

# **PHILIPS**

## **Guide to Starting Collection & Recycling For Lighting Equipment**

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# 1. **Executive Summary**



# Executive Summary

## *UNEP en.lighten Initiative Targets 2016 to Phase Out Incandescent Lighting*

“ Pilot countries identified to plan phase out incandescent lighting and undertake C&R practices includes the ECOWAS region.

## *Importance of Recycling*

“ Compact florescent lamps (CFLs) contain a small amount of mercury. Recycling prevents the release of mercury into the environment. CFLs and other lamps often break when thrown into a rubbish bin, or disposed to landfill.

“ LED lights also contain hazardous substances. Given the increased demand for LED, recycling them is of critical importance.

“ Recycling lamps allows the reuse of the glass, metals and other materials. Virtually all components of a lamp can be recycled.

# Executive Summary

## *Global Trend*

“ Globally there is a growing number of countries adopting collection and recycling (C&R) legislation often based on the European Union Waste Electrical and Electronic Equipment Directive (WEEE).

“ A lighting industry approach exists to establishing Collection and Recycling Service Organisation (CRSO).

“ The objective being to implement and optimize environmentally and financially sustainable CRSO for end-of-life (EoL) lamps, tailored to the specific country legislation.

## *Guidelines to Start a CRSO*

“ This presentation provides an overview of guidelines for all stakeholders to start a CRSO to C&R EoL lamps.

## 2. Key Concepts



# What does "WEEE" mean? (WEEE Directive 2002/96/EC – European context)

" Waste Electrical and Electronic Equipment

" Basis is Producer Responsibility:

– Producer is at least responsible for the financing of environmentally sound disposal of their products at an end-of-life stage. – Producer does not mean "the manufacturer".

" Definition of Producer: the one, independent of the sales method, who:

Produces and Sells Products under brand name;

Resells under their own brand products produced by another supplier (Private Labels); and

Imports or exports on a professional basis into a country.

# **Waste Electrical and Electronic Equipment (WEEE) is the Fastest Growing Waste Stream Around the World**

The EU WEEE Directive has been in force since February 2003. The legislation introduced the concept of producer responsibility and requires producers to set up collection schemes. The objective of these schemes is to increase the collection and subsequent recycling and/or re-use of WEEE.

Typically markets outside the EU use the WEEE Directive as a reference to formulate regulation.

Philips has been at the forefront of setting up producer responsibility collection schemes, starting in the Netherlands in the late 90s. We have advised the EU on developing the WEEE Directive and are doing the same with other governments around the world such as Indonesia.

Philips continued expectation by 2015 about 75% of all countries will have some form of WEEE legislation.

# Majority Have Phase Out Regulations for Inefficient Incandescent by 2016



Source: UNEP en.lighten Initiative update January 2013

# Europe Established CRSO Complying With the WEEE Directive, Managing C&R for EoL



## 1<sup>ST</sup> WEEE C(R)SO MANAGERS CONFERENCE

Hungary // Budapest

30 November & 1 December 2006

- |  |  |  |                         |  |
|--|--|--|-------------------------|--|
| 1 Austria<br>UFV-Altampen<br>Systembetreiber               | 11 Greece<br>Appliances<br>Recycling S.A.                    | 21 Poland<br>ElektroEko                        | 26 Spain<br>AMBILAMP    | 28 Switzerland<br>Sättung Licht<br>Schweiz |
| 2 Belgium<br>LightRec                                      | 12 Hungary<br>ELECTRO-COORD                                  | 22 Portugal<br>AMB3E                           | 27 Sweden<br>El-Kretsen | 29 United Kingdom<br>Recolamp Ltd.         |
| 3 Bulgaria<br>under construction                           | 13 Ireland<br>WEEES Ireland<br>(Recolight lit. lamps sector) | 23 Romania<br>Recolamp (Romania)               |                         |  |
| 4 Cyprus   | 14 Italy<br>Ecolamp  | 24 Slovakia<br>EKOLAMP-<br>Slovakia            |                         |  |
| 5 Czech Republic<br>EKOLAMP                                | 15 Latvia<br>SIA "Ekogasma"                                  | 25 Slovenia<br>ZEOS<br>(EKOSIJ lamp<br>sector) |                         |  |
| 6 Denmark<br>Lyskildbranchens<br>WEEE Forretning           | 16 Lithuania<br>under construction                           |  |                         |  |
| 7 Estonia<br>Ekogasma<br>SIA Eesti Filiaal                 | 17 Luxembourg<br>Ecolamp                                     |  |                         |  |
| 8 Finland<br>FLIP  | 18 Malta   |  |                         |  |
| 9 France<br>Rivoyati                                       | 19 Netherlands<br>LightRec NL                                |  |                         |  |
| 10 Germany<br>Lightcycle (CSO)<br>LARS (RSO)<br>OLAV (RSO) | 20 Norway<br>ES-Recur  |  |                         |  |

