International E-Waste Management Network (IEMN)
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Introduction to ESM best practices for e-refurbishers & e-recyclers in North America

(based on NAFTA CEC training modules)

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ESM is the right thing to do

- Taking all practicable steps to ensure that used & end-of-life products & wastes are managed in a manner that will protect human health & the environment

ESM guidance share key "generic" concepts…

OECD

Core Performance Elements

1. Environmental Management System
2. Safeguard Occupational & Environmental Health & Safety
3. Monitor, Recording & Reporting Programmes
4. Training Programme
5. Emergency Plan
6. Plan for Closure & After-care (with Financial Guarantees)

UN Basel PACE

ESM Criteria

1. Top Management Commitment to a Systematic Approach
2. Risk Assessment
3. Risk Prevention & Minimization
4. Legal Requirements
5. Awareness, Competency & Training
6. Record-keeping & Performance Measurement
7. Corrective Action
8. Transparency & Verification

… & identify operational-specific "best practices"

List of accepted e-products

Assess suitability of feedstock for reuse / recycling

Test & document functionality of refurbished products

Depollute feedstock prior to shredding / crushing

Use proper personal protective equipment

Handle hazardous components with special care

Implement pollution control & abatement measures

Package equipment properly

Ensure safe & secure storage & transport

Assure data security & destruction

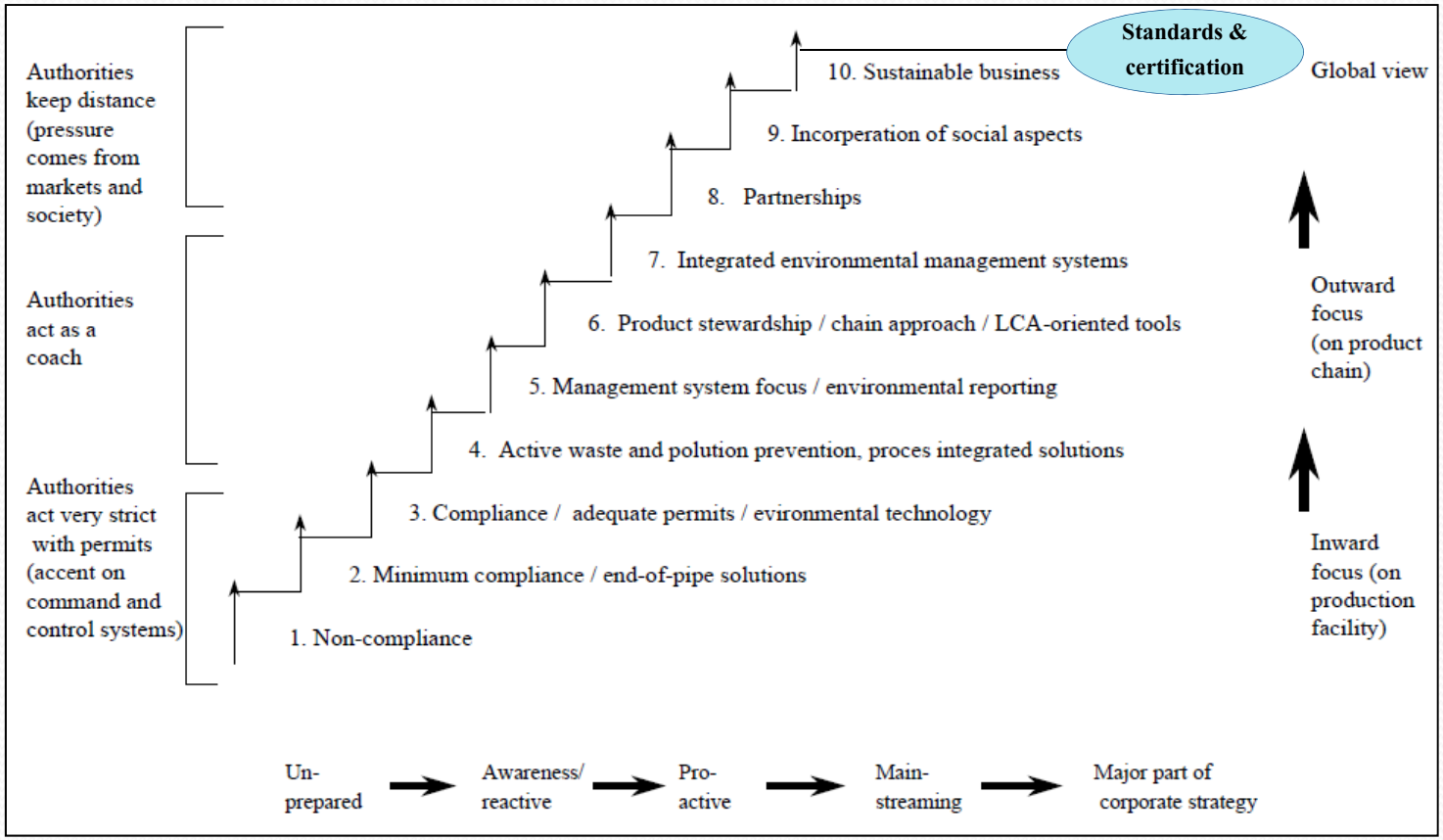
Assure downstream service providers practice ESM

