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**COMMISSION STAFF WORKING PAPER**

*accompanying the*

Proposal for a

**DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

**on waste electrical and electronic equipment (WEEE)**

(recast)

**Impact Assessment**

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## Summary and Conclusions

### 1. The Problem

The WEEE Directive aims to tackle improper treatment of waste electrical and electronic equipment (WEEE). This is the fastest growing waste stream in the EU, producing 8.3-9.1 million tonnes in 2005, growing to 12.3 million tonnes of WEEE by 2020.

Both at the time of the WEEE Directive's conception and for the future, there are two central problems with WEEE: A) disposal of WEEE to landfill and B) suboptimal recycling and recovery of WEEE by techniques that release or generate harmful substances. Both ends lose significant valuable recyclable resources and damage the environment and health, in the EU and in developing countries.

Experience with the Directive, gathered from stakeholders and Member States during a 3 year review, points to the Directive not working as **effectively** as intended and problems with its **efficiency** in achieving its objectives - there are some unnecessary costs.

### 2. Problems with the Effectiveness of the Directive

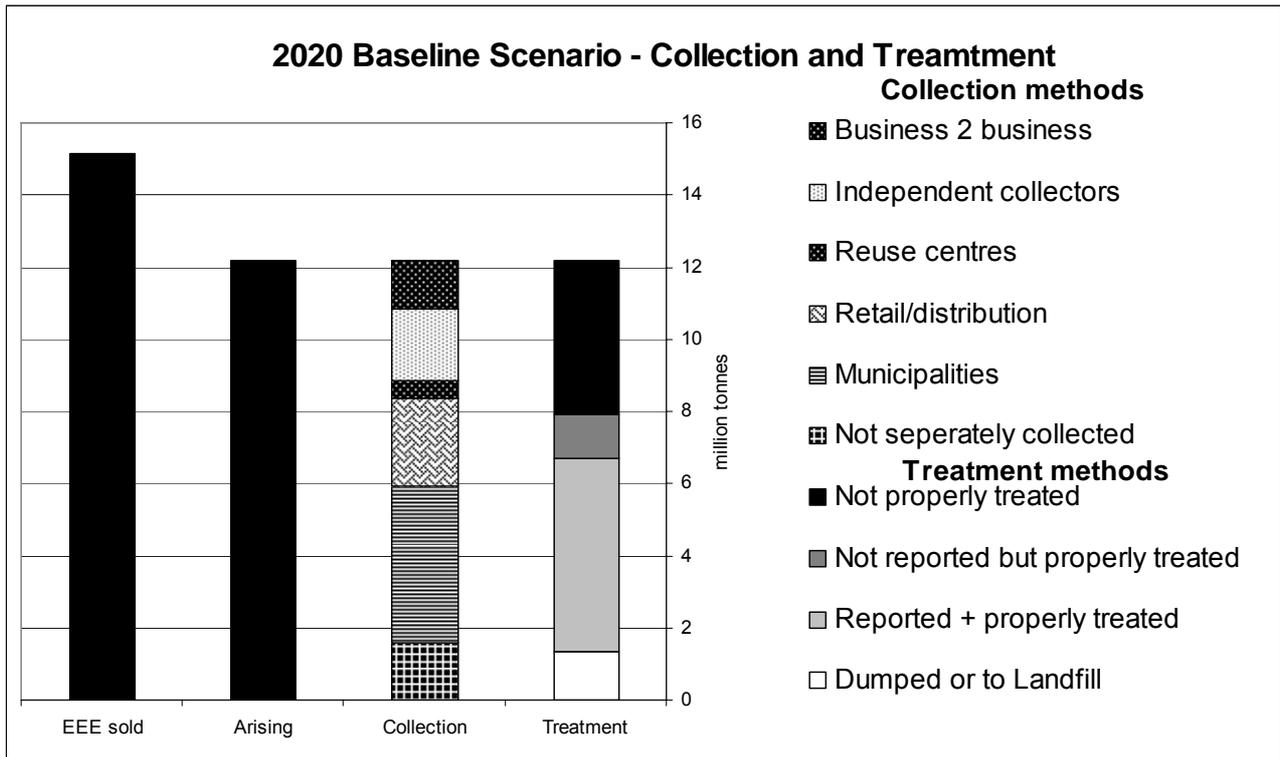
There have been significant changes in the patterns of collection and disposal since the WEEE Directive came into force: the combined effect of higher global metal prices and stimulation of organised collection by the WEEE Directive have resulted in high amounts of WEEE being collected separately from domestic waste, with only an estimated 13% of WEEE going to landfill or incineration.

The indications are that there is separate collection over 85% of WEEE arising, even though only 33% is officially reported as 'separately collected'. The WEEE Directive contains an obligation for all WEEE that is collected separately to be treated in ways which avoid environmental harm, but it is estimated that in practice 50% of what is collected - approximately 40% of all WEEE arising - is probably not being treated in line with the Directive's objectives and requirements. A large part of the unreported, but collected, WEEE may either be treated in the EU without due environmental care or illegally shipped to developing countries where parts of the valuable material are recycled in ways dangerous to the health and environment, or dumped.

Based on current practice, this problem will grow rather than diminish, with an estimated 4.3 million tonnes improperly treated each year by 2020, increasing from 3.4 million tonnes in 2005. The predicted destination and collection of WEEE in 2020 is estimated below<sup>1</sup>:

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<sup>1</sup> pom = put on the market; Arising = amounts of EEE arising as waste in a certain year



### Environmental Issues

When WEEE is treated in the EU without proper procedures, environmental harm arises, in particular from release of heavy metals like mercury from compact fluorescent lamps and flat-screens, and lead from TV's. Cooling and freezing equipment will release an average of over 6,720 tonnes ozone-depleting greenhouse gases annually over 2011-20 causing climate damage monetised at around €1bn each year.

In developing countries improper treatment and dumping of waste, is a health problem, with both adult and child workers being exposed to highly toxic substances whilst extracting valuable materials from WEEE with no health or environmental procedures. Recycling procedures that do not use best practice waste recyclable precious metals and plastics with knock-on energy use and environmental harm from production of virgin material.

### Economic and Social Issues

WEEE itself is an economic resource, with material value currently estimated in the order of magnitude of €2 bn a year. Whilst the economic costs for society of collection, disposing of and treating WEEE are estimated to increase to €5.6bn a year by 2020, including activity by public and informal sectors. With most of this activity taking place in the EU, this waste management activity brings revenue and employment to a waste treatment sector employing much manual labour.

### 3. Main Problems with the Efficiency of the Directive

Of the unnecessary costs identified in the operation of the Directive the most significant come from uncertainty on the scope of the Directive and requirements for producers to register and report in each Member State they sell in. Specific activity required by business from these, and other avoidable administrative costs are estimated at €66m /year using the EU's standard cost method.

These are set to continue. Differences in implementation practice on registration also lead to unwanted free-riding by distance-sellers, who pass their costs on to registered producers.

#### **4. Objectives**

The key objectives of the review are to solve problems with the effectiveness and the efficiency of the Directive: to put in place the conditions which bring about proper treatment of all WEEE being collected and to reduce the amounts of WEEE going to landfill; and to remove all unnecessary costs in achieving those goals. There are also objectives, in line with other EU policy, to promote employment for lower skilled workers and in high-tech innovation with export growth potential.

#### **5. Options**

The Commission services considered many options during the review, together with stakeholders. Some of those which were considered but not described in this IA are in Annex 12. The options analysed in this IA are:

##### **To tackle problems with Effectiveness:**

Option 1: Take no action

Option 2: Minimum inspection and enforcement requirements for treatment of WEEE

Option 3: Minimum inspection and enforcement requirements for waste shipment

Option 4: Increase collection target to align with quantities collected already (85% of WEEE arising), make producers responsible for this target, and include B2B equipment in the scope of the collection target;

Option 5: Set collection targets for the environmentally most relevant streams;

Option 6: Change the method of setting the target from kg/inhabitant to a % of the quantity of EEE put on the market in preceding year.

##### **To tackle problems with Efficiency:**

Option 1: Take no action

*To clarify scope and categorisation (alternatives):*

Option 2: Clarify the scope using fixed lists

Option 3: Define the WEEE scope under the RoHS Directive

Option 4: Classifying categories of equipment as WEEE from private households or B2B

*To cut administrative burden from registration and reporting (alternatives):*

Option 5: Inter-operability of national registers and harmonisation of reporting requirements

Option 6: EU operated Register

There are also 2 other options presented with smaller impacts: to include re-use within collection targets (Option 7); and to set targets for the proportion of each tonne of medical equipment that is to be recycled and recovered as already in place other categories of WEEE (Option 8).

## **6. Impact Analysis and Comparison of Options**

### ***Stronger Enforcement and/or Higher Targets to achieve the objectives?***

It is assumed that the Directive's existing requirements for proper treatment of all separately collected WEEE have not been effective due to: the high material value of WEEE (which makes informal collection and trade of WEEE profitable) and the additional costs of treatment in line with the Directive's requirements (which provide an incentive for improper treatment).

Efforts to increase enforcement of treatment and shipment of WEEE (Options 2 and 3) appear unlikely to be sufficiently efficient or effective to improve management of WEEE in line with the Directive. Both actions would provide increased disincentive to improperly treat WEEE but given the assumed volume of separately collected WEEE which is not properly reported and treated, Member States would need to dedicate very high levels of resources to this to make improper treatment unattractive. The costs of those enforcement resources would be a significant additional cost for society.

Setting targets at the estimated current level of all separate WEEE collection (Option 4) – 85% of WEEE arising - would achieve that level of collection more effectively, and without these additional enforcement costs. Under higher collection targets, to transparently meet their obligation to treat all separately collected WEEE, producers would need to offer sufficient incentives for organisations separately collecting WEEE to deliver that WEEE to proper treatment. For example, the producer would have to offer an incentive that was sufficiently attractive compared to the price that an unauthorised recycler would pay in the grey market to receive WEEE.

In this situation, the level of collection activity (both formal and informal) would not change but the destination of informally collected and traded WEEE would change. With no changes to the extent of WEEE collection activity, the costs to society from collection would not change in this option, compared to the baseline. The producer would continue to have to pay for the costs of the additional processes required during recycling to avoid environmental damage, but would now pay these for all separately collected WEEE, as the Directive intended.

Whilst the two possibilities have not been set out against each other in the stakeholder consultation, there was certainly support from stakeholders for having better enforcement, in particular when it concerns the shipments of WEEE.

**Following page: Summary Table of Impacts of Options for Effectiveness**

Option		No change (Option 1)	Greater Enforcement (Options 2&3)	85% Collection Target (Option 4)	Specific Targets (Option 5)
Destinations (% WEEE)	Landfill and Illegal Disposal	11	11	11	11
	Treatment in line with Directive	54	59	85	60
	Improper Treatment	35	30	4	29
ANNUAL COSTS	Gross Total Costs (€)	5.6bn + enforcement	6bn – 6.3 + basic enforcement	6.8bn + basic enforcement	6.5 - 6.8bn + basic enforcement
	Collection & transport	1.8bn	1.8bn	1.8bn	1.8bn
	Additional costs	0.9bn	0.9bn	1.1bn	1.1bn
	Basic Treatment	1.3bn	1.3bn	1.3bn	1.3bn
	Additional Treatment to meet legal standards	1.6bn	1.8bn	2.6bn	2.2bn
	Enforcement Costs	Not known to Commission	Increase estimated between 0.2 - 0.5bn	No increase	An increase, perhaps 0.1 - 0.3bn
ANNUAL BENEFITS	Value of Material Recovered (€)		2.2bn	2.2bn	2.2bn
	Environmental Damage	General	Baseline: Ozone depletion from 6720 tonnes of ODS released. Climate Damage of €1bn	Some reduction of climate damage possible; not quantifiable	Dependent on entry date of targets: Climate Damage reduced by €2bn-0.2bn/yr. Ozone depletion reduced by 12000-1200 tonnes.
					Dependent on entry date of targets: Climate Damage reduced by €2bn-0.2bn/yr. Ozone depletion reduced by 12000-1200 tonnes.

	In or out EU	Assumed 4,3 million tonnes treated improperly in our outside the EU	Assumed 3,7 million tonnes treated improperly in our outside the EU	Assumed 0,5 million tonnes treated improperly in our outside the EU	Assumed 3,5 million tonnes treated improperly in our outside the EU
Innovation and Export Markets		Little additional stimulus for development of sorting and recycling technologies	Small stimulus for technology development in a growing global market	Significant stimulus for technology development in a growing global market	Some stimulus for technology development in a growing global market
EU Employment		Baseline: Estimated number of jobs in EU treating WEEE about several ten thousands	Small increase in EU manual work, with estimated waste industry revenue increase €0.1bn	Greater EU high tech and manual work, estimated waste industry revenue increase €0.6bn	Higher EU high tech and manual work, estimated waste industry revenue increase €0.4bn

### *Setting the level and type of Target*

The Impact Assessment has shown evidence to assume that already 85% of arising WEEE is being separately collected, although not all is reported. The separately collected 85% of WEEE arising includes nearly all the large and medium size WEEE which is economic to collect. Data suggest that collection costs per unit collected remain the same, certainly between 25 to 85% of WEEE arising.

Setting targets (in Option 4) above the level of WEEE already being collected would require further separation of small WEEE from mixed waste. This would bring greater environmental benefits – both from recovering materials from landfill and particularly for some streams (see below), but would be more expensive per tonne to collect.

Setting targets significantly below the level of WEEE already being collected would diverge from the existing intention of the Directive and would make enforcement activities more costly, as greater amounts of WEEE would still be collected in the grey-economy.

To meet objectives, collection targets would best be set at the level of WEEE which is estimated to actually be collected already (85% of WEEE arising). At this level, significant proportions of small WEEE, including compact fluorescent lamps, which is currently estimated to be lost in unsorted domestic collection, would be at risk of going to unsorted waste.

Bringing about proper treatment of all separately collected WEEE would make the Directive effective at bringing about treatment and recycling of nearly all large and medium sized WEEE. This brings added costs from increased amounts of WEEE being treated in accordance with high environmental standards: costs are estimated to be around €1bn per year on top of the costs of €5.6bn per year for (gross) collection, disposal and treatment, if no further action is taken.

As the type of WEEE being treated will not change, only the amounts, treatment costs per unit will either remain the same, or reduce with economies of scale. The existing formal and informal collection infrastructure would not need to be expanded. This means that setting an 85% target does not decrease the cost-effectiveness of collection and treatment, but may (possibly) reduce the costs per unit for achieving environmental benefit from the Directive.

In Option 5, the fractions of WEEE with greatest potential for environmental harm, like cooling and freezing equipment, would be collected and so would receive (expensive) treatment. In this situation, remaining specific climate and ozone layer harm from cooling and freezing equipment could be largely avoided by setting a 100% collection target of waste arising for these equipment types.

Compared to Option 4, Option 5 has the advantage that proportions of certain streams of WEEE which are less environmentally damaging, would not need to be collected and formally reported. Particularly for some of the large household appliances, there are no great additional costs for recycling and treatment that avoids environmental harm. For these streams a proportion of the organisational costs would be saved in the formal economy. Compared to Option 5, this option would have the benefits (and costs) of pulling greater proportions of some of the more hazardous, but light WEEE (like compact fluorescent lamps) out of the domestic waste stream.

Option 5 would be less effective at avoiding waste treatment under bad conditions in developing countries, with a significant proportion of the 29% of all WEEE arising not being treated under the

collection target likely to go for illegal treatment. The illegal shipment of waste could be reduced through greater enforcement, but with a large proportion of WEEE outside producer targets, the grey trade in WEEE would be likely to be significant, making enforcement more costly and less effective than in Option 4.

Stakeholders, in general, rather linked the control on the hazardous substances in WEEE to sound treatment of the equipment than to an environmental weight based target. As concerns the level of the target, very few expressed a desired level. The recycling industries would welcome a rate of no less than 65% in function of amounts *put on the market*.

Both Options for target setting would include waste from EEE sold to businesses in the collection target. This was previously covered separately in the Directive from domestic consumer waste as it was historically already separately collected rather than going to landfill or illegal dumping. Now both are typically collected, including both streams into one target will avoid problems of free-riding from 'dual-use' waste having its treatment paid for by domestic consumers (see below).

### ***Setting the Date for the Target to apply***

The Commission proposes to set the revised targets for the end of 2016.

One of the greatest environmental problems from improper treatment of WEEE in the grey market is the release of CFCs and HCFCs from fridges, with average monetized climate damage of the magnitude of €bn/yr in 2011 declining annually to lower levels by 2020 and very significant ozone-depletion effects. As these are only contained in cooling and freezing equipment sold before 2002, the number of CFC/HCFC fridges in WEEE is declining each year, and is expected to be small after 2020.

Therefore, different dates for the entry into force of targets will have significantly different effects on the climate and ozone depletion benefits realised by the revised Directive. Targets brought into force at the end of 2016 may save something around €0.5bn in the first year declining to low levels by 2020, depending on the rate at which CFC/HCFC equipment comes back. Targets closer to 2011 would save €bn of climate damage annually, with intermediate years saving something in-between.

So, in addition to targets coming into force in 2016, the Commission proposes to consider by 2012 the appropriateness of a separate target for cooling and freezing equipment, to drive proper treatment of all cooling and freezing equipment which is being separately collected (whether formally or informally).

The revised Directive may be adopted by Council and European Parliament in 2011 and then transposed into law in the Member States. With the collection infrastructure (including informal collection) already in place for cooling and freezing equipment, the change needed to properly treat all separately collected WEEE in line with the Directive is the addition of sufficient treatment capacity.

A suitable treatment plant normally takes around 1 year to build and bring to operation. Costs of installing new treatment capacity are not likely to reduce with greater time.

### ***Incidence of Costs and Combining Targets with Greater Enforcement***

Under Option 4, producers are expected to take steps to secure the WEEE needed to meet their obligation to treat all separately collected WEEE. This will incur costs, but these costs are estimated to be more than offset by the recycling value of the materials in the WEEE that they receive. For example, to divert WEEE from unauthorised treatment, the *maximum* cost a producer would need to offer would be around the value of the WEEE to the unauthorised recycler. This price is the profit that can be made from recycling the WEEE (under sub-standard conditions) - the material value in the WEEE minus the recycling cost.

Whilst the producer would pay this cost, they would then recover the (higher) material value of the WEEE from the recycling – and so are likely not to have any net costs from obtaining WEEE. In practice, it is likely that producers would be able to acquire substantial proportions of WEEE for less than the net material value: by receiving it directly from municipalities or distributors at less than market value. This value can be used towards the producers' other obligations.

Combining greater enforcement (Opts 2&3) with higher collection targets would increase the risks for unauthorised treatment, making that financially less attractive and helping producers secure WEEE with lower incentives. However, the enforcement activity would have a cost.

Option 4 includes harmonizing the requirement for producers to have financial responsibility for collection of WEEE from households. These collection costs would move costs estimated to be in the region of €0.3bn/year from taxpayers to consumers – but are lower than the material value of the WEEE collected and passed on by public authorities, estimated at €1bn. Harmonizing this requirement would avoid any possible distortions in the single market from national arrangements on financing which might favour domestic producers.

Producers would be responsible for paying the additional costs of proper treatment. (These represent revenues for treatment operators.) As EEE is a competitive market and all competing products would be equally affected, the costs paid by producers are assumed to be passed on to purchasers of new EEE in purchase prices. As the increases in purchase price from additional WEEE costs are likely to be very small (less than €1) on a appliance costing €150-450, sales of appliances are also not thought to be affected, with no reduction of the shareholder value of producers.

### ***How to set Targets in tonnes***

Collection targets set as a % of WEEE arising also need to be determined in physical units for monitoring. Targets are currently set by reference to kg/inhabitant. For the EU15 Member States (who have a mainly saturated market for electronic goods) there is a stable relationship between the electronic goods put on the market in one year and the WEEE arising in that market in the following year (even though this is not the same equipment): levels of WEEE are about 80% of the EEE sold in the previous year.

A collection target of 85% of WEEE arising would be set as a target of about 65% of EEE sold in the previous year: (85% of 80% of EEE sold but allowing for a conservative estimate of the relationship between EEE and WEEE arising).

This approach has the disadvantage that, where the relationship between EEE put on the market and WEEE arising is not stable, there is greater uncertainty on the correlation between WEEE actually arising and the target. It can be assumed that the EU12 markets are less saturated and significantly less WEEE arises compared to the amounts bought, and the relationship is less stable. For this Impact Assessment it is assumed that this relation in the EU12 will be stabilised by 2020.

In the stakeholder consultation there was rather support for this option, the option of a fixed target not being supported as it does not reflect enough the variations between Member States and is unresponsive to increases in WEEE volumes. Additionally, most stakeholders also expressed their support to keep the mandatory character of a collection target.

## **7. Comparison of Options to improve Efficiency**

### ***Clarifying Scope and Categories***

Of the two options to provide greater clarity on the scope of and categorisation in the WEEE Directive, there is little difference between the impacts; both will provide greater legal precision on the scope and both would require publication of lists, either by Member States or the Commission of the products considered within the scope. Neither option would resolve any new uncertainties about new products which were not clearly inside or outside the scope.

If there was any support expressed for using lists to clarify the scope, then stakeholders supported the idea of having a positive and a negative list. Harmonising the scope under WEEE was supported rather than defining the scope under RoHS, however, this would require introducing a double legal basis in the WEEE Directive whereas a similar effect can be reached by referring to the scope in RoHS, already targeting harmonisation of scope.

The categorisation of certain categories of products as business waste would avoid problems of 'dual use' waste, when where business equipment very similar to consumer equipment (like IT equipment) enters domestic waste and its treatment paid for by producers of domestic equipment. This 'free-riding' would be likely to be more common if greater volumes WEEE were formally collected.

### ***Cutting unnecessary administrative costs from Registration and Reporting***

Three options are considered to cut the unnecessary costs from duplication and differences in registration and reporting by producers. Either the introduction of an EU Clearing House or single EU register would certainly provide the functions required for cutting the unnecessary costs: the single EU register would do so at much greater cost to the European Commission (and so taxpayer) with some benefit from reduced costs of operations by Member States. Introduction of legal requirements for interoperability of Member State registers stands a good chance of achieving the same result for producers registration, avoids the need for extra resourcing for the European Commission, but is unlikely to provide services for reconciling flows of funding for treatment between schemes with actual cross-border treatment of WEEE.

### ***Other changes***

Including reuse of whole appliances in the existing reuse/recycling target would entail environmental benefits at most likely no cost, as the flexibility on the most sustainable treatment operation (reuse or recycling) would remain. It would help avoiding that re-use is made unattractive by a need to meet higher recycling targets, even where it might be economically and socially more valuable.

Setting targets for medical equipment (cat. 8) equipment to the level of those for monitoring equipment (cat. 9) will have relatively small impacts: for some Medical Equipment (perhaps 10,000 tonnes/year) slightly greater shares of materials will be recovered.

## 8. The Recommended Set of Options and the Impacts

The analysis in this IA recommends the adoption of a combination of options to improve the effectiveness and efficiency of achievement of the WEEE Directive's existing objectives. These options are described with the key impacts in the table below:

Recommended Policy Options	Key impacts (compared to baseline)
<i>To Improve Effectiveness</i>	
Set collection targets for producers at levels close to the level of collection currently being undertaken, include B2B waste in those targets.	- Additional treatment costs of €bn per year, of which a significant but unknown proportion are increased revenues for EU treatment business.
Base these targets on levels of EEE put on the market in the preceding year, at 65% of EEE put on market for all Member States (85% of WEEE arising)	- These costs fall on producers who will be able to pass these on to consumers
Set minimum requirements for inspection and enforcement by Member States, with those requirements decided in Comitology	- Annual reduction of environmental harm to the atmosphere (of magnitude €bn per yr) up to 2020, EU localities and to workers in developing countries from safer treatment of 4.3million tonnes of WEEE.
<i>To improve efficiency</i>	
Define the scope of the Directive in the RoHS Directive (based on Article 95 of Treaty) and Require Member States to publish the list of products within the national scope	Increased, but not total, clarity on the scope of products, with the possibility for Member States to expand the scope in their territory.
Require interoperability and data-transfer between Member State producer registers	- Cuts unnecessary costs paid by producers of €6million a year, by allowing one registration for all EU obligations, with harmonised requirements for reporting and processes, of which SME's will have the biggest proportional benefit.
Include reuse of whole appliances in the target for recycling combined with reuse.	Removes disincentives for re-use of products, where that re-use is more economically valuable than recycling
Set targets for medical equipment (cat. 8) equipment to the level of those for monitoring equipment (cat. 9)	Small: for some Medical Equipment (perhaps 10,000 tonnes/year slightly greater shares of materials will be recovered.

Compared to other possible options, this set of options:

- Is the most likely to stimulate proper treatment of all WEEE arising outside the domestic waste stream, but not impose extra collection costs on society and may improve the cost-effectiveness of the current Directive;
- Is expected to lead to additional benefits from innovation and exports, with greater investment in recycling technologies supporting technology firms in a fast growing export market where EU firms are often the global leaders, offering expansion of high-tech jobs in this sector, in addition to reducing costs and opening new material markets;
- Is predicted to increase jobs further in the WEEE treatment and recovery sector in the EU – these are frequently manual jobs available for lower skilled sectors of the workforce. Some stimulation of the reuse sector should also lead to more jobs for socially disadvantaged people and also to better access to cheaper second-hand consumer goods for the poorest sector of society.

## **1. POLICY BACKGROUND, PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES**

### **1.1. Policy background**

#### *1.1.1. General background*

Electric and electronic equipment (EEE) is a product group characterized by extreme diversity and increasingly fast innovation cycles. Its production supports one of the fastest growing domains of manufacturing industry in the world. Currently, in the European Union (EU) alone an estimated 10.3 million tonnes of are sold annually, the biggest share by weight of which are large household appliances and IT and telecommunication equipment.

As the market continues to expand and also as innovation cycles become shorter and the replacement of equipment accelerates, one result is that waste electrical and electronic equipment (WEEE) is considered the fastest growing waste stream in the EU.

Currently, each year, each person in the EU 15 Member States discards an average of 14-24 kg of WEEE and for the 12 new Member States, the average discards are estimated to be 6-12 kg per inhabitant each year. WEEE arising each year is estimated to total 8,3 to 9,1 million tonnes per year in 2005, and is expected to grow to 12,3 million tonnes by 2020.

The WEEE arising now are products which have been put on the market (POM) in preceding years, with the average lifetime of products varying greatly, from mobile phones (2 years) to refrigerators (around 15 years).

WEEE is a complex waste stream of different materials and components, including several hazardous substances that can be released into the environment and damage human health if not treated appropriately. Potential risks for the environmental and human health are further increased by sub-standard recycling/recovery operations in developing countries, driven by a rising demand for raw materials and often supplied by illegal shipments of WEEE<sup>2</sup>.

These risks can be significantly reduced by sound management of WEEE. Elements of sound management include: separating WEEE from other waste to facilitate targeted and technically adequate treatment, applying treatment standards that minimize the release of harmful substances and recovering as much as feasible of materials and energy embodied in the waste. These measures can be complemented by innovative design of EEE. This can help to avoid to the extent possible the use of substances, in particular of hazardous substances, reduce possible exposure of workers and consumers, and favour the efficient dismantling and sorting of waste.

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<sup>2</sup> Environment and human health concerns in the processing of electrical and electronic waste, Greenpeace Research Laboratories, University of Exeter, Technical note 04/2006, May 2006; "High-Tech Trash" by C.Caroll, National Geographic, published January 2008; The recycling and disposal of electrical and electronic waste in China – legislative and market responses, Environmental Impact Assessment review 25 (2005), p.461, 462; Heavy metals concentrations of surface dust from e-waste recycling and its human Health implications in Southeast China, Anna W.Leung et al, January 2008.

In principle, such an approach offers opportunities for the waste management sector, equipment manufacturers and producers of EEE (first mover advantage). However, historically market forces alone have not been strong enough to promote significant improvements to the management of WEEE – as recently as the 1990s more than 90% of WEEE was still landfilled, incinerated or recovered without pre-treatment. Some of the main reasons seem to include:

- Hazardous substances are often the cheapest technical solutions in the short term;
- Environmental recycling or disposal of WEEE brings extra financial costs with the benefits accruing to society;
- Low prices for raw materials in previous decades discouraged investment in collection and recycling infrastructure and development of recycling technology. Even the present raw materials prices enable profitable operations in the EU for only few waste materials and fears of cyclical price changes keep holding back investment.

In reaction to this, in the late 1990s several Member States introduced national laws to address environmental concerns related to the management of WEEE. In 2000, the Commission proposed<sup>3</sup> EU legislation in this field, in response to rapidly growing amounts of WEEE and associated possible environmental and health problems, and to approximate product-related legislation across Member States. As a result, the WEEE<sup>4</sup> and RoHS<sup>5</sup> Directives were adopted in 2003.

#### *1.1.2. Objectives and rationale of the WEEE and RoHS Directives*

The WEEE Directive aims to prevent WEEE, and where this is not possible to recycle and recover it to reduce its disposal and to reduce the negative environmental impacts of WEEE through proper treatment of collected WEEE.

It requires Member States to ensure that collection and treatment schemes are set up and sets minimum collection targets to increase separate collection and also makes producers<sup>6</sup> responsible for the financing of the WEEE management. The Directive thus enables market mechanisms and financial incentives in favour of efficient collection, treatment and “design for recycling”.

The RoHS Directive, passed into law at the same time, prohibits the use of certain hazardous substances in domestically produced or imported EEE, approximating national legislation across Member States to ensure the free movement of goods. Its environmental objective is to protect humans and the environment against the release of these substances and to facilitate recycling and recovery of materials from WEEE. While establishing binding minimum requirements for all producers, it enables competitive advantages for

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<sup>3</sup> COM(2000) 347 final

<sup>4</sup> OJ L 37, 13.2.2003, p.24

<sup>5</sup> Directive on the restriction of the use of hazardous substances in electrical and electronic equipment (RoHS), OJ L 37, 13.2.2003, p.19

<sup>6</sup> “Producers” are manufacturers of EEE in the EU, resellers under their own brand as well as first-time importers of EEE into the EU.

innovative products and technologies that can comply with the substance ban more efficiently.