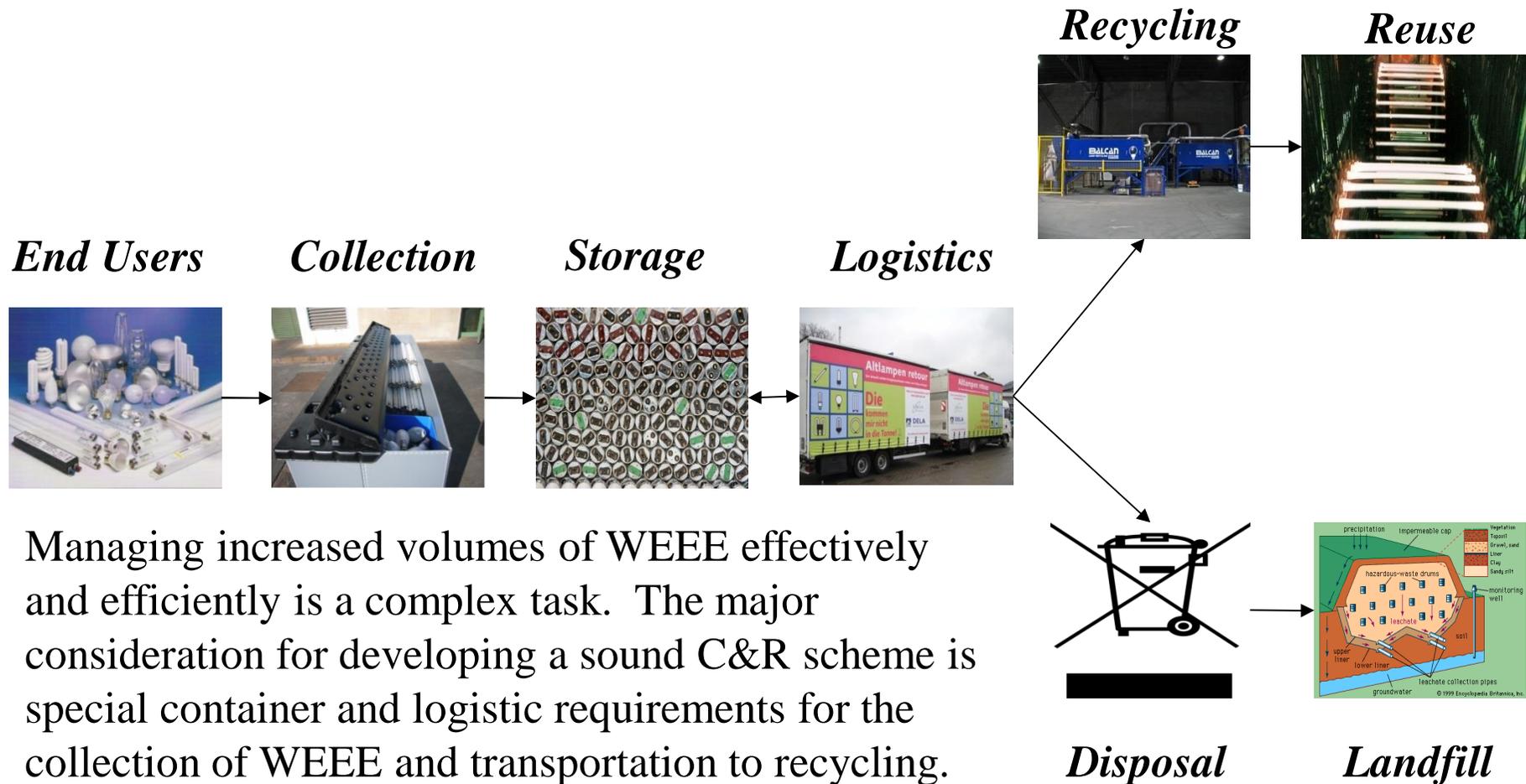


Current collection rates in the EU average around 38% or approximately 530 million end of life lamps per annum.

### **3. Outline of C&R**

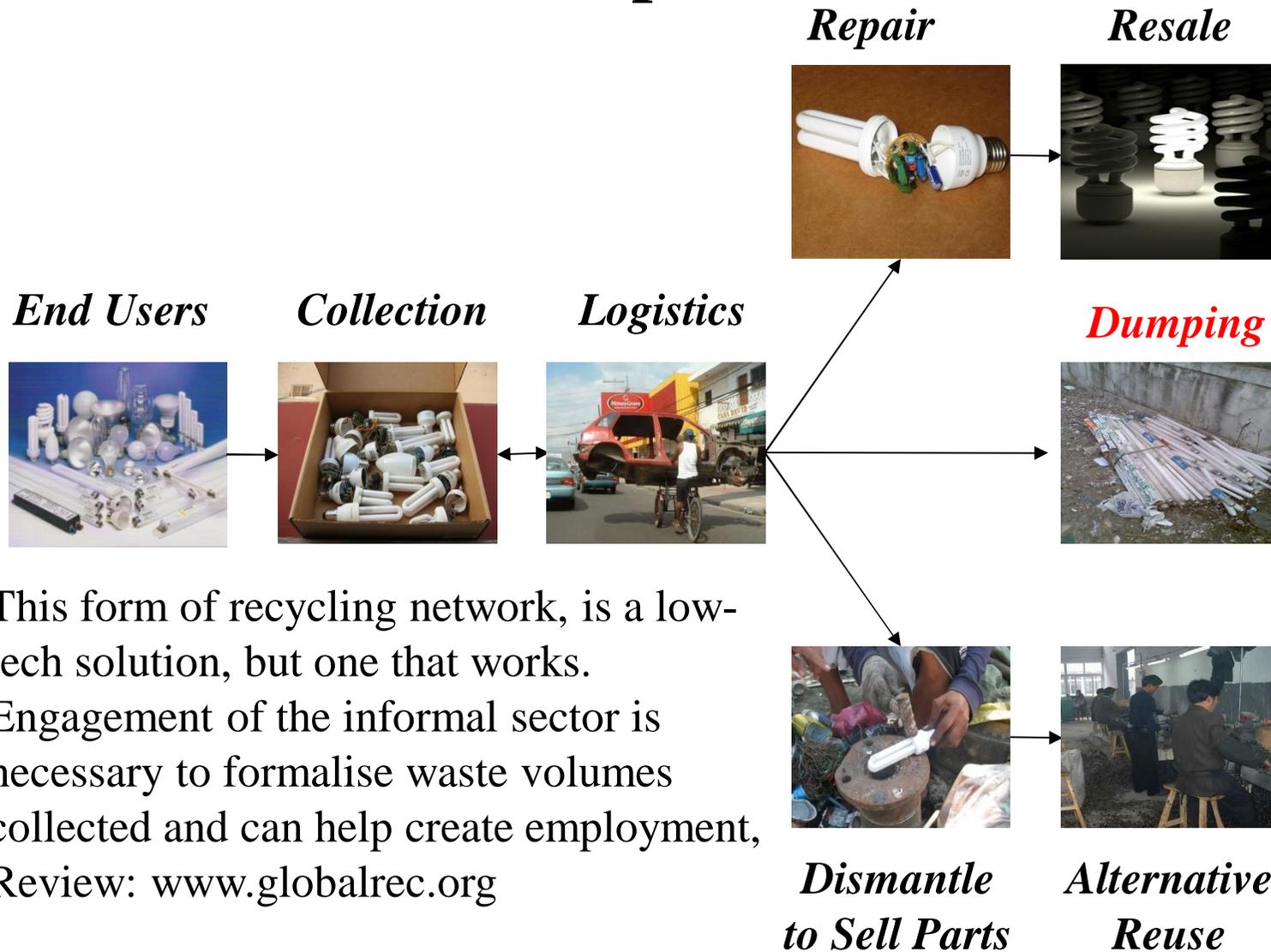


# Understanding Formal Flow for End of Life Lamp C&R



Managing increased volumes of WEEE effectively and efficiently is a complex task. The major consideration for developing a sound C&R scheme is special container and logistic requirements for the collection of WEEE and transportation to recycling. A standard split of C&R time and cost effort is 90% collection and 10% recycling.

# Understanding Informal Flow for End of Life Lamp C&R



## **4. Guidelines to Implement**



# End Users Profile

” No distinction can be made between household and professional end of life lamps.

