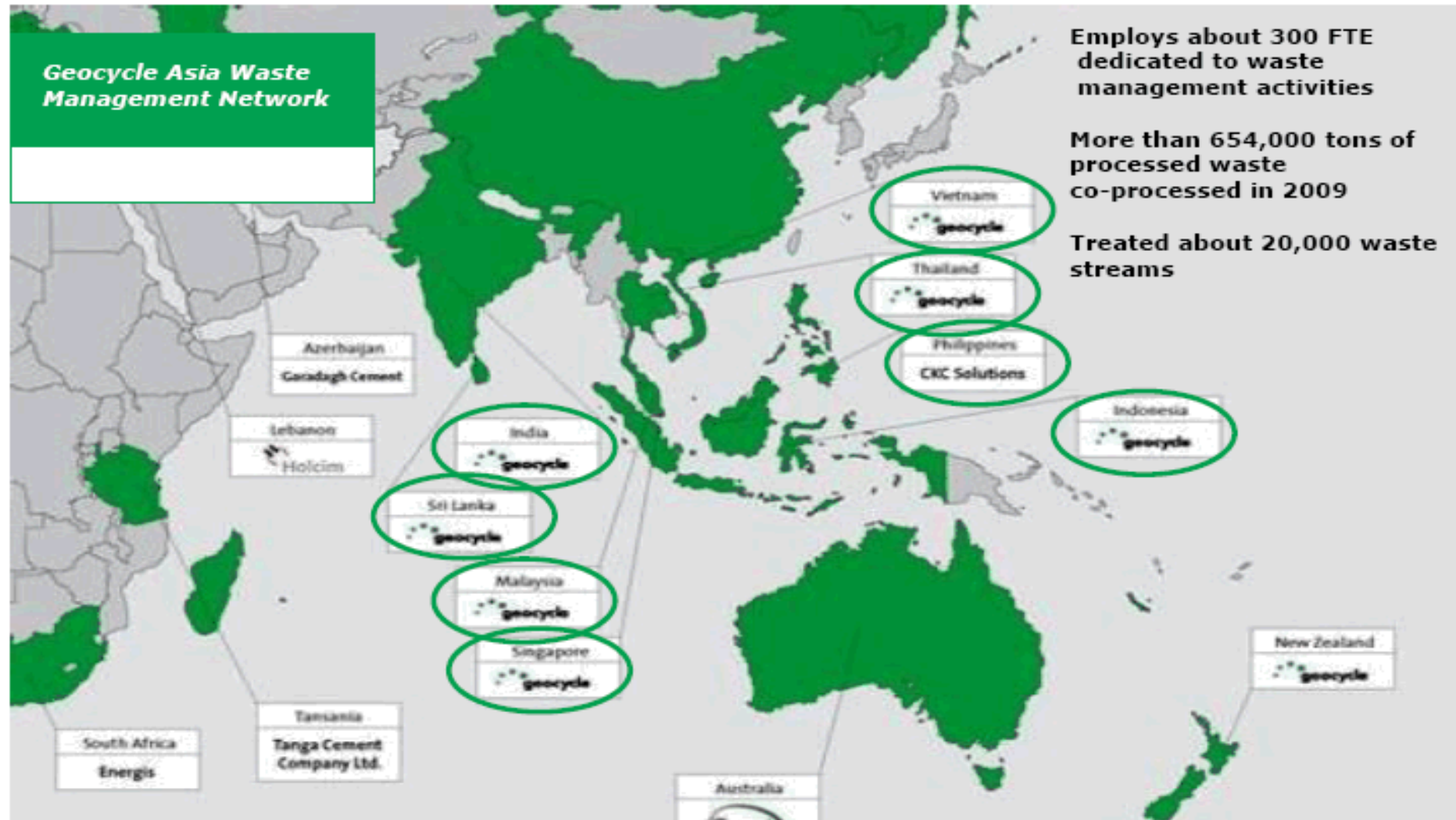
Our Vision

To be the preferred **total solutions provider** for industrial waste in Sri Lanka

Geocycle's global presence



The Geocycle Asia Waste Management Network



Permits, License and Certifications

Entire waste management chain in Geocycle is certified for ISO 9001, ISO 14001 & OHSAS 18001 and Geocycle laboratory is certified for ISO 17025-Laboratory Accreditation



Generic permit for schedule waste co-processing from PEA NWP



Scheduled & non hazardous waste collection, Transportation & preprocessing license from CEA



First Integrated Certificate in Sri Lanka from DNV

Waste co-processing

Using the cement manufacturing process to recycle, reuse, or treat waste while simultaneously manufacturing cement in a single combined operation

Features

- ✓ Flame temperatures 1800- 2000 °C
- ✓ Residence time 4-6 s
- ✓ Total destruction of material under controlled conditions
- ✓ No organic residue from the process



Our wide range of services

- Waste management solutions
 - Collection
 - Transportation
 - Pre processing and Co processing
- Consultancy Services in waste management activities
 - In house waste management



Non-hazardous wastes

- Biomass (saw dust, rice husk, wood etc.)
- Fabric wastes
- Industrial waste plastics and polythene
- Industrial rubber related products
- Glass
- Porcelain / Ceramic wastes
- Mill scale / Iron slag
- Tiles & brick wastes
- Fly ash / Bottom ash
- Branded products (branded garments, branded consumable, confiscated cigarettes etc)



Hazardous wastes / Scheduled

- Industrial sludge (Treatment plant sludge, petroleum sludge, ink and dye contaminated sludge etc)
- Mineral oil & oil contaminated wastes (liquid, semi liquid) -
- Solvent wastes (halogenated & non-halogenated) -
- Waste paints, lacquers, varnish etc.
- Waste agrochemicals, pesticide, insecticides etc.
- Waste pharmaceuticals
- Wood preservative wastes
- PCB, PBB, PCT wastes
- Containers & solid waste contaminated with hazardous materials



Laboratory services



- Analysis and testing
 - Registered in the CEA
 - ISO 17025 certified
 - Accredited by Sri Lanka Accreditation Board
 - Heavy Metal Analysis
 - PCB analysis
 - Heat Value, Flash Point, Viscosity Analysis
 - Sulphur, Chloride Analysis

Total solution services for CDPLC

Type of waste	Before Geocycle operations	Current operations with Geocycle
Used Copper Grit	Municipal land filling	Used as an aggregated in cement block manufacturing
Sludge	Municipal land filling	Cement kiln co-processing
Waste Oil	Sold to cottage industries via contractors	Cement kiln co-processing
Food waste from Kitchen	Municipal land filling	To a farm as livestock for pigs
Coconut Shells	Municipal land filling	Used as a raw material in activated carbon manufacturing
Polythene	Municipal land filling	Cement kiln co-processing
Cardboard	Municipal land filling	Recycling



HLL is more committed towards proactive env management..

