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# 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE)

## Environmental, Economic and Social Impacts Assessment
## Options for improvement

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# Study Structure

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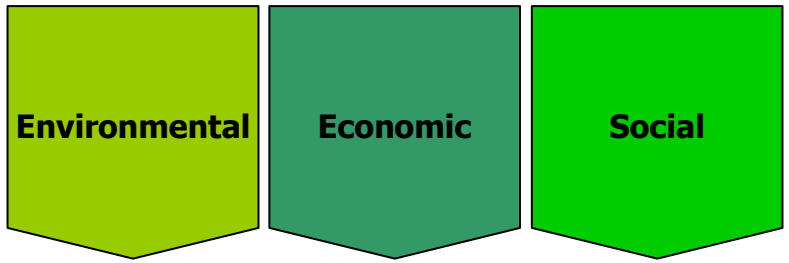
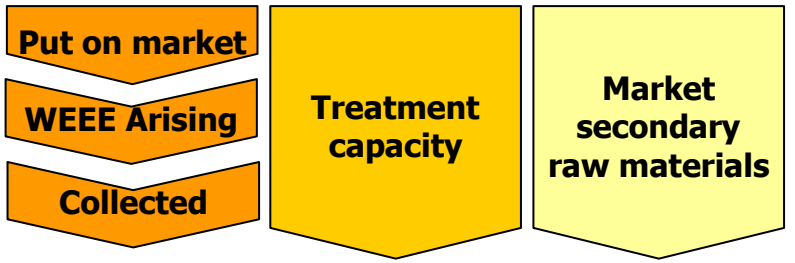
**Task 1: Evaluation**




*Impacts of WEEE: Societal perspective*




*Impacts of WEEE: Amounts and technologies*

**Task 2: Options**

# Study Structure

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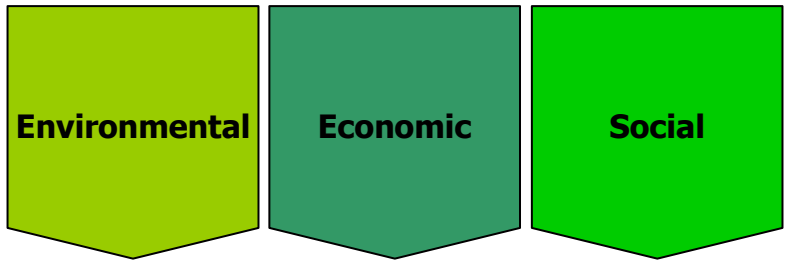


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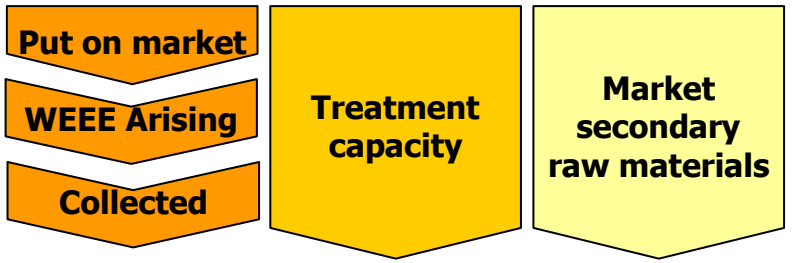


*Impacts of WEEE: Amounts and technologies*

**Task 2: Options**


**Additional:**

# EEE Put on Market – EU27, 2005 estimate

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## Put on market EU27:

10.3 Million t/year: ~19 kg/ inhabitant

**Based on:**

- **Sales data (per subcategory)**
- **National registers data (9 registers, 44% of the EU market)**
- **Including B2B (+/-15% of total)**
- **EuP studies**
- **Large differences over EU-27: between 6 and 24 kg**

# WEEE Arising – EU27, 2005 estimate

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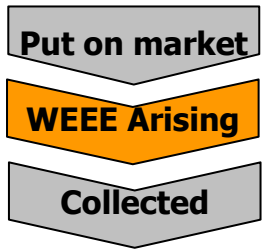
## Current WEEE arising across the EU27:

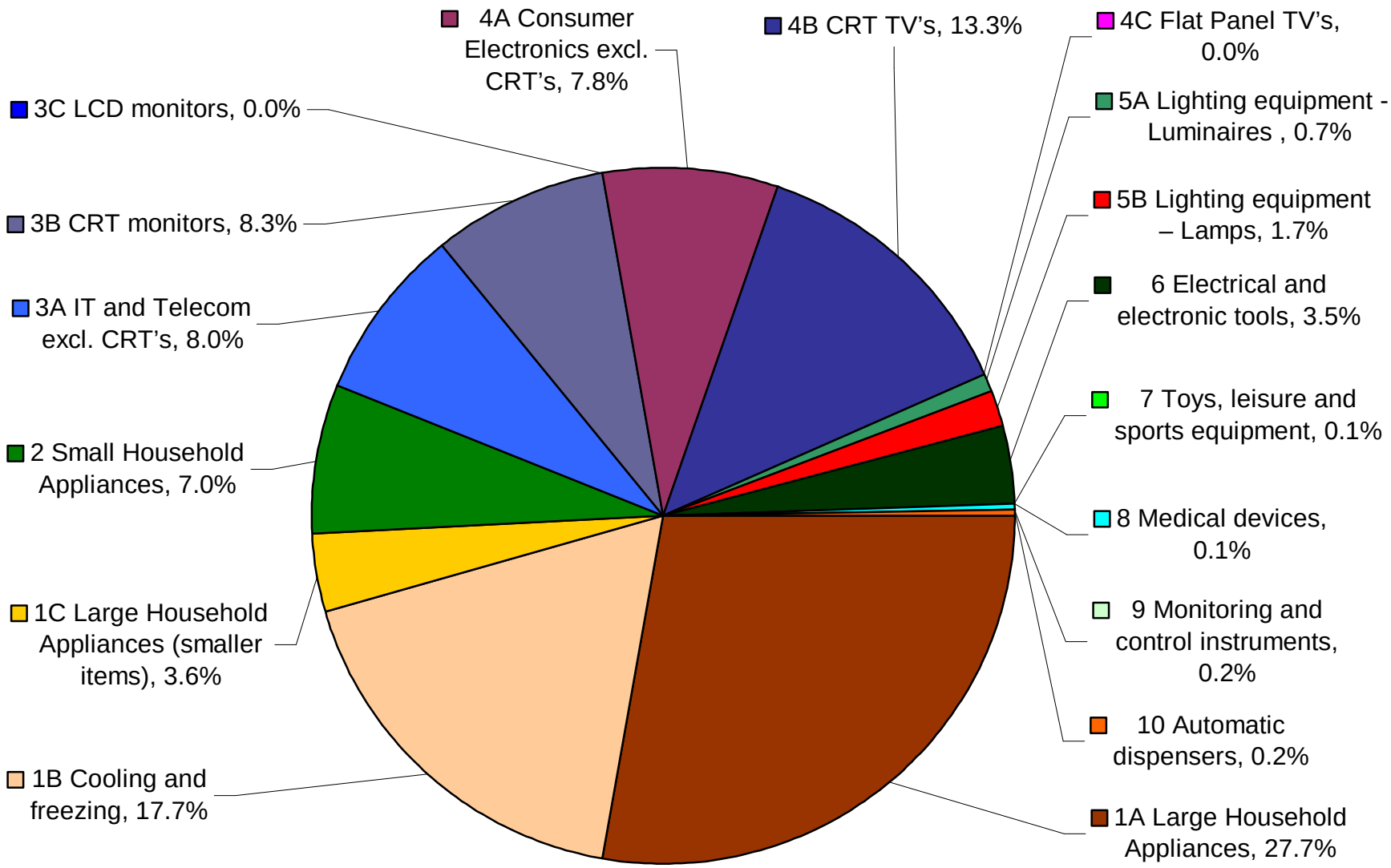



8.3 – 9.1 Million t/year

- **Different estimation models used***
- **B2C: Reaching about 10.6 Million tonnes by 2020**
- **Prediction: total WEEE arising (incl. B2B) might reach about 12.3 Million tonnes by 2020**
- **About 24 kg/ inhabitant by 2020, (incl. B2B)**

