

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

L.1021

(04/2018)

SERIES L: ENVIRONMENT AND ICTS, CLIMATE
CHANGE, E-WASTE, ENERGY EFFICIENCY;
CONSTRUCTION, INSTALLATION AND PROTECTION
OF CABLES AND OTHER ELEMENTS OF OUTSIDE
PLANT

**Extended producer responsibility – Guidelines
for sustainable e-waste management**

Recommendation ITU-T L.1021



ITU-T L-SERIES RECOMMENDATIONS

**ENVIRONMENT AND ICTS, CLIMATE CHANGE, E-WASTE, ENERGY EFFICIENCY; CONSTRUCTION,
INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT**

OPTICAL FIBRE CABLES	
Cable structure and characteristics	L.100–L.124
Cable evaluation	L.125–L.149
Guidance and installation technique	L.150–L.199
OPTICAL INFRASTRUCTURES	
Infrastructure including node elements (except cables)	L.200–L.249
General aspects and network design	L.250–L.299
MAINTENANCE AND OPERATION	
Optical fibre cable maintenance	L.300–L.329
Infrastructure maintenance	L.330–L.349
Operation support and infrastructure management	L.350–L.379
Disaster management	L.380–L.399
PASSIVE OPTICAL DEVICES	L.400–L.429
MARINIZED TERRESTRIAL CABLES	L.430–L.449

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T L.1021

Extended producer responsibility – Guidelines for sustainable e-waste management

Summary

Recommendation ITU-T L.1021 offers a description of the extended producer responsibility (EPR) system in dealing with e-waste. It expands on the different existing forms of EPR globally, not only in theoretical terms, but also with a practical view on their feasibility, challenges and prerequisites. It presents the definition of the EPR system, in addition to the roles and responsibilities of the different stakeholders and the different types of EPR, as well as how and why they could be used in certain contexts and not in others. The funding mechanism behind every mode and the organizational structure expected to be in place are also presented. Recommendation ITU-T L.1021 concludes with many best practices from the international arena, including developed, developing and emerging economies, as well as the challenges faced in some cases.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T L.1021	2018-04-06	5	11.1002/1000/13458

Keywords

Collection, dismantling, EPR, electronic equipment, end-of-life, end-of-life management, extended producer, e-waste, e-waste management, informal sector, legislation, polices, producer, recycling, refurbishment, repair, responsibility, reuse, second-hand EEE, secondary raw materials, take back waste, used EEE, waste sorting, WEEE.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2018

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Table of Contents

	Page
1	Scope..... 1
2	References..... 1
3	Definitions 1
3.1	Terms defined elsewhere 1
3.2	Terms defined in this Recommendation 1
4	Abbreviations and acronyms 2
5	Conventions 3
6	Objectives and benefits of the extended producer responsibility system 3
6.1	Support and incentivize improvements in product design and production systems 3
6.2	Benefits of extended producer responsibility systems 3
7	Challenges facing the adoption and implementation of extended producer responsibility systems 4
8	Extended producer responsibility implementation models in terms of responsibility and compulsiveness 4
8.1	Voluntary versus legislation or compulsory 4
8.2	Individual producer responsibility versus collective producer responsibility 5
8.3	Voluntary or mandated product take back systems 5
9	Allocation of responsibilities and stakeholders 6
9.1	Responsibility of producers 6
9.2	The government 6
9.3	Retailers and vendors 7
9.4	Consumers 7
10	Prerequisites for extended producer responsibility development: Available options .. 7
10.1	The financial burden 7
10.2	Scope of items subject to extended producer responsibility 7
10.3	Scope of duties 8
10.4	Complying recycling duties 8
10.5	Subsidies 8
10.6	Administration of an extended producer responsibility system 8
10.7	Organizational aspects 8
11	Supplementary measures required to implement extended producer responsibility models..... 9
11.1	Review of existing laws and new legislation 9
11.2	Survey on the status of e-waste generation and management 9
11.3	Establishing an efficient collection system 9
11.4	Free riders and illegal dumping 9