- Proactive ecology management through thorough biodiversity surveys with IUCN partnership



Semi wetland under monitoring



Naturally vegetated semi wetland under monitoring

Partnering with state & UN bodies



- IUCN & HLL Partnership program on biodiversity management and ecological enhancement
- First 'Chemical leasing promoter' in Sri Lanka with UNIDO and NCPC
- State – HLL joint ventures / partnerships
 - Supported Central Environmental Authority in hazardous waste manifest preparation
 - Act as the industrial technical partner in 'Stationery Sourced Emission Standard – Sri Lanka' – developments
 - Experiences sharing and capacity building of regulators on 'HM & PCDDF sampling & monitoring' in gaseous phase – annually
 - Steering committee member 'POPs & PCB National Action Planning' – Basel Convention
 - First private party working with the Paelaeobiodiversity Study group – MoENR & Archeology Dept

Supports to improve Solid Waste Management in Puttlam Municipal Area with IUCN

- We support to : Start up a solid waste recycling center and composting center
- Further assisting to ecologically dispose the sorted plastic / polythene waste



Rehabilitation of Mined Corals with IUCN

- Deployed 15 structures at Unawatuna using Holcim cement
- Regular monitoring on coral



Disposal of electronic waste

Environmental friendly disposal through Holcim Lanka (Pvt) Ltd.

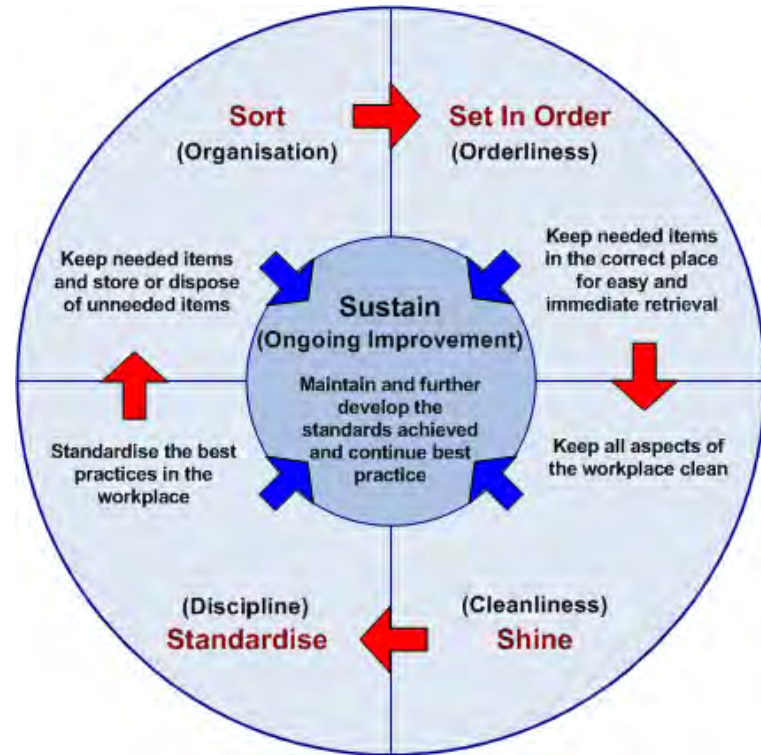


Hazardous Waste - Management Options

- Store permanently
- Retrievable storage
- Can be inspected and periodically retrieved.
- Secure landfills
- Modern, complex landfills with multiple liners and other impervious layers and monitoring systems.



TOXIC



5S is a system to reduce waste and optimize productivity through maintaining an orderly workplace.



How 5S concept is effectively practiced at Maliban.