* GDP growth EU-15: 2.7%; EU-new10: 5.4%

# Breakdown WEEE Arising – EU27, 2005



# WEEE collected and treated – EU27 – 2005

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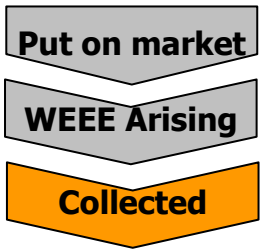


## Estimated at:

**2.2 Million tons**

- ~5 kg/inhabitant (average)
- Collection % large sized appliances roughly 40%
- Collection % medium appliances sized roughly 25%
- Collection % small appliances close to 0%, (except for gas discharge lamps)

# WEEE collected and treated – EU27

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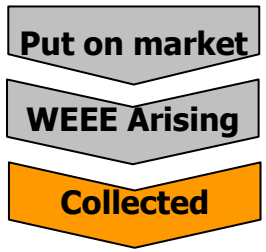


## Under Full Implementation & increase in collection assumptions:

5.3 million tons in 2011

- **Based on maximum observed collection percentages per subcategory (incl. NO, CH):**
- **Large appliances 75%**
- **Medium and small sized: 60%**
- **~11 kg/inhabitant**

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# Treatment Technologies

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Treatment capacity

**Recyclers have made/will make investments which will enable WEEE items to be treated meeting Annex II requirements**

**EU15 Member States installed sufficient capacity to treat WEEE arising by the middle of 2007**

**For Central and Eastern Europe it currently appears that a regional approach will be adopted**

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# Downstream markets

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**Market secondary raw materials**

**Profitable markets for metal recycling from WEEE**

**Main market for CRT glass back to new CRTs,**

**(but quickly declining over next 1-5 years due to flat panels)**

**Plastics: Difficulties in recovery due to cost-efficiency and definition of recycling targets for mixed metal/ plastic streams**

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# Environmental Impacts

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Environmental

## There is a large variety in environmental priorities

- **Toxicity effects:**
  - **Cat. 3C, 4C LCD panels and Cat. 5B Lamps**
- **Avoided ozone-layer depletion and global warming:**
  - **Cat. 1B Cooling and Freezing (+/- 2 tonnes CO2 prevention/ fridge, 34 million tonnes CO2 eq. not under control now!)**
- **Resource Depletion and Gross Energy Demand:**
  - **Cat. 1B Cooling and Freezing, Cat. 3B and 4B CRT screens**
- **Acidification for:**
  - **Cat. 3A IT excl. CRT and Cat. 3C LCD Monitors**
- **Eutrophication for:**
  - **Category 3C LCD Monitors and Category 6 Tools**
- **Etc.**

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# Different environmental priorities

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## Fridges & Freezers*
(CFC containing)

* Eco-Indicator'99

**Equals ≈ 12.500 car km's**

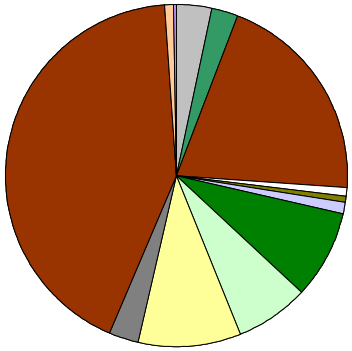
## IT equipment**
(Precious metals)

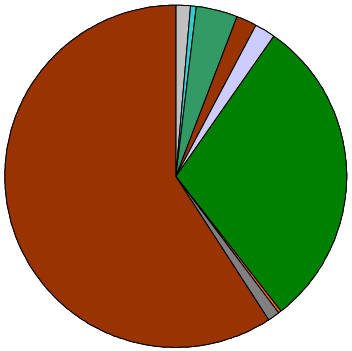
** Eco-Indicator'99

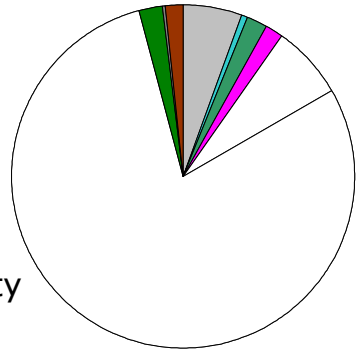
## Lamps***
(Mercury)

*** CML2-Terrestrial Ecotoxicity

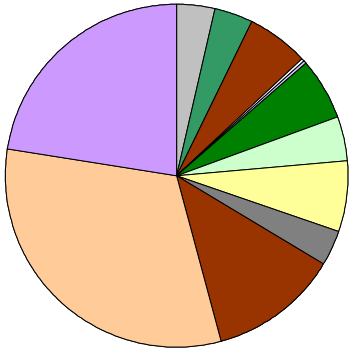
Weight

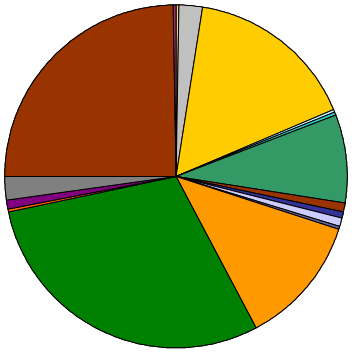


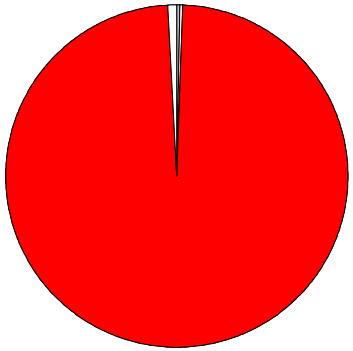




Environmental Weight







Al (general)
Cu
Fe
Glass (white)
Hg
Oil
Other/inerts
PCB
Plastics general
PS (polystyrene, high impact)
PUR
PVC
Stainless steel
Steel low alloyed
Cyclopentane
Isobutaan
CFC11
CFC12

Ag
Al (general)
As
Au
Be
Bi
Br
Cd
Ceramics
Cl
Co
Cr
Cu
Fe
Hg
Glass (LCD)
Liquid Crystals
Mn
Ni
Other/inerts
other plastics
Pb
Pd
Plastics general
PVC
Sb
Sn
Stainless steel
Steel low alloyed
Zn

Al (general)
Au
Br
Ceramics
Cl
Cr
Cu
Epoxy
Fe
Fluorescent powder
Glass (white - low quality)
Hg
Glass (white - high quality)
Ni
Pb
Pd
Plastics general
Sb
Sn
Stainless steel
Steel low alloyed
Zn

# Environmental Impact – Contribution of cat.

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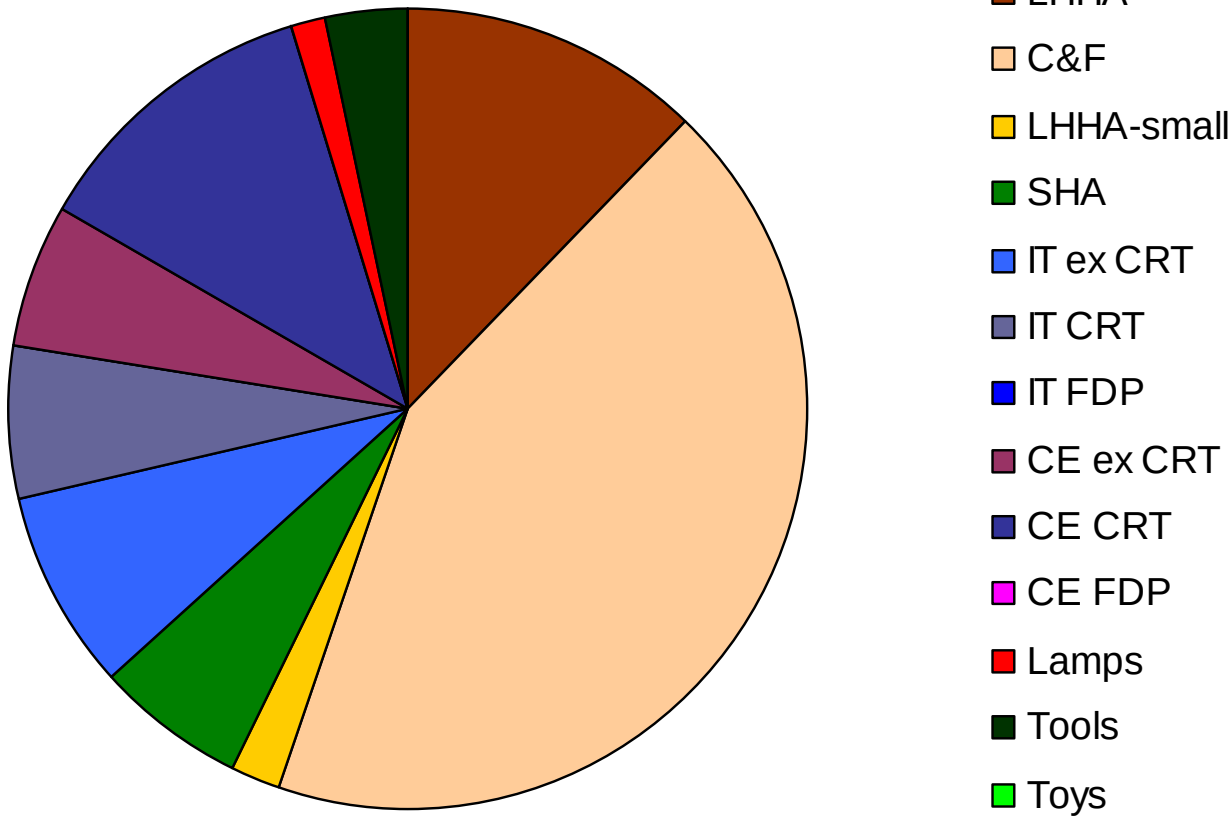
**Environmental**