Recent research (see ) has confirmed the need for these Directives in view of environmental protection. For example, the total prevented global warming potential by properly treating waste fridges containing chlorofluorocarbons (CFCs) is more than 2000 kg CO<sub>2</sub> equivalent per fridge. Energy savings from recycling metals and plastics contained in WEEE rather than losing them to landfill is significant, for example: recycled copper requires 85% less energy and recycled steel requires 74% less energy than the extraction and refining of virgin materials.

Material	Aluminium	Copper	Iron & Steel	Lead	Zinc	Paper	Plastics
Energy savings (%)	95	85	74	65	60	64	>80

**Table1: Energy savings of recycled materials over virgin materials (BIO 2006)**

### 1.1.3. Experience with implementing the Directives

Both Directives had to be transposed by the Member States by 13 August 2004. By 13 August 2005, collection and treatment systems needed to be in place and producers of electrical and electronic equipment needed to start providing for their financing. The collection and recovery targets needed to be achieved by 31 December 2006 and the substance ban entered into force on 1 July 2006. Practical experience with implementing the Directives is therefore still building up but the following results have already been achieved:

- 140 take-back schemes enable nearly 500 million Europeans to return their WEEE free of charge.
- Compared to the 1990s, since 2005 about 2 million tonnes of WEEE in the EU have yearly been diverted from disposal without any pre-treatment, by selective collection followed by treatment operations.
- The RoHS Directive has resulted in reducing the quantities of the banned substances being disposed of and potentially released into the environment by 89800 tonnes of lead, 4300 tonnes of cadmium, 537 tonnes of hexavalent chromium, 22 tonnes of mercury and 12600 tonnes of Octa-BDE per year<sup>7</sup>.
- Significant investments were made in treatment facilities (new facilities in the EU-15 plus new treatment facilities serving several new Member States at the same time) and the WEEE recycling business increased to a multi billion industry, employing several ten thousands of persons.
- More than 39,500 producers have registered and assume their financial producer responsibility obligations.

<sup>7</sup> Arcadis/Ecolas & RPA 2008, table 4.55.

- So far, no reduction in purchasing of EEE has been reported as a result of WEEE implementation.

#### 1.1.4. *Review*

There is now sufficient experience and knowledge to assess the operation of the Directives to tackle the areas where their objectives are not being met or where meeting those objectives could be achieved more efficiently.

The Directives themselves call for a review of certain provisions, notably the collection and recycling targets for 2008 and under RoHS; the list of substances banned, and the list of equipment covered by the substance ban.<sup>8</sup>

The review of the Directives forms part of the Commission's simplification strategy<sup>9</sup>, which should contribute to better achievement of the Directive's objectives, for example through improving implementation and enforcement of the Directives at national level and the elimination of unnecessary administrative burden.

## 1.2. **Expertise and information**

This report is mainly, but not exclusively, based on the information gathered from stakeholders, either through direct consultation or in the context of a set of studies commissioned by the European Commission. The main studies carried out by the European Commission between 2005 and 2007 in the context of the WEEE review are described in Annex 1. Over recent years a cumulative budget of about €540.000 was allocated to this data collection process, including the research studies and the data information gathering exercise.

#### 1.2.1. *Implementation Assessment*

A research study to generate full understanding of implementation of the WEEE Directive by the Member States and to obtain feedback on potential areas for revision was carried out and resulted in a report conducted in 2005 [see also Annex 1].

#### 1.2.2. *Data gathering exercise*

Stakeholders were given the opportunity to provide information at an early stage in the review upon which the succeeding steps in the review process could be based. During an 8 weeks period from June to August 2006, stakeholders were requested to submit information related to a wide range of issues among other, both public and private sector statistics, information on operations, costs and benefits, scientific and technical information on the issues as listed in [http://ec.europa.eu/environment/waste/weee/pdf/info\\_gath\\_ex.pdf](http://ec.europa.eu/environment/waste/weee/pdf/info_gath_ex.pdf).

Three major objectives of this project were 1) to gather relevant information in existing documents, 2) to make them available in a user-friendly manner, and 3) to identify significant data gaps, and to contact stakeholders for filling these gaps.

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<sup>8</sup> See Articles 4(3) and 6 of the RoHS Directive and Articles 5(5), 7 (4) and 17 (5) of the WEEE Directive.

<sup>9</sup> COM (2005) 535 final

[http://europa.eu.int/comm/enterprise/regulation/better\\_regulation/simplification.htm](http://europa.eu.int/comm/enterprise/regulation/better_regulation/simplification.htm)

A synthesis report was prepared and made available for the contractors of the research studies and for the general public in the CIRCA page [http://circa.europa.eu/Public/irc/env/weee\\_2008/library](http://circa.europa.eu/Public/irc/env/weee_2008/library). More information about this exercise can be found in Annex 1.

### *1.2.3. Research studies*

Studies were carried out by the United Nations University (hereafter referred to as UNU), Ökopol and Ecolas with subcontractors [details in Annex 1 and bibliography].

It has to be noted that detailed information on some of the subjects covered by the studies, in particular with regard to quantitative data on environmental impacts and costs, could not always be obtained. In such cases the analysis was focused on the more qualitative aspects of the options considered.

### *1.2.4. Compliance check studies*

The Commission services have performed studies for checking the conformity of the implementation of the Directive in the Member States.

As a result, infringement proceedings have been opened against Member States and additional cases may be opened in the coming months should the Commission identify lack of transposition of some provisions or incorrect transposition.

A substantial number of cases relates to the adoption by Member States of a definition of producer of electrical and electronic equipment based on the national market rather than using a European definition of producers.

### *1.2.5. Reporting from Member States on implementation*

A considerable amount of experience has also been gained and exchanged with the Member States during the meetings of the Committee for the Adaptation to Scientific and Technical progress<sup>10</sup> (TAC) since the adoption of the WEEE Directive at the beginning of 2003. In addition, Member States had to report to the European Commission for the first time on the implementation on the basis of Commission Decision 2005/249/EC<sup>11</sup> that lays down the questionnaire for reporting covering the period from 2004 to 2006, in September 2007. The deadline for setting up systems allowing final holders and distributors to return WEEE from private households free of charge being 13 August 2005, the analysis of implementation is therefore based on recent experiences.

A second reporting obligation for the Member States concerns the reporting of information on the quantities and categories of electrical and electronic equipment put on their market, collected through all routes, reused, recycled and recovered within the Member States, and

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<sup>10</sup> Article 14 to the WEEE Directive

<sup>11</sup> 2004/249/EC: Commission Decision of 11 March 2004 concerning a questionnaire for Member States reports on the implementation of Directive 2002/96/EC of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE), OJ L 78, 16.3.2004, p.56

on collected waste exported, by weight or, if this is not possible, by numbers<sup>12</sup>. The first reporting deadline is July 2008. The Commission has received at the end of August 2008 reports from 13 Member States. These reports confirm the data provided by the studies carried out for the WEEE review.

#### *1.2.6. Study on administrative burden*

A study on administrative burden from legislation, including the WEEE Directive is ongoing. In its 1<sup>st</sup> and 2<sup>nd</sup> module, information obligations stemming from EU legislation and from national implementation respectively are mapped. The next modules will do field measurement on the identified information obligations out of which recommendations and proposals will be developed for reducing administrative burden.

#### *1.2.7. Other sources*

The European Economic and Social Committee (EESC) is preparing the adoption of an own-initiative opinion on the management of WEEE. The Section of Agriculture, Rural Development and the Environment, which was responsible for preparing the committee's work on the subject, will present a draft opinion for vote at the plenary session to be held later this year. Preparatory documents can be found at the EESC register under reference NAT/389

<http://www.toad.eesc.europa.eu/EESCWIPListing.aspx?folder=NAT&WipLang=EN>

### **1.3. Direct Consultation**

This impact assessment is based on an extensive consultation of stakeholders and collection of data, information and views.

Throughout the process a continuous information exchange with stakeholders was carried out. In order to have Member States, producers, collection schemes, national registers, industry, NGO's and other stakeholders participating in the review process, an on-line public stakeholder consultation on possible options for change was organised from 11 April 2008 until 5 June 2008.

The consultation document is made available on the webpage: [http://circa.europa.eu/Public/irc/env/weee\\_2008\\_review/library](http://circa.europa.eu/Public/irc/env/weee_2008_review/library). Stakeholders were expected to provide opinions supported by detailed evidence on the economic, social and environmental impacts of the policy options. In particular any additional quantitative data, studies and evaluations were welcomed to allow analysing the full costs and benefits of potential changes in the operation of the Directive.

An electronic functional mailbox for receiving opinions and information on the WEEE review was created. The opinions and information received from stakeholders – unless requested otherwise – are made available on the same web-site under "stakeholder opinions". This allows stakeholders to see which pieces of information have already been provided and to read others opinions.

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<sup>12</sup> 2005/369/EC: Commission Decision of 3 May 2005 laying down rules for monitoring compliance of Member States and establishing data formats for the purposes of Directive 2002/96/EC of the European Parliament and of the Council on waste electrical and electronic equipment, OJ L 119, 11.5.2005, p.13

Summarised per group of stakeholders, following opinions were raised:

- Member States expressed various views, mainly linked to implementation issues related to their national level;
- Producers and producer associations clearly expressed the need for more harmonisation, in particular on the registration and reporting requirements and were supporting an obligatory "give back" by collection points to producers as not all WEEE collected separately is returning to the schemes set up by them;
- Municipalities and their associations did not support the obligatory "give back" and like to see a financing of the full collection costs by producers; they are supporting the reuse of goods and clearer standards for the treatment of WEEE;
- The retail sector stressed the need for clarifying the scope and the producer definition and hence the responsibilities linked to producers;
- The reuse sector is clearly in favour of a target for reuse to make reuse activities more visible and at the same time of measures improving quality (early selection, reuse criteria, treatment standards);
- Treatment operators support a mandatory collection target expressed in a percentage of quantities put on the market and in particular a high target for equipment with a high environmental weight; they also support the development of treatment standards and more accreditation and monitoring within the waste chain; finally, they call for keeping the current recycling and recovery targets;
- Environmental NGO's support higher collection rates, expressed in amounts put on the market, higher recovery/recycling targets and a target for reuse. They call for the proper implementation of producer responsibility and an overall better implementation of the Directive in the Member States.

A full summary of the results of the consultation and an overview of the stakeholders who contributed can be found at the same web-site under "stakeholder opinions summary".

In addition, Small and Medium Sized Enterprises (SMEs) were consulted. An 'SME Panel' was held at the end of 2006 to use the knowledge of the experiences, difficulties and costs encountered by small and medium sized businesses whilst implementing the WEEE Directive. A questionnaire was addressed to specific SMEs defined as, or acting as producer, importer or distributor under the WEEE Directive and to SMEs acting as treatment operators, collectors and retailers. In total, 456 SMEs have given input into the panel, in many cases with the help of the European Information Centres who then summarised it in national reports.

The data obtained from this panel were transferred in aggregated form to the contractors for reasons of confidentiality of the individual SME. The data provided a good idea on experiences and concerns of SMEs which are often different to those of larger (multinational) companies.

Illustration on the extent of the consultation process: 19 meetings of the Committee for the Adaptation to Scientific and Technical progress since adoption of the WEEE Directive, 118 reference documents placed on the open CIRCA website, 1 expert workshop, 1 SME panel, 26 national implementation reports and about 170 opinions, including additional information received as part of the public consultation.

In the light of the above, the stakeholder consultation in the review process has been carried out according to the European Commission's general principles and minimum standards for consultation<sup>13</sup>.

Furthermore, a European Commission's inter-service group including all the relevant services<sup>14</sup> was set up in order to ensure the necessary internal co-ordination throughout the review process.

Finally, on 7 July 2008, the Impact Assessment Board adopted an opinion on the draft version of the Impact Assessment. All recommendations for improvements have been incorporated into the current impact assessment, in particular,

- A robust **baseline scenario** has been included in the main text, including estimates of the amount of WEEE arising annually and estimates on their treatment routes and costs. On the basis of this refocused **problem definition**, the sections on objectives and options have been restructured;
- A discussion of **options discarded at an early stage** together with an explanation of the corresponding reasons has been added in an Annex to the report;
- The analysis of a possible new approach to the **collection target** has been strengthened and a desired level has been indicated;
- The **analysis of impacts**, including social impacts, has been deepened;
- The **administrative burden** assessment has been deepened and refined in an Annex to the report, noticing data provided by new studies and following the favourable assessment by the High Level Group of Independent Stakeholders on Administrative Burden of 18 September 2008;
- The views expressed by **stakeholders**, in particular during the public consultation, are more consistently reflected throughout the text.
- Finally, a lot of information that was previously contained in various Annexes has been integrated in the main text for **easier reference**.

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<sup>13</sup> COM(2002) 704 final

<sup>14</sup> The inter-service group is composed of representatives from the Secretariat General, the Legal Service, DG ENV, ENTR, TREN, RTD, JRC, TRADE, INFSO and SANCO

## **2. PROBLEM DEFINITION**

### **2.1. Introduction to the problem and who is affected**

#### *2.1.1. Introduction to the problem*

EEE contains numerous substances that can harm human health and the environment if the equipment is designed inappropriately or treated inappropriately either during use or when discarded. Annual volumes of waste from EEE (WEEE) in the EU continue to grow rapidly [see 1.1.1].

The WEEE Directive has been adopted to reduce these risks by establishing requirements to ensure the collection and environmentally sound treatment of WEEE. It complements the RoHS Directive which prohibits the use of certain hazardous substances in EEES. Sound management of WEEE reduces release of environmentally damaging substances, saves material resources and reduces energy use. The WEEE Directive should have been implemented at national level less than two years ago.

However:

- Only one third of the annual WEEE arising appears to be collected, treated and reported according to the WEEE legislation; illegal trade in WEEE to third countries is widespread, despite rules on waste shipment and illegal dumping is still widespread in the EU.
- Improper or substandard treatment of WEEE results in environmental damage and increased health risks, in the EU and particularly in third countries. Material resources, potentially available to replace raw materials, are lost where the best economic options for recovery of those materials are not used.
- Experience with the first years of implementation of the WEEE Directive has indicated unnecessary costs arising from the operation of the Directive, which make achievement of the Directive's objectives less efficient and the Directive less effective. These technical, legal and administrative problems affect market actors and administrations, including distortion of competition and unnecessary administrative burden.
- These costs are partly driven by diverging implementation of certain provision of the current WEEE Directive such as the scope of the Directive, and producer registration/reporting requirements.

In the remainder of this section the problem, as is estimated to evolve, is described in more detail. For clarity, the problem is divided between those issues limiting the effectiveness of the Directive [see section 2.3] and those issues reducing its efficiency [see section 2.4]. Whilst there are some links between these, the drivers of the problem in each case are sufficiently different to allow the separate description.

#### *2.1.2. Who is affected and how?*

Treatment of WEEE – and the Directive – concerns many stakeholders, who will therefore be affected by any changes proposed in this review.

- Member State authorities: the Directive is addressed to the Member States. They have to implement and enforce the Directive at national level; Municipalities often implement waste management services at local level;
- Producers of electrical and electronic equipment: are primarily responsible for the financing, collection, treatment, recovery and environmentally disposal of WEEE; furthermore they have to look after eco-design;
- Consumers of EEE: to whom the producers pass the costs of treatment - in the purchase price of EEE - and who have a role in the separate collection of WEEE;
- Retail and distribution sector: including their role as part of the collection systems in many Member States;
- Treatment operators: who treat the WEEE and contribute to the organising of the information flow by monitoring the amounts of WEEE entering and leaving the treatment facilities;
- Recyclers and recovery operators: to provide for the recovery of WEEE collected separately and to monitor the incoming WEEE flows;
- Producer responsibility organisations (PROs): acting on behalf of the producers to fulfil their obligations;
- Traders and shippers of WEEE;
- The EU society as a whole: for whom the impact of environmental and health damage in the EU and in third countries from EU waste is a concern;
- Citizens and traders in third countries who either currently suffer health affects from treatment of illegal WEEE or who profit from the illegal trade.

## **2.2. WEEE Arising- Baseline scenario 2011-2020**

Any changes introduced by this review are expected to come into legal force in Member States around 2011. In the description of the problem, to allow comparison of the policy options against baseline after that time, a problem scenario is developed for several years after 2011, formed from extrapolations of current evidence and reasonable assumptions.

### *2.2.1. WEEE arising: Volumes of WEEE*

Predictions made during the 1990's estimated the tonnage of EEE put on the EU15 market at 7 million tonnes. With the expansion from EU15 to EU27 and based on many sources and different estimation techniques, the UNU study estimates that the amount of new EEE put on the EU27 market in 2005 was 10.3 million tonnes per year. Based on current trends, sales of new EEE are estimated to rise to 12 million tonnes per year by 2011 taking 2,6% yearly growth rate as a basis.

In the explanatory memorandum of the WEEE Directive, the amount of EEE arising as waste (WEEE) was estimated in 1998 for the EU15 at 6 million tonnes. The new estimate of the UNU study for the current WEEE arisings across the EU27 for 2005 is between 8.3

and 9.1 million tonnes per year. The increase in the WEEE arisings since 1998 is due to expansion of the EU, growth in the number of households and higher consumption per capita.

Approximately 87% of WEEE arising in the EU (by weight) is from private households ('business to consumers': B2C) and 13% of WEEE arising comes from other than private households ('business to business': B2B)<sup>15</sup>.

The UNU study forecasts that household WEEE arisings may grow annually at between 2.5% and 2.7% reaching about 10.6 million tonnes by 2020. This would imply that total WEEE arisings (including B2B WEEE) might reach about 12.3 million tonnes by 2020.

There are significant differences in the weight of WEEE arising in different Member States, with the most significant difference between the 'new' Member States which joined the EU in 2005 and those already part of the EU. The difference is driven by the relatively low consumption of electrical products by households in new Member States in past years. As consumption of electrical products in these states is rising quicker than in the EU-15, volumes of WEEE are also expected to increase at greater rates, with 5.3% yearly according to the UNU study in the period 2011-2020.

The UNU study calculated that 2005 WEEE arisings exhibit the following ranges:

- EU15: 14-24 kg/head/year
- New Member States (EU12): 6-12 kg/head/year.

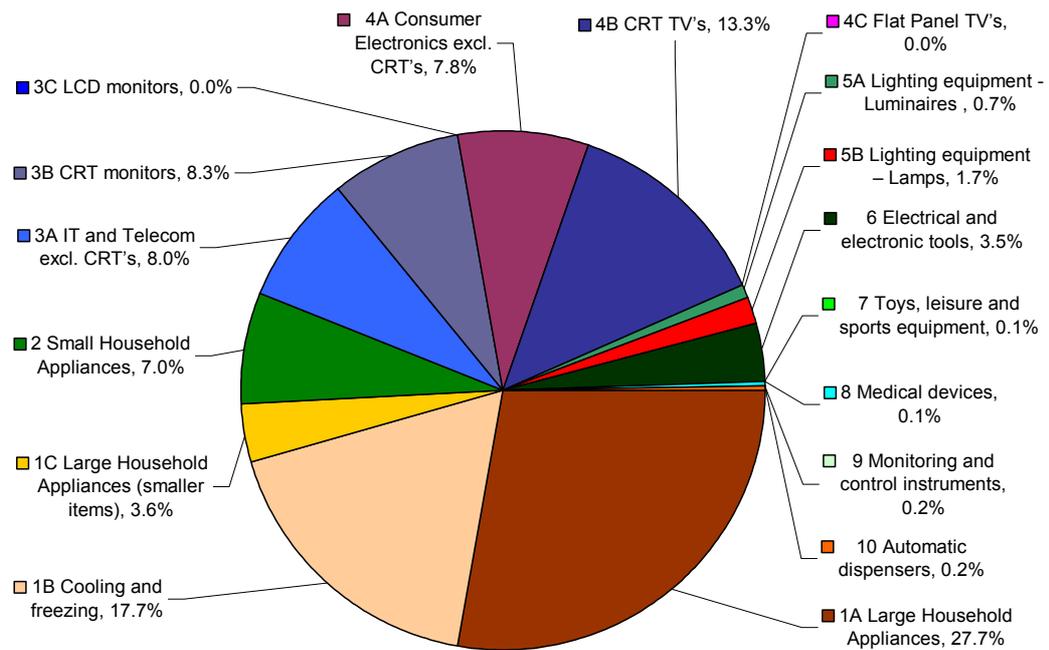
This scenario is based on data collected by the research studies, as no reporting from Member States was available at the time. Very recently (August 2008) the Commission received reports from 13 Member States. These reports confirm within a narrow margin the data from the research studies. For this reason and as the Commission is still in the process of verifying Member State data, this Impact Assessment remains based on data from the research studies.

### 2.2.2. *WEEE Arising: Composition by type of Equipment*

The average compositional breakdown for the EU has been calculated and shown in the Figure 1.

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<sup>15</sup> This calculation is based on UK data scaled up from the UNU study



**Figure 1: breakdown of WEEE arising in 2005 by weight**

In future years, due to changes in the EEE sold in previous years, this composition is predicted to change. Cathode Ray Tube (CRT) monitors will appear less in the WEEE arising, as they will be gradually replaced by flat panel screens of which the share in the WEEE arising will grow in the future. Other changes for example resulted by change in the behaviour of consumers or by the marketing of new appliances/applications, are not possible to be estimated here.

### 2.2.3. Material composition of WEEE

The three main materials arising from the WEEE arising are metals, glass and plastics. Ferrous metals account for approximately 50%, non-ferrous metals for 5% and plastics for 20-25% of the WEEE arising. Other materials are e.g.: oil and cooling agents from fridges, freezers and air conditioners, concrete from washing machines and wood from TV's. For a more detailed list of environmentally relevant substances in WEEE arising see Annex 2. The composition WEEE in the future will change as the composition of EEE put on the market currently differs from the past.

- This is the case for flat panel displays that are replacing CRT TV screens. The sales of CRT televisions represented 99,9% by weight of television sales in 2000 and this is expected to fall to only 21% by the year 2010. Taken the difference in weight into account, Liquid Crystal Display (LCD) televisions are estimated to represent 52% of weight of all sales by then.
- In the case of refrigerators and freezers CFCs and HCFCs<sup>16</sup> were used for their manufacture until the early 1990s, when it was found that these chlorinated gases

<sup>16</sup> Hydro chlorofluorocarbons

damaged the ozone layer. Regulation 3093/1994 amended by Regulation 2037/2000 banned their manufacture and regulated their treatment. Due to the long life cycle of cooling appliances, those gases still make up a significant part of today's WEEE stream, but this is expected to be less so in the future.

- In addition to this, there is a shift from the used of NiCd to other battery types. Also, the batteries Directive 2006/66/EC restricts the use of cadmium in portable batteries with certain exemptions.
- As regards polychlorinated biphenyls (PCBs), historically they were extensively used in electrical equipment such as capacitors and transformers. However, their use in open applications was widely banned in 1972 and they have not been used in the manufacture of new equipment since 1986. Thus, unless an appliance is more than 20 years old, the chance that it contains capacitors containing PCBs is remote at present and it will be less likely in the future.

#### 2.2.3.1. Hazardous substances in WEEE

The composition of WEEE arising will also change in the time with the implementation of the RoHS Directive. The RoHS Directive has restricted the use of some hazardous substances: lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr VI), polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). The latter two are manufactured compounds used as flame retardants in plastics used in a variety of domestic objects including computers, TVs, furniture (hard and soft), stereos etc. They are regarded as being harmful to the environment and endanger the health of wildlife and probably humans. To identify a few examples for the other substances: mercury is used in some lamps and certain electrical switches; cadmium is a valuable alloying metal for copper, a metal plating material and has long been used in batteries; lead is used in printed circuit boards and chromium VI is widely used to prevent corrosion in iron-based alloys.

However, despite the RoHS restriction, hazardous substances will still be present in WEEE, as:

- The RoHS restriction only applies to new EEE put on the market as from 1 July 2006. Since the average life time of an EEE is varying<sup>17</sup> but can be up to 15 years, the returning waste streams will consists of pre-RoHS waste until at least 2020.
- In addition to the substances covered by the RoHS Directive, other hazardous substances or substances likely to be characterised as such, are annually being used in EEE in considerable amounts. These are for example: non-reacted TBBPA<sup>18</sup> (40.000t), HBCDD<sup>19</sup> (210t), DEHP<sup>20</sup> (29000t), and beryllium oxide (1,5t). These are not restricted under the current RoHS Directive.

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<sup>17</sup> The average life time of medical equipment is often up to 20-30 years (Goodman 2006), for fridges about 15 years and for mobile phones, 23 months.

<sup>18</sup> Tetrabromobisphenol-A, flame retardant

<sup>19</sup> Hexabromocyclododecane, flame retardant

<sup>20</sup> Bis(2-ethylhexylphthalate), PVC (poly-vinyl chloride) plasticiser

- The RoHS Directive allows for the presence of the restricted substances at a low level<sup>21</sup>.
- Quite a few applications are excluded from the RoHS Directive where substitution is "technically or scientifically impracticable" or the positive impacts of substitution outweigh the benefits thereof. Whereas estimations on overall quantities of these hazardous substances are difficult to obtain, the most relevant ones as regards quantities seem to be lead in glass of cathode ray tubes (more than 50.000 tonnes of lead)<sup>22</sup>, mercury in lamps (4,3tons/yr) and in LCD panels as backlights (2,8tons/yr).
- Evidence on enforcement of the RoHS Directive indicates that significant volumes of non-compliant equipment have been placed on the market illegally, which will later enter the waste stream.
- PCBs are still somewhat present from old electricity transmission equipment in the waste stream, however this expected to be lower in the future.

Hazardous substances are therefore still expected to be found in the WEEE stream in the coming years including EEE put on the market before 1 July 2006 is returning until at least 2020.

#### 2.2.3.2. Environmental significance of categories of WEEE depending on their composition

The composition of different categories of WEEE differs greatly (a toy containing electronics has a very different composition to a television), and this affects both the economic value and environmental characteristics of the categories, for more detailed illustration see Annex 2.

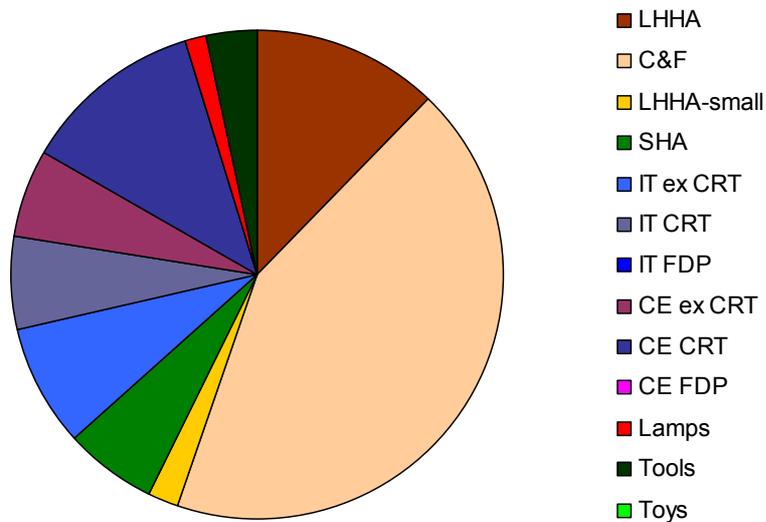
The differing composition of equipments make them weight differently from an environmental perspective. For example, the large household appliances (without cooling and freezing appliances) represent about 27% in weight whereas they would only represent half in environmental weight as illustrated in Figure2.

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<sup>21</sup> "maximum concentration values" are permitted for the banned substances; these are 0.1% by weight in homogenous materials except for mercury, where the limit is ten times lower.

<sup>22</sup> This figure represents the cumulative amount of lead used in cathode ray tubes for the coming years. For 2005, 31,8million units of televisions in the EU25 have been sold, with an average weight of 31kg. The amount per year is decreasing as the growth of the CRT market for televisions is an average of -13% per annum (See figure 6 in chapter on televisions in the MEEUP 2006 study). For a CRT monitor, the average weight of a screen is 22kg which contains 450g of lead.

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



**Figure 2: Contribution of the WEEE categories to the total impacts of diverting WEEE from disposal based on the Eco-Indicator'99 (UNU)<sup>23</sup>**

The figure shows that the most relevant products to divert from disposal are the CFC containing fridges. In addition it was found that the following categories of equipments are relevant for specific environmental categories due to their substances of concern:

- Toxicity effects are important for LCD monitors and Lamps;
- Avoided ozone layer depletion and global warming potential in case of cooling and freezing equipments;
- Cumulative energy demand and resource depletion for Cooling and freezing appliances and CRT screens;
- Acidification for IT and telecommunication equipments (excluding CRT) and LCD monitors;
- Eutrophication for LCD monitors and electrical and electronic tools.

### 2.3. Problems with the Effectiveness of the Directive- Baseline scenario 2011-2020

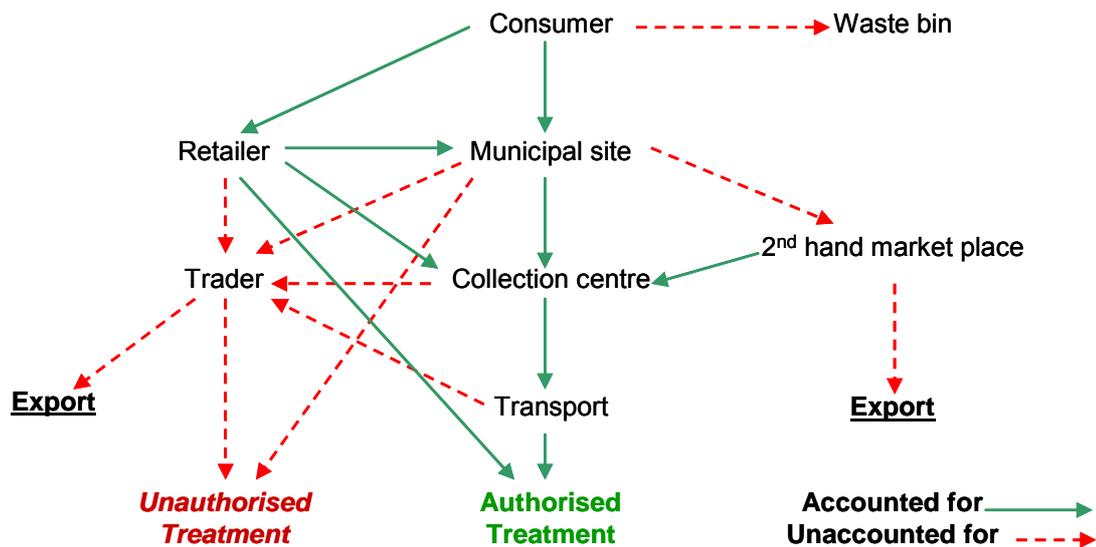
#### 2.3.1. Current Collection of WEEE

In its report "Towards Sustainable WEEE Recycling", EERA (European Electronics Recyclers Association) claims that only 20 to 33% of the amount put on the market is accounted for as being reported as separately collected by Member States. This is in line

<sup>23</sup> Abbreviations used in the figure: see glossary of terms

with figures from Member States, which reported separate collection of 2.6 million tonnes<sup>24</sup> in 2005 out of 8.3-9.1 million tonnes of WEEE arising (UNU study).

