Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Environmental Protection Agency

Establishment
The Environmental Protection Agency Act, 1992, was enacted on 23 April, 1992, and under this legislation the Agency was formally established on 26 July, 1993.

Responsibilities
The Agency has a wide range of statutory duties and powers under the Act. The main responsibilities of the Agency include the following:

- the licensing and regulation of large/complex industrial and other processes with significant polluting potential, on the basis of integrated pollution control (IPC) and the application of best available technologies for this purpose;

- the monitoring of environmental quality, including the establishment of databases to which the public will have access, and the publication of periodic reports on the state of the environment;

- advising public authorities in respect of environmental functions and assisting local authorities in the performance of their environmental protection functions;

- the promotion of environmentally sound practices through, for example, the encouragement of the use of environmental audits, the setting of environmental quality objectives and the issuing of codes of practice on matters affecting the environment;

- the promotion and co-ordination of environmental research;

- the licensing and regulation of all significant waste disposal and recovery activities, including landfills and the preparation and periodic updating of a national hazardous waste management plan for implementation by other bodies;

- implementing a system of permitting for the control of VOC emissions resulting from the storage of significant quantities of petrol at terminals;

- implementing and enforcing the GMO Regulations for the contained use and deliberate release of GMOs into the environment;

- preparation and implementation of a national hydrometric programme for the collection, analysis and publication of information on the levels, volumes and flows of water in rivers, lakes and groundwaters; and

- generally overseeing the performance by local authorities of their statutory environmental protection functions.

Status
The Agency is an independent public body. Its sponsor in Government is the Department of the Environment and Local Government. Independence is assured through the selection procedures for the Director General and Directors and the freedom, as provided in the legislation, to act on its own initiative. The assignment, under the legislation, of direct responsibility for a wide range of functions underpins this independence. Under the legislation, it is a specific offence to attempt to influence the Agency, or anyone acting on its behalf, in an improper manner.

Organisation
The Agency's headquarters is located in Wexford and it operates five regional inspectorates, located in Dublin, Cork, Kilkenny, Castlebar and Monaghan.

Management
The Agency is managed by a full-time Executive Board consisting of a Director General and four Directors. The Executive Board is appointed by the Government following detailed procedures laid down in the Act.

Advisory Committee
The Agency is assisted by an Advisory Committee of twelve members. The members are appointed by the Minister for the Environment and Local Government and are selected mainly from those nominated by organisations with an interest in environmental and developmental matters. The Committee has been given a wide range of advisory functions under the Act, both in relation to the Agency and to the Minister.

Waste from Electrical & Electronic Equipment

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INTRODUCTION

Waste from electrical and electronic equipment (WEEE) has been identified as a priority waste stream by the European Commission due to its potentially hazardous nature, the consumption of resources used during the manufacture of electrical and electronic equipment and the expected WEEE growth rates.

Due to the growing awareness of the environmental impacts associated with WEEE, the Commission is drafting a Directive which will specifically deal with the management of this waste stream. While small quantities of WEEE are presently being recycled in Ireland, the introduction of a Directive on WEEE will require significant increases in the quantity being collected and subsequently reused or recycled. In order to formulate plans for the management of this waste stream, information on the quantities of WEEE arising in Ireland, the composition of WEEE and current WEEE management practices, is required.

WHAT IS ELECTRICAL AND ELECTRONIC EQUIPMENT?

The 5th draft Directive on WEEE (CEC (a), 2000) defines Electrical and Electronic Equipment as *"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 1A and designed for use with a voltage rating not exceeding 1000 Volt for alternating current and 1500 Volt for direct current"*.

This definition and its associated Annex is intended to cover all appliances run by electricity. The voltage limits in the definition are intended to ensure that large industrial equipment is not covered by the proposal.

Annex I A of the draft Directive sets out the categories of equipment covered:

- *Large household appliances*
- *Small household appliances*
- *IT & Telecommunication equipment*
- *Consumer equipment*
- *Lighting equipment*
- *Electrical and electronic tools*
- *Toys*
- *Medical equipment systems (with the exception of all implanted and infected products)*
- *Monitoring and control instruments*
- *Automatic dispensers*

WHAT ARE THE MAIN ENVIRONMENTAL CONCERNS?

The disposal of waste from electrical and electronic equipment is of environmental concern for a number of reasons. These include the fate of dangerous materials in the waste, the depletion of resources and the impacts of waste treatment methods.

DANGEROUS SUBSTANCES

Electrical and electronic equipment contains a wide variety of materials and components, including some that are considered dangerous. Commonly found components include: printed circuit boards, flame retarded plastics, cathode ray tubes, liquid crystal displays, batteries, mercury switches, capacitors and resistors. These components contain a wide range of materials including environmentally problematic ones such as mercury, lead, cadmium, chromium, CFC's (chloro-fluorocarbons), PCB's (polychlorinated biphenyls), PCN's (polychlorinated napthalenes) and brominated flame retardants.

These substances make up only a small proportion of the total weight of EEE, but the potential environmental problems that even small quantities can cause are serious enough to warrant concern. The following substances are targeted by the EU draft directive on WEEE:

Mercury (Hg)- It has been estimated that 22% of the annual world consumption of mercury can be attributed to electrical and electronic equipment (ENEA, 1995). Many older appliances contain mercury-bearing components. A large use of mercury is for fluorescent tubes, where it transforms the UV-light created in the gas discharge to visible light. Mercury is also used in relays, tilt switches, and in medical equipment.

Cadmium (Cd)- Cadmium is used in batteries, as a pigment and stabiliser in plastics, in specialist treatment of mechanical surfaces and in speciality solders. It is also used as a fluorescent material in screens and was used in old cathode ray tubes (CRT's). Consumer electronics have been found to contribute 9% of total cadmium in municipal solid waste (US EPA, 1989). Of this cadmium, 95% is attributed to batteries and only 0.1% to CRT's (Hedemalm *et al.*, 1995).

Lead (Pb)- A 1989 study by the US EPA found that lead from consumer electronics accounted for 17% of all lead in municipal solid waste (a further 65% of the lead comes from lead-acid batteries). More recently, consumer electronics have been found to account for 40% of lead in MSW in Europe (CEC (b), 2000). With increased efficiency in the recycling of batteries, lead from electrical and electronic equipment is likely to become the main source of lead in municipal solid waste (MSW).

