

Inefficiencies in the German WEEE Management System

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Abstract

The paper analyses the German Waste Electrical and Electronic Equipment (WEEE) management system. First an overview of the regulation for WEEE and the principle of Extended Producer responsibility (EPR) in Germany is being provided, followed by an investigation of inefficiencies in the implementation of the EPR concept, lack of incentives for eco-design, as well as recycling step-backs in Germany. It can be concluded that the German WEEE management system has still many drawbacks which hinder proper recovery of high amounts of important metals.

Keywords: Waste Electrical and Electronic Equipment, Extended Producer Responsibility, Recycling, Ecodesign

Introduction

In 2003, the WEEE Directive (2002/96/EC) came into force with the goal of achieving higher re-use, recycling and recovery rates for waste electrical and electronic products. In 2012, the amended WEEE Directive came into force on 12th of August. This amended WEEE II Directive contains higher collection targets for WEEE (Besiou et al., 2012), but it still sets mass based instead of value based collection targets. Both the WEEE Directive and its amended version WEEE II are based on the principle of producer responsibility (PR), which is supposed to set incentives to producers for designing products which are easier to re-use, disassemble, recycle and recover by attributing the financial responsibility for collection, recovery and recycling to producers for their own products.

Revised: 01.06.2015

Online Publication Date: 01.08.2015

The transposition of the WEEE Directive in the EU led to different national implementations with different types of producer responsibilities. In Germany the 2003 WEEE Directive has been implemented under the legal Act Governing the Sale, Return and Environmentally Sound Disposal of Electrical and Electronic Equipment (ElektroG).

The second WEEE Directive has not yet been implemented. The main modifications brought by the new WEEE Directive will be implemented

step-by-step until 2018 and include:

- Further increase of the collection and recovery rates in the different EU member states
- Photovoltaic modules will now be covered by WEEE, i.e. they will have to be registered as EEE at the Clearing House
- By appointing authorized representatives in the countries the registration procedures should become easier
- The currently 10 product categories will be reduced to only 6 in 2018
- The "open scope" is introduced: All products which aren't subject to any exception will be under the scope of WEEE. Currently, products have to fit into one of the 10 categories. (<http://www.elektrogesetz.com/#weee2>)

Figure 1: Interplay of PuWaMA, clearing house, producers and EoL service providers

Source: Otmar Deubzer, 2011

Under the ElektroG, PWMA are collecting WEEE in five collection groups as in Table 1:

Table 1: E-waste collection groups in Germany

CG	Product Categories
1	Large household appliances (Cat 1), automatic dispensers (Cat 10)
2	Refrigerators and freezers (Cat 1)
3	IT and telecommunications equipment (Cat 3), consumer equipment (Cat 4)
4	Gas discharge lamps (Cat 5)
5	Small household appliances (Cat 2), lighting equipment, electric and electronic tools (Cat 6), toys, sports and leisure equipment (Cat 7), medical products (Cat 8), monitoring and control instruments (Cat 9).

Source: Rotter et al., 2011.

According to the ElektroG, three main actors are involved in the management of WEEE in Germany. First, public waste management authorities (PWMA) are responsible for the organization of the collection points for the WEEE. But WEEE can also be collected in smaller amounts by retailers and even producers and disassembly companies. When containers are full, local public waste management authorities report to the Clearing House (Stiftung Elektro-Altgeraete Register [EAR]) which is the designated authority carrying all functions and duties to ensure the proper implementation of the ElektroG. EAR is using specially designed mathematical models in order to determine the responsible producer for the next container pick up. After receiving notification, the responsible producer must ensure the immediate pick up of the container and treatment of the waste through its network of logistic companies and certified treatment facilities.

The structure of the German system for WEEE management can be observed in Figure 1.

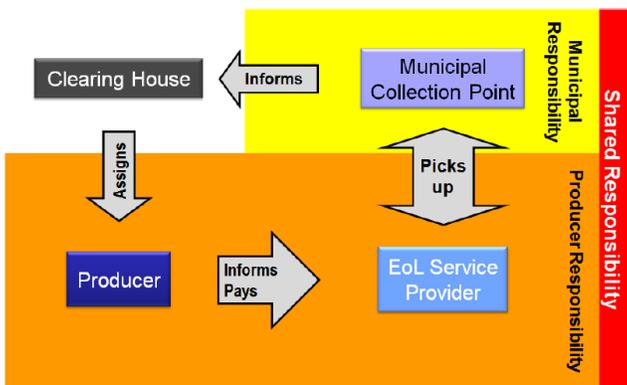
1 Extended Producer Responsibility

There are several definitions for the term of "extended producer responsibility" or EPR. One of the definitions is given by the Organization for Economic Co-operation and Development (OECD):

(. . .) an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle (OECD, 2004: p. 9).