Eco-Indicator'99 H/A weighted, per kg WEEE total collected



# Envl. Impact – Directive Benefits 2005 to 2011

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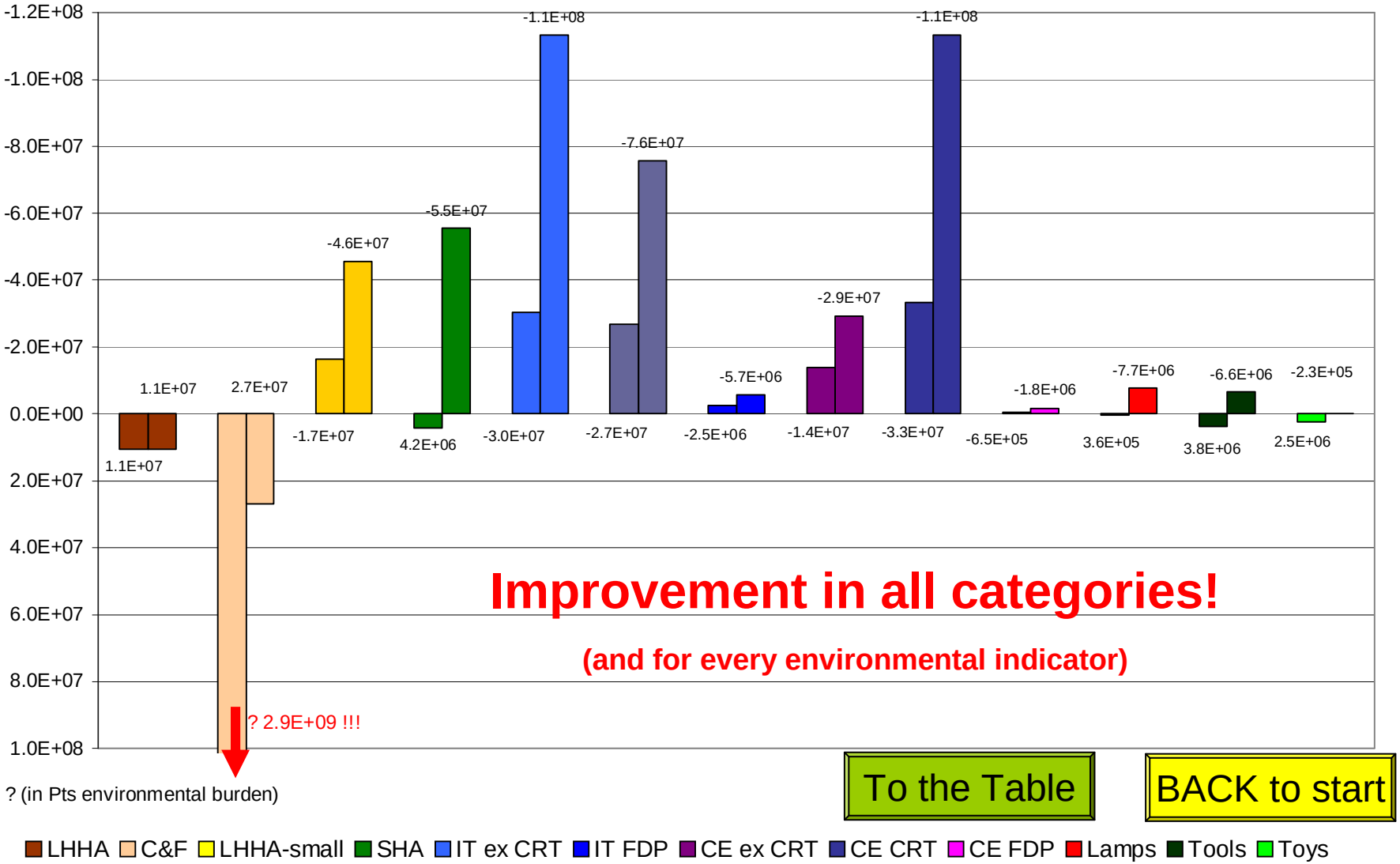
? (in Pts avoided environmental impact)

**Eco-Indicator'99 H/A weighted, total WEEE arising, 2005 (left bar) to 2011 (right bar)**

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# Economic Impact - Administrative Burden

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Economic

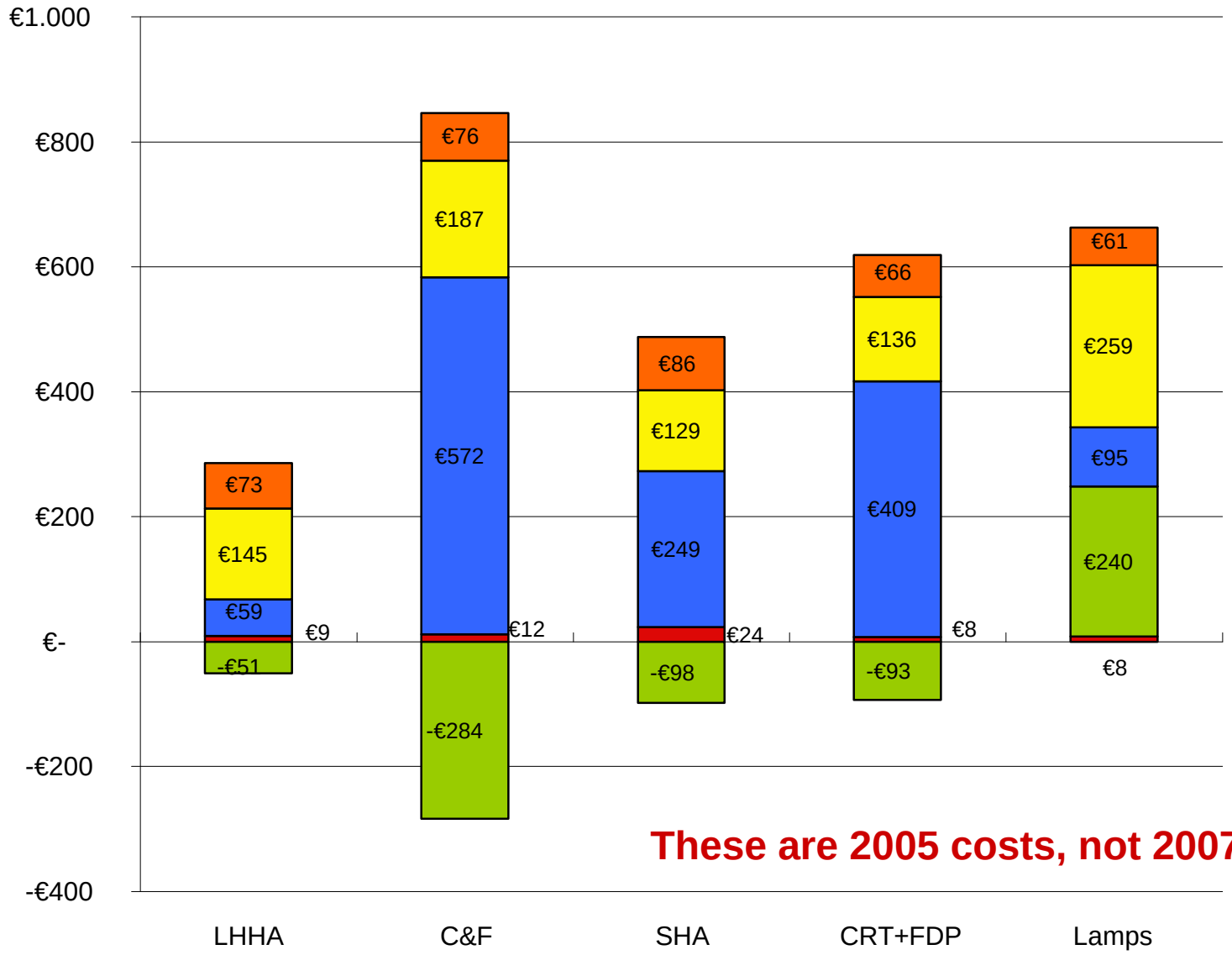
## Administrative burden concerns:

- Inconsistency in legislative requirements
- Inconsistency in registering and reporting activities
- Low stakeholder awareness of specific responsibilities (e.g. large number of SME's do not know legal obligations)

## Registering & reporting activities:

- Number of reporting activities are at least 72 different reports/year
- Total Burden EU27 for registering and reporting activities ranges from 37 to 43 Million €/year (at 8 hour/ report)
- Potential threat of competition distortion due to:
  - Deliberately reporting of B2C as B2B,
  - Lower quantities than actual ones
  - Reporting, but no further action
  - No reporting

# Economic Impact - Tech & Additional costs - 2005




Economic

Additional Costs

Transport and collection (incl. access to WEEE)

Shredding, sorting, dismantling, pretreatment

Recycling + recovery processes

Incineration and landfill

Technical

**These are 2005 costs, not 2007 price levels!**

# Economic Impact - EU 27 – 2005

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Economic

| | Technical Costs [Million EUR] | | Total Costs [Million EUR] | |
|---|---|---|---|---|
| Year | Current Collection% | Maximum collection% | Current Collection% | Maximum collection% |
| 2005 | **764** | 1,692 | **935** | 2,045 |
| 2011 | 889 | **1,970** | 1,089 | **2,381** |
| 2020 | 1,125 | 2,492 | 1,377 | 3,012 |

## Influencing factors:

- Additional costs represents 10% to 30%
- Time of operation and economies of scale
- Increase in amounts WEEE collected & treated
- New treatment technologies and changing compositions
  (e.g. flat panel displays in arising streams, as well as downstream markets)
- Large differences in costs per treatment category
- Material prices 2007 over 2005: 50 – 100 €/ton more revenue!

# Social Impact

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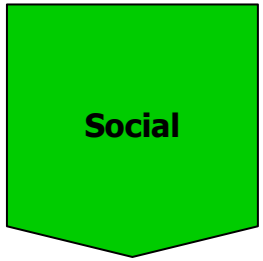


## Lack of data and in depth research on:

- Employment and Labour Market
- Health and Safety Standards
- Social Environment including Awareness Rising
- Changes of Behaviour
- Digital Divide

## Reasons for this lack of data are:

- Late transposition of WEEE in Members States
- Unsolved methodological problems in merging quantitative and qualitative data

## Consumers role in guiding policies such as WEEE requires further research

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# Options - Scope of the WEEE Directive

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Change of scope

## Definition of scope should tackle and enable:

- The right products: Environmental relevancy
- The assignment of responsibilities

## Preconditions:

- Achievement of a level playing field
- Clarification and enforcement of EU27 harmonisation

## Options 1: Level playing field and harmonisation:

- Considered dual legal basis/ “95 character” for scope
- Develop EU27 criteria list for products in/out of scope

# Options - Scope of the WEEE Directive

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Change of scope

## Options 2: Base stream on occurring waste streams (5 or 6) collection categories:

- Allows better environmental target setting
- Increases harmonization
- Enables better monitoring of treatment performances

## Options 3: Remove difference B2B and B2C,

- "Real B2B" appliances removed from scope, example criteria:
  - Taken care by industry,
  - Not found in consumer collection stream,
  - Other legislation applicable (f.i. certain medical products)
- All other/ dual use products should by definition fall under B2C,
  - Deduction of own individual collection efforts from total obligations to stimulate more collection (for instance PC's from businesses)

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# Options - Collection targets – 2005*

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| Country | Category Number 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Totals 1-10 [kg/ab] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Norway | | | | | | | | | | | 13.41 |
| Switzerland | | | | | | | | | | | 11.44 |
| Austria | | | | | | | | | | | 2.77 |
| Belgium | | | | | | | | | | | 7.26 |
| Czech R | | | | | | | | | | | 0.33 |
| Estonia | | | | | | | | | | | 0.63 |
| Finland | | | | | | | | | | | 8.10 |
| Hungary | | | | | | | | | | | 1.27 |
| Ireland | | | | | | | | | | | 8.22 |
| Netherlands | | | | | | | | | | | 4.44 |
| Slovakia | | | | | | | | | | | 0.66 |
| Sweden | | | | | | | | | | | 12.20 |
| UK | | | | | | | | | | | 9.95 |
| **Euro av.** | **3.11** | **0.42** | **0.65** | **0.88** | **0.14** | **0.08** | **0.02** | **0.01** | **0.00** | **0.00** | **5.31** |

**Collection Targets**

**Source:: WEEE Forum Key Figures 2005*

# WEEE Arising - Breakdown per product cat. - 2005

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| # | Treatment category | Current % collected of WEEE Arising | 2005 amounts collected and treated (ktons) |
|---|---|---|---|
| 1A | Large Household Appliances* | 16%* | 348 |
| 10 | Automatic dispensers | 59% | |
| 1B | Cooling and freezing | 27%** | 362 |
| 1C | Large Household Appliances (smaller items) | 40% | 231 |
| 2,5A, | Small Household Appliances, Lighting equipment – Luminaires | 27% | 269 |
| 8 | Medical devices | 50% | |
| 9 | Monitoring and control instruments | 65% | |
| 3A | IT and Telecom excl. CRT's | 28% | 288 |
| 4A | Consumer Electronics excl. CRT's | 40% | 150 |
| 6 | Electrical and electronic tools | 21% | 35 |
| 7 | Toys, leisure and sports equipment | 24% | 20 |
| 3B | CRT monitors | 35% | 150 |
| 4B | CRT TV's | 30% | 236 |
| 3C | LCD monitors | 41%** | 7 |
| 4C | Flat Panel TV's | 41%** | 7 |
| 5B | Lighting equipment – Lamps | 22% | 28 |

**Collection Targets**

**Is more and more not reported but directly treated in same installations*

*** No change in average waste stream compositions assumed*

# Options – Collection Targets

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**Observations:**


- **Large variety in actual collection rates per category**
- **The current target can be achieved in EU15, simply by collecting category 1 items (white goods)**
- **The current target cannot easily be achieved in the 12 new EU member states**
- **Evidence is found that monitoring and enforcement of waste shipments increases collection amounts**
- **More data sets are needed to draw firm conclusions on the reasons and influencing factors (e.g. availability of collection points, geographical location, culture, MSW collection ways, etc)**

# Options – Collection Targets

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Collection Targets

**Favoured options:**

- **Higher specific collection targets for more relevant WEEE, AND/OR:**
- **Apply another market mechanism for collection**

**Other options:**

- **Redefining the collection target (% based on previous year's put on market)**
- **More enforcement on waste shipments**
- **Mandatory consumer education**
- **Mandatory hand-in to compliance schemes**

**Discussion: IPR as mechanism: Collect more costs more: Replace negative incentive with positive financial one (except for cat. 1A, 3A)**

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# Options - Recycling & Recovery targets