By far the largest source of the lead in consumer electronics has been found to be contained in CRT's. CRT's are found primarily in television sets and computer monitors and can vary considerably in their composition but all contain substantial proportions of lead (Minnesota Office of Environmental Assistance, 1995). It is estimated that a television CRT contains 15-20% lead oxide (ENEA, 1995). Other important sources include soldering on printed circuit boards, pigments and stabilisers in plastics, and leaded glass (Hedemalm *et al.*, 1995).

Hexavalent Chromium (Cr)- Electrical and electronic equipment does not account for a significant share of chromium use and most producers no longer use it at all. It is used as a corrosion protector for steel plates and in printed circuit boards and plastic covers (ENEA, 1995).

Brominated Flame Retardants (BFR's)- It is estimated that flame retarded plastics make up around 5.5% of WEEE by weight, or 25% of all plastic used in EEE (Hedemalm *et al.*, 1995). Of these flame retarded plastics, approximately 80% are treated with brominated flame retardants (ENEA, 1995).

BFR's are designed into electronic products as a means of ensuring flammability protection. They are mainly used in printed circuit boards, components (such as connectors), plastic covers and cables.

RESOURCE DEPLETION

There is potential for significant loss of resources when electrical and electronic equipment is disposed of at landfills.

A 1997 report estimated that 6 million tonnes of WEEE would be generated in Europe in 1998. They calculated that the potential loss of resources from this would be:

2.3 million tonnes of ferrous metal

1.2 million tonnes of non-ferrous metals, of which
652,000 tonnes of copper
336,000 tonnes of aluminium

162,000 tonnes of heavy metal

12-27,000 tonnes of lead

6-8 tonnes of mercury

1.2 million tonnes of plastics

156,000 tonnes of flame retardants

336,000 tonnes of glass

Source: AEA Technology (1997)

Some of the materials and components contained in old equipment can be recovered for use in new products thus reducing the need to extract new materials and manufacture new products. Of particular benefit is the energy saved through recycling or reuse. For example, the energy used in mining copper is 6 times more than that used in recycling the same amount, and for aluminium the figure is over 20 times (ICER, 2000).

IMPACTS OF WASTE TREATMENT METHODS

LANDFILL

In Ireland over 91% of municipal waste is disposed of in landfill sites (Irish EPA, 1998). The inclusion of waste from electrical and electronic equipment in this general waste has raised some concerns regarding its potential environmental impact. Studies of WEEE in landfill have found that it is extremely difficult to quantify the potential environmental impact of the equipment due to the complex and lengthy processes that take place in the landfill as the waste degrades. Many external factors affect the decomposition of the chemical substances, including temperature, salt concentrations, pH and oxygen concentration. In addition, as space in landfills is becoming increasingly scarce, there is a need to closely examine the types of waste that are entering these sites.

THERMAL TREATMENT

While no thermal treatment of municipal waste currently takes place in Ireland, it is worth considering the environmental consequences of this practice as thermal treatment is being assessed as a waste management option for the country.

A reduction in waste volumes and the utilisation of energy by burning the waste are clear advantages to incineration. Also, some environmentally hazardous organic substances in WEEE are converted to less environmentally hazardous compounds in the incineration process (Taberman *et al.*, 1995). Items of electrical and electronic equipment with high plastics content have a high calorific content and are therefore very suitable for incineration. However, they also contain heavy metals and halogenated substances which cause environmental problems such as the concentration of heavy metals in the slag and potential emissions of mercury, dioxins and furans.

LEGISLATION

Due to the environmental concerns regarding the potential impacts of WEEE, the European Commission is presently preparing legislation in the form of a draft directive on WEEE. The aims of this directive are to:

- Reduce the quantities of WEEE being disposed of in landfills;
- Reduce the harmfulness of WEEE;
- Conserve natural resources; and
- Ensure harmonisation of measures used in Member States to avoid distortion to the internal market.

In order to achieve these, the following measures are proposed in the draft directive:

- Manufacturers will be required to improve the design of their products in order to avoid the generation of waste and to facilitate the recovery and disposal of WEEE by:
  - the substitution of hazardous substances such as lead, mercury, cadmium, hexavalent chromium and certain brominated flame retardants;
  - measures to facilitate identification and re-use of components and materials, particularly plastics;
  - measures to promote the use of recycled plastics in new products; and

- incentives from national governments to encourage producers to design equipment that can be easily recycled or refurbished.

- Producers should take the responsibility for certain phases of the waste management of their products. This is intended to create a financial incentive to improve product design. The legislation is likely to require producers to pay the costs of recycling products from domestic households and may also require them to pay collection costs.

- Separate collection of WEEE is to be ensured along with a collection target in order to create a level playing field throughout the Member States.

- Producers will be required to ensure that appropriate systems are in place to improve the treatment and re-use/recovery of WEEE. Targets for the re-use and recycling of WEEE are to be set.

- Consumers are to be informed of their role in the system through a labelling requirement for items of EEE.

The fifth draft of the Directive (CEC (a), 2000) has in fact been split into two Directives: the Directive on WEEE and a Directive on hazardous substances in EEE which will restrict the use of the following hazardous substances: brominated flame retardants, hexavalent chromium, lead, cadmium and mercury. There is also the possibility of a third directive being introduced in relation to product design.

At present, there is no specific national legislation in Ireland in relation to WEEE. However, the Waste Management Act, 1996 provides the necessary powers to regulate specific waste streams, including WEEE. It also allows for the provision of "producer responsibility" obligations where considered necessary. However, no national programmes or agreements currently exist for the management of WEEE.

HOW MUCH WEEE IS BEING PRODUCED?

QUANTITIES ARISING IN EUROPE

Numerous attempts have been made to measure the potential quantities of WEEE arising in Europe. However, the results vary widely and comparisons of the studies are difficult because the methods used and the assumptions made in calculating the waste quantities differ from one study to another. Notwithstanding this, the Italian National Agency for New Technology, Energy and the Environment (ENEA) attempted to calculate WEEE arisings for 1998. They estimated that between **5.4** and **6.7 million tonnes/year** would be generated in the EU and that there would be a **3** to **5% annual growth** in WEEE arisings throughout the Member States for all product categories. This gives a total WEEE potential of around 20kg/inhabitant/year which appears to have been widely accepted as an indicative value.

PERSPECTIVE

Total annual arisings of all wastes in the EU is estimated at about 1.6 billion tonnes.

