

Turkey: Balancing Development, Sector Competitiveness, and Challenges of Complying with the EU Environmental Aquis

Analysis of Household Appliances Sector and Implementation of Waste Electrical and Electronic Equipment Directive (2002/96/EC)

Sector Note

Sustainable Development Department

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Abbreviation list

AEGP-ECID	Association of Electronic Good Products
BERR	United Kingdom Department for Business Enterprise and Regulatory Reform (disbanded as of June 2009 with creation of UK Department for Business, Innovation and Skills)
B2B	Business to business
B2C	Business to consumer
BEYSAD	Association of Turkish White Goods Producers
C&F	Cooling and freezing equipment
CFCs	Chlorofluorocarbons
CRT/LCD	Cathode ray tube (Electronic display equipment)
Cr-Cd	Chrome – Cadmium alloys
GNP	Gross net product
EEE	Electrical and electronic equipment
ESES DPL	Environmental Sustainability and Energy Sector Development Policy Loan
EU	European Union
EPR	Extended producers responsibility
Euro/€	Monetary unit/currency of the European Union
FPD	Flat panel display
IPPC	Integrated pollution prevention and control
IPR	Individual producer responsibility
Kg	Kilogram
LCD	Liquid crystal display (Electronic display equipment)
LHHA	Large household appliances
MOD	Ministry of Development

MOEF	Ministry of Environment and Forestry
MOEU	Ministry of Environment and Urbanization
MOIT	Ministry of Industry and Trade
MOSIT	Ministry of Science, Industry and Technology
Ni	Nickel
NVMP	Netherlands Foundation for the Disposal of Metal and Electrotechnical Products
PbO	Lead oxide
PCS	Producer Compliance Scheme
PP	Polluter pays
REC	Regional Environmental Center
R&D	Research and development
RoHS	EU Directive on Restriction of Hazardous Substances
SHHA	Small household appliances
SME	Small and medium enterprises
SPO	State Planning Organization
TIS	Turkish Institute of Standards
TOBB	The Union of Chambers and Commodity Exchanges of Turkey
TÜBİTAK-MRC	Scientific and Technological Research Center for Turkey, Marmara Research Center
TURKBESD	Association of Turkish White Goods Producers
UNEP/MAP	United Nations Environmental Program/ Mediterranean Action Plan
UNU	United Nations University
US EPA	United States Environmental Protection Agency
VOC	Volatile organic compounds
WEEE	Waste from electrical and electronic equipment
YTL	New Turkish Lira

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Executive Summary

Turkey's macroeconomic policies and strategies consider industrial growth as a major source of economic growth. However, industries, such as energy, iron and steel, cement, chemicals and construction, are energy intensive and contribute to air, water and soil pollution. Similarly, key sectors, such as automobile, electronics and household appliances, generate waste streams that could cause irreversible and hazardous effects on human health and environment if not managed properly. The experience of EU Member States shows that sector issues associated with harmonization of national environmental regulations with the EU Environmental Acquis are often complex, challenging and costly⁴, and causing implementation barriers to industrial competitiveness. The new regulatory requirements in line with EU Environmental Acquis will further affect producers and importers in sectors where significant environmental impacts appear during product use or at the end of product life

As part of the effort to harmonize its legislation with the EU Environmental Acquis, Turkey is intensively engaged in strengthening environmental management policies. Key steps toward such improvements include the integration of environmental management systems in national economic development. Consequently, the private sector is under increasing pressure from regulators and international trading partners to strengthen compliance with environmental regulations. Recently, the private sector is stepping up its interest in win-win opportunities like water conservation and energy efficiency for enhanced environmental performance. The public sector role in putting policy incentives into place geared toward innovation, technology improvements and cost effective investments is key. Hence the need for decision makers to assess all ensuing issues.

This sector note reviews policy and compliance issues in the electrical household appliances sector concerning implementation of the 2002/96/EC Directive on Waste from Electrical and Electronic Equipment (WEEE Directive). It aims to contribute to the knowledge and capacity of public and private sector stakeholders to formulate WEEE implementation targets in line with sector development goals and with environmental policies concerning WEEE and to assist the Government of Turkey in promoting environmental sustainability in a manner aligned with EU Environmental Acquis. The methodology used for the analysis draws on the Bank's experience in analyzing the linkages among industrial growth and environmental compliance and public policies promoting smart industrial growth. It reviews relevant international experiences in order to identify key factors affecting the implementation of the WEEE Directive and extract those that are relevant to Turkey.

Waste Electrical and Electronic Equipment Directive (2002/96/EC)

The WEEE Directive⁵ sets collection, recycling and recovery targets for electrical goods and is part of the EU legislative initiative to solve the problem of huge amounts of toxic e-waste. The

⁴ Turkey will incur substantial costs in implementing actions under the EU Environmental Acquis estimated in the range of €28–59 billion⁴ over the 17 year period of implementation.

⁵ Founded upon the extended producer's responsibility principle, this directive makes producers and importers of electrical and electronic responsible for the waste generated by the products they introduce into markets. The directive provides guidance on the recycling targets, which is currently being revised

legislation also aims to conserve landfill and to support sustainable development by encouraging recycling practices and minimize the opportunities for illegal WEEE export. The need for such a directive in view of environmental policy priorities include public health protection, energy efficiency, effective toxicity control and air emissions reduction relevant to ozone depletion and global warming. Energy savings from recycling metals and plastics in WEEE is significant. For instance, using recycled copper could result in 85 percent energy savings per unit of production and for plastics more than 80 percent.

Harmonization with the provisions of the WEEE Directive will affect several sectors, including household appliances, electronic and battery-operated equipment, and electrical machinery. Based upon the extended producer's responsibility (EPR) and polluter pays (PP) principles, the Directive is one of the key policy tools aiming to reduce the environmental impacts of WEEE by making the producers responsible for the management of their products at the end-of-life stage.⁶ Under the WEEE Directive, the EU requires manufacturers and/or distributors of electronic and electrical equipment to manage and pay for the collection and further handling of WEEE products, as well as provide WEEE-related information to their customers. Producers must register and mark products and components in individual countries that fall under the WEEE Directive and periodically report to government agencies on collection, disassembly and proper disposal of equipment at its end of life.

Implementation experience from EU and other Countries

There are significant differences in the organization, effectiveness and efficiency of the WEEE practices adopted by different countries. Data available indicates that factors such as availability of collection points, geographical location, culture, waste collection organization and financial mechanisms influence treatment performance.

The EU member states experience related to implementation of WEEE directive at national level varies concerning issues such as *producer responsibility*, *harmonization* (e.g., registration process, reporting procedures); *standardization* (e.g., labeling, standard definition for weight, standards for effective recycling); and *monitoring of collection, treatment and recovery* (e.g., specified amounts to be collected, enforcement of legislation on waste shipments).

In Sweden, Denmark, Belgium and the Netherlands, national regulations and organized management schemes for WEEE were already established in the form of single collective compliance schemes used nationally prior to the adoption of WEEE Directive. Transposition, therefore, has been relatively straightforward and achieved through changes on issues such as individual producer responsibilities, product labeling, financial guarantees needed to market a product, and collection and recycling targets. Other countries without any previous WEEE management systems or culture, developing the necessary new legal and operational infrastructure to comply with the directive posed a larger challenge due to different approaches employed, such as giving more weight to using market-based approaches and having multiple providers of takeback systems.

⁶ The other policy tool that is supporting the same environmental objective is the complementary Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

In EU member states setting up implementation targets was not always straightforward. Weight-based collection targets of 4 kg per inhabitant were easily met by EU member states with waste collection and recycling schemes in operation for a longer period.⁷ For some Central and Eastern member states, however, setting a target was more challenging. Countries that are front runners, like Sweden, collect as much as 17 kg/person and have recycling rates of 80 to 90 percent, including energy recovery; while others have very low levels, such as Poland with 1.0 kg/person; Romania 1.5.kg/person (2010); and Italy 2.6 kg/person. Introducing a uniform collection target for all product categories could lead to low collection of certain products. To mitigate this concern EU is developing create standards for the treatment of different WEEE categories.⁸

In EU WEEE collection is largely organized through a *national singular collective system* and/or *competitive clearinghouse system*. It is believed that each system has its own merits thus there is no clear winner between these systems.

EU member countries use different options for the fee structure that are usually based on the (i) actual costs of recycling; (ii) projected costs of recycling per product category, and (iii) cross subsidization between product groups to support recycling in another. The collection and administrative burden is proportional to the increased complexity of the fee structure. Fees are usually allocated based on current market share either in the form of fees on products sold or allocation of actual costs to products placed on the market. Sorting by brands is seen as highly complex and costly and is not exercised. Most producers consider a mandatory visible⁹ fee option as an important buffer against potential negative impacts.

In EU development of appropriate infrastructure for treatment of WEEE in accordance with the requirements of the WEEE Directive was gradual and was associated with significant investment cost. By mid-2007, sufficient infrastructure capacity was developed in most EU-15 member states. At the same time member states from Central and Eastern Europe were lagging behind which implied that a regional approach could be considered to address infrastructure imbalance. The economic burden associated with Directive's technical cost for takeback and treatment of WEEE arising in 2005, is estimated, excluding start-up costs, from €0.76 billion and is projected to grow to €3.0 billion in 2020. These estimates are based on the maximum possible collection percentages of 75 percent for large and 60 percent for smaller appliances. The total costs include mainly guarantees, provisions and, to a lesser extent, overhead and administrative burden are provided in Table 2.

Collection and treatment of WEEE is regulated in other parts of the world, most notably in Japan and in some states of the US, China and Korea. Other countries like Thailand are in the process of adopting WEEE legislation. Japan represents an important case reviewed in this report and is considered as the front runner in use of the EPR that gave impetus to product design changes. Despite the fact that the Japan legislation does not set any collection targets, in 2007 the system that deals with large household appliances recycled around 3.7 kg/capita of WEEE.

⁷ Solving the E-Waste Problem Initiative White Paper (March 2010)

⁸ J.O. Eriksson (2011) Personal communication with Managing Director of El-Kretsen.

⁹ In visible fee option, the producers are allowed to communicate the amount charged for WEEE compliance separately.

Turkey's Electrical Household Appliances Sector and WEEE Implementation Challenges

Turkey's electrical household appliances industry is a significant contributor to the national economy with a business volume of \$10 billion and a significant market share both domestically and internationally. Sixty-five percent of its production is exported with 80 percent of all exports going to the European markets. The sector employs directly and indirectly about 2.5–3 million people. On average, the value added in the white goods sector is in the range of 55 to 60 percent, and the sector contributes around \$1 billion in indirect taxes. In 2008, revenues in the sector amounted to \$8 billion, and exports reached \$3.4 billion.¹⁰ In 2009, the Turkish electronics sector grew substantially, reaching a production volume of about \$9.5 billion and registering export revenues of \$4.9 billion and imports of \$12.2 billion.

In 2008, the global sales of white goods trade reached \$61.6 billion. Globally, following China, Germany and Italy, Turkey steadily occupies the fourth place with a global market share of 4.3 percent. Sector exports have grown significantly over the years, and according to the latest figures exports of white goods reached around \$2.23 billion in 2010 – which is lower than in 2008, but this was due to softer demand as a consequence of the economic crisis.¹¹ In 2009, the exports of the sector accounted for 5 percent of Turkey's export volume.¹² The sector aims to reach an export volume close to \$10 billion by 2023.¹³

There are a number of conditions specific to Turkey that pose considerable implementation challenges and therefore need to be highlighted. In Turkey, WEEE penetration, despite growing trends, still remains comparatively lower than the EU average. This is linked to country's relatively low income levels and living standards. In addition, the service life of electrical and electronic products, similar to other durables, is much longer than in the EU countries.

Notwithstanding the considerable waste management improvements and significant investments, in recent years, recycling and recovery systems are in their infancy to effectively meet the requirements of EU waste directives. Waste is usually collected with no or insufficient source separation, proper handling of collected waste is weak. According to the Turkish Statistical Institute out of 3,225 municipalities, in 2008 only 37 had a sanitary landfill in place. While 24.36 million tons¹⁴ of municipal solid waste was collected in 2008 (corresponding to a per-capita waste production of 1.15 kg/day), only around 2.1 million tons¹⁵ were recovered and recycled in 2007. Infrastructure for handling WEEE is even less developed. Out of the estimated WEEE arising of around 368,000¹⁶ tons, only 5,000¹⁷ tons were handled by licensed firms in 2010

Scrap sector plays an important role in the effective collection of various waste streams, including WEEE, and the extensive revalorization of useful material streams. It is estimated that the scrap sector collects and treats 99 percent of the WEEE generated in Turkey. The sector includes collectors and processors which are significant employers, particularly in the Ankara

¹⁰ Ibid.

¹¹ General Secretariat of Istanbul Mineral and Metals Exporters Association–IMMIB (2001).

¹² Industry and Trade (2011) White Goods Sector Report. General Directorate of Industry

¹³ Ministry of Industry and Trade (2011) General Assessment of Turkish Industry Sectors 2010.

¹⁴ Turkish Statistics Institute (2010) Municipal Waste Statistics, 2008. Newsletter No:50, dated 25.3.2010.

¹⁵ MoEF (2010) Packaging and packaging waste statistics (2007). Packaging newsletter, No: 4, dated 26.2.2010.

¹⁶ While this value reflects our estimates, the REC study estimates the WEEE arising between 350,000 to 550,000

¹⁷ The REC study states this number is 10,000 tons

region where more than 10,000 people are directly engaged with collection and treatment of different waste streams. It is estimated that the livelihoods of 1.5 to 2 million¹⁸ people are based on the scrap sector. Nevertheless, the majority of scrap processors is known to operate in a way that harms both the environment and workers' health and is believed to lack funds for environmental and safety improvements. A great deal of their operations is believed to be outside the formal system, with limited accounting.

The white goods sector has realized significant improvements in its economic and environmental performance. Resource requirements and emissions associated with both production processes and product use have been reduced significantly in the last two decades. Although the sector also fulfills the requirements of Directive 2002/96/EC in the European markets, it has made little progress regarding the management of its products at the end of their service life in the domestic market.

As it is commonly encountered with the introduction of a new policy, the implementation of the WEEE Directive in Turkey is likely to face a number of challenges. A six year transition period established in the draft WEEE regulation can be used to fill in the information gaps and make necessary adjustments before the directive reaches its full effect. Major implementation challenges which Turkey is likely to experience are similar to those of the new EU member states. These include the following:

- ***Impact on firms' relative profitability and sales, and hence on their competitiveness could be significant in domestic market.*** The study measures the impact of compliance with WEEE Directive by assessing the price elasticity of demand, measured by the relative demand response to a price change of the product. Depending on the product value, the impact on sales value could vary. For instance if the cost of the white good ranges from €500–2000/unit, the above results would imply an impact range of €15–62 million for a price elasticity of 0.10 and €56–224 million for a price elasticity of 0.36. The above implications on firm competitiveness may be severe—especially for small or medium firms that operate on thin profit margins.
- ***Large demographic and economic differences could lead to significant lack of uniformity in applying the WEEE Directive.*** Heterogeneity across Turkey could lead to insufficient WEEE arisings in the eastern and southeastern parts of the country, where population is sparse and income levels are lower, and thus to make collection cost-ineffective.
- ***Developing realistic collection targets could be challenging and will require time.*** Without a comprehensive inventory of WEEE, based on specific geographic characteristic and collection costs and benefits, adopting a uniform national target may result in emphasis placed only on those regions with high WEEE concentration—typically the Marmara region and around larger and more prosperous cities like Ankara, Izmir, Adana, Antalya, Gaziantep, and Kayseri—while leaving environmentally unwanted practices intact in other parts of the country.

¹⁸ Cinkaya, İ. Chairman of Turkish Scrap Merchants Association. Personal communication. 14 June 2011.

The way forward

Currently, Turkey has an extensive system that handles electronic and electrical equipment at the end of service. However, as the system is predominantly informal, information regarding qualitative and quantitative aspects of WEEE generation, collection, treatment, recycling, recovery and disposal is scarce. In the absence of reliable information, it is not possible to assess the extent of adverse environmental impacts or the social and economic implications of the existing situation. It is known, however, that in line with global trends WEEE quantities would be increasing. Certain WEEE categories—at the minimum fridges and other cooling equipment, CRTs, and lighting equipment—are handled in ways that damage the environment and pose a risk for human health. Besides environmental concerns, the economic and social potential of WEEE management is far too significant to be left in informal hands. Consequently developing and implementing WEEE policy in line with 2002/96/EC that aims to assure safe and accountable management of WEEE and intends to stimulate innovation would be highly positive. At the same time, ensuring environmental protection without compromising the competitive position of sectors that are important for the development of the country poses a challenge. Consumer awareness is key for managing WEEE in a safe and responsible manner and for changing consumer's behavior and prevent inappropriate dumping or transfer of WEEE.

As the body responsible for the transposition of the WEEE Directive the MoEU has shown remarkable leadership in creating a process that is inclusive, analytical, and facilitates dialogue and consensus building. Although the path followed by the MoEU had some adverse effect of slowing down progress, the emerging output -- the draft Regulation from May 2011, evolves in a promising direction where a variety of tools -- regulatory, market based, or information based, would be in use. More specifically, diverse set of actors will be required to meet certain regulatory requirements to enter the WEEE playing field, but once on the field, they will be subject to market forces giving them incentives to innovate and offer better or lower cost alternatives. The regulation would also facilitate the flow of information among key parties, such as obliging producers to share information about their products with recycling companies or obliging producers, municipalities and distributors to inform the general public. In parallel, it is promising that additional fiscal information is available to the actors in the WEEE field from organizations like TUBITAK, Ministry of Science, Industry and Technology, and KOSGEB. In addition prior to the introduction of the legislation, the dynamics allocating physical and financial responsibilities have to be thought through properly. The interaction of the WEEE legislation with other regulations, such as those related to hazardous substances, transboundary movement of waste or health and safety markings may need to be clarified.

It is noteworthy that the draft regulation leaves it to the market to decide tariffs that will govern transactions among key parties. However, given that there is little information on the cost of treating WEEE in an environmentally responsible manner, it might be sensible if the government takes the lead in setting initial tariff levels based on investigation of the cost of appropriate handling of WEEE. The details of the directive need to be clearly communicated by the legislation, leaving as little grey area as possible for interpretation. The experiences with the implementation of packaging regulations serve as a good example of implementation problems and possible failures.

The draft regulation rightly sets gradually increasing targets. Although the analysis does not aim to judge whether the targets¹⁹ are realistic or sufficiently demanding, it supports the approach taken by the Government. Furthermore, EU experience shows that there is a need for a proper preparation stage, which includes identifying the waste arising, collection potentials and necessary treatment standards for product groups. In particular, pilot studies for collection could play an important role. The six year transition period in the draft regulation could be used to fill in the information gaps and make necessary adjustments before the legislation reaches its full effect.

Turkey could benefit from a registration system of WEEE which properly determines the details of registration plans. The MoEU can best serve this function or it can delegate it to a different body, reporting directly to the Ministry. The registration costs in Turkey are estimated to be in the range of €3–5 million per annum²⁰ which could financially sustain a registration system.

Cost of compliance of the sector with WEEE Directive would depend on a number of factors, including product category, collection efficiency and treatment complexity, economic value of recyclable materials and extent of administrative costs. As incomes rise in urban and rural areas, the demand for new products is also expected to rise. The Sector Note estimates that total WEEE arisings would reach nearly 583,000 tons by 2018, a number that closely reflects estimates from other studies. If per capita WEEE reaches 7.3 kg/person by 2018 and, and if the current draft legislation of 4 kg/person were effective, this would imply a collection rate of approximately 55 percent. This amount is twice as high as the collection rates commonly achieved in most European countries. Total costs of recycling *all* WEEE for 2012 is estimated to be approximately €194 million with the highest costs in the product areas of cooling and freezing, large household appliances and those concerning CRTs. This implies that the total cost of compliance with the 0.2 kg/capita target (2012) is about €6.7 million, and approximately reaching €137–139 million to comply with the 4 kg/capita target by 2018 (Table 13). Compliance costs are expected to initially rise over time, as consumers generate greater WEEE quantities and collection rates begin to rise.

Stimulating recovery and introducing recycling technologies would be a priority area for policy consideration. Setting up a national WEEE recycling R&D facility or a "center of excellence" as in Japan and the UK, will encourage innovative R&D and technology transfer. Policies that encourage companies to "brand" recycling technologies to reduce energy consumption and secure a long-term supply based on recovered materials would help companies to mitigate the cost imposed by WEEE regulation. Education is a key area both to enlighten the younger generation about fundamental recycling and to instruct the older generation on the use of recovered materials as sustainable products.

International experience suggests that countries that get the collection and recycling system up and running before committing themselves to performance and targets face less implementation hurdles. Legislators in EU member states have spent considerable time studying the legal and

¹⁹ The draft regulation foresees gradual implementation to start with 0.2 kg/capita in 2012 and reaching to a final target of 4 kg/capita in 2018.

²⁰ D. Temel (2009) WEEE Directive and Turkey. Problems Facing the Implementation of 2002/96/EC on WEEE in Turkey.

operational approach in those countries with established WEEE schemes, only to prove that it is of key importance to build systems that meet local specifics of culture, geography and industry, and that take into account existing practices of waste collection.

1. Introduction

Background

1. The World Bank is supporting the Government of Turkey in implementing its sustainable development agenda under the Environmental Sustainability and Energy Sector Development Policy Loan (ESES DPL) series. Specifically, the ESES DPL series supports actions that are among the most critical for Turkey's transposition²¹ of its environmental legislation with the EU Environmental Acquis, such as the government's adoption of an EU Integrated Environmental Approximation Strategy (2007–2023). The World Bank is providing further support to the Government for harmonization of the environmental legislation with EU Acquis via nonlending technical assistance, focusing on environmental sustainability. The programmatic approach is used to provide flexibility in delivering sound policy advice tailored to the Government of Turkey's needs.

2. This sector analysis reviews the challenges of balancing development, industrial sector competitiveness, and implementation requirements of EU Environmental legislation while sustaining economic growth. The outputs of this assistance aim to (a) engage environmental regulators and the private sector in discussing specific challenges on the road to full compliance with the EU Environmental Acquis and (b) examine sector issues and, where feasible, compliance costs for selected manufacturing sectors. The analysis includes a review of the policy foundations for steady compliance while sustaining industrial competitiveness and business decisions that contribute to meeting the national development goals. It aims to provide public and private sector stakeholders with a set of policy options and incentives that will stimulate industrial compliance.

3. Turkey's macroeconomic policies and strategies consider industrial growth as a major source of economic growth. However, industries, such as energy, iron and steel, cement, chemicals and construction, are energy intensive and contribute to air, water and soil pollution. Similarly, other key sectors, such as automobile, electronics and household appliances, generate waste streams that could cause irreversible and hazardous effects on human health and environment if not managed properly. The experience of EU member states shows that sector issues associated with harmonization of national environmental regulations with the EU Environmental Acquis are often complex and challenging. These include implementation schedules, implementation barriers and industrial competitiveness. Decision makers need to assess all of these issues to put policy incentives into place geared toward innovation, technology improvements and cost effective investments.

4. As part of the effort to harmonize its legislation with the EU Environmental Acquis, Turkey is intensively engaged in strengthening environmental management policies. The private sector is under increasing pressure from regulators and international trading partners to strengthen compliance with environmental regulations. Enterprises from the cement, chemical and automobile industries are already engaged in cleaner production initiatives coordinated by business associations. The private sector is stepping up its interest in win-win opportunities like

²¹ Transposition is the aligning of country legislation with the EU Directive.

water conservation and energy efficiency for enhanced environmental performance. For instance, chemical firms are implementing the Responsible Care Program and the Turkish Institute of Standards (TIS) requirements to address waste generation and air and water pollution and to improve overall environmental performance. Additionally new regulatory requirements in line with EU Environmental Acquis will further affect producers and importers in sectors where significant environmental impacts appear during product use or at the end of product life.

5. Turkey will incur substantial costs in implementing actions under the EU Environmental Acquis estimated in the range of €28–59 billion²² over the 17 year period of implementation. This in itself presents a sizable challenge for the manufacturing sector with approximately 280,000 enterprises accounting for 21 percent of GNP and representing 94 percent of Turkey's exports (TURKSTAT, 2005). It is expected that about €13 billion will be required by private sector over this period²³ to comply with the implementation requirements of the Integrated Pollution Prevention and Control (IPPC)²⁴ Directive, the Volatile Organic Compounds (VOC) Directive, and the Seveso Directive. The cost of implementing all EU Directives related to chemical management will be in the same order of magnitude and will affect small and medium manufacturing enterprises.

6. Harmonization with the provisions of the waste electrical and electronic equipment (WEEE) Directive (2002/96/EC)²⁵ will affect several sectors, including household appliances, electronic and battery-operated equipment, and electrical machinery. The extended producer's responsibility (EPR) principle, which is at the center of the WEEE Directive, implies companies to introduce design changes to improve product recoverability, reusability and recyclability while offering environmental benefits. The WEEE Directive also requires better integration and coordination with up- and down-stream actors involved in the lifecycle of manufactured goods. A large part of implementation costs for the WEEE Directive will be borne by private producers. Therefore, a thorough review of the baseline conditions and potential impacts of accelerated compliance pressure could help public and private sectors make more balanced decisions.

7. The electrical household appliances industry is a significant contributor to the national economy with a business volume of \$10 billion and a significant market share both domestically and internationally. Sixty-five percent of its production is exported with 80 percent of all exports going to European markets. The sector employs directly and indirectly about 2.5–3 million people.

8. The cost of compliance with WEEE depends on a number of factors, including the product category, collection efficiency, treatment complexity, economic value of recyclable

²² Turkey, Economic Reforms and Accession to European Union, Bernard M. Hoekman and Subidey Togan, World Bank (2005)

²³ Estimated cost is based on the EU Technical Assistance Project for Environmental Heavy-Cost Investment Planning Project

²⁴ EU Directive 2008/1/EC concerning Integrated Pollution Prevention and Control. This is the codified version of the original Directive ("the IPPC Directive"), which replaces Directive [96/61/EC](#) and requires industrial and agricultural activities with a high pollution potential to have a permit. This permit can only be issued if certain environmental conditions are met, so that the companies themselves bear responsibility for preventing and reducing any pollution they may cause. Integrated pollution prevention and control concerns new or existing industrial and agricultural activities with a high pollution potential, as defined in Annex I to the directive (energy industries, production and processing of metals, mineral industry, chemical industry, waste management, livestock farming, etc.).

²⁵ Founded upon the extended producer's responsibility principle, this directive makes producers and importers of electrical and electronic responsible for the waste generated by the products they introduce into markets. The directive provides guidance on the recycling targets, which is currently being revised.

materials and extent of administrative costs. There is limited number of studies on the cost of WEEE compliance, and many of them are relatively outdated. One 2003 study reports collection and treatment costs ranging from €0.35/kg to €0.64/kg based on a limited number of systems that were operational.²⁶ A more recent study conducted by the United Nations University reports technical costs of compliance in EU for large household appliances, which cover parts of white goods like washing machines, dish washers and ovens, as €0.24/kg or €12.76/unit. The same study reports the costs for refrigerators as €0.56/kg or €21.46/unit.²⁷ At the moment, the Regional Environment Centre (REC) Turkey is performing a comprehensive study to assess compliance costs likely to arise in Turkey under different implementation scenarios. So far, the team has not gained access to the REC study findings. The MoEU under a UNEP/MAP project performed the only other study that puts forward compliance cost estimates. According to this study, the average cost of WEEE collection and handling was estimated to be €0.28/kg.²⁸

Objectives and Audience

9. This analysis reviews a set of policy and compliance issues in the electric household appliances (referred to as “white goods”) sector with the 2002/96/EC Directive (WEEE Directive). It aims to contribute to the knowledge and capacity of public and private sector stakeholders to formulate WEEE implementation targets in line with sector development goals and with environmental policies concerning WEEE. The note also aims to assist the Government of Turkey in promoting environmental sustainability in a manner aligned with EU Environmental Acquis requirements as follows:

- Advance the understanding of environmental, social and economic costs and benefits associated with the implementation of specific environmental legislation;
- Enhance knowledge on international “best practice” that the private sector can use in balancing sector growth and environmental management objectives driven by EU compliance;
- Provide guidance on optional policy approaches tailored to Turkey’s context that the private sector can use in evaluating its compliance and competitiveness position; and
- Expand the discussion on key issues by engaging public and private sector throughout the preparation process.

10. The audience of the sector note is the Government of Turkey, specifically the Ministry of Development (MoD), Ministry of Environment and Urbanization (MoEU), Ministry of Science, Industry and Technology (MoSIT) and Treasury who are the key public sector entities that formulate and implement government policies for sustainable economic growth. Private organizations representing the sector are business associations like the Association of Turkish White Goods Producers (ATWGP–TURKBESD), Association of Electronic Goods Producers (AEGP–ECID), Union of Chambers of Commerce and Commodity Exchanges of Turkey, and different chambers of industry and commerce, particularly in the Marmara and Aegean regions where the main white goods producers are located. All are important counterparts and direct beneficiaries of the sector analysis.

²⁶ Future Energy Solutions (2003) Study into European WEEE Schemes.

²⁷ United Nations University (2008) 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE).

²⁸ MoEF (2009) Final Report of UNEP/Mediterranean Action Plan.