Yet, the evidence suggests that the great majority of WEEE (by weight) is being separately collected rather than becoming part of the mixed municipal waste stream: but not reported as separately collected. EERA sees the following explanation: significant proportions of WEEE going to unauthorised treatment and illegal export. EERA made this visible in the following diagram showing the different flows of consumer WEEE.



**Figure 3: possible leaks in return logistics of WEEE from private households<sup>25</sup>**

The full (green) arrows represent streams that are properly monitored and reported; evidence suggests that this could be the minority of streams.

The dotted (red) arrows represent streams whose volumes, destination and/or treatment are not reported. It is therefore uncertain if and to which extent these stream are subject to sub-standard or even illegal treatment and trade.

### 2.3.1.1. Collection of WEEE from households

WEEE arising from household is estimated at 87% of the total WEEE arising.

The legal responsibilities for the collection of the WEEE from households currently require collection either by producers, retailers (distributors) or by municipalities, or a combination of those organisations. The situation differs greatly between Member States, in some only producers being responsible (eg. Bulgaria) and in others only municipalities (eg. Denmark).

<sup>24</sup> 5,31kg/inhabitant times 492million inhabitants (UNU 2007)

<sup>25</sup> Municipal site: operated by the municipality or by a commissioned company, often with its own commercial interest; Collection centre: WEEE is handed over to a take-back scheme, commissioned recycler/logistic company, or commercial agent, who may or may not have his own commercial interest

The financial responsibility for collection is frequently allocated differently from the physical responsibility. For example, in Austria, distributors, municipalities and producers have responsibility for physical collection, but only distributors and producers have financial responsibility. A table indicating the different legal approaches in this regard in the EU 27 Member States (from Ökopol, 2007) is presented in Annex 3. In practice, consumers or owners of WEEE are often required to take WEEE to collection sites, or to distributors. Evidence suggests that large proportions of WEEE are either collected informally directly from consumers or from distributors or collection sites by private traders in WEEE.

#### 2.3.1.2. Collection of Business to Business WEEE

B2B WEEE is estimated at 13% of the total WEEE arising.

The collection of B2B equipments is mostly managed on a contractual basis by producers (UNU study) These equipments currently represent less than 1% of WEEE arising at municipal collection points or at retailers (WEEE Forum 2005, ERP 2006).<sup>26</sup>

According to EERA, the collection and treatment of B2B waste is often not controlled and accounted for officially. They suggest that this results in being a possible source of malpractice and illegal exports to non-OECD countries.

#### 2.3.1.3. Difference between recorded collection in Member States

There are great differences in the amounts of WEEE recorded as collected between Member States based on experiences with national compliance schemes. In 2005 the best performing Member States recorded to collect up to 70% of the WEEE arising in their Member State (which equalled 60% of the amount of WEEE put on the market or 14 kg/inhabitant).

Other Member States recorded far lower collection less. In New Member States (EU12), much less is recorded as collected, the low levels most probably reflecting unsaturated markets for much EEE so that new purchasing of EEE does not replace existing EEE thereby not generating WEEE.

#### 2.3.1.4. Differences between categories of WEEE recorded as collected

The following table describes the share of the different categories of equipments of the WEEE arising and how much of the different categories of equipment are currently being reported as collected. Reported collection is particularly low for large household appliances, cooling and freezing appliances, CRT's and small domestic appliances, leaving a gap of non reported (or non collected?) waste of respectively 23%, 13%, 15% and 6% of the total WEEE arising.

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<sup>26</sup> This data refers to "real" B2B equipments, not dual use products that are reported as B2B stream, but end up in the municipal waste

Treatment category	% of WEEE arising per category (%)	% of WEEE arising in the category reported as separately collected	% of WEEE arising in the category NOT reported as separately collected	amounts of WEEE NOT being reported as separately collected as % share of total WEEE arising
Large Household Appliances (LHHA)	27.7	16.3	83.7	23.2
Cooling and freezing	17.7	27.3	72.7	12.9
Large Household Appliances (smaller items)	3.6	40	60	2.2
Small Household Appliances (SHA), Lighting equipment – Luminaires and ‘domestic’ Medical devices	7.7	26.6	73.4	5.7
IT and Telecom excl. CRT’s	8	27.8	72.2	5.8
CRT monitors	8.3	35.3	64.7	5.4
LCD monitors	0	40.5	59.5	0
Consumer Electronics excl. CRT’s	7.8	40.1	59.9	4.7
CRT TV’s	13.3	29.9	70.1	9.3
Flat Panel TV’s	0	40.5	59.5	0
Lighting equipment – Lamps	1.7	27.9	72.1	1.2
Electrical and electronic tools	3.5	20.8	79.2	2.8
Toys, leisure and sports equipment	0.1	24.3	75.7	0.1
Medical devices	0.1	49.7	50.3	0.1
Monitoring and control instruments	0.2	65.2	34.8	0.1
Automatic dispensers	0.2	59.4	40.6	0.1
<b>Total</b>	<b>100</b>	n/a	n/a	<b>73.6</b>

**Table 2: WEEE arising and collection according to product categories**

### 2.3.2. Current Destinations of WEEE

Separately collected WEEE can be transferred to various destinations, with material traders playing a major role in determining the final destination.

Information provided by stakeholders, for example the EERA submission mentioned previously state that there are the following main destinations for EU WEEE:

- Separate collection and sent for reuse (of whole appliances)
- Separate collection and treatment in the EU in line with the Directive;

- Separate collection and treatment in the EU not in line with the Directive;
- Separate collection and illegal shipment to 3<sup>rd</sup> countries;
- No separate collection but collection with mixed municipal waste and treatment together with this waste stream (largely landfill or incineration)

For example, data from the Netherlands indicates that WEEE from households is collected and flows to related destinations in the following proportions:

- Treated by producers (after collection by municipalities and retailers): 31%
- Sold to metal dealers (after collection by municipalities): 13%
- To recyclers/treatment operators (from retailers and others): 45%
- Not separately collected: 11%

The following section describes the estimation of these destinations for the EU.

#### 2.3.2.1. Evidence, Deductions and Assumptions in this IA on collection and destinations

As mentioned above, EERA estimates that only up to 33% of the amount of WEEE put on the market is being reported as separately collected. The number of the amount of WEEE put on the market is largely comparable to the number of WEEE arising. Starting point of the assumptions below is that 67% of WEEE arising is unreported, estimates of collection activity and destinations of WEEE have to be based on deductions from available evidence. This section describes that evidence and makes the deductions and assumptions transparent. The impact of changing the 3 most important assumptions is considered later in the IA, as a sensitivity analysis.

#### 2.3.2.2. Disposal of WEEE with municipal waste

Based on analysis in the UNU study of the type and size of WEEE arising, knowledge of WEEE put on the market and the evidence of the current levels of reported collection of small appliances (for example only 26,6% of estimated waste arisings from small household appliances, lighting equipment and domestic medical devices are reported as collected) the Commission estimates that a big section of small domestic appliances are not separated from the domestic waste stream and go to mixed domestic waste treatment (typically landfill or incineration). This estimation represents 10% by weight of WEEE arising.

A large proportion of WEEE by weight comprises large or medium appliances<sup>27</sup> from domestic waste which are easily distinguished from general domestic waste and are in practice already 'sorted' by consumers throwing away their WEEE – they do not fit into waste bins. As these have material value for recycling, these are considerably unlikely to go to unsorted domestic waste collection, either to landfill or incineration.

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<sup>27</sup> Composed of Large household appliances, partly IT equipments, cooling and freezing devices, TVs and monitors.

Another 13% of WEEE is B2B waste which is treated differently under the WEEE Directive because it is typically collected separately, but of which around 10% is assumed to be illegally disposed of– so 1% of total WEEE arising.

Some large and medium domestic appliances are assumed not to be collected separately, but illegally disposed off or collected and going to landfill. This is assumed to be 2% of WEEE arising.

As a working hypothesis for this IA the Commission services therefore estimates that 13% of WEEE is currently not being separately collected but rather collected and treated together with the municipal solid waste stream.

#### 2.3.2.3. Destination of WEEE outside municipal waste streams

As 13% of the WEEE arising are not separately collected, it is assumed that the rest 87% of the WEEE arising is being separately collected (whether reported or unreported).

##### WEEE reused

Separately collected WEEE is also sometimes prepared for reuse. Experiences from the UK on computer reuse and trials on refrigerator take-back (DTI 2000 and DEFRA 2003) have shown that reuse and refurbishment tends to take place where there is a market for these items and the means to cover the costs of refurbishment/repair. Where margins are low, reuse activity tends to be run by charity organisations. Viable activities have focused on refurbishment of washing machines and IT equipment but for refrigerators the rate of refurbishment achieved was very low (~2 % of used refrigerators collected were reusable, mainly because the age of the equipment made it difficult/impossible to obtain spare parts such as shelves and compartment doors). Elsewhere, typically 5-10% of collected equipment is found to be reusable.

Many consumers throw away products because of minor problems. Up to 75% of these products are often repairable, but consumers purchase a new product because the cost for repair is disproportionately high. However, RREUSE states that reuse of WEEE is economically viable as the demand from consumers for second-hand EEE is bigger than the supply. RREUSE, a specialised European network of national and regional social economy federations and enterprises with activities in re-use and recycling, has 16 member organisations covering 10 Member States, plus two international member organisations in total collect, repair and recycle 300 000 tonnes of WEEE through 1 200 centres.

For the purpose of this IA conservative estimate for reuse is used: it is assumed that less than 2% of WEEE arising goes for re-use.

##### WEEE treated in accordance with the provisions of the Directive

**Reported WEEE:** On the basis of EERA data, it is assumed that 33% of the WEEE arisings are reported to be separately collected. It is assumed that all the WEEE reported by Member States as separately collected is treated in accordance with the Directive (mainly the requirements of Annex II).

The reported figures for collection therefore indicate the minimum volumes of WEEE which are being both collected and treated in accordance with the Directive.

**Legally Shipped WEEE:** WEEE can be treated in accordance with the Directive outside the EU, if treated to standards equivalent to those in the Directive. Trade statistics show that 25,000 tonnes of WEEE is reported as legally shipped out of the Community yearly. This number is significantly lower than the assumed total export.

**Unreported WEEE:** While a certain amount of WEEE may be treated in accordance with the Directive, but not reported, there are also reasons to assume that unreported WEEE could be treated improperly. Treatment of WEEE in line with the Directive usually requires extra environmental precautions causing extra costs which are not matched by increased recovery of valuable materials (see later section). For some types of WEEE, particularly those containing hazardous substances, these costs are very significant in relation to the value of material.

It could therefore be possible that significant cost savings are taken as incentives for sub-standard treatment of e.g. cooling and freezing equipment and other WEEE with particular environmental harm. This risk is presumably lower for e.g. dishwashers and washing machines where the material values can be recovered with less complex and costly processes.

Current capacity for treating WEEE in line with the Directive is reported as being sufficient for the WEEE reported as separately collected in 2006-7, with some small amounts of excess capacity in some Member States. As these reports cover only 33% of WEEE, it may be that there is currently significant under-capacity in the EU to properly treat all WEEE arising, an assumption supported by information from EERA<sup>28</sup>.

It is assumed for the purpose of this IA that only 10% of unreported WEEE being treated in line with the Directive.

#### WEEE not treated in accordance with the Directive

The evidence and working assumptions above would account for 58% of the WEEE arising<sup>29</sup>, leaving 42% unaccounted for.

A recent study by Witteveen-Bos<sup>30</sup> on the Dutch situation showed that beside the amounts collected and accounted for by the producer responsibility organisation, WEEE was also collected via other ways. It estimated that out of the total amount of 18,5kg of WEEE arising per inhabitant in the Netherlands, one third was collected and treated under the Dutch collective schemes, one third reached Dutch recycling plants via other channels and one third escaped to unknown destinations. As the PROs, the public waste system and private waste treatment industry are well established in the Netherlands, the situation is likely to be different and possibly more critical in other Member States.

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<sup>28</sup> EERA in correspondence with the Commission, indicate that 50% of the total WEEE arising could be treated currently if operators started working double shifts. Extra capacity would take 1 year to build and get operational after permissions were granted.

<sup>29</sup> 58% represents 33% reported, 2% reused, 10% probably treated in line with the Directive and an unsorted fraction of 13%

<sup>30</sup> [http://www.weee-forum.org/att/literature/2008\\_Electronic%20waste%20parallel%20streams\\_Witteveen\\_Bos.pdf](http://www.weee-forum.org/att/literature/2008_Electronic%20waste%20parallel%20streams_Witteveen_Bos.pdf)

According to the UNU study<sup>31</sup> there is common agreement that substantial leakage occurs for any WEEE items which have a value, such as large household appliances (which contain mainly metals), desktop computers, TV's and mobile telephones. There are well-established 'grey markets' for these items.

For B2B WEEE, the current amount of WEEE recorded as collected & treated as percentage of estimated WEEE arising indicates that still between 35 and 50% of B2B are not being recorded as separately collected. EERA suggests that this results in being a source of malpractice and illegal exports to non-OECD countries.<sup>32</sup>

There is also substantial anecdotal evidence and research suggesting that often treatment is not conducted in line with the WEEE Directive, concentrating on the recovery of materials with value, whilst minimising costs to the detriment of environmental and health precautions.

**WEEE illegally shipped to 3<sup>rd</sup> countries:** Various pieces of evidence suggest that very large volumes of WEEE are shipped out of the EU illegally for sub-standard treatment in the developing world. These shipments are often disguised as export of used equipment, but in fact are shipped for their material value. Due to the illegal nature of these shipments there is no data available on the overall volume of the shipments, but there are some specific cases available when these illegal shipments were discovered during the few investigations taken of which the Commission services are aware. Some WEEE are repaired and exported as used goods and not actually as waste to developing countries where these products are reused, these are not accounted for in the figure of WEEE not treated in accordance to the Directive.

The UNU study mentions reports about shipments of WEEE disguised as goods from the port of Hamburg (DEUTSCHE UMWELTHILFE 2007) and findings that 28% of businesses (collectors and exporters) were found to be exporting WEEE illegally from the Netherlands (VROM 2007). A study in the United Kingdom showed that about 10% of WEEE transports were shipped illegally to non-OECD countries.

**Treatment in the EU not in accordance with the Directive:** Anecdotal evidence points to parts of WEEE not being processed in the EU in accordance with the treatment standards of Annex II of the WEEE Directive: large household appliances and in particular cooling and freezing appliances being shredded without de-pollution, and CRT glass that ends up together with construction and demolition waste. For example according to recent information provided<sup>33</sup>, CFC-containing refrigerators were discovered being treated in car shredding plants instead of specialised facilities, which results in CFC emissions.

The Commission services have anecdotal evidence from stakeholders of "cherry picking" by some WEEE operators the WEEE with high material value from the WEEE collected in Member States. The equipment with high value (e.g. a high precious metal content), are taken from collected WEEE to recycling plants or for illegal export.

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<sup>31</sup> Section 10.2

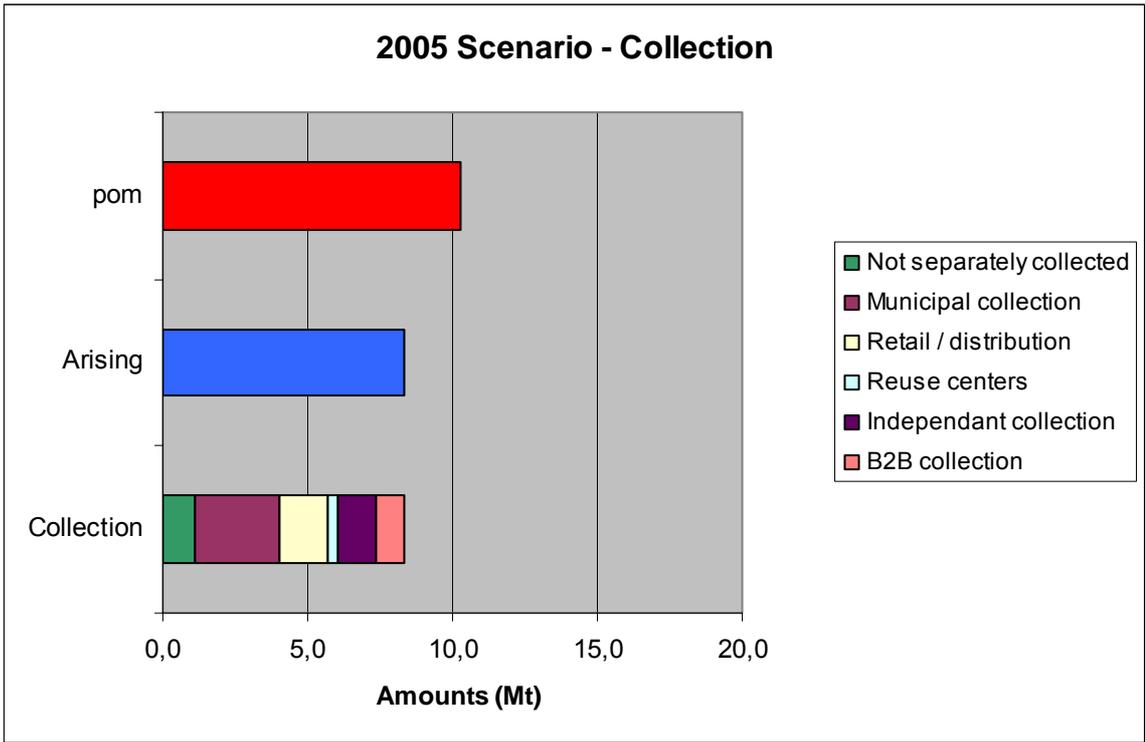
<sup>32</sup> Section 4

<sup>33</sup> Capital 09/2008 "Klimatskandal: Deutschland stümpert bei FDKW-Entsorgung"

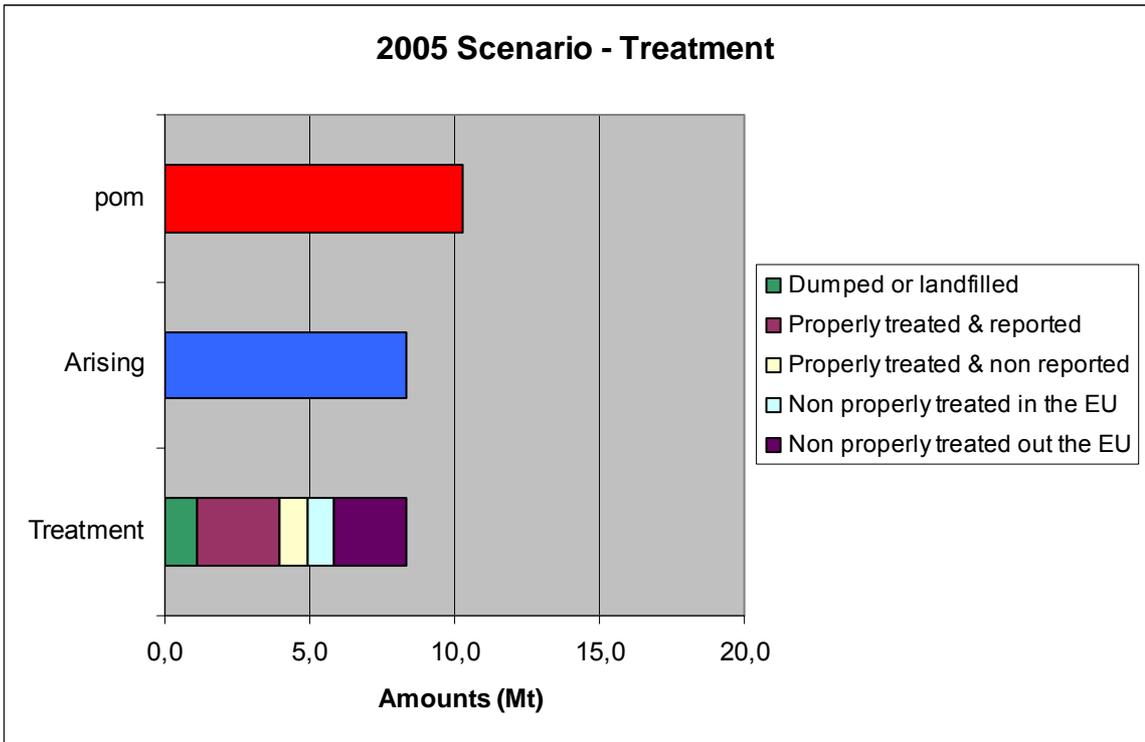
### 2.3.3. *Quantitative Estimations on Collection and Destinations of WEEE in 2005*

Based on the evidence, data for 2005, deductions and assumptions above, the following **working scenario** can be established for the year 2005 (the WEEE arising is taken at the lower end of the estimations from the UNU, 8.3 million tonnes).

- **13% of WEEE arising by weight** (1,1 million tonnes) is not separated from domestic waste, or is illegally disposed of, e.g. as consequence of consumers not complying with the requirement not to dispose of WEEE as unsorted municipal waste. This may apply in particular small domestic appliances, easily put in the waste bin.
- All of the 2,7 million tonnes of WEEE reported as collected by Member States - **33% of WEEE arising** - go to authorised treatment facilities where they are treated in accordance with the Directive.
- Of the remaining 54% (4.5 million tonnes) which are **separately collected but not accounted for** :
  - Reuse of WEEE is assumed to be at a level lower than **2%** of the WEEE arising, representing less than **0.2 million tonnes**.
  - WEEE (particularly large household appliances) treated in line with the Directive, but not be reported is assumed to be **11%** of the WEEE arising, or **0.9 million tonnes**.
  - There is not sufficient information to make reliable estimates of what proportion of the WEEE still unaccounted for is illegally shipped out of the EU and what proportion is treated, recycled or recovered not in accordance with the provisions of the Directive. However, in a worst case scenario WEEE separately collected, improperly treated in or out of the EU could be assumed to represent around **41% of the WEEE arising** or 3.4 million tonnes.



**Figure 4: Collection of WEEE<sup>34</sup>**



**Figure 5: Destinations of WEEE**

<sup>34</sup> pom = put on the market; Arising = amounts of EEE arising as waste in a certain year

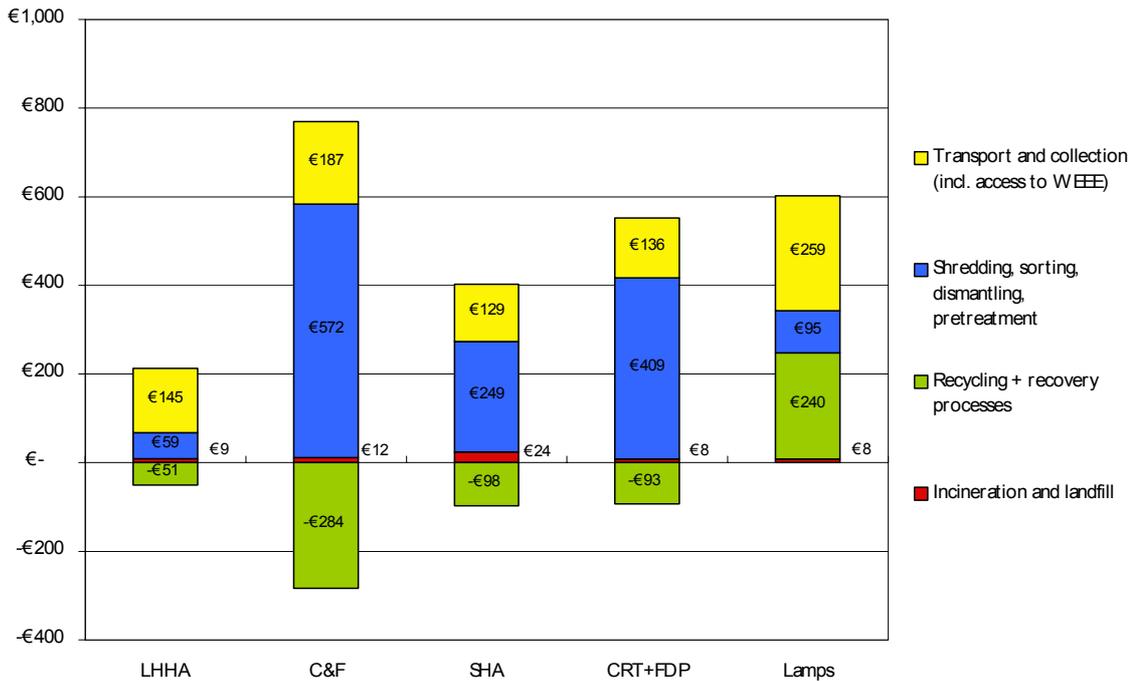
#### 2.3.4. *Drivers of the Effectiveness Problems*

The problem described above that a large percentage of the WEEE arising is not properly treated is mainly driven by three facts:

- The high material value of WEEE;
- Proper treatment of WEEE, in line with the requirements of the WEEE Directive adds additional costs;
- There seems to be low enforcement of the WEEE Directive's treatment requirements at national level.

Background to the drivers:

- **Material Value:** The three main materials arising from WEEE are metals, glass and plastics. Ferrous metals account for approximately 50%, non-ferrous metals for 5% and plastics for 20-25% of the WEEE arising. There are well-established markets for recycled metals and some markets for some of the plastics. It is important to notice that changing market prices for materials have to be taken into consideration when assessing these drivers. The UNU study highlights that material values have risen by 50-100 €/tonne from 2005 to 2007.
- **Differences between WEEE:** For some products the cost of extraction of the valuable materials is higher than the value of the materials. Others, particularly those high in metal, are more valuable. [See Figure 6]
- **Global recycling market:** Transport costs for WEEE are low in comparison to the value of the materials, thus allowing a global market for WEEE recycling. In many developing countries, (for example in Africa, the Indian sub-continent and in China) the costs of WEEE processing is low, partly due to low labour costs with manual dismantling, but also very often because it involves sub-standard treatment practices. These low recycling costs compared to recycling in the EU, makes trade of WEEE to developing countries (usually illegal) profitable. This creates competition for particularly the valuable fractions of WEEE between certain traders and EU-based recyclers.
- **Additional costs of treatment in line with the Directive:** Pre-treatment of WEEE to recycle it in line with the Directive (e.g. removing hazardous substances) creates additional costs. For example, pre-treatment of fridges is estimated by the UNU study at 21,84 € per fridge while the costs for less problematic large household appliances is only 3,19 € per appliance. Figure 6 illustrates these differences for some categories in 2005 (UNU) for treatment in line with the Directive.



**Figure 6: Breakdown of the cost of collection and treatment of WEEE equipment categories**

- **Low level of enforcement:** according to anecdotal evidence from stakeholder consultations and from the UNU study there seems to be a lack of enforcement of the WEEE Directive on many levels. The UNU study<sup>35</sup> points out that not all producers are registered - sometimes deliberately when penalties are lower than financial obligations.

Low levels of effective enforcement in some Member States are themselves driven by lack of enforcement capacity.

### 2.3.5. Evolution of the Effectiveness Problems: 2011-2020 (No action/ Baseline scenario)

This section describes how the collection and destinations of WEEE are estimated to change over the period of interest to the review (2011-20, the period after which reviewed legislation is likely to be in force) if there was no change in policy.

#### 2.3.5.1. Will there be any changes in the drivers of the problem?

##### Changes on the market

The volume of EEE put on the market is predicted to grow further, and the volume of WEEE arising is estimated by UNU to continue to increase between 2.5-2.7%.

The value of recycled metal is likely to remain high due maintained demand in the world economy, maintaining the global demand for WEEE containing high proportions of metal for recycling.

<sup>35</sup> Section 11.5.2

Some markets for recycled plastic could mature over time, as new technology, partly stimulated by the high oil price, or low-wage separation, allows greater purity of recycled material and new uses are found for the material. This would provide some increased demand for recycled plastic.

The Directive's current target of 4kg/capita.yr to be collected in all 27 Member States at the end of 2008 represents only about 22% of the total WEEE arising<sup>36</sup>. As consumption grows this ratio would become lower, projected to be only 19% in 2014<sup>37</sup>, meaning that relatively less environmental protection is guaranteed. This target is already effectively redundant as a stimulus to separate collection, with the possibility of higher levels of unreported collection

### Impacts of other Product and Waste Policies

- Other design-relevant Community legislation, such as RoHS, REACH<sup>38</sup> and EuP<sup>39</sup> are not assumed to have an immediate impact on the level of collection. They can however in the future positively impact on treatment efforts (and thereby indirectly on the attractiveness of collection) if design requirements and substance choices in favour of better recycling are established. However, REACH and EuP are likely to have effects on the composition of WEEE only in the longer term, as their implementation can affect the majority of EEE only at a very modest pace and any effects on WEEE will be further delayed by the average lifetime of EEE.
- New waste management legislation, notably the revised Waste Framework Directive with its waste prevention provisions, may influence WEEE arisings and collection rates in the longer term. However, as these measures are still in a very early stage of development there is insufficient evidence for any quantitative estimates.
- Better enforcement of the Waste Shipment Regulation in the future may have a positive impact on reducing the amounts of illegal WEEE shipments. However, incentives will remain to either escape from costs or to benefit more from highly demanded resources.
- Better enforcement of the Landfill Directive in future may reduce negative impacts of WEEE disposal in the long term.
- No effect is expected from the regulation on ozone depleting substances (ODS)<sup>40</sup> as waste issues are to be dealt with in the WEEE Directive.