WEEE therefore represents less than 0.5% of the total EU waste stream.

Total annual arisings of MSW in the EU is estimated at about 156 million tonnes.

WEEE therefore represents approximately 4% of the EU MSW stream.

QUANTITIES ARISING IN IRELAND

APPROACH ADOPTED

The method adopted in this study to estimate the quantities of WEEE arising in Ireland is based on a material flows approach. This methodology is based on the sales of items of electrical and electronic equipment. These sales figures have then been applied to a number of calculation methodologies to generate theoretical waste arisings for each of the selected items. Then by using average weights and an average composition of the waste stream, total WEEE arisings for Ireland have

been extrapolated.

In this study, a representative selection of appliances were chosen which represented a range of compositional and life-cycle criteria that typify the EEE waste stream. These appliances along with their reason for selection are presented below.

ITEMS OF EQUIPMENT STUDIED

- *Personal Computer - dynamic market, hazardous materials*
- *Refrigerator - saturated market, CFC issue*
- *Television - saturated market, CRT disposal problem*
- *Photocopier - high reuse potential, complex composition*
- *Fluorescent lamps - hazardous content*
- *Handheld drills & Saws - disposed of in uncontrolled manner*
- *Toaster - disposed of in uncontrolled manner*
- *Coffee Maker - disposed of in uncontrolled manner*

However, due to data limitations the only items from this list that could be examined in detail were personal computers, televisions, refrigerators and toasters.

STEPS INVOLVED

Four different steps were involved in estimating the quantities of WEEE arising in Ireland, as follows:

- Step one: Acquire sales data
- Step two: Apply waste calculation models
- Step three: Extrapolate total waste quantities
- Step four: Calculate material waste arisings

Step One: Sales Data

Sales data was acquired from a range of sources including the Central Statistics Office, market research companies and industry associations (see Figure 1).

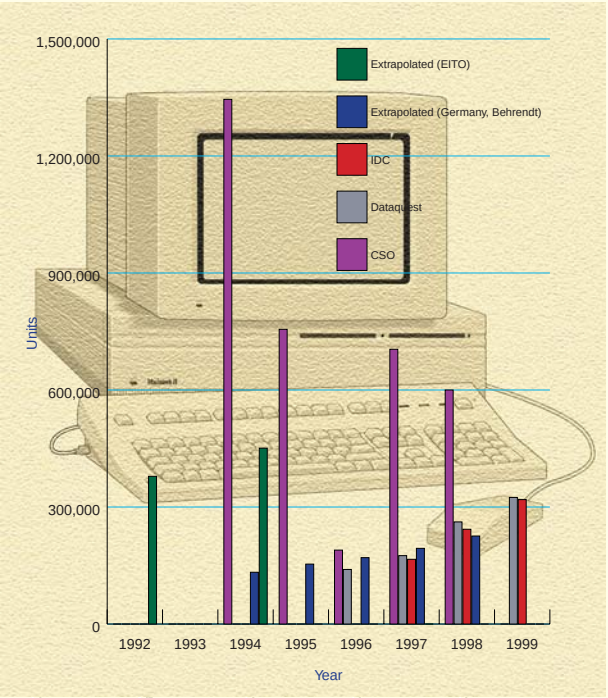

Figure 1: Comparison of Data Sources for PC Sales

Due to the wide range of data sources and the variance in the quality of the data, a combination of different sources for different items was selected. Missing data was extrapolated and future growths were forecasted.

Figures 2 to 5 show these figures graphically. Simple trends have been calculated using regression analysis and due to the rapid changes taking place in the Irish economy should be considered with caution.

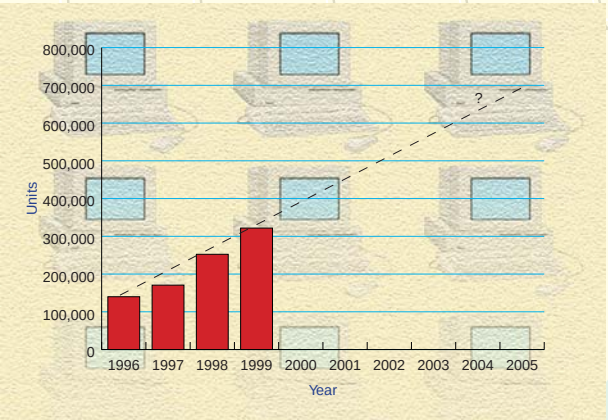

Figure 2: Sales of PC's in Ireland

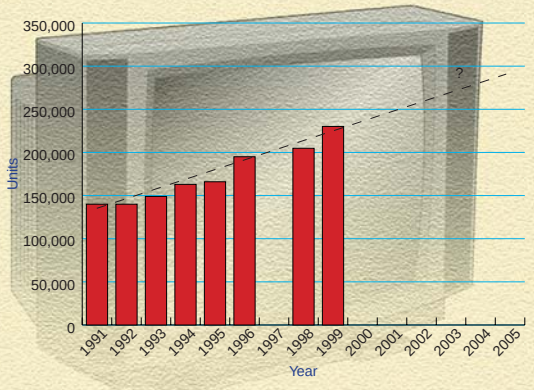

Figure 3: Sales of Televisions in Ireland

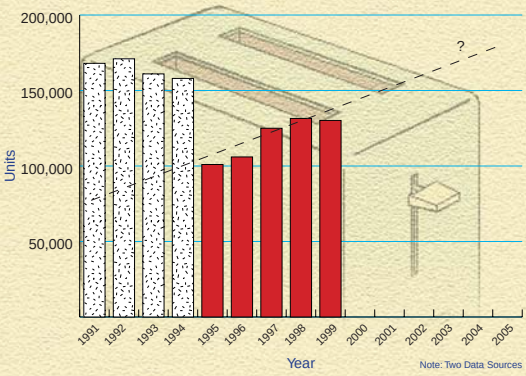

Figure 5: Sales of Toasters in Ireland

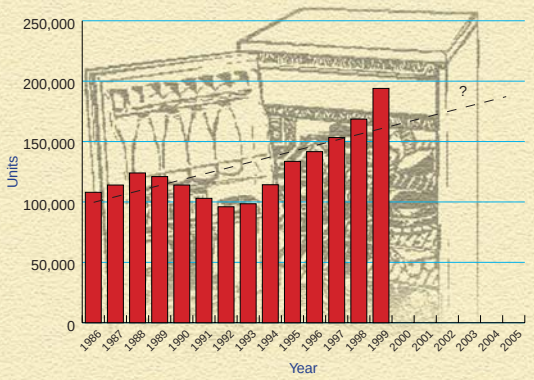

Figure 4: Sales of Refrigerators and Fridge/Freezers in Ireland

Step Two: Waste Calculation Models

Step two involves the application of waste calculation models to calculate WEEE arisings. Seven different models are used in world-wide studies with each model using a different set of assumptions and variables. The variables used include stock (household and commercial), sales and product lifetimes.