Methodology

11. The methodology draws on the Bank's experience in analyzing the linkages among industrial growth, environmental compliance and public policies that promote smart industrial growth. The approach taken in the analysis covers the following main areas:

12. First, the note reviews relevant international experiences in order to identify key factors affecting the implementation of the WEEE Directive and extract those that could be of relevance to Turkey. It then highlights country specific characteristics that are relevant to implementation and identifies key challenges paying particular attention to

- Collection targets;
- Specific requirements regarding collection and handling/treatment of electronic and electrical equipment waste;
- Allocation of responsibilities for collection, treatment and cost-sharing;
- Organization of waste collection systems, specifically the extent of collaboration within the sector, as well as public-private partnerships in infrastructure;
- Degree of recovery, reuse and recycling; and
- Ecodesign innovations.

13. Second, the analysis is based on quantitative compliance cost approximations with known error margins. Certain inputs were used from projects led by the Ministry of Environment and Forestry and other sources (e.g., Matra Final Report 2009, UNEP/MAP, United Nations University, WEEE Forum), which were readily available and contained relevant information. Interviews with representatives from the association of white goods suppliers, companies licensed for WEEE collection, municipalities and other organizations involved in the collection of WEEE provided useful inputs. In addition, interviews were performed with international private and public sector representatives, as well as academicians, regarding implementation experiences in different parts of the world. The authors factored into the analysis both the opinions and comments of representatives of the public and private sectors familiar with international implementation experiences and country-specific aspects of WEEE implementation and industrial compliance during interviews, as well reviews of international experience from available sources.

14. The Sector Note reviews the potential impacts of the following alternative policy options: regulations, institutions and access to information. It also includes a review of the experience of other EU member countries.

15. The note is organized as follows: section 2 reviews the background and requirements of the WEEE Directive and EU experience in implementing the directive; section 3 describes the sector context in the Turkish economy; section 4 presents WEEE in the context of Turkey and provides an overview of anticipated challenges; it also performs a quantification of WEEE generated and estimates the total cost of compliance and its potential impact on competitiveness; and section 5 provides an overview of policy instruments and identifies the main policy recommendations specific to the sector.

Limitations

16. Due to the relatively tight timeframe for preparation and inaccessible data, there are certain limitations both to the scope and to the depth of the quantitative analysis. While electronic products, and in particular those that are part of information and communication technologies, are an important component of WEEE, both in terms of quantities and in terms of environmental impact potential, these products and their respective producers are not analyzed in detail here – although useful outputs such as costs of collection and treatment for these fractions are generated. Similarly, lighting equipment and producers are outside the scope of the study. Although the analysis focused primarily on white goods²⁹ and their producers, some of its findings and recommendations are valid and useful for other sectors generating WEEE.

17. While a considerable amount of quantitative and qualitative data was compiled for the preparation of this study, enabling a better understanding of the development and business dynamics of the white goods sector, some data required for the assessment of WEEE compliance costs were limited. For example, it is known that many large producers have certified environmental management systems, and they comply with the applicable environmental regulations. In addition, many companies made significant environmental improvements in the *production* and *use* phases of white goods. For example, since 1990s water and energy inputs to the manufacture of white goods have fallen dramatically and the products themselves have become more energy and water efficient. Newer products also contain less hazardous substances. This information is important to understand, but is inadequate for the purposes of quantifying the costs of compliance with WEEE Directive, which primarily focuses on the end-of-life stage of white goods.

18. Readily available information is scarce regarding WEEE quantities and geographic distribution and the nature and size of the required infrastructure, including the technical and administrative infrastructure that needs to be in place. Lack of such information is an important limitation for making an accurate assessment of compliance costs. The cost estimates in the note were derived from available information using unit and cost data from other studies, such as the UNU 2008, UNEP-MAP 2009 and WEEE Forum 2008, and calibrated using the Turkish statistical data. This approach helped to estimate the projected WEEE quantities, as well as unit costs of compliance by WEEE product category adopted from long-running recycling systems in the EU. To this extent the costs derived in this note should be considered conservative since long-running systems may have captured the economies of scale or other learning-curve aspects to system operation and maintenance. Other assumptions were made for demand growth of white goods and electronics based on reasonably reliable sources like the Economist Intelligence Unit (EIU), whose projections went until 2015 instead of the relevant implementation year of 2018. In this instance, GDP growth was used as a proxy for income growth and demand for WEEE products.

²⁹ Among others, the fact that HHA sector has been highly supportive in data provision has been a key factor motivating this scope.

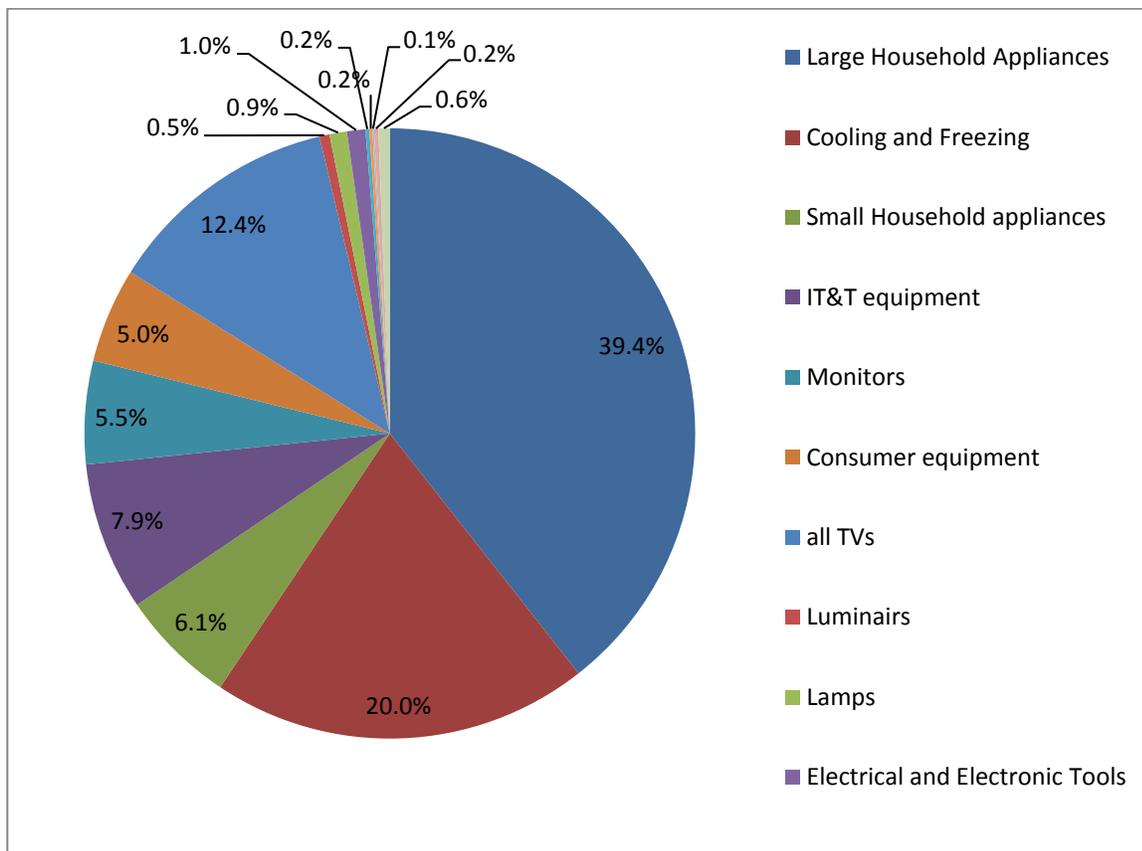
19. Similar information gaps existed with respect to sector earnings and investment rates, limiting the sector competitiveness analysis. Ultimately, the analysis used available information from business associations and a major white goods firm willing to share key pieces of information. Impact estimates on sales volumes should be considered a first attempt to quantify such a number, serving as a starting point where the dialogue can continue. The methods adopted in this study can be easily updated once the relevant information becomes available.

2. Waste Electrical and Electronic Equipment Directive

Background and Objective of the Directive

20. The Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) is a key element of the EU's environmental policy for waste management. WEEE is the fastest growing waste stream in the EU, producing up to 9.1 million tons in 2005 and growing to an estimated 12.3 million tons by 2020.³⁰ A big share of the waste stream (up to 90 percent) is disposed in landfills, incinerated or recovered without any or without proper pretreatment. The average breakdown of WEEE arising in the EU in 2008 is given in Figure 1.

Figure 1: Breakdown of WEEE Arising in the EU in 2008³¹



Source: WEEFORUM(2010)

21. The directive addresses a complex waste flow in terms of product variety,³² association of different materials and components, hazardous materials content and growth patterns. It also

³⁰ Proposal for a Directive of the EU Parliament and of the Council on Waste Electrical and Electronic Equipment (WEEE), Impact Assessment, 2008, Commission Staff Working Paper.

³¹ WEEFORUM (2010). 2008 Key Figures.

intends to trigger design modifications that make electrical and electronic equipment (EEE) easier to dismantle, recycle and recover. Finally, the directive plays an important role in prevention and dispersion of hazardous waste in the environment, as well as in the recycling and reuse of such waste to reduce its disposal.

22. Based upon the extended producer's responsibility (EPR) and polluter pays (PP) principles, the Directive 2002/96/EC on WEEE is one of the key policy tools aiming to reduce the environmental impacts of WEEE by making the producers responsible for the management of their products at the end-of-life stage.³³ Under the WEEE Directive, the EU requires manufacturers and/or distributors of electronic and electrical equipment to manage and pay for the collection and further handling of WEEE products, as well as provide WEEE-related information to their customers. The WEEE Directive sets collection, recycling and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic e-waste. The legislation also aims to conserve landfill and to support more sustainable development by encouraging recycling practices.

23. A key element of the WEEE Directive is the "producer responsibility," which makes producers³⁴ (e.g., manufacturers, sellers and distributors) responsible for the "end-of-life" collection and recycling of electrical and electronic equipment products. The thrust of the EU Directive requirements through the process of legal harmonization is translated into the national implementing legislation. Producers must register and mark products and components in individual countries that fall under the WEEE Directive with the crossed-out trash bin symbol, a mark that indicates that these products cannot be discarded randomly for pickup but rather must be turned in for environmentally sound treatment and disposal. Furthermore, periodic reports must be submitted to government agencies on the arrangements put in place for the collection, disassembly and proper disposal of equipment at its end of life. Thus, the directive also aims to maximize the separate, efficient collection and treatment of WEEE and to minimize the opportunities for illegal WEEE export or the need to engage in evidence trading.

24. The need for such a directive in view of environmental policy priorities include public health protection, energy efficiency, effective toxicity control and air emissions reduction relevant to ozone depletion and global warming. Energy savings from recycling metals and plastics in WEEE is significant compared to waste landfilling. For instance, using recycled copper could result in 85 percent energy savings per unit of production and for plastics more than 80 percent. The directive's thrust is to deliver positive results in conjunction with another interrelated Directive on Restriction of Certain Hazardous Substances in the Electrical and Electronic Equipment (EU 2002/95/EC Directive/RoHS Directive) adopted in February 2003 and effective since July 1, 2006. The RoHS Directive restricts the use of six³⁵ hazardous substances in the manufacture of various types of electronic and electrical equipment sold in EU countries.

³² The directive covers products in ten different categories, including large and small household appliances, lighting equipment (lamps), IT and telecommunication equipment, consumer equipment, electrical and electronic tools, toys, entertainment and sports equipment, monitoring and control instruments, and automatic dispensers.

³³ The other policy tool that is supporting the same environmental objective is the complementary Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

³⁴ Producer is defined as an EU-based manufacturer who supply products in an EU state; an organization that supply products made by another manufacturer under their own brand; a distance seller in one Member State who supply equipment to users in another Member State.

³⁵ Lead, mercury, cadmium, hexavalent chromium, polybrominated biphenils, polybrominated diphenyl ether.

It aims to reduce environmental impacts of waste and improve recyclability while reducing hazardous substances, which would decrease the exposure risk to the recycling staff.

25. Separate collection is set as a precondition by the WEEE Directive for treatment and recycling of WEEE. According to the directive, all type of WEEE, including those from private households and others, should be separately collected with their disposal as unsorted municipal waste minimized and convenient facilities set up to include public collection points. The directive's target is set for separate collection from households of at least 4 kg/per inhabitant per year. On the other hand, the recast of the directive will establish a new mandatory target by 2016 and might propose a target that takes into consideration the percentage of the quantities of EEE sold to private households.

Experience with Implementing WEEE Directives, Lessons Learned from EU and Other Countries

26. The WEEE Directive defines only the general requirements to comply with mandatory collection and recycling objectives while the modalities of the logistics and the organization of the takeback schemes are left to the Member States. Consequently, there were significant differences noted in the organization, effectiveness and efficiency of the practices adopted by different countries.

27. The EU Member States experience related to WEEE directive implementation at the national level includes, for example, issues related to producer responsibility, *harmonization* (e.g., registration process, reporting procedures); *standardization* (e.g., labeling, standard definition for weight, standards for effective recycling); and *monitoring* of collection, treatment and recovery (e.g., specified amounts to be collected, enforcement of legislation on waste shipments). Data available indicated that factors such as availability of collection points, geographical location, culture, waste collection organization and financial mechanisms influence treatment performance.

28. The WEEE-related directives have also been implemented in other parts of the world, most notably in Japan and in some states of the US, China and Korea. Other countries like Thailand are in the process of adopting WEEE legislation. The following section aims to highlight important characteristics of various forms of WEEE directive application and the experiences they provide.

Experiences from the EU Member States³⁶

29. In Sweden, Denmark, Belgium and the Netherlands, national regulations and organized management schemes for WEEE were already established in the form of single collective compliance schemes used nationally prior to the EU Directive. Their transposition has been relatively straightforward and achieved through changes on issues, including individual producer

³⁶ Information in this section is primarily based on a review conducted by the European Commission on the Implementation of the Waste Electrical and Electronic Equipment Directive in the EU (by EC Directorate General on Joint Research Centre (2006), Seville) and supplemented by personal interviews conducted by the authors.

responsibilities, product labeling, financial guarantees needed to market a product, and collection and recycling targets.

30. In the case of other countries without any previous WEEE management systems or culture, developing the necessary new legal and operational infrastructure to comply with the directive posed a larger challenge due to different approaches employed, such as giving more weight to market-based approaches and having multiple providers of takeback systems. While several countries have been late with the transposition of the directive, all EU Member States had implemented national WEEE legislation by January 1, 2008. Many who have assured timely transposition, however, paid little attention to the practical application details of the directive and had to introduce further secondary regulations and clarifications. Highlights of the lessons learnt during the first years of WEEE implementation in the EU are summarized in the following paragraphs.

31. Setting up implementation of targets was not always straightforward. Weight-based collection targets of 4 kg per inhabitant were easily met by Western EU member states with schemes in operation for a longer period; thus this has not provided an incentive for improving their current system.³⁷ For some Central and Eastern Member States, however, the target was more challenging. There is little research available on the reasons why certain national schemes are more efficient than others with regard to overall costs, recycling percentage and collection amounts achieved. Moreover, due to variations in standards and definitions of recycling and treatment performance, comparisons among countries are difficult. Some countries that are front runners, like Sweden, collect as much as 17 kg/person and have recycling rates of 80 to 90 percent, including energy recovery; while others have very low levels, such as Poland with 1.0 kg/person; Romania 1.5 kg/person (2010); and Italy 2.6 kg/person. As one overall collection target for all product categories could lead to low collection of certain products, there are arguments for developing more specific collection targets per product category. There is ongoing work to create standards for WEEE treatment.³⁸

32. Consumers' responsibilities could be perceived as barriers to increased collection rates, although producers have the capacity to effect changes at the source and to reduce environmental impacts of their products. Low collection rates registered in some EU member states are due to low level of consumer awareness of e-waste, compounded by illegal and unauthorized handling of WEEE. Thus, increasing consumer awareness is crucial for implementing WEEE efficiently and maximizing environmental results—collecting more, increasing cost efficiency and treating better. Effective education campaigns could raise consumer awareness of WEEE and why it needs to be treated separately from regular municipal waste. It is important that all stakeholders, especially industries, make a concerted effort to raise public awareness, ensuring that households understand the nature of WEEE and change behavior.

33. Registration and reporting requirements of the directive created a serious administrative burden for producers. Some Member States experienced failures to report, leading to environmental damage and illegal exports, thus pointing at weaknesses in monitoring and enforcement mechanisms. One prerequisite for effective implementation of the directive is the

³⁷ Solving the E-Waste Problem Initiative White Paper (March 2010)

³⁸ J.O. Eriksson (2011) Personal communication with Managing Director of El-Kretsen.

establishment of common and consistent reporting framework with harmonized definitions and publically accessible.

Collective versus Competitive Systems

34. The WEEE collection can be organized through a *national singular collective system* and/or *competitive clearinghouse system*. It is believed that each system has its own merits thus there is no clear winner between these systems.

35. The *collective system*³⁹ consists of a dominant national organization, nongovernmental not-for-profit companies set up and owned by one or more trade associations, with physical responsibilities for collection and recycling and financial responsibilities for all WEEE within national boundaries. These associations are organized into product categories to focus on achieving maximum efficiency in their recycling operations and to identify markets for recycled material and product reuse. This system is *proven* successful because it (i) is free of additional costs incurred by managing a national clearing house, separate collection containers and extra logistics; (ii) provides the simplest and most effective route to collecting and recycling WEEE if managed properly, (iii) offers economies of scale attractive particularly for small countries where volumes cannot create a viable market for multiple systems, and (iv) typically exceeds the collection and recycling targets set. Member States, such as Sweden, Netherlands, and Belgium, and other European countries, such as Norway and Switzerland, operate collective systems that were in place prior to the WEEE Directive.

36. The *clearinghouse system*⁴⁰ involves multiple partners: producers, recyclers and waste organizations. The government ensures that there is a register of producers, defines the allocation mechanisms, as well as the reporting and monitoring requirements. A central national coordination body is responsible for determining the collection obligation of each producer via the national register, assigning this obligation to the compliance scheme on behalf of the producer and establishing an allocation mechanism that enables compliance systems to collect WEEE in an equitable manner from various collection points. The system is designed to meet the minimum levels of collection and recycling in the most cost-efficient manner without any pressure to exceed them or to provide an incentive for additional environmental or behavioral improvements beyond that stipulated in legislation.

Collection and Logistics

37. There are three main collection approaches used for WEEE, including (i) collection and intermediate storage in municipal sites, (ii) in-store retailer takeback, and (iii) producer takeback. The majority of schemes are organized primarily around the collection sites operated by municipalities, for example, the Swedish system. The municipal sites are usually free for households to use to an unlimited extent. Retailer participation is encouraged in some countries, but the quantities collected through this route remain below 30 percent. While the retailer takeback is also free, it may be limited to the purchase of a new product—the so-called trade in

³⁹ This is generally present in countries with previous experience with WEEE.

⁴⁰ This is particularly preferred by the bigger Member States due to its potential to fuel competition and drive the costs down.

systems. Producer takeback is often used for the “business to business” settings and includes the collection of larger commercial equipment in a “new-for-old” basis.

38. The use of multiple recyclers and logistics firms is usually preferred for the transfer and treatment of the collected WEEE. As these firms go through a competitive tendering process, this approach helps to reduce costs substantially. In countries like Sweden, there are examples of municipally owned and operated recycling centers losing market due to their inability to reduce costs.⁴¹ The clarity in communicating the system's work dynamics to the consumer and the simplicity of their engagement also plays a key role in collection effectiveness. With higher complexity, such as having multiple systems for different products, the effect on collection rates is negative.

Fee Structures

38. Different options are used for the fee structure. The fees are usually based on the (i) actual costs of recycling; (ii) projected costs of recycling per product category, and (iii) cross subsidization, namely the fees on some product groups to support recycling in another. The collection and administrative burden is proportional to the increased complexity of the fee structure. Fees are usually allocated based on current market share either in the form of fees on products sold or allocation of actual costs to products placed on the market. Sorting by brands is seen as highly complex and costly and is not exercised.

39. Most producers consider a mandatory visible⁴² fee option as an important buffer against potential negative impacts. In the absence of a mandatory visible fee, the costs tend to be absorbed into the product price and disappear. This is particularly worrisome for those producers who are active in highly price sensitive and competitive low margin markets, such as consumer electronics, who may have to bear the short-term costs.

40. With respect to the financial model, there is a split view between the brown⁴³ and white goods (i.e., household electrical equipment) sectors and the ICT sector, reflecting the different preferences for dealing with historic WEEE and orphan products. The brown and white goods sectors have significant amounts of historical waste and, in particular, the white goods sector, supports visible fee schemes used, for example, in Recupel of Belgium and NVMP of the Netherlands. They are less supportive of ex post-based market share schemes, such as ICT Mileu of the Netherlands. The ICT firms, on the other hand, have fewer historic liabilities and therefore prefer the opposite. Schemes such as El-Kretsen of Sweden and El Retur of Norway accommodate both financing systems within a single organization.

41. An approach that combines different product groups into one group or sets a fee based on the retail price is inevitable beyond a certain point to improve recovery and administration. More complex financing approaches that better reflect actual recycling costs are used in the Nordic countries, but they come at the expense of companies who complain about the detail level and

⁴¹ J. Christiansen (2011) Personal communication. Technical Advisor for WEEE and Hazardous Waste. Avfall Sverige (Swedish Waste Management Association)

⁴² In visible fee option, the producers are allowed to communicate the amount charged for WEEE compliance separately.

⁴³ Brown goods refer to those household appliances that are portable or semi-portable and are often used on tabletop, countertops or other platforms.

excessive workload. In cases where fee-based systems are used, the paperwork and monitoring requirements often increase significantly both for producers and the scheme based on the numbers of product classifications and fee bands. The alternative of having a simpler system with fewer groups or categories including a wider product range, on the other hand, inevitably leads to greater cross-subsidizing and weakens the relationship between actual recycling costs and fees.

Financial Guarantees and Freeriding

42. The WEEE Directive requires each producer to provide a financial guarantee when placing a product in the market to cover the recycling costs when the product is discarded. This is an important provision aimed at safeguarding the producers against bearing the costs of freeriders and orphan products. In cases where the legislation promotes joint compliance schemes rather than individual ones, the guarantee may take into account inflation in collection and treatment costs, thereby making it prohibitively expensive to undertake an individual route.

43. In 2006, the freeriders were stated to represent 10 to 20 percent of products placed on the market, highlighting the importance of enforcement. Enforcement is seen as the key issue to assure cost effectiveness and equity of the schemes. To overcome the problem of freeriders, producers have suggested that only those products with a proof of registration should be allowed in the markets. National collective schemes are generally regarded as effective for ensuring good market coverage and reducing the problems of freeriders and orphan products provided that full enforcement by competent authorities is guaranteed.

Individual Producer Responsibility (IPR) and Ecodesign

44. It is argued that assigning financial responsibility for collection and recycling of end-of-life products encourages producers to avoid financial burdens by taking ecodesign measures to minimize waste and assist recyclability. This principle is an integral part of WEEE Directive, 2002/96/EC. Firms are expected to invest in ecodesign if they can recover the benefits of their investments through lower product recycling costs. Although IPR and associated ecodesign improvements are still possible on theory, during transposition compliance criteria are usually set in a way that encourages participation in a collective scheme to ensure equity and to reduce the burden of monitoring and control. Promotion of collective systems and other compliance criteria, such as product weight being the dominant criteria determining charges, discarding other product attributes in the same category, significantly dilutes incentives for ecodesign changes. Although some producers voice their disappointment with the existing application, there is also consensus that ecodesign issues are already being tackled outside of the scope of this directive.

Product Scope and Producers

45. Many EU Member States are currently examining possible “grey area” products and developing guidelines to assist companies in deciding whether their products are covered by the WEEE Directive or not. There is an industry concern related to some Member States choice to adopt the widest scope possible and not limit themselves to those products that are part of the categories listed in Annex 1A of the directive. For example, some states, such as the UK, include only products that are clearly within Annex IA of the directive while other states exclude large

machine tools and some types of “fixed installations” from the regulatory scope. There are states, such as Finland, that endeavor to include as many types of electrical equipment as possible.⁴⁴ Furthermore in the EU, issues exist concerning the definition of “producer” and responsibilities assigned to producers. These are mostly related to the free circulation of products among EU Member States once placed on the European market and, therefore, are less relevant for the case of Turkey.

Box 1: Producers Obligations in EU Member States⁴⁵

Most producers comply with WEEE by joining a Producer Compliance Scheme (PCS); in many states this is sufficient as the PCS registers their members on their behalf. However, producers must register themselves in eleven EU States including Austria, Germany, Ireland, Portugal and Sweden. The main requirements for equipment manufacturers who are also producers in four of the EU States are summarized below:

France: The seven existing compliance schemes register their members on their behalf without a registration fee. Manufacturers are required to print the crossed WEEE bin symbol and producer's name on the products. France is one of the few countries that have a mandatory requirement to show “visible fees” at the point of sale of new products. The visible fee informs the customer of the actual cost of collection, recycling and end-of-life disposal, and it is part of the product's price. According to French law, distributors who import equipment should apply labels with their name on each individual piece of equipment. In practice this is not done as it requires repackaging, and it has been claimed that this requirement could be illegal as it restricts the free movement of goods within the EU. Producers have to report on weight and number of sales annually.

Germany: There are many compliance schemes, but producers must also register with the authorities for which there is a complex fee structure. Unlike in other states, it is also necessary to pay a financial guarantee for back-to-consumers (B2C) using the national guarantee scheme. Financial guarantees are required to ensure that the financial cost of disposal of WEEE at end of life can be met if the original seller has ceased trading. Manufacturers should print the crossed WEEE bin symbol and producer's name on products. German producers are required to report on weight and number of sales monthly for B2C and annually for back to business (B2B). The German authorities use a long list of product types to decide if equipment is B2C or B2B although B2B producers must also prove that equipment will not become municipal waste. This is important as there are separate fees and reporting requirements for B2C and B2B.

Netherlands: Most producers both Dutch and from outside the Netherlands join one of the three Dutch PCSs, which is accepted as registration. It is possible to comply without joining a PCS, but very few producers have adopted this approach. There is no registration fee in the Netherlands. The product types accepted by each PCS are limited, and so in reality there is usually a choice of only one scheme. Despite this, the Netherlands has one of the lowest costs for WEEE compliance in the EU. Dutch PCS require quarterly reporting, but producers that comply individually report annually. In the Netherlands, deciding whether a product is B2C or B2B is not what it may appear at first sight. IT and telecom products weighing over 35 kg are classified as B2B whereas lighter equipment is B2C, irrespective of the customer. Deciding whether other types are B2C or B2B is decided by a lengthy list from the NVMP scheme.

UK: All producers must join one of the 40 UK-approved PCSs. The PCS registers producers on their behalf and pays the registration fees. Manufacturers should print the crossed wheelie bin symbol and producer's name on all products. Quarterly reporting of sales in terms of weight and number is required. Showing the visible fee is optional in the UK, but it is not used, mainly as it is strongly disliked by retailers. Over 3,200 producers have joined a UK PCS, over 6,000 organizations have registered in Germany and over 3,700 in France, which has a smaller electronics industry than the UK. The shortfall in the UK is probably because some manufacturers have assumed their products are not within scope, but others may be unaware that they should have joined a scheme.

Source: ERA Technology (2009)

⁴⁴ ERA Technology (2009). The WEEE Directive and its Implementation in the EU (available at www.era.co.uk/rfa).

⁴⁵ Extracted from ERA Technology (2009) The WEEE Directive and its Implementation in the EU (available at www.era.co.uk/rfa)

An Overview of Actual Performance in EU-27⁴⁶ Member States

46. The 2008 review⁴⁷ of the WEEE Directive carried out by the United Nations University found that the collection targets in the EU-15⁴⁸ Member States could be easily met in 2005, although the average collection performance in the EU-15 has been roughly half of leading countries like Norway and Switzerland. The collection target has, however, remained a key challenge for new Member States.

47. The estimated amount of WEEE currently collected and treated as a percentage of the amounts of WEEE arising for the EU-27 Member States in 2005 are provided in Table 1. Per capita collection rates in individual Member States in 2008 is given in Figure 2. These figures point to large differences in collection performance by different Member States per subcategory, indicating room for improvement. Factors such as availability of collection points, geographical location, culture, waste collection schemes, as well as the present financing mechanisms are believed to have an influence on the collection treatment performance. The previously mentioned review of the United Nations University also found that various influencing factors are probably all relevant to a certain level, including the active role of different stakeholders involved like public authorities and EU Member States.