Otherwise, it is assumed that the drivers of the problem will remain largely unchanged for the duration of the Baseline scenario.

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<sup>36</sup> Total WEEE arising in 2008 = 18,2 kg/capita.yr (8,96Mt on 492million inhabitants)

<sup>37</sup> Total WEEE arising in 2014 = 21,3 kg/capita.yr (10,46Mt on 492million inhabitants)

<sup>38</sup> Registration, Evaluation, Autorisation and restriction of Chemical Substances, OJEU L 396, 30.12.2006, p. 1

<sup>39</sup> Energy using Products, OJEU L 191, 22.7.2005, p.29-58

<sup>40</sup> OJ L 244, 29.9.2000, p.1

### 2.3.5.2. Collection and Destinations of WEEE

On the basis of these drivers, previous assumptions and further assumptions that in the future more collected WEEE will be reported, it can be estimated that in the Baseline scenario by 2020:

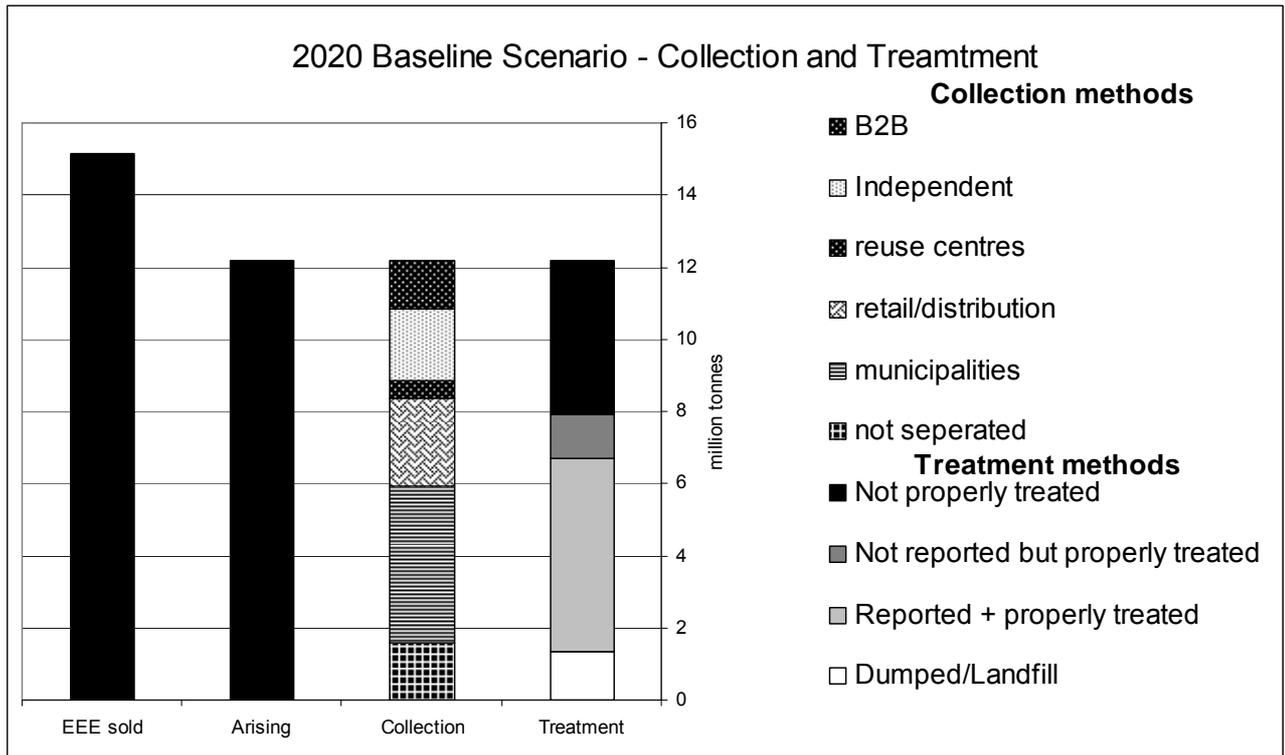
- total quantity of electrical and electronic equipment put on the market would be **15.1 million tonnes**<sup>41</sup>;
- the total WEEE arising across the EU27 increases to **12.3 million tonnes**;
- slightly less (**11%**) of WEEE will be disposed of with domestic waste or illegally dumped (**1.4 million tonnes**); this decrease is expected mainly because consumers are expected to be better aware of the requirements not to dispose WEEE as unsorted municipal waste;
- still **2%** of the WEEE arising will be reused (**0.25 million tonnes**);
- greater proportions of WEEE - around **42%** of the WEEE arising (**5.1 million tonnes**)<sup>42</sup> will be reported as separately collected and treated in line with the Directive. The assumption is based on an increase similar as the one seen in PRO schemes that have been running for 5 or more years; this increase is based on growth, further implementation of the Directive and on the inclusion of a fraction that was separately collected and treated in line with the Directive but not reported before. A further reasoning on why this proportion would increase is to be found in Annex 4.
- **45%** of the total WEEE remains unaccounted for (**5.5 million tonnes**)
  - Out of the unaccounted fraction, less than one quarter (**10%**) is recycled in the EU in accordance with the Directive;
  - The remaining **35%** (4.3 million tonnes) are not treated in accordance with the Directive, be it in the EU or outside the EU.

**Figure 7: Collection and Destinations of WEEE in 2020 according to the baseline scenario**

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<sup>41</sup> This is calculated with the yearly growth rate of 2,6% taking as the basis value 10.3 tonnes/year placed on the market in 2005.

<sup>42</sup> This amount corresponds with an amount of about 10kg per inhabitant per year in the EU, assuming that the population growth rate for all countries reaches 0% by 2020 and that the current growth rate follows a linear relationship between current growth rates and the expected rate in 2020.



### 2.3.5.3. How does changing key assumptions impact on the baseline?

Three changes are being considered for the future that would impact on the baseline.

**Prices for metals and plastics fall compared to 2007:** In this case the economic driver for separate collection of WEEE will disappear for even larger proportions of WEEE (material value below total costs for recovery).

**Higher, or lower, proportions of unreported WEEE are in reality treated properly:** The difference between levels of WEEE being treated in line with the Directive or not makes a significant difference particularly for the categories of WEEE (like cooling and freezing) with high treatment cost due to high environmental damage from improper treatment. If higher proportions of unreported WEEE of this type were treated properly than predicted, the environmental harm from (sub-standard) treatment would be lower.

**Significantly more than 11% of WEEE is going to landfill:** If more WEEE is being landfilled, the potential environmental impacts of WEEE in the EU will be higher (notably energy and resource losses; pollution in case of sub-standard disposal). Treatment costs would be lower – but with a significant net cost to society. As shown by UNU the harm from landfilling WEEE is even greater than from improper treatment.

### 2.3.6. Impacts of the Effectiveness Problems: 2011-2020 (No action/ Baseline scenario)

#### 2.3.6.1. Environmental impacts

As the materials contained in different WEEE are substantially different, the environmental impact of WEEE depends on both the type of WEEE and the way it is treated. Those impacts are both global and local.

### General Impacts from materials in WEEE

Some 50% of WEEE by weight consists of ferrous metals, largely steel. Collecting and recycling this material typically results in savings of 74% energy, 76% water pollution and 86% air pollution if compared to primary steel production.

Under the baseline scenarios, based on the supposition that large amount of WEEE is being separately collected, for the calculation 87% of separately collected WEEE is assumed, up to 3.5 million tonnes (equal to 1.8 % of EU annual production) of steel can be recycled from this waste stream alone<sup>43</sup>.

### Total Potential Environmental Impacts

The potential environmental impacts of WEEE vary depending on the equipment in question. Potential impacts comprise emissions of toxic substances as well as inefficient use of materials and energy. They can contribute to global problems (e.g. climate related impacts) as well as "local" impacts in the EU or third countries (e.g. eco-toxic emissions, damage to human health).

The main climate related impacts derive from the release of CFCs due to inappropriate treatment of cooling and freezing appliances, and also from unnecessary energy use (CO<sub>2</sub> emissions) when energy savings of material recycling are not realized. On current trends, greenhouse gas release cooling and freezing equipment would be around 35 million tonnes of CO<sub>2</sub> equivalent a year in 2011 (compared to the likely baseline), with a monetised value of the damage having a magnitude of around €1 billion/year - declining each year to low levels by 2020.<sup>44</sup> This decline comes as CFC-ban in cooling and freezing equipment feeds through to the WEEE stream.

Toxic emissions damaging eco-systems and human health at local and regional levels can be caused by uncontrolled dumping and sub-standard treatment, including all stages of badly managed storage, transport, recovery and disposal.

All of the potential impacts mentioned can be well managed if the WEEE is separately collected and sent to state-of-the-art treatment. More details on the environmental impacts can be found in Annex 6. An estimate of monetary value has only been provided for one part (the GHG) impacts of these environmental damages.

#### 2.3.6.2. Economic impacts

The total economic costs (excluding the economic costs of environmental harm) are the efforts and costs spent on collection, treatment, recycling and disposal of WEEE. As the volumes of WEEE arising increase, the total costs from the management of WEEE will also increase but likely not at the same rate. Economies of scale in collection and treatment are likely to reduce costs per tonne; technological development of treatment operations is likely to further reduce treatment cost.

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<sup>43</sup> Annual crude steel production in the EU is about 200 million tonnes (source Eurofer via <http://www.eurofer.org/index.php/eng/Home>)

<sup>44</sup> The basis for this estimate is in Annex 6.

### Composition of cost

- Costs of consumers, public authorities or the retail sector to collect WEEE;
- Costs to transport WEEE to treatment centres either in the EU or overseas;
- Treatment, preparation for reuse, recovery, recycling process costs and any costs of disposal of rest fractions;
- Additional costs (for control, reporting, administration);
- The cost for society of the unsorted WEEE fraction (landfilling and incineration).

These costs include organisational costs, for authorities, distributors and producers in setting up and running logistic systems. In addition, administrative costs from reporting and labelling by producers add to costs.

For all the WEEE that is separately collected, some actor in society is moving the WEEE from the consumer to a recycling facility. Many geographic and economic factors affect these costs which vary across the EU to a great degree. That variance is likely to be greater than the difference in collection costs caused by collection taking place by different actors. In this IA, it is assumed that the cost for collection and transport by independent collectors and traders who ship WEEE for treatment is broadly the same per tonne as the collection and transport cost for PROs.

Treatment of WEEE in line with the Directive adds costs to the process as steps like depollution or removal of CFCs are required to reduce environmental harm. These additional costs depend on the type of WEEE concerned and the processes used. The latter are largely determined by Annex II of the Directive. For estimation of the additional costs in this IA, the Commission assumes requirements which eliminate environmental harm at least possible costs. They are based on estimates of existing costs and changes in technology between now and 2020.

In the UNU study, the net total cost (covering the 1<sup>st</sup> four bullets mentioned above) for the fraction of WEEE that has been reported as separately collected and treated in 2005 (2.6Mt) is estimated to be €0.94 billion (358€/tonne). This figure is based on material prices of the year 2005 and expresses the costs incurred due to the WEEE Directive as compared to landfilling. Transport costs from consumers to collection centres are not included. The level of this figure is confirmed by more recent data published by the WEEE forum on its website<sup>45</sup>.

On the basis of the assumptions on collection and destinations of WEEE in the baseline, the current cost for the fraction that has not been reported can be estimated. The overall gross cost composition as presented in the key figures (WEEE forum 2007) can be used as reference to estimate the respective costs for collection (17%), logistics (29%), treatment (33%) and additional costs (21%). Assuming that the costs for logistics and collection remain comparable, that there are no additional costs and that the treatment cost is much below the cost for treatment in line with the Directive, the cost currently occurring for the

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<sup>45</sup> Key Figures 2007, [http://www.weee-forum.org/att/news/2007%20Key%20Figures\\_Final.pdf](http://www.weee-forum.org/att/news/2007%20Key%20Figures_Final.pdf)

non reported fraction is estimated at maximum €1.2 billion, bringing the total net cost for 2005 at about €2.1 billion.

With a baseline for 2020 as described above (a greater proportion of WEEE been reported as separately collected and treated in line with the Directive and the effect of economies of scale) the total net annual cost is estimated at €3.4 billion by 2020, corresponding to about 328€/tonne of WEEE.

To this should be added enforcement costs from Member State authorities.

It should be noted that:

- These estimations are highly sensitive to some assumptions used. For example a sensitivity analysis carried out by the UNU study showed that current 2007 material prices increase the revenues of recycling of WEEE by 50 – 100 EUR/tonne compared to 2005.<sup>46</sup>;
- Other factors that will influence net costs - developments and availability of markets for downstream fractions and high-level reapplication/ valorisation of secondary raw materials, and changes in composition of WEEE: for example flat panels are expected to cause significant increase in total costs due to costly mercury removal steps.
- The impact of long running optimization of systems as this plays an important role on the cost side. Looking at long running systems across EU, the gap between minimum and maximum cost levels (both technical and additional) is much lower (UNU 2007);
- economies of scale and investments in recycling / recovery plants (capacity and technologies);

Existing recycling and recovery targets can usually be achieved with existing technologies. The current levels of collection will provide little impetus for investment and innovation in techniques and technologies for (pre)treatment, recycling and recovery.

#### Economic impact of reuse

The UNU study explains based on the UK experience that here viable reuse activities have focused on refurbishment of washing machines and IT equipment but for refrigerators the rate of refurbishment achieved is rather low (2% of used appliances). For other appliances, typically 5 to 10% of collected equipment is found to be reusable.

### 2.3.6.3. Social impacts

#### Employment

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<sup>46</sup> Since the publication of the research studies, oil and metal prices have increased in such a way that for most fractions, the cost and revenues come to a break even. The costs remain for those fractions where treatment operations are necessary before further recycling/recovery as in cooling and freezing appliances, CRT glass, mercury containing lamps and LCD screens with mercury backlights.

Material recycling from waste creates 5 to 7 times more jobs than disposal by incineration and 10 times more jobs than disposal in landfills<sup>47</sup>.

The Commission's Thematic Strategy on waste prevention and recycling considers that the waste management and recycling sector in the EU25 provides 1.2 to 1.5 million jobs. The waste collection and treatment sector typically employs many lower skilled workers as well as expert technicians.

While there are limited data on the employment effects of the WEEE Directive, the income generated by the collection and dismantling of WEEE is often referred to as a good job opportunity for disadvantaged people in the first labour market (RREUSE 2006a, p. 2, WILLIAMS 2006).

Early assumptions of NeWET from 2001 speak of approximately 3,870 jobs being created under the implementation of the WEEE Directive in Germany. In Lithuania it has been estimated that 290 jobs have been created (ECGL 2003, p. 7). For the Netherlands it is reported that a small number of jobs has been created in local authorities. Additional employment in administration of the collective schemes has been kept to a minimum to reduce costs. Meanwhile, the organisation of the collective schemes has resulted in significant consolidation in the recycling sector with the displacement of small organisations, including social welfare organisations. The loss of jobs in these small organisations has probably been offset by increases in employment in the larger firms to deal with additional throughput of WEEE (DG ENV 2001a, p. IV).

In the Baseline scenario it is expected that net employment remains unchanged.

### Social impacts of reuse

Reuse of WEEE has positive social impacts. According to Anderson, the Rreuse network has about 17,000 people in social organisations who collect, repair and recycle about 300,000 tonnes of equipment from about 1200 work centres, and supplying mainly to an 'excluded' market. For less valuable fractions or for reuse with low revenue margins, reuse activity tends to be run by charitable organisations that employ and train low skilled people. The sector is employing 40.000 people and engaging 110.000 volunteers in Europe<sup>48</sup> of which an important part works on WEEE, usually these were long-term unemployed, handicapped or people at risk. Given the size of their market share, RREUSE considers this a remarkable sector for employment opportunities for people with limited chances elsewhere.

The re-use of WEEE provides high quality products at affordable prices which offers an important means for people with low income to raise their standards of living and to participate in social activities, in particular in the IT sector bridging the "digital divide", or delivering necessary means of communication for commercial or cultural purposes<sup>49</sup>. But

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<sup>47</sup> (source: European Ferrous Recovery and Recycling Federation)

<sup>48</sup> See <http://rreuse.org/t3/>

<sup>49</sup> The "i2010 – A European Information Society for growth and employment" initiative was launched by the Commission on 1 June 2005 as a framework for addressing the main challenges and developments in the information society and media sectors up to 2010. It promotes an open and competitive digital economy and emphasises ICT as a driver of inclusion and quality of life. The initiative contains a range of EU policy

given that EEE is only entering the waste chain when it is considered to be out of value, it might also no longer be supportive for these social aspects.

During an expert-workshop organised by the UNU study, it was mentioned that refurbishment, resale and reuse of equipment does lead to the creation of jobs, but that most of this happens before the EEE enters the waste stream.

## **2.4. Problems with the Efficiency of the Directive- Baseline scenario 2011-2020**

### *2.4.1. Description of the Problems*

Experience with the operation of the WEEE Directive has revealed several issues which offer potential for reducing costs for producers, treatment operators and authorities involved in compliance with the Directive. These are:

- Administrative Burden – particularly from differences in the operation of national producer registers. Annex 8 gives a full overview of the administrative burden of the WEEE Directive
- Costs incurred by certain producers not meeting their financial obligations ("free-riders"). This causes additional costs for producers who are meeting their obligations, and risks distorting competition between producers
- Diversion of some WEEE from re-use – where it would have a higher economic and social value

### *2.4.2. Drivers of the Efficiency Problems*

The problems related to the efficiency of the Directive has two drivers, one relates to the interpretation of the scope of the Directive and the product categories, the other relates to the differences in producer registration requirements.

#### *2.4.2.1. Difference in Interpretations of the Scope and Categorisation*

The WEEE Directive applies to 10 categories of "electrical and electronic equipment", currently illustrated by a non-exhaustive list of examples. Some equipment is excluded from the scope.<sup>50</sup> Member States have discretion to go beyond the requirements of the Directive and include additional products in their national WEEE laws (WEEE is based on Art. 175 of the EC Treaty).

During implementation, the Commission services together with Member States and stakeholders have taken steps to clarify the scope. It published "Frequently Asked Questions on RoHS and WEEE" addressing this issue. Nevertheless, uncertainty exists in particular in the following areas:

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instruments to encourage the development of the digital economy such as regulatory instruments, research and partnerships with stakeholders.

<sup>50</sup> Equipment that is part of another equipment not covered by the scope of the Directive as well as equipment connected with the protection of the essential interests of the security of Member States, arms, munitions and war material, etc.

- Whether various products in the "grey area" would be covered by one of the 10 equipment categories, by the definition of EEE or by the exclusions. (An example is church organs whose lead-pipes depend on electrical air fans to function properly);
- Under which product category certain products fall - this classification can influence the recycling and recovery requirements applicable to the product; and
- Whether certain EEE should be classified as generating WEEE from private households (known as business to consumer equipment or B2C) or WEEE from users other than private households (known as business to business equipment or B2B). This classification is directly linked to the setting and achievement of targets as well as to the regime of financing.

As a result of the issues above, during implementation, in many cases Member States postponed decisions on scope at national level until they received guidance from the Commission, which has slowed down implementation and prolonged uncertainty for business and administrators. Attempts to gain agreement between Member States on categorisation are often a slow process and are not always successful.

In other cases different Member States and administrations came to divergent interpretations of the scope, leaving economic operators with uncertainty whether their products are covered by the WEEE Directive and whether they need to comply with the (financial) producer responsibility and reporting requirements.

The uncertainty has caused confusion among producers on the rules they need to comply with and also given some producers the opportunity to choose the interpretation of the definition of scope which best suits them.

This situation has led to the following costs:

- Some producers evade costs and financial guarantees by falsely classifying their product as B2B WEEE (for which this requirement does not exist). As much of this B2B waste nevertheless ends up in the household waste stream and the cost falls on those producers who have registered for household WEEE;
- Avoidance of higher recovery/recycling requirements by different product categorisation, which can lead to lower levels of environmental protection;
- Disadvantage in competition for those who fulfil the requirements of the Directive (in particular the financing) and those with very similar products who don't;
- Unintended costs for firms selling into more than one Member State where they have to meet different obligations, including different registration and reporting requirements as a result of differing classifications. This also includes cost of the administrative work to assess for each Member State which obligations and categorisation must be complied with, for example on whether their dual-use products are classified as household WEEE.

#### 2.4.2.2. Differences in Producer Registration Requirements

To make the financial producer responsibility enforceable, the identity of producers and the quantities of EEE they put on the market must be known to Member States. The WEEE

Directive therefore requires Member States to draw up a register of producers and to collect information on the quantities and categories of electrical and electronic equipment put on their market, collected, reused, recycled and recovered within the Member State including exports.

Member States have taken different approaches with respect to:

- who needs to register
- who needs to report
- what needs to be reported
- interpretation of the term “producer” (national vs European approach)
- obligations of distance sellers.

Further details are provided in Annex7.

These divergent interpretations have resulted in a multitude of different registration schemes and requirements. By far the largest concern raised by industry stakeholders relates to the differences in requirements of national producer registers causing administrative costs from repetition and divergence of registration and reporting obligations. Actors can have to adhere to up to 27 varying requirements when placing EEE on the EU market.

#### 2.4.3. *Evolution of the Efficiency Problems: 2011-2020 (No action/Baseline scenario)*

If no action is taken, the problem of unnecessary costs and free-riding by producers will persist. However, the scope of the problem could change, due to the following expected changes to the drivers of these problems:

##### 2.4.3.1. Expected change to the driver of differences in the interpretation of scope and categorisation

Within the period 2011-2020, many uncertainties with existing products will have been resolved. Yet, certain problems with differing interpretation of scope and category are likely to remain and new ones will arise due to new products being developed.

- As the WEEE forum<sup>51</sup> has failed to develop a guideline on which products are relevant for collection points and which may not be covered by Annex IB of the Directive. No changes to the drivers of the problem are expected in this regard.
- More co-ordination in categorisation of WEEE in 10 product categories could be achieved between some Member States who jointly developed a decision tree. It is however uncertain whether the Member States will use this decision tree uniformly.

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<sup>51</sup> The European Association of Electrical and Electronic waste take back systems <http://www.weee-forum.org/>

- No common decision tree exists for categorisation of B2C versus B2B, therefore uncertainty will persist.

#### 2.4.3.2. Expected changes to the driver of differences in producer registration requirements

This driver is predicted to continue throughout the baseline period if despite some actions that have been taken to reduce the problem:

National registers established the European WEEE Registers Network (EWRN) which has been concentrating on establishing contact with all functioning registers and are beginning to address options for registers to harmonise/apply consistent practices on the approach to address a number of key issues such as those addressed above. This work is done however on a voluntary basis and not all Member States are represented, so that the most likely progress in tackling these problems would be at a slow pace and not coherent across the internal market.

The Commission initiated in 2007 and 2008 infringement proceedings against Member States having adopted a "national approach".

Present producers will have largely completed their registration and adapted to different Member States' requirements for the period 2011-2020. However, the complexities will remain affecting any new<sup>52</sup> producers throughout this period.

For existing producers, the obligation to report in different formats will continue although with some mitigation from the work of EWRN mentioned above. However, costs will continue when any new products are brought onto the market.

## 2.5. The EU right to act

This review is an integral part of developing a better regulatory environment in the EU. It will contribute to a European regulatory framework of the highest standards of law making, respecting the principles of subsidiarity and proportionality. Simplification intends to make legislation at both Community and national level less burdensome, easier to apply and thereby more effective. The Commission is committed to reduce unnecessary burdens while preserving the level of environmental protection.

Moreover, Council and Parliament have explicitly called on the Commission in Articles 5 and 7 of the WEEE Directive to review the targets provided for in the Directive.

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<sup>52</sup> As new producer can be considered those bringing new goods on the market but also those new on the market that replace producers leaving the market

### 3. OBJECTIVES

#### 3.1. General, specific and operational objectives

The **general objective** of the review is to achieve the objectives of the WEEE Directive more effectively and efficiently, thus optimizing benefits for the society as a whole in return for the legislative, administrative and economic efforts required, thereby to contribute to a better regulatory environment that is simple, understandable, effective and enforceable, thus advancing sustainable development and environmental protection while helping businesses to maintain its competitiveness and ability to grow and create jobs.

The specific objectives are:

- Reduced costs for producers and treatment operators through the removal of all unnecessary administrative burdens, without lowering the level of environmental protection.
- Reduced costs for producers complying with the Directive by elimination of the costs they bear from free-riding by other producers or other distortion of competition.
- Creation of the conditions that lead to the proper treatment of all separately collected WEEE in line with the provisions of the Directive
- Increased diversion of WEEE from the domestic waste stream

This leads to four **operational objectives** defined as follows:

- (1) certainty for economic operators on definitions, scope and categorisation of products;
- (2) removal of different requirements for compliance (including reporting and registration) between Member States and reduced duplication of reporting;
- (3) creation of adequate incentives for all separately collected WEEE to be treated in line with the Directive, rather than being improperly treated in the EU or illegally shipped to third countries;
- (4) provision of incentives for waste to be diverted from the domestic waste stream.

#### 3.2. Policy coherence

The WEEE Directive forms part of EU legislation aiming at creating a recycling society in the EU. Its coherence with general Community strategies and with EU legislation on product design and waste management is described in Annex 9.

By supporting the development of the waste industry in the EU, without causing distortions in competition between producers, the WEEE Directive supports the objectives of the Lisbon Strategy for Jobs and Growth, with positive impacts on EU employment and technological development. Electrical and electronic engineering in the EU amounted in

2006 to a turnover of nearly 320 billion Euro annually and an employment of some 2,8 million people in more than 18 000 companies<sup>53</sup>.

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[http://ec.europa.eu/enterprise/electr\\_equipment/electra.htm](http://ec.europa.eu/enterprise/electr_equipment/electra.htm)

## **4. OPTIONS TO IMPROVE THE EFFECTIVENESS OF THE DIRECTIVE**

### **4.1. Description of the Options**

The Commission has considered, with stakeholders, various options to create the incentives which will lead to all separately collected WEEE being treated in line with the Directive and to stimulate greater diversion of WEEE from domestic waste streams. The options are described below.

These are not necessarily mutually exclusive (except for the option no action) and can therefore be combined:

- (1) No action: making no changes to the Directive, including maintaining the minimum collection target of 4kg/inhabitant/year of WEEE for Member States (equal to 33% of WEEE arising);
- (2) Require greater enforcement by setting minimum inspection requirements for WEEE treatment;
- (3) Require greater enforcement by introducing minimum inspection requirements for waste shipments;
- (4) Increase the collection targets, make producers responsible for this target and include B2B equipment in the scope of the collection target. (85% of WEEE arising)
- (5) Set a 100% collection target on the environmentally most relevant streams (cooling and freezing appliances, Cathode Ray Tubes and mercury containing appliances such as energy saving lamps and LCD screens) ;
- (6) Change the method of setting the target from kg/inhabitant to a % of the quantity of EEE put on the market in preceding year[(s)].

Various other options were considered but rejected during the review and in particular after the stakeholder consultation. These covered options on collection targets, targets for reuse, recycling and recovery, options on scope, producer responsibility, treatment requirements and a de minimis rule. These are described in Annex 12 together with reasons for their rejection.

### **4.2. Analysis of impacts**

#### *4.2.1. Option (1): No action*

Under this option, no changes to the Directive or other new Commission initiatives on WEEE would be proposed. The Commission would continue to monitor implementation and take infringement actions against Member States where there was evidence that the Directive was not being implemented properly, this could for example be the case if treatment requirements were not respected. At this stage, it is not possible to judge however whether infringement actions would be taken or the legal and practical result of any such infringement actions.

If infringement actions are successful, it is likely that Member State response would be to take some steps to increase the recording and treatment of separately collected WEEE. Actions taken would differ between Member States.

Some Member States have already used the legal power given under Art.175 to set targets for separate collection (and so, in practice, proper treatment) that go beyond the 4kg target set by the Directive. For example, Belgium has set an 8.5kg target/inhabitant to be achieved.

The no action scenarios assessed here assume that some other Member States set further increased collection targets that come into effect during the period 2011-20, and that Member States take additional steps to bring a greater proportion of WEEE to proper treatment. (See scenario in chapter 2 for 2011-2020).

### Analysis of Impacts

In a no policy change, it is assumed that 35% of the WEEE arising (4.3 million tonnes per year) are treated improperly (be it inside or outside the EU). The environmental, economic and social impacts of this option are assessed in Section 2.3.

#### 4.2.2. *Option (2): Minimum legal requirements for inspections of WEEE treatment*

In this option, Article 16 of the Directive would be amended to provide for minimum requirements for enforcement action to be defined by Comitology with European Parliament oversight.

The Commission would propose minimum inspection requirements to the Comitology Committee in relation to inspection of treatment operators and recyclers for compliance with the treatment provisions of the Directive. These minimum requirements which it assesses would be sufficient to provide adequate incentives for WEEE operators to comply with requirements. At the same time, the treatment requirements of Annex II need to be amended in light of technical and scientific progress. A comitology decision to this effect is under preparation.

As waste enforcement has a history of inadequate resourcing in some Member States, it is possible that these requirements may be resisted by Member States.

To give an impression of the scale of enforcement required: using 2008 costs of a representative bundle of WEEE for treatment in line with Annex II, the additional costs are around €250/tonne WEEE. Where these are not offset by payments from producers, for a treatment operator running 50,000 tonnes of WEEE through his plant each year, the financial gain from avoiding proper treatment on, for example half his input, would be €6.25 million. Even if the penalties or non-compliance were set very high, at €12.5million, inspection would have to be rigorous enough to discover more than 50% of non-compliance to provide sufficient counter-incentive for non-compliance. If the Commission were to set minimum requirements at this level, these effects need to be taken into account.

It is estimated from Member State reporting that there are currently 4000 authorised treatment plants in the EU, and 200 shredders which would require inspection. It is possible that additional inspections would be necessary for presently unauthorised treatment plants.

Evidences demonstrated that some enforcement actions related to the WEEE Directive have been effective. In the Netherlands due to enforcement actions, the total percentage of illegal activities has decreased from 2004 to 2006<sup>54</sup>.

Greater enforcement of treatment requirements could lead to two wider effects, both of which would concern WEEE with minimum treatment requirements under Annex II:

- A greater numbers of treatment operators would treat more WEEE in line with the Directive.
- Low-cost treatment of WEEE outside the EU could become a relatively more attractive option, compared to improper treatment of WEEE in the EU. Therefore, the number of illegal shipments of WEEE could increase.