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**Targets for recycling, recovery**

| | | EERA 2005 | | Recupel 2006 | | NVMP 2005 | |
|---|---|---|---|---|---|---|---|
| **Category** | | **Recyc.** | **Recov.** | **Recyc.** | **Recov.** | **Recyc.** | **Recov.** |
| 1A | LHHA | 75-90% | 80-91% | 84.3% | 84.5% | 77.0% | 79.6% |
| 1B | C&F | 80-95% | 90-98% | 77.3% | 90.7% | 79.4% | 93.0% |
| 2 | SHHA | 55-80% | 65-85% | 79.7% | 83.8% | 67.3% | 72.7% |
| 3A | IT ex CRT | 65-80% | 70-90% | 79.7% | 83.8% | N.A. | |
| 3B | IT CRT | 65-96% | 80-100% | 84.3% | 86.5% | | |
| 4A | | | | | | | |
| 4B | | | | | | | |
| 34C | | | | | | | |
| 5B | Lamps | | 74-80% | 93.3% | 93.3% | 93.2% | 93.2% |
| 6 | Tools | 40-70% | 45-85% | 79.7% | 83.8% | 67.3% | 72.7% |
| 7 | Toys | 50-70% | 54-70% | 79.7% | 83.8% | 67.3% | 72.7% |
| 8 | Med. | 70-90% | 80-90% | 79.7% | 83.8% | 67.3% | 72.7% |
| 9 | M&C | 65-95% | 65-95% | 79.7% | 83.8% | 67.3% | 72.7% |
| 10 | Aut.Disp. | 70-80% | 80-85% | 84.3% | 84.5% | 76.7% | 80.5% |

**Targets do not necessarily reflect environmental performance!!!**

# Options - Recycling & Recovery targets

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Targets for recycling, recovery

## Options 1: Maintain or increase targets for:

- Small household appliances: plastics recycling
- CRT appliances

## Options 2: 'Measure only' the achieved levels for the other categories

- For monitoring and enforcement reasons

## Options 3: No targets for Cat. 8 Medical:

- Negligible amount of products
- B2C part: can be included in SHA
- B2B part: other RoHS substances and control over Health and Safety.

## Options 4: Boundary conditions to improve:

- Harmonisation of definitions
- Incorporate targets in BAT or industry standard
  as this allows balancing resource recovery, toxic control and EHS aspects

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# Options - Reuse targets

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**Targets for reuse whole appliances**

**Limited amounts of data and evidence**

**Reuse abuse: Many illegal waste shipments**

**Not possible to provide conclusive arguments in favour or against reuse**

**Options 1: To be considered:**

- **Initial development of a clearer definition of reuse**
- **Targets for reuse should be further researched outside of WEEE and to be investigated for inclusion in the EuP**

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# Options - Treatment requirements

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Treatment requirements

**Times have changed and treatment technologies have improved**

**Dismantling is not the only solution for control over hazardous components**

**Options:**

- **Establish a clear definition of “remove”**
- **Delete specific (superfluous) requirements**
- **Align Annex II with ROHS and Batteries Directives**
- **Enable development of BAT / Industry Standards**

➢ **Balancing of recycling targets, treatment requirements and EHS in industry standards preferable**

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# Grouping of options

Grouping of Options

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| | Collection target | Recycling target | Specific Treatment Requirement * |
|---|---|---|---|
| Large Household (1A,10)* | NO | NO | NO |
| Cooling and Freezing (1B) | YES | Maybe | YES: CFC's |
| Small Household: 1C,2A,3A,4A,6,7 | YES | YES: For plastic recycling | YES: NiCd from Cat. 6 |
| CRT containing (3B, 4B) | YES | YES: For CRT glass | YES: Control over PbO |
| Flat panels (3C, 4C) | YES | Maybe | YES: Hg removal from LCD |
| Gas discharge lamps | YES | Maybe for HQ glass | YES: Hg removal |

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# Conditions for success

Conditions for Success

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## Redefine & simplify key provisions in terms of the two main environmental concerns:

- **Collect more**, especially for appliances of concern
- **Treat better,** allowing high level re-applications of downstream fractions and more control over destinations

## WEEE a societal problem demands a societal solution:

- All stakeholders contribute in line with their positive influence (responsibilities) and capabilities
- Alternative financing mechanism, promoting higher collection rate should be investigated

## For environmental reasons, EPR with respect to DfR should be removed from the WEEE Directive and placed:

- In RoHS for removability guidance and/or thresholds for exemptions
- In EuP for overall EcoDesign balancing to avoid environmental contradictions

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# Conclusions

Conclusions & Recommendations

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## 1. Make the WEEE Directive a Waste management framework

- Waste stream oriented scope, allowing better target setting, monitoring and reporting on treatment requirements
- ReUse out of the WEEE Directive (not referring to waste)

## 2. Enforce provisions at EU & Member State level

- Registration EU wide (or harmonization requirements)
- Standards in Bookkeeping
- Financial guarantees as level playing field (individual vs collective)
- (Illegal) Waste shipment (e.g. under “ReUse” label)

## 3. Split legal framework and operational standards

- Developments in treatment technologies, change waste stream, new products

## 4. Simplify and increase harmonization

- Work towards Pan-European solutions and approaches (operations, administrative procedures)

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**Further questions:**

**huisman@step-iniative.org**
**www. step-iniative.org**

# Next WEEE review steps: Address responsibilities!

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| | |
|---|---|
| **Producers:** | **Organizing: Primarily responsible** |
| | **Financing: should not be a collection negative incentive** |
| | **Design: Avoid Recycling Accidents, reduce dismantling time** |
| **Consumers:** | **Hand in old products, not in the waste bin** |
| **Retail/ distr.:** | **Accessible collection points (and 'all' for 'all' trade-in)** |
| | **Mandatory trade-in to certified schemes** |
| **Municipalities:** | **Well-accessible collection points** |
| | **Avoid/ promote reuse for old/ relatively new products** |
| | **Mandatory hand-in to certified schemes** |
| **Recyclers:** | **Invest in eco-efficient treatment** |
| | **Develop recycling standards** |
| | **Transparency on waste stream destinations** |
| **Schemes:** | **Maximise collection amounts, minimize (overhead) costs** |
| | **Educate consumers** |
| **Governments:** | **Provide clear framework,** |
| | **Monitor and enforce where necessary (waste shipments)** |
| **NGO's:** | **More focus on scientific evidence and overall picture** |

**WEEE: a societal problem demands a societal solution**

# Research Recommendations

Conclusions & Recommendations

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1. **Influence of changing product compositions over time**
   - CRT to flat panels and CFC phase-out
2. **Ranking of scenarios**
   - Costs versus environmental outcomes
3. **Re-examine plastic recycling options**
   - Rapid development recycling technologies
   - Increase in material prices
   - BFR's use in plastic re-applications versus not recycle
4. **Comparison provisions WEEE Directive & other relevant environmental provisions**
5. **Development of treatment standards that balance resource recovery, toxic control and Health and Safety aspects**

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# Extra Slides

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# StEP – Solving the E-Waste Problem