Figures 6 to 13 show the results from the waste calculation models for each of the appliances being examined. The results in the graphs are presented in units only, while the charts contain the upper and lower estimates of the calculation methods in tonnes.

Results for PC's

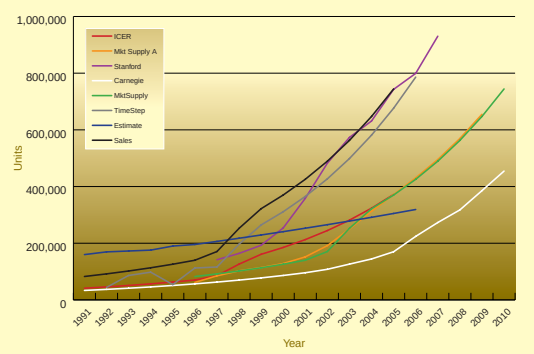

Figure 6: Comparison of Calculation Models for PC Arisings

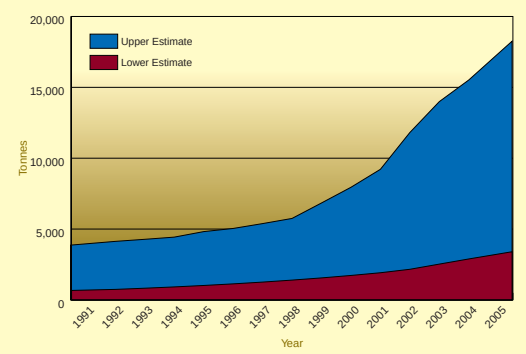

Figure 7: Upper and lower Estimated Arisings for PC's in Ireland

Results for Televisions

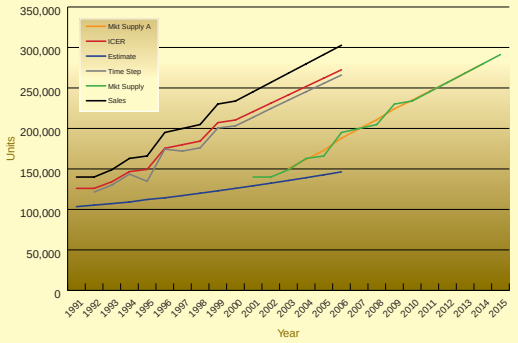

Figure 8: Comparison of Calculation Models for TV Arisings

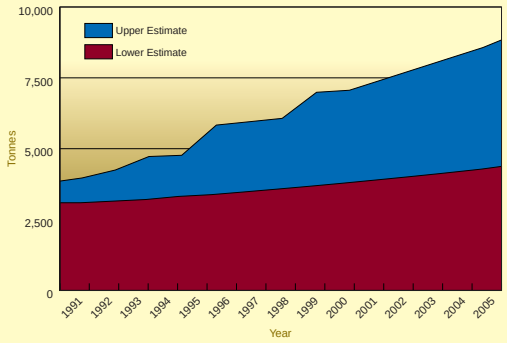

Figure 9: Upper and Lower Estimated Arisings for TV's in Ireland

Results for Refridgerators

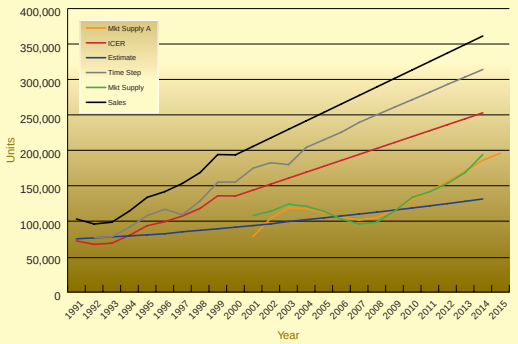

Figure 10: Comparison of Calculation Models for Refrigerators Arisings

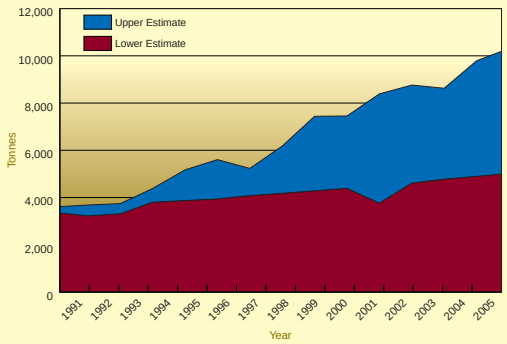

Figure 11: Upper and Lower Estimated Arisings for Refrigerators in Ireland

Results for Toasters

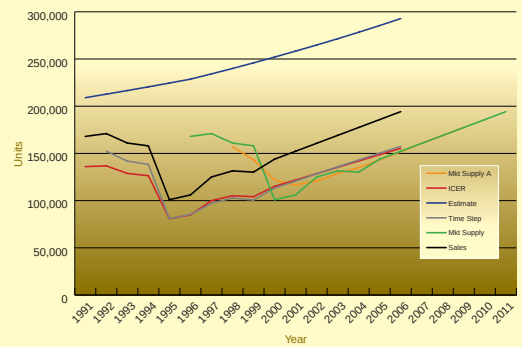

Figure 12: Comparison of Calculation Models for Toaster Arisings

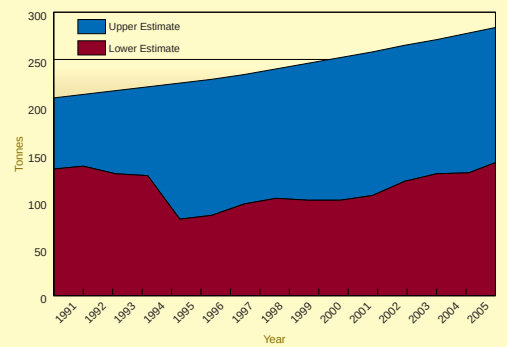

Figure 13: Upper and Lower Estimated Arisings for Toasters in Ireland

Step Three: Total Quantity of WEEE Arisings

A number of studies have examined the mix or composition of the EEE waste stream. Typically it has been found that a large part of the waste (by weight) is made up of just two types of equipment: large household appliances such as refrigerators, cookers and washing machines, and IT equipment such as PC's, printers and copiers.