### Environmental impact

There would be less environmental impacts if more WEEE would be treated in line with the Directive. Quantitative estimates are impossible as success would depend from the quality and quantity of inspections carried out by Member States. Following the assumption that presently roughly one third of WEEE is treated improperly, the reduction of environmental and health impacts could be significant. However it is unlikely that full compliance with the treatment requirements of the Directive could be achieved by this action.

### Economic impact

The WEEE Directive already prescribes (Article 16) that Member States have to ensure that inspection and monitoring enable the proper implementation of the WEEE Directive. Adding minimum monitoring requirements in the legal text may lead to additional inspection costs at national level in some Member States, where current enforcement activities are low. Any Commission proposal to this effect would have to take account of additional costs for authorities.

Any additional inspections by Member States would impose additional administrative costs on treatment operators, who would need to provide information to the authorities during inspection. If each inspection is estimated to take 1 hour and there were 4 additional inspections a year for 2000 sites, the total administrative cost for business would be around €168 000 (€1<sup>55</sup> cost for 1 hour per inspection) per year which would mean a cost of €84 a site.

The UNU study assessed whether stakeholders currently felt or experienced an administrative burden in monitoring and control enforcement. 81% of the respondents considered that the activity is needed. They requested however consistency in reporting standards and formats.

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<sup>54</sup> In case of retailers, more than 60% were in violation in 2004 and only 11% in 2006. With this, the amount of collected TVs has increased by 50%. The final conclusion is that the enforcement actions were effective and the level of compliance in the chain of electronic waste collection and treatment has improved significantly

<sup>55</sup> Eu 27 average, source: Statistics Austria: labour cost survey. [http://www.statistik.at/web\\_en/statistics/social\\_statistics/labour\\_costs/labour\\_cost\\_survey/index.html](http://www.statistik.at/web_en/statistics/social_statistics/labour_costs/labour_cost_survey/index.html)

### Social impacts

No social impacts are expected from this option unless some reduction of hidden employment, in particular in the treatment sector, which is difficult to quantify and for which the overall effect on employment is expected to be low.

#### 4.2.3. *Option (3) Minimum inspection requirements for waste shipments*

This option would require a minimum number of inspections to check whether shipments of WEEE would be legal. The minimum requirements would be set by Comitology, making the guidelines for WEEE shipments agreed by waste shipment correspondents from Member States legally binding.<sup>56</sup> These guidelines were developed to help the Member State authorities in the control of waste shipment, but their application currently is not compulsory.

As with Option (2), the increase in the number of inspection and enforcement actions would need to be very large to provide sufficient counter-incentives for illegal shipment of waste, at least whilst metal prices remain high.

Strengthened monitoring activities would increase the likelihood of (financial) penalty for illegal WEEE shipments, reducing the financial attractiveness of this treatment route.

The strength of the impacts of setting minimum requirements would depend on the minimum standards set, in relation to existing levels of inspection and enforcement in Member States. Legally binding guidelines will help to have efficient enforcement operation to be carried out. As mentioned under the previous option, there is record that effective enforcement action for electronic waste have led to tangible benefits and reduced illegal activities.

### Environmental impact

The extent of the environmental improvement would depend on what minimum standards are set. However it can be reasonably assumed that making waste shipment guidelines legally binding, would reduce the number of illegal shipments of WEEE outside the EU and would thus reduce in particular the severe negative environmental and health impacts in third countries as described in Section 2.

### Economic impact

Adding minimum inspection requirements in the legal text would lead to additional inspection costs in Member States, where current enforcement activities are low. The possible additional costs will have to be taken into account when the Comitology proposals will be developed.

### Social impact

No social impacts are expected from this option in the EU but there would likely be impacts on traders and on illegal and dangerous (child) labour in some countries: more

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<sup>56</sup> [http://ec.europa.eu/environment/waste/shipments/pdf/correspondents\\_guidelines\\_en.pdf](http://ec.europa.eu/environment/waste/shipments/pdf/correspondents_guidelines_en.pdf)

inspections could lead to less illegal shipments, causing less health problems of those treating the equipment in substandard conditions and causing a small shift from hidden employment to official employment.

4.2.4. *Increase the collection targets (85% of WEEE arising), make producers responsible for this target and include B2B equipment in the scope of the collection target.*

This option would:

- Increase the separate collection targets to match the levels estimated to be currently collected separately (by all parties), including B2B equipment in the scope of the collection target.
- Make producers responsible for ensuring that this proportion of WEEE is collected and for financing collection.

4.2.4.1. Making producers fully responsible for the collection, including an obligation to finance collection

Under the baseline, it is estimated that more than 85% of the WEEE arising is being collected separately although little more than 30% of WEEE is reported as being collected. It is presumed that the reported 30% are treated according to the requirements of the WEEE Directive. Studies suggest that significant quantities of the remaining 55% are transported illegally to third countries and treated under sub-standard conditions and further quantities are treated not according to the WEEE Directive in the EU.

Under this option, producers would be made responsible for meeting the targets. This option is assumed to be effective at increasing the fraction of separately collected WEEE which will undergo proper treatment. Producers, for historical, ethical and commercial reasons, are very likely to ensure that WEEE for which they become responsible is properly treated. There are particular commercial and legal drivers for high levels of likely compliance by producers. Notably the reputation of producers with consumers is often central to the marketing of electrical and electronic products.<sup>57</sup>. Indeed, making producers responsible for the entire chain (from collection to proper treatment) would avoid the "leakage" problem as described in Section 2. Also possible enforcement actions (where necessary) by Member States targeted at producers and PROs can be a motivation.

The option would limit the existing wording of the obligation in Article 8 for producers to "provide at least for the financing of the collection [...] of WEEE deposited at collection facilities set up under Art.5(2)" which would harmonise the financial responsibility for collection costs, with producers having financial responsibility for WEEE collected before, as well as after it reaches collection facilities.

#### Environmental impacts

Whilst it is not possible to assess to exactly what percentage the improper treatment of WEEE would decrease, improper treatment would be reduced significantly, with the

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<sup>57</sup> One aspect of this is illustrated by the relative effectiveness of stakeholder criticism of electronics firms in changing corporate behaviour [See in particular Greenpeace's likely influence on Apple and Dell ]

expectation that reputational pressures would lead to significant incentives for all WEEE reaching producers being properly treated. It can reasonable be assumed that the negative environmental impacts as described in Section 2 will decrease proportionally with the decrease of improper treatment of WEEE.

### Economic impact

Nine Member States currently make producers financially responsible for all collection costs, whilst nine others have shared financial responsibility which includes producers. The differing regimes for financial and physical responsibility across the Member States are described in Annex 3. Harmonizing the obligation for producers to finance collection of WEEE from households would avoid any possible distortions in the single market from national arrangements on financing which might favour domestic producers.

It would also level the playing field between producers opting for setting up individual schemes for the separate collection of WEEE and producers opting for collective solutions and using existing municipal collection sites, and so passing to others some of the costs for the separate collection. This levelling may encourage more individual collection schemes, where they are more cost-efficient.

Around 45% of separately collected WEEE is currently collected by public authorities – the rest is collected through alternative channels. The amounts currently collected include WEEE already financed by producers and WEEE deposited by consumers at collection points, leaving a smaller proportion of WEEE being physically collected from houses by authorities. The collection costs of municipalities for which producers would be made responsible are estimated to be in the region of €0.3bn/year<sup>58</sup> – but are lower than the material value of the WEEE that would be collected and passed on by public authorities, estimated at €1bn/year.

The incidence of cost will also be affected by price variations for metals and oil (plastics). For instance, metal prices increased between 2005 and 2007 by around 70€/ton of recycled metal. This *increased* the value of 12 million tonnes of WEEE by around €500 million. The value of metal is most likely to be captured by the producers or traders of WEEE.

Putting in place a uniform financial obligation for producers to pay municipalities for the WEEE they collect separately does not prevent producers from expanding these existing alternative routes for collection. These alternatives allow producers to avoid WEEE passing to municipalities, giving alternative means to collect WEEE more cheaply if municipalities attempt to charge excessive collection fees, something which would be a matter for negotiation between producers and authorities. Nevertheless, if implementation measures are poorly worded they might allow municipalities to charge more than the actual proportion of collection costs attributable to separate collection of WEEE.

However, if there were any net costs to producers after taking into account the material value of WEEE, normally they would pass the costs of producer responsibility obligations

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<sup>58</sup> Akron, “Cost calculation for the collection of household waste at municipal collection sites: an analysis in the frame of the take-back obligation”, december 2004, at <http://admin.vvsg.be/cmsmedia/LNdms3716%20Studie%20kostprijs%20containerpark%2021122004.pdf?uri=ff80808100d54ff90100e0f8a79c01cd&action=viewWorkingAttachement>

onto consumers through the purchase price of EEE. These costs therefore do not represent a loss for producers. Producers tend to pass the costs through to the consumers because of the high level of competition in the EEE market – which leaves little room for producers to absorb additional costs in their margins. Equal obligations for all producers selling into the EU market (cf free riding below) allows all to pass costs on without fear of increasing prices out of line with competitors.

Under this part of the option, these costs for collection would pass from the general taxpayer to the purchasers of EEE, in line with the polluter pays principle.

#### Social impacts

Under this option, it can be expected that the waste treatment sector dealing with EU WEEE will receive additional business under the baseline scenario in 2020 of 2.44 million tonnes of WEEE to be treated according to the Directive depending on the levels of collection set, with an increase in jobs in this sector. It is unlikely to assume that all separately collected WEEE will go to treatment in the EU: with global trade in waste, recyclers in third countries can compete on price with EU treatment operators. The WEEE Directive permits WEEE being treated in third countries where it is treated at the standards required by the Directive, and allowed by the rules of the Waste Shipment Regulation.

However, significant increase in treatment capacity would be expected in the EU. In addition to the turnover and jobs offered, the investment in this capacity would stimulate commercial innovation in treatment and recycling technologies. This is an area of great future global growth, where EU firms have an existing advantage (due to stimulation from the WEEE Directive coming into force).

This option is predicted to stimulate on-going innovation in treatment technologies. The financing of WEEE treatment and recycling, coupled with a long-term obligation for treatment falling effectively to producers allows investments in R&D and commercialisation which would not otherwise take place, due to inertia and lack of investment in the waste sector (as it is currently structured). This again has the potential to open up global technology markets in a growing sector.

- 4.2.4.2. Setting the collection target at the levels currently estimated to be collected (around 85% of WEEE arising) is broadly equivalent to a 65% target for WEEE put on the market.

#### Environmental impacts

Under the baseline, it is estimated that more than 85% of the WEEE is being collected separately although little more than 30% of WEEE is reported as being collected. Under this option, all separately collected WEEE would go to treatment in line with the Directive. The environmental impacts of this option would depend on the difference in impact between the Annex II operations required by the Directive and the alternative treatment that would have happened under the baseline scenario.

For example, it is estimated that if all cooling and freezing equipment would go to proper treatment, the environmental damage from greenhouse gas release could be reduced by something in the order of 200 million tonnes of CO<sub>2</sub> equivalent between 2011-20 (compared to the likely baseline), with a monetised value of the magnitude of around €1

billion a year at the start of the decade declining to low levels by 2020 as the 1990s CFC/HCFC ban feeds through to the WEEE stream.<sup>59</sup>

The date chosen for entry into force of higher targets makes a difference to the benefits of the WEEE Directive. Environmental damage from release of CFCs and HCFCs in cooling and freezing equipment is by far the greatest environmental benefit from this policy option. For example, more than 3/4 of the H/CFC release from refrigerants and foams in cooling and freezing equipment due to improper treatment appears likely to happen in before the latter half of the period 2011-2020, though this depends on the rate with which H/CFC containing equipment enters the waste stream.

This option would mean that a most of the CRT and LCD screens would need to be collected. Given the currently low collection percentages, this would mean that 67% of the CRT TVs and monitors and 60% of the LCD monitors would be additionally collected. Additional mercury and lead from these equipments would be controlled to avoid entering the environment.

With higher turnover from recycling and the pre-treatment activities, investment may increase to recycle a proportion of the plastics (which comprise 20-25%) of WEEE that will have a recycling value after 2011. The environmental gain from using recycled plastics depends both on the impacts (particularly energy use) during pre-treatment for recycling and the raw material which the recycled material substitutes.

### Economic impacts

As collection and recycling activities (whether in the EU or overseas) are already undertaken for the assumed 85% collection of WEEE arising, the main economic impacts come from the additional costs of treating all of that WEEE collected in line with the Directive. Those treatment requirements are mainly contained in Annex II of the Directive.

Note that - as similar collection activities will take place under this option compared to practice under 'do nothing', there would be no significant costs from changes to collection: there would only be a change in that different people would pay for that collection. The existing infrastructure for collection could be used, and there need to be no increase in costs per tonne collected. Indeed, there is the possibility that greater formal collection could reduce costs per tonne through economies of scale, although this factor has not been included in this analysis. The cost for collection and transport can be estimated to remain at €1.8billion per year as of 2020.

The estimated additional costs of treatment are difficult to quantify for the moment. To give an indication of the magnitude of the cost, it is indicated that coupled with estimates of categories of WEEE arising in 2020 and estimates of the costs of additional (Annex II treatment) per category, the costs for producers for the additional treatment of WEEE is broadly estimated at €1bn/year more than under the baseline as illustrated in figure 9 below.

It is likely that producers will pass the costs of producer responsibility obligations onto consumers through the purchase price of EEE. These costs are unlikely to represent a loss

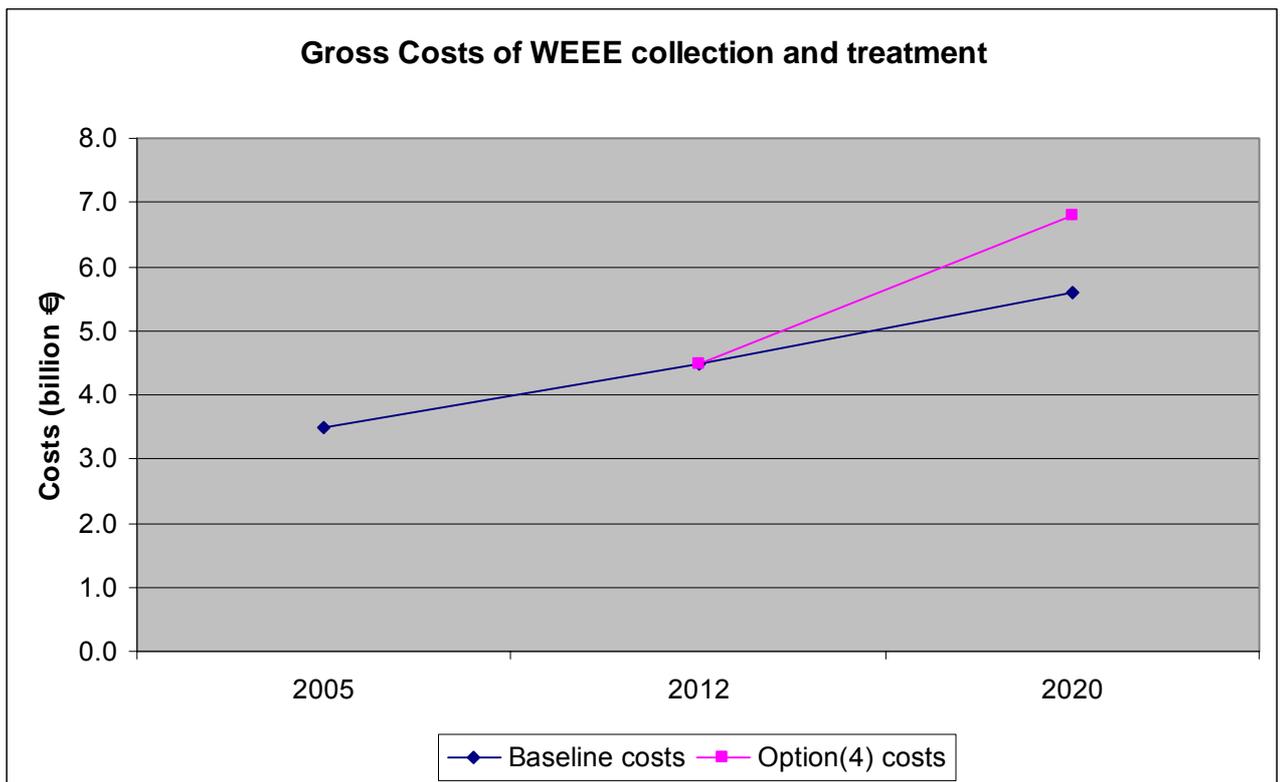
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See Annex 6 for basis of valuation.

for producers because of the high level of competition in the EEE market – which leaves little room for producers to absorb additional costs in their margins; and the equal treatment of all producers selling into the EU market (cf free riding below) – which, as all producers bear the same producer responsibility obligations, allows all to pass them on without fear of increasing prices out of line with competitors.

The waste treatment sector dealing with EU WEEE will therefore receive additional business under the baseline scenarios for 2020 of around €1bn a year, with an increase in jobs in this sector. A significant increase in treatment capacity would be expected in the EU. In addition to the turnover and jobs offered, the investment in this capacity would stimulate commercial innovation in treatment and recycling technologies.



**Figure 9: Treatment cost under this option**

For the purpose of this Impact Assessment and based on figures of the UNU study, it can be assumed that costs for collection and treatment per tonne of WEEE evolve nearly linearly from 20% to 65% collection of EEE put on the market in the preceding year. However, it is expected that very high collection rates approaching the maximum of 100% of the WEEE arising would entail disproportionate costs. This would be due to, for example, the necessity to extract small WEEE from unsorted municipal waste. In particular small WEEE with a weight below 1kg is currently hardly handed in by consumers (this would explain at least 11% of the not separately collected WEEE).

Any targets significantly below the level of assumed actual collection of 85% WEEE arising – for example a target of only 60% - would exclude substantial amounts of separately collected WEEE from the obligation of producers to ensure proper treatment. While even with such a target possibly more WEEE would be treated properly than under

the current baseline, the balance between a lower target and the assumed actual collection would remain subject to possible sub-standard treatment and illegal exports.

Furthermore, with a target set lower than the estimated amount of WEEE currently being separately collected, the inspection and enforcement bodies of Member States would have greater workload – and if not resourced appropriately – the risk of detection and penalties for improper treatment or illegal trade would be lower.

#### Social impacts

It can be expected that with having an incentive to collect (treat and recover) more WEEE the attitude of consumers to contribute to the separate collection needs to increase. The effect of producers passing on the cost of this option to the individual consumer in the purchase price will be rather low<sup>60</sup>.

Stimulus would be given to job creation in the e-waste sector, which tends to employ a greater proportion of low-skilled workers.

#### 4.2.4.3. Including B2B WEEE in the scope of the collection target

According to the UNU study, the WEEE arising in the EU for 2005 is about 8,3million tonnes, including B2B equipment that represent about 1million tonnes. This volume of WEEE will rise by 2014 to 10.2million tonnes and it is supposed that the volume of B2B equipment will rise proportionately.

As a direct link between producers and users exists in many cases, the risk of B2B WEEE ending up in unsorted municipal waste is less than with B2C WEEE. Nevertheless, the current amount of WEEE collected & treated as percentage of WEEE arising indicates that still between 35 and 50% of B2B are not being collected separately.

The initial motivation for different legal requirements for B2B and B2C waste was to reflect that much B2C waste went to landfill, whilst most B2B waste was already separately collected commercially. This difference between the waste streams has now disappeared and including B2B equipment in the scope of the collection target would increase the incentive to also collect the fraction of waste that is currently not yet collected separately (as for other WEEE).

#### Environmental impacts

Proper treatment of all B2B WEEE will create environmental benefits in line with the difference between the Annex II requirements for treatment and the standards to which WEEE is improperly treated.

#### Economic impacts

Producers have already to ensure the collection of WEEE from users other than private households and have to finance the costs for collection, treatment, recovery and environmental sound disposal of WEEE placed on the market after 13 August 2005. The

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<sup>60</sup> €1 billion spread over 125 million families is about 8€per family per year.

financing for the collection of historic B2B WEEE depends on whether the product is being replaced or not.

The reporting obligations do already foresee the amount of B2B collected to be reported. The inclusion in the target will therefore not increase the administrative cost for reporting. The additional costs from treating a greater share of WEEE properly, including B2B, have already been described above.

### Social impacts

No particular social impacts are expected except potentially slightly increased employment possibilities in the e-waste sector.

#### 4.2.5. *Option (5) Set a 100% collection target on the environmentally most relevant streams*

Setting general collection targets for WEEE with greatest potential for environmental harm, like cooling and freezing equipment would add additional cost for proper treatment. In this situation, the specific climate and ozone layer harm from cooling and freezing equipment could be largely avoided by setting a 100% collection target for these equipment type (as in the Batteries and End of Life Vehicle Directives).

This option would include removing targets for the other streams of WEEE where the difference between the environmental damage from profit-maximising treatment and treatment in line with the Directive is small. This would not remove the obligation for producers to treat all separately collected WEEE.

### Environmental impacts

With any low target for general WEEE – and in the absence of a specific target for the separate collection, a large proportion, between 40-60% of Cooling and Freezing WEEE is not expected to receive proper treatment due to the relatively expensive processing (to remove the CFCs and HCFCs<sup>61</sup>) and the possibility to treat other more profitable-to-recycle appliances to reach any low general target. With additional specific targets this would not be a problem.

This same reasoning applies for WEEE which has significant environmental impacts (so is expensive to treat) and which is light and with low recycling value. (e.g. mercury containing gas discharge lamps and LCD backlights<sup>62</sup>). For these streams, where even high weight based targets can be met without collecting these light WEEE streams, high proportions of this WEEE is likely to continue not to be collected separately (but remain in the mixed waste) and so not receive separate treatment. Ensuring the treatment of WEEE with the highest potential for environmental impacts would result in the greatest share of environmental benefits from WEEE treatment being realised.

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<sup>61</sup> In addition, the ozone-layer depletion and global warming potential of CFC fridges also make minimising leakage from controlled collection and recycling systems highly relevant as the total prevented global warming potential by treating fridges is more than 2000 kg CO<sub>2</sub> equivalent per fridge (UNU 2007).

<sup>62</sup> In 2006, 660 million lamps were sold in the EU containing about 4.3 tons of the extremely toxic mercury, with another 2.8 tons contained in LCD panels.

Yet, if targets were only applied to the most environmentally harmful WEEE streams problems in developing countries receiving the other WEEE streams would persist and potential environmental benefits from better material and energy recovery of less problematic WEEE would be lost because there would continue to be a large grey market for WEEE not covered by such targets, much of which would be likely to end up in illegal treatment in developing countries, where treatment techniques for all streams of WEEE cause environmental and health damage.

### Economic impacts

The additional costs from treatment are estimated to be slightly lower than under an 85% collection target, with lower levels of additional treatment being required, but with high levels of treatment of the most expensive to treat equipment taking place. The resulting economic effects would be similar as for Option 4.

With 100% collection and treatment targets for some waste streams, it would be costly to collect (and treat) large proportions of some of the WEEE streams which are currently going into domestic waste. For instance, the UNU study estimates collection costs for lamps to be around €270/tonne compared to collection costs in the area of €140/tonne for other WEEE. As quantified in the UNU study there will be higher treatment costs per unit of weight as these items require special precautions and processes (e.g. removal of hazardous fractions).

For streams where profit maximising recycling would anyway not be significantly different from treatment under the Directive, the cost difference would also be small.

Costs of separate collection of specific streams of WEEE under this option will be higher (per unit collected and treated in these streams) than under an option which requires collection of more WEEE streams, because the collection would need to capture smaller items (e.g lightbulbs) which would be likely to otherwise end up in mixed waste.

From the perspective of reporting on quantities collected and treated, no net additional administrative burden is expected. Burden would move from producers of the WEEE currently collected to those for the more environmentally harmful streams.

### Social impacts

As for Option 4.

#### 4.2.6. *Option (6) Collection targets set in relation to EEE put on the market in the preceding year*

This option would set the methodology to calculate the collection target as a percentage of EEE put on the market in the preceding year. Evidence shows that there is a rather stable relation between EEE put on the market each year and the amount of WEEE arising in the years following.

Compared to a fixed kg/inhabitant target, this method for calculating the collection target would allow taking into account the differences in WEEE arising in each Member State. For the EU15 Member States (who have a mainly saturated market for electronic goods) there is a stable relationship between the electronic goods put on the market in one year and the WEEE arising in that market in the following year (even though this is physically

not the same equipment): levels of WEEE are about 80% of the EEE sold in the previous year. So for example, a collection target of 85% of WEEE arising could be set as a target of about 65% of EEE sold in the previous year (in the EU15 states). It would thus account in a dynamic way for differences in economic development and consumption, offering a better balanced sharing of tasks between Member States. It would make better use of the potential for environmental benefits in countries with high arising of WEEE while avoiding to over-burden economies with small amounts of WEEE per capita.

This approach has the disadvantage that, where the relationship between EEE put on the market and WEEE arising is not stable, there is greater uncertainty on the correlation between WEEE actually arising and the target. It can be assumed that the EU12 markets are less saturated and significantly less WEEE arises compared to the amounts bought, and the relationship is less stable. For this Impact Assessment it is assumed that this relation in the EU12 will be stabilised by 2020.

For this IA, it is assumed that the market for electronic goods in the EU12, will be saturated as well by 2020.

#### Environmental impacts

The environmental impacts depend on the actual level of the collection target (see option 4) and are not directly linked to the methodology used for calculating the target. At a reasonably high target, environmental benefits would likely increase in comparison to the present situation.

#### Economic impacts

The proposed methodology for the calculation of the collection target requires information on the amounts of EEE put on the national markets. As the current Directive already requires this data to be monitored and reported (cfr. COM decision 2005/369/EC), no additional administrative costs are expected.

#### Social impacts

No particular social impacts are expected except potentially slightly increased employment possibilities in the e-waste sector.

### **4.3. Sensitivity of the analysis to changes in estimates of the collection rate and relationship of EEE put on market to WEEE arising**

If the estimate of the 'do nothing' baseline collection rate is wrong compared to the levels of collection that would actually happen in practice, the benefits and costs of an 85% target change, but not very significantly. If in practice the proportion that would have been collected was lower than 85% (ie. there was more WEEE in mixed waste,), the 85% target would increase separation of WEEE from municipal waste streams. This would bring some extra costs/tonne from the difficulty of obtaining this separation, but would bring greater environmental benefits per tonne: avoiding dumping and landfill and recovering materials has high environmental benefit. Current collection practices indicate that 85% of WEEE arising (by weight) can be separately collected without the need for expensive processes to sort WEEE from domestic waste. Above this figure costs/tonne rise faster.

If the 85% estimated collection is an underestimate, (so the target is set below actual collection), there is a greater likelihood of treatment practice diverging from the existing legal requirements of the Directive. As already discussed for the present situation (target significantly below actual collection) enforcement of the Directive would become more expensive and the prices needed to bring WEEE out of the grey market would be likely to be higher.

If the relationship between WEEE arising and EEE put on the market is lower or higher than the 80% estimated, similar effects to those mentioned above would occur. If the relationship is lower (e.g WEEE arises at levels equal to 77% of the EEE sold in any year), having a collection target based on 85% of 80% would mean an effectively higher than 85% target as a % of WEEE arising. The opposite holds if the WEEE/EEE relationship differs in the other direction.

The impacts of having a higher than 85% effective target would be to bring about more separate collection of WEEE. This would bring extra collection and treatment costs – with those treatment costs being proportionally higher, as smaller WEEE would need to be collected, but also more significant environmental benefits, as described above.

To take into account a possible decrease in the proportion of WEEE arising, compared to EEE put on the market, the target set as a proportion of WEEE put on the market could be set at 65% - calculated as 85% of 77% of EEE sold in any year.

Overview of costs and benefits of the different options

Option		No change	Greater Enforcement	85% Collection Targets	60% Collection Targets + Specific Targets
Destinations (% WEEE)	Landfill and Illegal Disposal	11	11	11	11
	Treatment in line with Directive	54	59	85	60
	Improper Treatment	35	30	4	29
ANNUAL COSTS	Gross Total Costs (€)	5.6bn + enforcement	6bn – 6.3 + basic enforcement	6.8bn + basic enforcement	6.5 - 6.8bn + basic enforcement
	Collection & transport	1.8bn	1.8bn	1.8bn	1.8bn
	Additional costs	0.9bn	0.9bn	1.1bn	1.1bn
	Basic Treatment	1.3bn	1.3bn	1.3bn	1.3bn
	Additional Treatment to meet legal standards	1.6bn	1.8bn	2.6bn	2.2bn
	Enforcement Costs	Not known to Commission	Increase estimated between 0.2 - 0.5bn	No increase	An increase, perhaps 0.1 - 0.3bn
ANNUAL BENEFITS	Value of Material Recovered (€)	2.2bn	2.2bn	2.2bn	2.2bn
	Environmental Damage	General	Baseline: Ozone depletion from 6720 tonnes of ODS released. Climate Damage of	Some reduction of climate damage possible; not quantifiable	Dependent on entry date of targets: Climate Damage reduced by €2bn-0.2bn/yr. Ozone depletion reduced by

		€1bn		12000-1200 tonnes.	depletion reduced by 12000-1200 tonnes.
	In or out EU	Assumed 4,3 million tonnes treated improperly in our outside the EU	Assumed 3,7 million tonnes treated improperly in our outside the EU	Assumed 0,5 million tonnes treated improperly in our outside the EU	Assumed 3,5 million tonnes treated improperly in our outside the EU
Innovation and Export Markets		Little additional stimulus for development of sorting and recycling technologies	Small stimulus for technology development in a growing global market	Significant stimulus for technology development in a growing global market	Some stimulus for technology development in a growing global market
EU Employment		Baseline: Estimated number of jobs in EU treating WEEE about several ten thousands	Small increase in EU manual work, with estimated waste industry revenue increase €0.1bn	Greater EU high tech and manual work, estimated waste industry revenue increase €0.6bn	Higher EU high tech and manual work, estimated waste industry revenue increase €0.4bn

#### 4.4. Comparison of Options to improve Effectiveness

##### *Stronger Enforcement and/or Higher Targets to achieve the objectives?*

It is assumed that the Directive's existing requirements for proper treatment of all separately collected WEEE have not been effective due to: the high material value of WEEE (which makes informal collection and trade of WEEE profitable) and the additional costs of treatment in line with the Directive's requirements (which provide an incentive for improper treatment).