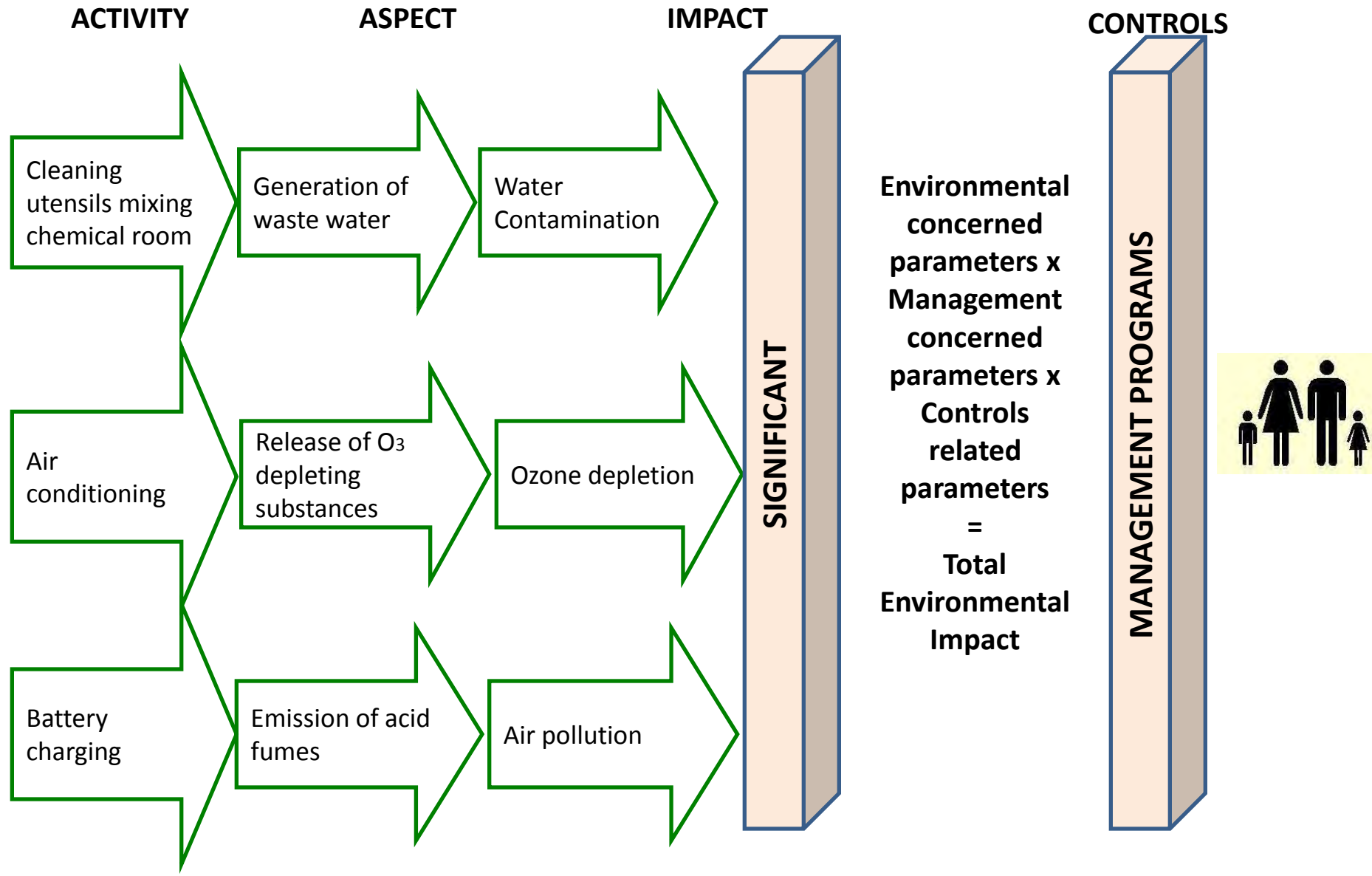


Quality Circles

- Maliban has formed quality circles in all departments in order to encourage employee suggestions to resolve work related problems and achieve company objectives through team work.
- They have been rewarded for high performances at the annual quality circle conventions.



Environmental Aspect Evaluation





Environment Management Project

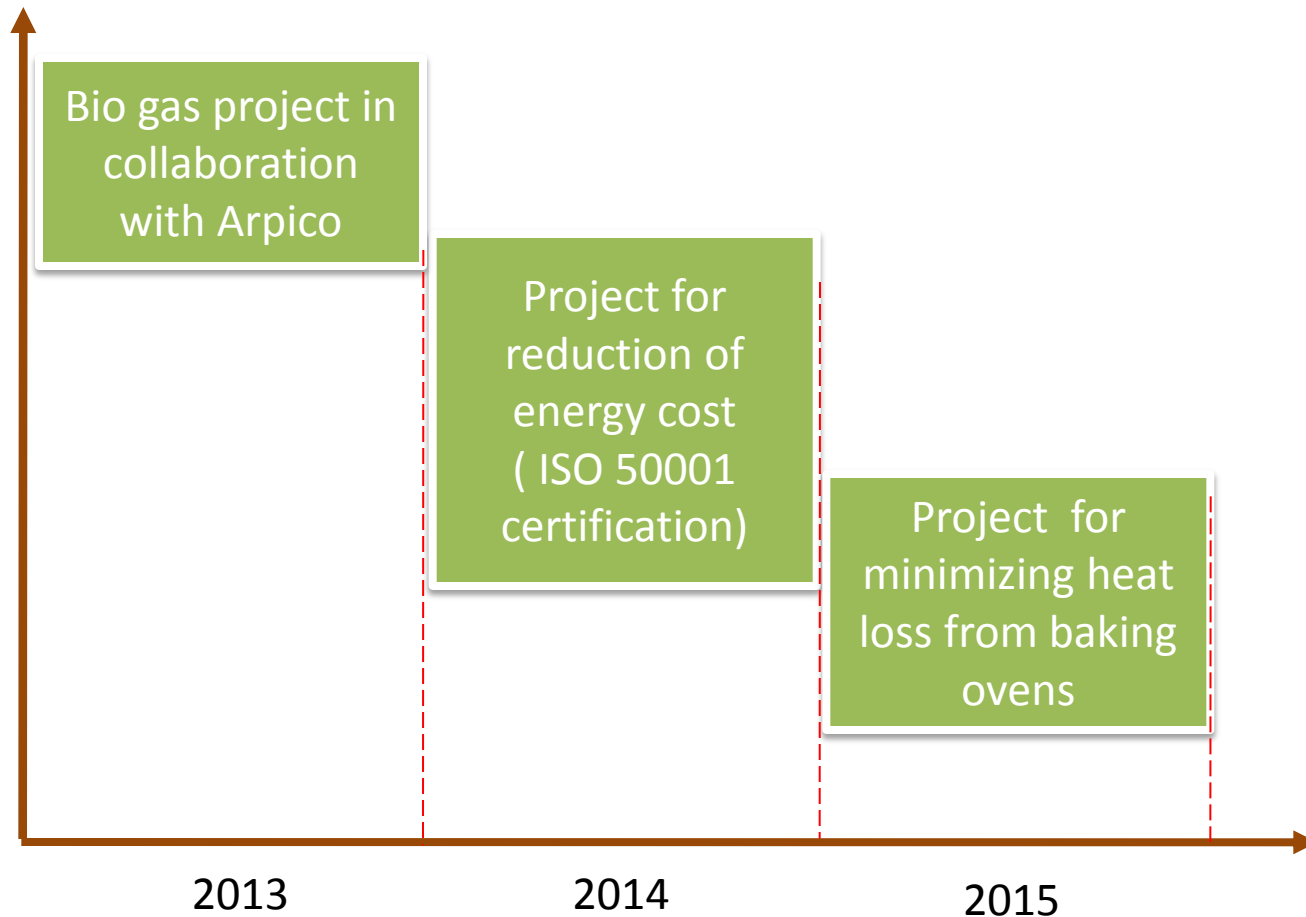
Setting up a Waste Water Treatment

Waste water is discharged water from production activities, lunch rooms and wash rooms. For a month an average of about 180,000 gallons of water is consumed.

Water released from production activities and lunch rooms are collected into tanks through fat traps are collected manually and disposed as semi solid waste. They are used for making animal feed by waste contractors. Waste water treatment plant was set up to treat the separated water by spending more than 20 million rupees. Treated water is used for watering the garden and washing toilets.