Table 1: Amount of WEEE Collected and Treated in EU27 in 2005 as a Percentage of WEEE Arising

Treatment Category	% Collected of WEEE Arising
Large household appliances	16.3
Cooling and freezing	27.3
Large household appliances (smaller items)	40.0
Small household appliances, lighting equipment, luminaires and domestic medical devices	26.6
IT and telecom, excluding CRT's	27.8
CRT monitors	35.3
LCD monitors	40.5
Consumer electronics, excluding CRT's	40.1
CRT TV's	29.9
Flat panel TV's	40.5
Lighting equipment – lamps	27.9
Electrical and electronic tools	20.8
Toys, leisure and sports equipment	24.3
Medical devices	49.7
Monitoring and control instruments	65.2
Automatic dispensers	59.4

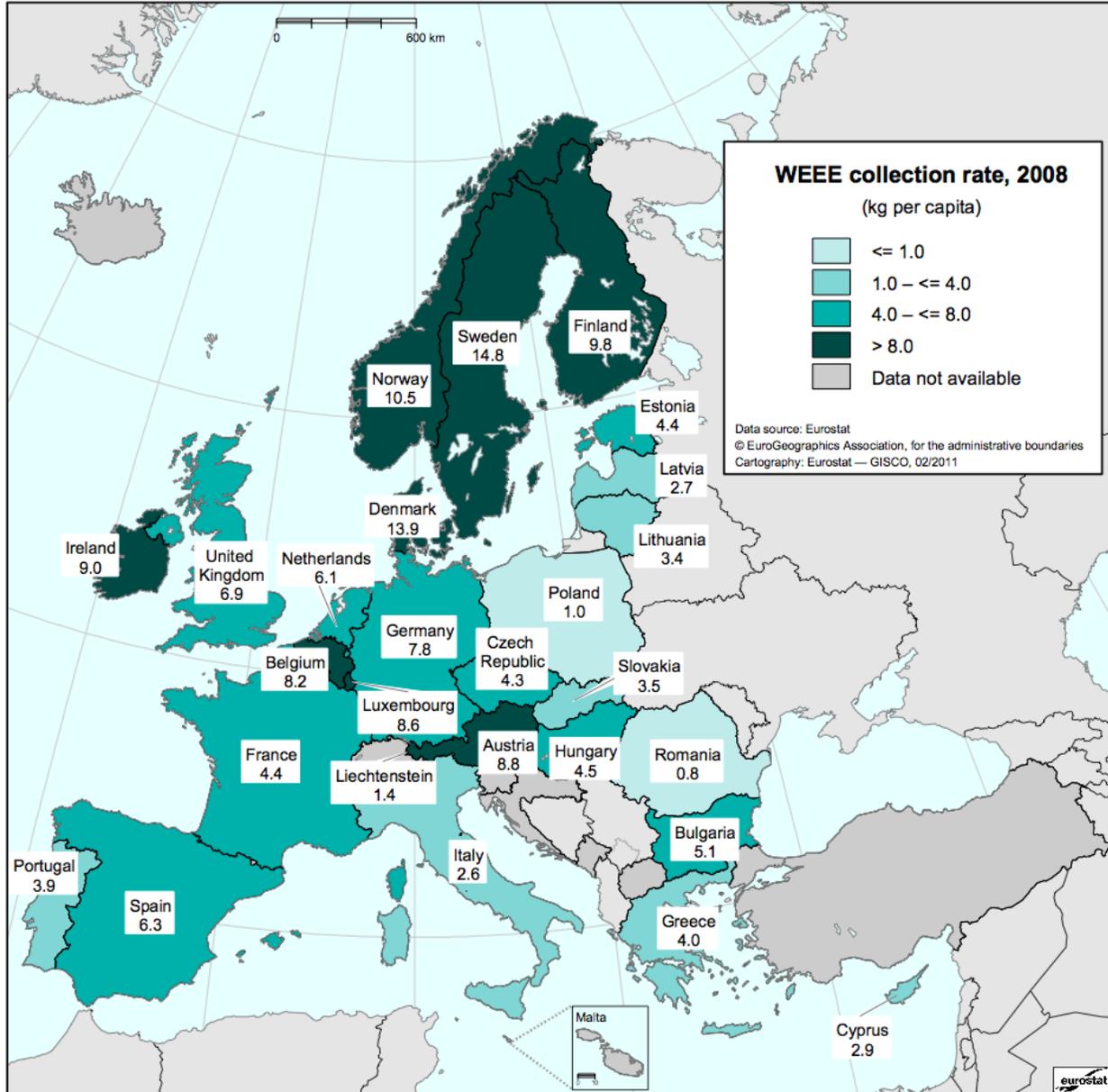
Source: Adapted from UNU (2008)

⁴⁶ The EU-27 comprises Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

⁴⁷ United Nations University (2008) 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE).

⁴⁸ The EU-15 comprises Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

Figure 2: Amount of WEEE Collected in Member States (2008)



Source: Eurostat

48. Development of the appropriate infrastructure to enable treatment of WEEE in accordance with the requirements listed in Annex II of the directive has been gradual and was associated with significant investments. By mid-2007, sufficient capacity to treat WEEE arising was installed in EU-15 Member States. The situation in Central and Eastern Europe is believed to be different and may imply that a regional approach by groups of Member States could be adopted.

Compliance Costs

49. The economic burden associated with the technical requirements for takeback and treatment of WEEE arising was estimated, excluding start-up costs, from €0.76 billion in 2005 for the current amount collected to €3.0 billion in 2020 as shown in Table 3. The latter is based on the maximum possible collection percentages, which are estimated at 75 percent for large and 60 percent for smaller appliances. The technical costs for collection and recycling, including revenues for secondary materials—in particular for metals, glass and plastics—are provided in Table 2. The total costs include mainly guarantees, provisions and, to a lesser extent, overhead and administrative burden.

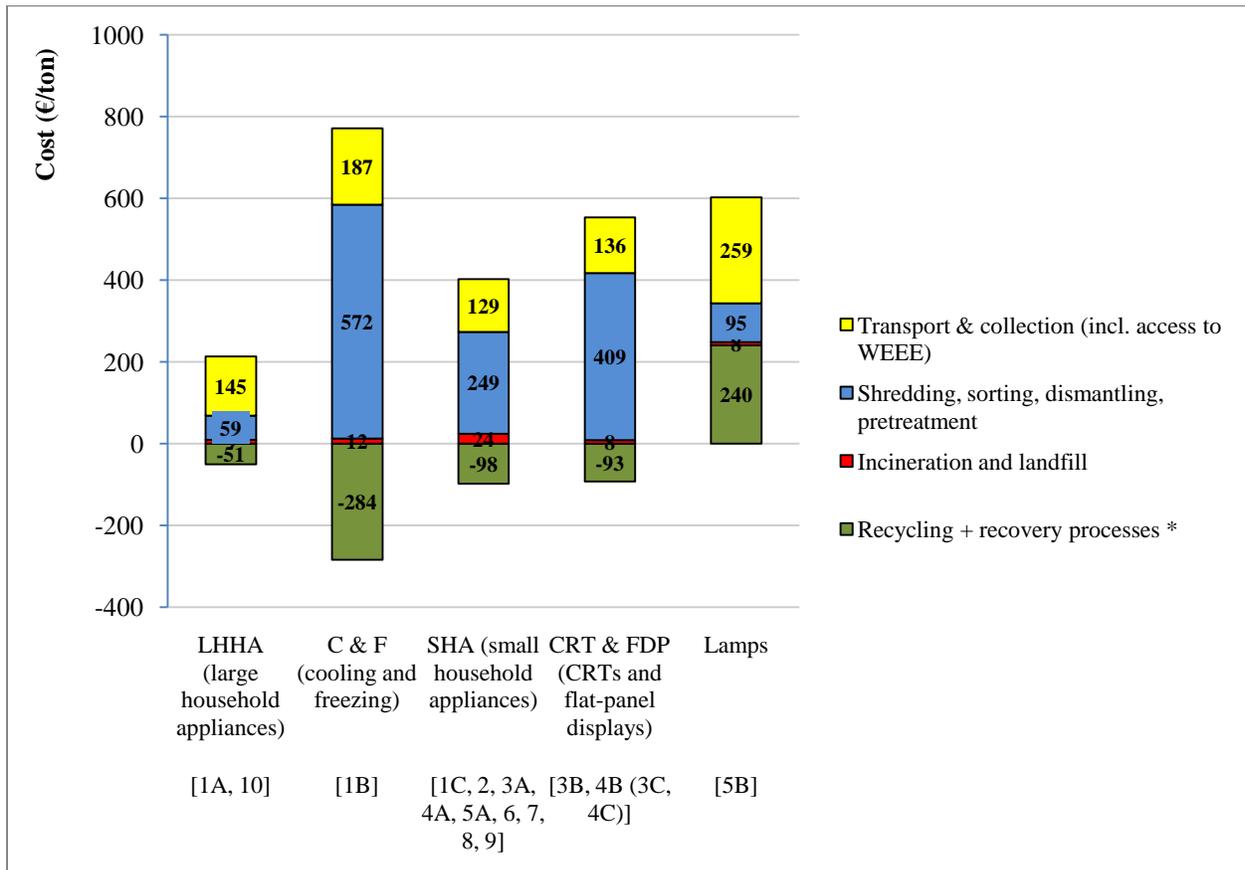
Table 2. Overall Economic Impact across EU-27 Member States Assuming Full Implementation

Year	Technical costs (million €)		Total costs (million €)	
	Current collection %	Maximum collection %	Current collection %	Maximum collection %
2005	764	1,692	935	2,045
2006	783	1,735	959	2,097
2011	889	1,970	1,089	2,381
2020	1,125	2,492	1,377	3,012

Source: Adapted from UNU (2008)

50. The values listed above are considered to be influenced by the following:
- Additional costs on total compliance costs that represent a considerable percentage across different categories;
 - Long running optimization of systems (e.g., for the long running systems across the EU, the gap between minimum and maximum cost levels is much lower);
 - Percentage of WEEE collected and treated versus potential WEEE arising in EU-27; and
 - Category compositions and recycling technologies used, which are further influenced by future developments of new technologies.
51. Based on the systems running for a longer time, the technical costs for five main product categories in 2005 are presented in Figure 3.

Figure 3: Breakdown of Technical Costs for the Five Main Product Categories (derived from long running systems in 2005)



Source: Adapted from UNU (2007).

52. As shown in Figure 3, the technical cost breakdown is largely different for various product categories; for example, transport costs are significant for large household appliances. Revenues are almost equal to the further processing costs after the transport steps. The treatment costs for chlorofluorocarbon (CFC) removal are a major portion of the total costs in the case of cooling and freezing and the CRT-containing appliances. Lamps have relatively high costs given the hazardous nature of possible mercury content thus the need for transport to special landfills. Also, there is little revenue left for small appliances after transport and pretreatment.

53. The noted economic impacts of WEEE takeback and treatment are influenced by the following:

- Prices for secondary materials. The sensitivity analysis showed that current 2007 market prices increased the revenues of the above categories by €50–100/ton compared to 2005. This generated a net revenue after collection and transport for some categories;
- Developments and availability of markets for downstream fractions and high-level reapplication/valorization of secondary raw materials;

- Future developments of treatment technologies, as well as different treatment/dismantling requirements for particular product streams, mean that costs for CFC-containing appliances are likely to decrease, and flat panels are expected to cause a significant increase in total costs due to costly mercury removal steps.

54. A review of economic impacts of the WEEE Directive linked to the administrative burden across EU-27 Member States made the following conclusions:

- Costs related to registering and reporting ranged from €36.7 million to €42.8 million based on eight hours needed per report;
- The average number of reporting activities are about 72 reports delivered every year per producer; and
- There is a potential threat of competition distortion due to deliberately misreporting of “business to consumer “(B2C) as “Business to business” (B2B), as well as empty reporting without further action, or simply omitting reporting. This could have adverse impact on those companies investing in realization of full and EU-wide legal compliance.

55. In addition, differences in national legislative requirements and the time required to meet specific details of implementation are considered key factors influencing cost structures and contributing to high costs.

Directive Improvements

56. UNU study suggests various improvements for the WEEE directive using the implementation experience in EU. These include changing the scope of the directive by removing the appliances covered as real B2B; adjusting collection targets, as the targets for LHHA can be removed as these products are already recycled extensively due to their intrinsic value and setting stricter collection targets for cooling and freezing equipment that have potentially high environmental impact; modifying recycling targets like setting a gradually decreasing target for CRTs, as these products are gradually disappearing; and changing the standards for treatment. Table 3 is a summary of the proposed modifications regarding collection and recycling targets and treatment requirements.

Table 3. Differentiated Targets for Collection, Recycling and Treatment

	Collection target	Recycling target	Specific treatment requirement
Large household (1A, 10)	No	No	No
Cooling and freezing (1B)	Yes	Maybe	Yes for CFCs
Small household (2A, 3A, 4A, 6, 7) (plastic dominated part)	Yes	Yes for plastic recycling	Yes for NiCd from Cat. 6
Small household (1C, 3A) (metal dominated part)	No	No	No
CRT containing (3B, 4B)	Yes	Yes for CRT glass	Yes for control over PbO
Flat display panels (3C, 4C)	Yes	Maybe	Yes for LCD Hg removal
Gas discharge lamps	Yes	Maybe for HQ glass	Yes for Hg removal

Source: Adapted from UNU (2007).

57. Another major suggestion concerns higher collection amounts and improved quality of treatment. To improve the collection and treatment results, the review puts forward two suggestions:

- Either producers should remain primarily financially responsible and be given the necessary means, including better access to WEEE, combined with a more dynamic and higher collection target based on past market quantities; or
- Another stakeholder can be made primarily responsible—the Member States themselves or compliance schemes as a more independent and separate entity with producers as part of the board together with other stakeholders. This option maintains incentives for collecting more, treating better together and sustaining competition among schemes to improve cost efficiency.

58. Some of these suggestions direct the recasting effort of the WEEE Directive for which the following paragraphs provide further information.

Factors Impacting the Operation of Compliance Schemes

59. Experience from EU countries shows that the following factors may have an impact on the operation of compliance schemes:

- Distance and geography. Smaller distances reduce costs for transport and logistics;
- Population size and density. Areas with higher population enable economic efficiencies and economies of scale;
- Cost of labor. Collection, sorting and treatment are highly labor intensive;
- Length of time in operation. There are greater opportunities for experienced operators to fine tune the system, negotiate better contracts with suppliers, rationalize overheads and invest in capacity;
- Established consumer behavior. European compliance schemes owe their success to prevailing consumer recycling behavior. The level of WEEE recycling awareness in relation to specific product groups is also a key driver of success.

60. Other conditions for better results are identified as follows: (i) support better enforcement of the key provisions at the EU and Member State level on all organizational and operational parts of the recycling chain, especially to reduce illegal waste shipments, (ii) enable more simplification and harmonization throughout the EU-27 as current differences in interpretation within and among Member States and even regions delay implementation and subsequently cause considerable environmental drawbacks, and (iii) increase consumer awareness to stimulate more collection.

The Recast Directive and Other Ongoing Developments

61. The European Commission has carried out a comprehensive set of reviews of the WEEE Directive and its implementation in EU Member States, resulting in three main publications by Ökopool, the United Nations University and Ecolas. Also, various research papers and detailed

analyses were carried out on the current WEEE management practices in various countries and regions around the globe.⁴⁹

62. According to these analyses, the pace of initiating and enacting WEEE specific legislation is very slow across the globe. Handling of WEEE in developing countries was found to be influenced by high rate of repair and reuse within a large informal recycling sector. This informal recycling has the potential of making a valuable contribution, if their operations can be regulated in accordance with strict safety standards.

63. In 2008, only one-third of the annual WEEE arising was collected, treated and reported, according to the WEEE legislation, while illegal trade in WEEE to third countries was common despite rules on waste shipment⁵⁰ and illegal dumping. Enforcement of the directive's provisions was rather difficult for customs: watching the WEEE export flow and detecting illegal exports without having clear information and documentation on all used EEE packaging was a challenge.

64. Following a consideration of the findings of these reviews, the European Commission submitted proposals to amend this directive in December 2009. This review considered aspects such as illegal shipment of WEEE outside EU, improper treatment of WEEE within and outside EU and lack of enforcement. The WEEE review is expected to result in an amendment to the WEEE Directive as soon as the end of 2011. Aspects that might change include the following:

- *Scope*: Aim to clarify the grey areas and confirm the status of fixed installations probably through inclusion in scope.
- *Harmonization of requirements*: Current diversity of national legislation inhibits the free movement of goods within the EU and changes are needed to correct the situation. A variety of options are being considered, such as streamlining registration and data requirements for uniformity in all EU States. Single registration in the EU instead of all states where sales are made is another option being considered. Definitions should also be clarified for uniformity in all EU States, such as the difference between B2C and B2B.
- *Promotion of individual producer responsibility*: WEEE is no more than a tax without incentives to design equipment for easier recycling. Another study that looked into the implementation of the Producer Responsibility Principle of the WEEE Directive⁵¹ considers a number of financial models some of which are intended to encourage better design for the environment. The study highlights that manufacturers should be able to achieve cost savings by making products that have less environmental impact and are simpler to recycle.
- *Mechanisms that account for the global market nature of electrical equipment need to be implemented*: Equipment made in one EU State is often sold in many others and can reach end-of-life in a different state from where it was originally sold.
- *Collection and recycling targets*: These may be revised but the way equipment is collected could also be changed to increase recovery rates. There are proposals, currently

⁴⁹ F. O. Ongondo, I.D. Williams, T. J. Cherrett (2011) "How are WEEE Doing? A Global Review of the Management of Electrical and Electronic Wastes," *Waste Management* 31, 714-730.

⁵⁰ Convention on the Control and of Transboundary Movements of Hazardous Wastes.

⁵¹ Ököpol (2007). The Producer Responsibility of the WEEE Directive.

under discussion in EU member states, to set the mandatory collection target based on a percentage of the average weight of the electrical and electronic equipment placed on the market over the two previous years. 65 percent is the currently discussed figure.

65. Ongoing efforts in the EU regarding improvements of WEEE Directive included developing standards for collection, treatment, recovery and recycling of WEEE. The WEEE-Forum, an association formed by 38 WEEE management schemes from Member States, pioneered the most interesting work regarding introducing a label, called WEELABEX.

Examples of International Experience

66. An overview of generic experiences from other countries that have a longer history with the implementation of is provided below:

Box 2: The Swedish WEEE System, El-Kretsen

The regulation on WEEE was introduced in Sweden on July 1, 2001. Since then, Swedish citizens have collected close to 1 million tons of WEEE. With a collection rate of 16 kg/capita-year, Sweden has one of the highest collection rates.

WEEE is managed under a single nation-wide system called Elretur in Sweden. El-Kretsen is an organization established by the producers and manages a nationwide collection and recycling system for WEEE. The system initiated in July 2001 between producers and local authorities is called Elretur and is managed in collaboration with the Swedish local authorities as follows: (i) the local authorities manage and fund collection and storage points where the households may leave the WEEE without charge, (ii) El-Kretsen manages and funds transports of the WEEE to pretreatment and recycling in accordance with the prevailing laws. The system is convenient for the households who can leave the WEEE at the same collection points as other waste, as well as for producers who are members of El-Kretsen since they get access to a nationwide and well-established system. Elretur is the only nationwide collection system in Sweden.

In the initial years of the WEEE implementation, treatment was the higher component of the cost, and during this time municipalities were responsible for covering the costs of collection and storing waste. With the improvements in collected waste management supported by increasing prices for the recovered material streams, the balance has shifted over the years to the collection component. Consequently upon a request from municipalities, a new agreement was reached in January 2011 between El-Kretsen and the municipalities whereby the system will compensate the municipalities for part of their cost by around €4.2 million every year. The funds that the municipality receives are calculated by a formula that takes the population, WEEE quantity and number of collection sites into consideration.

El-Kretsen organizes the transport of WEEE collected by municipalities and businesses through the use of licensed contractors. The amounts of collected waste are continuously reported to El-Kretsen's web-based information system, which allows the carriers to plan and transport the waste effectively. The logistics system is based on the best possible use of large vehicles, quick loading and unloading with specialized loading carriers. El-Kretsen's loading carriers are marked with bar codes; the transporter reads the codes and keeps statistics of the collected waste quantities from each collection point. The WEEE is transported from the collection points to the so-called pretreatment facilities. Transportation of hazardous waste, which is the category that most types of WEEE fall under, is strictly regulated in Sweden.

Specialized pretreatment and recycling facilities with which El-Kretsen has a contract are regulated by the Swedish legislation, by agreements between El-Kretsen and the recycling companies, by certain developed standards, and by the code of conduct appended to all pretreatment agreements with El-Kretsen. Controls and follow ups at the facilities are made through audits, as well as through reports to El-Kretsen and to supervisory authorities. The control includes treatment at the facility and downstream treatment. The reports to El-Kretsen should account for how the WEEE was treated, where the fractioned material, such as metals, plastics and hazardous waste, was sent and how the material was treated at the receiving facility.

The producers have to register their products through an on-line system operated and monitored by the Swedish EPA. El-Kretsen keeps track of the logistics and treatment costs in different product categories and allocates them to the producers according to their market share. The municipalities are responsible to inform the households why WEEE must be separated, how to separate it and where it can be collected. The nationwide collection system comprises approximately 1,000 collection points around the country. They should also give information about the collection and recycling results from the producers. The municipalities fund information dissemination and the major part of collection, and the producers fund transport, treatment and recycling. The cooperation between local authorities and producers is considered as a key success factor. The producers are required to consult the local authorities before introducing a new collection system or upon demand of a local authority. The purpose of the consultation is to make the producers' collection system coordinate with the municipal waste management.

Avfall Sverige – Swedish Waste Management and El-Kretsen continuously work on improving WEEE management system and run parallel projects to develop new collection systems suited for specific conditions in different parts of the country in cooperation with several local authorities. These organizations also facilitate the diffusion of successful improvements across the country. A recent example of such efforts is the introduction of a special device called “The Collector,” which aims to increase the relatively low collection rates for fractions such light bulbs, smaller batteries and smaller WEEE. The device resembles a vending machine and is placed in stores, making it convenient for the public to return such WEEE.

Source: Authors based on material from Swedish Waste Management Association

(http://www.avfallsverige.se/fileadmin/uploads/elretur_eng.pdf) and interviews with personnel from Swedish Waste Management Association and El-Kretsen

67. With regards to the management of WEEE, Japan represents an important case and is considered as the front runner in use of the EPR dimension and in resulting design changes. Two different systems operate in Japan. One focuses specifically on computers, and the other covers other electronic equipment like TVs and household appliances.

Box 3: WEEE Management System in Japan

In Japan, the regulations to make producers responsible for collecting and managing the waste from electronics and household appliances came into force in 2001. Japanese municipalities were aware of the complexity associated with the WEEE and, therefore, did not want to be involved. Today there are two separate systems in Japan: (i) an arrangement dealing exclusively with computers, and (ii) a system that deals with WEEE associated with four product categories, including TVs, refrigerators and freezers, washing machines and air conditioners.

The system that deals with computers is relatively straightforward. The consumers are required to send in the computers they no longer want by post to the producers. Computers that are sold after October 2003 benefit from a postage fee paid by the producers, whereas for products purchased earlier, the consumers bear the cost.

For the rest of the WEEE, the retailers are the main actors with physical collection responsibility. The retailers may charge the consumers when they bring in their WEEE. The costs that consumers should pay to return their products are clearly marked with a sticker placed on the product. The costs of transporting and treating WEEE after being collected by retailers are borne by the producers.

In Japan, besides operating a recycling plant by themselves, every main EEE producer works very closely with other recycling plants. This is considered as one of the key issues underlying Japan’s success for stimulating ecodesign changes through the use of the EPR regulations. Despite the fact that the legislation does not set any collection targets, in 2007 the system that deals with large household appliances recycled around 3.7 kg/capita of WEEE. While the collection costs for the WEEE are reported to range between €1–40 per unit of appliance, the recycling costs for different product groups are reported to be as follows:

- Refrigerators and freezers: €44–53/unit;
- Washing machines: €24–32/unit,
- TV sets: €17–27/unit
- Air conditioners: €24–33/unit

Sources: Author’s interviews with Dr. Naoko Tojo and Mr. Panate Manomaivibool who are experts in the field of environmental product policy and work as researchers at the International Institute for Industrial Environmental Economics at Lund University, Sweden.

68. The US has recently introduced a new bill for e-waste legislation at the national level, the Responsible Electronics Recycling Act of 2010, geared toward stopping companies from exporting electronic waste to developing countries, an action that creates dangerous and toxic places, causes severe environmental damage and harms human health. In the US, which has not ratified the Basel Convention, it is estimated that 50-80 percent of the e-waste collected for recycling is being exported and ends up at unsafe overseas recycling facilities. The legislation has received support from companies like Apple, Samsung and Dell who have published this

initiative on their website. Currently there are 25 states in the US that have passed legislation mandating statewide e-waste recycling. All laws except California's use the producer responsibility approach, where the manufacturers must pay for recycling. This means that 65 percent of the US population is now covered by a state e-waste recycling law. Box 4 provides some detailed information on the US WEEE management system and its achievements in several states.

Box 4: WEEE Management System in the US

According to the Consumer Electronics Association (CEA), Americans own approximately 24 electronic products per household today.⁵² The US Environmental Protection Agency (EPA) estimates that Americans throw out 400 million units of high-tech trash annually and that they will dump another 50 billion over the next decade. In 2008, Vermont solid waste districts collected more than 1.6 million pounds of e-waste. According to a report from the policy center Demos, constant upgrades caused by improving technology and plunging prices create millions of pounds of e-waste. The products are often potentially toxic, containing lead, mercury, chromium, zinc and other hazardous materials. Of the throwaways, most are sent to dumps and incinerators. Less than 15 percent are recycled—usually through voluntary takeback programs or processed in developing countries using unsafe methods, according to the Demos study.

Beginning in January 1, 2005, an Electronic Waste Recycling Fee was assessed for sales in California on certain electronic devices covered by law, such as video display products like computer monitors and televisions. The fee for California consumers ranges from \$8–25 depending on screen size and is collected at the time of retail sale, including Internet and catalog sales. Collected fees are deposited in an Electronic Waste Recovery and Recycling Account managed by the State of California and are used to pay authorized collectors and recyclers, fostering the development of recycling opportunities and offsetting the cost of properly managing these types of products at their end of life.⁵³

Examples of innovations include (i) Electronics Recyclers International in Fresno, California has a 900-horsepower tech-trash shredding system that can gobble up 20,000 pounds an hour, and the company's founder also launched 1800-recycling.com, which directs customers to local recycling centers; (ii) California has more than a dozen eco-ATMs, automated self-serve machines that can identify and buy back used electronics directly from consumers; (iii) Dell said it diverted more than 150 million pounds of electronics from landfills in fiscal year 2011, nearly two-thirds from the Americas, in a program that invites consumers to drop off old computers, monitors, printers, scanners and more at Goodwill donation sites; (iv) Best Buy said that its in-store recycling kiosks gathered nearly 7 million pounds of e-waste in California—about 52,000 pounds per store.

In the US nationwide, the Consumer Electronics Association said it hoped to recycle a billion pounds of e-waste a year by 2016—about three times more than the 2010 amount and enough to fill a 71,000-seat stadium. The EPA is working to educate consumers and others on why it is important to reuse and recycle electronics and what options are available for safe reuse and recycling of these products. Increasingly state and local governments, manufacturers and retailers are providing more opportunities to recycle and reuse this equipment.

Starting January 1, 2011, in Vermont, a new electronic waste law bans the disposal of electronic waste and provides convenient free collection of certain electronic waste for consumers, charities, school districts and small businesses.⁵⁴ Currently Vermont solid waste districts subsidize the cost of e-waste collections to prevent disposal and provide for better waste management of the waste. The Procedure for the Environmentally Sound Management of Electronic Waste for Collectors, Transporters and Recycling Facilities, effective July 1, 2011, establishes guidelines for the proper environmental management of electronic devices collected, transported and recycled in the State of Vermont. It also provides guidance on how to register as a collector, transporter or recycler under Vermont's electronic waste management law. Manufacturers will pay for the e-waste collection and recycling program starting July 1, 2011. E-devices, such as computers and monitors, printers, TVs, VCRs, stereo equipment and wireless phones, will be banned from landfills.

Other state initiatives include Maryland's county-by-county collection system established in 2006 with the manufacturer responsible for either funding the program or creating their own plans. This law was updated in 2007 with a new measure that expands the product scope to include TVs and other display devices. Virginia signed a bill on March 11, 2008 that underlines the producer responsibility and requires manufacturers to set up a collection system for consumers to return computer equipment for recycling and reuse free of charge.

Source: Authors

⁵² Consumer Electronics Association, Market Research Report, Trends in CE Use, Recycle and Removal, April 2011

⁵³ The TRI Products Inc. website, a California State Approved Electronic Waste Recycling Center.

⁵⁴ Vermont E-Waste recycling program website, <http://www.anr.state.vt.us/dec/e-waste/>.

3. Overview of the Sector, Future Projections and Key Issues

Generic

69. Electrical household appliances sector comprises a large number of diverse product groups. These product groups include large household appliances known as “white goods,” such as fridges, deep freezers, washing machines, dishwashers, dryers, ovens, cookers,⁵⁵ and smaller household appliances, such as blenders, mixers, toasters, and fruit presses, as well as others, such as air conditioning equipment, water heaters and water treatment units.

70. The Turkish household appliances sector started production in the 1950s as an assembly industry. Manufacturing of the first products started in 1955, and the first Turkish-made refrigerator, named Arçelik, was on the market in 1960. Since then, and except during crisis periods, sector production has increased continuously. Six main producers represent about 90–95 percent of the domestic market with around 50 medium-size manufacturing plants and around 500 firms supplying parts and components. There are also some 12,000 distributors and 1,500 authorized service stations.⁵⁶ About 200 of the suppliers are organized under the White Goods and Parts Suppliers Association of Turkey (BEYSAD). Six major producers are members of the Association of Turkish White Goods Producers (TURKBESD). Manufacturers of the smaller white goods products are organized in the Small Domestic Appliances Industrialists (KESID).⁵⁷

71. The manufacturing plants in the white goods sector has a production capacity of more than 25 million units per annum, representing the second largest capacity in Europe after Italy.⁵⁸ While up to 20,000 people are employed in manufacturing of household appliances, this figure reaches 120,000 when the sector suppliers are included. Out of this, 15,000 people are white-collar workers, and remainder hold blue-collar jobs.⁵⁹ Including distributors and service station, the household appliances sector provides jobs for 2.0 million people. Firms in the sector represent both domestic and foreign capital investment. The six main producers are members of TURKBESD. Table 4 lists these producers and their brands.