Adopt formal sector operations & activities

Understand & comply with relevant laws (including other country import restrictions)

Countries & facilities may be at different stages of ESM development

Different stages in the process of growing to a high level of environmental management



OECD Workshop on ESM of Wastes Destined for Recovery Operations (Austria, 2000)

Used & waste electronics contain substances of concern…

Electrical Component	Substances of Concern
Plastics	Phthalate plasticizers, Bromated Flame Retardants
Cathode Ray Tubes (CRT)	Lead, Antimony, Mercury, Phosphors, Barium Oxide
Liquid Crystal Displays (LCD)	Mercury
Rubber	Phthalate plasticizer, Bromated Flame Retardants
Wiring / Electrical (Interior)	Phthalate plasticizer, Lead, Bromated Flame Retardants, Copper
Motherboards / Circuit Boards	Lead, Beryllium, Antimony, Bromated Flame Retardants
Fluorescent Lamps	Mercury, Phosphorus, Flame Retardants
Batteries	Lead, Lithium, Cadmium, Mercury, Nickel
External Electric Cables	Bromated Flame Retardants, Plasticizers
Light Emitting Diodes	Gallium arsenide
Used Mobile Phones	Cadmium, Lead, Arsenic, barium, beryllium, strontium

…that pose risks to health & the environment if improperly managed

Environment

- Open burning / dumping
- Backyard smelting
- Uncontrolled acid leaching
- Processing dusts & emissions
- Residual wastes
- Hazardous components
- Spills & breakage
- Process wastewater
- Surface water runoff

Human health

- Ingestion
- Skin or eye absorption
- Inhalation
  - Brain, liver & kidney damage
  - Thyroid disruption
  - Gastrointestinal tract damage
  - Impaired neurological development
  - Weakness, muscle atrophy, twitching
  - Impaired fetal development
  - Reduced fertility
  - Anemia & respiratory failure
  - Memory & learning problems