Future Development Plans





Thank You

Beneficial use of MSW for Industries

*Challenges in an Asian context with example from
China*

Ib Larsen

*Regional MSW System Development Manager, Holcim Asia
Network*



A member of the Holcim Group

Content of presentation

- MSW processing for absorption by cement kilns in general
- Additional issues for MSW processing in an Asian context
 - *Very high organic content and moisture*
 - *Strong informal sector*
- Current activities to manage the additional issues for ASIA
 - *Waste drying processes and projects*
 - *Bio-drying. Holcim plant in China*
- Conclusion

Processing MSW for kiln absorption

- MSW is especially difficult to upgrade for positive use
 - MSW is a mix of all materials that humans use
- Upgrade always requires a complex number of processes:
 - Pre-shredding (bag-opening and initial size reduction)
 - Manual separation of recyclables and unwanted items
 - Screening/removal of undersized waste (fines and organics for compost or stabilising).
 - Removal of metals and possibly PVC
 - Mechanical sorting of remaining process waste (positive or negative manual sorting, air-classifying, gravity separation)
 - Shredding of the process waste and subsequent removal of fines in 15-20 mm screens
 - Size reduction, depending on specific usage



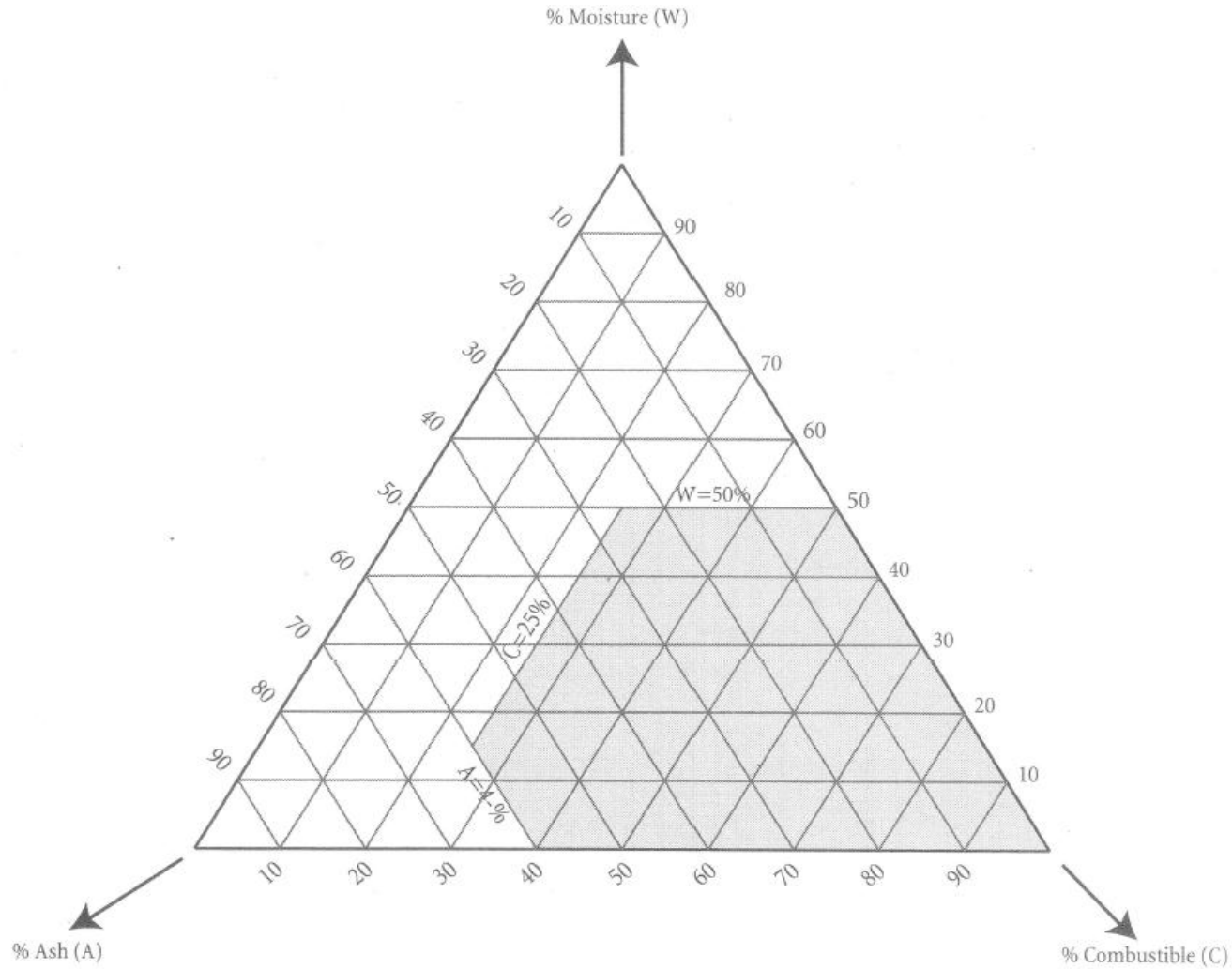
Processing Municipal Solid Waste –Asia

- MSW in Asia
 - very high content of putrescible organic waste (food waste)
 - Very high moisture content
 - Combustion value negative or very low
 - Sorting extraordinary difficult:
(Waste fractions stick together – mud)
 - A large informal sector is active in waste sorting

Typical waste composition - Europe and Asia

COMPONENT	ASIA (JAKARTA) PERCENTAGE (%)	TYPICAL EUROPE PERCENTAGE (%)
Food and Yard Waste	67	20
Paper	6	40
Plastic	17	6
Metal	0.5	8
Glass	1	8
Other (textiles, stone, sand, etc.)	8.5	18
TOTAL	100	100
Moisture content %	55-60	20-25

Requirements for waste to be combustible



Informal material collection (Jakarta)

Recycling level:

- Recycling at households and during collection: 20-25%
- Recycling at landfill: 5-10%

Components:

- Households selling the recyclables to vendors
- Collectors and scavengers operating at
 - household waste piles and bags
 - Hand chart collection
 - temporary storage sites
 - Collection vehicles
- Landfill

Materials:

- At households and during collection:
 - Glass, metal and rubber (close to 100%)
 - Wood and plastic (approximately 50%).
- At the landfill:
 - low grade thin plastic bags and wood.



Informal material collection

- *Any solution will have to respect the livelihood of the informal waste sector*
 - Establish sorting facilities with improved working conditions in front of the waste processing
 - Engage informal sector for the sorting activities
 - Informal sector owns recyclables
 - Informal sector are employed

Adopted waste drying methods in Asia

Thailand



Vietnam



Vietnam



India



India



Adopted waste drying methods in Asia

- Sun-drying or storage dewatering:
Highly space demanding (slow process)/ weather depending
- Hot-air and mechanical press dewatering:
High energy demand