## *Define WEEE from Private Households*

WEEE from private households means WEEE which comes from private households and WEEE which comes from commercial, industrial, institutional and other sources which, because of its nature and quantity, is similar to that from private households. Waste likely to be used by both private households and users other than private households shall in any event be considered to be WEEE from private households.



# What Lamps to Collect at End of Life?

Compact fluorescent lamps (CFL):



Other fluorescent lamps including straight tubes and round tubes:



High intensity discharge (HID) lamps:



Light emitting diode (LED):



# Where to Collect EoL Lamps?

- “ Public Collection Points - hospitals, schools, post office, restaurants, shopping malls, commercial office buildings and retail outlets.
- “ Professional End Users - Large installers and maintenance, re-lamping, electrical distribution.
- “ Mobile & Curbside Collection Vehicle Service.
- “ Online Mail Order.
- “ Waste Merchant.

# Foldable Container Collection

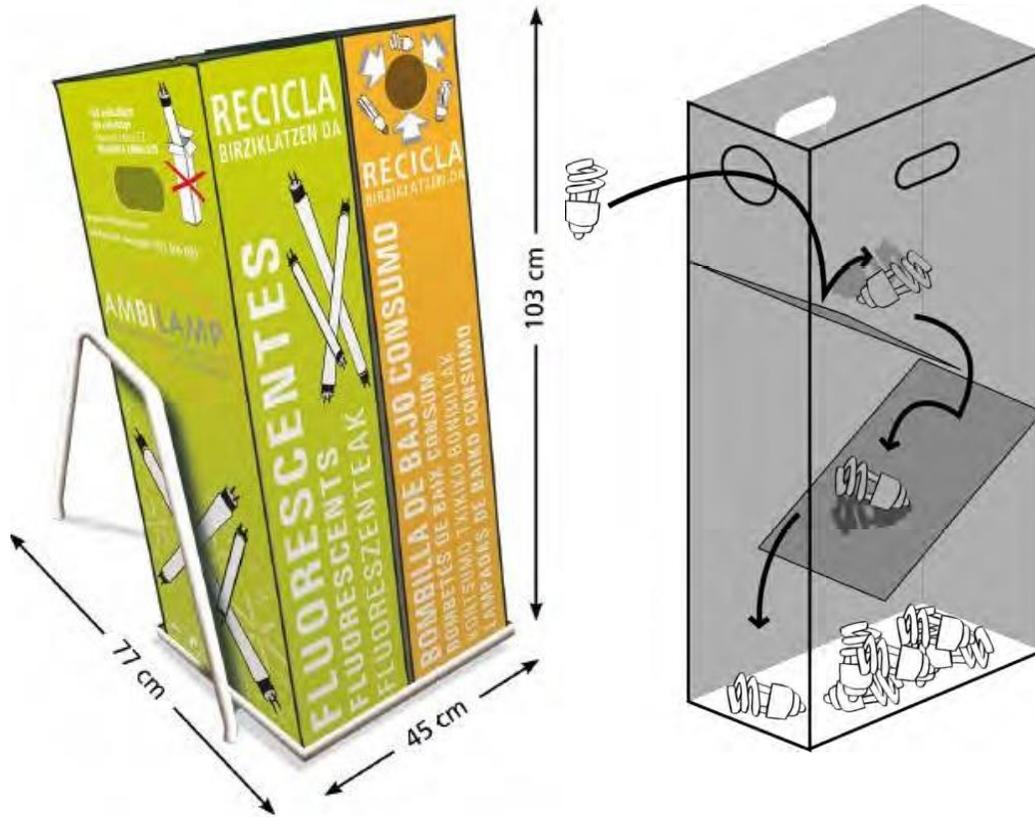


- ” Easy to assemble
- ” Can be used outdoors
- ” Collapsible and stackable
- ” Light
- ” Long-lasting materials
- ” Traceability of the container
- ” Adapted to different types of lamps
- ” Capture professional user volumes.



” Suitable for large installers and maintenance, relamping, electrical distribution, professional end users.

# Smaller Container



- “ Economical
- “ Communication element
- “ Separation of fluorescent and other lamps
- “ Anti-breakage ramp system
- “ Foldable and easy to assemble
- “ Minimum capacity efficiency
- “ Retail installation provides more convenient access to public and the household.



# Incentivised Collection ó Reverse Vending



” Built-in technology recycles C&R CFL and LED lamps containing mercury and other hazardous materials.

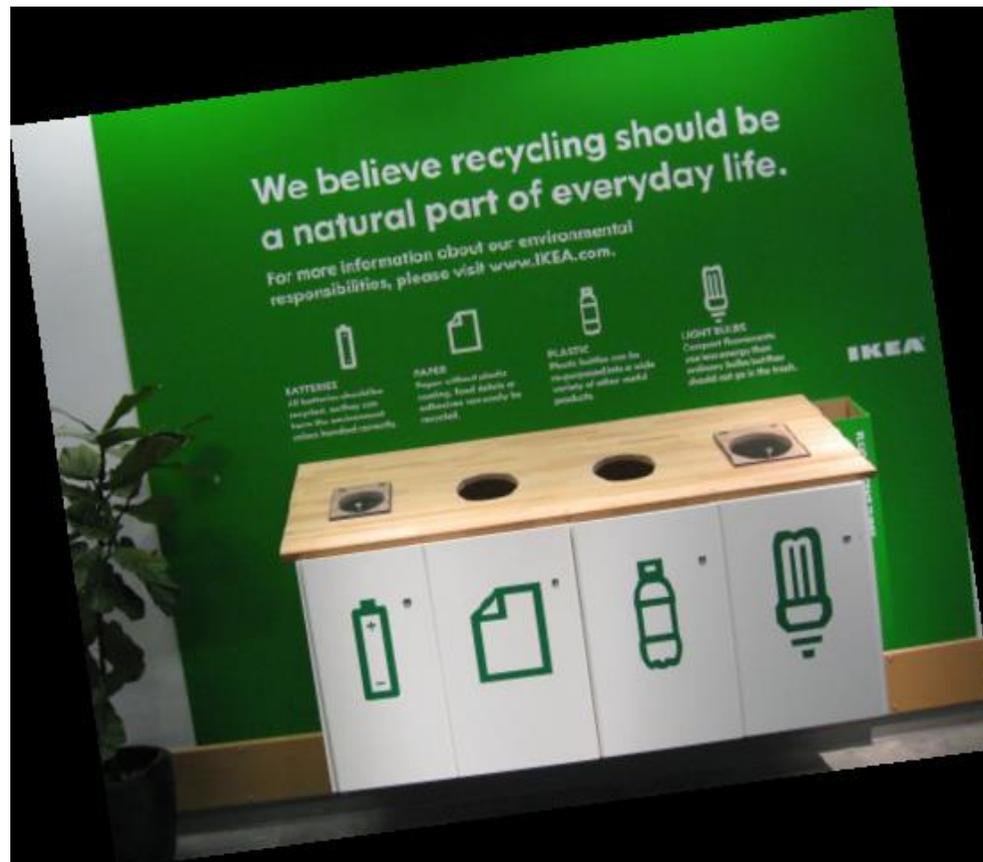
” An automated soft-drop system designed to safely collect and lower light bulbs into a special collection container, minimizing breakage.