Examples of components that can pose risks

Batteries

Screens

Heating & cooling equipment

capacitors

ink cartridges

PCB transformers

smoke detectors

mercury thermostats

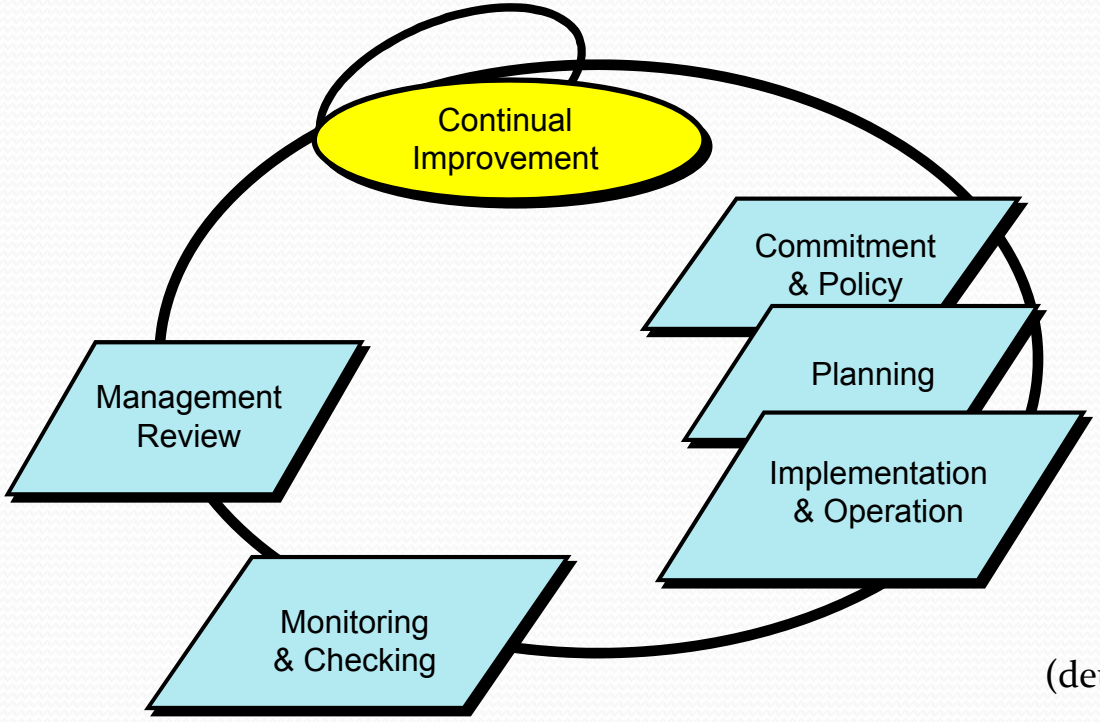
mercury bulbs

Other

Risk prevention & risk management will be presented later

Environment, Health & Safety Management Systems facilitate ESM

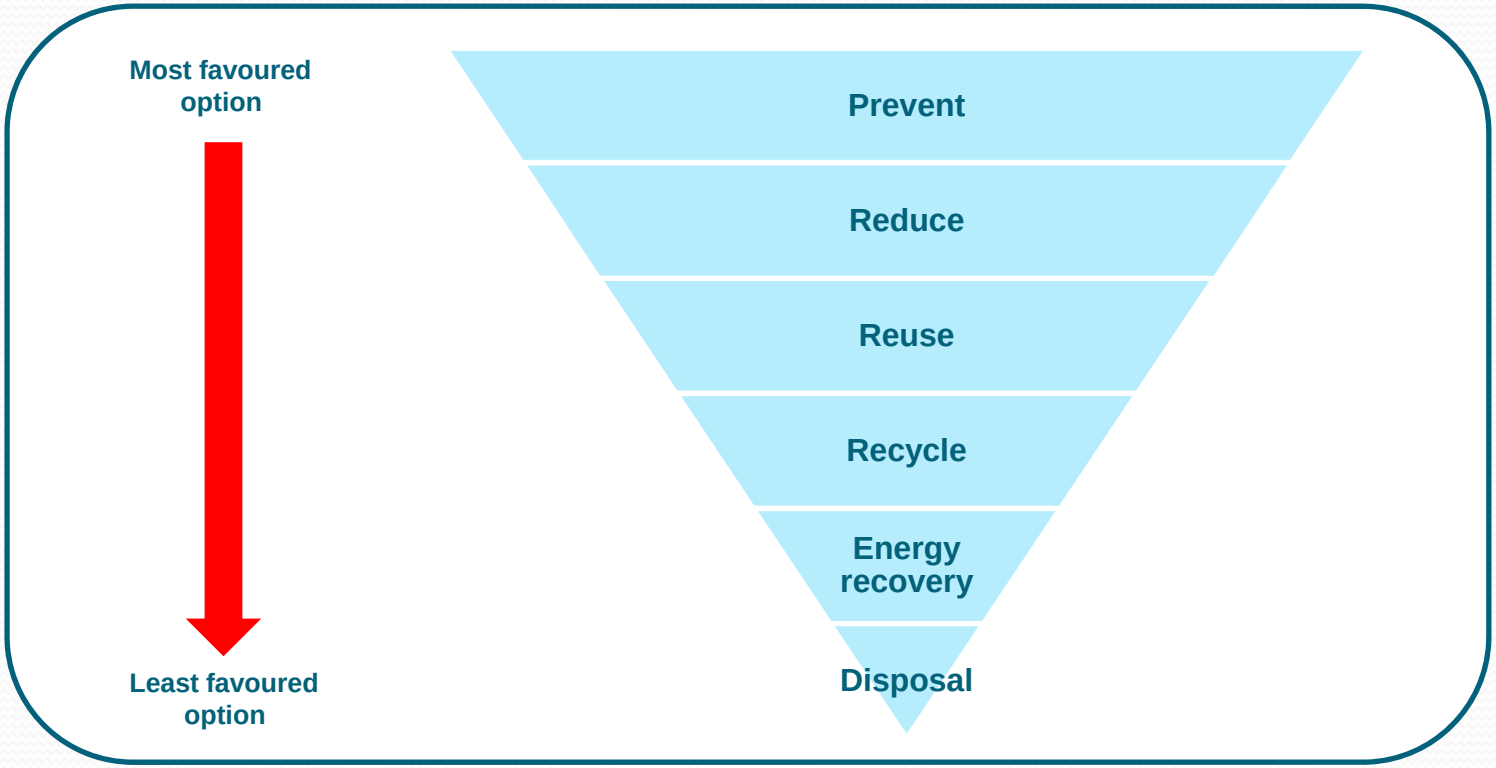
- Systematic approach to integrate environmental, health & safety considerations into day-to-day activities of an organization