Jaco Huisman

# StEP Organisational Chart

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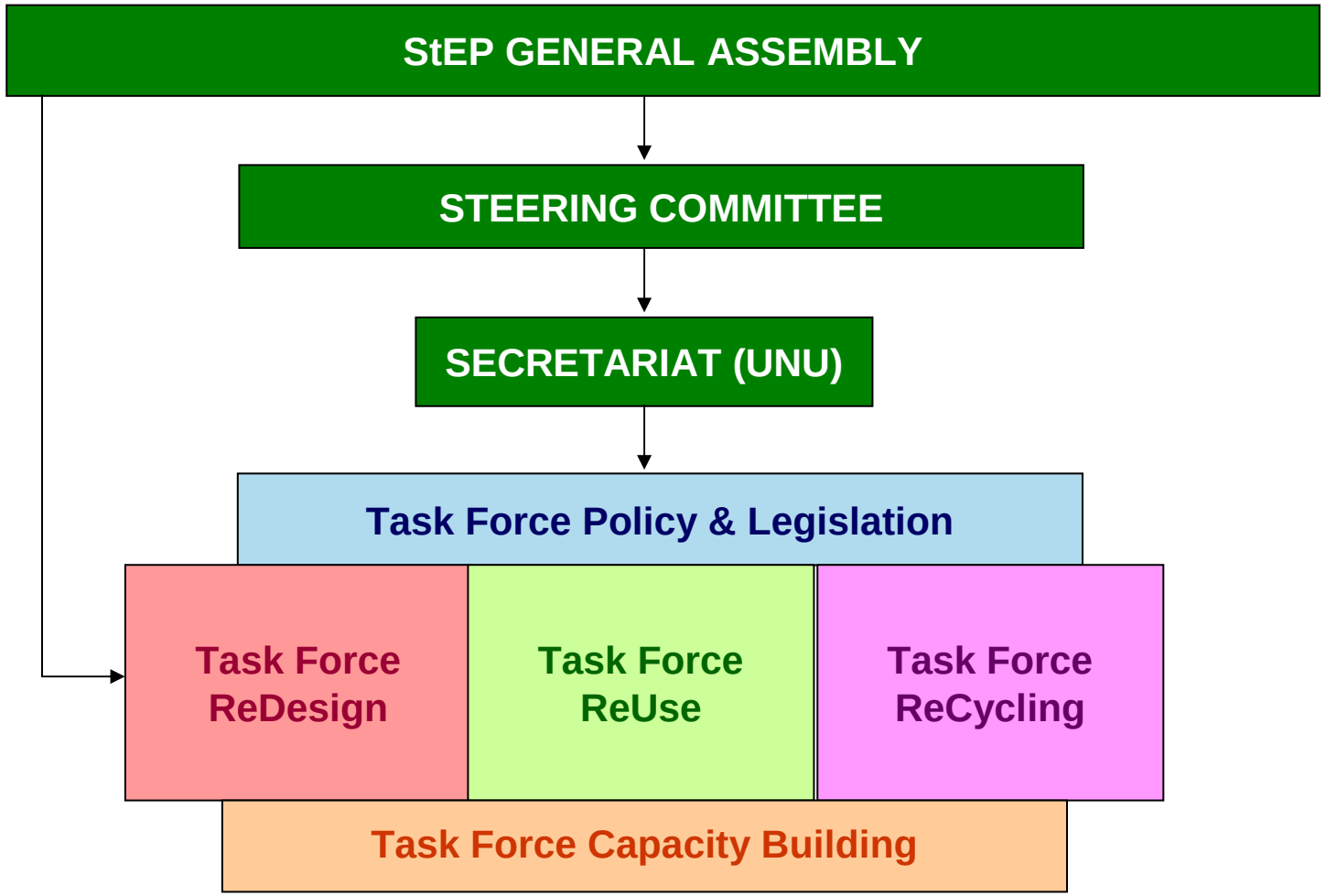

# Membership Overview (March 2008)

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- **International Organisations**
  - Center for Environment and Development for the Arab Region and Europe (CEDARE)
  - Global Digital Solidarity Fund (DSF)
  - United Nations Conference on Trade and Development (UNCTAD)
  - United Nations Environment Programme (UNEP)
  - United Nations University (UNU)
- **Governmental and Development Cooperation**
  - German Technical Cooperation (GTZ)
  - Swiss State Secretariat of Economics (SECO)
  - United States Environmental Protection Agency (US-EPA)
- **Industry**
  - AEA Technology
  - AER Worldwide
  - Ausmelt Ltd.
  - Cisco Systems Ltd.
  - Dataserv Ltd.
  - Datec Technologies
  - Dell
  - Ericsson
  - Flection
  - GOAB mbH
  - Hewlett Packard (HP)
  - José Ospina Consultant
  - MicroPro
  - Microsoft
  - National Center for Electronics Recycling (NCER)
  - Nokia
  - Philips Consumer Lifestyle
  - Promotionteam Wetzlar
  - Sims Recycling Solutions
  - Taizhou Chiho Tiande
  - Umicore Precious Metal Refining
- **Academia & Research**
  - Austrian Society for Systems Engineering and Automation (SAT)
  - Chinese Acadamy of Sciences, Research Center for Eco-Environmental Sciences
  - Delft University of Technology
  - GAIKER Foundation
  - Institute for Applied Ecology (Öko-Institut)
  - Federal Laboratory for Materials Testing and Research (EMPA)
  - Fraunhofer Institute for Reliability and Microintegration (FHG-IZM)
  - Korea Institute of Geoscience & Mineral Resources (KIGAM)
  - Massachusetts Institute of Technology (MIT), Material Systems Laboratory
  - Micro Industries Development Assistance & Services (MIDAS)
  - Regional Environmental Centre for Central and Eastern Europe (REC)
  - Rifer Environmental
  - Technical University of Braunschweig – Institute of Machine Tools and Production
  - TELECOM & Management Sud Paris
  - Thai Electrical and Electronic Institute (EEI)
  - University of Melbourne, Faculty of Engineering
  - University of Limerick
  - 3P Consortium for Sustainable Management

# StEP Core Principles

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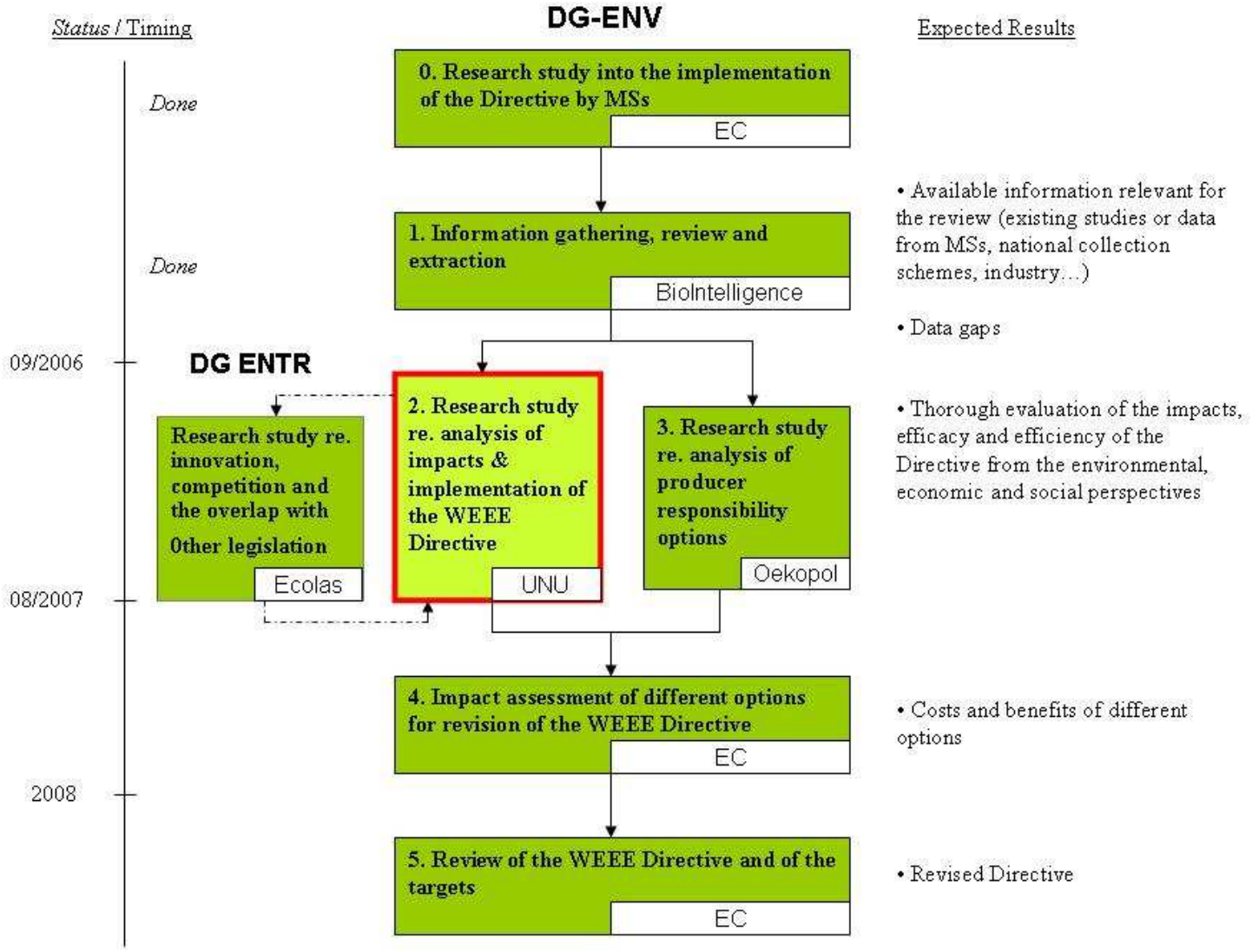
1. StEP's work is founded on scientific assessments including social, environmental and economic aspects
2. StEP conducts research on the entire life-cycle of electronic and electrical equipment
3. StEP's research and pilot projects are meant to contribute to the solution of e-waste problems
4. StEP condemns all illegal activities related to e-waste including illegal shipments
5. StEP seeks to foster safe and eco/energy-efficient reuse and recycling practices around the globe in a socially responsible manner

# Illustration Review Process

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# WEEE Arising - Breakdown per product cat.