Table 4: Main Companies of the White Goods Sector

Company name	Brands	Source of Capital
Arçelik	Arçelik, Beko, Altus	Domestic
Vestel	Vestel, Regal	Domestic
BSH	Bosch, Siemens, Profilo	German
Indesit	Hotpoint, Ariston, Indesit	Italian
Demirdöküm	Demirdöküm	Domestic
Süsler-Candy	Hooever, Süsler	Italian and domestic

⁵⁵ For this study, the main focus is on the products included in the large household appliances category.

⁵⁶ Ministry of Industry and Trade (2011) White Goods Sector Report. General Directorate of Industry.

⁵⁷ Export Promotion Centre of Turkey (2010) Household Appliances.

⁵⁸ Republic of Turkey Prime Ministry Investment Support and Promotion Agency of Turkey, July 2011, Turkish Home Appliances & Electronics Industry Report.

⁵⁹ Ministry of Industry and Trade (2011) White Goods Sector Report. General Directorate of Industry.

72. According to a recent study,⁶⁰ the largest domestic market shares belong to the following producers: Arçelik 57 percent, Bosch 25 percent, and Vestel 18 percent. Sector manufacturing plants are concentrated in the Marmara, Aegean and Central Anatolia regions with main production facilities in Istanbul, Manisa, Eskisehir, Bolu, Bursa, Izmir, Ankara, Kocaeli, Yavlova, Kayseri, Konya and Bilecik.⁶¹

73. Turkey's membership in the European Customs Union stimulated foreign direct investments in the sector. Main European brands like Bosch-Siemens and Merloni invested in Turkey, fueling domestic competition and stimulating research and development (R&D) in domestic firms and compliance with EU's quality standards. While the ratio of R&D spending to sales in three of the largest exporting companies were 0.70, 0.12 and 0.11 percent in 1994, these ratios rose to 1.63, 0.81 and 0.36 percent in 1998.

74. Similar to other sectors in Turkey, the majority of R&D activities in the white goods sector was geared toward quality and design improvements and product adaptation. In recent years, however, product development efforts have increased. As the sector pioneer, Arçelik has 10 percent of all product patents issued in Turkey.⁶² Considering that the total number of patents issued in Turkey remains significantly below developed countries, this white goods company share is a telling indicator of achievement in this sector.

Economic Outlook

75. On average, the value added in the white goods sector is in the range of 55 to 60 percent, and the sector contributes around \$1 billion in indirect taxes. In 2008, revenues in the sector amounted to \$8 billion, and exports reached \$3.4 billion.⁶³ In 2009, the Turkish electronics sector grew substantially, reaching a production volume of about \$9.5 billion and registering export revenues of \$4.9 billion and imports of \$12.2 billion.

76. In 2008, the global sales of white goods trade reached \$61.6 billion. In the same year, the largest trade volumes registered were China with 25.9 percent, Germany with 11.7 percent and Italy with 11.6 percent of the global trade. Turkey followed in fourth place globally with a share of 4.3 percent. Sector exports have grown significantly over the years, and according to the latest figures exports of white goods reached around \$2.23 billion in 2010.⁶⁴ In 2009, the exports of the sector accounted for 5 percent of Turkey's export volume.⁶⁵ The sector aims to reach an export volume close to \$10 billion by 2023.⁶⁶

77. In 2009, the sales of white goods dropped by 4 percent in Western Europe and 25 percent in Eastern Europe. In Turkey, white goods production, shown in Figure 4, contracted by 4 percent, but exports increased by 4.5 percent. To overcome stagnation in the sector, from March to June 2009 the Government of Turkey reduced the private consumption tax applicable to white

⁶⁰ N. Alptekin (2010) Estimating Market Share Of White Goods Sector in Turkey with Analytic Network Process.

⁶¹ Ministry of Industry and Trade (2011) White Goods Sector Report. General Directorate of Industry.

⁶² Enterprise Europe, (2009) White Goods Sector Report

⁶³ Ibid.

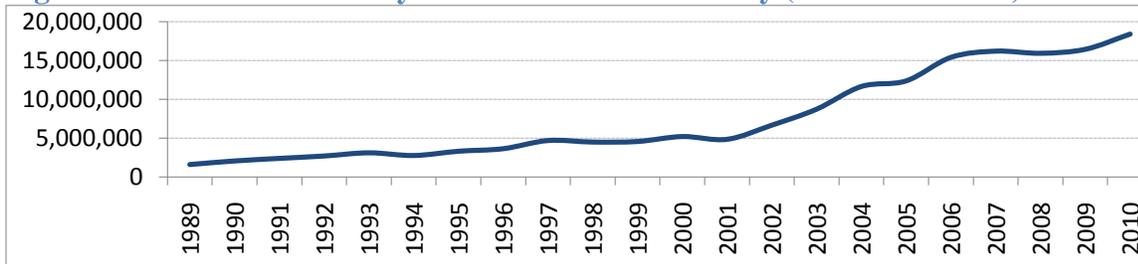
⁶⁴ General Secretariat of Istanbul Mineral and Metals Exporters Association-IMMIB (2001).

⁶⁵ Industry and Trade (2011) White Goods Sector Report. General Directorate of Industry

⁶⁶ Ministry of Industry and Trade (2011) General Assessment of Turkish Industry Sectors 2010.

goods from 6.7 percent to zero percent. Between June and September 2009, the tax reduction was adjusted to two percent. Furthermore, special provisions were made for value added tax applied to some equipment used by the sector. These tax adjustments significantly increased sales volumes for white goods.

Figure 4: Total Production by the White Goods Industry (number of units)⁶⁷



Source: TURKBESD

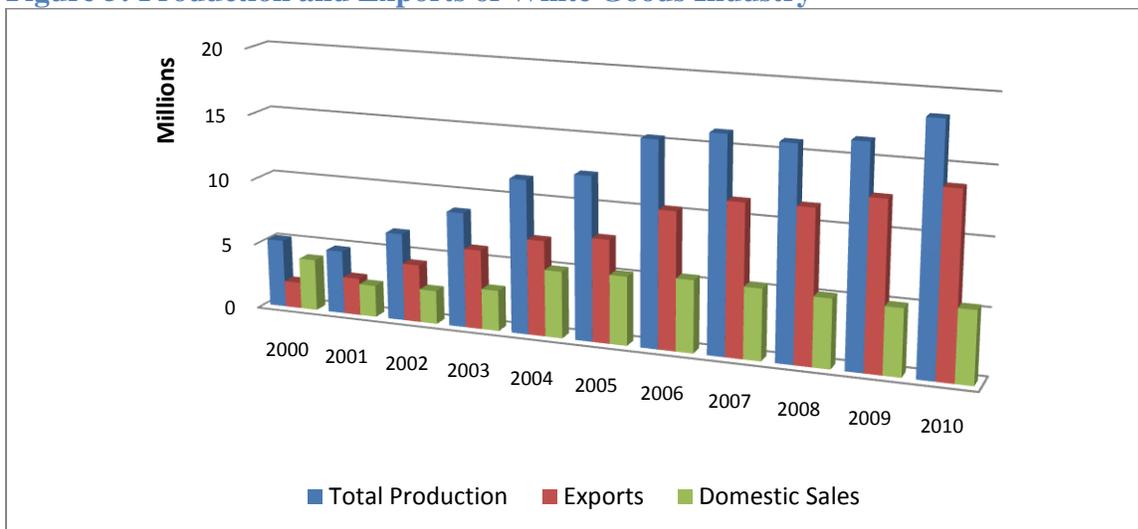
78. Turkish white goods exports increased considerably within the last decade. The share of exports and domestic sales for the sector is given in Figure 5. The economic value of the sector's international trade between 2004 and 2008 is provided in Table 5.

Table 5: Economic Value of International Trade in the White Goods Industry (US\$ thousands)

	2004	2005	2006	2007	2008
Exports	1,429,542	1,698,861	2,154,707	2,725,238	2,964,047
Imports	251,207	299,667	391,282	439,769	548,531

Source: Undersecretariat of Foreign Trade

Figure 5: Production and Exports of White Goods Industry



Source: TURKBESD

⁶⁷ Based on data provided by TURKBESD.

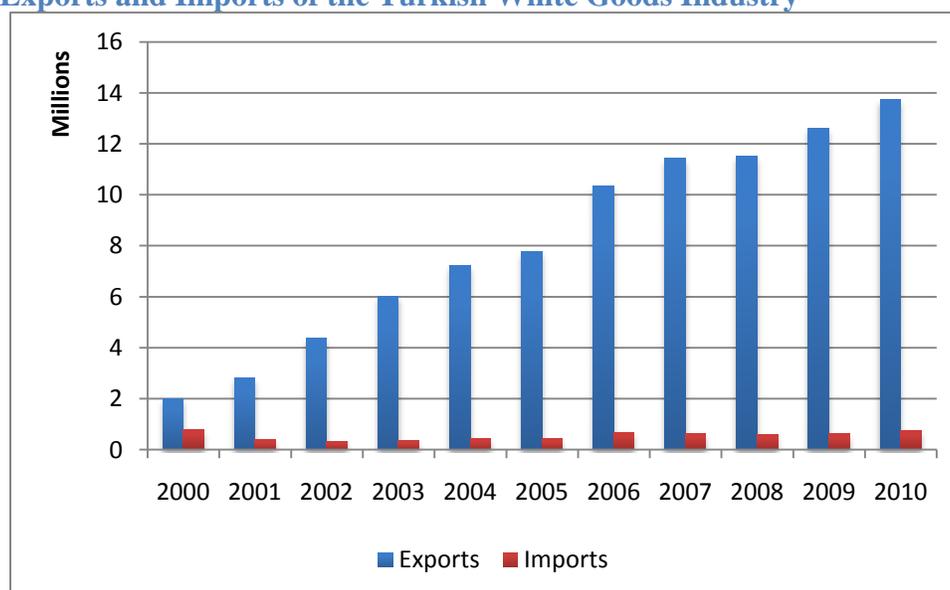
79. Whereas the EU market is the main destination and accounts for 66 percent of Turkey's exports, the sector also has a global reach thanks to production plants in Russia and China.⁶⁸ In the early years after Turkey became a part of the EU customs union, the demand for imported brands increased. Demand has shifted back to domestic producers who have improved their product quality. The fact that Turkish producers can meet the EU quality standards at a lower cost is an important competitive advantage. However, the price discrepancies for domestic and export markets maintained by public enterprises have an adverse impact on the price competitiveness of Turkish producers in domestic and foreign markets.⁶⁹ Imports in the sector remain considerably small (see Figure 6). The breakdown of export volumes per product category and main export destinations is given in Table 6.

Table 6: Breakdown of Exports in White Goods Sector⁷⁰

	Years					Destination (with percentage shares)
	2004	2005	2006	2007	2008	
Refrigerators and deep freezers	591,478	737,653	936,188	1,148,690	1,106,660	England (16), France (12), Germany (9), Italy (7), Iraq (6)
Washing machines	390,551	475,864	579,908	645,360	667,138	France (11), Germany (10), Italy (10), England (9), Spain (8)
Dishwashers	51,099	67,192	109,275	209,793	264,208	France (16), Spain (15), England (12), Italy (8), Germany (7)
Ovens-cookers	141,359	139,617	156,597	199,733	251,898	England (15), Romania (10), France (9), Russia (6), Ukraine (5)
Others	255,055	278,535	372,738	521,662	674,143	England (16), Germany (12), Russia (7), France (7), Italy (4)

Source: Undersecretariat of Foreign Trade

Figure 6: Exports and Imports of the Turkish White Goods Industry



⁶⁸ Ministry of Industry and Trade (2011) White Goods Sector Report. General Directorate of Industry

⁶⁹ Enterprise Europe, (2009) White Goods Sector Report.

⁷⁰ Undersecretariat of Foreign Trade.

Source: TURKBESD

79. In Turkey the upward trend of production and export figures of white goods sector continued in January 2011.⁷¹ According to TURKBESD, production and export volumes in January 2011 has increased by 11.3 and 8.26 percent, respectively, as compared to the same period of 2010.

Key Issues for the Sector

81. Turkish white goods brands are less known in foreign markets. Market saturation in the EU, high transportation costs and difficulties faced in customs create challenges to export. In addition, imported goods that are not in compliance with Turkish standards constitute a major problem for Turkish producers.

82. In the domestic market, inadequate market control and sales without invoicing forms remain a problem. These sales often take place in spot markets that offer prices lower than retailers, giving rise to unfair competition. Such sales also represent a loss of tax income for the state and fuel an informal economy. In addition, the white goods sector depends heavily on Cr-Ni steel, which is imported.

Environmental Profile of the Sector

83. Environmental impacts of white goods can arise during production, while in use or at the end of their service life. In the *production stage*, the main concerns are significant water and energy consumption and effluent discharge, containing toxic and hazardous chemicals like solvents, heavy metals, acids, detergents and even cyanide used for surface treatment and coating, as well as the generation of hazardous solid and liquid waste. The *use phase* is considered to have the lion's share with more than 90 percent of total environmental impact⁷² primarily with energy consumption and associated emissions. For example, according to information from Arçelik,⁷³ the use phase accounts for 92 percent of total life-cycle emissions of CO₂ with the production/assembly stage at 7 percent and logistics at 1 per cent. Water consumption, detergent use and subsequent effluent generation are also among important environmental impacts in the use phase. The main environmental impact of the *end-of-life stage* is the release of toxic and hazardous substances and greenhouse gases, which can result in severe land and water contamination or contribute to global warming.

84. In general the Turkish white goods sector can be characterized as having a good environmental performance profile, touching upon all key life cycle stages. Production facilities of main producers have environmental management systems (EMS) that comply with the requirements of the ISO 14001 standards. Necessary effluent and emission control systems are also in place, and facilities are in full compliance with applicable environmental regulations with discharge and emission permits. Some companies even attain compliant status prior to the

⁷¹ Turkey Consumer Products: White Goods Production, Exports Up in January, Economist Intelligence Unit, February 2011.

⁷² R. Otto, A. Ruminy, and H. Mrotzek, (2006) Assessment of the Environmental Impact of Household Appliances. Appliance Magazine. April 2006.

⁷³ Arçelik Sustainability Report 2008-2009.

implementation of certain regulations, such as one that packages waste.⁷⁴ Going beyond compliance, sector companies have good track records for adoption of cleaner production approaches that reduce resource consumption and improve environmental performance. For example, Arçelik, one of the sector's main players, has reduced water consumption per unit production for different product groups between 5–57 percent from 2008 to 2009. In the same period, overall heat and electrical energy consumption were also reduced by 10 percent,⁷⁵ and the eight production facilities of the company were recently given a high energy efficiency rating by an independent German energy auditor.⁷⁶ Another large player, BSH, reported around a 50 per cent reduction in water used per unit of production as a result of a resource productivity effort. They also lowered energy consumption by 36 percent and CO₂ emissions 82 percent by switching to natural gas in one facility.⁷⁷ In addition, sector companies have voluntarily assisted the MoEF work that aims to develop a waste inventory of industrial operations in the country and works with various universities and research centers to this end.

85. Introducing design changes to reduce the environmental impacts arising during the *use phase* is an area where the Turkish companies have been particularly progressive and successful. Since the 1990s, Turkish companies have concentrated their R&D efforts to resource efficiency and developed products that save significant energy and water during use. For example, washing machines and dishwashers produced by BSH use 67 and 57 percent less water today, respectively, as compared to 1990. Table 7 summarizes the energy efficiency improvements realized with BSH products. Other producers, like Vestel, also have products that reduce water consumption during use.

Table 7: Energy Consumption of Different White Goods Produced by BSH Group⁷⁸

Product Group	1990	2007	Saving
Refrigerator	0.53 kWh	0.11 kWh	79%
Freezer	0.53 kWh	0.19 kWh	75%
Freezer Refrigerator	0.57 kWh	0.22 kWh	61%
Cooker	1.10 kWh	0.76 kWh	31%
Dishwasher	1.74 kWh	1.05 kWh	40%
Washing Machine	0.27 kWh	0.17 kWh	37%

86. The majority of sector products have energy efficiency ratings that meet, and in certain cases surpass, the requirements set by “class A” of EU’s energy labeling scheme,⁷⁹ which sets moving targets. In Arçelik's case, 100 percent of washing machines and dishwashers, 79 percent of refrigerators and 40 percent of ovens produced in 2009 allow energy savings required by class A or more.⁸⁰ Companies also support programs that aim to raise public awareness about

⁷⁴ Ibid.

⁷⁵ Ibid.

⁷⁶ F. Özkadı, Energy and Environment Manager at Arçelik. Personal communication (1.6.2011)

⁷⁷ BSH Group, Environmentally Friendly Initiatives. <http://www.bsh-group.com.tr/page.aspx?id=142>.

⁷⁸ Adapted from BSH Group, Environmental Sustainability, Energy Efficiency. Available at <http://sustainability.bsh.com.tr/page.aspx?id=93>

⁷⁹ The scheme places products in one of the seven categories marked by letters from A to G, where A represents the products with highest energy efficiency.

⁸⁰ Arçelik Sustainability Report 2008-2009.

environmental impacts of white goods. Arçelik, for example, has developed campaigns concentrating on energy efficiency in collaboration with UNDP-Turkey and on water use with the TEMA foundation, a local environmental NGO.

87. For the end-of-life phase of product management, the main producers report high recyclability rates for their products. Arçelik, for example, states that white goods they produce have recyclability rates between 84 and 98 percent, depending on the type of product. BSH states that 80 percent of the materials used in large household appliances can be recycled.⁸¹ However, these companies do not practice taking back their products and recycling appropriate components. With regards to refrigerant gases used in refrigerators and freezers, the companies have moved progressively from those with high ozone depletion and greenhouse potential, such as CFCs, to more environmentally friendly alternatives, such as R134a and R600 (isobutene). In accordance with the requirements of the RoHS Directive for the end-of-life stage to which Turkish producers comply, products contain limited amounts of hazardous substances.

88. In addition to environmental regulations in Turkish national legislation, the companies also meet the requirements of EU environmental regulations that are not yet implemented in Turkey, such as registration, evaluation, authorization and restriction of chemical substances (REACH) and WEEE. The fact that sector companies received several environmental awards from reputable national and international organizations, support the sector's argument that they maintain high environmental performance profile.

⁸¹ BSH Group Environmental Sustainability. <http://sustainability.bsh.com.tr/page.aspx?id=105>

4: WEEE in Turkey

Turkey's Context for Implementation of WEEE

89. Before defining the implementation challenges linked to the transposition of EU Directive on WEEE, it would be useful to highlight certain country dynamics that are relevant to this analysis. The following characteristics and dynamics are of particular importance.

90. WEEE penetration, despite growing trends, still remains comparatively lower than the EU average. This is linked to Turkey's relatively low income levels and living standards. In addition, the service life of electrical and electronic products, similar to other durables, is much longer than in the EU countries. Tight family and social links mean products no longer wanted by one party are passed to another who continues to derive value from it. This cascading effect can involve several users. Even when products are no longer used for their original purpose, owners can revalorize their utility, for example, washing machines turned into flower pots is not an uncommon sight in Turkey.

91. When used white goods are no longer wanted by their users, they are usually sold to scrap collectors, merchants or service stations—items like washing machines can have an end-of-life price of YTL 20–50 per item. Products discarded by their users are quickly spotted, collected by scrap merchants and either refurbished for further use or processed for recovery of valuable fractions. Consequently, both the amount of WEEE that arises from households and the amount sent to landfills or discarded in an uncontrolled manner into the environment are believed to be low.

92. In Turkey, scrap dealing is widespread. It plays an important role in the effective collection of various waste streams, including WEEE, and the extensive revalorization of useful material streams. The sector includes collectors and processors and is a significant employer, particularly in the Ankara region where more than 10,000 people are directly engaged with collection, pre-treatment and recovery of different waste streams.. In the entire country, 1.5 to 2 million⁸² people are believed to have their livelihoods linked to the scrap dealing sector, including WEEE. Currently scrap collectors collect, and at times purchase, a great majority of the WEEE from consumers, service stations or from waste sites. Collectors bring the materials to scrap processors who buy the scrap based on a price decided by the market value of the useful fractions they can extract. Scrap processors are regarded to have significant knowledge and skills regarding dismantling and recovery. They perform highly useful and valuable pretreatment by dismantling collected products and sorting and preparing valuable fractions for recovery. Most of these fractions are then sold to appropriate domestic and overseas parties that can perform the actual recovery. Consequently the scrap dealing sector is of key importance to the low-cost and highly effective collection and pretreatment of WEEE and to the recovery and recycling of useful materials. In fact, it is believed that this sector collects and pre-processes 99 percent of the WEEE generated in Turkey. Prelicensed companies are reported to rely heavily on scrap dealers for collection, pretreatment and even treatment of WEEE and to form partnerships with them to take part in WEEE tenders opened by large companies.

⁸² Cinkaya, İ. Chairman of Turkish Scrap Merchants Association. Personal communication. 14 June 2011.

93. Nevertheless, the majority of scrap processors are known to operate in a way that harms both the environment and workers' health. A big portion of the processors are small players that operate at facilities with limited space and inadequate infrastructure. They usually follow the shortest route to recovery of valuable fractions that often results in the release of harmful fractions in the environment. . They are believed to lack both the awareness and the funds for necessary environmental and safety improvements. They have limited record keeping and reporting capabilities and a great deal of their operations is believed to be outside the formal system.

94. Also in Turkey, white goods manufacturers have used “trade-in” offers successfully for many years, and these have intensified in the last decade. This has two major implications. The first, based on the observations during the latest trade-in campaign, is that only a small fraction of white goods older than 15 years are still in use. Given that no CFCs were used by the Turkish manufacturers since 1995, this may mean that the number of CFC-containing cooling equipment is relatively low.⁸³ The second implication is that the campaigns provide a special channel that can be highly effective in collecting end-of-life white goods.⁸⁴

Transposition of WEEE Directive in Turkey

95. Transposition preparations for the WEEE Directive started in 2004. The MoEF conducted several studies to support the analytic basis for WEEE implementation plan, which included the Matra Project cooperation supported by the Government of the Netherlands and the UK Department for Business Enterprise and Regulatory Reform (BERR), the responsible party for the transposition and implementation of the RoHS and WEEE Directives in Turkey. MoEF completed another study in cooperation with the Slovak Environmental Agency under the UNEP/MAP. In the mean time, the preparations concerning the RoHS regulations were completed, and the regulation came into force on May 30, 2008, after publication in the official gazette number 26891.

96. The WEEE draft regulation was published on MoEF’s website in October 2010, requesting feedback by the relevant parties and the private sector. In fall of 2010, a “regulatory impact study” funded by the EU and conducted by Regional Environmental Center (REC) of Turkey was initiated. This study aims to analyze the directive's economic, environmental and social impacts under different implementation scenarios which would provide the best balance of economic, environmental and social performance. As part of this study, a minimum of four workshops were organized in different regions of the country in which issues pertaining to directive implementation were discussed with multiple stakeholders, including municipalities and private companies. It is believed that this study has produced a number of useful insights and these are taken into consideration while creating updated drafts of the regulation. Although the same study is also stated to have produced preliminary information that would be highly useful for our study, such as WEEE quantities or compliance costs under different scenarios, our team was unable to gain access to these findings.

⁸³ D. Temel (2009) WEEE Directive and Turkey. Problems Facing the Implementation of 2002/96/EC on WEEE in Turkey.

⁸⁴ The industry states that trade-in campaigns are traditionally used as a marketing tool and have not been utilized for physically taking back old products.

97. MoEF has communicated different drafts of the directive with different stakeholders and requested their feedback. It has also organized consultation meetings where relevant stakeholder groups were invited. Based on the contents of the last two drafts⁸⁵ of the regulation, several interviews confirm that industry feedback was taken into consideration and changes were made accordingly. However, it also indicates that representation of relevant stakeholders could be increased. Some important changes reflected in the May draft of the 2011 legislation include new collection, recovery and recycling targets for Turkey until 2016, as well as revised producers' responsibilities, such as providing training, achieving the collection targets and having control of the process they will finance without being responsible to provide containers for municipalities. A specific comparison of the three current drafts available in the public domain is provided in Annex 1.

Implementation Challenges

98. There are a number of conditions specific to Turkey that pose considerable implementation challenges and therefore need to be highlighted. Some of these challenges are similar to those experienced in some EU Member States, in particular for newer members.

99. As no official WEEE management is in place, accurate information regarding quantities, characteristics and geographic distribution of WEEE in the country does not exist. There are various attempts to make educated assumptions regarding WEEE generation, including this study, but these have error margins that can be significant.

100. Consumer awareness and behavior is a key determinant in WEEE application. Although there are several on-going efforts to raise public awareness, the current level stays significantly low. There are also large demographic and economic differences across the country, creating significant heterogeneity among geographic regions. Two of the major and somehow interconnected implications of such heterogeneity are (i) the difficulty to access sufficient quantities of WEEE in the eastern and southeastern parts of the country where population is sparse and income levels are lower and (ii) the work toward a uniform national target may result in emphasis placed only on those regions with high WEEE concentration—typically the Marmara region and around larger and more prosperous cities like Ankara, Izmir, Adana, Antalya, Gaziantep, and Kayseri—leaving environmentally unwanted practices intact in the rest of the country.

101. In EU experience, countries that have inadequately developed waste management capabilities find it particularly difficult to meet WEEE directive requirements. Although considerable improvements have been made to this end in recent years thanks to significant investments, waste management and recycling and recovery systems are highly inadequate and in their infancy. While waste is usually collected with no or insufficient source separation, proper handling of collected waste is weak. Out of 3,215 municipalities, only 13 have a sanitary landfill in place. Of the 18–20 million tons of solid waste collected only about 2.5 million tons are recovered and recycled. The infrastructure for handling WEEE is even less developed. None of the recycling facilities that will require large investments are in place. Out of the estimated

⁸⁵ There are three drafts available: October 1–17, 2010; December 2–18, 2010 and May 4, 2011

WEEE arising of around 368,000⁸⁶ tons, only 5,000⁸⁷ tons were handled by licensed firms in 2010.

102. In Turkey municipalities are responsible for proper management of municipal solid waste. As the majority of the municipalities lack the resources to meet this responsibility by themselves, they increasingly engage subcontractors for the work. Despite having a thorough procedure for such arrangements in place,⁸⁸ there are concerns regarding the current practice. More specifically, political interests may sometimes influence the selection of subcontractors, and these sub-contractors may perform suboptimal waste management to maximize profit. As previously stated, source separation is highly underdeveloped and not always encouraged by waste operators. The consequence is inadequate technical infrastructure and lack of consumer readiness for proper end-of-life WEEE management, making implementation particularly challenging.

103. According to the latest draft of the Turkish WEEE Directive (dated 4.5.2011), the responsibility to collect WEEE from consumers is given to the municipalities. This will require municipalities to develop the necessary infrastructure and engage the necessary personnel. However, the majority of the Turkish municipalities already experience resource shortages and can barely fulfill more fundamental obligations, including water distribution, sewage treatment, and road maintenance. Consequently the municipalities are likely to experience difficulties in accessing required resources and making necessary investments. This can hinder or delay crucial collection efforts.

104. The draft directive includes provisions concerning reuse of WEEE. There are, however, numerous concerns regarding reuse. Turkey lacks legal provisions governing product reuse, and reuse promotion can lead to suboptimal results unless legal provisions are developed concerning product safety and consumer protection; energy rating limits; chemical composition of products; product liability issues; and quality control procedures.

105. From an administrative point of view, WEEE directive implementation will require certain resources both for the private and public sector. Currently the MoEF is reported to have only one and a half person responsible for the WEEE Directive. This presents a major challenge, as the MoEU takes the responsibility to keep a registry of eligible producers and to perform necessary monitoring and control functions for a substantial number of parties estimated to be between 5,000 and 16,000.⁸⁹ Although it may not possible to estimate the exact number of additional resources to deliver the required performance, the establishment of a dedicated team with sufficient resources would be essential.

Estimation of WEEE Quantities in Turkey

106. The availability of representative and reliable information on the quantity, type, geographic distribution and temporal trend of WEEE forms the backbone for a meaningful

⁸⁶ While this value reflects our estimates, the REC study estimates the WEEE arising between 350,000 to 550,000.

⁸⁷ The REC study states this number is 10,000 tons.

⁸⁸ As part of the permitting process, interested parties prepare waste management plans with the municipalities. These are checked and approved by the MoEF and the local environmental directorates that monitor compliance.

⁸⁹ S. Arcan, (2011) Personal communication. Environmental Engineer, MoEF (13.6.2011)

analysis. Recent data is often difficult to get. Therefore, in the absence of the most recent estimates, the first iteration of this note's assessment is based on earlier sources, namely the study conducted by MoEF under UNEP/MAP (2009). The UNEP/MAP study estimates Turkish waste quantities using WEEE arisings for white goods in 2007 from international studies⁹⁰ and statistics of products sold from Statistical Institution of Turkey (TUIK). The results of this approach are given in Table 8. As a crosscheck, a comparison of sales figures listed in the second column was found to be consistent with sales information from TurkBESD.