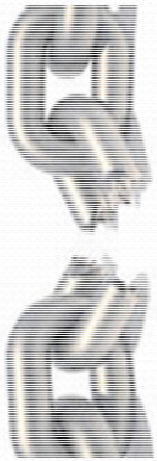
(details to follow)

ESM approaches should integrate the Waste Management Hierarchy

- Feasible opportunities for waste management should be undertaken at higher levels of this hierarchy



A chain is only as strong as its weakest link… so is ESM



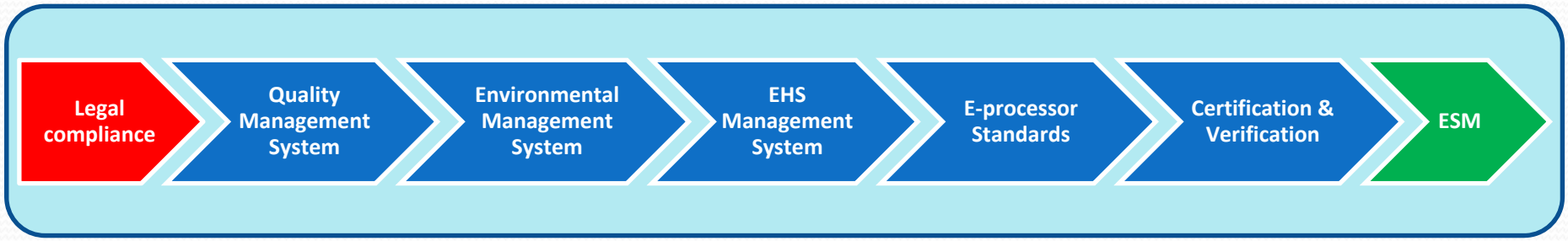
- Understand ESM needs of your country & industry sectors
- Examine country laws in place that support ESM
- Apply consistent ESM measures to support level-playing fields
- Foster complimentary approaches & exceed legal compliance

- ✓ ISO 9000
- ✓ ISO 14000 / EMAS
- ✓ OHSAS 18000
- ✓ Service contracts
- ✓ Extended producer responsibility
- ✓ Standards for e-processing
- ✓ Certification & verification schemes
- ✓ Disposal bans

What do you think?