Holcims solar drying plant Sri Lanka

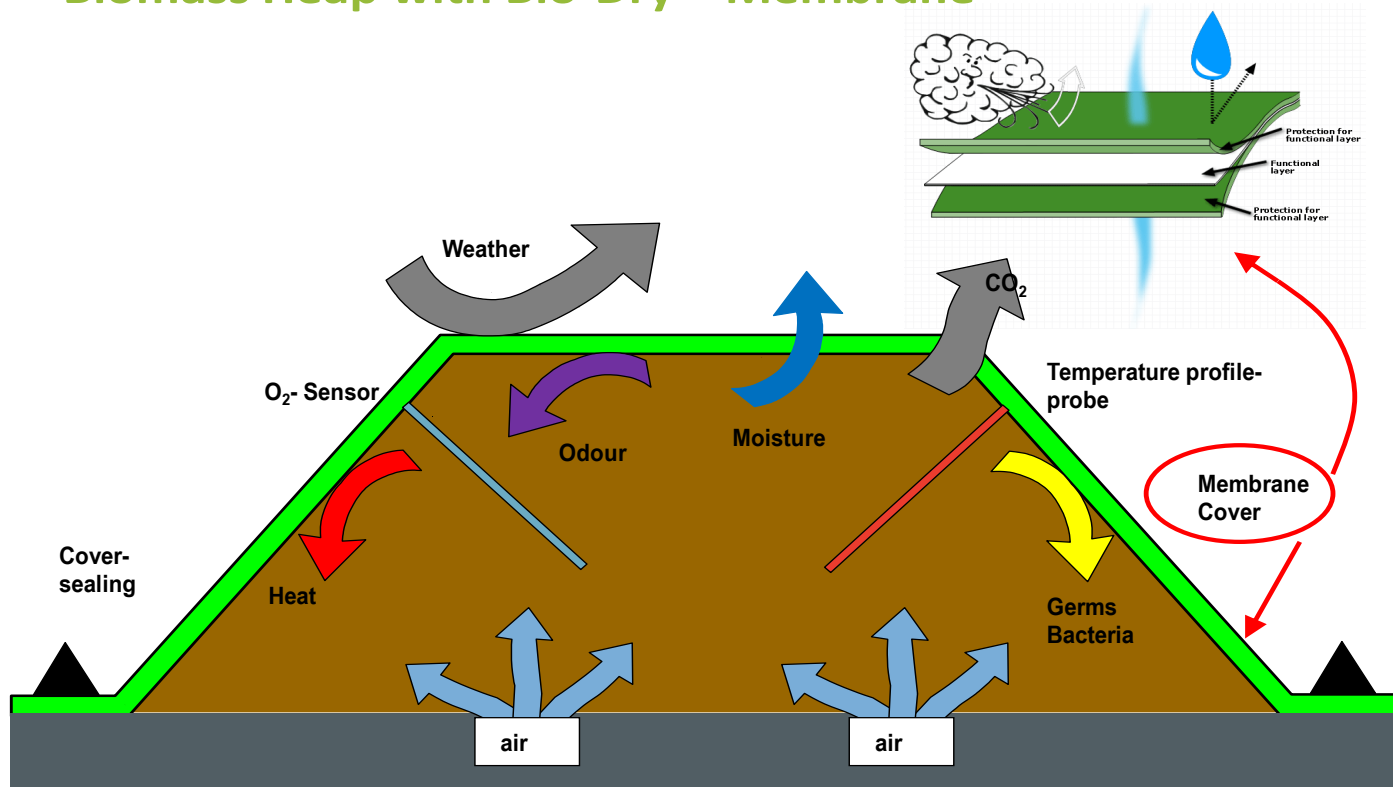


New development for Asia: Bio-drying

- Include the organic fraction (or parts hereof) in the fraction for combustion
- Utilise the heat from the natural decomposing of organic material to evaporate moisture
- Remove the vapor by slight airstream
- processes:
 - under semi-permeable membranes
 - in chambers

Membrane bio-drying principles

Bio-Dry™: Cross- Section of Waste or Biomass Heap with Bio-Dry™ Membrane



Membrane bio-drying plant



Holcim chamber bio-drying testing



Vietnam

Guatemala

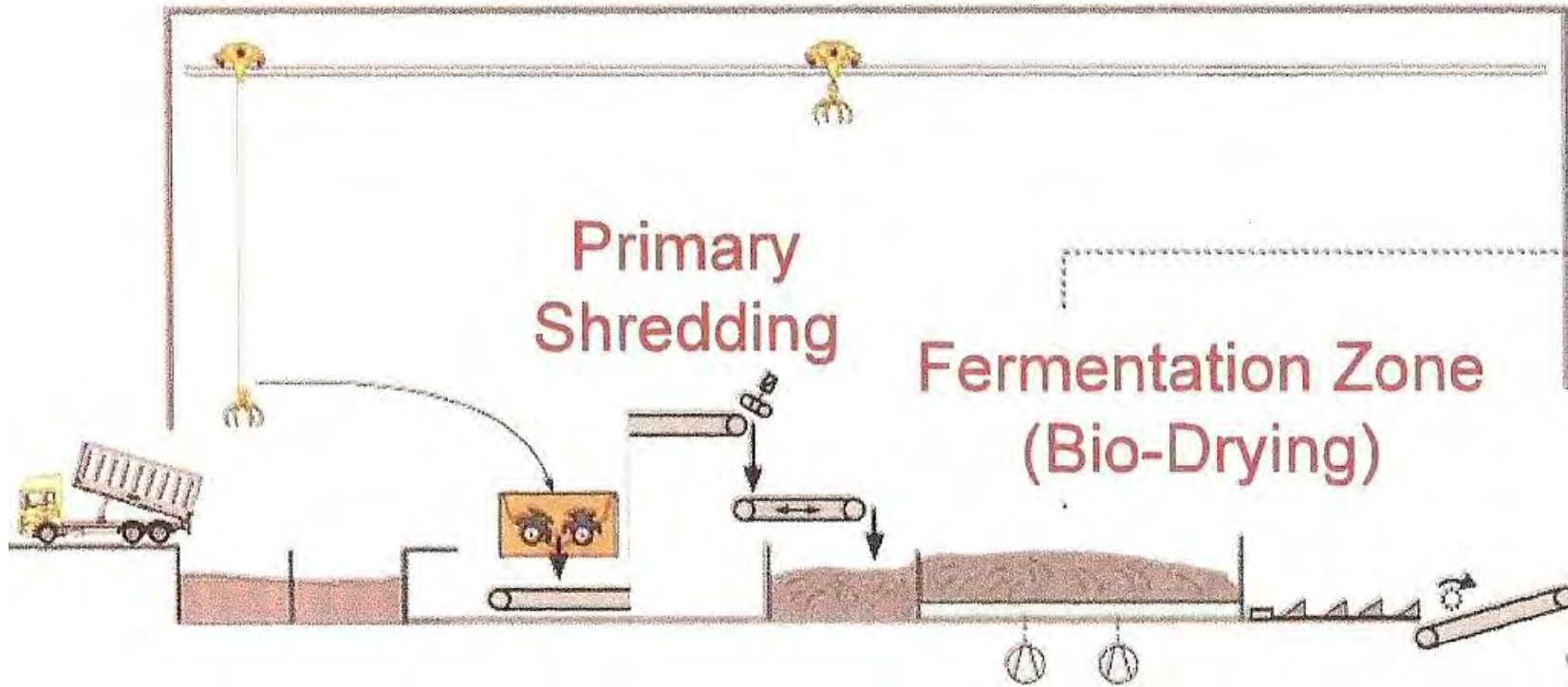


Bio-drying plant China

Huaxin Cement,
Holcim China



Chamber bio-drying principles



Outputs from bio-dry plant

Material	%
RDF	50
Stone and glass	9
Fines	15
Metal	1
Evaporation and water run-off	25