” An internal mercury fume extractor and mercury fume filter.

” The user automatically receives a reward incentive voucher that can be used for product discounts and sales incentives.

# Joint Waste Collection

” Multi product container for smaller WEEE such as lamps, batteries, space efficient and provides synergies for collection at retail sites.



# Informal Collection from Salvagers



- “ Waste pickers scour cities.
- “ Going from business to business, home to home, and some are on call.
- “ They collect and sometimes buy recyclables, packing them including lamps.
- “ Selling them for profit to sorters who then ship it off for processing.
- “ This form of recycling network, is a low-tech solution, but one that works.
- “ Engagement of the informal sector is necessary to formalise waste volumes collected and can help create employment. Review: [www.globalrec.org](http://www.globalrec.org)



# Independent Collection, Refurbish then Resell



- “ Independent collection of end of life CFL.
- “ The most difficult task is opening the CFL to then be refurbished.
- “ The refurbished CFL is then re-sold.
- “ Small business exists to refurbish CFL justified by the replacement price savings.
- “ The refurbishment operator seeks official certification.

# Storage Guidelines

- É An operational CRSO scheme typically outsources storage.
- É Warehousing will need to have license to store hazardous waste.
- É Warehousing require contingency planning in place in the event of an event, to follow protocol in handling of hazardous waste:



Train all the workers involved for the proper handling of mercury which may include the use of spill control kit.

# Logistic Guidelines



- É As collected volumes increase specialized logistic providers will be required with dedicated fleets to handle the above special purpose containers. They usually require licenses to deal with RoHs.
- É Logistic providers are tendered annually by the CRSO. There are a number of providers who have a dedicated territory to ensure competitive pricing from one logistics provider to another.
- É Logistically the waste collected is consolidated at take-back storage sites and transported to recycling.
- É Online logistic system will be required to track and trace containers.

# Why Recycle Lamps?

*It is the safest way to deal with the hazardous materials found in many lamps*

“ Mercury is a powerful neurotoxin which can lead to neural degeneration, nervous diseases and death in humans.

“ The safest way to dispose of mercury-containing lamps is to recycle them.

“ This prevents them from entering landfill from where they leak into the environment.

*It reduces the demand for virgin resources and reduces energy consumption*

“ This is because primary processing is more energy intensive than recycling.

“ Recycling equipment allows virtually full recovery of rare earth elements for reuse (:-cradle to cradleØsolution).

# How to Recycle Lamps?

- “ One example is the MRT Compact Crush and Separation Plant from Sweden.
- “ It is self contained processing equipment for recycling of most types of discarded fluorescent lamps.
- “ The plant which is incorporated in a 20" container in which the air is brought to a sub-pressure, preventing mercury from being released into the environment.
- “ The container can be fixed or relocated or used as a mobile unit.
- “ Internal plant illustration:



# Recycling Technology

“ Balcan, United Kingdom



“ Herborn, Germany



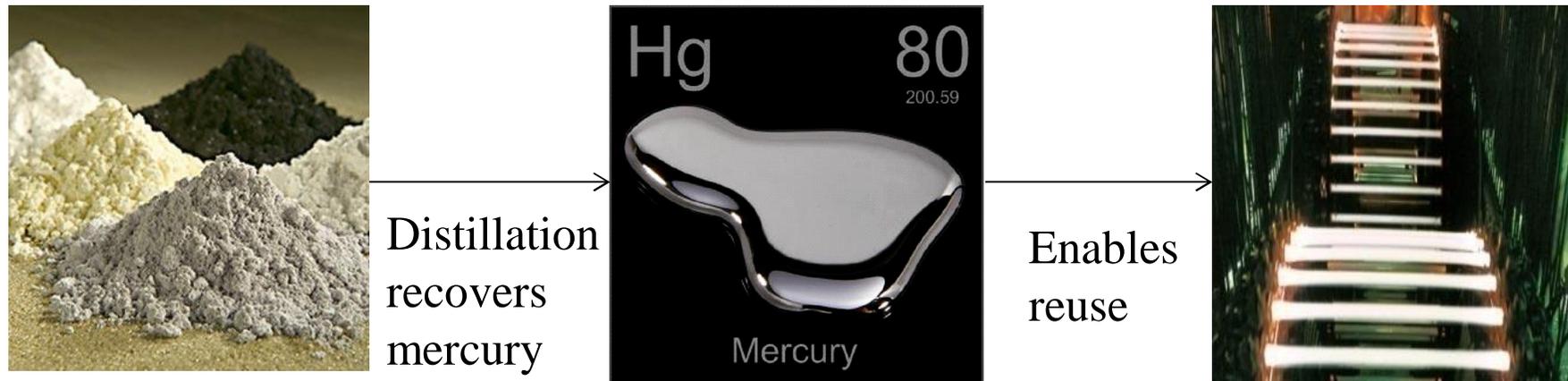
“ MRT, Sweden



# Closing the Materials Loop

*What are the lamps recycled into? ÷cradle to cradleö reuse:*

“ Recycling allows direct reuse in the manufacture of lighting equipment.

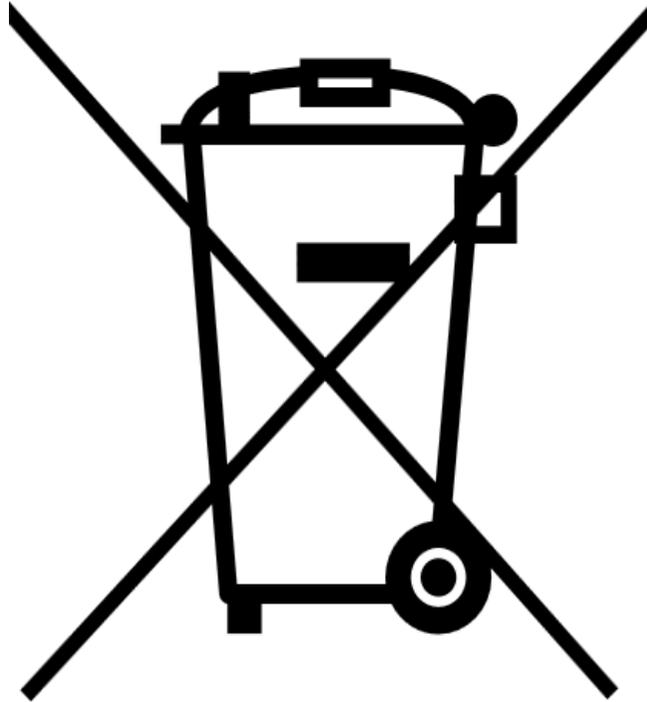


“ The material recovery rate from recycling typically exceeds 95%.