ESM is a journey of a thousand steps

- Legal compliance is the bare minimum
- Quality control & environmental management systems are a great start
- Consider health & safety of workers & surrounding community
- Evolve to include increasingly specific provisions to protect EHS
- Identify a means to demonstrate conformity with ESM criteria



Consider industry-specific standards to support EHS needs of e-processors

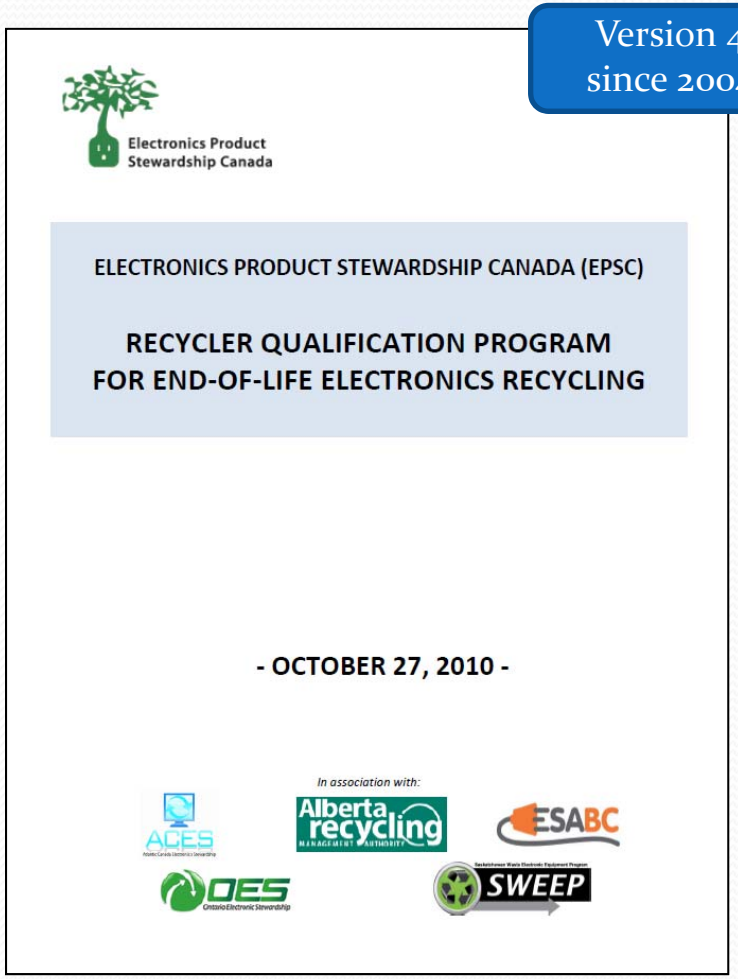
- Standards are intended to augment, not replace, regulations
- Often used if laws are absent/insufficient or inadequately enforced
- Incite change & establish a level playing field

Canadian voluntary standards

1. Recycler Qualification Program (RQP)
2. Electronics Reuse and Refurbishing Program (ERRP)

- Initially developed by manufacturers in response to EPR obligations
- Electronic Product Recycling Association (EPRA) promotes uptake across Canada
- E-processors must meet standards to participate in provincial EPR programs
- EPRA conducts third party audit & verification of e-processors

EPSC's Recycler Qualification Program in Canada considers several ESM aspects…



- EHS management system
- Legal & other requirements
- EHS risk assessment
- Environmental controls
- Health & safety controls
- Operational controls
- Data security
- Sampling, audits, inspections
- Corrective action plans
- Emergency planning & response
- Transportation
- Downstream recyclers

…& specifies acceptable processes & end points

ONLY plastics can be exported to a non-OECD country for processing under the Recycler Qualification Program

- Requires EHS controls
- Prohibits illegal shipments
- Ensures diligence downstream
- Prohibits landfilling
- Prohibits prison labour