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| # | Treatment category | Current % collected of WEEE Arising | 2005 amounts collected and treated (ktons) | Future % collected of WEEE Arising | 2011 max. amounts (ktons) |
|---|---|---|---|---|---|
| 1A | Large Household Appliances | 16.3% | 348 | 16,3%* | 348* |
| 10 | Automatic dispensers | 59.4% | | 59.4%* | |
| 1B | Cooling and freezing | 27.3% | 362 | 75% | 1158** |
| 1C | Large Household Appliances (smaller items) | 40.0% | 231 | 75% | 507 |
| 2,5A, | Small Household Appliances, Lighting equipment – Luminaires | 26.6% | 269 | 60% | 706 |
| 8 | Medical devices | 49.7% | | | |
| 9 | Monitoring and control instruments | 65.2% | | | |
| 3A | IT and Telecom excl. CRT's | 27.8% | 288 | 60% | 724 |
| 4A | Consumer Electronics excl. CRT's | 40.1% | 150 | 60% | 261 |
| 6 | Electrical and electronic tools | 20.8% | 35 | 60% | 98 |
| 7 | Toys, leisure and sports equipment | 24.3% | 20 | 75% | 72 |
| 3B | CRT monitors | 35.3% | 234 | 75% | 579 |
| 4B | CRT TV's | 29.9% | 236 | 75% | 688 |
| 3C | LCD monitors | 40.5% | 7 | 75% | 15** |
| 4C | Flat Panel TV's | 40.5% | 7 | 75% | 15** |
| 5B | Lighting equipment – Lamps | 27.9% | 28 | 60% | 87 |

**Is not changed as more and more not reported but directly treated in same installations*

*** No change in average waste stream compositions assumed*

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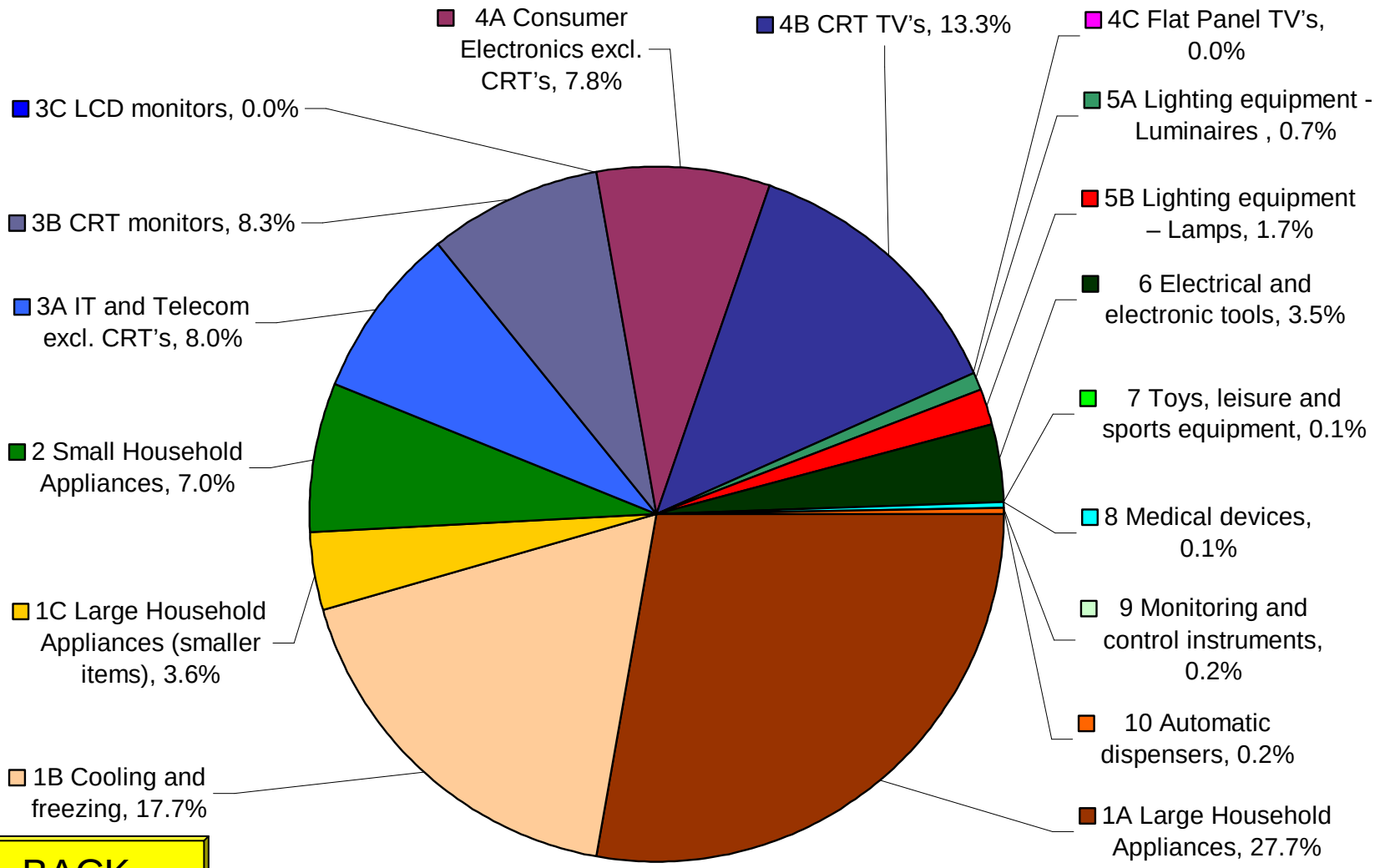
# Breakdown WEEE Arising – EU27, 2005

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# Environmental impacts relevance of individual product categories - 2005

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**WEEE arising kton**

8,291,430,000

| Indicator: | Cat.1A | Cat.1B | Cat.1C | Cat.2,5,8 | Cat.3A | Cat.3B | *Cat.3C* | Cat.4A | Cat.4B | *Cat.4C* | Cat.5B | Cat.6 | Cat.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name | LHHA | C&F | LHHA-small | SHA | IT ex CRT | IT CRT | *IT FDP* | CE ex CRT | CE CRT | *CE FDP* | Lamps | Tools | Toys |
| Weight | 25.7% | 16.0% | 7.0% | 12.2% | 12.5% | 8.0% | 0.2% | 4.5% | 9.5% | 0.2% | 1.5% | 1.7% | 1.0% |
| Eco-indicator 99 H/A v203 | 11.6% | 39.8% | 4.0% | 9.7% | 12.9% | 6.0% | 0.4% | 3.5% | 8.8% | 0.2% | 1.2% | 1.7% | 0.3% |
| Idem, Human Health | 7.7% | 52.4% | 3.3% | 7.3% | 14.4% | 3.3% | 0.5% | 3.1% | 5.9% | 0.1% | 0.5% | 1.4% | 0.2% |
| Idem, Ecosystem Quality | 20.4% | 11.7% | 8.5% | 16.8% | 14.7% | 6.5% | 0.4% | 5.6% | 8.3% | 0.1% | 3.5% | 3.0% | 0.5% |
| Idem, Resource Depletion | 17.9% | 18.8% | 4.2% | 13.1% | 8.6% | 12.3% | 0.3% | 3.8% | 16.0% | 0.2% | 2.0% | 2.0% | 0.7% |
| Cumulative Energy Demand | 22.6% | 21.3% | 5.7% | 10.2% | 13.6% | 7.9% | 0.4% | 4.2% | 10.3% | 0.3% | 1.3% | 1.5% | 0.7% |
| Abiotic depletion | 24.1% | 21.0% | 6.5% | 9.7% | 13.6% | 7.5% | 0.4% | 4.1% | 9.5% | 0.2% | 1.2% | 1.5% | 0.7% |
| Global warming (GWP100) | 3.1% | 89.3% | 0.7% | 1.7% | 1.7% | 1.0% | 0.0% | 0.6% | 1.3% | 0.0% | 0.2% | 0.2% | 0.1% |
| Ozone layer depletion (ODP) | 0.0% | 99.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Human toxicity | 33.3% | 17.4% | 7.8% | 16.9% | 10.3% | 2.0% | 0.3% | 6.0% | 0.7% | 0.2% | 2.2% | 2.2% | 0.7% |
| Fresh water aquatic ecotox. | 32.5% | 19.4% | 7.2% | 17.4% | 13.1% | 0.0% | 0.3% | 5.8% | -0.7% | 0.2% | 1.7% | 2.1% | 0.8% |
| Marine aquatic ecotoxicity | 25.8% | 21.4% | 8.2% | 11.4% | 13.5% | 4.2% | 0.4% | 6.7% | 3.1% | 0.3% | 3.0% | 1.7% | 0.5% |
| Terrestrial ecotoxicity | 6.1% | 4.4% | 2.9% | 6.0% | 4.1% | 1.2% | 0.3% | 2.0% | 1.5% | 0.6% | 69.4% | 1.1% | 0.2% |
| Photochemical oxidation | 18.6% | 13.4% | 7.1% | 8.6% | 31.1% | 4.0% | 0.7% | 4.9% | 8.5% | 0.2% | 0.6% | 1.7% | 0.5% |
| Acidification | 9.9% | 9.0% | 4.4% | 9.4% | 39.7% | 5.4% | 1.0% | 4.4% | 13.6% | 0.2% | 0.7% | 2.0% | 0.3% |
| Eutrophication | 20.4% | 23.1% | 5.7% | 15.2% | 9.4% | 7.5% | 0.4% | 5.0% | 9.0% | 0.3% | 1.0% | 2.5% | 0.4% |