Efforts to increase enforcement of treatment and shipment of WEEE (Options 2 and 3) appear unlikely to be sufficiently efficient or effective to improve management of WEEE in line with the Directive. Both actions would provide increased disincentive to improperly treat WEEE but given the assumed volume of separately collected WEEE which is not properly reported and treated, Member States would need to dedicate very high levels of resources to this to make improper treatment unattractive. The costs of those enforcement resources would be a significant additional cost for society.

Setting targets at the estimated current level of all separate WEEE collection (Option 4) – 85% of WEEE arising - would achieve that level of collection more effectively, and without these additional enforcement costs. Under higher collection targets, to transparently meet their obligation to treat all separately collected WEEE, producers would need to offer sufficient incentives for organisations separately collecting WEEE to deliver that WEEE to proper treatment. For example, the producer would have to offer an incentive that was sufficiently attractive compared to the price that an unauthorised recycler would pay in the grey market to receive WEEE.

In this situation, the level of collection activity (both formal and informal) would not change but the destination of informally collected and traded WEEE would change. With no changes to the extent of WEEE collection activity, the costs to society from collection would not change in this option, compared to the baseline. The producer would continue to have to pay for the costs of the additional processes required during recycling to avoid environmental damage, but would now pay these for all separately collected WEEE, as the Directive intended.

Whilst the two possibilities have not been set out against each other in the stakeholder consultation, there was certainly support from stakeholders for having better enforcement, in particular when it concerns the shipments of WEEE.

##### *Setting the level and type of Target*

The Impact Assessment has shown evidence to assume that already 85% of arising WEEE is being separately collected, although not all is reported. The separately collected 85% of WEEE arising includes nearly all the large and medium size WEEE which is economic to collect. Data suggest that collection costs per unit collected remain the same, certainly between 25 to 85% of WEEE arising.

Setting targets (in Option 4) above the level of WEEE already being collected would require further separation of small WEEE from mixed waste. This would bring greater

environmental benefits – both from recovering materials from landfill and particularly for some streams (see below), but would be more expensive per tonne to collect.

Setting targets significantly below the level of WEEE already being collected would diverge from the existing intention of the Directive and would make enforcement activities more costly, as greater amounts of WEEE would still be collected in the grey-economy.

To meet objectives, collection targets would best be set at the level of WEEE which is estimated to actually be collected already (85% of WEEE arising). At this level, significant proportions of small WEEE, including compact fluorescent lamps, which is currently estimated to be lost in unsorted domestic collection would be at risk of going to unsorted waste.

Bringing about proper treatment of all separately collected WEEE would make the Directive effective at bringing about treatment and recycling of nearly all large and medium sized WEEE. This brings added costs from increased amounts of WEEE being treated in accordance with high environmental standards: costs are estimated to be around €1bn per year on top of the costs of €0.6bn per year for (gross) collection, disposal and treatment, if no further action is taken.

As the type of WEEE being treated will not change, only the amounts, treatment costs per unit will either remain the same, or reduce with economies of scale. The existing formal and informal collection infrastructure would not need to be expanded. This means that setting an 85% target does not decrease the cost-effectiveness of collection and treatment, but may (possibly) reduce the costs per unit for achieving environmental benefit from the Directive.

In Option 5, the fractions of WEEE with greatest potential for environmental harm, like cooling and freezing equipment, would be collected and so would receive (expensive) treatment. In this situation, remaining specific climate and ozone layer harm from cooling and freezing equipment could be largely avoided by setting a 100% collection target of waste arising for these equipment types.

Compared to Option 4, Option 5 has the advantage that proportions of certain streams of WEEE which are less environmentally damaging, would not need to be collected and formally reported. Particularly for some of the large household appliances, there are no great additional costs for recycling and treatment that avoids environmental harm. For these streams a proportion of the organisational costs would be saved in the formal economy. Compared to Option 5, this option would have the benefits (and costs) of pulling greater proportions of some of the more hazardous, but light WEEE (like compact fluorescent lamps) out of the domestic waste stream.

Option 5 would be less effective at avoiding waste treatment under bad conditions in developing countries, with a significant proportion of the 29% of all WEEE arising not being treated under the collection target likely to go for illegal treatment. The illegal shipment of waste could be reduced through greater enforcement, but with a large proportion of WEEE outside producer targets, the grey trade in WEEE would be likely to be significant, making enforcement more costly and less effective than in Option 4.

Stakeholders, in general, rather linked the control on the hazardous substances in WEEE to sound treatment of the equipment than to an environmental weight based target. As

concerns the level of the target, very few expressed a desired level. The recycling industries would welcome a rate of no less than 65% in function of amounts *put on the market*.

Both Options for target setting would include waste from EEE sold to businesses in the collection target. This was previously covered separately in the Directive from domestic consumer waste as it was historically already separately collected rather than going to landfill or illegal dumping. Now both are typically collected, including both streams into one target will avoid problems of free-riding from 'dual-use' waste having its treatment paid for by domestic consumers (see below).

### ***Setting the Date for the Target to apply***

The Commission proposes to set the revised targets for the end of 2016.

One of the greatest environmental problems from improper treatment of WEEE in the grey market is the release of CFCs and HCFCs from fridges, with average monetized climate damage of the magnitude of €1bn/yr in 2011 declining annually to lower levels by 2020 and very significant ozone-depletion effects. As these are only contained in cooling and freezing equipment sold before 2002, the number of CFC/HCFC fridges in WEEE is declining each year, and is expected to be small after 2020.

Therefore, different dates for the entry into force of targets will have significantly different effects on the climate and ozone depletion benefits realised by the revised Directive. Targets brought into force at the end of 2016 may save something around €0.5bn in the first year declining to low levels by 2020, depending on the rate at which CFC/HCFC equipment comes back. Targets closer to 2011 would save €1bn of climate damage annually, with intermediate years saving something in-between.

So, in addition to targets coming into force in 2016, the Commission proposes to consider by 2012 the appropriateness of a separate target for cooling and freezing equipment, to drive proper treatment of all cooling and freezing equipment which is being separately collected (whether formally or informally).

The revised Directive may be adopted by Council and the European Parliament in 2011 and then transposed into law in the Member States. With the collection infrastructure (including informal collection) already in place for cooling and freezing equipment, the change needed to properly treat all separately collected WEEE in line with the Directive is the addition of sufficient treatment capacity.

A suitable treatment plant normally takes around 1 year to build and bring to operation. Costs of installing new treatment capacity are not likely to reduce with greater time.

### ***Incidence of Costs and Combining Targets with Greater Enforcement***

Under Option 4, producers are expected to take steps to secure the WEEE needed to meet their obligation to treat all separately collected WEEE. This will incur costs, but these costs are estimated to be more than offset by the recycling value of the materials in the WEEE that they receive. For example, to divert WEEE from unauthorised treatment, the *maximum* cost a producer would need to offer would be around the value of the WEEE to the

unauthorised recycler. This price is the profit that can be made from recycling the WEEE (under sub-standard conditions) - the material value in the WEEE minus the recycling cost.

Whilst the producer would pay this cost, they would then recover the (higher) material value of the WEEE from the recycling – and so are likely not to have any net costs from obtaining WEEE. In practice, it is likely that producers would be able to acquire substantial proportions of WEEE for less than the net material value: by receiving it directly from municipalities or distributors at less than market value. This value can be used towards the producers' other obligations.

Combining greater enforcement (Opts 2&3) with higher collection targets would increase the risks for unauthorised treatment, making that financially less attractive and helping producers secure WEEE with lower incentives. However, the enforcement activity would have a cost.

Option 4 includes harmonizing the requirement for producers to have financial responsibility for collection of WEEE from households. These collection costs would move costs estimated to be in the region of €0.3bn/year from taxpayers – but are lower than the material value of the WEEE collected and passed on by public authorities, estimated at €1bn. Harmonizing this requirement would avoid any possible distortions in the single market from national arrangements on financing which might favour domestic producers.

Producers would be responsible for paying the additional costs of proper treatment. (These represent revenues for treatment operators.) As EEE is a competitive market and all competing products would be equally affected, the costs paid by producers are assumed to be passed on to purchasers of new EEE in purchase prices. As the increases in purchase price from additional WEEE costs are likely to be very small (less than €1) on a appliance costing €150-450, sales of appliances are also not thought to be affected, with no reduction of the shareholder value of producers.

### ***How to set Targets in tonnes***

Collection targets set as a % of WEEE arising also need to be determined in physical units for monitoring. Targets are currently set by reference to kg/inhabitant. For the EU15 Member States (who have a mainly saturated market for electronic goods) there is a stable relationship between the electronic goods put on the market in one year and the WEEE arising in that market in the following year (even though this is not the same equipment): levels of WEEE are about 80% of the EEE sold in the previous year.

A collection target of 85% of WEEE arising would be set as a target of about 65% of EEE sold in the previous year: (85% of 80% of EEE sold but allowing for a conservative estimate of the relationship between EEE and WEEE arising).

This approach has the disadvantage that, where the relationship between EEE put on the market and WEEE arising is not stable, there is greater uncertainty on the correlation between WEEE actually arising and the target. It can be assumed that the EU12 markets are less saturated and significantly less WEEE arises compared to the amounts bought, and the relationship is less stable. For this Impact Assessment it is assumed that this relation in the EU12 will be stabilised by 2020.

In the stakeholder consultation there was rather support for this option, the option of a fixed target not being supported as it does not reflect enough the variations between Member States and is unresponsive to increases in WEEE volumes. Additionally, most stakeholders also expressed their support to keep the mandatory character of a collection target.

## **5. OPTIONS TO IMPROVE THE EFFICIENCY OF THE DIRECTIVE**

### **5.1. Description of the Options**

To improve the efficiency of the WEEE Directive, the following options have been assessed.

Other than the "no action option", the options can be combined except for options 2 and 3 which are alternatives, and options 5 and 6 which are alternatives:

- (1) No action (business as usual scenario)
- (2) Clarifying the scope by using a fixed list of products: Under this option, two lists would be developed, one defining products falling under the scope (positive list), the other defining those products falling outside the scope (negative list). These lists would replace the existing list of products that fall under the different product categories in Annex IB of the WEEE. The Commission would be given a mandate to update these lists through the Comitology process and would be likely to do so annually.
- (3) Defining the scope under the RoHS Directive: This option would bring the detailed scope of the Directives (Annex IA of the WEEE Directive) into the RoHS Directive, under Article 95 of the EC Treaty. The WEEE Directive would refer to this scope, but the WEEE scope would remain under Article 175 of the EC Treaty. Member States would be obliged to publish the list of products falling under the scope of the Directive at national level.
- (4) Classifying categories of equipment as WEEE from private household or B2B: The legal text of the Directive would be changed to provide clarity on which categories of equipment would be defined as being WEEE from households (B2C) or as WEEE from users other than households (B2B) by classifying Categories 1-7 and B2C and Categories 8-10 and B2B.
- (5) Introduction of legal requirements for inter-operability between Member State registers and harmonisation of definitions and reporting standards. This would be operated by Member States.
- (6) The establishment of a harmonised EU register of producers which will serve as framework for information exchange and transfer of obligations. This would be operated by an EU body. This option includes harmonisation of definitions and reporting standards.
- (7) Include the reuse of whole appliances in the components, material and substance reuse and recycling targets, increased with 5%,
- (8) Include a recycling and recovery target for category 8 equipment (medical devices) similar to the target for category 9 equipment (control and monitoring equipment);

## 5.2. Analysis of impacts

### 5.2.1. Option (1): No action

#### Environmental impacts

If no action would be taken, divergent national interpretations would persist and there is a risk that some products would not be covered by the national implementation laws. These products would not need to comply with the requirements of the WEEE and RoHS Directives. Fewer compliant products would have negative environmental impacts as, for example, these products could continue to use the hazardous substances prohibited by the RoHS Directive and could not need to be collected and recycled.

Indirectly, problems with the functionality of the national registers across the EU may be hindering efforts to detect free riders and contribute to a better enforcement of the requirements of the WEEE Directive.

#### Economic impacts

Lack of clarity of the scope can lead to the absence of Extended Producer Responsibility contributions for some of these products in some Member States. This would continue to cause imbalances in the level playing field between stakeholders.

The unclarity whether a product covered by the scope would be classified as B2B or B2C products would result in a continuing risk of distortion of the market and existence of free-riders by those who declare their goods as B2B and who therefore do not have to place a financial guarantee. This is especially affecting dual use products which are declared as B2B product but end up in the B2C scheme. In this case the cost for the collection and treatment of the appliances is paid by the producers that declared B2C appliances. Escaped financial guarantees can be in the order of magnitude of several ten thousands of euros for an individual producer. This problem of dual use products is the most relevant for the categories of IT and communication equipment and consumer equipment, which represent more than 20% of EEE placed on the market.

The lack of harmonisation between the requirements of national producer registers will continue causing administrative burden, in particular for actors that have business in several Member States.

The information flow will remain incomplete, further leading to sub-optimal enforcement possibilities.

#### Social impacts

If certain products which should be covered by the scope, would be excluded from the scope at national level, the requirements of the Directives (restriction on the use of hazardous substance, collection and recycling) would not apply which could lead to negative social impacts, ie on human health.

As regards the lack for harmonisation of the registration requirements, social impacts may result from discouragement of small companies to act on several Member States markets.

### 5.2.2. *Option (2): Clarifying the scope by using fixed lists of products*

#### Environmental impacts

This option can lead to environmental improvements as it clarifies largely which products need to meet the product requirements, need to be collected and recycled and treated and to what degree. This would contribute to further meeting the environmental objectives of the Directives.

#### Economic impacts

This option clarifies producer responsibility, reduces administrative burden for the industry and provides for a level of playing field across the Member States. Having a concrete list of products updated would lower the administrative burden for Member States as requirements of the Directive would become clearer.

#### Social impacts

Social impacts could be linked to simplified operation across Member States, notably for small businesses.

### 5.2.3. *Option (3): Defining the scope under the RoHS Directive*

#### Environmental impacts

This option would lead to more clarity, therefore it can be expected that more products would need to comply with the requirements of the Directives. This would have positive environmental impacts: more products would be collected and recycled and more products would need to be RoHS compliant.

#### Economic impacts

Having a fixed product scope under the RoHS Directive would also provide a level playing field for producers, it would further reduce uncertainty and would have positive impacts on administrative burden.

#### Social impacts

Social impacts could be linked to improved legal security and thereby simplified operation across Member States, notably for small businesses.

### 5.2.4. *Option (4): Classifying categories of equipment*

#### Economic impacts

Classifying categories of equipment as WEEE from private households or B2B would be an important step to clarify the application of the Directive. Where the division between B2B and B2C products is not this clear, the products should be categorised as B2C products unless otherwise proven. This would make the division between WEEE from private households and B2B clear and would provide legal certainty on what requirements producers need to fulfil with regard to financing and reporting and provide level of playing field for them by reducing the options for free riding.

The economic impacts of this option depend on the classification. For equipment that would be classified as B2B, no longer financial guarantees need to be set. For equipment that would be classified as B2C, producers will be not unfairly burdened by free-riders.

#### Environmental impacts

Clarifying which category applies would in particular have an effect on dual use products constituting at least 20% of the WEEE arising. This would have positive environmental impacts as circumvention of the Directive's requirements would be reduced and dual use products would thus be financed, appropriately treated and recycled.

#### Social impacts

No particular social impacts are relevant to this option.

#### 5.2.5. *Option (5): Inter-operability of national registers and harmonisation of reporting requirements*

#### Economic impacts

This option would have a significant impact in reducing unnecessary administrative burden. The current registration and reporting requirements are laid down in Article 12 of the WEEE Directive. Total administrative costs of registration are estimated to be €14 million per year (assuming that there are 4.000 new producers each year who are assumed to register in the EU 27 on an average of 14 Member States at a estimated registration cost of €250 per registration).. As producers normally would not register without this legal provision, the administrative burden caused by this provision is regarded the same as the administrative costs.

Article 12 (1) also requires Member States to collect information, including substantiated estimates on an annual basis on the quantities and categories of EEE put on their market, collected through all routes, reused, recycled and recovered within the Member States, and on collected waste exported, by weight or by numbers. Whether this requirement would impose any information obligation on companies would depend on the national methodology used to collect this data. The WEEE Directive for example also allows Member States to use substantiated estimates for this data collection. The draft study on the reduction of administrative burden reports that Member States use different measurement methods which are often due to national requirements that go beyond the EU information obligation. In practice, it is expected that all Member States will request this data from producers and treatment operators. In such cases, it is expected that the companies concerned already have this data readily available as part of the normal business operations. If Member States when implementing the Directive would require companies to transfer this existing data to them, this could lead to some administrative cost. This administrative cost is estimated at about €57 million per year (with an estimated 40000 producers reporting on an average in 14 Member States) and 10,000 authorised treatment facilities in the EU, working for an average of 4 hours at the average EU salary of €25/hour). The administrative burden is linked to the 13 times reporting for producers and is then estimated at €52M.

Article 12 (1) also requires distance sellers to provide information on their compliance with the financial producer responsibility obligations and to report on quantities of EEE

put on the market of the MS of the purchaser. This requirement is needed to monitor compliance with the producer responsibility obligations for distance sellers and to ensure a level playing field between producers irrespective of their selling technique. The information on the quantities of EEE put on the market is regarded as information which is already available and thus not induced by the legal provision. This would thus not cause any administrative burden. The administrative cost are estimated at €0.04 million per year (under the assumptions that that there are 400 distance sellers in the EU and the information requirement takes 4 hours per year at an average EU salary of €25 per hour). The administrative costs, linked to the registration requirement are estimated at € 1,4 million (under the following assumptions: 400 distance sellers, selling via distance communication in an average of 14 Member States at an average of €250 per registration). In total it has an administrative cost of 1,44M€ whereas the total administrative burden is 1,4M€

Under this option, the registration requirements would be harmonised, leading to only one registration per producer valid for the entire EU. In order to reduce the administrative costs related to the information gathering exercise of Article 12 (1), this option would give the Commission the mandate to harmonise the measurement methods through a comitology procedure. This would resolve the reported difficulties of the current situation that Member States use different measurement methods. Under the above-mentioned assumptions both measures would lead to cutting costs with up to a factor 14 or a reduction of administrative burden of up to €6,4 million per year.

Cost impacts have been calculated also by Ökopol on basis of costs associated with various electronic databases associated with regulatory measures. In their calculation, it is assumed that the set-up costs of a formalised network of national bodies occurs only once and that costs for operating the network as well as the EU clearing house that has to deal with the transfer of money and of obligations on top of this network, are spread over 12 years.

Due to reduced registration at Member State level, reduced registration renewals and reduced reporting for industry, cost savings can be realised. The annual costs and the total present values for national competent authorities and businesses being discounted at 4% over 12 years, indicate that this option could result in cost savings of €288 million to €10 million over 12 years.

It is therefore expected that this option has positive effects on intra-EU competition by providing a more level playing field amongst various stakeholders (particularly for distance selling) and aiding cross-border enforcement of the WEEE Directive.

Detailed cost calculations as well as the factors identified as being crucial are further explained in Annex 13.

#### Environmental impacts

No particular impacts are to be expected.

#### Social impacts

No particular impacts are to be expected.

#### 5.2.6. *Option (6): EU operated register*

##### Economic impacts

It is difficult to accurately assess the costs associated with performing the necessary activities at an EU level to support a harmonised register, as no exact model exists. As a proxy, comparisons have been made with the European Chemicals Agency. However, it can be assumed that the costs for national authorities and industry go in line with the costs under the EU clearing house.

If it is assumed that the number of registered producers may double the operating costs of national authorities would also double, as these are assumed to be proportional to the number of registered producers. Under the current situation, these costs would reach €36.6 million per year. However the current costs are associated with multiple registrations across the EU. With single registrations, the operating costs would be reduced to between €1.1 million and €3.4 million per year across the EU-27 (with additional coordination staff costs of €1.2 million). The number of registered producers would need to increase by at least a factor of 10 before the annual costs are comparable to those of an Agency, as discussed above (Ökopol 2007).

If the costs of an EU harmonised Register are assumed to be similar to those for the European Chemicals Agency, it is therefore difficult to justify the additional costs of establishing an EU harmonised Register, either for all EEE producers or for those newly registering.

Alternatively, it could be assumed that the operating cost of an EU Register would be no greater than the combined costs of 27 national systems, as the workload would be similar, and would potentially be reduced due to efficiency savings. However, there would still be a need for staff at a Member State level, due to the requirement for market surveillance. The costs of these staff may be similar as for the EU Clearing house. However, the EU register would still incur some development costs and would still make newly established national registers redundant.

##### Environmental impacts

No particular impacts are to be expected.

##### Social impacts

No particular impacts are to be expected.

#### 5.2.7. *Option (7): Include the reuse of whole appliances in the components, material and substance reuse and recycling targets*

##### Environmental impacts

In this option, the reuse fraction can contribute to the targets, without prejudicing how much need to be reused effectively per category, this aspect being regulated by the market. Studies show that 5 to 10% of collected equipment is found to be reusable. Therefore, under this option, including reuse of whole appliances in the targets, would be

accompanied with a 5% increase of the current reuse/recycling targets in order to keep the same level of environmental ambition.

This option would allow continued operation of current re-use arrangements, but would remove disincentives for re-use of whole appliances.

The environmental benefits of reuse and repair come from the delay/avoidance of products and their components to become (premature) waste, reduce their overall ecological impact and conserve valuable natural resources as it diminishes the need for new products. It requires also less energy to reuse/repair compared to recycling.

However, older appliances tend to consume more energy than new products – and continued use of old products where they would not have been used, or where they would have been replaced by newer products, will increase energy use. With a 5% target increase, corresponding to what the market now allows (5 to 10%), there is low risk that the tradeoffs between reuse and replacement would be distorted.

Under this option, Member States would have to decide in practice which operation (reuse of whole appliances, component/material/substance reuse or recycling) would be the best in terms of environmental protection. Therefore, it is not possible to further quantify the environmental impacts thereof.

#### Economic impacts

There are no significant economic impacts to be expected as this target setting combines both existing practices (and costs) of recycling/recovery of equipment and of the reuse of whole appliances.

#### Social impacts

It is expected that this option would lead to more re-use of whole appliances which would supply cheaper appliances to the poorest sector of society.

#### Impacts on administrative burden

The reuse of components and parts is already to be reported together with the recycling data. Monitoring and reporting the reuse of whole appliances is not considered to be different, the more as Member States have already the possibility to report on this reuse on a voluntary basis. Therefore, it is assumed that there is no impact on administrative burden by this option.

#### 5.2.8. *Option (8): Include recycling and recovery targets for medical devices*

It is estimated that 32 000 tonnes of medical equipment is placed on the EU market yearly. It is difficult to define recovery, reuse and recycling targets for these equipments as technologies and sizes of the equipments differ. However, data collected on recycling percentages (UNU 2007) indicate that the recovery and recycling rate of these appliances are very close to those of the monitoring and control instruments<sup>63</sup>. Therefore targets for

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<sup>63</sup> UNU (2007), section 10.3

these appliances are proposed under this option at the same level as targets for control and monitoring equipment.

#### Environmental impacts

Medical devices are currently excluded from the scope of the RoHS Directive<sup>64</sup>, therefore the use of hazardous substances in these equipments are not prevented at this date. It is estimated that medical devices sold annually in the EU contain the following amounts of hazardous substances: 1160 tonnes lead, 1,8 tonnes cadmium, and approximately 20kg mercury. Setting a target for medical devices would entail environmental benefits, since it would reduce the risk of uncontrolled disposal and it would save resources.

#### Economic impacts

The data collected on declared recycling percentages (UNU 2007) indicates that the proposed recovery, reuse and recycling targets are achievable not entailing excessive costs. The cost of collection and recycling of medical devices varies depending on whether the appliance concerned is a small or a big appliance, the technical cost related to recycling of medical equipments is estimated to vary between 162 -304 euros per tonne.

#### Social Impacts

No direct impacts are expected.

#### Impacts on administrative burden

Reporting on the amounts of medical devices being treated is yet not obligatory. Setting a target for medical devices would mean increased reporting obligations with may lead to an increase in administrative burden for producers, depending on how Member States would implement this. As it concerns a category that represents only 0.3% of the total WEEE arising, it is assumed that the impact on administrative burden on producers by this option is rather small.

### **5.3. Comparison of Options to Improve the Efficiency of the Directive**

#### *Clarifying Scope and Categories*

Of the two options to provide greater clarity on the scope of and categorisation in the WEEE Directive, there is little difference between the impacts; both will provide greater legal precision on the scope and both would require publication of lists, either by Member States or the Commission of the products considered within the scope. Neither option would resolve any new uncertainties about new products which were not clearly inside or outside the scope.

If there was any support expressed for using lists to clarify the scope, then stakeholders supported the idea of having a positive and a negative list. Harmonising the scope under WEEE was supported rather than defining the scope under RoHS, however, this would

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<sup>64</sup> However, when the medical devices are covered by the RoHS Directive, the environmental impact on the long term of setting a target, in particular for ensuring proper treatment, might be lower. See further the Impact Assessment on the review of the RoHS Directive.

require introducing a double legal basis in the WEEE Directive whereas a similar effect can be reached by referring to the scope in RoHS, already targeting harmonisation of scope.

The categorisation of certain categories of products as business waste would avoid problems of 'dual use' waste, when where business equipment very similar to consumer equipment (like IT equipment) enters domestic waste and its treatment paid for by producers of domestic equipment. This 'free-riding' would be likely to be more common if greater volumes WEEE were formally collected.

### ***Cutting unnecessary administrative costs from Registration and Reporting***

Three options are considered to cut the unnecessary costs from duplication and differences in registration and reporting by producers. Either the introduction of an EU Clearing House or single EU register would certainly provide the functions required for cutting the unnecessary costs: the single EU register would do so at much greater cost to the European Commission (and so taxpayer) with some benefit from reduced costs of operations by Member States. Introduction of legal requirements for interoperability of Member State registers stands a good chance of achieving the same result for producers registration, avoids the need for extra resourcing for the European Commission, but is unlikely to provide services for reconciling flows of funding for treatment between schemes with actual cross-border treatment of WEEE.

### ***Other changes***

Including reuse of whole appliances in the existing reuse/recycling target would entail environmental benefits at most likely no cost, as the flexibility on the most sustainable treatment operation (reuse or recycling) would remain. It would help avoiding that re-use is made unattractive by a need to meet higher recycling targets, even where it might be economically and socially more valuable.

Setting targets for medical equipment (cat. 8) equipment to the level of those for monitoring equipment (cat. 9) will have relatively small impacts: for some Medical Equipment (perhaps 10,000 tonnes/year) slightly greater shares of materials will be recovered.

## **6. MONITORING AND EVALUATION**

### **6.1. Indicators of progress towards meeting the objectives**

The core indicators for progress towards better environmental and health protection through separate collection and dedicated treatment of WEEE along the lines recommended in this Impact Assessment are the following:

- (1) Extent to which administrative burdens are cut at the EU and Member States levels while at least maintaining the present level of environmental protection.
- (2) The extent to which Member States and producers effectively achieve the aims set out in the WEEE Directive, including the abolishment of “free riding”.
- (3) The extent to which arising WEEE is collected separately and treated at the high environmental and health protection standards required by the WEEE Directive and other relevant Community legislation.

### **6.2. Outline for monitoring and evaluation arrangements**

Based on the monitoring and review of the progress made towards the set of objectives using the above mentioned indicators and other information requirements in Article 12 in the WEEE Directive the Commission will evaluate the results of this policy and report every three years to the Council and the European Parliament.

These monitoring and evaluation exercises will be based on reporting requirements of the Member States as defined in Article 12 of the WEEE Directive. The reporting is streamlined on the basis of a questionnaire that the Commission sends to the Member States. The content of this questionnaire is set out through comitology procedure.

The following issues will in particular be addressed in the setting up of the monitoring and evaluation arrangements:

- focus the monitoring and reporting on the key data which are necessary to assess the extent to which the objectives of the legislation are being achieved;
- continue to support Member States throughout the introduction and implementation of the revised legislation.

## 7. CONCLUSIONS

During 2011-20 around 85% of the EU's WEEE by weight is predicted to be collected separately from domestic waste, but an estimated 4.3 tonnes, about 35% would not be treated in line with the Directive, despite existing legal requirements if no action is taken. It is likely that within that 1/3 there would be higher proportions of the WEEE streams, like cooling and freezing equipment, which lead to greatest environmental harm from improper treatment.

This WEEE would escape proper treatment. A combination of producer obligations and enforcement is needed to provide the set of incentives to bring WEEE to proper treatment and meet the objectives of the WEEE Directive.

Large unnecessary costs from the current implementation of the WEEE Directive, particularly differences and duplication in registration would continue.

### The Recommended Set of Options and the Impacts

The analysis in this IA recommends adoption of a combination of options to improve the effectiveness and efficiency of achievement of the WEEE Directive's existing objectives. These options are described with the key impacts in the table below:

Recommended Policy Options	Key impacts (compared to baseline)
<i>To Improve Effectiveness</i>	
Set collection targets for producers at levels close to the level of collection currently being undertaken, including B2B waste in those targets.	- Additional treatment costs of €1bn per year, of which a significant but unknown proportion are increased revenues for EU treatment business.
Base these targets on levels of EEE put on the market in the preceding year, at 65% of EEE put on market for all Member States	- These costs fall on producers who will most likely pass these on to consumers
Set minimum requirements for inspection and enforcement by Member States, with those requirements decided in Comitology	- Annual reduction of environmental harm to the atmosphere (of magnitude €1bn per yr), EU localities and to workers in developing countries from safer treatment of 4.3million tonnes of WEEE.  - No additional revenues from material recycling – other than through greater innovation stimulated by greater investment in treatment technologies.