		Disposition Hierarchy			Acceptable Processes & Points of Final Disposition							
		Material Recovery Required	Energy recovery Permitted	Other disposition Permitted	Manual dismantling and material separation	Mechanical material separation	Extraction/purification/refinement	Smelting to reclaim metal	EFW Incineration (use of material as an energy substitute)	Landfill	Hazardous Waste Landfill	Export to a non-OECD/EU country for processing
Electronic Scrap	EOLE	★			✓	✓	×	×	×	×	×	×
	Components (hard drives, chips, etc)	★			✓	✓	✓	✓	×	×	×	×
	Wires / Cables	★			✓	✓	✓	✓	×	×	×	×
	Copper Yokes	★			✓	✓	✓	✓	×	×	×	×
	Circuit Boards	★			✓	✓	✓	✓	×	×	×	×
	Metal / plastic laminates	★			✓	✓	✓	✓	×	×	×	×
Non Hazardous	Metal	★							×	×	×	×
	Mixed Metals	★							×	×	×	×
	Metal dusts (bag house)	★							×	×	×	×
	Non-leaded Glass	★						×	×	×	×	×
	Plastic		★	★				×			×	✓
	Mixed Plastics		★	★				×			×	✓
	Wood		★	★				×			×	×
	Leather, cotton and other fibres		★	★				×			×	×
	Insulation (Fibreglass / composite)		★	★				×			×	×
Substances of Concern	Leaded Glass	★			✓	✓	✓	✓	×	×	×	×
	Washed leaded glass cullet	★			×	✓	✓	✓	×	×	×	×
	Mercury Lamps	★			×	✓	✓	×	×	×	×	×
	Mercury	★			×	✓	✓	×	×	×	×	×
	Batteries	★			×	✓	✓	✓	×	×	×	×
	Ink / Toner Cartridges		★		✓	✓	✓	✓	✓	×	×	×
	Ink / Toner		★		×	✓	✓	×	✓	×	×	×
	Phosphor Powder			★	×	✓	✓	×	×	×		×
	Ethylene Glycol			★	×	✓	✓	×	×	×		×

In accordance with the Disposition Hierarchy material recovery is always preferential over other disposition methods for all materials but only required where indicated with an '★'.

Where the use of the material for energy recovery, or other disposition methods is permitted, they are indicated with an '★'.

Process/application not permitted under the ERS	×
Process/application is permitted under the ERS & subject to on-site audit	✓
Process/application is permitted under the ERS & subject to document review and verification	

Governments have an important role to play in fostering ESM

- Understand what ESM means to you
- Identify & understand existing ESM strengths & weaknesses
- Promote EHS protection through regulations & enforcement
- Demonstrate leadership (how is government e-waste managed?)

Considerations & lessoned learned…

- Identify the current situation in your country (gather baseline information)
  - ☑ Types & quantities of e-waste generated
  - ☑ Final disposition of e-waste generated (e.g. recycled versus disposed)
  - ☑ Existing laws applicable to the management of e-waste (i.e. environmental, health, safety)
  - ☑ Existing infrastructure used to refurbish & recycle e-waste
- Prioritize activities to tackle the e-waste problem
  - ☑ Collection for environmentally sound management (ESM)
  - ☑ Address regulatory gaps (including imports / exports)
  - ☑ Others?
    - Infrastructure development, knowledge transfer
    - Waste reduction, green procurement
    - Reduced hazardous substance content
    - Data security, employment growth
- Establish partnerships to help advance the e-waste agenda
  - ☑ Relevant government authorities
  - ☑ Industry & associations (including retailer associations)
  - ☑ Others as appropriate (e.g. ENGOs, NGOs, academia…)

Considerations & lessoned learned…

- Consider economically sustainable approaches for collection & ESM first
  - ☑ Ancillary benefits from EU, US & Asian restrictions on e-waste content
  - ☑ Emergence of "dirty & clean" electronic product streams is unlikely
- Clearly define e-waste & clarify the scope of products for inclusion
  - ☑ Televisions & computers are usually addressed first
  - ☑ Broaden product scope using a phased-in approach
- Extended Producer Responsibility (EPR) versus Product Stewardship?
  - ☑ EPR is often preferred but manufacturers may not exist in some countries
  - ☑ Responsibilities may also be imposed upon first importers & first sellers
  - ☑ Product stewardship often entails continued financial support from governments & taxpayers
- Voluntary versus mandatory approaches?
  - ☑ Large number of players involved in the manufacture & sale of e-products
  - ☑ Free-riders may emerge & jeopardize the success of voluntary approaches
  - ☑ Industry & business leaders often request laws to level the playing field