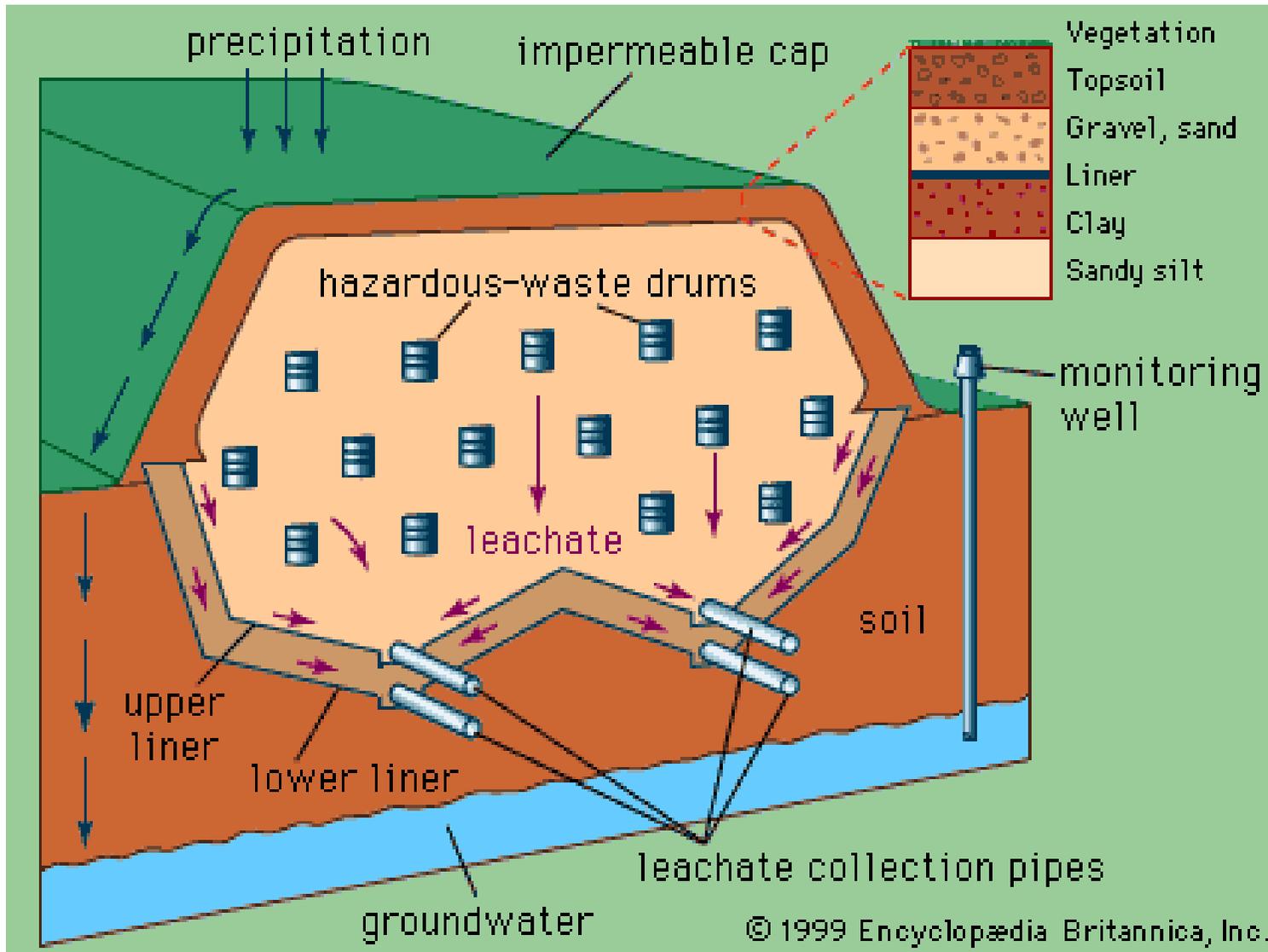
“ Secondary use of raw materials being a stated objective of the Basel Convention.

“ There are also alternative industrial use of the recycled materials such as glass for building insulation.

# Disposal ó As Last Resort



# Landfill ó Hazardous Waste Site Only



# Administration & Communication Guidelines

- “ The CRSO should have a not-for-profit legal status upon incorporation.
- “ The CRSO will perform its accounting and administration in-house.
- “ It will be necessary to implement software to record and maintain the confidentiality of put on market details of the participants to the CRSO.
- “ Annual external audit required.
- “ The visible fee will need to be modeled by the CRSO and independently verified that the level of fee is at a sustainable amount for the CRSO to cover all operational expenses.
- “ The visible fee should be shown separately on all sales invoice.
- “ All participants to the CRSO will be required to sign the same terms and conditions of the Participation Agreement.
- “ Any importation and re-exporting of lighting equipment volumes will require random audit checks to confirm the extent of any refunds of payments of visible fee.
- “ Standard terms of a Collection Agreement would be signed by all collection points.
- “ CRSO are encouraged to use the standard logo and trade name “Green Light”.