<i>To improve efficiency</i>	
Define the scope of the Directive in the RoHS Directive (based on Article 95 of Treaty) and Require Member States to publish the list of products within the national scope	Increased, but not total, clarity on the scope of products, with the possibility for Member States to expand the scope in their territory.
Require interoperability and data-transfer between Member State producer registers	- Cuts unnecessary costs paid by producers of €6.4million a year, by allowing one registration for all EU obligations, with harmonised requirements for reporting and processes, of which SME's will have the biggest proportional benefit.
Include reuse of whole appliances in the target for recycling combined with reuse.	Removes disincentives for re-use of products, where that re-use is more economically valuable than recycling
Set targets for medical equipment (cat. 8) equipment to the level of those for monitoring equipment (cat. 9)	Small: for some Medical Equipment (perhaps 10,000 tonnes/year slightly greater shares of materials will be recovered.

Compared to other possible options, this set of options:

- Is the most likely to stimulate proper treatment of all WEEE arising outside the domestic waste stream.
- take into account uncertainty in the estimations and uncertainties about future: the option set remains the best option under changes to key assumptions: on metal prices, and the proportions of waste being dumped or incinerated and treated properly in the baseline.
- is expected to lead to additional benefits from innovation and exports, with greater investment in recycling technologies supporting technology firms in a fast growing export market where EU firms are often the global leaders, offering expansion of high-tech jobs in this sector, in addition to reducing costs and opening new material markets.
- are predicted to increase jobs further in the WEEE treatment and recovery sector in the EU – these are frequently manual jobs available for lower skilled sectors of the workforce. Some stimulation of the reuse sector should also lead to more jobs for socially disadvantaged people and also to better access to cheaper second-hand consumer goods for the poorest sector of society.

## Annex 1: Description of (research) studies

The executive summaries of the major (research) studies are available on a public website.

1. Study contracted via DG JRC / IPTS to AEA Technology

The objective of the study is to generate full understanding of implementation of the WEEE Directive by the Member States and to obtain feedback on potential areas for revision. The review of the implementation of the WEEE Directive in EU Member States on which this report is based has been undertaken for the European Commission (DG Joint Research Centre, Institute for Prospective Technological Studies) by AEA Technology in association with the Regional Environmental Centre for Central and Eastern Europe.

The report identifies and describes regulatory and management approaches considering WEEE at worldwide level. It outlines key trends and describes the main benefits and problems in the implementation of the WEEE Directive. It also identifies opportunities for harmonisation and improvement in the way the WEEE Directive is being implemented across Member States.

This report is available at <http://www.jrc.es/publications/pub.cfm?prs=1408>.

2. Synthesis report of the information gathering exercise by BIO Intelligence Services

A consortium led by BIO Intelligence Service assisted the European Commission in the following tasks:

- Management of information retrieval from stakeholders and other third-parties as a part of the WEEE Review.
- Identification of further sources of available information and collection of that information, and in case of a barrier, persuade the stakeholders to share such information.
- Cross-reference all existing available information with reference to a set of issues to be examined in the WEEE Review.
- Identify the significant data gaps and/or data conflict in existing available information.

The consortium did not perform a detailed analysis of the extracted information; this was the task of the other research studies (see **Error! Reference source not found.**). The exercise resulted in an assessment of about 132 references that were made available online together with a synthesis report. This report provided the systematic overview of the content of these references whilst assessing the possible overlaps, contradictions and gaps in the knowledge related to the information needed for the review. The result served as a direct input for the contractors of the research studies and is available in the CIRCA page [http://circa.europa.eu/Public/irc/env/weee\\_2008/library](http://circa.europa.eu/Public/irc/env/weee_2008/library).

3. Study contracted to UNU with subcontractors.

The objective of the study is to complete the information needed to perform an analysis of options for the review of the Directive and to provide that analysis, in particular by giving a thorough evaluation of the impacts, efficacy and efficiency of the Directive from an environmental and economic, and as far as possible, a social perspective, by analysing the management (collection, treatment) of different categories of WEEE. The information and analysis will be used as the main content of a future impact appraisal of options for review of the Directive.

See [http://ec.europa.eu/environment/waste/weee/studies\\_en.htm](http://ec.europa.eu/environment/waste/weee/studies_en.htm)

As part of this study contract an expert stakeholder workshop was organised on 15 March 2007. The workshop was organised on a personal invitation basis and was a combination of presentations and working group discussions. The outcome of these discussions served the contractor in the drafting of the draft final report. The conclusions of the workshop are available together with the presentations in the CIRCA page [http://circa.europa.eu/Public/irc/env/weee\\_2008\\_ws/home](http://circa.europa.eu/Public/irc/env/weee_2008_ws/home).

4. Study contracted to ÖKOPOL with subcontractors.

The objective of the study is to give a thorough evaluation of the operation of the Directive's provisions relating to producer responsibility obligations of WEEE and consider options to improve the operation of those obligations in the EU. The study will give a full picture on how Member states have transposed and implemented the producer responsibility obligations and the producer definition of the Directive. It will examine the interaction between the systems set up by Member States and the impact on achievement of the Directive's objectives and on business. It will provide a thorough evaluation of the functioning of the register of producers that Member states shall draw up and options for its further improvement, development and simplification. It will assess options to improve the achievement of the objectives of the Community environmental policy (in particular the Directive itself) on WEEE, particularly the development and simplification of the Directive in line with the Communication on better regulation.

See also [http://ec.europa.eu/environment/waste/weee/studies\\_en.htm](http://ec.europa.eu/environment/waste/weee/studies_en.htm)

5. Study contracted to ECOLAS with subcontractors.

The objective of the study is to assess the impacts on innovation and competition of the WEEE requirements, identifying the factors and requirements that have a critical positive or negative impact and to compare the approach undertaken in the WEEE Directive with respect to other approaches undertaken in the EU for different waste streams and outside the EU, identifying advantages and disadvantages with regard to innovation and competition. Finally it will formulate proposals to revise the Directive with a view to improving its cost-effectiveness. The study has clearly included in its assessment the eventual impacts on SMEs.

See also [http://ec.europa.eu/environment/waste/weee/studies\\_en.htm](http://ec.europa.eu/environment/waste/weee/studies_en.htm)

## Annex 2: Environmentally relevant materials arising as waste (UNU Study,2007)

Arising ton TOTAL WEEE [t]	Cat 1a	Cat 1b	Cat 1c	2; 5a; 8	3a	3b	3c	4a	4b	4c	5b	6
Ag	0.31	0.00	0.13	0.09	118.77	19.60	0.00	2.08	11.29	1.65	12.73	2.24
Au	0.07	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.70	0.11	4.90	0.55
Au	0.00	0.00	0.04	0.03	19.55	2.61	0.00	0.23	0.00	0.00	0.00	0.00
Be	0.00	0.00	0.00	0.00	1.29	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	11.88	9.80	0.00	0.00	51.07	0.41	0.00	0.00
Br	0.00	0.00	9.15	5.85	366.22	58.81	0.17	0.00	213.41	12.68	0.00	0.00
Cd	0.00	0.00	10.30	37.25	51.96	17.97	23.15	6.63	0.00	0.00	0.00	0.00
Cl	0.00	0.00	10.87	7.18	2.47	169.89	0.21	0.00	0.00	2.35	0.00	0.00
Co	0.00	0.00	13.16	47.89	66.81	22.87	3.48	8.36	9.68	0.13	0.00	0.00
Cr	0.20	0.00	0.80	0.53	155.89	6.86	0.02	0.00	203.20	2.33	2.01	3.09
CRT-glass cone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	149496.83	3685.90	0.00	0.00
CRT-glass screen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	303562.97	7372.43	0.00	0.00
Cu	68201.40	33027.65	54694.57	128773.83	39343.88	69099.79	2903.34	737.68	38865.95	603.75	7587.25	4104.02
Epoxy	0.00	0.00	480.58	313.95	0.00	2809.73	9.37	0.00	3418.91	395.45	0.00	0.00
Fluorescent powder	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hg	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.15	0.37
Glass (LCD)	0.00	0.00	8.01	15.17	987.31	8.98	0.23	5.19	0.00	0.00	6069.80	0.00
Liquid Crystals	0.00	0.00	0.00	0.00	59.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mn	0.00	0.00	0.69	2.66	3.71	1.23	0.19	0.46	0.00	0.00	0.00	0.00
Ni	0.98	0.00	36.04	122.39	779.45	145.39	36.46	35.18	478.97	7.15	90.31	15.94
Oil	66.00	7067.50	531.50	1021.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	29.46	0.00	28.61	18.62	262.29	357.75	0.57	2.25	822.47	15.36	57.27	60.27
PCB	27.89	0.00	0.35	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pd	0.04	0.00	0.08	0.05	7.42	0.47	0.00	0.02	0.26	0.04	1.00	0.17
PVC	7503.73	827.41	1161.40	1436.73	2128.03	127.42	55.91	0.00	2806.09	65.29	2246.81	1255.11
Sb	1.77	0.00	1.66	1.09	47.01	39.21	0.03	0.00	162.34	3.58	3.92	3.54
Sn	1001.81	0.00	16.02	244.78	979.89	269.54	5.56	21.63	43.54	8.08	12.97	91.15
Stainless steel	35632.87	34475.62	12929.89	18544.50	12743.46	27607.24	72.11	0.00	0.00	0.00	0.00	0.00
Cyclopentane	0.00	1620.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isobutaan	0.00	379.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CFC11	0.00	8446.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CFC12	0.00	3351.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Zn	301.33	0.00	33.76	125.05	987.31	529.27	5.70	9.80	1392.29	3.99	25.21	114.55
<b>Total [t]</b>	<b>1,269,894</b>	<b>925,677</b>	<b>470,233</b>	<b>413,618</b>	<b>695,159</b>	<b>395,607</b>	<b>9,940</b>	<b>113,778</b>	<b>580,670</b>	<b>12,824</b>	<b>66,708</b>	<b>56,981</b>

### **Annex 3: Physical and financial responsibilities for collection**

Legal allocation of responsibilities for Collection of WEEE in EU Member States (Ökopöl).

Member State	Physical Responsibility	Financial Responsibility
Austria	D/M/P	D/P
Belgium (Brussels)	D/M	D
Bulgaria	P	P
Cyprus	P	P
Czech R.	D/P	D/P
Denmark	M	M
Estonia	D/P	D/P
Finland	D <sup>65</sup> /P	P
France	D/M/P	D/P
Germany	M	M
Greece	P	P
Hungary	P	P
Ireland	D/M	D//P
Italy	D/M	D/M
Latvia	P	P
Lithuania <sup>66</sup>	D/M/P	P
Luxembourg	D/M	D/M
Malta	D/P	D/P
Netherlands	D/M	D/M
Poland	D	D
Portugal	D/M/P	D/P
Romania	M	M
Slovakia	D/P	D/P
Slovenia	D/M	D/M
Spain	D/M	P
Sweden	P	P
UK	D/P	D/P

D = Distributor, M = Municipality, P = Producer  
(definition varies between national and European approach)

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<sup>65</sup> In the Waste Act Section 18h(2) it is stated that sellers of EEE shall accept WEEE from private households if replaced by purchasing a similar product, or shall direct the purchaser to another reception point

<sup>66</sup> Based on the legal text as well as other policy documents

#### **Annex 4: Evolution of Collection Performance to meet targets**

Evidence from recorded compliance with existing collection targets in Member States indicates that producers have made greater progress in the years further before the target date than closer to that date. They appear to have a rather logarithmic evolution whilst coming towards the target which is the heading towards the total amount of WEEE arising [(see dotted line on the graph down).]

This is seen in schemes that existed before the entry into force of the WEEE Directive. For example, the collection targets for Belgium have increased in 5 years time from 45.000 tonnes in 2003, representing about 4,5kg per inhabitant, to 81.000 tonnes in 2007 (see graph based on annual reports). At the same time, there was a rather firm stimulation for increased collection by the legal obligation in the transposition law (8,5kg per inhabitant to be collected by 2007)<sup>67</sup>. The increase can be explained partly by the annual consumption (and hence waste) growth and by further implementation of the system. This most likely includes the integration of a fraction that was already been separately collected but that was not reported for.

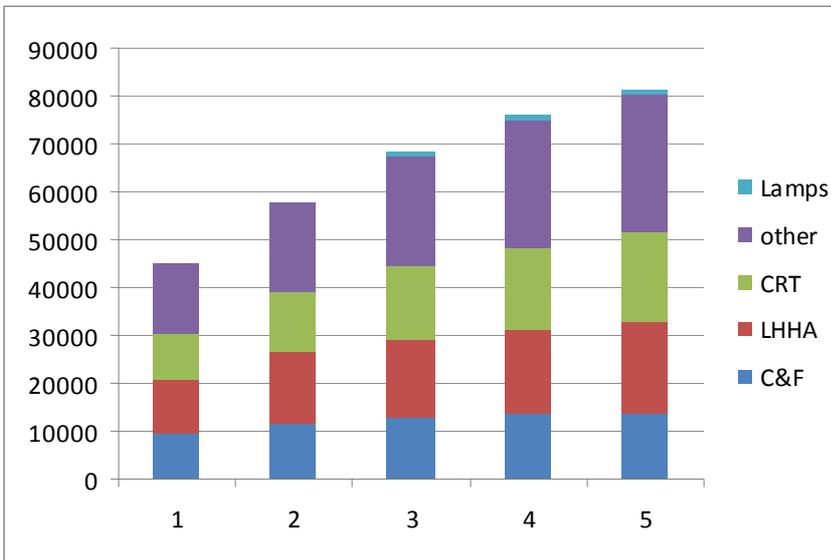


Table: Belgian collection figures, 5 years after start-up

<sup>67</sup> VLAREA art.3.5.3 (Vlaams reglement inzake afvalvoorkoming and -beheer)

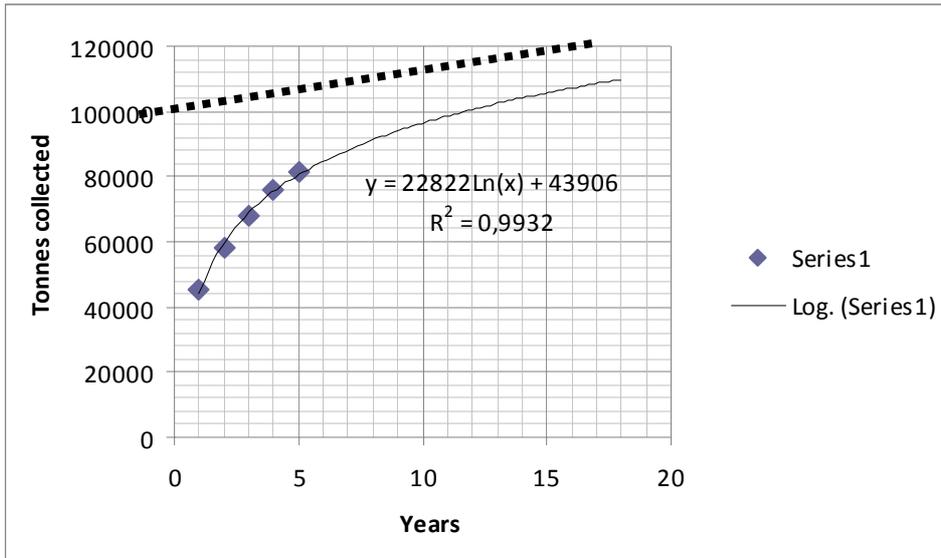


Table: behaviour of collection in function of time (example for Belgium)

**Annex 5: Leaching of metals of disposed WEEE**

Estimated leaching of metals from consumer electronics in a controlled landfill (BIO 2006)

Element	To soil	To air	To water
Hg	0.0004%	0.0000%	0.0071%
Cd	0.0001%	0.0000%	0.0026%
As	0.0001%	0.0000%	0.0022%
Cr	0.0001%	0.0000%	0.0019%
Cu	0.0002%	0.0000%	0.0045%
Pb	0.0001%	0.0000%	0.0016%
Zn	0.0000%	0.0000%	0.0006%
Cl	0.2933%	0.1035%	1.4373%
Ni	0.0002%	0.0000%	0.0040%

Estimated leakage of metals in MSW<sup>68</sup> incineration of consumer electronics (BIO 2006)

Element	To flue gas	To air	To water
Hg	93.0%	0.4420%	0.0011%
Cd	77.0%	0.0500%	0.0555%
As	29.0%	0.1000%	0.0002%
Se	68.0%	0.2000%	0.0000%
Cr	8.0%	0.0000%	0.0006%
Sb	36.0%	0.0000%	0.0000%
Cu	4.0%	0.0000%	0.0001%
Pb	32.8%	0.1988%	0.0011%
Zn	37.0%	0.2000%	0.0007%
Sn	33.0%	0.2000%	0.0037%
Ni	5.0%	0.0000%	0.0074%

<sup>68</sup> Municipal Solid Waste

## Annex 6: Details on environmental impacts of WEEE

### General Impacts from materials in WEEE

#### **Ferrous metals**

Some 50% of WEEE by weight consists of ferrous metals, largely steel. Collecting and recycling this material typically results in savings of 74% energy, 76% water pollution and 86% air pollution if compared to primary steel production.

#### **Precious Metals**

Precious metals, particularly gold, palladium, platinum and silver are used as coatings on electrical contacts and connectors in EEEs. Absolute quantities are small compared to the overall weight. However recovery from WEEE contributes to saving greenhouse gas emissions and primary resources as well as reducing environmental impacts of primary production.

#### **Plastic**

Plastic recycling has also high theoretical potential of energy and pollution saving: - up to 80% compared to the primary production of plastic if very pure streams of waste material are used as recycling feedstock. However, for many polymers, the current sorting processes for recycling can use as much energy as the creation of the polymer from raw materials<sup>69</sup>. Energy recovery from the plastic fraction of WEEE is a very advantageous option in these cases, compared to landfill and incineration without energy recovery.

#### **Hazardous substances**

Numerous hazardous substances occur in WEEE as described in the section 2.2.3.1.

### Some Specific Environmental Impacts from WEEE Categories of EEE

#### **Climate related impacts**

##### - Cooling and Freezing Equipment

Only the magnitude, rather than precise estimates of the climate change damage from release of CFCs and HCFCs can be given. The following section shows the assumptions used in reaching these magnitudes, and is based on the Bio-intelligence study and the UNU study:

Cooling and freezing (C&F) appliances represent about 17.7% of the WEEE arising. Only 27% of this is being reported as collected and treated. The remaining 73% represent about 1 million tonnes of C&F. At an average weight of 48kg, this suggests that up to **21 million** C&F annually could by-pass proper treatment. Around 80% of these are estimated to contain Ozone Depleting Substances (ODS) in 2008 with 0.4kg of CFCs in the refrigerant and insulating foam per appliance.

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<sup>69</sup> See [http://circa.europa.eu/Public/irc/env/weee\\_2008/library?l=/recycling\\_techniques/ltu-lic-0536-sepdf/\\_EN\\_1.0\\_&a=d](http://circa.europa.eu/Public/irc/env/weee_2008/library?l=/recycling_techniques/ltu-lic-0536-sepdf/_EN_1.0_&a=d)

By 2011, fewer C&F equipment returning in the WEEE stream will have ODSs in. Assuming this level falls to 70% of the 2008 figure, this would be around 15m pieces of equipment, so 6000 tonnes of CFC. With average global warming potential (of CFC11 and CFC12 of 7500), this would equate to 45m tonnes of CO2 equivalent. A monetary estimate of the damage cost of this release at €30/tonne CO2-equivalent amounts to **€1.35 billion in 2011**. This is an order of magnitude of €1bn.

The proportion of ODS containing C&F is expected to decline. Assuming that this reaches levels equivalent to 10% of the 2008 numbers in 2020, damage costs from the monetised GHG damage from released ODS would be in the order of €0.1bn by that year.

The damage to the ozone layer from these releases can not be monetised, though the releases from old WEEE represent a significant part of the EU's release of ODS.

The proportion of ODS saved from release by proper treatment depends on the stringency of the standards applied by treatment plants. Use of best practice makes a significant difference. Treatment standards in WEEE will be determined through comitology procedures for Annex II of the Directive.

- Metals and precious metals from high grade circuit boards

Printed circuit boards typically can be found in consumer equipments and IT and telecommunication equipments (categories 3 and 4 of the WEEE Directive). They contain precious metals as well as a number of hazardous substances, including arsenic, antimony, beryllium, brominated flame retardants, cadmium, lead, etc. While 1 million tonnes of categories 3 and 4 are reported as collected and assumed to be treated appropriately, up to 1,8 million tonnes could be disposed of or treated inappropriately inside or outside the EU, with the associated health and environmental impacts .

- Plastic containing equipment

It is estimated that 20-25% (1,6-2 million tonnes) of WEEE arising is composed of plastics. The plastic-dominated products are small household appliances, IT and telecommunication equipments, consumer electronics, electrical and electronic tools and toys and leisure and sport equipments (UNU study). Recovery of material and energy from these categories would contribute to overall resources savings and reduction of CO2 emissions due to energy savings in recycled plastics.

## Local Environmental impacts in the EU

- Disposal

When WEEE is disposed of in a landfill or dumped, there is a risk that hazardous substances, for example mercury, cadmium, hexavalent chromium and PCBs leach into the soil and groundwater. Another concern is the vaporisation of mercury found in WEEE<sup>70</sup>. There is still a risk of leaching of metals also from controlled landfills, in case of mercury, cadmium, etc illustrated by the table in Annex 5.

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<sup>70</sup> Bio Intelligence Service, 2006 Section 8.1

- Incineration

In case of incineration of WEEE for example cadmium, mercury, lead will be found in the bottom ashes and fly ashes that can thus contribute to emissions of heavy metals into the air and reduces the quality and potential use of fly ashes and bottom-ashes (incineration residues)<sup>71</sup>. The incineration of brominated flame retardants and PVC leads to the generation of extremely toxic dioxins and furans. Copper acts as catalyst in this reaction. An example demonstrating the leakages of heavy metals from the incineration of consumer electronic products can be found in the table in Annex 5.

- Potential specific local environmental impacts of improperly managed WEEE

- (1) Lamps and LCD monitors & TV's are of particular concern for terrestrial eco-toxicity and ecosystem quality, mainly because of their mercury content; similarly, battery packs because of their cadmium content;
- (2) Acidification which is mainly caused by IT and telecommunication equipments, excluding CRT and LCD monitors, because of the presence of precious metals and eutrophication mainly caused by LCD monitors and electrical and electronic tools.

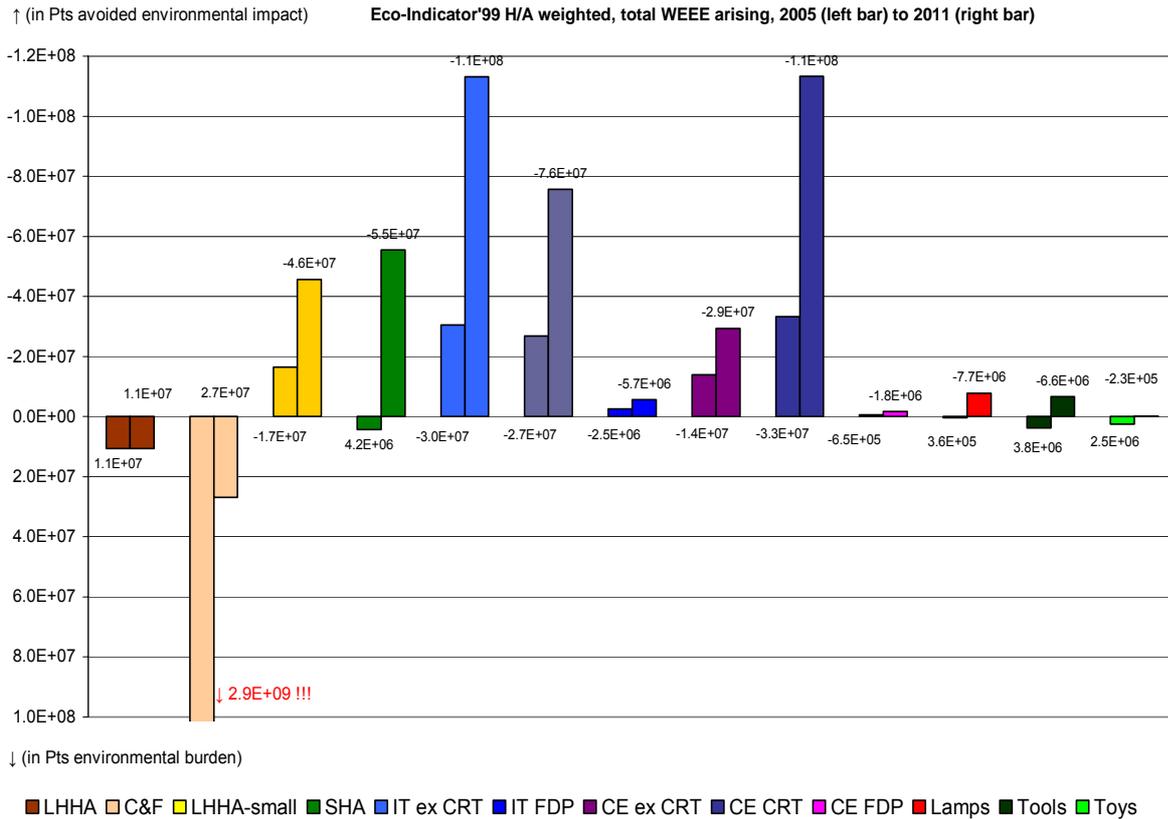
### **Environmental impacts of appliances**

The UNU study has calculated, using the Eco-indicator 99, the total environmental impact per kg of average appliances of each of the 10 WEEE categories for the scenario that the WEEE is collected and recycled instead of being disposed of together with the municipal solid waste stream (MSW), i.e. either incinerated or disposed of in a landfill.<sup>72</sup>

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<sup>71</sup> Extended Impact Assessment for the batteries Directive SEC(2003)1343

<sup>72</sup> An important assumption here is that for the full collection scenario, the values are based on the 2005 baseline impacts without taking into account the changes in product and thus waste stream compositions as well as in development in recycling technologies applied. In particular the transition from CRT to flat panels displays and from CFC to HC based fridges will have an impact on the graph below. At present there is not enough data available to determine how this affects the waste stream composition over time. Also, the possible effects of other pieces of Community legislation, such as REACH and the EuP Directive have not been taken into account in these calculations.



**Figure**

**Figure: Total environmental impact for 2005\* compared to 2011\*\* (EI99 H/A)**

\* Current 2005 collection (left) \*\* Maximum collection 2011 full implementation (right)

### Environmental impact of illegal shipment of waste to third countries

The impacts of WEEE treatment in third countries cannot be quantified due to lack of data. In any case they must be assumed to be much higher than treatment of this waste would cause in the EU. The reason for this assumption lies in generally much lower environmental and safety standards in the countries to which WEEE is exported from the EU.

Some of the most severe cases of sub-standard treatment of WEEE in developing countries are described for example in reports from the Basel Action Network (BAN)<sup>73</sup> and Greenpeace<sup>74</sup>. BAN witnessed disposal of waste and treatment practices that result in intense emission of toxic pollutants to the environment as well as severe exposure of humans to these substances. As many of these operations are unlawful, no statistics exist to quantify or monetise the impacts which are nevertheless considered to be severe.

### Environmental impact of reuse

The **environmental benefits of reuse** are very limited according to Rechberger (2006). He examined two extreme scenarios: one with no reuse of products and another with reuse of all products giving between 50% and 100% product life extension. The study found that even intensive

<sup>73</sup> Basel Action Network, "Exporting Harm" <http://www.ban.org/E-waste/technotrashfinalcomp.pdf> and "Digital Dump" [http://www.ban.org/BANreports/10-24-05/documents/TheDigitalDump\\_Print.pdf](http://www.ban.org/BANreports/10-24-05/documents/TheDigitalDump_Print.pdf)

<sup>74</sup> Greenpeace, "Poisoning the poor, electronic waste in Ghana, August 2008"

product reuse of EEE reduces total resource consumption (materials and energy) of a highly developed economy by less than 1%. This is further substantiated by Rose and Stevels (2001) which showed that the environmental benefits are very low compared to materials recycling

## **Annex 7: Background to the driver of different implementation of the provisions on the producer registration/reporting:**

Member States have taken different approaches with respect to:

- who needs to register ; and
- who needs to report and what needs to be reported.

### **Who needs to register?**

From the wording in the Directive, it is clear that "the producer" has to register, but the term 'producer' has been interpreted differently. 20 countries take a 'national approach', whereby the first importer of a product into a Member State is considered to be the producer, if there is no manufacturer of that brand on the national market. In these Member States it is only legal entities that are based in the Member State where products are placed on the market that are entitled to register as the legally obligated producer. This creates a situation in certain Member States that brand manufacturers either have to open a national seat, causing extra costs, or that the burden is shifted to the first importer.

3 other Member States follow a 'European' approach, where the producer must be present within the EU but does not have to have a legal entity within the MS<sup>75</sup>.

The 4 remaining Member States have either an ambiguous or an undefined approach.

A particular problem arises in case of distant sellers as producers are defined irrespective of their selling technique<sup>76</sup>, and Member States have divergent interpretations. Workshops organised by the Member States have shown that these different approaches lead to the obligation for registration and reporting by distance sellers in both home and buyers Member States or to no obligation for registration and reporting in either Member State.

Distance sellers that are based in Member States where they must register in countries where they sell products to end users and sell to end users in countries that only allow nationally based actors to be producers, cannot meet their producer responsibility obligations, and are therefore unwilling free-riders (Ökopol 2007). There is little control whether producers are registered and have made their financial contributions is important in order to avoid free riding. VROM estimates that 15% of the WEEE stream is not collected as a result of free riders, i.e. producers or importers who sell electrical and electronic equipment but do not have, or live up to their take back obligations regarding WEEE (ETC/RWM 2007).

In half of the Member States, the PRO compliance schemes can register their producers members, with some PRO's have the same functionality as the Member State registers. In the other half,

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<sup>75</sup> The three MS only apply a European approach in their 'legal' definition of the producer. However, in practice, producers report what is placed on the market in these countries.

<sup>76</sup> Distance seller is not defined as such but rather the as the person who uses a selling technique by means of distance communication as defined in Directive 1997/7/EC of the European Parliament and of the Council of 20 May 1997 on the protection of consumers in respect of distance contracts, OJ L 144, 4.6.1997, p.19.

producers must register individually regardless of their membership to a compliance scheme, which creates additional administrative burden.