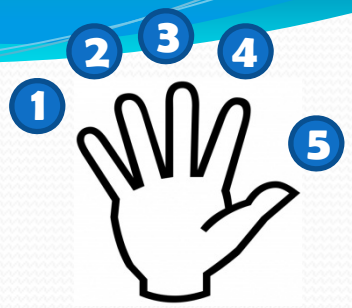
Considerations & lessoned learned…

- EPR requires producers to design, finance & implement programs
  - ☑ Industry often meet EPR responsibilities in a collective fashion
  - ☑ Government authorities typically approve programs before implementation
- Curbing disposal of e-waste relies on consumer participation
  - ☑ Ensure reasonable & convenient access to collection facilities
  - ☑ Do not impose back-end fees to drop off e-waste at collection facilities
  - ☑ Take-back programs should include a strong communications component
  - ☑ Consider the use of incentives to encourage consumers to return e-products
- Utilize "ESM-compliant" service providers to manage e-waste
  - ☑ Ensure operations are in accordance with applicable domestic & international law
  - ☑ Develop standards for environmentally sound management
  - ☑ Establish verification programs to approve service providers only if they meet standards
  - ☑ Periodically inspect service providers to assure ongoing conformity

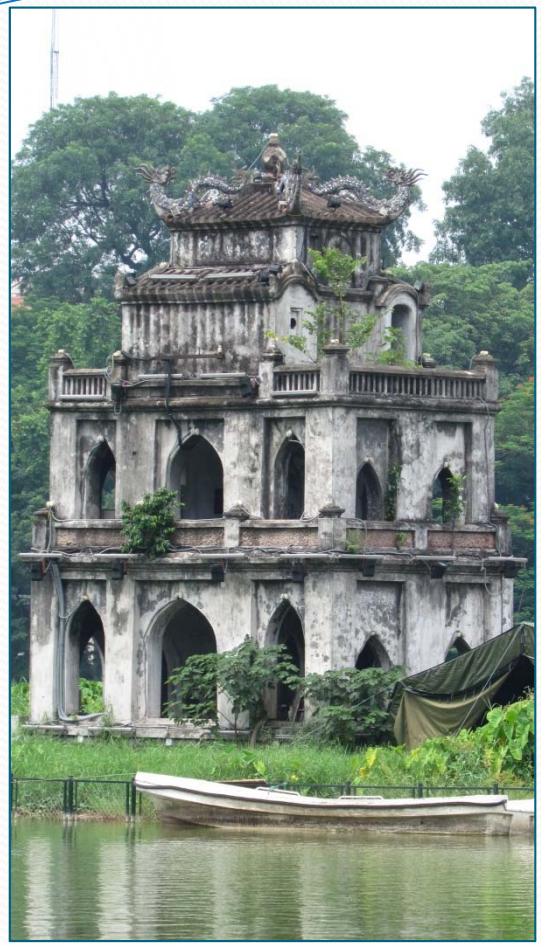
Considerations & lessoned learned…

- Programs should possess realistic, timely & meaningful targets
  - ☑ Integrated performance targets are becoming more popular
  - ☑ Establish indicators to assess how much risk is effectively managed
- Transparency is a critical aspect of program design & implementation
  - ☑ Identify interested stakeholders & consult with them along the way
  - ☑ Make annual reports publically available
  - ☑ Include third-party verified performance & financial statements (e.g. certified auditors)
- Clarify rules governing the allocation of program revenue
  - ☑ Use revenues for their intended purpose (e.g. offset costs of program delivery)
  - ☑ Consider whether financial incentives should be offered to collectors & recyclers
  - ☑ Avoid cross subsidization of product streams
- Programs should account for historical & orphan e-waste
  - ☑ Consumers will not differentiate
  - ☑ Quantities could be significant during initial stages of program implementation

Key take away messages:



1. Used & waste e-products pose risks if managed improperly
2. ESM protects the community health, worker safety & the environment
3. ESM can be achieved using complimentary approaches
4. EHS Management Systems foster systematic & continual improvement
5. ESM goes beyond legal compliance & standards certification



Hoan Kiem Lake & the Tortoise Tower
Hanoi

Cảm ơn

Thank you!