Table 8: Estimated Waste Quantities for Large Household Appliances for 2007

Product	Sales in 2007 (# units)	Waste (tons)	Waste (kg/capita)
Refrigerator	1,899,774	76,117	1.1
Washing machine	1,534,769	45,995	0.7
Dishwasher	983,600	11,488	0.2
Oven	735,411	20,056	0.3
Air conditioner	1,300,000	2,470	0.0
Other white goods	500,000	360	0.0
Total large white goods (WEEE category 1)	6,953,554	156,486	2.22

Source: Adapted from UNEP/MAP (2009) Final Report

107. The UNEP/MAP study also calculated waste quantities arising from the other products and categories as shown in Table 9, using the WEEE distribution data for the European Union in 2005. Note that large household appliances currently constitute nearly 50 percent of total WEEE, and CRTs and monitors comprise over 20 percent. These figures are for 2007, but equally important is the pattern and direction of future product demand and its consequent waste streams. To get a sense of where demand is going Table 10 summarizes growth across several broad WEEE product categories that are regularly tracked by consistent and reliable sources.

Table 9: Estimated Waste Quantities for Different EEE Categories for 2007

Product Class	Waste (tons)	Waste (kg/capita)	Rate in total WEEE
Large household appliances	156,486	2.22	49.00%
CRT TV's	42,475	0.60	13.30%
CRT monitors	26,507	0.38	8.30%
IT and telecom (except CRT)	25,549	0.36	8.00%
Consumer electronics (except CRT)	24,910	0.35	7.80%
Small household appliances	22,355	0.32	7.00%
Electrical and electronic equipment	11,178	0.16	3.50%
Lighting equipment	7,665	0.11	2.40%
Observation and control tools	639	0.01	0.20%
Automats	639	0.01	0.20%

⁹⁰ The assumptions given in the 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE) – Final Report dated 5th August 2007 issued by United Nations University are used.

Toys, hobby and sports equipment	319	0.00	0.10%
Medical devices	319	0.00	0.10%
LCD monitors	0	0.00	0.00%
Flat panel TV's	0	0.00	0.00%
Total WEEE	319,359	4.52	

Source: Adapted from UNEP/MAP Final Report (2009)

Table 10: Growth and Population Assumptions 2007-2016

Product category	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016*	2017*	2018*	Source
Electrical appliances & housewares (% real change)	12.4	5.9	-6.3	7.2	5.9	6.4	7.3	7.0	6.7	5.9	5.3	4.9	EIU, March 2011
Household audio & video equipment (% real change)	10.2	-2.3	-6.4	8.6	6.7	6.4	6.2	5.9	5.4	4.8	4.3	3.9	EIU, March 2011
Television sets (stock per 1,000 people)	497	513	528	544	547	551	556	562	569	569	569	569	EIU, March 2011
Television sets (% growth)	1.0	3.2	2.9	3.0	0.6	0.7	0.9	1.1	1.2	0.0	0.0	0.0	Author's calculation
PCs ('000 units)	9,500	16,150	18,489	21,131	23,236	25,426	27,674	29,971	32,337	32,337	32,337	32,337	EIU, March 2011
PCs (% growth)	46.2	70.0	14.5	14.3	10.0	9.4	8.8	8.3	7.9	0.0	0.0	0.0	Author's calculation
Population demographics													
Real GDP growth (annual %)	4.7	0.7	-4.8	8.9	5.5	4.7	5.2	5.5	5.2	4.6	4.1	3.8	EIU, March 2011
Population (million)	71.16	71.89	72.83	73.76	74.67	75.42	76.18	76.94	77.71	78.48	79.27	80.06	UN Population Statistics
Population growth (annual %)	1.3	1.0	1.3	1.3	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	UN Population Statistics
Total domestic WEEE collection target						0.2	0.3	0.5	1.0	4.0	4.0	4.0	Draft WEEE Regulation

Notes: Forecasts of consumer product growth were not available, so numbers from 2015 are adjusted using available forecasts of GDP growth from the EIU. Growth in television and PC penetration were not available and are conservatively assumed constant from 2015 onward.

Sources: Economist Intelligence Unit (EIU); UN Population Statistics; Draft WEEE regulation; Author's calculations.

108. The figures in Table 10 represent growth from the retail side, but these may not reflect the WEEE that would be generated at the end-of-product-life stage. Indeed, it is Turkey's experience that certain product turnover is quite low, as consumers pass on products to others who continue to use them for the same or other purposes. As incomes rise in urban and rural settings, however, demand for new products is expected to rise. Additionally awareness of WEEE value is expected to generate further demand for these products, as old appliances are replaced with newer, more efficient units. In this basic representation, these growth estimates are used with the understanding that this simplification may overestimate WEEE to some extent.

109. Growth in traditional household items, such as large appliances and video equipment, fell dramatically during the economic crisis in 2008-2009, whereas the per capita stock of television and PCs was still on the rise. Forecasts beyond 2015 were difficult to obtain for specific product categories of appliances and electronics, but since consumption of these goods is a function of income, 2015 growth rates were adjusted for the first two product categories by forecasted Gross Domestic Product (GDP) growth, a measure of national income growth. Note that GDP growth slows beginning in 2015, and thus the corresponding demand for appliances and electronics also declines. The market penetration of televisions and PCs (units per 1,000 people) is likely to continue to rise in the future well beyond 2018, but corresponding growth figures were unavailable for these products past 2015. In this case, market penetration rates by GDP are not adjustable since annual changes in GDP growth are actually negative (i.e., percentage change in GDP year-over-year). Applying the same technique above would result in a declining penetration rate, which is probably unrealistic. In this case, a conservative assumption is made for constant penetration rates for televisions and PCs after 2015.

110. Returning to the calculation of total waste amounts, growth rates were assigned to each product category and the results are presented in Table 11. Large household appliances dominate overall WEEE volume, however, the share of other forms of electronic waste rise with increased penetration of computers and CRT monitors. Total WEEE arisings reach nearly 583,000 tons by 2018, a number that closely reflects estimates from other studies.⁹¹ Per capita WEEE reaches 7.3 kg/person by 2018 and, if the current draft legislation of 4 kg/person were effective, this would imply a collection rate of approximately 55 percent. This amount is twice as high as collection rates commonly achieved in most European countries.

⁹¹ Namely the study by the Regional Environment Center (REC), which approximated total annual WEEE arisings from 350,000 to 550,000 tons each year.

Table 11: Projection of Waste Quantities to 2018

Code	PRODUCT CLASS	Waste quantity (‘000 tons)											
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1A, 1C	Large household appliances	77.9	82.5	77.3	82.9	87.8	93.4	100.2	107.2	114.4	122.0	127.6	133.8
1B	Cooling and freezing	78.6	83.2	78.0	83.6	88.5	94.2	101.1	108.1	115.4	123.1	128.7	135.0
2	Small household appliances	22.4	23.7	22.2	23.8	25.2	26.8	28.8	30.8	32.8	35.0	36.6	38.4
3A	IT and telecom, excl. CRTs	25.5	25.0	23.4	25.4	27.1	28.8	30.6	32.4	34.1	36.0	37.3	38.8
3B	CRT monitors	26.5	45.1	51.6	59.0	64.8	70.9	77.2	83.6	90.2	90.2	90.2	90.2
3C	LCD monitors	-	-	-	-	-	-	-	-	-	-	-	-
4A	Consumer electronics, excl. CRTs	24.9	24.3	22.8	24.7	26.4	28.1	29.8	31.6	33.3	35.1	36.4	37.8
4B	CRT TVs	42.5	43.8	45.1	46.5	46.7	47.1	47.5	48.0	48.6	48.6	48.6	48.6
4C	Flat panel TVs	0.0	0.0	0.0	0.0	0.0	23.5	23.7	23.9	24.2	24.2	24.2	24.2
5A	Lighting equipment – luminaires	-	-	-	-	-	-	-	-	-	-	-	-
5B	Lighting equipment – lamps	7.7	8.1	7.6	8.2	8.6	9.2	9.9	10.5	11.3	12.0	12.6	13.2
6	Electrical and electronic tools	11.2	11.8	11.1	11.9	12.6	13.4	14.4	15.4	16.4	17.5	18.3	19.2
7	Toys, leisure and sports equipment	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5
8	Medical devices	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5
9	Monitoring and control instruments	0.6	0.7	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1
10	Automatic dispensers	0.6	0.7	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1
	Total WEEE	319.0	349.6	340.9	367.9	389.9	437.6	465.5	494.2	523.6	546.9	563.6	582.5
	Total waste quantity per capita (kg/capita)	4.48	4.86	4.68	4.99	5.22	5.80	6.11	6.42	6.74	6.97	7.11	7.28

Notes: Some categories are blank as they are merged with other categories, such as 5A and 5B.

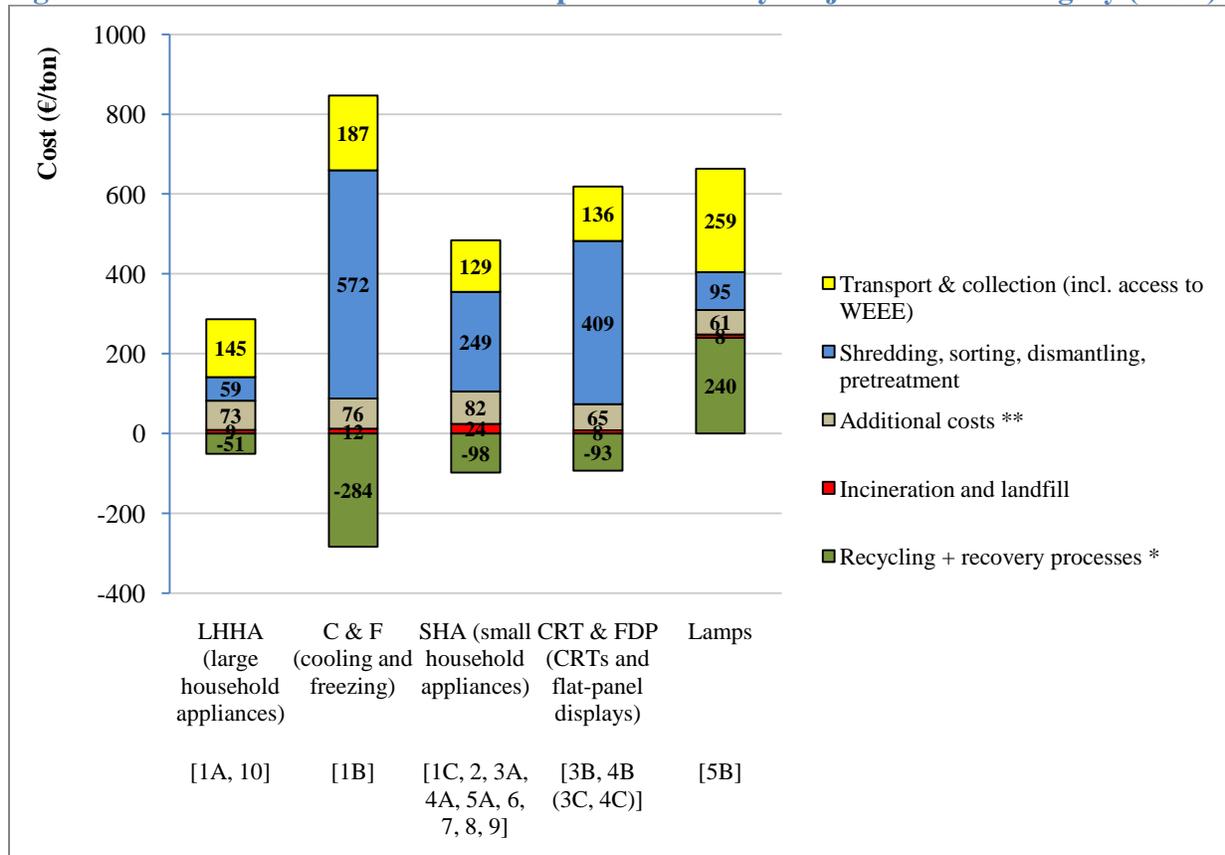
Sources: Numbers from 2007 adapted from UNEP/MAP Final Report; projections using growth assumptions from EIU.

Total Costs of Compliance

111. Total costs of compliance are calculated by combining estimates of WEEE amounts from Table 11 with component costs of compliance from Figure 7. At this point, collection targets are not introduced to get a sense of what it would cost to collect and recycle all material.

112. In Figure 7, component costs include transport and collection, processing (shredding, sorting, dismantling and pretreatment), incineration and landfill (where required), and recycling and recovery processes. Recycling and recovery processes include the resale of recycled materials in secondary markets and represent a net benefit from the revenues generated through these (re)sales. To give a more complete picture, an approximation of additional costs is added, which includes administrative costs from the distribution chain for levying fees and other administrative and R&D costs. Figure 7 depicts these unit costs by broad product category. Note that cooling and freezing has substantial processing costs but potentially high recycling revenues, as materials can be sold in secondary markets (negative numbers represent a negative cost or revenue). Also note that for lamps, recycling costs are positive since the materials recycled are considered hazardous waste and strictly speaking cannot be sold in secondary markets. In this case, it represents a positive cost.

Figure 7: Technical and Additional Component Costs by Major Product Category (€/ton)



* Negative recycling and recovery process numbers represent revenues from the sale of materials in the secondary markets.

** Additional costs include administrative costs from the distribution chain for levying fees, other costs (including scheme administration, costs for levying funds as financial guarantees, costs for monitoring, enforcement or control, costs for PR or awareness raising, as sometimes defined by law), R&D costs and special costs, for example, costs for sorting and sampling and for specific waste streams, such as batteries or packaging (UNU, 2007).

Source: United Nations University (2007) 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE).

113. Total costs of recycling all WEEE for 2012 is approximately €194 million (Table 12, with the highest costs in the product areas of cooling and freezing, large household appliances and those concerning CRTs (3B and 4B) (Figure 8). Again, processing is the main driver of these costs. Calculating the cost per kilogram, Figure 9 indicates these product categories are highest along with lighting equipment (5B), which does not have secondary markets for some portions recycled materials. Also note that there are substantial revenues to be made through the recycling of these cost-intensive products, which in some could offset a high percentage of overall costs. Currently these revenues are captured in the informal scrap dealer market and could be additional revenue to producers if they were to engage in this market.

114. The distribution of total costs also reveals some interesting patterns (Figure 10). Cooling and freezing (1B) is about one-third of the total cost, and one-half after the inclusion of CRT TVs (4B) and large household appliances (1A, 1C). WEEE from CRT monitors is roughly 20 percent of total cost. These four product categories together represent over 70 percent of total cost. It is also interesting to note that the percentage share of certain product categories in total cost remains fairly stable over time with the exception of CRT TVs constituting 17 percent of WEEE in 2007 to only 10 percent by 2018. The opposite is true for CRT monitors (3B), which represents 10 percent of total cost in 2007 and 18 percent by 2018.

Total Costs of Compliance with Collection Targets

115. Collection targets are now introduced to the analysis to estimate total cost of compliance. The targets selected are those currently under consideration in the draft WEEE legislation (i.e. per capita targets). The EU is also considering collection targets based on the average number of products placed on the market during two previous years (e.g. 65-85%). At the time of writing it was uncertain as to whether this was under any serious consideration by Turkish authorities, thus we followed the per capita targets formulated under current draft WEEE legislation. There is also an argument to be made in favor of using the per capita target on waste generation. WEEE product turnover is quite low in Turkey and setting targets based on (domestic) sales volume may not necessarily be reflective of waste generation.

116. Generally, compliance costs are expected to initially rise over time as greater WEEE quantities are generated by consumers and collection rates begin to rise. In the longer-term, these costs may fall due to scale economies in greater collection and recycling. Ultimately the total costs of compliance are a function of the collection targets set forth in the WEEE Directive. According to the latest draft 0.2 kg/capita are to be collected in 2012 with increasing rates until 2016 or 2018 (4 kg/capita). Estimated waste generation rates are actually higher than this (Table 11) and so the total cost of compliance with the Directive is calculated as only that fraction that is required to be collected and recycled. For example, in 2012 437,600 tons of waste is estimated

to be generated or 5.8 kg/capita (Table 11) and it would cost approximately €194 million to collect and recycle this amount (Table 12)). The Directive states that only 0.2 kg/capita is required and this represents only 3.4% of the total amount generated (i.e. 0.2 kg/capita / 5.8 kg/capita). Hence the total cost of compliance is only 3.4% of total cost – or €6.7 million (3.4% of €194 million). Using this calculation approach for future years, it will cost €137-139 million to comply with the 4 kg/capita target by 2016/2018 (Table 13).

Table 12: Component Costs of Recycling WEEE in Turkey by Product Category in 2012 ('000 €)

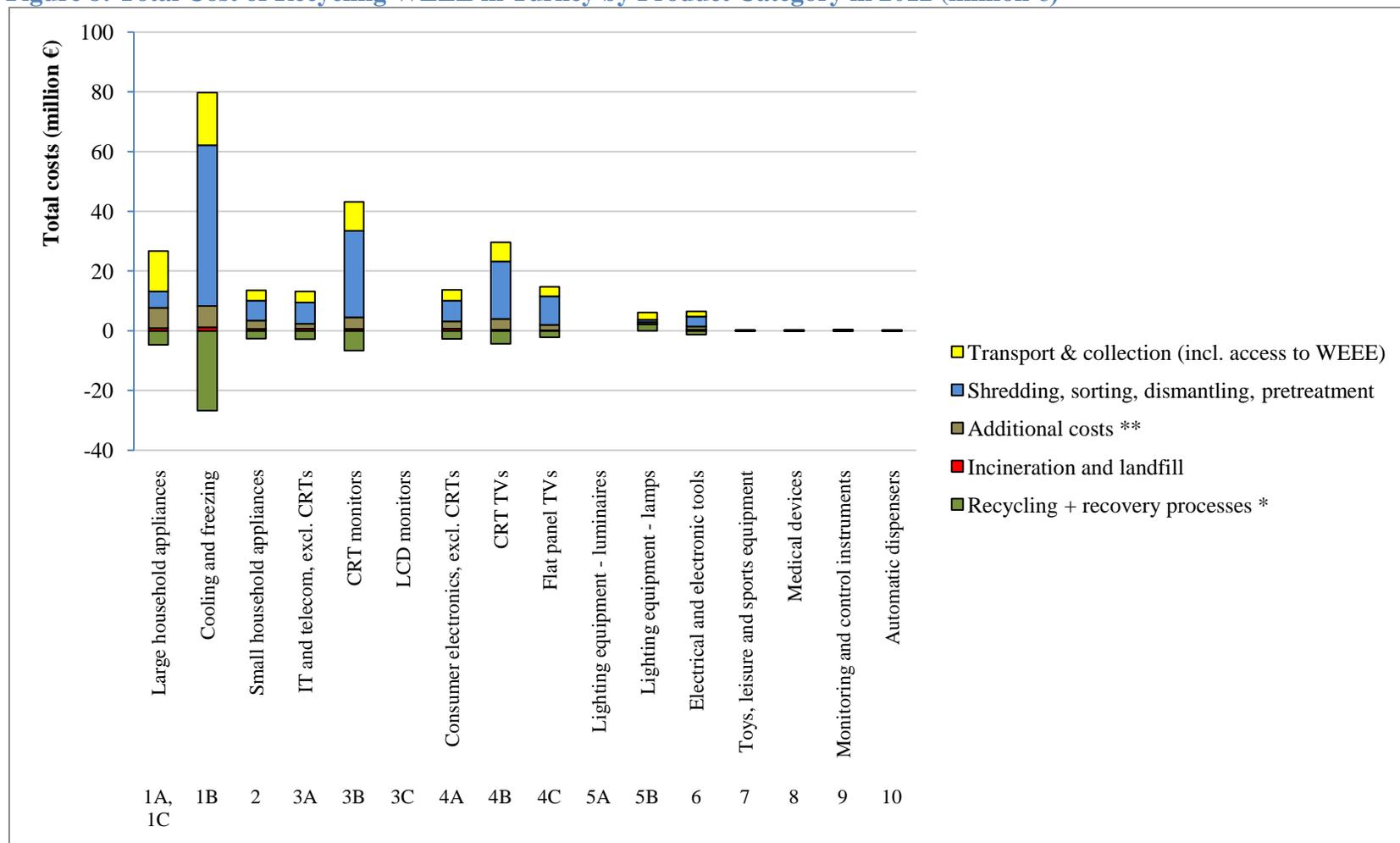
		2012						
Code	Category	Transport & collection (incl. access to WEEE)	Shredding, sorting, dismantling, pretreatment	Incineration and landfill	Recycling + recovery processes *	Additional costs **	Total	Cost/kg
1A, 1C	Large household appliances	13,538	5,509	840	-4,762	6,835	21,960	0.24
1B	Cooling and freezing	17,614	53,878	1,130	-26,751	7,116	52,988	0.56
2	Small household appliances	3,456	6,672	643	-2,626	2,738	10,883	0.41
3A	IT and telecom, excl. CRTs	3,716	7,173	691	-2,823	1,629	10,386	0.36
3B	CRT monitors	9,648	29,016	568	-6,598	3,926	36,560	0.52
3C	LCD monitors	-	-	-	-	-	-	-
4A	Consumer electronics, excl. CRTs	3,623	6,993	674	-2,752	2,435	10,973	0.39
4B	CRT TVs	6,404	19,260	377	-4,379	3,544	25,205	0.54
4C	Flat panel TVs	3,191	9,595	188	-2,182	1,765	12,557	
5A	Lighting equipment - luminaires	-	-	-	-	-	-	-
5B	Lighting equipment - lamps	2,379	873	73	2,205	564	6,094	0.66
6	Electrical and electronic tools	1,728	3,336	322	-1,313	1,084	5,157	0.38
7	Toys, leisure and sports equipment	49	95	9	-37	39	155	0.40
8	Medical devices	49	95	9	-37	24	140	0.37
9	Monitoring and control instruments	99	191	18	-75	78	311	0.41
10	Automatic dispensers	111	45	7	-39	56	180	0.24
Total		65,607	142,731	5,550	-52,170	31,831	193,550	0.42

* Negative recycling and recovery process numbers represent revenues from the sale of materials in the secondary markets.

** Additional costs include administrative costs from the distribution chain for levying fees, other costs (including scheme administration, costs for levying funds as financial guarantees, costs for monitoring, enforcement or control, costs for PR or awareness raising, as sometimes defined by law), R&D costs and special costs, for example, costs for sorting and sampling and costs for specific waste streams such as batteries or packaging (UNU, 2008).

Source: Author's calculations.

Figure 8: Total Cost of Recycling WEEE in Turkey by Product Category in 2012 (million €)

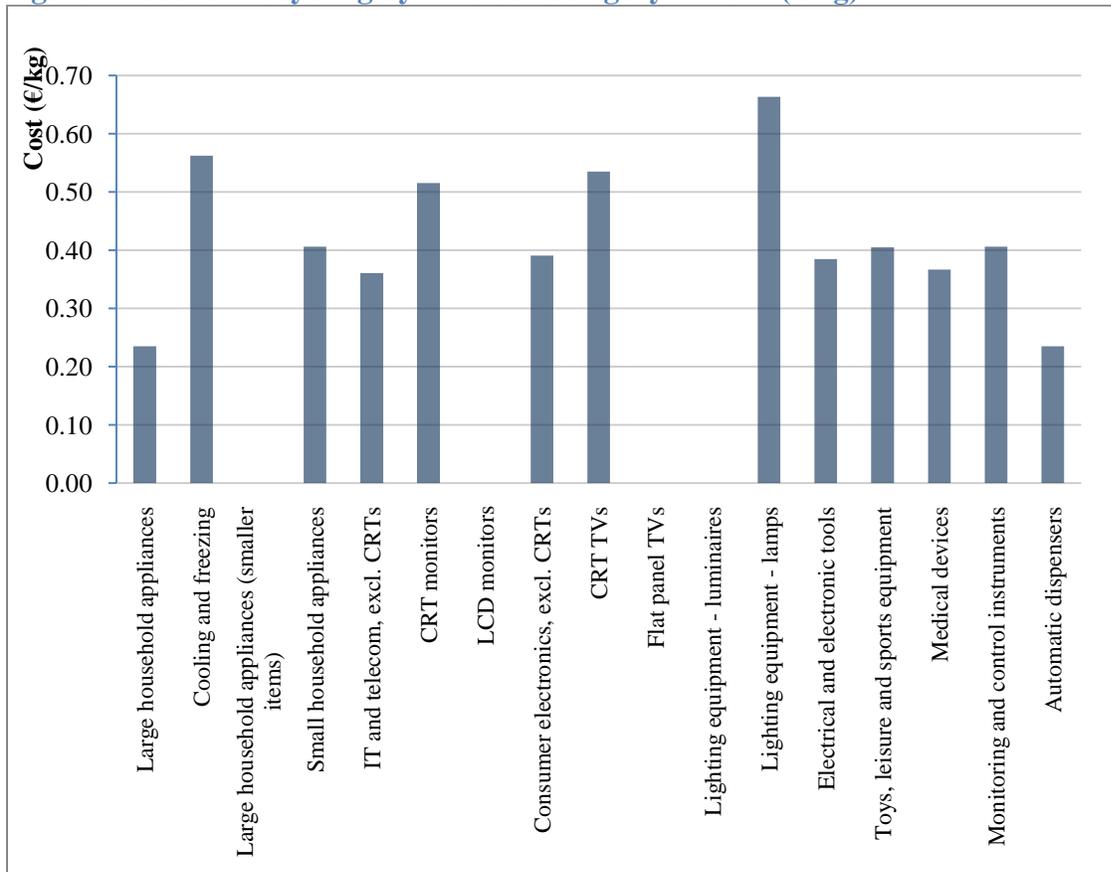


* Negative recycling and recovery process numbers represent revenues from the sale of materials in the secondary markets.

** Additional costs include administrative costs from the distribution chain for levying fees, other costs (including scheme administration, costs for levying funds as financial guarantees, costs for monitoring, enforcement or control, costs for PR or awareness raising, as sometimes defined by law), R&D costs and special costs, for example, costs for sorting and sampling and costs for specific waste streams such as batteries or packaging (UNU, 2008).

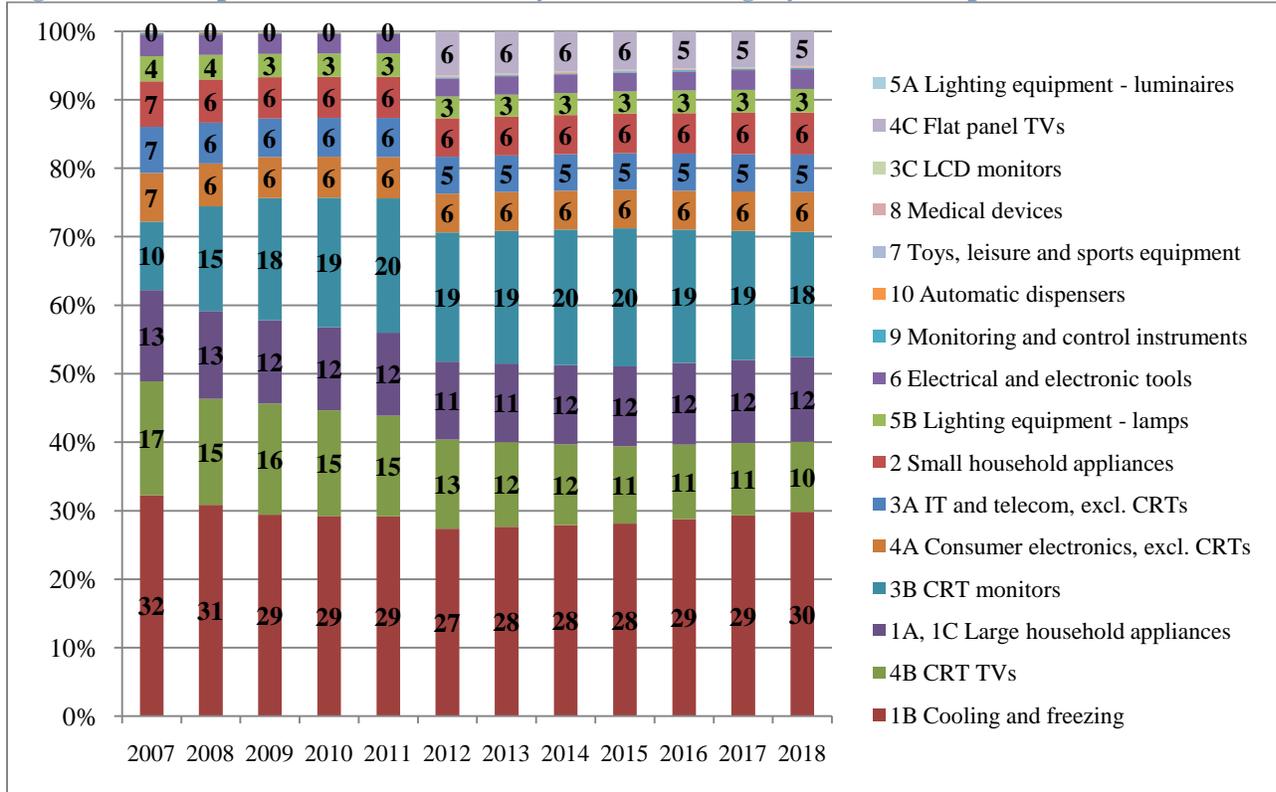
Source: Author's calculations.

Figure 9: Cost of Recycling by Product Category in 2012 (€/kg)



Source: Author's calculations.

Figure 10: Composition of Total Cost by Product Category 2007-2018 (percent)



Source: Author's calculations.