### Who needs to report and what needs to be reported?

Requirements for reporting of products put on the market vary e.g. with respect to:

- the frequency of reporting,
- the reporting formats; and
- the data to be provided<sup>77</sup>.

Furthermore, the functionality of the registers isn't further defined and some require the producer as well to demonstrate compliance with the setting of a financial guarantee. [As in most cases, the participation by the producer in an appropriate scheme counts as a guarantee, there is a direct link with producer responsibility organisations.]

#### Frequency of reporting

Reporting of products put on the market varies from monthly, quarterly bi-annually to annual reporting periods. Reporting should be frequent enough to deter unscrupulous producers that, for example, may be able to avoid reporting if only present on the market for peak sales periods. Chosen reporting periods may also affect producers in divergent ways due to certain seasonal variations in sales for certain products which might affect when products are most often returned as WEEE.

#### Reporting Formats

Again due to the diversity of reporting format, when reporting the number of products placed on the market, national registers require divergent reporting with respect to the categories of equipment that sales must be reported in. This causes increased administrative burden and cost, at least when initially setting up internal systems to deal varying reporting formats.

#### Data to be provided: Lack of common definition of weight

Similar to the above arguments, there is a great deal of divergence between Member States application of the definition of weight, which causes unnecessary administrative burden when putting products on the market. In certain cases, the definition applied in Member States makes it impossible for legal producers to be able to gather the data from the “bill of materials” they have to accurately report the weight of the product. In this circumstance, when a new product is launched in the market, the producer must physically weigh the product and relevant components in order to fulfil the weight definition in different Member States. This requires additional resource planning software and working time.

#### Data to be provided: Definition of “put on the market”

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<sup>77</sup> More details on the different national reporting requirements are provided in Annex 8.

Member States have also taken different approaches on which EEE should be regarded as “put on their market” in cases of intra-Community trade. Differences or ambiguities may cause confusion among producers on what sales should be reported in a Member State given that known subsequent intra-community trade will happen. In most Member States, it is when a financial transaction raising VAT occurs that theoretically products are “put on the national market” and sales are required to be reported by the producer who placed those products on the market. Depending on whether the national register allows foreign producers located in another Member State to register or not, the producer may be one of several actors, manufacturer, distributor/wholesaler or even retailer. However, discussions with producers reveals that most manufacturers and large wholesalers/distributors will not report sales on the national market to the register if they know that the client (which may be the legal producer in the Member State) will subsequently ship those products to another market. This makes sense from a producers’ perspective, as any sales reported to the national register will be used to calculate its market share.

**Annex 8: Mapping of the administrative burden of the WEEE Directive**

<b>Provision</b>	<b>Information obligation (IO)</b>	<b>Admin burden</b>	<b>Admin cost</b>
Art. 12 (1)	Member States to draw up a register of producers	€14M	€14M
	Member States to collect information, including substantiated estimates on an annual basis on the quantities and categories of EEE put on their market, collected through all routes, reused, recycled and recovered within the Member States, and on collected waste exported, by weight or by numbers	€52M	€57M
	Member States to ensure that distance sellers provide information on their compliance with the financial producer responsibility obligations and on quantities of EEE put on the market of the MS of the purchaser.	€1,4M	€1,44M
Art. 10 (1) and (4)	Member States to ensure that use of EEE in private households are provided with necessary information. Member States may require that some of the information is provided by producers and/or distributors	n/a IO occurs at national level	n/a IO occurs at national level
Art. 10 (3)	Member States to ensure that producers mark the EEE with crossed-out wheel bin	€2M	€2M
Art. 11 (1)	Member States to ensure that producers provide treatment information for each type of new EEE	€0.75M	€0.75M
Art. 11 (2)	Member States to ensure that producer of EEE is identifiable by a mark on the appliances	€0M	€0M
Art. 7 (3)	Member States to ensure that producers (or third parties acting on their behalf) keep records on the mass of WEEE, their components, materials or substances when entering (input) or leaving (output) the treatment facility and/or when entering (input) the recovery or recycling facility	€0M	€1M
Art. 6 (2)	Member States to ensure that all treatment companies obtain a permit under the Waste Framework Directive. Member States to carry out inspections in treatment facilities benefiting from a derogation of the permit requirement	n/a	n/a
Art. 6 (6)	Exporter to proof that the recovery, reuse and/or recycling operation took place under conditions equivalent to the requirements of this Directive	n/a; IO occurs at national level	n/a; IO occurs at national level



## **Annex 9: Policy Coherence**

The objectives of the Directives are fully in line with general Community strategies, including the Lisbon Strategy, the Sustainable Development Strategy, the Energy and Climate Package, the 6<sup>th</sup> Environmental Action Programme and its mid-term review, Integrated Product Policy, the Thematic Strategies on the sustainable use of natural resources and on waste prevention and recycling, the 'Marketing of Products' package and the Commission's recent lead market initiative.

The review of the Directives is foreseen in the Commission's simplification programme, with implements the Community Lisbon Programme.<sup>78</sup> The review of the Directives should eliminate unnecessary barriers and burdens facing European business and society, in line with the "growth and jobs" strategy of the EU.

Full implementation of the EU waste legislation acquis, including the WEEE and RoHS Directives in Europe would contribute to reducing CO<sub>2</sub> emissions and thus contribute to European climate reduction targets agreed in Kyoto.<sup>79</sup> .

The substance ban, design requirements and waste management approach of the RoHS and WEEE Directive contribute to the objective of Thematic Strategy on the Sustainable Use of Natural Resources<sup>80</sup> which calls for lowering the overall environmental impact of resource use in a growing economy. The RoHS Directive takes account of this by allowing exemptions from the substance ban where “substitution is technically or scientifically impracticable or where the negative environmental health and/or consumer safety impacts caused by substitution are likely to outweigh the environment, health and/or consumer safety benefits thereof”<sup>81</sup> and by requiring regular reviews of the substance bans in the light of scientific evidence<sup>82</sup>. The WEEE Directive responds to this by reducing the environmental and health impacts per unit of material used without restricting the use itself or limiting quantities.

The WEEE and RoHS Directives also contribute to the objectives of the Thematic Strategy on Waste Prevention and Recycling<sup>83</sup> which calls for less waste being generated in terms of toxicity (“qualitative waste prevention”) and weight (“quantitative prevention”), and for an optimization of recycling in view of overall environmental and health benefits. The substance ban of the RoHS Directive responds in particular to the call for “qualitative prevention”. The WEEE Directive responds to the aim of optimized re-use, recycling, and other recovery at a high level of environmental and health protection, giving planning security to economic actors through binding collection targets and harmonized standards for waste treatment.

In line with the Integrated Product Policy approach<sup>84</sup>, the RoHS Directive introduces life-cycle considerations as an essential criterion for granting exemptions.<sup>85</sup> The WEEE Directive seeks to

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<sup>78</sup> The objective of the simplification exercise is to contribute to a European regulatory framework of the highest standards in respect of the principle of subsidiary and proportionality. Simplification intends to make legislation less burdensome, easier to apply and thereby more effective in achieving its goals. Following on these principles, a regulatory action should not be beyond what is necessary to achieve the policy objectives pursued, needs to be cost-efficient, and should take the lightest form of regulation called for.

<sup>79</sup> Prognos study, May 2008, <http://www.prognos.com/Singleview.306+M5c828d79ff6.0.html>.

<sup>80</sup> <http://europa.eu.int/comm/environment/natres/index.htm>

<sup>81</sup> RoHS Article 5

<sup>82</sup> RoHS Article 6?

<sup>83</sup> <http://europa.eu.int/comm/environment/waste/strategy.htm>

<sup>84</sup> Reference IPP

improve the environmental performance of all operators involved in the life-cycle of electrical and electronic equipment, e.g. distributors and consumers and treatment operators.

WEEE and RoHS contribute to the objectives established by the 6<sup>th</sup> Environmental Action Programme<sup>86</sup> and its mid-term review<sup>87</sup>, which call, *inter alia*, for a significant reduction in the quantity of waste going to disposal and the volumes of hazardous waste produced while avoiding an increase of emissions to air, water. Moreover, the RoHS Directive explicitly refers to the Sixth Environment Action Programme with respect to future decisions on the prohibition of additional hazardous substances under the RoHS Directive.<sup>88</sup>

Ensuring consistency with the “Marketing of Products” Package is particularly important in the context of the RoHS review. This legislative package aims to simplify and improve existing internal market legislation on goods, by providing a clear and consistent legal framework which will at the same time guarantee safe products on the market. In the case of RoHS, harmonised definitions and obligations for the economic operators could lead to substantial economic benefits (reduction of administrative burden for administrations and producers) and more efficient and coordinated enforcement at Community level.

The WEEE Directive is one of the policy instruments mentioned in the Lead Market initiative<sup>89</sup> to foster recycling markets, help more and better recycling yielding environmental and economic gains.

### **Coherence with EU legislation on product design and waste management**

The provisions of the Directives are coherent with the requirements of other pieces of EU legislation on product design and waste management as explained below.

#### *RoHS and REACH*

REACH<sup>90</sup> aims to create an EU-wide system for the management of chemicals and their safe use, by *inter alia* requiring manufacturers and importers to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the [European Chemicals Agency \(ECHA\)](#). RoHS, on the other hand aims to contribute to the protection of human health and the environmentally sound recovery and disposal of waste electric and electronic equipment and to eliminate the disparities between the national laws of the Member States. To this end, it restricts the use of certain hazardous substances in electrical and electronic equipment put on the Community market as from 1 July 2006. Since the objectives and approaches of both pieces of legislation differ, one cannot be replaced by the other.

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<sup>85</sup> Exemptions from the substance ban are allowed where “substitution is technically or scientifically impracticable or where the negative environmental health and/or consumer safety impacts caused by substitution are likely to outweigh the environment, health and/or consumer safety benefits thereof.

<sup>86</sup> Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme OJ L 242, 10.9.2002, p. 1–15.

<sup>87</sup> COM(2007) 225 final.

<sup>88</sup> Article 4(3) of RoHS.

<sup>89</sup> COM (2007)860 final

<sup>90</sup> Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, OJ L 396 of 30 December 2006.

In fact, the two pieces of legislation are complementary: REACH confirms the importance of managing chemical releases related to the waste life stage, which forms the core of RoHS, by requiring information on all stages of the substance lifecycle to be provided for in the chemical safety report. REACH is based on the demonstrated risk of the substances resulting from their use, while RoHS is founded on a preventive approach, based on the hazard profile of the substances. Currently, should a substance that is subject to authorisation under REACH be restricted under the RoHS Directive for use in EEE, such application will be exempted from the REACH authorisation requirements.

However, since REACH is subsequent to RoHS, and much wider and elaborate in scope, certain provisions of RoHS could be clarified or further elaborated upon in the light of REACH. For example, on the basis of REACH criteria could be added on the basis of which other hazardous substances in EEE could be further restricted under Article 4(3) of RoHS,<sup>91</sup> Using the REACH model, it should be clarified in the RoHS Directive that the EEE producer who requests an exemption under RoHS should be required to provide safety information on that particular use of substances in EEEs, as well as information on the available substitutes and their characteristics.

#### *RoHS, WEEE and the EuP Directive*

Directive 2005/32/EC<sup>92</sup> establishes a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 94/42/EEC and Directives 96/57/EC and 2000/55/EC of the European Parliament and of the Council ("EuP Directive").

On the basis of the EuP Directive, the Commission, on the basis of a comitology procedure, could adopt specific implementing measures setting specific eco-design requirements for energy-using products which may also be covered by the WEEE/RoHS Directives.

Whereas the Commission could select products also covered by the WEEE/RoHS Directives as candidates for implementing measures under the EuP Directive, there is a difference in approach between these Directives. The EuP Directive aims for improvement of the energy efficiency but only where this is possible without detriment to other environmental impacts in the life-cycle of the product and considering economic feasibility.

The RoHS Directive requires substitution of the banned substances for all EEE within its scope, regardless of cost-benefit considerations. Exemptions are only possible if substitution is technically or scientifically impracticable or whether the negative impacts of substitution outweigh the positive ones. As regards the hazardous substances the RoHS Directive therefore provides a more direct protection of the environment and human health.

There is a need to avoid ambiguity for those EEE potentially covered by all three Directives. With regard to substances banned by the RoHS Directive, ambiguity is avoided because the EuP Directive applies without prejudice to the RoHS Directive (see recital....). With regard to the WEEE Directive ambiguity could arise as concerns the general requirement of the WEEE Directive for Member States to encourage design for recycling (Article 4 of the WEEE Directive). However,

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<sup>91</sup> While RoHS simply states that further prohibitions can be decided based on available scientific evidence, and the substitution of those substances by more environment-friendly alternatives which ensure at least the same level of protection for consumers, without providing any definition of these criteria, REACH provides for a detailed risks identification for substances and their substitutes.

<sup>92</sup> OJ L 191, 22.7.2005, p.29

since this is general requirement, this requirement should be seen as addition to any specific design requirements developed under EuP.

#### *RoHS, WEEE and specific EU waste management legislation*

The WEEE and RoHS Directives apply without prejudice to Community legislation on safety and health requirements protecting all actors in contact with WEEE as well as specific Community waste management legislation, such as the Battery Directive<sup>93</sup> and the End-of Life Vehicles Directive.

The Commission has clarified the links between these pieces of legislation in several guidance documents. For example, with respect to restrictions on the use of hazardous substances, batteries are covered by the provisions of the Batteries Directive<sup>94</sup>; not by the RoHS Directive. Batteries are only covered by the requirements of the WEEE Directive in so far batteries are still included in the electrical or electronic equipment at the moment of discarding. Electrical and electronic equipment are covered by the End-of Life Vehicles Directive in so far they are specifically designed to be used in vehicles, otherwise they are covered by the WEEE and RoHS Directives.

#### *WEEE and general EU waste management legislation*

The WEEE Directive supplements general EU waste management legislation, such as the Waste Framework Directive,<sup>95</sup> the Landfill<sup>96</sup> and Incineration<sup>97</sup> Directive. It refers back to the general definitions set out in these Directives, for instance regarding the definition of waste and general waste management operations such as recovery and disposal<sup>98</sup> and to the general provisions of the Waste Shipment Regulation.<sup>99</sup>

#### *WEEE and the Regulation on ODS*

Regulation (EC) 2000/2037 requires that ODS contained in refrigeration, air-conditioning and heat pump equipment should be recovered for destruction, recycling or reclamation during the servicing and maintenance of equipment or before the dismantling or disposal of equipment. In principle, emissions from equipment covered by the WEEE directive should be avoided. However, recent assessments point at weak recycling rates. Improving the recovery of ODS contained in WEEE such as fridges and freezers could be achieved by strengthening the provisions contained in the Directive, notably by inserting a standard in the form of a minimum recovery rate for ODS contained in waste products and equipment and by enlarging the scope of WEEE to include larger installations, such as commercial refrigeration and air conditioning.

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<sup>93</sup> Recital 10 and Article 2 (2). It also required the 'old' Battery Directive to be revised in light of the WEEE Directive, recital 11.

<sup>94</sup> OJ L 266, 26.9.2006, p.1

<sup>95</sup> OJ L 114, 27.4.2006, p.9

<sup>96</sup> OJ L 182, 16.7.1999, p.1

<sup>97</sup> OJ L 332, 28.12.2000, p.91

<sup>98</sup> See Article 3 of the WEEE Directive.

<sup>99</sup> See Article 6 of the WEEE Directive.

## **Annex 10: Markets for secondary materials**

Markets of many recyclable materials are growing. WEEE items contain three main categories of materials: metals, glass and plastics.

Ferrous metals account for approximately 50% and non-ferrous metals for 5% of WEEE arising. There are stable markets for metal recycled from WEEE. Metals are easily extracted from WEEE and the quality of recycled metal is comparable to the quality of virgin metal.

Displays (particularly cathode ray tubes) account for the largest amount of glass in EEEs. The technology has however changed and flat panel displays gradually replace CRTs (cathode ray tubes) in monitors and televisions. The main market for recycled CRT glass is new CRT manufacturing. However as the CRT manufacturing is predicted to decline, other markets for the recycled glass from CRT screens will need to be identified. Potential markets can be identified, as for example bricks and tiles.

Plastics are estimated to compose 20-25% of the total weight of WEEE. Technologies exist to recycle plastics from WEEE, but there are difficulties with the environmental and cost efficient recovery of plastics due to the heterogeneity of polymers present. The market of recycled plastic therefore currently seems limited. Nevertheless, plastic recycling has high potential for energy saving (up to 80%) compared to primary production of plastics.<sup>100</sup>

The Lead Market initiative of the European Commission<sup>101</sup> highlighted the significant market potential in recycling, and that the barriers to market development need to be addressed. This initiative included the area of plastic recycling as a market with a large potential for improvement for recycling technologies. The Lead Market Initiative proposes an action plan listing policy instruments to foster recycling markets, help more and better recycling yielding environmental and economic gains. The actions also aim to further develop the plastic recycling market in the future.

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<sup>100</sup> A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale (Annex II) {COM(2007) 860 final SEC(2007) 1729}

<sup>101</sup> COM (2007)860 final

**Annex 11: EEE separately collected, treated and reported**

		EERA 2005		Recupel 2006				NVMP 2005	
Category		Recyc.	Recov.	Recyc.	Recov.	Incin.-e	Landfill	Recyc.	Recov.
	LHHA	75-90%	80-91%	84.3%	84.5%	0.1%	14.7%	77.0%	79.6%
	C&F	80-95%	90-98%	77.3%	90.7%	1.0%	8.3%	79.4%	93.0%
	SHHA	55-80%	65-85%	79.7%	83.8%	0.9%	15.4%	67.3%	72.7%
	IT ex CRT	65-80%	70-90%	79.7%	83.8%	0.9%	15.4%	N.A.	
	IT CRT	65-96%	80-100%	84.3%	86.5%	3.6%	9.3%		
	CE ex CRT	65-80%	70-85%	79.7%	83.8%	0.9%	15.4%	67.3%	72.7%
	CE CRT	70-96%	75-100%	84.3%	86.5%	3.6%	9.3%	83.7%	93.4%
C	IT/ CE FDP	N.A.							
	Lamps	70-80%	74-80%	93.3%	0.0%	0.0%	6.7%	93.2%	93.2%
	Tools	40-70%	45-85%	79.7%	83.8%	0.9%	15.4%	67.3%	72.7%
	Toys	50-70%	54-70%	79.7%	83.8%	0.9%	15.4%	67.3%	72.7%
	Med.	70-90%	80-90%	79.7%	83.8%	0.9%	15.4%	67.3%	72.7%
	M&C	65-95%	65-95%	79.7%	83.8%	0.9%	15.4%	67.3%	72.7%
	Aut.Disp.	70-80%	80-85%	84.3%	84.5%	0.1%	14.7%	76.7%	80.5%

**Table: Recycling and recovery percentages achieved by the Belgian (Recupel) and Dutch (NVMP) producer responsibility organisations, compared to figures from EERA, the European Electronics Recycling Association.**

## **Annex 12: Options rejected during the review and in particular after the stakeholder consultation**

### Options on collection targets:

- Fixed mandatory collection target for all Member States or differentiated per Member State expressed in weight per inhabitant per year to be achieved by a certain date; discarded because there was rather no support for a fixed collection target unless it was differentiated per Member State. This differentiation would be able to respond to the variations of consumption per Member State, however, seen the incomplete reporting by MS and the unpredictability of future consumption, it would not allow flexibility.
- An obligatory give-back by collection points (local municipalities, retailers, distributors, brokers, traders, recycling shops,...) to the producer responsibility organisations (PRO's) or to individual schemes. This option was mainly supported by producers who do experience that not all WEEE is returning via the schemes; this option was rather not supported by municipalities as they prefer to get direct revenues from the collected fractions to compensate the costs for collection that is not compensated by producers. As this situation can be solved between the operators on the market, it is no longer considered as an option.

### Options on recycling / recovery targets:

- Material based targets for all WEEE or per product category; this option got only support if material based targets would have been developed on top of the existing targets per category; most stakeholders rather linked this option to the necessary treatment operations that would allow achieving a high rate of material recovery as in particular for CRT glass and plastics. The option has further been discarded because such a target needs to be set with care as many parameters influence collection and hence the composition of the collected fraction on which such a material target is based.
- Stimulation of outlet market for recycled and recovered products, in particular for encouraging high level of material re-application. Few reactions on this option in the consultation and the issue that such stimulation would mainly happen in relation to re-application in products, it has been discarded in the review of a piece of waste legislation.

### Options on reuse targets:

- Set a target for reuse of whole appliances to be achieved by a certain date; this option was supported by the reuse sector. As the reuse market is rather limited to a couple of equipments rather than to all categories and the limited availability of data to set precise and realistic targets, this option has been discarded. Stimulation for reuse is worked out via another option.
- Give obligatory access for the reuse sector / organisations to collected WEEE to select that equipment that could meet the criteria for being reused, refurbished or repaired. Rather than giving obligatory access, the development of reuse criteria was supported by stakeholders. Such criteria have been developed under the Basel Convention for mobile phones and are in development for computing equipment. Seen the link with shipments of waste, the option to develop criteria under the WEEE directive was discarded.

#### Options related to clarification of the scope:

- Clarifying the scope, by formalising criteria used in the document [http://ec.europa.eu/environment/waste/weee/pdf/faq\\_weee.pdf](http://ec.europa.eu/environment/waste/weee/pdf/faq_weee.pdf) on Frequently Asked Questions (FAQ); this option was largely supported by stakeholders but was discarded because this option was considered more appropriate for legally non-binding measures...

Options related to the width of the scope (inclusion, exclusion and maximising scope) were all discarded as most stakeholders did not express an opinion during the consultation and as the current scope was felt appropriate; additionally, the option of exclusion would be tackled under the option on clarification of the scope.

#### Options related to the producer responsibility provisions:

- Stimulate eco-design through defining targets for reusability, recyclability and recoverability of electrical and electronic equipment. Little support was expressed by stakeholders on this option. Additionally, to set such targets, much investigation would be needed to have appropriate measuring methods to calculate the targets. Whereas this was realised for vehicles in the type approval Directive, a multitude of equipments under this Directive would render the measure none proportionate and was therefore discarded.

Options related to treatment requirements (introduction of standards, define "remove" and modify the entries in Annex II) were all discarded as they could be tackled via a comitology decision. Such decision is in preparation.

An option to introduce a de minimis rule was suggested in the stakeholder consultation. This de minimis rule could be included to exempt small producers from certain requirements and in particular of the financing. A draw back of this measure is that it would factually create free-riders and makes it more difficult to enforce. As the reduction benefits of such a de minimis provision would occur at national level, it is not possible at this moment to estimate them. The current Directive however already gives the Member States flexibility to use elements of a de minimis approach in the national implementation as long as this would be in line the objectives of the Directive such as full financial producer responsibility. Member States are for instance allowed to report on reasoned estimates. They could therefore wave the request for detailed reporting below a certain size of company; and Member States could offer drastically simplified registration for very small companies. Therefore the option is discarded.

### **Annex 13: Detailed cost calculation of the inter-operability option**

Cost impacts have been calculated on the basis of costs associated with various electronic databases associated with other regulatory measures (Ökopol 2007).

It is assumed that the set-up costs of a formalised (electronic) network of national bodies which allow for communication about the registration of producers and the amount of EEE put on the market occur in year 0 and the annual operating costs are incurred from years 1 to 12. Discounting the annual costs of €40,000 at 4% results in total present value costs of €375,400 for operating the network at a European level over 12 years. Combining these with the potential set-up costs suggests that the total present value costs of establishing and operating the network are in the range<sup>102</sup> of €495,000 to €853,000. These costs may be incurred by the Commission (as it is the case for comparable electronic databases, Ökopol 2007).

On top of the formalised electronic network, an EU clearing house has to deal with transfer of money and of obligations. The same assumption of time span (12 years) is taken to spread the set-up costs of the network. Discounting the annual costs of €0.8 million to €3.25 million at 4% over 12 years results in total present value costs of €7.1 million to €30.5 million for operating the network at a European level. Combining these with the potential set-up costs indicates that the total present value costs to the Commission are in the range of €15.6 million to €65.5 million, over 12 years. However, it should be noted that the Excise Movement and Control System<sup>103</sup> is being developed to monitor the movement of products across borders; there may be the potential for a WEEE network to utilise this system in some way, thereby reducing the set-up and, potentially, the operational costs (Ökopol 2007).

An EU clearing house will require an increase in activities by Member States to exchange information with other Member States on distance sellers and the export of second-hand goods. There is currently no information on the amount of EEE sold in this way. However, assuming that it results in an increase of 10% in the work of Member States, this could incur additional administrative costs of €1.83 million per year, equal to a total present value of €7 million over 12 years (Ökopol 2007).

However, due to reduced registration at Member State level, reduced registration renewals and reduced reporting for industry, cost savings can be realised. The annual costs and the total present values for national competent authorities and businesses being discounted at 4% over 12 years, indicate that this option could result in cost savings of €288 million to €410 million over 12 years.

It is therefore expected that this option has positive effects on intra-EU competition by providing a more level playing field amongst various stakeholders (particularly for distance selling) and aiding cross-border enforcement of the WEEE Directive. These benefits cannot be quantified because no data are available on the negative impacts of the existing system, due to the short time since implementation. There may be increased costs for distance sellers due to the requirement to register in each country they sell to, which was not previously the case. However, it is not known how many distance sellers this would apply to. This will enforce the 'national' approach across all countries, retaining the role of importers (operating within the EU) as the 'producer' and therefore limiting the extent to which the costs of collection and treatment may influence the design of EEE.

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<sup>102</sup> The range corresponds with the values found for different benchmarks

<sup>103</sup> See [http://ec.europa.eu/taxation\\_customs/common/faq/faq\\_2898\\_en.htm](http://ec.europa.eu/taxation_customs/common/faq/faq_2898_en.htm)

## Impact on administrative burden

Finally, for the setting up a National Register or Clearing House, a considerable percentage of stakeholders experienced a burden in carrying out this activity, especially when considering that more than 46% do not have to deal with this activity. 93% of those who ticked an answer consider that the activity is needed, even if has to be carried out by competent bodies.

When looking at availability of resources the great majority of stakeholders answered that they have enough resources. This was mainly because they are not carrying out this activity.

The following issues have been identified as crucial:

- (1) **Frequency:** This impacts on the burden for reporting (the higher the frequency, the higher the number of hours required to report and, consequently, higher economic and administrative burdens). On the other hand frequency of reporting could increase the control of the number of free-riders (a higher frequency provides more control on free-riders in the market, especially producers that might enter and leave a market in less than one year). When the amounts put on the market are used to define financing obligations for producers or compliance schemes, stakeholders have argued that, for some markets, fluctuations could be very high and low frequency of reporting (annual) could be in-sufficient to precisely allocate obligations,
- (2) **Basis:** The **weight** of appliances put on the market is used in most Registers (only a couple of them are asking for Units). The main problem is lack of consistency in weight definition (i.e. including or excluding batteries, cable, accessories),
- (3) **Grouping:** The level of detail in reporting can vary because of the information that is needed (e.g. Ireland, related to the Visible Fee sub-categories); other kind of grouping could depend on separate collection clusters (e.g. Austria),
- (4) **Split B2B/B2C:** The split of B2B/B2C in reporting varies from country to country. The needed of split B2B/B2C appliances put on market and, in particular the definition of B2B/B2C have a great impact on the financing aspects of WEEE; especially when no defined rules or criteria are in place to differentiate appliance this could cause potential asymmetry in the market due to different financing mechanism as defined by article 8 and 9 of the WEEE Directive. In particular, when different obligations or options are in place in respect of:

As regards the costs related to the preferred option, the following table shows the annual/one-off costs and total present value costs per stakeholders:

Stakeholder	Costs		Savings (Benefits)	
	Annual (or one-off) (€ million)	Total Present Value (discounted at 4% over Years 1-12) (€ million)	Annual (€ million)	Total Present Value (discounted at 4% over Years 1-12) (€ million)
Commission - set-up of Network (one-off)	(8.5 - 35.0)	8.5 - 35.0	-	-
Commission Operating costs of Network	0.8 - 3.3	7.1 - 30.5	-	-
MS - Operating Costs of Network	1.2	11.2	-	-
MS - Reduced Registrations	-	-	14.9 - 17.1	139.5 - 160.9
Industry - Reduced Registration Renewals	-	-	4.6 - 5.3	43.4 - 50.1
Industry - Reduced Reporting	-	-	19.4 - 24.1	182.4 - 225.8
Total	2.0 - 4.5	26.8 - 76.7	38.9 - 46.5	365.3 - 436.9
Net Present Value (€ million)				288.6 - 410.1

For manufacturers, it relates to reduced costs associated with reduced registration and reporting requirements for manufacturers active in more than one Member State. However, some may take on activities currently undertaken by importers, distributors, thereby increasing costs. Savings may be smaller for SMEs due to sales in fewer countries.

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## Glossary of terms

B2B.....	Business to Business
B2C.....	Business to Consumer(s)
BAN.....	Basel Action Network
CE.....	Consumer electronics
CE ex CRT...	Consumer electronics excluding CRT screens
CE CRT.....	CRT from consumer electronics
CE FDP.....	FDP from consumer electronics
C&F.....	Cooling and Freezing
CFC.....	Chlorofluorocarbons
CRT	Cathode Ray Tube
EEE	Electrical and Electronic Equipment
EU	European Union
EU12	The 12 States of the EU that became Member after 1 May 2004
EU15	The 15 States of the EU Member before 1 May 2004
EuP	Energy using Products
FDP	Flat display panels
HCFC	Hydro chlorofluorocarbons
LCD	Liquid Crystal Display
LHHA	Large Household appliances
LHHA	Small Large Household appliances (smaller items)
MSW	Municipal Solid Waste
ODS	Ozone Depleting Substances
PBB	Polybrominated Biphenyls
PBDE	Polybrominated Diphenyl Ethers
PCB	Polychlorinated Biphenyls

POM Put on the market

PRO Producer Responsibility Organisation

REACH Registration, Evaluation, Authorisation and restriction of Chemicals

RoHS Restriction on the use of Hazardous Substances

SHA Small Household Appliances

IT ex CRT IT equipment excluding CRT screens

IT CRT CRT from IT equipment

IT FDP FDP from IT equipment

SME Small and Medium Sized Enterprise

WEEE Waste Electrical and Electronic Equipment