# Government Communicate to Convert to Energy Saving Lamps

A standard bulb costs

**\$25** to run every year\*

(100W INCANDESCENT)



And you'll only pay

**\$5** a year to run this one\*

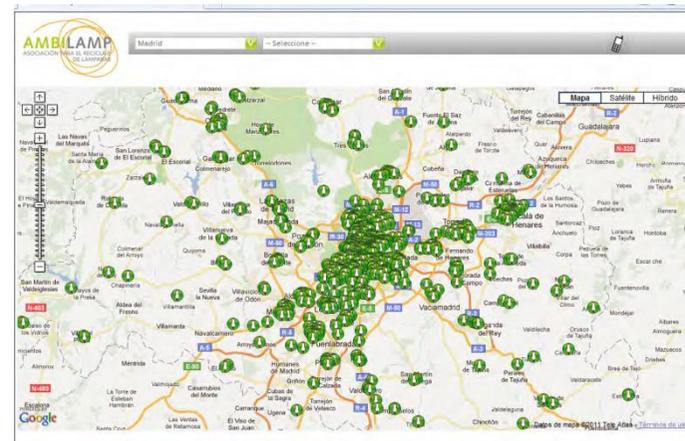
(20W EFFICIENT CFL)

# CRSO Communicate to Build Awareness for End Users



# CRSO Communicate Convenience to C&R Lamps

“ For example locate collection points via Google:

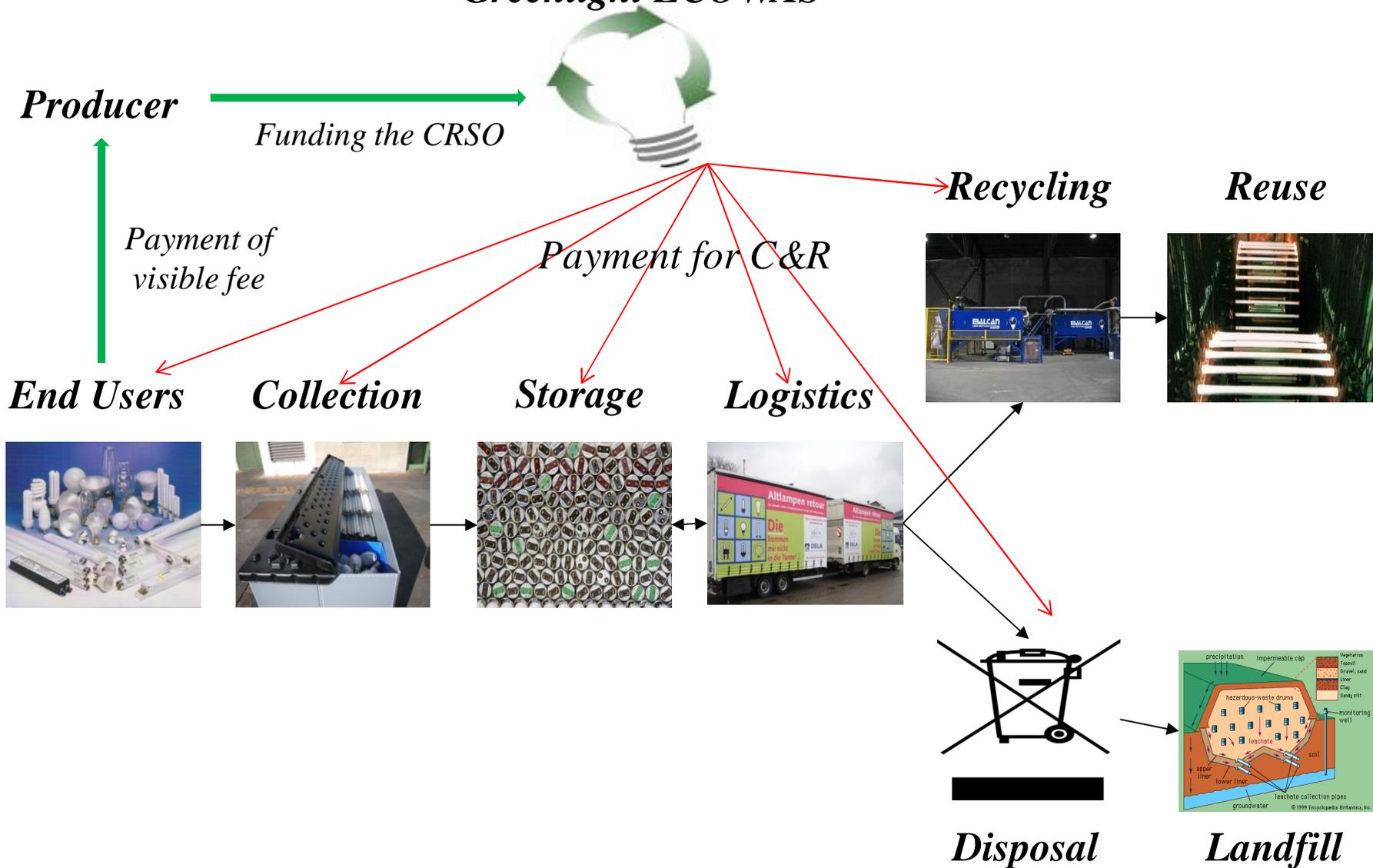


## **5. Financing Approach**



# Financing the CRSO via Visible Fee

*Greenlight ECOWAS*



# Proper Financing of C&R of Lighting Equipment via Visible Fee

- “ C&R is financed via a visible fee system operated by a 3<sup>rd</sup> party CRSO.
- “ The consumer is aware that a specific amount of the purchase price of a product supports an end-of-life management system.
- “ The advance fees can be collected either directly from the consumer at the point of sale or can be collected from producers based upon their total sales.
- “ The advantage of a visible fee is that throughout the value chain no profits are calculated over the fee (by the value chain players) and that the use of the fee for C&R can be transparently audited by governments.

# **Border and Point of Sale Control Essential to Enforcement of CRSO Regulation**

Countries implementing extended producer responsibility requires identifying the producer, importer or distributor of goods.

If the goods are smuggled, imitation goods and unbranded products that dominate the market, it is difficult to assign responsibility to the producer, importer or distributor.

Any regulation development will require governments to strongly monitor and enforce customs control at borders to ensure that importers are registered with the CRSO to minimise free-riding.

Regulation will require placing an equivalent producer responsibility with sanctions on the purchaser of any smuggled, imitation goods and unbranded products.

This will be an issue with improper importers as they seek to gain commercial advantage by distorting the competitive level playing field.