Table 13: Total Cost of Compliance with Collection Targets (million €, unless otherwise specified)

Code	Category	2012	2013	2014	2015	2016	2017	2018
1A, 1C	Large household appliances	22.0	23.6	25.2	26.9	28.5	30.0	31.5
1B	Cooling and freezing	53.0	56.9	60.8	64.9	68.8	72.4	75.9
2	Small household appliances	10.9	11.7	12.5	13.3	14.1	14.9	15.6
3A	IT and telecom, excl. CRTs	10.4	11.0	11.7	12.3	12.9	13.4	14.0
3B	CRT monitors	36.6	39.8	43.1	46.5	46.5	46.5	46.5
3C	LCD monitors	-	-	-	-	-	-	-
4A	Consumer electronics, excl. CRTs	11.0	11.7	12.3	13.0	13.6	14.2	14.8
4B	CRT TVs	25.2	25.4	25.7	26.0	26.0	26.0	26.0
4C	Flat panel TVs	12.6	12.7	12.8	13.0	13.0	13.0	13.0
5A	Lighting equipment - luminaires	-	-	-	-	-	-	-
5B	Lighting equipment - lamps	6.1	6.5	7.0	7.5	7.9	8.3	8.7
6	Electrical and electronic tools	5.2	5.5	5.9	6.3	6.7	7.0	7.4
7	Toys, leisure and sports equipment	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8	Medical devices	0.1	0.2	0.2	0.2	0.2	0.2	0.2
9	Monitoring and control instruments	0.3	0.3	0.4	0.4	0.4	0.4	0.4
10	Automatic dispensers	0.2	0.2	0.2	0.2	0.2	0.2	0.3
	Total cost	193.5	205.6	218.0	230.7	239.0	246.9	254.5
	WEEE Directive collection targets (kg/capita)	0.2	0.3	0.5	1.0	4.0	4.0	4.0
	Total waste quantity per capita (kg/capita)	5.8	6.1	6.4	6.7	6.9	7.1	7.3
	Total cost of compliance with collection targets	6.7	10.1	17.0	34.2	137.9	138.9	139.9

Source: Author's calculations.

Implications on competitiveness

117. The impact of compliance costs on relative profitability, and hence competitiveness, is also of interest. The approach taken here is to measure the effect of an increase in the cost of doing business on domestic sales. Unit costs of compliance were estimated in the previous section (i.e. €/kg), but we need to know how changes in cost or price affect sales.

118. One measure that can aid in assessing this impact is the price elasticity of demand, which measures the relative demand response to a price change of the good. By definition, the price elasticity of demand is the percentage change in price divided by the percentage change in output. For the relevant price information, in 2009 a consumption tax on white goods was eliminated (6.7 percent) between March 15, 2009 and June 15, 2009. The tax was then reinstated on June 16, 2009 (but only by 2 percent). These price changes serve as the price response variable in our calculation. For changes in output, monthly sales data of white goods from the white goods business association TurkBESD are used. Monthly sales data were first "de-seasonalized" to remove trends that normally occur throughout the year, so the consequent changes in month-to-month sales can be attributed to the price change event. Following this procedure, the estimated price elasticity of demand for the 6.7 percent price decrease was 0.36 and for the 2 percent increase was -0.10. Since the elasticity of 0.36 is associated with a price decrease and -0.10 with a price increase, for the remainder of the impact analysis we use the absolute value to create a range of potential impacts (i.e., we use 0.10 instead of -0.10).

119. To measure the cost of compliance impact on sales, the following information obtained from a combination of business associations and a representative major white goods company was used:

White goods market:

Total sales of white goods in 2009: 16,436,000 units

Domestic sales in 2009: 5,011,000 units

→ 30.5 percent of all sales occur in the domestic market

120. Table 14 summarizes the total cost of compliance for a given production profile of a representative major white goods company. Total production is multiplied by the share of domestic sales to arrive at domestic production. Production is then converted to weight (kg) and multiplied by the estimated costs of compliance per kg, resulting in the total cost of compliance per white good category.

Table 14. Production and Product-weight Information from One Major Company

Product	2009 Total Production (units)	Share of domestic sales	Domestic Production (units)	Average Product Weight (kg)	Cost of Compliance (€/kg)	Total cost of Compliance (€)
Fridges and coolers	1,024,503	0.305	312,473	68.2	0.56	11,933,985
Washing machines	690,292	0.305	210,539	67.0	0.24	3,385,468
Dishwashers	641,373	0.305	195,619	46.8	0.24	2,197,190
Ovens	304,268	0.305	92,802	50.0	0.24	1,113,621
Total						18,630,264

Sources: TurkBESD; author's calculations; representative major white goods company.

Company-level information:

Value of sales: 48 percent of total sales value comes from 30.5 percent of their unit sales (i.e., 48 percent of their sales value comes from domestic unit sales)

Net domestic sales value of white goods: €2,044,000,000 x 48 percent = €981,000,000

Impact evaluation:

Cost of compliance as a percentage of net domestic sales value: €981,000,000 / €18,630,264 = 1.90 percent

Price elasticity of demand: 0.10 to 0.36

Percentage impact on domestic sales: $1.90 / 0.10$ to $0.36 = 0.19$ to 0.68 percent

Impact on sales volume for the white goods sector: 16,436,000 units x 0.0010 to 0.0068 = 31,214 to 112,370 units

121. Depending on the value of the good, the impact on sales value varies. For instance if the cost of the white good ranged from €500–2000/unit, the above results would imply an impact range of €15–62 million for a price elasticity of 0.10 and €56–224 million for a price elasticity of 0.36. These results suggest that the impact of complying with the WEEE Directive is significant in domestic markets. The implications on firm competitiveness may be severe—especially for small or medium firms who operate on thin profit margins.

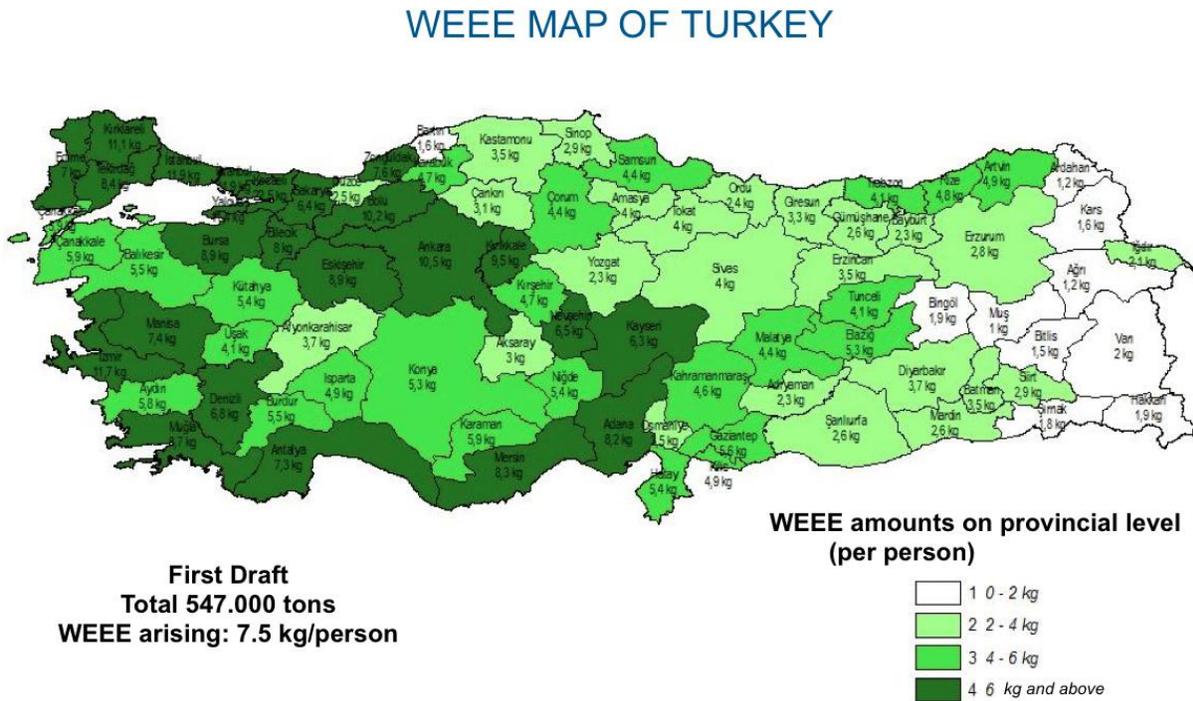
Spatial Distribution of WEEE and Collection Alternatives

122. The UNEP/MAP study makes reference to a study performed by TURKBESD⁹² that estimates a need for approximately 850 collection points operated by municipalities, which are estimated to have an investment cost of €250,000,000 and an annual operational cost of €50,000,000. The electrical and electronic wastes that will be deposited in these municipal collection points would then be transferred to the recycling facilities. Due to the large number of local collection points in this process, establishment of central collection facilities is also proposed. According to studies of some national collection and recycling enterprises, 15 large collection centers are needed to cover all areas of Turkey and to meet 4 kg/capita target.

123. According to the preliminary findings of the previously mentioned REC study, which investigates the regulatory impacts of WEEE under different scenarios and is a work in progress, the geographic distribution of WEEE quantities at the provincial level is estimated as shown in Figure 11.

⁹² The representatives from TURKBESD stated to our team that no studies concerning compliance costs have been performed by their organization.

Figure 11: Draft Map of Geographic Distribution of WEEE in Turkey⁹³



Source: Adapted from REC Turkey (2011)

124. Interviews conducted during the sector note preparation confirm that the present options for users to dispose WEEE in Turkey are the following: discard as garbage, abandon in the street, sell to scrap dealers, donate, exchange old for new products or sell to producer.

125. As mentioned earlier, WEEE recovery and reuse is not sufficiently acknowledged in Turkey even though the hazardous contents of EEE pose important problems for waste management. Currently the MoEU issues “certificates of conformity” for companies who are willing to undertake collection and treatment of WEEE. By the time of writing, 14 companies have acquired these certificates, which are regarded as preliminary licenses. These firms collect and manually or mechanically breakdown the collected WEEE into parts, such as iron, copper, aluminum, chromium, brass, plastic, cardboard, wood, electronic circuits, electronic components and electrical materials. The electronic circuits, electronic components, electrical materials and plastics are exported to countries, such as Belgium, Germany and France.

126. Successful examples of WEEE collection from licensed companies follow in Box 4. The examples include the *Evciler*, a company established in 2008 to collect electrical waste in Ankara, and *Ugur Metal*, a collection company in Istanbul (see Box 5).

⁹³ REC Turkey (2011) Capacity Raising in the Environmental Sector – WEEE Directive. February 2011, Istanbul

Box 5: Collection of WEEE

Evciler is the only company that currently has a license to collect and treat all ten categories of waste listed in the WEEE Directive with the exception of refrigerators and air conditioning equipment, as the investment for these products is not feasible at this point. In 2010 *Evciler* invested about €2.2 million in their plant, which has a capacity of 500 tons/month. The company sources around 1 percent (3–5 tons/month) of this amount from collection points operated by the Cankaya municipality and from the landfill site in Mamak in Ankara. The rest is collected from companies and institutional clients all over the country. When the waste amounts to more than 2–3 tons, they offer to pay to the waste owner. Otherwise, they collect it for free. The incoming waste, such as transformers, computers, and printers, is fed into a series of machines, which process the waste and separate iron, copper, aluminum and brass in powder form. The materials are then sold in the market, and the remainder is regarded as their own waste. The plastic portion is sent to an incineration plant, and the rest is landfilled. The company frequently takes part in awareness raising programs and communicates with organizations requesting information.

Ugur Metal was prelicensed in 2008 to collect and recycle e-waste in Istanbul, has a collection capacity of 500–600 tons/year and considers the business profitable. They collect various types of EEE, but not all listed in the directive, from big companies, individuals, scrap collectors and the Atlas municipality in Kodikoy. They collect big EEE like computers and TVs from large companies, and from the scrap dealers they mainly buy materials to dismantle, classify and export. They do export electrical circuits, and the other parts, such as, aluminum, copper, steel and iron, are sold to licensed recycling companies. Currently, *Ugur Metal* is constructing a new plant with a capacity of 16,000 tons/year to include new equipment and specific storage to meet the directive's requirements that the original license will impose. Although the company operates in line with a prelicense issued by MoEF, there is no fixed price that *Ugur Metal* offers when buying EEE. Their price depends on the materials dismantled and export prices and is balanced against cost so the business remains profitable. They export mainly to Far Eastern countries but also to some EU countries and the US, and they only have agreements only licensed companies. *Ugur Metal* representatives were involved in meetings at MoEF in Ankara related to WEEE Directives and were consulted on several occasions on e-waste management issues.

Source: Authors

WEEE and the Industry

127. The white goods industry has been involved in WEEE work since 2004. For a long time, the industry has concentrated its efforts on postponing the introduction of the directive. Studies initiated by the Istanbul Chamber of Commerce to identify the potential impacts on industry of WEEE implementation and to develop a roadmap for preparedness⁹⁴ did not raise significant industry interest. In recent years, the industry has changed its stand and has taken active part in multistakeholder discussions and provided more constructive input to the efforts of MoEF and REC. Discussions with TURKBESD indicate that the industry is concerned about the regulation's introduction without a clear implementation framework. Industry's views and position regarding the implementation of the WEEE Directive, as communicated by TURKBESD,⁹⁵ can be summarized as follows:

- The regulation's development is due to the EU commitment and is not motivated by a real and large enough problem in Turkey. Substantial amounts of WEEE are already collected and valorized by ongoing business dynamics in Turkey. The additional benefits that the directive may provide will have an excessively high cost/benefit ratio.
- The sector takes a very clear position that strongly rejects industry responsibility to cover, even partially, the cost associated with WEEE collection from consumers and its storage. In the meantime, the sector communicates clearly its readiness to bear all the necessary physical and financial responsibilities for those WEEE categories that are part of white goods after collection and storage by the municipalities or their delegated parties.
- The sector maintains that the collection of municipal solid waste is a responsibility of the municipalities; hence, the responsibilities for household collection and storage of WEEE naturally fall on municipalities. With that reasoning, collection should be financed through currently collected environmental taxes and, if necessary, through raising tax levels.
- The sector objects any requirement that obliges them to bear costs associated with municipal collection and storage of WEEE and that they cannot control. It is strongly against any provision that will bring an obligation to provide financial support to municipalities motivated by a fear that this may imply costly engagements with a vast number of municipalities.
- The provision that gives the municipalities powers regarding the choice of transport and recycling companies for the WEEE they collect concerns the sector. The sector's position is that it should have control over the WEEE belonging to its members, and it objects to bear responsibility for any costs that they cannot control.

⁹⁴ Z. Yöntem (2007) Assessment of the Industrial Compliance Strategies for EU Environmental Acquis: Strategic Action Plan Proposal for Directive Related to WEEE (Unfinished) EkoDenge.

⁹⁵ R. Öztaşkın and M. Börekçi, personal communication.

- The sector states that it is still not informed of either how producer and product registration will take place or what kind of enforcement mechanisms will be in place. These, combined with other experiences with unjust implementation of relevant regulations that gives rise to unfair competitiveness impacts, make the industry wary of the directive's equitable implementation.
- The sector is concerned that its members represent large and prestigious companies and products with nowhere to hide. It is, therefore, concerned that members might be pushed to cover freeriders.
- The sector highlights the importance of a change in consumer attitudes toward EEE.
- The sector regards its ecodesign initiatives as sufficient and calls for policy incentives reflected in the directive to support further ecodesign.
- The sector is wary of the different nature of the wide product spectrum covered by the directive with some, including the member products, being associated with costly treatment requirements.
- The sector indicates its intention to form an organization to take care of necessary member compliance coordination and its openness to discuss the inclusion of others in such a scheme.
- The sector is aware of the delays and difficulties in implementing the WEEE Directive in the EU. It, therefore, finds the proposed collection targets overly ambitious for Turkey. Experiences with the implementation of other directives, such as the one concerning packaging waste, indicate that a bumpy road lies ahead.
- The sector is aware of the lack of reliable information to guide WEEE-related developments. It considers the scope and implementation time of the pilot studies conducted in different municipalities, such as Kadikoy, Kocaeli, and Muğla, too narrow to generate useful information.
- Even if some costs are defined and covered by the industry, the sector is skeptical that the WEEE would be managed according to the directive's spirit with the main barrier being a lack of awareness. It holds that probably some scrap dealers will somehow acquire licenses and will continue to work with materials as always. Although this may be acceptable for some product categories, for others it may entail continuation of status quo behind a new façade.
- The sector believes that it would be difficult to bring the useful fractions obtained during recycling back to its own production in a way that can be strategically beneficial.
- Based on recent conflicts between waste management companies and industrial and commercial operators regarding the collection of packaging waste, the sector fears similar

conflicts may arise during implementation of WEEE Directive, unless there are properly assigned responsibilities and clear communication on regulations.

- The sector realizes the need for developing the necessary infrastructure, which takes time. It, therefore, supports the finalization and introduction of necessary provisions as soon as possible. In line with this thinking, the sector has even developed its own road map for compliance. The details of this road map can be seen from Figure 12.

Figure 12: Actions Steps to Prepare for WEEE compliance

Nu.	Actions by producers	Start	End	2011				2012				2013				2014				2015			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Publication of the regulation	09.02.2011	01.04.2011	■																			
2	Actions for raising consumer awareness (Advertisement movies for TV and movie theaters, education in primary schools, posters in distributor, social responsibility projects)	01.03.2011	28.12.2012	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
3	Establishment of responsible organisation	01.03.2011	01.06.2012	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
4	Establishment of the TURKBESD take-back recycling system	01.03.2011	30.05.2014	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
5	Discussions with the Ministry and other stakeholders for the development of online WEEE registration system	01.09.2011	31.08.2012			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
6	Training for distributors and Service providers	02.01.2012	01.01.2014					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
7	Licensing of the Producer facilities	02.01.2012	01.01.2014					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
8	Initiation of recycling programmes in collaboration with environmental engineering depts of Universities	01.06.2011	31.08.2012	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
9	Initiation of WEEE related projects with other departments of universities, such as industrial engineering	01.09.2011	01.01.2013			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
10	Initiation of joint efforts with the Ministry and other stakeholders aimed at inclusion of the Scrap merchants in WEEE systems	02.01.2012	01.06.2015					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
11	Evaluation of the actions in the last 4 years	01.01.2014	01.09.2015																	■	■	■	
12	Initiation of producer responsibility	02.11.2015	01.01.2016																			■	

Source: Adapted from TURKBESD.

128. A review of this road map reveals that the industry acknowledges the importance of working with a wide group of stakeholders to assure compliance and is prepared to initiate necessary partnerships. It holds the position that other stakeholders relevant to WEEE implementation should develop their own road maps, and these should set the foundation for the nature and terms of collaboration.

5. Managing the Next steps

129. **Currently, Turkey has an extensive system that handles electronic and electrical equipment waste.** However, as this system is predominantly informal, information regarding qualitative and quantitative aspects of WEEE generation, collection, treatment, recycling, recovery and disposal is scarce. In the absence of reliable information, it is not possible to assess the extent of adverse environmental impacts or the social and economic implications of the existing situation. It is known, however, that in line with global trends WEEE quantities will be increasing. Certain WEEE categories—at the minimum fridges and other cooling equipment,

CRTs, and lighting equipment—are handled in ways that damage the environment and pose a risk for human health. Besides environmental concerns, the economic and social potential of WEEE management is far too significant to be left in informal hands. Consequently developing and implementing policy elements in line with 2002/96/EC that aims to assure safe and accountable management of WEEE and intends to stimulate innovation is seen highly positive. At the same time, ensuring environmental protection without compromising the competitive position of sectors that are important for the development of the country poses a challenge.

130. **Turkish white goods sector is of great importance for the country's economy.** At the same time, the sector's products make up around half of the WEEE generated in the country on a weight basis. The national legislative framework that applies to different life cycle stages of white goods aims at certain environmental performance standards and include the following:

- Environmental Law (Official Gazette number 18132, dated 11.8.1983)
- Law Concerning Energy Efficiency (Official Gazette number 26510, dated 2.5.2007)
- Regulation for the Control of Water Pollution (Official Gazette number 25687, dated 31.12.2004)
- Regulation for the Control of Industry Induced Air Pollution (Official Gazette number 27277, dated 3.7.2009)
- Regulation for the Control of Hazardous Wastes (Official Gazette number 25755, dated 14.03.2005 and subsequent amendments)
- Regulation for the Control of Packaging Wastes (Official Gazette number 26562, dated 24.6.2007)
- Regulation Concerning the Reduction of Ozone Depleting Substances (Official Gazette number 27052, dated 12.11.2008)
- Regulation Restricting the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, the so-called RoHS (Official Gazette number 26891, dated 30.5.2008)

131. **The white goods sector has realized significant improvements in its economic as well as environmental performance.** Resource requirements and emissions associated with both production processes and product use have been reduced significantly in the last two decades. Although, the sector fulfills many of the requirements of Directive 2002/96/EC in the European markets, it has made limited progress regarding the management of its products at the end of their service life in the domestic market.

132. **As the body responsible for the development of the WEEE Directive in Turkey, the MoEU has shown a remarkable leadership in creating a process that is inclusive, analytical, and facilitates dialogue and consensus building.** As it is commonly encountered with the introduction of a new policy instrument, the process has been slow and implementation of the WEEE Directive in Turkey has been facing a number of challenges. One of the chief challenges is linked to the collection of WEEE. Here two factors come to the forefront. On one hand, the lack of consumer awareness about the importance of managing WEEE in a safe and responsible manner is likely to sustain behavior leading to inappropriate dumping or transfer of WEEE. On the other hand, the municipalities that bear the main responsibility to collect and store household WEEE lack both the necessary infrastructure and the resources to develop such infrastructure.

Another key challenge is linked to the lack of knowledge about the existing infrastructure that can be of value for some WEEE categories, as well as the known lack of infrastructure critical to handling fridges and cooling equipment in an environmental safe manner.

133. Properly addressing implementation challenges will require time. The provisions of the latest draft of the regulation sets gradually increasing targets, starting with 0.2 kg/capita in 2012 and reaching to a final target of 4 kg/capita in 2018. Although the study does not provide a detailed judgment of whether the set targets are realistic or sufficiently demanding, it supports the gradual phase-in approach taken by MoEU. EU experience shows that countries that have transposed the directive without giving proper consideration to the details of practical application had to introduce secondary regulations and clarifications. There is a need for a proper preparation stage, which among other tasks should identify the requirements for waste arising, collection potentials and necessary treatment standards for product groups. In particular, pilot studies for collection could play an important role. This six year transition period can be used to fill in the information gaps and make the necessary adjustments before the directive reaches its full effect.

134. Implementation targets, whether they are based on percentages or absolute WEEE quantities, should be realistic and supported by a reliable inventory of WEEE, and should factor in geographic distribution and temporal dimensions of WEEE generation, as well as the costs and benefits of different scenarios. The assessment presented in this note, when brought together with experiences from EU countries, indicate that setting an absolute target might be premature. There are discussions in the EU, as part of the development of a recast WEEE directive, to replace the absolute target currently in use⁹⁶ by one that will be based on a percentage of the weight of electrical and electronic products placed on the markets of Member States.⁹⁷ Although a percentage based target arguably has shortcomings in capturing the time lag between sales and waste generation – a particularly important issue for durable products like white goods is, that it provides a better yardstick, particularly for a country like Turkey where information on WEEE quantities is scarce but systems that record products placed on the market are mostly in place. In addition, it would be important that the targets are responsive to the significant heterogeneity observed in the country. There could be risks associated with setting national collection targets, as this may concentrate collection and treatment efforts in regions with higher population density—typically the Marmara region and regions around larger cities like Ankara, Izmir, and Adana—and may fail to provide incentives for necessary development in the rest of the country.

135. Providing the necessary collection and recycling infrastructure would be central to implementation of WEEE legislation. Although new entrepreneurs are entering the WEEE arena at a relatively high pace, they are typically focusing on high-value categories, such as ICT equipment. These companies are facing difficulties in sustaining their financial viability. Their struggle is primarily linked to gaining access to WEEE but also to the size of investments and to the lack of knowledge and experience. It would be important to create the right mechanisms to engage the primarily informal scrap dealers as part of the solution to upgrade the infrastructure with relatively low investments. There is growing awareness in the sector regarding

⁹⁶ Set to 4 kg/person-year

⁹⁷ Current proposal is 65 percent of the average weight of goods placed on the market in two previous years.

environmental and human health impacts and sector performance and willingness to improve. As a response of the anticipated requirements of the WEEE Directive, the sector is also exploring possibilities for consolidation. Both the newly established recycling companies and the producers of white goods see scrap dealers as an important player for compliance. Consequently, this sector, which has valuable knowledge and experience, could be supported by incentives to gradually formalize informal actors. It is worth noting that besides financial and institutional support, the scrap dealers would require assistance to improve their managerial and administrative capabilities.

136. **The draft regulation includes provisions that prioritize “reuse of WEEE as a whole” (Article 5(b)).** While this provision can have environmental and economic benefits for certain product groups for others, such as all white goods, TVs, and some of the ICT products, it could be counterproductive and may result in prolonging the life of inefficient equipment with potential negative environmental impacts. It may, therefore, be useful to first assess the characteristics of WEEE collected and, based on this, create more specific guidelines for reuse. It would be also necessary to establish a legal basis supporting reuse.

137. **It is promising to see that the Turkish Directive is evolving in a direction where a combination of different policy tools (regulatory, market based, or information based) will be in use.** More specifically, diverse set actors will be required to meet certain regulatory requirements to enter the WEEE playing field, but once on the field, they will be subject to market forces giving them incentives to innovate and to offer better or lower cost alternatives. The directive also facilitates the flow of the information among key parties, such as obliging producers to share information about their products with recycling companies or obliging producers, municipalities and distributors to inform the general public. In parallel, it noteworthy that additional information support would be available to the actors in the WEEE field from organizations like TUBITAK, Ministry of Science, Industry and Technology, and KOSGEB.

138. **Introduction of new policy instruments carries significant importance if it is accompanied by proper enforcement.** Turkey has made significant progress particularly since the beginning of membership negotiations with the EU in introducing environmental policy elements. However, enforcement is an area where Turkey has historically remained weak. Certain parties, and notably the producers and recycling companies holding preliminary licenses, are already concerned that the necessary enforcement of WEEE requirements may be lacking, and this may result in continued environmental damage, as well as harming competitiveness. The white goods sector, comprised primarily of large and reputable companies, has generally responded positively to environmental requirements and has taken necessary implementation steps. It has also voluntarily pioneered environmental initiatives that go beyond compliance. With regard to WEEE, it now holds a position that is supportive of the introduction of the directive soon. Quite rightly, however, private sector wants to be assured that the implementation of WEEE regulation will provide a level playing field and fair competition.

139. **Fair and effective registration would ensure that parties responsible for taking care of WEEE would be properly identified and forced to meet their responsibilities—a key issue in establishing fairness.** In the EU a separate unit is usually established to register the producers and products. Turkey needs a proper and accountable registration system. The MoEU

can best serve this function or the Ministry can delegate it to a different body, reporting directly to the Ministry. The registration costs in Turkey are estimated to be in the range of €3–5 million per annum⁹⁸. In any case, it is of utmost importance that the details of the registration plans are determined and communicated.

140. **It is encouraging that draft regulation leaves it to the market to decide tariffs that will govern transactions among key parties.** However, given that there is little information on the cost of treating WEEE in an environmentally responsible manner, it might be sensible for the regulating authorities to take the lead in setting initial tariff levels based on investigation of the cost of appropriate handling of WEEE. Yet, the details of the regulation need to be clearly communicated, leaving as little grey area as possible for interpretation. The experiences with the implementation of packaging regulations serve as a good example of problems and possible failures.

141. **Stimulating recovery and introducing recycling technologies would be a priority area for consideration in the new legislation.** Setting up a national WEEE recycling R&D facility or a "center of excellence" as in Japan and the UK will encourage innovative R&D and technology transfer. Policies that encourage companies to "brand" recycling technologies to reduce energy consumption and secure a long-term supply based on recovered materials would help companies to mitigate the cost imposed by WEEE regulation. Education is a key area both to enlighten the younger generation about fundamental recycling and to instruct the older generation on the use of recovered materials as sustainable products.

142. **There is a pressing need for capacity development of scrap dealers whose practices have shortcomings regarding their environmental performance.** Since scrap dealers represent a key stakeholder group that can assist with timely and cost-efficient compliance with the WEEE Directive a concentrated capacity building effort could bring mutually beneficial outcomes. Traditionally scrap dealers have been highly interested and remain almost exclusively in charge of handling products, such as washing machines, dishwashers, cookers and, to a certain extent, fridges. Responding to the increase in waste streams containing electronics and in particular ICT products and rising demand for materials that can be derived from these, the scrap dealers have also been expanding into this area. It should be noted such products, although outside the main scope of this study, are associated with significant environmental concerns. Consequently the government could concentrate on upgrading the capabilities of existing scrap dealers for dealing with such traditional fractions. It can also provide support through provision of land, offering low interest credits, and providing tax reductions for formally registered companies.

143. **Turkish companies could be proud of their ecodesign achievements, resulting in products with high water and energy efficiency.** The WEEE Directive could enhance their potential to leverage further ecodesign improvements to assist recovery, recycling and generate strategic benefits. The draft regulation allows for both collective and individual responsibility in line with the provisions of the original directive of the EU. It is in the interest of producers to take a more active stand in the determination of the directive details, particularly regarding how to organize the structures that will enable compliance. Given the fact that a relatively low

⁹⁸ D. Temel (2009) WEEE Directive and Turkey. Problems Facing the Implementation of 2002/96/EC on WEEE in Turkey

number of producers are serving the majority of the Turkish market, a collective approach within the white goods sector could be strategically sensible. The industry has an advantage like having successfully run trade-in campaigns. Although these were not used to collect WEEE in the past, this can be done relatively easily from now on. The industry can set up its own recycling facility or can establish strong partnerships with third parties. The action plan drawn by the industry looks like a very good starting point and highlights intentions in this direction. In addition, the MoEU could play a guiding role by informing industry about possible benefits of different organizational forms.