Difficulties occur when attempting to identify the specific composition of the EEE waste stream as a large number of studies have produced a wide range of results. For the purposes of this investigation we have taken two studies, one being a full European study (AEA Technology, 1997) and the other being confined to the UK (ICER, 2000), and we have used an average of the two.

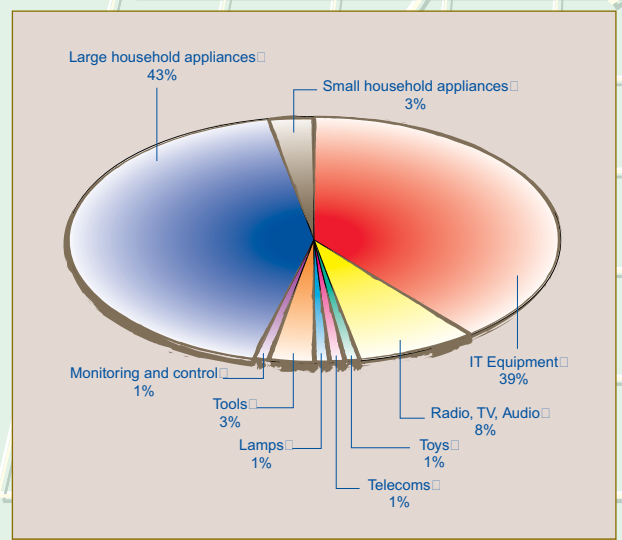

Figure 14: Percentage composition (by weight) of the EEE waste stream (from ICER, 2000).

Table 1: Contribution to WEEE composition (by weight) for key items: comparison of studies.

Item	AEA Technology (1995)	ICER (2000)	Average
PC	6.3%	10.6%	8.45%
Refrigerator/ Freezer	17.5%	13%	15.25%
Television	8.8%	5.2%	7%
Toaster	0.2%	0.5%	0.35%
TOTAL	32.8%	29.3%	31.05%

In order to extrapolate total quantities of WEEE in Ireland, the sum of the calculated arisings for PCs, refrigerators, TVs and toasters was assumed to represent 31.05% of the total WEEE arisings. Using this value the total WEEE arisings for Ireland was estimated and the results are represented below.

Total WEEE arisings for Ireland for the period 1991 to 2005 = 505,000 to 1,040,000 tonnes,

- *an average of 34,000 to 69,000 tonnes per annum.*
- *or, approximately 9 to 18 kg/inhabitant/year.*

Total municipal solid waste for Ireland in 1998 was predicted at 2,056,652 tonnes.

- *WEEE therefore represents 1.65 to 3.36% of total MSW in Ireland.*

For the year 2000 WEEE of between approximately 36,000 and 74,000 tonnes is predicted.

Step Four: Material Composition of WEEE

Given the diverse range of materials found in items of WEEE, it is extremely difficult to give a generalised material composition for the entire waste stream. However, a number of studies have attempted to do so. Most studies, when investigating the material composition of WEEE examine five categories of materials: ferrous metals, non-ferrous metals, glass, plastic, and "other". As can be seen from Figure 15, ferrous metals account for the largest portion of materials in WEEE, with plastics also making a large contribution.

In order to examine the material composition of WEEE in Ireland, we have used the study of the Nordic Council of Ministers (Taberman *et al.*, 1995). Using the material composition estimates from this study together with our waste calculations, we can estimate the arisings of specific materials from WEEE in Ireland. The results of the material composition along with the upper and lower

estimates for the quantities of each material arising from WEEE in Ireland in 2000 are given in Table 2, with results being presented graphically in Figure 16.

Table 2: Material arisings from WEEE in Ireland for the year 2000.

Material type	Composition (wt%)	Arisings (tonnes) Upper	Lower
Iron and steel	47.9	35,249	15,994
Aluminium	4.7	3,459	1,569
Copper	7.0	5,151	2,337
Other metals (non-ferrous)	1.0	736	334
Metals total	60.6	44,595	20,235
Flame retarded plastic	5.3	3,900	1,770
Non-flame retarded plastic	15.3	11,259	5,109
Plastics total	20.6	15,159	6,879
Glass	5.4	3,974	1,803
Rubber	0.9	662	301
Wood & plywood	2.6	1,913	868
Concrete & ceramics	2.0	1,472	668
Printed circuit boards	3.1	2,281	1,035
Other	4.6	3,385	1,536
TOTAL	100.0	73,589	35,615

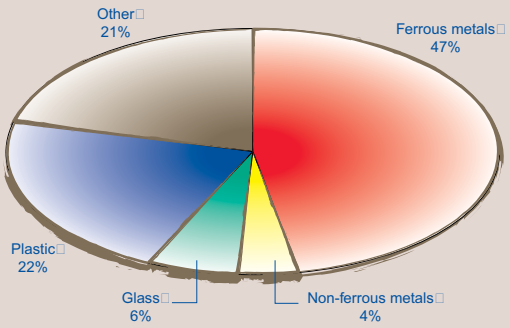

Figure 15: Material composition of WEEE (ICER, 2000)