OECD characterizes the purpose and goal of EPR as to internalize the environmental and social lifecycle costs into the product's price, especially with regard to costs incurred during the end-of-life management of the product. As such, it is expected that EPR will incentivize producers to consider these impacts and costs already at the design stage of the product. Practical implementation of EPR occurs through the liability of producers to take back their products at end of lifecycle. „Take-back requirements are the primary EPR regulatory instrument" (OECD, 2004: p. 207.).

The extended producer responsibility can be fulfilled either in a collective (CPR) or individual way (IPR). In the first case, producers are collectively responsible for generated WEEE "equipment in a given category which



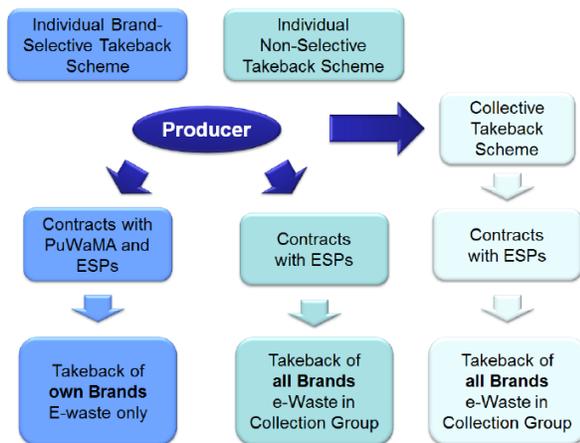
has comparable characteristics in terms of its uses or functions” (ElektroG), while in case of individual producer responsibility, producers are only responsible for the WEEE generated from their own products. Theoretically, IPR is providing the highest incentives for designing products for easier recycling.

According to the German ElektroG, producers have three options for fulfilling their producer responsibility obligations:

- Individual brand-selective take back schemes (IBTS). Producers are responsible for organising take-back systems for their own products. Since currently PWMA are collecting WEEE collectively, such a system would involve PWMA to collect separately or to sort out the products of the respective producer, leading to increased logistics costs. At the same time the producer has to directly contract end of life service providers.
- Individual non-selective take back schemes (INTS). In this case producers are responsible for contracting end of life service providers to manage their attributed market share of WEEE by the EAR. The own products of the respective producer do not need to be separately collected.
- Collective take back scheme (CTS). According to this option, producers are collectively responsible for managing WEEE by financing the management of their attributed market share of WEEE.

Figure 2 presents the possibilities for producers to implement their producer responsibility in Germany.

Figure 2 - Producer responsibility in Germany



Source:

2 Inefficiencies of the German WEEE Management System

Disincentives for Individual Producer Responsibility

Germany is one of the countries where IPR exists as an option for producers to deal with the end of life of WEEE generated from their products. However, in practice, IPR remains just a theoretical option due to several hindering factors towards putting it into practice, such as:

a) The European WEEE Directive assigns responsibility of WEEE treatment to the producers. However, responsibility for who should be in charge of collection is not clearly defined. According to the ElektroG, the collection system in Germany is centralized, meaning that it functions under the responsibility of the municipalities. Since municipalities are the ones organizing and collecting all brands of WEEE together, there is no chance for IPR to pay for the end of life treatment of their own products. This is due to the fact that treatment facilities cannot identify and separate the brands of each producer in order to charge them for the treatment of their own products. As such, producers are financing the end of life treatment of their assigned share of the WEEE as part of collective take back systems (CPR). “*In practice each producer shares the average cost of collectively recycling mixed categories of types of waste products*” (Mayers et al., 2013). At the same time producers have no incentive to collect more of their allocated share, as they would have to pay more in this case. Due to the centralized collection system, it is important to understand that producers have only a *financial responsibility* (financing the management of WEEE after collection), but no *physical responsibility* (having no influence on how collection is being done).

b) To put in practice an IPR system involves that producers must organize on their own collection and treatment systems outside of the centralized system, which would be too costly.

c) In Germany, all producers must provide a financial guarantee for the end of life treatment of their products. Since this financial guarantee must be paid in both cases, as being part of a CPR or IPR, producers will obviously choose CPR to at least avoid the extra costs of organizing individual collection and treatment systems for their own

WEEE. In other European Member States, on the opposite, producers being part of a CPR do not need to provide a financial guarantee, as their participation in the CPR being seen as a sufficient guarantee. Obviously, in these countries, producers have no incentive to switch to IPR, where they should then provide the financial guarantee as well as financing for the organization of collection and treatment of their own products. *“High efforts connected to the identification of products and the economics of recycling turn this case into a theoretical construct”* (Bohr, 2007).

We can see that just because the WEEE Directive is mandating IPR, this does not lead to actually putting IPR into practice, or to giving incentives for ecodesign. According to Bohr (2007) *“mandating individual treatment spurs individual take back”*.