144. International experience suggests that countries that get the collection and recycling system up and running before committing themselves to performance and targets face less implementation hurdles. Legislators in EU member states have spent considerable time studying the legal and operational approach in those countries with established WEEE schemes, only to prove that it is of key importance to build systems that meet local specifics of culture, geography and industry, and that take into account existing practices of waste collection.

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Annexes

Annex 1: WEE Directive

DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 27 January 2003
on waste electrical and electronic equipment (WEEE)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission ⁽¹⁾,

Having regard to the Opinion of the Economic and Social Committee ⁽²⁾,

Having regard to the Opinion of the Committee of Regions ⁽³⁾,

Acting in accordance with the procedure laid down in Article 251 of the Treaty in the light of the joint text approved by the Conciliation Committee on 8 November 2002 ⁽⁴⁾,

Whereas:

- (1) The objectives of the Community's environment policy are, in particular, to preserve, protect and improve the quality of the environment, protect human health and utilise natural resources prudently and rationally. That policy is based on the precautionary principle and principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.
- (2) The Community programme of policy and action in relation to the environment and sustainable development (Fifth Environmental Action Programme) ⁽⁵⁾ states that the achievement of sustainable development calls for significant changes in current patterns of development, production, consumption and behaviour and advocates, *inter alia*, the reduction of wasteful consumption of natural resources and the prevention of pollution. It mentions waste electrical and electronic equipment (WEEE) as one of the target areas to be regulated, in view of the application of the principles of prevention, recovery and safe disposal of waste.
- (3) The Commission Communication of 30 July 1996 on review of the Community strategy for waste management states that, where the generation of waste cannot be avoided, it should be reused or recovered for its material or energy.

- (4) The Council in its Resolution of 24 February 1997 on a Community strategy for waste management ⁽⁶⁾ insisted on the need for promoting waste recovery with a view to reducing the quantity of waste for disposal and saving natural resources, in particular by reuse, recycling, composting and recovering energy from waste and recognised that the choice of options in any particular case must have regard to environmental and economic effects but that until scientific and technological progress is made and life-cycle analyses are further developed, reuse and material recovery should be considered preferable where and in so far as they are the best environmental options. The Council also invited the Commission to develop, as soon as possible, an appropriate follow-up to the projects of the priority waste streams programme, including WEEE.

- (5) The European Parliament, in its Resolution of 14 November 1996 ⁽⁷⁾, asked the Commission to present proposals for Directives on a number of priority waste streams, including electrical and electronic waste, and to base such proposals on the principle of producer responsibility. The European Parliament, in the same Resolution, requests the Council and the Commission to put forward proposals for cutting the volume of waste.

- (6) Council Directive 75/442/EEC of 15 July 1975 on waste ⁽⁸⁾ provides that specific rules for particular instances or supplementing those of Directive 75/442/EEC on the management of particular categories of waste may be laid down by means of individual Directives.

- (7) The amount of WEEE generated in the Community is growing rapidly. The content of hazardous components in electrical and electronic equipment (EEE) is a major concern during the waste management phase and recycling of WEEE is not undertaken to a sufficient extent.

- (8) The objective of improving the management of WEEE cannot be achieved effectively by Member States acting individually. In particular, different national applications of the producer responsibility principle may lead to substantial disparities in the financial burden on economic operators. Having different national policies on the management of WEEE hampers the effectiveness of recycling policies. For that reason the essential criteria should be laid down at Community level.

⁽¹⁾ OJ C 365 E, 19.12.2000, p. 184 and OJ C 240 E, 28.8.2001, p. 298.

⁽²⁾ OJ C 116, 20.4.2001, p. 38.

⁽³⁾ OJ C 148, 18.5.2001, p. 1.

⁽⁴⁾ Opinion of the European Parliament of 15 May 2001 (OJ C 34 E, 7.2.2002, p. 115), Council Common Position of 4 December 2001 (OJ C 110 E, 7.5.2002, p. 1) and Decision of the European Parliament of 10 April 2002 (not yet published in the Official Journal), Decision of the European Parliament of 18 December 2002 and Decision of the Council of 16 December 2002.

⁽⁵⁾ OJ C 138, 17.5.1993, p. 5.

⁽⁶⁾ OJ C 76, 11.3.1997, p. 1.

⁽⁷⁾ OJ C 362, 2.12.1996, p. 241.

⁽⁸⁾ OJ L 194, 25.7.1975, p. 47. Directive as last amended by Commission Decision 96/350/EC (OJ L 135, 6.6.1996, p. 32).

- (9) The provisions of this Directive should apply to products and producers irrespective of the selling technique, including distance and electronic selling. In this connection the obligations of producers and distributors using distance and electronic selling channels should, as far as is practicable, take the same form and should be enforced in the same way in order to avoid other distribution channels having to bear the costs of the provisions of this Directive concerning WEEE for which the equipment was sold by distant or electronic selling.
- (10) This Directive should cover all electrical and electronic equipment used by consumers and electrical and electronic equipment intended for professional use. This Directive should 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, in particular Council Directive 91/157/EEC of 18 March 1991 on batteries and accumulators containing certain dangerous substances⁽¹⁾.
- (11) Directive 91/157/EEC needs to be revised as soon as possible, particularly in the light of this Directive.
- (12) The establishment, by this Directive, of producer responsibility is one of the means of encouraging the design and production of electrical and electronic equipment which take into full account and facilitate their repair, possible upgrading, reuse, disassembly and recycling.
- (13) In order to guarantee the safety and health of distributors' personnel involved in the take-back and handling of WEEE, Member States should, in accordance with national and Community legislation on safety and health requirements, determine the conditions under which take-back may be refused by distributors.
- (14) Member States should encourage the design and production of electrical and electronic equipment which take into account and facilitate dismantling and recovery, in particular the re-use and recycling of WEEE, their components and materials. Producers should not prevent, through specific design features or manufacturing processes, WEEE from being reused, unless such specific design features or manufacturing processes present overriding advantages, for example with regard to the protection of the environment and/or safety requirements.
- (15) Separate collection is the precondition to ensure specific treatment and recycling of WEEE and is necessary to achieve the chosen level of protection of human health and the environment in the Community. Consumers have to actively contribute to the success of such collection and should be encouraged to return WEEE. For this purpose, convenient facilities should be set up for the return of WEEE, including public collection points, where private households should be able to return their waste at least free of charge.
- (16) In order to attain the chosen level of protection and harmonised environmental objectives of the Community, Member States should adopt appropriate measures to minimise the disposal of WEEE as unsorted municipal waste and to achieve a high level of separate collection of WEEE. In order to ensure that Member States strive to set up efficient collection schemes, they should be required to achieve a high level of collection of WEEE from private households.
- (17) Specific treatment for WEEE is indispensable in order to avoid the dispersion of pollutants into the recycled material or the waste stream. Such treatment is the most effective means of ensuring compliance with the chosen level of protection of the environment of the Community. Any establishment or undertakings carrying out recycling and treatment operations should comply with minimum standards to prevent negative environmental impacts associated with the treatment of WEEE. Best available treatment, recovery and recycling techniques should be used provided that they ensure human health and high environmental protection. Best available treatment, recovery and recycling techniques may be further defined in accordance with the procedures of Directive 96/61/EC.
- (18) Where appropriate, priority should be given to the reuse of WEEE and its components, subassemblies and consumables. Where reuse is not preferable, all WEEE collected separately should be sent for recovery, in the course of which a high level of recycling and recovery should be achieved. In addition, producers should be encouraged to integrate recycled material in new equipment.
- (19) Basic principles with regard to the financing of WEEE management have to be set at Community level and financing schemes have to contribute to high collection rates as well as to the implementation of the principle of producer responsibility.
- (20) Users of electrical and electronic equipment from private households should have the possibility of returning WEEE at least free of charge. Producers should therefore finance collection from collection facilities, and the treatment, recovery and disposal of WEEE. In order to give maximum effect to the concept of producer responsibility, each producer should be responsible for financing the management of the waste from his own products. The producer should be able to choose to fulfil this obligation either individually or by joining a collective scheme. Each producer should, when placing a product on the market, provide a financial guarantee to prevent costs for the management of WEEE from orphan products from falling on society or the remaining producers. The responsibility for the financing of the management of historical waste should be shared by all existing producers in collective financing schemes to which all producers, existing on the market when the costs occur,

⁽¹⁾ OJ L 78, 26.3.1991, p. 38. Directive as amended by Commission Directive 98/101/EC (OJ L 1, 5.1.1999, p. 1).

- contribute proportionately. Collective financing schemes should not have the effect of excluding niche and low-volume producers, importers and new entrants. For a transitional period, producers should be allowed to show purchasers, on a voluntary basis at the time of sale of new products, the costs of collecting, treating and disposing in an environmentally sound way of historical waste. Producers making use of this provision should ensure that the costs mentioned do not exceed the actual costs incurred.
- (21) Information to users about the requirement not to dispose of WEEE as unsorted municipal waste and to collect WEEE separately, and about the collection systems and their role in the management of WEEE, is indispensable for the success of WEEE collection. Such information implies the proper marking of electrical and electronic equipment which could end up in rubbish bins or similar means of municipal waste collection.
- (22) Information on component and material identification to be provided by producers is important to facilitate the management, and in particular the treatment and recovery/recycling, of WEEE.
- (23) Member States should ensure that inspection and monitoring infrastructure enable the proper implementation of this Directive to be verified, having regard, *inter alia*, to Recommendation 2001/331/EC of the European Parliament and the Council of 4 April 2001 providing for minimum criteria for environmental inspections in the Member States ⁽¹⁾.
- (24) Information about the weight or, if this is not possible, the numbers of items of electrical and electronic equipment put on the market in the Community and the rates of collection, reuse (including as far as possible reuse of whole appliances), recovery/recycling and export of WEEE collected in accordance with this Directive is necessary to monitor the achievement of the objectives of this Directive.
- (25) Member States may choose to implement certain provisions of this Directive by means of agreements between the competent authorities and the economic sectors concerned provided that particular requirements are met.
- (26) The adaptation to scientific and technical progress of certain provisions of the Directive, the list of products falling under the categories set out in Annex IA, the selective treatment for materials and components of WEEE, the technical requirements for storage and treatment of WEEE and the symbol for the marking of EEE should be effected by the Commission under a committee procedure.
- (27) The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission ⁽²⁾.

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Objectives

The purpose of this Directive is, as a first priority, the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment.

Article 2

Scope

1. This Directive shall apply to electrical and electronic equipment falling under the categories set out in Annex IA provided that the equipment concerned is not part of another type of equipment that does not fall within the scope of this Directive. Annex IB contains a list of products which fall under the categories set out in Annex IA.

2. This Directive shall apply without prejudice to Community legislation on safety and health requirements and specific Community waste management legislation.

3. Equipment which is connected with the protection of the essential interests of the security of Member States, arms, munitions and war material shall be excluded from this Directive. This does not, however, apply to products which are not intended for specifically military purposes.

⁽¹⁾ OJ L 118, 27.4.2001, p. 41.

⁽²⁾ OJ L 184, 17.7.1999, p. 23.

*Article 3***Definitions**

For the purposes of this Directive, the following definitions shall apply:

- (a) 'electrical and electronic equipment' or 'EEE' means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields falling under the categories set out in Annex IA and designed for use with a voltage rating not exceeding 1 000 Volt for alternating current and 1 500 Volt for direct current;
- (b) 'waste electrical and electronic equipment' or 'WEEE' means electrical or electronic equipment which is waste within the meaning of Article 1(a) of Directive 75/442/EEC, including all components, subassemblies and consumables which are part of the product at the time of discarding;
- (c) 'prevention' means measures aimed at reducing the quantity and the harmfulness to the environment of WEEE and materials and substances contained therein;
- (d) 'reuse' means any operation by which WEEE or components thereof are used for the same purpose for which they were conceived, including the continued use of the equipment or components thereof which are returned to collection points, distributors, recyclers or manufacturers;
- (e) 'recycling' means the reprocessing in a production process of the waste materials for the original purpose or for other purposes, but excluding energy recovery which means the use of combustible waste as a means of generating energy through direct incineration with or without other waste but with recovery of the heat;
- (f) 'recovery' means any of the applicable operations provided for in Annex IIB to Directive 75/442/EEC;
- (g) 'disposal' means any of the applicable operations provided for in Annex IIA to Directive 75/442/EEC;
- (h) 'treatment' means any activity after the WEEE has been handed over to a facility for depollution, disassembly, shredding, recovery or preparation for disposal and any other operation carried out for the recovery and/or the disposal of the WEEE;
- (i) 'producer' means any person who, irrespective of the selling technique used, including by means of distance communication in accordance with Directive 97/7/EC of the European Parliament and of the Council of 20 May 1997 on the protection of consumers in respect of distance contracts⁽¹⁾:
- (i) manufactures and sells electrical and electronic equipment under his own brand,
- (ii) resells under his own brand equipment produced by other suppliers, a reseller not being regarded as the 'producer' if the brand of the producer appears on the equipment, as provided for in subpoint (i), or
- (iii) imports or exports electrical and electronic equipment on a professional basis into a Member State.
- Whoever exclusively provides financing under or pursuant to any finance agreement shall not be deemed a 'producer' unless he also acts as a producer within the meaning of subpoints (i) to (iii);
- (j) 'distributor' means any person who provides electrical or electronic equipment on a commercial basis to the party who is going to use it;
- (k) 'WEEE from private households' means WEEE which comes from private households and from commercial, industrial, institutional and other sources which, because of its nature and quantity, is similar to that from private households;
- (l) 'dangerous substance or preparation' means any substance or preparation which has to be considered dangerous under Council Directive 67/548/EEC⁽²⁾ or Directive 1999/45/EC of the European Parliament and of the Council⁽³⁾.
- (m) 'finance agreement' means any loan, lease, hiring or deferred sale agreement or arrangement relating to any equipment whether or not the terms of that agreement or arrangement or any collateral agreement or arrangement provide that a transfer of ownership of that equipment will or may take place.

*Article 4***Product design**

Member States shall encourage the design and production of electrical and electronic equipment which take into account and facilitate dismantling and recovery, in particular the reuse and recycling of WEEE, their components and materials. In this context, Member States shall take appropriate measures so that producers do not prevent, through specific design features or manufacturing processes, WEEE from being reused, unless such specific design features or manufacturing processes present overriding advantages, for example, with regard to the protection of the environment and/or safety requirements.

*Article 5***Separate collection**

1. Member States shall adopt appropriate measures in order to minimise the disposal of WEEE as unsorted municipal waste and to achieve a high level of separate collection of WEEE.

⁽¹⁾ OJ 196, 16.8.1967, p. 1. Directive as last amended by Commission Directive 2001/59/EC (OJ L 225, 21.8.2001, p. 1).

⁽²⁾ OJ L 200, 30.7.1999, p. 1. Directive as amended by Commission Directive 2001/60/EC (OJ L 226, 22.8.2001, p. 5).

⁽¹⁾ OJ L 144, 4.6.1997, p. 19.

2. For WEEE from private households, Member States shall ensure that by the 13 August 2005:

- (a) systems are set up allowing final holders and distributors to return such waste at least free of charge. Member States shall ensure the availability and accessibility of the necessary collection facilities, taking into account in particular the population density;
- (b) when supplying a new product, distributors shall be responsible for ensuring that such waste can be returned to the distributor at least free of charge on a one-to-one basis as long as the equipment is of equivalent type and has fulfilled the same functions as the supplied equipment. Member States may depart from this provision provided they ensure that returning the WEEE is not thereby made more difficult for the final holder and provided that these systems remain free of charge for the final holder. Member States making use of this provision shall inform the Commission thereof;
- (c) without prejudice to the provisions of (a) and (b), producers are allowed to set up and operate individual and/or collective take-back systems for WEEE from private households provided that these are in line with the objectives of this Directive;
- (d) having regard to national and Community health and safety standards, WEEE that presents a health and safety risk to personnel because of contamination may be refused for return under (a) and (b). Member States shall make specific arrangements for such WEEE.

Member States may provide for specific arrangements for the return of WEEE as under (a) and (b) if the equipment does not contain the essential components or if the equipment contains waste other than WEEE.

3. In the case of WEEE other than WEEE from private households, and without prejudice to Article 9, Member States shall ensure that producers or third parties acting on their behalf provide for the collection of such waste.

4. Member States shall ensure that all WEEE collected under paragraphs 1, 2 and 3 above is transported to treatment facilities authorised under Article 6 unless the appliances are reused as a whole. Member States shall ensure that the envisaged reuse does not lead to a circumvention of this Directive, in particular as regards Articles 6 and 7. The collection and transport of separately collected WEEE shall be carried out in a way which optimises reuse and recycling of those components or whole appliances capable of being reused or recycled.

5. Without prejudice to paragraph 1, Member States shall ensure that by 31 December 2006 at the latest a rate of separate collection of at least four kilograms on average per inhabitant per year of WEEE from private households is achieved.

The European Parliament and the Council, acting on a proposal from the Commission and taking account of technical and economic experience in the Member States, shall establish a new mandatory target by 31 December 2008. This may take the form of a percentage of the quantities of electrical and electronic equipment sold to private households in the preceding years.

Article 6

Treatment

1. Member States shall ensure that producers or third parties acting on their behalf, in accordance with Community legislation, set up systems to provide for the treatment of WEEE using best available treatment, recovery and recycling techniques. The systems may be set up by producers individually and/or collectively. To ensure compliance with Article 4 of Directive 75/442/EEC, the treatment shall, as a minimum, include the removal of all fluids and a selective treatment in accordance with Annex II to this Directive.

Other treatment technologies ensuring at least the same level of protection for human health and the environment may be introduced in Annex II under the procedure referred to in Article 14(2).

For the purposes of environmental protection, Member States may set up minimum quality standards for the treatment of collected WEEE. Member States which opt for such quality standards shall inform the Commission thereof, which shall publish these standards.

2. Member States shall ensure that any establishment or undertaking carrying out treatment operations obtains a permit from the competent authorities, in compliance with Articles 9 and 10 of Directive 75/442/EEC.

The derogation from the permit requirement referred to in Article 11(1)(b) of Directive 75/442/EEC may apply to recovery operations concerning WEEE if an inspection is carried out by the competent authorities before the registration in order to ensure compliance with Article 4 of Directive 75/442/EEC.

The inspection shall verify:

- (a) the type and quantities of waste to be treated;
- (b) the general technical requirements to be complied with;
- (c) the safety precautions to be taken.

The inspection shall be carried out at least once a year and the results shall be communicated by the Member States to the Commission.

3. Member States shall ensure that any establishment or undertaking carrying out treatment operations stores and treats WEEE in compliance with the technical requirements set out in Annex III.

4. Member States shall ensure that the permit or the registration referred to in paragraph 2 includes all conditions necessary for compliance with the requirements of paragraphs 1 and 3 and for the achievement of the recovery targets set out in Article 7.

5. The treatment operation may also be undertaken outside the respective Member State or the Community provided that the shipment of WEEE is in compliance with Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community ⁽¹⁾.

WEEE exported out of the Community in line with Council Regulation (EEC) No 259/93, Council Regulation (EC) No 1420/1999 ⁽²⁾ of 29 April 1999 establishing common rules and procedures to apply to shipments to certain non-OECD countries of certain types of waste and Commission Regulation (EC) No 1547/1999 ⁽³⁾ of 12 July 1999 determining the control procedures under Council Regulation (EEC) No 259/93 to apply to shipments of certain types of waste to certain countries to which OECD Decision C(92)39 final does not apply, shall only count for the fulfilment of obligations and targets of Article 7(1) and (2) of this Directive if the exporter can prove that the recovery, reuse and/or recycling operation took place under conditions that are equivalent to the requirements of this Directive.

6. Member States shall encourage establishments or undertakings which carry out treatment operations to introduce certified environmental management systems in accordance with Regulation (EC) No 761/2001 of the European Parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) ⁽⁴⁾.

Article 7

Recovery

1. Member States shall ensure that producers or third parties acting on their behalf set up systems either on an individual or on a collective basis, in accordance with Community legislation, to provide for the recovery of WEEE collected separately in accordance with Article 5. Member States shall give priority to the reuse of whole appliances. Until the date referred to in paragraph 4, such appliances shall not be taken into account for the calculation of the targets set out in paragraph 2.

2. Regarding WEEE sent for treatment in accordance with Article 6, Member States shall ensure that, by 31 December 2006, producers meet the following targets:

- (a) for WEEE falling under categories 1 and 10 of Annex IA,
- the rate of recovery shall be increased to a minimum of 80 % by an average weight per appliance, and

⁽¹⁾ OJ L 30, 6.2.1993, p. 1. Regulation as last amended by Commission Regulation (EC) No 2557/2001 (OJ L 349, 31.12.2001, p. 1).

⁽²⁾ OJ L 166, 1.7.1999, p. 6. Regulation as last amended by Commission Regulation (EC) No 2243/2001 (OJ L 303, 20.11.2001, p. 11).

⁽³⁾ OJ L 185, 17.7.1999, p. 1. Regulation as last amended by Commission Regulation (EC) No 2243/2001.

⁽⁴⁾ OJ L 114, 24.4.2001, p. 1.

- component, material and substance reuse and recycling shall be increased to a minimum of 75 % by an average weight per appliance;

(b) for WEEE falling under categories 3 and 4 of Annex IA,

- the rate of recovery shall be increased to a minimum of 75 % by an average weight per appliance, and
- component, material and substance reuse and recycling shall be increased to a minimum of 65 % by an average weight per appliance;

(c) for WEEE falling under categories 2, 5, 6, 7 and 9 of Annex IA,

- the rate of recovery shall be increased to a minimum of 70 % by an average weight per appliance, and
- component, material and substance reuse and recycling shall be increased to a minimum of 50 % by an average weight per appliance;

(d) for gas discharge lamps, the rate of component, material and substance reuse and recycling shall reach a minimum of 80 % by weight of the lamps.

3. Member States shall ensure that, for the purpose of calculating these targets, producers or third parties acting on their behalf keep records on the mass of WEEE, their components, materials or substances when entering (input) and leaving (output) the treatment facility and/or when entering (input) the recovery or recycling facility.

The Commission shall, in accordance with the procedure laid down in Article 14(2), establish the detailed rules for monitoring compliance, including specifications for materials, of Member States with the targets set out in paragraph 2. The Commission shall submit this measure by 13 August 2004.

4. The European Parliament and the Council, acting on a proposal from the Commission, shall establish new targets for recovery and reuse/recycling, including for the reuse of whole appliances as appropriate, and for the products falling under category 8 of Annex IA, by 31 December 2008. This shall be done with account being taken of the environmental benefits of electrical and electronic equipment in use, such as improved resource efficiency resulting from developments in the areas of materials and technology. Technical progress in reuse, recovery and recycling, products and materials, and the experience gained by the Member States and the industry, shall also be taken into account.

5. Member States shall encourage the development of new recovery, recycling and treatment technologies.

*Article 8***Financing in respect of WEEE from private households**

1. Member States shall ensure that, by 13 August 2005, producers provide at least for the financing of the collection, treatment, recovery and environmentally sound disposal of WEEE from private households deposited at collection facilities, set up under Article 5(2).

2. For products put on the market later than 13 August 2005, each producer shall be responsible for financing the operations referred to in paragraph 1 relating to the waste from his own products. The producer can choose to fulfil this obligation either individually or by joining a collective scheme.

Member States shall ensure that each producer provides a guarantee when placing a product on the market showing that the management of all WEEE will be financed and that producers clearly mark their products in accordance with Article 11(2). This guarantee shall ensure that the operations referred to in paragraph 1 relating to this product will be financed. The guarantee may take the form of participation by the producer in appropriate schemes for the financing of the management of WEEE, a recycling insurance or a blocked bank account.

The costs of collection, treatment and environmentally sound disposal shall not be shown separately to purchasers at the time of sale of new products.

3. The responsibility for the financing of the costs of the management of WEEE from products put on the market before the date referred to in paragraph 1 (historical waste) shall be provided by one or more systems to which all producers, existing on the market when the respective costs occur, contribute proportionately, e.g. in proportion to their respective share of the market by type of equipment.

Member States shall ensure that for a transitional period of eight years (10 years for category 1 of Annex IA) after entry into force of this Directive, producers are allowed to show purchasers, at the time of sale of new products, the costs of collection, treatment and disposal in an environmentally sound way. The costs mentioned shall not exceed the actual costs incurred.

4. Member States shall ensure that producers supplying electrical or electronic equipment by means of distance communication also comply with the requirements set out in this Article for the equipment supplied in the Member State where the purchaser of that equipment resides.

*Article 9***Financing in respect of WEEE from users other than private households**

Member States shall ensure that, by 13 August 2005, the financing of the costs for the collection, treatment, recovery and environmentally sound disposal of WEEE from users other than private households from products put on the market after 13 August 2005 is to be provided for by producers.

For WEEE from products put on the market before 13 August 2005 (historical waste), the financing of the costs of management shall be provided for by producers. Member States may, as an alternative, provide that users other than private households also be made, partly or totally, responsible for this financing.

Producers and users other than private households may, without prejudice to this Directive, conclude agreements stipulating other financing methods.

*Article 10***Information for users**

1. Member States shall ensure that users of electrical and electronic equipment in private households are given the necessary information about:

- (a) the requirement not to dispose of WEEE as unsorted municipal waste and to collect such WEEE separately;
- (b) the return and collection systems available to them;
- (c) their role in contributing to reuse, recycling and other forms of recovery of WEEE;
- (d) the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment;
- (e) the meaning of the symbol shown in Annex IV.

2. Member States shall adopt appropriate measures so that consumers participate in the collection of WEEE and to encourage them to facilitate the process of reuse, treatment and recovery.

3. With a view to minimising the disposal of WEEE as unsorted municipal waste and to facilitating its separate collection, Member States shall ensure that producers appropriately mark electrical and electronic equipment put on the market after 13 August 2005 with the symbol shown in Annex IV. In exceptional cases, where this is necessary because of the size or the function of the product, the symbol shall be printed on the packaging, on the instructions for use and on the warranty of the electrical and electronic equipment.

4. Member States may require that some or all of the information referred to in paragraphs 1 to 3 shall be provided by producers and/or distributors, e.g. in the instructions for use or at the point of sale.

Article 11

Information for treatment facilities

1. In order to facilitate the reuse and the correct and environmentally sound treatment of WEEE, including maintenance, upgrade, refurbishment and recycling, Member States shall take the necessary measures to ensure that producers provide reuse and treatment information for each type of new EEE put on the market within one year after the equipment is put on the market. This information shall identify, as far as it is needed by reuse centres, treatment and recycling facilities in order to comply with the provisions of this Directive, the different EEE components and materials, as well as the location of dangerous substances and preparations in EEE. It shall be made available to reuse centres, treatment and recycling facilities by producers of EEE in the form of manuals or by means of electronic media (e.g. CD-ROM, online services).

2. Member States shall ensure that any producer of an electrical or electronic appliance put on the market after 13 August 2005 is clearly identifiable by a mark on the appliance. Furthermore, in order to enable the date upon which the appliance was put on the market to be determined unequivocally, a mark on the appliance shall specify that the latter was put on the market after 13 August 2005. The Commission shall promote the preparation of European standards for this purpose.

Article 12

Information and reporting

1. Member States shall draw up a register of producers and collect information, including substantiated estimates, on an annual basis 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 on collected waste exported, by weight or, if this is not possible, by numbers.

Member States shall ensure that producers supplying electrical and electronic equipment by means of distance communication provide information on the compliance with the requirements of Article 8(4) and on the quantities and categories of electrical and electronic equipment put on the market of the Member State where the purchaser of that equipment resides.

Member States shall ensure that the information required is transmitted to the Commission on a two-yearly basis within 18 months after the end of the period covered. The first set of information shall cover the years 2005 and 2006. The information shall be provided in a format which shall be established within one year after the entry into force of this Directive in accordance with the procedure referred to in Article 14(2) with a view to establishing databases on WEEE and its treatment.

Member States shall provide for adequate information exchange in order to comply with this paragraph, in particular for treatment operations as referred to in Article 6(5).

2. Without prejudice to the requirements of paragraph 1, Member States shall send a report to the Commission on the implementation of this Directive at three-year intervals. The report shall be drawn up on the basis of a questionnaire or outline drafted by the Commission in accordance with the procedure laid down in Article 6 of Council Directive 91/692/EEC of 23 December 1991 standardising and rationalising reports on the implementation of certain Directives relating to the environment⁽¹⁾. The questionnaire or outline shall be sent to the Member States six months before the start of the period covered by the report. The report shall be made available to the Commission within nine months of the end of the three-year period covered by it.

The first three-year report shall cover the period from 2004 to 2006.

The Commission shall publish a report on the implementation of this Directive within nine months after receiving the reports from the Member States.

Article 13

Adaptation to scientific and technical progress

Any amendments which are necessary in order to adapt Article 7(3), Annex IB, (in particular with a view to possibly adding luminaires in households, filament bulbs and photovoltaic products, i.e. solar panels), Annex II (in particular taking into account new technical developments for the treatment of WEEE), and Annexes III and IV to scientific and technical progress shall be adopted in accordance with the procedure referred to in Article 14(2).