Conclusion

- Preparing MSW to be absorbed by cement kiln is a complex process
- The wet waste with high organic content in Asia necessitates drying as an **additional** step to the MSW processing to prepare for combustion
- Bio-drying as the additional step allows for very high levels of landfill avoidance due the inclusion of the organic waste in the combustible fraction and reduces costs for the drying process
- Holcim is committed to assist the society in solving the problem with disposal of MSW and to assist society in developing and implementing the most efficient technologies and processes



Because tomorrow matters



HAZARDOUS WASTE GENERATION , MANAGEMENT & CURRENT SITUATION IN SRI LANKA

***K.H. Muthukudaarachchi,
Deputy Director General
Environmental Pollution Control Division,
Central Environmental Authority***

Contents

I

Overview

II

General Status

III

Major Work Status

Hazardous Waste:

The term hazardous waste refers to any solid, semisolid, liquid, or gaseous waste that cannot be handled by routine waste management methods because of biological, chemical or physical properties that may pose a danger to living organisms, materials, structures, or the environment. In some cases it may be a mixture of solid, liquid or gaseous components.

Hazardous substances include, but not limited to;

- ☐ poisons,
- ☐ Explosives
- ☐ Flammables
- ☐ Oxidizers
- ☐ Irritants
- ☐ Explosives
- ☐ Pesticides
- ☐ acids, caustics,
- ☐ pathological waste and radioactive wastes.

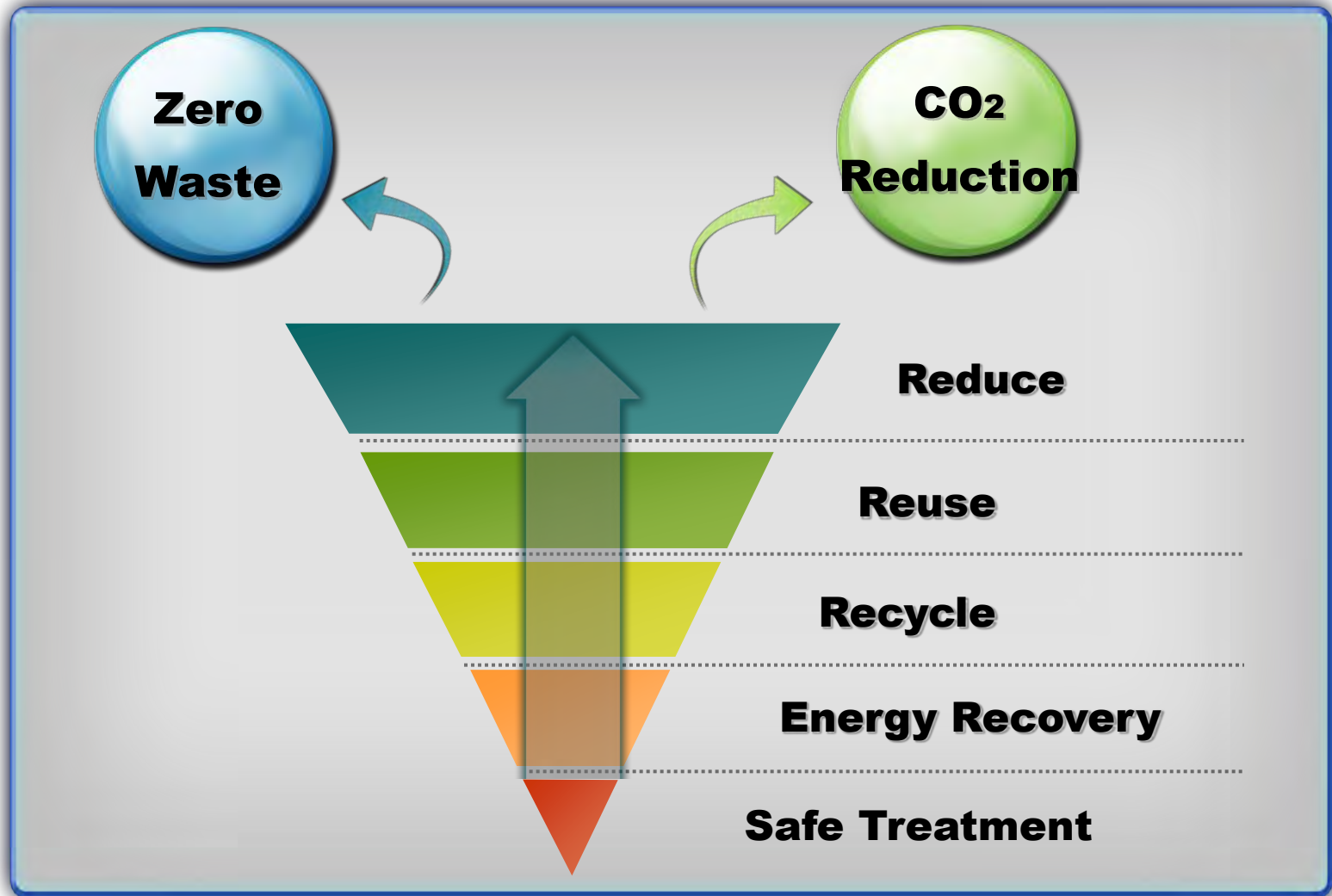
ISSUES;

- Non-availability of a proper facility for the disposal of HW in the country
- Lack of adequate testing facilities in the laboratory
- Lack of proper procedures for implementation of HWM regulation (set formats / guidance manuals etc)

ISSUES; contd.....