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# Environmental Benefits – 2005 to 2011

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| Indicator | | Number* | Unit |
|---|---|---|---|
| **2005 WEEE: Arising: 8.3 million tons Collected: 2.2 million tons** | | **2011 WEEE: Arising: 9.7 million tons Collected: 5.3 million tons** | |
| Weight | is the equivalent of: | 1,359 | kton WEEE Arising |
| Eco-indicator 99 H/A v203** | | -643,591 | Europeans |
| Idem, Human Health** | | -423,125 | Europeans |
| Idem, Ecosystem Quality** | | -46,038 | Europeans |
| Idem, Resource Depletion** | | -174,589 | Europeans |
| Cumulative Energy Demand | | 75 | million GJ |
| Abiotic depletion | | -40 | kton Sb |
| Global warming (GWP100) | | -36 | million ton CO2 |
| Ozone layer depletion (ODP) | | -4.8 | kton CFC11 |
| Human toxicity | | -4,047 | kton 1,4-DB*** |
| Fresh water aquatic ecotox. | | -404 | kton 1,4-DB*** |
| Marine aquatic ecotoxicity | | -3,551 | Mton 1,4-DB*** |
| Terrestrial ecotoxicity | | -74 | kton 1,4-DB*** |
| Photochemical oxidation | | -3.0 | kton 1,4-DB*** |
| Acidification | | -50 | kton SO2 |
| Eutrophication | | -1,493 | ton PO4--- |

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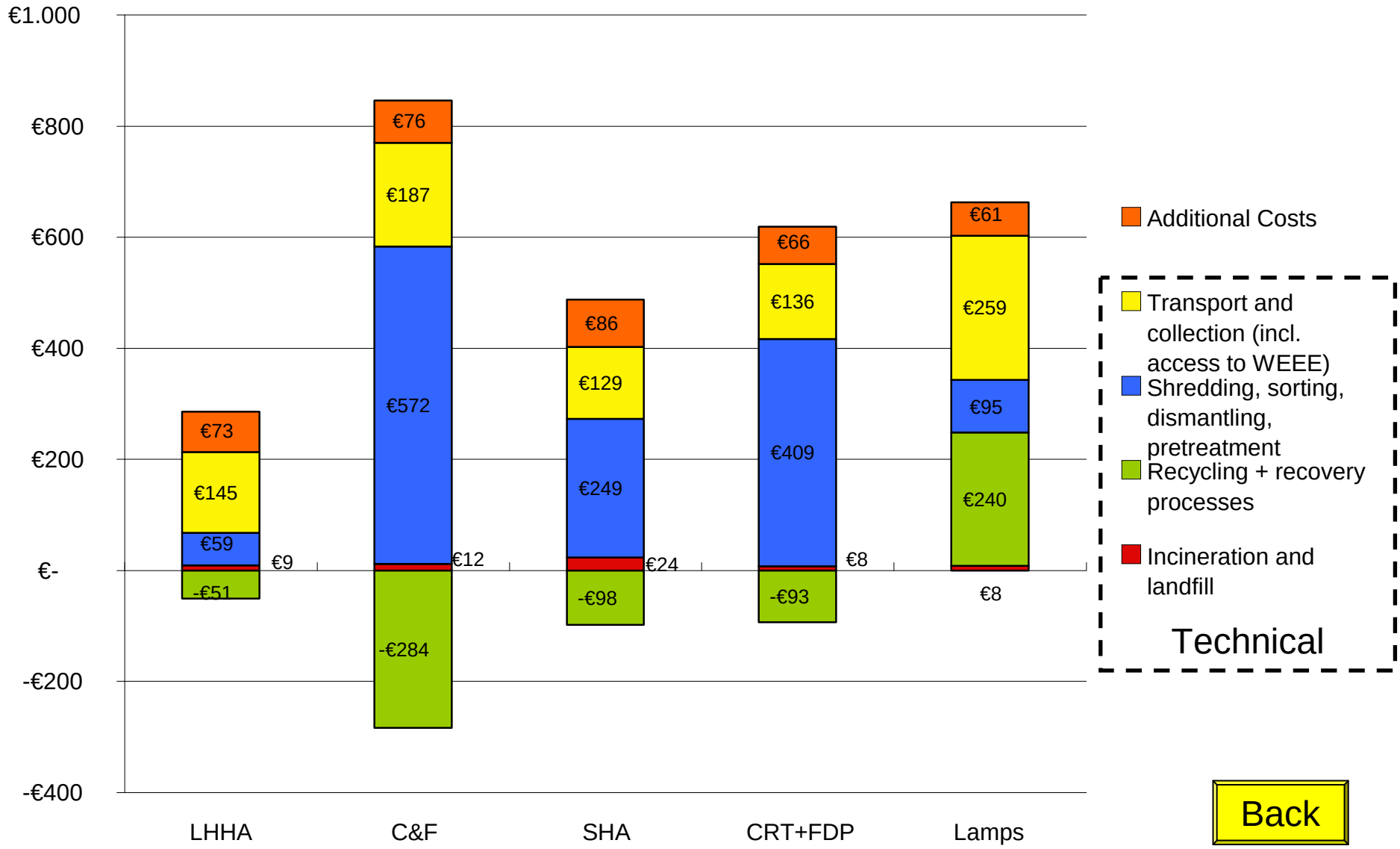
**Negative means avoided environmental impact, ** Meant as a rough illustration only: 1 Pt roughly equals 1/1000 of the environmental load of one European p.year (Goedkoop 1999) ***kg 1,4-dichlorobenzene **** Under the assumption of an unchanged 80% presence of CFC fridges in the WEEE stream over time*

# Economic Impact - Tech & Additional costs - 2005

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# Economic Impact - Responsibilities

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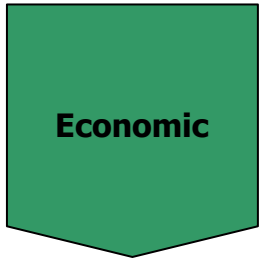


## Economic Impact reflects different kind of costs:

- Technical costs: collection, transport, treatment
- Additional costs: costs for funds (guarantees), R&D, PR, Administrative and other OH, etc

## All those costs reflect different responsibilities of stakeholders involved in the chain

## Differences between responsibilities (costs) taken over by Compliance Scheme or any individually compliant producer, reflect different boundary conditions at Member State level

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kton of panels to be treated per year - EU 27 from 2005 - 2025