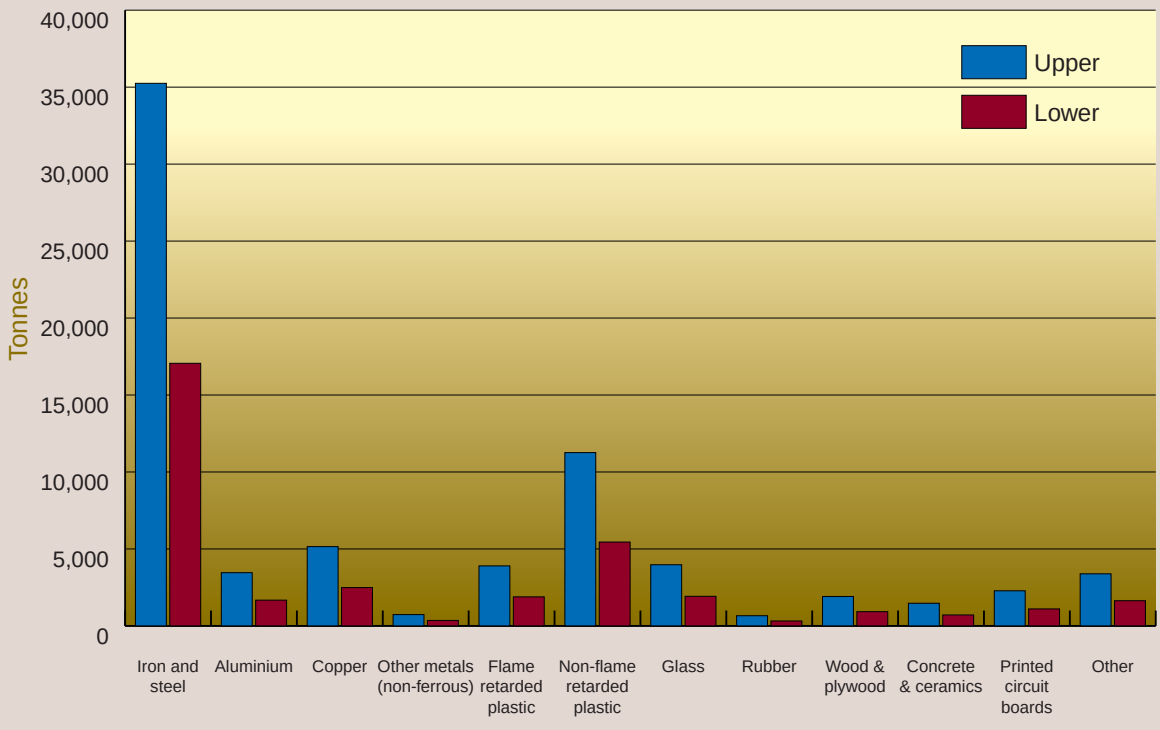

Figure 16: Material arisings from WEEE in Ireland in 2000.

Using the material flow approach, we can calculate arisings of specific materials within the EEE waste stream. Upper and lower estimates for a number of different materials is presented below.

Ferrous Metals

Ferrous metals, iron and steel are the most common materials found in EEE and they account for almost half of the total weight of WEEE.

Calculation of Ferrous Metals Arisings From WEEE in Ireland

242,000 to 498,000 tonnes of ferrous metals between 1991 and 2005;

- an average of 16,000 to 33,000 tonnes a year.
- Or, approximately 4.2 to 8.7 kg/inhabitant/year

Non-Ferrous Metals

Non-ferrous metals, including precious metals, represent only 13% of WEEE but are an important consideration when examining this waste stream.

Calculation of Non-ferrous Metals Arisings from WEEE in Ireland

64,000 to 132,000 tonnes of non-ferrous metals between 1991 and 2005;

- an average of 4,300 to 8,800 tonnes a year.
- Or, approximately 1.1 to 2.3 kg/inhabitant/year

Of this, 35,000 to 73,000 tonnes will be copper

- An average of 2,400 to 4,900 tonnes per year
- Or, approximately 0.6 to 1.3 kg/inhabitant/year

Plastics

Plastics are the second largest component by weight, accounting for approximately 21% of WEEE.

Calculation of Plastics Arisings from WEEE in Ireland

104,000 to 214,000 tonnes of plastics between 1991 and 2005;

- an average of 6,900 to 14,000 tonnes a year.
- Or, approximately 1.8 to 3.7 kg/inhabitant/year

Of this, 27,000 to 55,000 tonnes will be flame retarded plastic

- An average of 1,800 to 3,600 tonnes per year
- Or, approximately 0.5 to 0.95 kg/inhabitant/year

Glass

Glass accounts for around 5.4% of the total weight of WEEE.

Calculation of Glass Arisings from WEEE in Ireland

27,000 to 56,000 tonnes of glass between 1991 and 2005;

- an average of 1,800 to 3,700 tonnes a year.
- Or, approximately 0.5 to 1 kg/inhabitant/year

Specific Components Arising from WEEE in Ireland

There are a number of components in the EEE waste stream that present particular environmental and waste management problems which require identification in the material flow model.

Printed Circuit Boards

Printed circuit boards are complex in their chemical composition and pose a problem for the waste management and recycling industry. They are composed of any combination of a number of sub-components including chips (integrated circuits), capacitors, resistors, inductors, relays, soldering/adhesives and lighted indicators. They account for approximately 3% of WEEE and are present in several categories of EEE including computer systems, medical equipment, office equipment, telecommunications, toys and TV/audio equipment.

Calculation of Printed Circuit Board Arisings from WEEE in Ireland

16,000 to 32,000 tonnes of printed circuit boards between 1991 and 2005;

- **an average of 1,100 to 2,100 tonnes a year.**
- **Or, approximately 0.3 to 0.55 kg/inhabitant/year**

Brominated Flame Retardants

It is estimated that between 1,800 and 3,600 tonnes of flame retarded plastics will arise each year in Ireland. The most commonly used flame retardant system in thermoplastics is a combination of antimony trioxide (Sb2O3) and a brominated compound. Using the assumption (based on technical data) that flame retarded thermoplastics contain 18% brominated flame retardants and 5% antimony trioxide and that of the brominated flame retardants, 80% is bromine, the quantities in Ireland are calculated with the results shown in Table 3.

Table 3: Annual bromine and antimony trioxide arisings from flame retarded thermoplastics in Ireland.

Material	Annual material arisings (tonnes)	
	Upper	Lower
Bromine	518.4	259.2
Antimony-trioxide (Sb2O3)	180	90

Cathode Ray Tubes

Cathode ray tube (CRT) technology is used in both televisions and computer monitors. They are made up of four parts: the cone, the screen, the connection between the two and the electronics. They are composed of two to three types of glass containing ray-absorbing metal oxides and there is a large difference in the glass formulas used by the various producers of CRT's. It has been calculated that CRT's make up 4.9% of WEEE by weight. From this the quantities of CRT's arising in Ireland have been calculated and are presented as follows:

Calculation of Cathode Ray Tube Arisings from WEEE in Ireland

25,000 to 51,000 tonnes of CRTs between 1991 and 2005;

- **an average of 1,700 to 3,400 tonnes a year.**
- **Or, approximately 0.45 to 0.9 kg/inhabitant/year**

WEEE MANAGEMENT IN IRELAND

The electrical and electronic equipment recycling industry in Ireland is relatively underdeveloped compared with that in other European countries. However, there is a well established industry for the recycling of large household appliances along with other metal-rich equipment.