# Cost versus Value from Recycling

Informal market  
(unknown treatment)



WEEE schemes  
(controlled treatment)

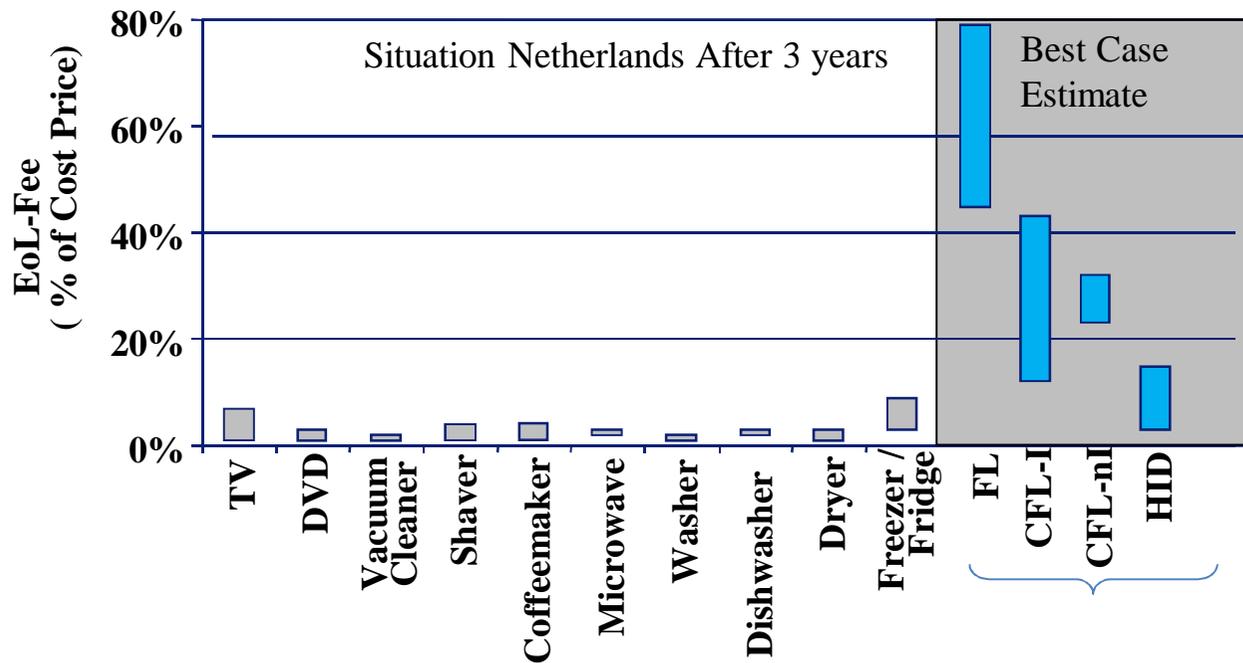


Valuable WEEE  
(precious metals)



Costly WEEE  
(hazardous substances)

Resulting in high C&R costs in relation to production costs



# Differentiating Lamps to Other Waste

Lamps represent about 1% of the total weight of WEEE, but more than 25% of total WEEE collection and recycling costs in the EU.

The collection and recycling of lamps is considerably different from all other end-of-life electronic products due to their specific characteristics:

- " Fragile
- " Hazardous waste
- " Low weight of individual lamps with different shapes and dimension
- " High volume of lamps put on the market every year
- " Minimal residual value at end-of-life
- " New LED technology
- " Specific collection containers and treatment equipment
- " No distinction can be made between household and professional EoL lamps.

Due to these characteristics, collection and recycling costs are considerable in relation to product prices.