- Lack of an insurance scheme to cover the risk arising during handling of HW
- Lack of resources

Waste Management Hierarchy



Major HW generating sectors covered under the SWML procedure

- Agro chemicals repackaging
- Textile washing & Dye industries
- Waste oil handling & processing
- E –waste processing
- Tyre Manufacturing
- Healthcare waste management
- Power generation
- Metal processing industries

Current Disposal practices

- Dispose along with the Municipal waste
- Market the scrap containers
- Burring
- Thermal destruction

Measures currently adopted ;

- ❑ Direction of certain hazardous waste to dispose at Holcim Cement Kiln**
- ❑ Promotion exportation of (certain) HW**
- ❑ Temporary storage at the site of generation**

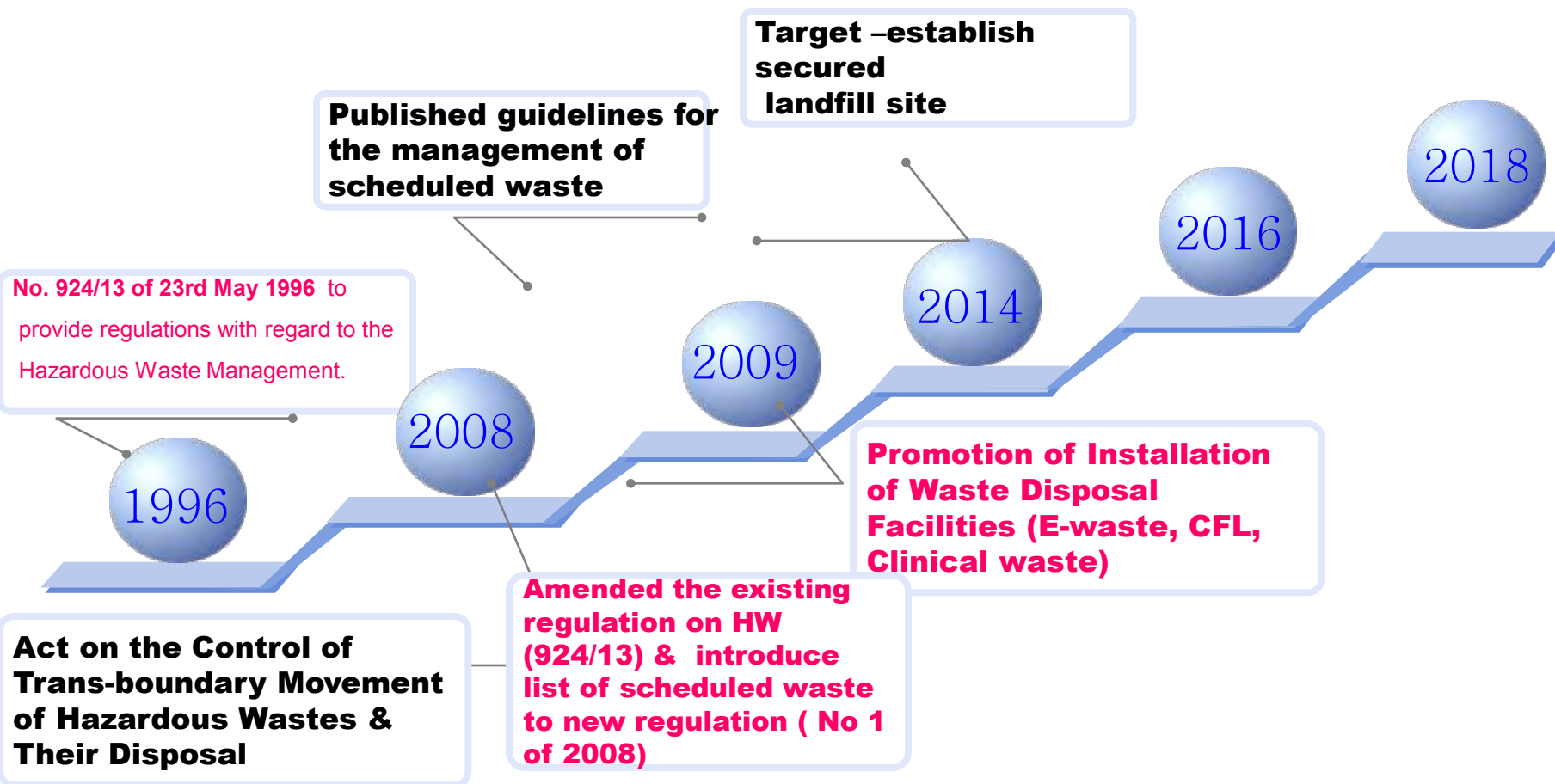
Private sector involvement in the HWM

- Geocycle (Pvt) Ltd – destruction of HW under the Thermal destruction
- Asia Recycling - Recycling of florescent bulbs
- Finlay Rentokil (pvt) Ltd – Management of clinical waste

Techniques could be used to manage HW;

- **Promote recycling**
- **Encourage CP interventions (through EPL procedure)-to reduce quantity of waste**
- **Development of guidelines on proper handling of hazardous wastes**

History of HW Legislation



E waste as a HW , What is E Waste

- **E-Waste for short - or Waste Electrical and Electronic Equipment (WEEE) - is the term used to describe old, end-of-life or discarded appliances using electricity.**
- **It includes computers, consumer electronics, fridges etc which have been disposed of by their original users.**

Why It is a Problem

- E Items are complicated assembly of more than 1,000 materials, many of which are **highly toxic**, such as chlorinated and brominated substances, toxic gases, toxic metals, biologically active materials, acids, plastics and plastic additives.
- Most consumers are **unaware** of the toxic materials

Result ? How they stored



Burned to get the valuable metals



- This releases heavy metals such as lead, cadmium and mercury into the air and ashes & emits carcinogenic gases

At their back yards



Management Tools

- **Producer Responsibility**
- **Polluter pays principle**
- **Regulations**

E Waste Management

- **Regulation**
 - e waste has been prescribed as scheduled waste that requires a license for handling by the National Environmental (Protection & Quality) regulation No. 01 of 2008 published by the gazette notification No 1534/18 on 01.02.2008.
 - According to this regulation;
 - Generator, Collector, Transporter, Storer, Recycler, Recoverer ,Disposer
- Should obtain the License for Scheduled waste Management From the CEA