In order to assess the current state of EEE recycling and management in Ireland, surveys of the EEE recycling industry and of Local Authorities were undertaken.

WEEE RECYCLING INDUSTRY

Essentially, there are two sectors of the recycling industry dealing with electrical and electronic equipment: large shredder operators and smaller specialist recyclers.

SHREDDERS

Shredders are part of the general ferrous scrap industry. Also known as fragmentisers, these large hammermills are designed to shred a mixed stream of metal-rich items including end-of-life vehicles, household appliances including cookers, washing machines and refrigerators and other light iron. A clean shredded metal product as well as a mixed non-ferrous product is produced. This is then either sold to one company in Ireland or is exported. This type of equipment is recycled because it has a scrap metal value which exceeds the costs associated with collection and processing. A waste stream comprising of dirt, glass, concrete, rubber and plastic, known as fluff, is also produced.

There are currently three shredders in operation in Ireland (Limerick, Cork and Dublin) with a further two located in Northern Ireland (Belfast and Armagh). They have a combined shredding capacity of about 320,000 tonnes in the Republic of Ireland and 250,000 tonnes in Northern Ireland.

In addition to shredder operators, there are several firms that act as metal processors, traditionally known as scrap metal dealers. These companies operate mechanical shears for the dismantling of metal items and often handle white goods. There are currently seven such operators in Ireland.

SPECIALIST RECYCLERS

There are two main types of specialist EEE recyclers in Ireland: those that solely collect items for export to countries with more advanced recycling systems and those that extract components and materials for recycling. The majority of companies in Ireland fall into the first category which is indicative of our small recycling infrastructure. In addition to these recyclers, there are a small number of companies and organisations that refurbish equipment for reuse.

The majority of specialist EEE recyclers in Ireland handle IT equipment. This is because there are good markets for re-selling equipment, often oversees and also because many of the materials that can be recovered have a high value. A PC is first assessed for potential refurbishment and resale. The old machine is cleaned up and refurbished, then sold. One Irish company estimated that 50 to 70% of its incoming PC's are treated in this manner. Most of these refurbished systems are exported for sale, often to Eastern Europe or Asia. Those computers which are not suitable for resale are demanufactured and the components are resold or exported for recycling. Common practice in Ireland is to isolate printed circuit boards, secure them (often by drilling a hole through) and then exporting them for precious metal recovery overseas. Often in Ireland, components are stored until sufficient quantities have accumulated and are then shipped overseas for material recovery. A major problem in the recycling of computer monitors and televisions is the cathode ray tube (CRT). The main problem for recycling CRT's had been the identification of markets or uses for the two types of glass of which they are composed. There is currently only one company in Ireland that can process cathode ray tubes and this is only being done on a small scale. The majority of televisions and computer monitors are being exported whole for CRT processing in countries such as the UK, Germany and the United States.
At present in Ireland there is one company that is involved in the recycling of fluorescent lamps, with other companies engaged in the collection of the lamps for export to recycling plants in the UK or mainland Europe.

The vast majority of equipment processed by specialist recyclers comes from the commercial sector. These are usually producers who operate take-back schemes or want to dispose of surplus stock, or large companies who want to dispose of their waste responsibly.

Currently there is very little equipment being sourced from the domestic market because there are no mechanisms for recyclers to obtain a steady supply of equipment.

In the UK, the lack of commercial return for recycling some types of equipment is widely seen as the limiting factor to expanding capacity (ICER, 2000) and this is also the case in Ireland. However, it is likely that with sufficient demand (resulting from the impending European legislation) returns on recycled materials may become more viable.

MANAGEMENT OF WEEE BY LOCAL AUTHORITIES

A questionnaire regarding WEEE was sent to all the Local Authorities (36) in order to assess their current WEEE management practices with responses received from 20 Local Authorities i.e., approximately 56%.

Around half of the respondent local authorities impose some kind of restriction on the acceptance of WEEE at their landfill sites, with restrictions varying from area to area, with most targeting just white goods and fluorescent lamps. Only one landfill site specifically does not accept computer systems and one landfill accepts no WEEE at all.

Approximately 70% of the responding local authorities operate schemes for the separate collection of items of WEEE. The majority of the schemes take the form of collection points sited at civic amenity sites or landfills and target white goods only (80%). Some target refrigerators only, and 25% collect fluorescent lamps. Only two authorities (Galway and Louth County Councils) provide a collection facility for all types of WEEE. One authority promotes a twice yearly collection day for white goods at their area offices.

Twelve of the local authorities (60%) have initiatives planned for improving the management of WEEE. The majority of these proposals are for collection facilities at planned civic amenity sites. Three authorities are currently planning significant initiatives for the management of WEEE:

- Fingal County Council. A local authority partnership with two private sector recycling companies is proposed, involving the establishment of a collection/storage point at an existing civic amenity site for computer equipment and possibly general consumer electronics.

- Louth County Council. An existing private sector recycling operation is based at a civic amenity site and accepts all white goods free of charge. This system has been successful and it is planned to expand the facility to provide for the free collection of televisions, computers, consumer electronics and fluorescent lamps.

- Dublin Corporation. A partnership project is proposed which will involve the local authority, a private sector recycling company, a social economy enterprise and a community project. The proposal aims to create a sustainable model for the recycling and reuse of computer waste. It is anticipated to be commercially viable as well as providing training and employment for disadvantaged people. Three first stage collection and treatment centres will be set up, including a service to actively collect waste from commercial and domestic sources. These will be linked to a second stage "secure" disposal centre. Refurbishment will also allow distribution of low-cost equipment to low-income communities.

CONCLUSIONS

- The use of official statistics in relation to sales data is problematic, with data from market research companies being more reliable. The study has found that combining data from different sources for different items appears to be the most appropriate way to establish sales data.

- The annual growth increases of 20 to 35% for personal computers and the rapid technology changes means that computer systems are an important item for waste management considerations. Although there is a steadier growth trend in established household items like refrigerators and televisions, this growth is greater than other European countries due to the recent population growth and associated housing growth in Ireland.

- The application of different waste calculation models produces a range of results with the true value lying somewhere between the upper estimate and the lower estimate. There is a need to calibrate waste calculation models with data on actual WEEE arisings.