## **6. Government Involvement**



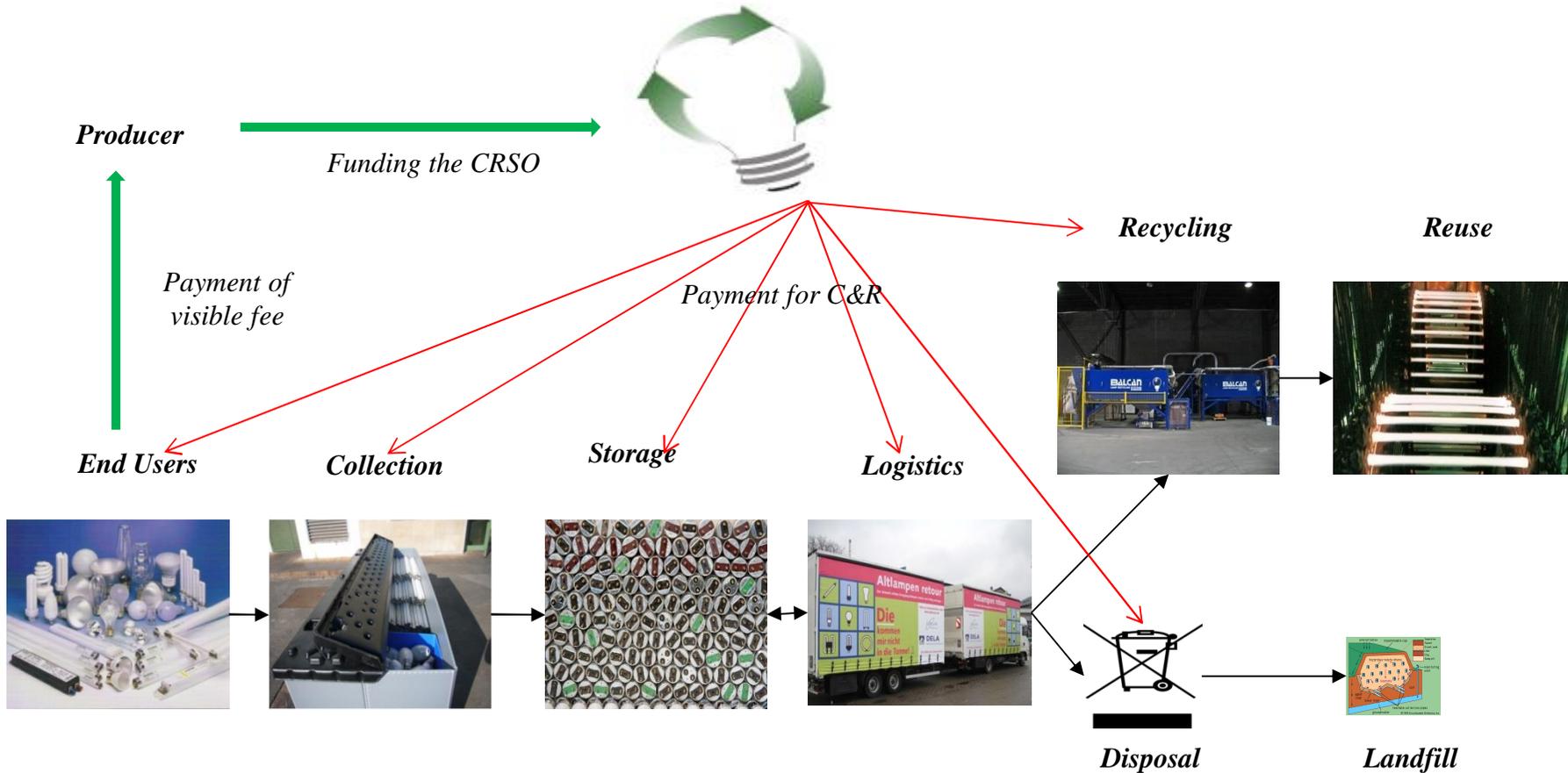
# Government Oversight



*Regulation and monitoring*

*Reporting and compliance*

*Greenlight ECOWAS*



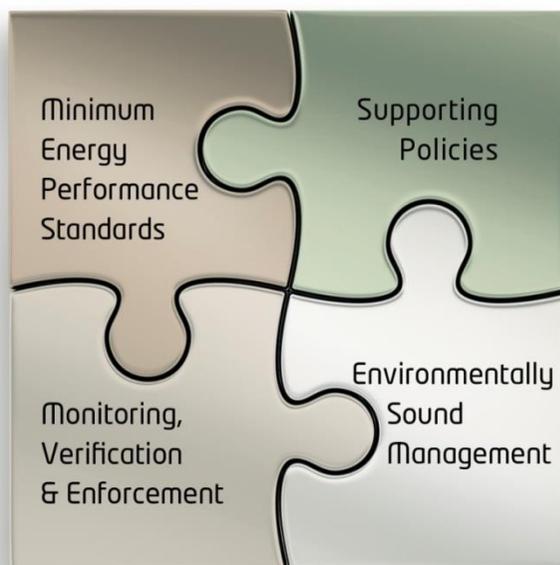
# Elements of Successful Government Regulation (Refer Separate Paper)

- " Principle of Producer Responsibility
- " Collective Financing Schemes
- " Separate Collection
- " Information for Users
- " Define WEEE from Private Households
- " Recycling & Recovery
- " Health & Safety
- " Registration, Information and Reporting
- " Implementation of Penalties

## **7. Overview & Conclusion**



# UNEP en.lighten Initiative Integrated Policy Approach



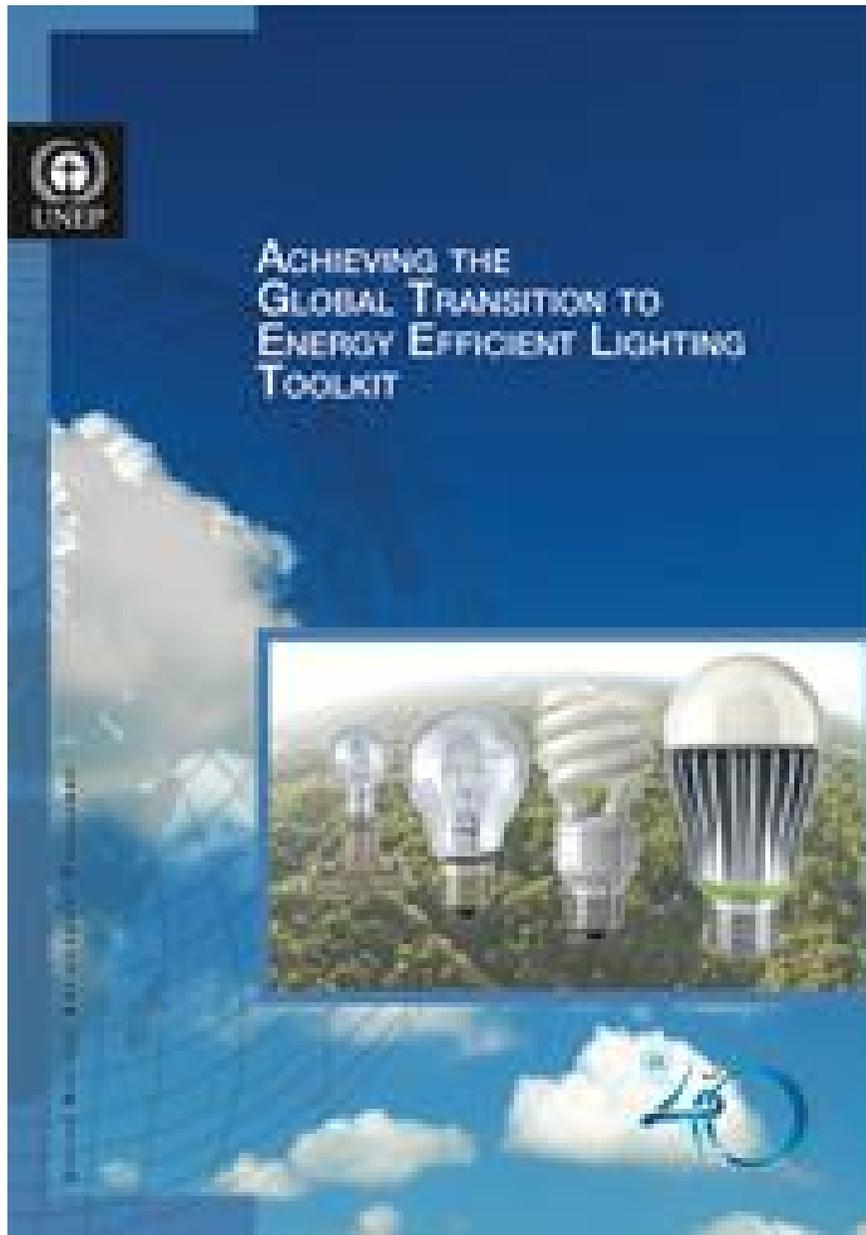
**Sustained  
Success  
with  
Operating  
CRSO**

Outcome - integrated policy approach (laws) to accelerate use of efficient lighting technology and phase-out inefficient incandescent lamps.

Implement monitoring, verification and enforcement activities to ensure an effective transition to efficient lighting.

Implement financially sustainable CRSO to C&R end of life lamps.

# Efficient Lighting Toolkit



[www.enlighten-initiative.org](http://www.enlighten-initiative.org)

# Lighting Roadmap Overview

<b>C&amp;R Key Stages to Set-Up</b>	<b>1 Status &amp; Strategy Milestone</b>	<b>2 Commitment Milestone</b>	<b>3 Business Plan Milestone</b>	<b>4 Budget Milestone</b>	<b>5 Start-Up Milestone</b>	<b>6 Evaluation Milestone</b>
Results:	Lighting Roadmap.	Yes or no commitment from stakeholders to C&R roadmap.	Yes or no commitment from stakeholders to business plan.	Sufficient funding budgeted.	Live company or pilot project operating.	C&R operational. Updated market assessment per Milestone 1 on a semi-annual basis
Standard Time Required	1 - 2 Months	1 - 2 Months	1 - 2 Months	3 - 12 Months	18 - 48 Months	
Time Schedule Cumulative	Month 2	Month 4	Month 6	Month 18	Month 36 - 60	

# Conclusion ó Lamps are Different

- “ One financially and environmentally sustainable CRSO specifically for lamps.
- “ Involving the whole country market lamp industry.
- “ Based on strongly enforced lamp specific legislation.

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