Lack of incentives for Ecodesign

The formation of waste begins with the design stage of a product. As such, *“the establishment, by this Directive, of producer responsibility is one of the means of encouraging the design and production of EEE, which take into full account and facilitate their repair, possible upgrading, reuse, disassembly and recycling”* (WEEE Directive, 2003). Initially it was assumed that the implementation of IPR would imply producers having to pay for the treatment of their own products, which theoretically would have given incentives to the producers to pay more attention to designing their products in such a way as to make them easier and respectively cheaper to recycle. *“If you want to invest in the design of your products then – if you want to get the return on investment – you have to have Individual-Brand-Selective Take Back Systems. If that’s not possible, then of course there is no incentive. It is money that you strictly speaking, have thrown out the window”* (EAR, 2011).

In Germany, the national system for managing WEEE has been developed in such a way as to promote competition in order to reduce as much as possible the price of treatment and recycling. This has also happened in practice, as Germany has much lower prices for treatment of WEEE in comparison to other countries, as for example, The Netherlands, where the focus is not on competition, but rather on easy

management system where treatment is based on monopoly of ICT Millieu (Table 2).

Table 2: Cost in Euros of collecting and recycling of specific IT&TE products per unit in 2006

Country	Laptop	Desktop	Digital Camera
Germany	0.07 €	0.38 €	0.01 €
The Netherlands	1.08 €	2.70 €	0.07 €

Source: Kristensen et al., 2011

But the reduced cost of treatment gained through competition in Germany, which resulted also in lower treatment costs for producers, gave producers little incentive to focus or even consider the concept of ecodesign – designing their products for ease of dismantling and recycling. This unwillingness towards ecodesign is also sustained by the fact that producers pay at the moment according to their pre-calculated market shares and not for their own products. Reasons why it is impractical for producers to pay for recycling of their own products have been discussed in the previous section regarding disincentives for IPR. Kristensen et al. (2011) sustain that *“if producers were made to pay the treatment price of their own specific products, they would get a market advantage by improving their design-for-reuse”*. In such a system, competition and high quality treatment could coexist, whereas now the competition for achieving lowest treatment costs does not necessarily lead to high quality treatment in Germany.

In the new WEEE Directive, shops larger than 400 m² are now as well responsible for collection and treatment of WEEE. But, since wholesalers do not have any direct implication or influence on product design, how could such an action support ecodesign of products?

Also since the original WEEE did not demanded any recycling standards or criteria, the environmental benefits of recycling are questionable, especially taking into consideration the competition in Germany of the treatment companies towards reducing costs.

Another important issue of the German system is the complexity of the administrative burden. Since Stiftung EAR applies a centralized allocation mechanism for take-back obligations, producers have to organize complex take back systems spread all over the country, and as such ignoring the benefits of regional partnerships (Bohr, 2007).

Recycling step-backs

Moreover, one can observe recycling activities for WEEE, which seem to be oriented towards a different objective since the European WEEE II Directive¹ still contains mass-based instead of value-based recovery rates. Hence, WEEE recyclers have an incentive to achieve such mass-based recovery rates and they tend to collect materials which dominate in terms of weight. In this process, they neglect valuable materials which are lost along the recycling chain² by ending up in materials fractions from which they cannot be recovered. A value-based recovery objective would, instead, set incentives to increase the collection of small WEEE and extract valuable materials in low concentrations, such as found in mobile phones and smartphones. Hence, the current mass-based recovery rates of the European WEEE II Directive have a prohibitive effect on the recovery and recycling of such small WEEE. So major reasons for the large "hidden treasury" monetary values which are not put to use clearly relates to the currently level of collection and recycling, in particular the very low collection rates at the end-of-life stage especially for small electronics. It seems that consumers do not have any substantial incentives to return these products at the end-of-life stage. Consumers are, however, vital for the creation of circular material supply chains since they are physically holders of these products.

The creation of materials cycles also requires a receiving and processing industry, which currently is developed at a very small level. Existing state-of-the-art metallurgical plants have the appropriate technology to achieve high recovery rates for valuable materials, as long as these materials reach the right material fraction. According to (Hagelüken, et al., 2010), due to inefficiencies in collection, dismantling and pre-processing "less than 20% of the gold recycling potential from European WEEE is realized". As such, better collection rates can have a positive impact on recycling of WEEE. For example the collection rates for flat screens and for notebooks, 85% and 50% respectively, are much higher than for mobile phones

and smartphones (only 5%). Hence, potentials for improved collection rates have to be investigated for all types of electronic equipment.

3 Conclusion

The article discusses inefficiencies in the German WEEE management system by addressing issues of disincentives for Individual Producer Responsibility, lack of incentives for ecodesign and recycling step-backs. It can be concluded that the German WEEE management system has still many drawbacks which hinder proper recovery of high amounts of important metals.

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² A recycling chain is defined as "the sequence of operation leading to the recovery of materials from waste. These operations include (1) collection which is the beginning of any waste management process, (2) preparation for material recovery which covers manual and/or mechanical operations & sorting and (3) material recovery which consists in chemical, physical or metallurgical operations, but does not include incineration for energy recovery and the reprocessing into materials that are to be used as fuels" (European Association of Metals, 2013).

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