Initiatives Taken by the CEA

M-Waste Management Programme

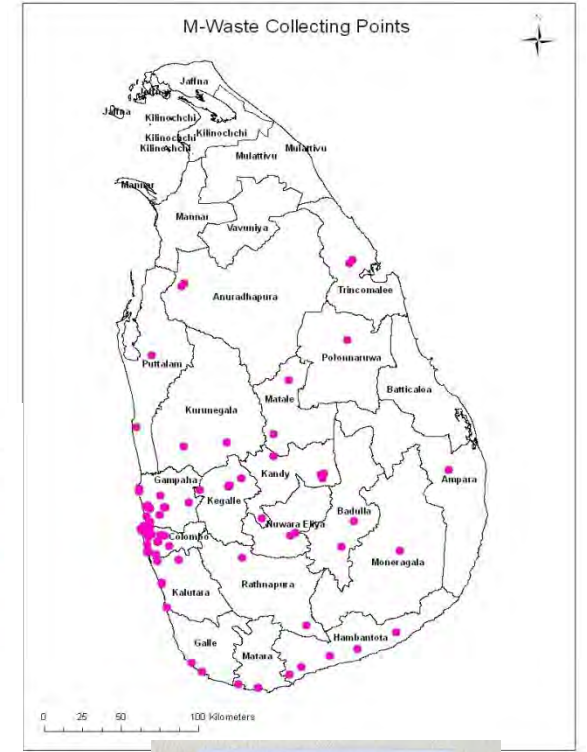
In 2009 CEA signed MOU with Dialog to to establish islanwide collection systems for used Mobile Phones



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මත්තීය சுற்றாடல் அதிகாரசபை மற்றும் டயலாக் டெலிகொம் இணைந்து ஒழுங்கு செய்யும்

භාවිතයෙන් ඉවත් කළ ජංගම දුරකථන හා
උපාංග කළමනාකරන ව්‍යාපෘතිය

உபயோகமற்ற கையடக்கத் தொலைபேசி மற்றும்
அதன் பாகங்களை முகாமைத்துவப்படுத்தும் நிகழ்ச்சித்திட்டம்



- 2010 CEA entered in to an MOU with 14 partner companies to manage E waste in national level. This programme implements under common theme “*Ensuring an E waste Free envionment*” and logo

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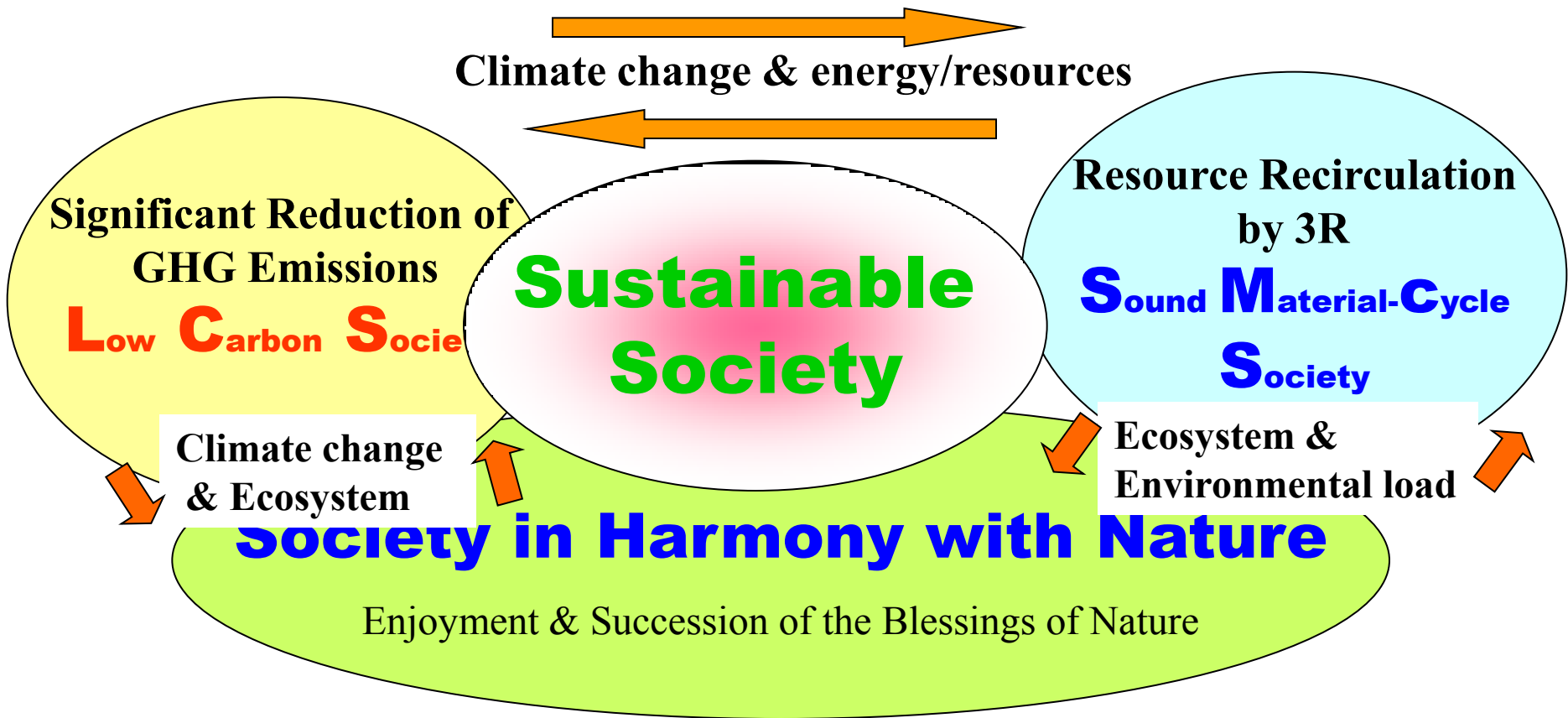
•Organizing E Waste Drop-Off events

Considered as one of the most successful practices

Average 3 tones of E waste had been collected in one event



Concept of Sustainable Society



Source: Annual Report on the Environment and the Sound Material-Cycle Society in Japan 2008

Green Technology Industry as New Growth Engines

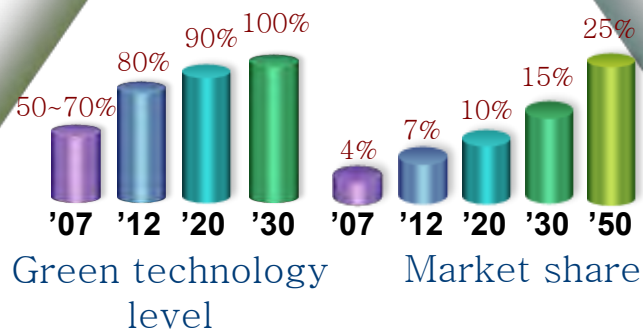
Green Technology Development

- Next generation new & renewable energy, Clean fossil fuel energy (IGCC, CCS), Solar photosynthesis, Artificial sun
- Green home, Green TV, etc.

Green Market Pre-occupation

- Green industry global standard preoccupation
- Hydrogen fuel cell, solar energy etc.

Obtainment of Competitiveness



Green industry activation

- Construction of 'next generation green technology industry cluster'
- Construction of high intelligent green network



Thank you!