Before the Annexes are amended the Commission shall *inter alia* consult producers of electrical and electronic equipment, recyclers, treatment operators and environmental organisations and employees' and consumer associations.

Article 14

Committee

1. The Commission shall be assisted by the Committee set up by Article 18 of Directive 75/442/EEC.

2. Where reference is made to this paragraph, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to Article 8 thereof.

The period laid down in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The Committee shall adopt its rules of procedure.

⁽¹⁾ OJ L 377, 31.12.1991, p. 48.

Article 15**Penalties**

Member States shall determine penalties applicable to breaches of the national provisions adopted pursuant to this Directive. The penalties thus provided for shall be effective, proportionate and dissuasive.

Article 16**Inspection and monitoring**

Member States shall ensure that inspection and monitoring enable the proper implementation of this Directive to be verified.

Article 17**Transposition**

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 13 August 2004. They shall immediately inform the Commission thereof.

When Member States adopt these measures, they shall contain a reference to this Directive or be accompanied by such reference on the occasion of their official publication. The methods of making such a reference shall be laid down by the Member States.

2. Member States shall communicate to the Commission the text of all laws, regulations and administrative provisions adopted in the field covered by this Directive.

3. Provided that the objectives set out in this Directive are achieved, Member States may transpose the provisions set out in Articles 6(6), 10(1) and 11 by means of agreements between the competent authorities and the economic sectors concerned. Such agreements shall meet the following requirements:

- (a) agreements shall be enforceable;
- (b) agreements shall specify objectives with the corresponding deadlines;
- (c) agreements shall be published in the national official journal or an official document equally accessible to the public and transmitted to the Commission;
- (d) the results achieved shall be monitored regularly, reported to the competent authorities and the Commission and made available to the public under the conditions set out in the agreement;
- (e) the competent authorities shall ensure that the progress reached under the agreement is examined;
- (f) in case of non-compliance with the agreement Member States must implement the relevant provisions of this Directive by legislative, regulatory or administrative measures.

4. (a) Greece and Ireland which, because of their overall:

- recycling infrastructure deficit,
- geographical circumstances such as the large number of small islands and the presence of rural and mountain areas,
- low population density, and
- low level of EEE consumption,

are unable to reach either the collection target mentioned in the first subparagraph of Article 5(5) or the recovery targets mentioned in Article 7(2) and which, under the third subparagraph of Article 5(2) of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste⁽¹⁾, may apply for an extension of the deadline mentioned in that Article,

may extend the periods referred to in Articles 5(5) and 7(2) of this Directive by up to 24 months.

These Member States shall inform the Commission of their Decisions at the latest at the time of transposition of this Directive.

- (b) The Commission shall inform other Member States and the European Parliament of these decisions.

5. Within five years after the entry into force of this Directive, the Commission shall submit a report to the European Parliament and the Council based on the experience of the application of this Directive, in particular as regards separate collection, treatment, recovery and financing systems. Furthermore the report shall be based on the development of the state of technology, experience gained, environmental requirements and the functioning of the internal market. The report shall, as appropriate, be accompanied by proposals for revision of the relevant provisions of this Directive.

Article 18**Entry into force**

This Directive shall enter into force on the day of its publication in the *Official Journal of the European Union*.

Article 19**Addressees**

This Directive is addressed to the Member States.

Done at Brussels, 27 January 2003.

For the European Parliament

The President

P. COX

For the Council

The President

G. DRYS

⁽¹⁾ OJ L 182, 16.7.1999, p. 1.

ANNEX IA

Categories of electrical and electronic equipment covered by this Directive

1. Large household appliances
 2. Small household appliances
 3. IT and telecommunications equipment
 4. Consumer equipment
 5. Lighting equipment
 6. Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
 7. Toys, leisure and sports equipment
 8. Medical devices (with the exception of all implanted and infected products)
 9. Monitoring and control instruments
 10. Automatic dispensers
-

ANNEX IB

List of products which shall be taken into account for the purpose of this Directive and which fall under the categories of Annex IA

1. Large household appliances

Large cooling appliances

Refrigerators

Freezers

Other large appliances used for refrigeration, conservation and storage of food

Washing machines

Clothes dryers

Dish washing machines

Cooking

Electric stoves

Electric hot plates

Microwaves

Other large appliances used for cooking and other processing of food

Electric heating appliances

Electric radiators

Other large appliances for heating rooms, beds, seating furniture

Electric fans

Air conditioner appliances

Other fanning, exhaust ventilation and conditioning equipment

2. Small household appliances

Vacuum cleaners

Carpet sweepers

Other appliances for cleaning

Appliances used for sewing, knitting, weaving and other processing for textiles

Irons and other appliances for ironing, mangling and other care of clothing

Toasters

Fryers

Grinders, coffee machines and equipment for opening or sealing containers or packages

Electric knives

Appliances for hair-cutting, hair drying, tooth brushing, shaving, massage and other body care appliances

Clocks, watches and equipment for the purpose of measuring, indicating or registering time

Scales

3. IT and telecommunications equipment

Centralised data processing:

Mainframes

Minicomputers

Printer units

Personal computing:

Personal computers (CPU, mouse, screen and keyboard included)

Laptop computers (CPU, mouse, screen and keyboard included)

Notebook computers
Notepad computers
Printers
Copying equipment
Electrical and electronic typewriters
Pocket and desk calculators
and other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means
User terminals and systems
Facsimile
Telex
Telephones
Pay telephones
Cordless telephones
Cellular telephones
Answering systems
and other products or equipment of transmitting sound, images or other information by telecommunications

4. Consumer equipment

Radio sets
Television sets
Videocameras
Video recorders
Hi-fi recorders
Audio amplifiers
Musical instruments
And other products or equipment for the purpose of recording or reproducing sound or images, including signals or other technologies for the distribution of sound and image than by telecommunications

5. Lighting equipment

Luminaires for fluorescent lamps with the exception of luminaires in households
Straight fluorescent lamps
Compact fluorescent lamps
High intensity discharge lamps, including pressure sodium lamps and metal halide lamps
Low pressure sodium lamps
Other lighting or equipment for the purpose of spreading or controlling light with the exception of filament bulbs

6. Electrical and electronic tools (with the exception of large-scale stationary industrial tools)

Drills
Saws
Sewing machines
Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending or similar processing of wood, metal and other materials
Tools for riveting, nailing or screwing or removing rivets, nails, screws or similar uses
Tools for welding, soldering or similar use
Equipment for spraying, spreading, dispersing or other treatment of liquid or gaseous substances by other means
Tools for mowing or other gardening activities

7. Toys, leisure and sports equipment
 - Electric trains or car racing sets
 - Hand-held video game consoles
 - Video games
 - Computers for biking, diving, running, rowing, etc.
 - Sports equipment with electric or electronic components
 - Coin slot machines

 8. Medical devices (with the exception of all implanted and infected products)
 - Radiotherapy equipment
 - Cardiology
 - Dialysis
 - Pulmonary ventilators
 - Nuclear medicine
 - Laboratory equipment for *in-vitro* diagnosis
 - Analysers
 - Freezers
 - Fertilization tests
 - Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability

 9. Monitoring and control instruments
 - Smoke detector
 - Heating regulators
 - Thermostats
 - Measuring, weighing or adjusting appliances for household or as laboratory equipment
 - Other monitoring and control instruments used in industrial installations (e.g. in control panels)

 10. Automatic dispensers
 - Automatic dispensers for hot drinks
 - Automatic dispensers for hot or cold bottles or cans
 - Automatic dispensers for solid products
 - Automatic dispensers for money
 - All appliances which deliver automatically all kind of products
-

ANNEX II

Selective treatment for materials and components of waste electrical and electronic equipment in accordance with Article 6(1)

1. As a minimum the following substances, preparations and components have to be removed from any separately collected WEEE:
 - polychlorinated biphenyls (PCB) containing capacitors in accordance with Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT) ⁽¹⁾,
 - mercury containing components, such as switches or backlighting lamps,
 - batteries,
 - printed circuit boards of mobile phones generally, and of other devices if the surface of the printed circuit board is greater than 10 square centimetres,
 - toner cartridges, liquid and pasty, as well as colour toner,
 - plastic containing brominated flame retardants,
 - asbestos waste and components which contain asbestos,
 - cathode ray tubes,
 - chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC),
 - gas discharge lamps,
 - liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 square centimetres and all those back-lighted with gas discharge lamps,
 - external electric cables,
 - components containing refractory ceramic fibres as described in Commission Directive 97/69/EC of 5 December 1997 adapting to technical progress Council Directive 67/548/EEC relating to the classification, packaging and labelling of dangerous substances ⁽²⁾,
 - components containing radioactive substances with the exception of components that are below the exemption thresholds set in Article 3 of and Annex I to Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation ⁽³⁾,
 - electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume)

These substances, preparations and components shall be disposed of or recovered in compliance with Article 4 of Council Directive 75/442/EEC.
2. The following components of WEEE that is separately collected have to be treated as indicated:
 - cathode ray tubes: The fluorescent coating has to be removed,
 - equipment containing gases that are ozone depleting or have a global warming potential (GWP) above 15, such as those contained in foams and refrigeration circuits: the gases must be properly extracted and properly treated. Ozone-depleting gases must be treated in accordance with Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer ⁽⁴⁾.
 - gas discharge lamps: The mercury shall be removed.
3. Taking into account environmental considerations and the desirability of reuse and recycling, paragraphs 1 and 2 shall be applied in such a way that environmentally-sound reuse and recycling of components or whole appliances is not hindered.
4. Within the procedure referred to in Article 14(2), the Commission shall evaluate as a matter of priority whether the entries regarding:
 - printed circuit boards for mobile phones, and
 - liquid crystal displaysare to be amended.

⁽¹⁾ OJ L 243, 24.9.1996, p. 31.

⁽²⁾ OJ L 343, 13.12.1997, p. 19.

⁽³⁾ OJ L 159, 29.6.1996, p. 1.

⁽⁴⁾ OJ L 244, 29.9.2000, p. 1. Regulation as last amended by Regulation (EC) No 2039/2000 (OJ L 244, 29.9.2000, p. 26).

ANNEX III

Technical requirements in accordance with Article 6(3)

1. Sites for storage (including temporary storage) of WEEE prior to their treatment (without prejudice to the requirements of Council Directive 1999/31/EC):
 - impermeable surfaces for appropriate areas with the provision of spillage collection facilities and, where appropriate, decanters and cleanser-degreasers,
 - weatherproof covering for appropriate areas.
2. Sites for treatment of WEEE:
 - balances to measure the weight of the treated waste,
 - impermeable surfaces and waterproof covering for appropriate areas with the provision of spillage collection facilities and, where appropriate, decanters and cleanser-degreasers,
 - appropriate storage for disassembled spare parts,
 - appropriate containers for storage of batteries, PCBs/PCTs containing capacitors and other hazardous waste such as radioactive waste,
 - equipment for the treatment of water in compliance with health and environmental regulations.

ANNEX IV

Symbol for the marking of electrical and electronic equipment

The symbol indicating separate collection for electrical and electronic equipment consists of the crossed-out wheeled bin, as shown below. The symbol must be printed visibly, legibly and indelibly.



Annex 2: ROHS Directive

DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 27 January 2003
on the restriction of the use of certain hazardous substances in electrical and electronic equipment

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 95 thereof,

Having regard to the proposal from the Commission ⁽¹⁾,

Having regard to the opinion of the Economic and Social Committee ⁽²⁾,

Having regard to the opinion of the Committee of Regions ⁽³⁾,

Acting in accordance with the procedure laid down in Article 251 of the Treaty in the light of the joint text approved by the Conciliation Committee on 8 November 2002 ⁽⁴⁾,

Whereas:

- (1) The disparities between the laws or administrative measures adopted by the Member States as regards the restriction of the use of hazardous substances in electrical and electronic equipment could create barriers to trade and distort competition in the Community and may thereby have a direct impact on the establishment and functioning of the internal market. It therefore appears necessary to approximate the laws of the Member States in this field and to contribute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment.
- (2) The European Council at its meeting in Nice on 7, 8 and 9 December 2000 endorsed the Council Resolution of 4 December 2000 on the precautionary principle.
- (3) The Commission Communication of 30 July 1996 on the review of the Community strategy for waste management stresses the need to reduce the content of hazardous substances in waste and points out the potential benefits of Community-wide rules limiting the presence of such substances in products and in production processes.
- (4) The Council Resolution of 25 January 1988 on a Community action programme to combat environmental pollution by cadmium ⁽⁵⁾ invites the Commission to pursue without delay the development of specific measures for such a programme. Human health also has

to be protected and an overall strategy that in particular restricts the use of cadmium and stimulates research into substitutes should therefore be implemented. The Resolution stresses that the use of cadmium should be limited to cases where suitable and safer alternatives do not exist.

- (5) The available evidence indicates that measures on the collection, treatment, recycling and disposal of waste electrical and electronic equipment (WEEE) as set out in Directive 2002/96/EC of 27 January 2003 of the European Parliament and of the Council on waste electrical and electronic equipment ⁽⁶⁾ are necessary to reduce the waste management problems linked to the heavy metals concerned and the flame retardants concerned. In spite of those measures, however, significant parts of WEEE will continue to be found in the current disposal routes. Even if WEEE were collected separately and submitted to recycling processes, its content of mercury, cadmium, lead, chromium VI, PBB and PBDE would be likely to pose risks to health or the environment.
- (6) Taking into account technical and economic feasibility, the most effective way of ensuring the significant reduction of risks to health and the environment relating to those substances which can achieve the chosen level of protection in the Community is the substitution of those substances in electrical and electronic equipment by safe or safer materials. Restricting the use of these hazardous substances is likely to enhance the possibilities and economic profitability of recycling of WEEE and decrease the negative health impact on workers in recycling plants.
- (7) The substances covered by this Directive are scientifically well researched and evaluated and have been subject to different measures both at Community and at national level.
- (8) The measures provided for in this Directive take into account existing international guidelines and recommendations and are based on an assessment of available scientific and technical information. The measures are necessary to achieve the chosen level of protection of

⁽¹⁾ OJ C 365 E, 19.12.2000, p. 195 and OJ C 240 E, 28.8.2001, p. 303.

⁽²⁾ OJ C 116, 20.4.2001, p. 38.

⁽³⁾ OJ C 148, 18.5.2001, p. 1.

⁽⁴⁾ Opinion of the European Parliament of 15 May 2001 (OJ C 34 E, 7.2.2002, p. 109), Council Common Position of 4 December 2001 (OJ C 90 E, 16.4.2002, p. 12) and Decision of the European Parliament of 10 April 2002 (not yet published in the Official Journal), Decision of the European Parliament of 18 December 2002 and Decision of the Council of 16 December 2002.

⁽⁵⁾ OJ C 30, 4.2.1988, p. 1.

⁽⁶⁾ See page 24 of this Official Journal.

human and animal health and the environment, having regard to the risks which the absence of measures would be likely to create in the Community. The measures should be kept under review and, if necessary, adjusted to take account of available technical and scientific information.

- (9) This Directive should apply without prejudice to Community legislation on safety and health requirements and specific Community waste management legislation, in particular Council Directive 91/157/EEC of 18 March 1991 on batteries and accumulators containing certain dangerous substances ⁽¹⁾.
- (10) The technical development of electrical and electronic equipment without heavy metals, PBDE and PBB should be taken into account. As soon as scientific evidence is available and taking into account the precautionary principle, the prohibition of other hazardous substances and their substitution by more environmentally friendly alternatives which ensure at least the same level of protection of consumers should be examined.
- (11) Exemptions from the substitution requirement should be permitted if substitution is not possible from the scientific and technical point of view or if the negative environmental or health impacts caused by substitution are likely to outweigh the human and environmental benefits of the substitution. Substitution of the hazardous substances in electrical and electronic equipment should also be carried out in a way so as to be compatible with the health and safety of users of electrical and electronic equipment (EEE).
- (12) As product reuse, refurbishment and extension of lifetime are beneficial, spare parts need to be available.
- (13) The adaptation to scientific and technical progress of the exemptions from the requirements concerning phasing out and prohibition of hazardous substances should be effected by the Commission under a committee procedure.
- (14) The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission ⁽²⁾.

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Objectives

The purpose of this Directive is to approximate the laws of the Member States on the restrictions of the use of hazardous substances in electrical and electronic equipment and to contri-

⁽¹⁾ OJ L 78, 26.3.1991, p. 38. Directive as amended by Commission Directive 98/101/EC (OJ L 1, 5.1.1999, p. 1).

⁽²⁾ OJ L 184, 17.7.1999, p. 23.

bute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment.

Article 2

Scope

1. Without prejudice to Article 6, this Directive shall apply to electrical and electronic equipment falling under the categories 1, 2, 3, 4, 5, 6, 7 and 10 set out in Annex IA to Directive No 2002/96/EC (WEEE) and to electric light bulbs, and luminaires in households.
2. This Directive shall apply without prejudice to Community legislation on safety and health requirements and specific Community waste management legislation.
3. This Directive does not apply to spare parts for the repair, or to the reuse, of electrical and electronic equipment put on the market before 1 July 2006.

Article 3

Definitions

For the purposes of this Directive, the following definitions shall apply:

- (a) 'electrical and electronic equipment' or 'EEE' means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields falling under the categories set out in Annex IA to Directive 2002/96/EC (WEEE) and designed for use with a voltage rating not exceeding 1 000 volts for alternating current and 1 500 volts for direct current;
- (b) 'producer' means any person who, irrespective of the selling technique used, including by means of distance communication according to Directive 97/7/EC of the European Parliament and of the Council of 20 May 1997 on the protection of consumers in respect of distance contracts ⁽³⁾:
 - (i) manufactures and sells electrical and electronic equipment under his own brand;
 - (ii) resells under his own brand equipment produced by other suppliers, a reseller not being regarded as the 'producer' if the brand of the producer appears on the equipment, as provided for in subpoint (i); or
 - (iii) imports or exports electrical and electronic equipment on a professional basis into a Member State.

Whoever exclusively provides financing under or pursuant to any finance agreement shall not be deemed a 'producer' unless he also acts as a producer within the meaning of subpoints (i) to (iii).

⁽³⁾ OJ L 144, 4.6.1997, p. 19. Directive as amended by Directive 2002/65/EC (L 271, 9.10.2002, p. 16).

Article 4

Prevention

1. Member States shall ensure that, from 1 July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). National measures restricting or prohibiting the use of these substances in electrical and electronic equipment which were adopted in line with Community legislation before the adoption of this Directive may be maintained until 1 July 2006.

2. Paragraph 1 shall not apply to the applications listed in the Annex.

3. On the basis of a proposal from the Commission, the European Parliament and the Council shall decide, as soon as scientific evidence is available, and in accordance with the principles on chemicals policy as laid down in the Sixth Community Environment Action Programme, on the prohibition of other hazardous substances and the substitution thereof by more environment-friendly alternatives which ensure at least the same level of protection for consumers.

Article 5

Adaptation to scientific and technical progress

1. Any amendments which are necessary in order to adapt the Annex to scientific and technical progress for the following purposes shall be adopted in accordance with the procedure referred to in Article 7(2):

- (a) establishing, as necessary, maximum concentration values up to which the presence of the substances referred to in Article 4(1) in specific materials and components of electrical and electronic equipment shall be tolerated;
- (b) exempting materials and components of electrical and electronic equipment from Article 4(1) if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to therein is technically or scientifically impracticable, or where the negative environmental, health and/or consumer safety impacts caused by substitution are likely to outweigh the environmental, health and/or consumer safety benefits thereof;
- (c) carrying out a review of each exemption in the Annex at least every four years or four years after an item is added to the list with the aim of considering deletion of materials and components of electrical and electronic equipment from the Annex if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to in

Article 4(1) is technically or scientifically possible, provided that the negative environmental, health and/or consumer safety impacts caused by substitution do not outweigh the possible environmental, health and/or consumer safety benefits thereof.

2. Before the Annex is amended pursuant to paragraph 1, the Commission shall *inter alia* consult producers of electrical and electronic equipment, recyclers, treatment operators, environmental organisations and employee and consumer associations. Comments shall be forwarded to the Committee referred to in Article 7(1). The Commission shall provide an account of the information it receives.

Article 6

Review

Before 13 February 2005, the Commission shall review the measures provided for in this Directive to take into account, as necessary, new scientific evidence.

In particular the Commission shall, by that date, present proposals for including in the scope of this Directive equipment which falls under categories 8 and 9 set out in Annex IA to Directive 2002/96/EC (WEEE).

The Commission shall also study the need to adapt the list of substances of Article 4(1), on the basis of scientific facts and taking the precautionary principle into account, and present proposals to the European Parliament and Council for such adaptations, if appropriate.

Particular attention shall be paid during the review to the impact on the environment and on human health of other hazardous substances and materials used in electrical and electronic equipment. The Commission shall examine the feasibility of replacing such substances and materials and shall present proposals to the European Parliament and to the Council in order to extend the scope of Article 4, as appropriate.

Article 7

Committee

1. The Commission shall be assisted by the Committee set up by Article 18 of Council Directive 75/442/EEC ⁽¹⁾.

2. Where reference is made to this paragraph, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to Article 8 thereof.

The period provided for in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The Committee shall adopt its rules of procedure.

(1) OJ L 194, 25.7.1975, p. 39.

Article 8**Penalties**

Member States shall determine penalties applicable to breaches of the national provisions adopted pursuant to this Directive. The penalties thus provided for shall be effective, proportionate and dissuasive.

Article 9**Transposition**

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 13 August 2004. They shall immediately inform the Commission thereof.

When Member States adopt those measures, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. The methods of making such a reference shall be laid down by the Member States.

2. Member States shall communicate to the Commission the text of all laws, regulations and administrative provisions adopted in the field covered by this Directive.

Article 10**Entry into force**

This Directive shall enter into force on the day of its publication in the *Official Journal of the European Union*.

Article 11**Addressees**

This Directive is addressed to the Member States.

Done at Brussels, 27 January 2003.

For the European Parliament

The President

P. COX

For the Council

The President

G. DRYS

ANNEX

Applications of lead, mercury, cadmium and hexavalent chromium, which are exempted from the requirements of Article 4(1)

1. Mercury in compact fluorescent lamps not exceeding 5 mg per lamp.
2. Mercury in straight fluorescent lamps for general purposes not exceeding:
 - halophosphate 10 mg
 - triphosphate with normal lifetime 5 mg
 - triphosphate with long lifetime 8 mg.
3. Mercury in straight fluorescent lamps for special purposes.
4. Mercury in other lamps not specifically mentioned in this Annex.
5. Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
6. Lead as an alloying element in steel containing up to 0,35 % lead by weight, aluminium containing up to 0,4 % lead by weight and as a copper alloy containing up to 4 % lead by weight.
7. — Lead in high melting temperature type solders (i.e. tin-lead solder alloys containing more than 85 % lead),
 - lead in solders for servers, storage and storage array systems (exemption granted until 2010),
 - lead in solders for network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunication,
 - lead in electronic ceramic parts (e.g. piezoelectronic devices).
8. Cadmium plating except for applications banned under Directive 91/338/EEC ⁽¹⁾ amending Directive 76/769/EEC ⁽²⁾ relating to restrictions on the marketing and use of certain dangerous substances and preparations.
9. Hexavalent chromium as an anti-corrosion of the carbon steel cooling system in absorption refrigerators.
10. Within the procedure referred to in Article 7(2), the Commission shall evaluate the applications for:
 - Deca BDE,
 - mercury in straight fluorescent lamps for special purposes,
 - lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunications (with a view to setting a specific time limit for this exemption), and
 - light bulbs,as a matter of priority in order to establish as soon as possible whether these items are to be amended accordingly.

⁽¹⁾ OJ L 186, 12.7.1991, p. 59.
⁽²⁾ OJ L 262, 27.9.1976, p. 201.

Annex 3: Draft WEEE Regulation, Key points

Draft WEEE Regulation (May 2011)

One of the main changes in the current draft regulation is that municipalities are held responsible to establish collection centers and perform the collection. Also a new timeline to start establishing centers and perform collection based on municipal population is introduced:

Municipal Population	Starting dates to establish collection centers and performing collection
400,000<x	2012
200,000<x<400,000	2013
100,000<x<200,000	2014
50,000<x<100,000	2015
10,000<x<50,000	2016
x<10,000	2017

Municipalities are held responsible to submit a WEEE management plan to the MoEF for approval. Municipalities' responsibilities include informing the public about collection programs and performing or delegating the collection in accordance with the approved management plan. Other responsibilities of municipalities are as follows:

- Cooperate with local administrations for WEEE collection;
- Ensure the WEEE collected is transferred to producers, authorized organizations or licensed facilities for agreed tariffs;
- Ensure the WEEE collected is stored in appropriate containers in storage centers.

Another change in the current draft regulation is that producers are no longer held responsible for financing boxes and containers in the collection centers. The main difference between the previous draft and the current one is that producer responsibility to establish a system and bear the costs starts only after the WEEE is collected and submitted to them by municipalities and distributors. This change is mainly due to TURKBESD's proposal with a claim that unforeseen costs could have a negative impact on the sector's competitiveness and exports.

Another proposal raised by TURKBESD was the timeline of collection targets. TURKBESD suggested that there should be a transition period for private companies for licensing and raising awareness after the WEEE regulation is published. Furthermore, TURKBESD suggested that the producer's responsibility to collect and recycle WEEE should start after a preparation period, namely 12/31/2015. And since the WEEE collection targets are national targets; municipalities, producers or distributors should share responsibility to meet them with the national authorities.

This argument was also supported by TESID. Both associations argued that the new WEEE regulation is likely to raise their production costs and that producer's responsibility should start after a transition period for infrastructural adjustments. Timeline and collection targets set by the previous draft regulation (December 2010) together with TURKBESD's proposal are as follows:

Collection Targets in Previous Draft WEEE Regulation (December 2010)		TURKBESD's Proposal	
2012	0.2 kg/person/year	2012-2015	-
2013	0.3	2016	1
2014	0.5	2017	2
2016	1	2018	4
2018	4		

MoEF responded to this suggestion in the current draft by breaking collection targets into pieces for different WEEE categories, whereas total targets and timelines for WEEE from households remained the same. Despite the strong opposition of the sector, the responsibility to meet the collection targets is again given to the producers. The breakdown of collection targets in Article 15 of the current draft regulation is as follows:

WEEE Categories	Collection Targets (kg/capita-year)				
	2012	2013	2014	2016	2018
1. Refrigerators/freezers	0,04	0,05	0,09	0,17	0,68
2. Large household appliances and automatic dispensers (excluding refrigerators/freezers)	0,07	0,1	0,16	0,32	1,3
3. TVs and screens	0,04	0,07	0,10	0,22	0,86
4. IT and telecommunication and consumer equipments (excluding TVs and screens)	0,03	0,05	0,08	0,16	0,64
5. Lighting equipment	0,00	0,00	0,01	0,02	0,08
6. Electrical and electronic tools (with the exception of large-scale stationary industrial tools), toys, leisure and sports equipment, medical devices, monitoring and control instruments	0,02	0,03	0,06	0,11	0,44
Total WEEE from households (kg/capita-year)	0,2	0,3	0,5	1	4

TURKBESD also argued that training recycling facilities should not be producer's responsibility, and it should be removed from the regulation, however, the responsibility remained same in the current draft. Other issues mentioned in the current draft are a WEEE management plan to be

prepared by the producers and submitted for MoEF's approval and a producers' contribution in joint studies to collect the WEEE from household in areas that are not in municipalities' control. In addition, recycling and recovery targets set by the current draft regulation are as follows:

WEEE Categories		Recycling Targets by Years by Weight %				
		2012	2013	2014	2015	2016
Large household appliances		65	-	-	-	75
Small household appliances		40	-	-	-	50
IT and telecommunication equipment		50	-	-	-	65
Consumer equipment		50	-	-	-	65
	Lighting equipment	20	-	-	-	50
	Gas discharge lamps	55	-	-	-	80
Electrical and electronic tools		40	-	-	-	50
Toys, leisure and sports equipment		40	-	-	-	50
Medical devices		--	-	-	-	--
Monitoring and control instruments		40	-	-	-	50
Automatic dispensers		65	-	-	-	75

WEEE Categories		Recovery Targets by Years by Weight %				
		2012	2013	2014	2015	2016
Large household appliances		75	-	-	-	80
Small household appliances		55	-	-	-	70
IT and telecommunication equipment		60	-	-	-	75
Consumer equipment		60	-	-	-	75
	Lighting equipment	50	-	-	-	70
	Gas discharge lamps	70	-	-	-	80
Electrical and electronic tools		50	-	-	-	70
Toys leisure and sports equipment		50	-	-	-	70
Medical devices		--	-	-	-	--
Monitoring and control instruments		50	-	-	-	70
Automatic dispensers		70	-	-	-	80

Another change in the new draft is about establishment of a coordination center. According to Article 22 of the current draft regulation, in circumstances that more than one organization is authorized by the MoEF for special WEEE categories, those organizations should establish a joint center to coordinate with the MoEF and the local authorities. The coordination center is responsible for and authorized to do the following:

- Ensure that the collected WEEE at municipal collection points is distributed among authorized organizations based on their market shares;
- Control producers' information to be registered in MoEF's registration system;

- Report to the MoEF on behalf of the authorized organizations.

Otherwise, there has been no major change in the responsibilities of distributors, consumers and recycling facilities.

Finally as most stakeholders agree, the draft regulation should be finalized and published as soon as possible, since unregulated and uncontrolled conditions cause environmental pollution, raw material loss, tax loss due to inefficient disassembly and recycling, and illegal scrap dealing.