- The study estimated that WEEE arisings in the period 1991 to 2005 will be between **505,000 and 1,040,000 tonnes.** This equates to an average of **34,000 to 69,000 tonnes per annum** or **9 to 18 kg per inhabitant per annum.**

- The general estimation methodology used may also be applicable to similar end-of-life products or product groups.

RECOMMENDATIONS

- Systematic long-term WEEE collection trials should be undertaken by selected local authorities to gather reliable information about actual WEEE arisings in order to validate predictions of waste arisings. They would also identify the cost implications of such collections.

- These collection trials could be integrated into trials of equipment, component and material recovery schemes. These would be useful national trials prior to the introduction of any EU Directive, and would be of value to the industry.

- Waste estimation would be improved by the harmonisation of classification systems between the different trade and production statistical systems to facilitate easier use of the two data sets in sales calculations. Improved validation of relevant incoming data to the Central Statistics Office would also be beneficial.

For further details, please refer to the complete Topic Report that can be downloaded from our website at www.epa.ie

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An Ghníomhaireacht um Chaomhnú Comhshaoil

Bunú
Achtaíodh an tAcht fán nGníomhaireacht um Chaomhnú Comhshaoil ar an 23ú lá d'Aibreán, 1992 agus faoin reachtaíocht seo bunaíodh an Ghníomhaireacht go hoifigiúil ar an 26ú lá d'lúil, 1993.

Cúraimí
Tá réimse leathan de dhualgais reachtúla ar an nGníomhaireacht agus de chumhachtaí reachtúla aici faoin Acht. Tá na nithe seo a leanas san áireamh i bpríomhfhreagrachtaí na Gníomhaireachta:

- ceadúnú agus rialáil próiseas mór/ilchasta tionsclaíoch agus próiseas eile a d'fhéadfadh a bheith an-truaillitheach, ar bhonn rialú comhtháite ar thruailliú (Integrated Pollution Control-IPC) agus cur chun feidhme na dteicneolaíochtaí is fearr atá ar fáil chun na críche sin;
- faireachán a dhéanamh ar cháiliocht comhshaoil, lena n-áiritear bunachair sonraí a chur ar bun a mbeidh rochtain ag an bpobal orthu, agus foilsiú tuarascálacha treimhsiúla ar staid an chomhshaoil;
- comhairle a chur ar údaráis phoiblí maidir le feidhmeanna comhshaoil agus cuidiú le húdaráis áitiúla a bhfeidhmeannas caomhnaithe a chomhlíonadh;
- cleachtais atá fónta ó thaobh an chomhshaoil de a chur chun cinn, mar shampla, trí úsáid iniúchtaí comhshaoil a spreagadh, cuspóirí cáilíochta comhshaoil a leagan síos agus cóid chleachtais a eisiúint maidir le nithe a théann i bhfeidhm ar an gcomhshaol;
- taighde comhshaoil a chur chun cinn agus a chomhordú;
- gach gníomhaíocht thábhachtach diúscartha agus aisghabhála dramhaíola, lena n-áirítear líontaí talún, a cheadúnú agus a rialáil agus plean náisiúnta bainistíochta um dhramháil ghuaiseach, a bheidh le cur i ngníomh ag comhlachtaí eile, a ullmhú agus a thabhairt cothrom le dáta go tréimhsiúil;
- córas a fheidhmiú a chuirfidh ar ár gcumas astúcháin COS (Comhdhúiligh Orgánacha Sho-ghalaithe) a rialú de bharr cáinníochtaí suntasacha peitril a bheith á stóráil i dteirminéil;
- na rialúcháin OMG (Orgánaigh a Mionathraíodh go Géiniteach) a fheidhmiú agus a ghníomhú maidir le húseaid shrianta a leithéad seo d'orgánaigh agus iad a scaoileadh d'aon turas isteach sa timpeallacht;
- clár hidriméadach náisiúnta a ullmhú agus a chur i ngníomh chun faisnéis maidir le leibhéil, toirteanna agus sruthanna uisce in aibhneacha, i lochanna agus i screamhuiscí a bhailiú, a anailisiú agus a fhoilsiú; agus
- maoirseacht i gcoitinne a dhéanamh ar chomhlíonadh a bhfeidhmeanna reachtúla caomhnaithe comhshaoil ag údarás áitiúla.

Stádas
Is eagras poiblí neamhspleách í an Ghníomhaireacht. Is í an Roinn Comhshaoil agus Rialtais Áitiúil an coimirceoir rialtais atá aici. Cinntítear a neamhspleáchas trí na modhanna a úsaidtear chun an tArd-Stiúrthóir agus na Stiúrthóirí a roghnú, agus tríd an tsaoirse a dhearbhaionn an reachtaíocht di gníomhú ar a conlán féin. Tá freagracht dhíreach faoin reachtaíocht aici as réimse leathan feidhmeannas agus cuireann sé seo taca breise lena neamhspleáchas. Faoin reachtaíocht, is coir é iarracht a dhéanamh dul i gcion go míchuí ar an nGníomhaireacht nó ar aon duine atá ag gníomhú thar a ceann.

Eagrú
Tá ceanncheathrú na Gníornhaireachta lonnaithe i Loch Garman agus tá cúig fhoireann chigireachta aici, atá lonnaithe i mBaile Átha Cliath, Corcaigh, Cill Chainnigh, Caisleán an Bharraigh agus Muineachán.

Bainistíocht
Riarann Bord Feidhmiúcháin lánaimseartha an Ghníomhaireacht. Tá Ard-Stiúrthóir agus ceathrar Stiúrthóirí ar an mBord. Ceapann an Rialtas an Bord Feidhmi úcháin de réir mionrialacha atá leagtha síos san Acht.

Coiste Comhairleach
Tugann Coiste Comhairleach ar a bhfuil dáréag ball cunamh don Ghníomhaireacht. Ceapann an tAire Comhshaoil agus Rialtais Áitiúil na baill agus roghnaítear iad, den chuid is mó, ó dhaoine a ainmníonn eagraíochtaí a bhfuil suim acu i gcúrsaí comhshaoil nó forbartha. Tá réimse fairsing feidhmeannas comhairleach ag an gCoiste faoin Acht, i leith na Gníomhaireachta agus i leith an Aire araon.

Waste from Electrical & Electronic Equipment

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