	Page
11.5 Research and development for up-cycling	9
11.6 Protection of data privacy	10
Annex A – Terms of reference for a take back committee	11
A.1 Structure	11
A.2 Action	11
A.3 Stakeholders	11
A.4 Process and indicative timeline	12
A.5 Working group on e-waste policy and legislation	13
A.6 Working group on e-waste financing	13
A.7 Working group on standards, monitoring and capacity building	14
Appendix I – Extended producer responsibility in Europe	15
Appendix II – Extended producer responsibility in France	16
II.1 General background information on French regulation [b-Orange-France, 2017]	16
Appendix III – Extended producer responsibility in South Korea: Eco-assurance system	24
III.1 Background and development [b-KSP]	24
III.2 Items under the Eco-assurance System	24
III.3 Scope of producers under obligation	24
III.4 Duties of producers	24
III.5 Precautionary duties	24
III.6 Recycling duties	25
Appendix IV – Extended producer responsibility in Japan: Home Appliance Recycling Act	26
IV.1 Background to the Home Appliance Recycling Act 2001	26
IV.2 Objectives of the Act	26
IV.3 Targeted products	27
IV.4 Responsibilities under the Act	27
IV.5 Cost-bearing mechanism	28
IV.6 Targets set under the Home Appliance Recycling Act	29
IV.7 Penalties	29
IV.8 Transparency of the selection of the collectors	30
IV.9 Other related policies	30
Appendix V – Information on international convention (This appendix does not form an integral part of this Recommendation.)	31
Bibliography	32

Introduction

Environmental issues, including waste problems, are too big and significant to be addressed solely by governments. All members of society should share the responsibility. For this reason, many countries have established extended producer responsibility (EPR) to formulate environmental policies. In many developing countries, there is a paradigm shift concerning waste policies where the goal of waste policies is changing from expanding services to reducing demand for services. Globally, for major countries the goal of waste policies centres on waste minimization, i.e., focuses on reduction, reuse, recycling and recovery (4R) services. All these 4R activities must be efficiently conducted by all members of society, including consumers, producers, and governments.

There is no doubt that the concept of EPR has been gaining ground as a policy option for sustainable e-waste management. EPR is also sometimes referred to as "take back", since producers are held responsible for the recovery and final disposal of their products after they have been discarded by end users, although producers do not always have a direct connection with them.

The EPR mechanism allows the sharing of responsibilities in dealing with waste problems. Under the EPR system, producers share the roles for promoting recycling with consumers and governments. EPR also includes producers subsidizing the recycling business. In general, the recycling business does not enjoy commercial profits for a variety of reasons. For example, in some cases, the products of recycling businesses, mostly recycled materials, are sometimes disadvantaged against virgin materials in quality as well as price. Without appropriate compensation, private businesses do not engage in the recycling business. EPR should provide subsidies and assistance to private recycling businesses to enable them to enjoy profits [b-SRI-EPR].

According to the Sustainable Recycling Industries (SRI) programme, SRI producers are assigned recycling duties for their waste with the assumption that consumers wish to return used items to them after consumption. Producers, in complying with their recycling duties, provide recyclers with subsidies by entrusting them with their recycling duties. Producers also assist recyclers in various ways in their efforts to reduce their financing burdens. They can assist recyclers by collecting e-waste using their delivery trucks, changing the materials and structures of their goods for easier dismantling and extraction of materials or buying recycled raw materials. The primary reason for producers to share responsibility is the fact that producers are in the best position to promote or improve recycling activities with various means to help recyclers. For equipment where producers have no direct contact with end users, governments or municipalities should assume their role in promoting and facilitating collection [b-SRI-EPR].

The OECD defines EPR as:

"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. There are two related features of EPR policy: (1) the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities, and (2) to provide incentives to producers to incorporate environmental considerations in the design of their products." p. 9 of [b-OECD]

In general, EPR is a policy concept that calls for shifting all or part of the responsibility and costs of recycling or disposal of products at their end of life (EoL) term (after usage by consumer) to the producers who have designed and manufactured or sold the product to the consumer in the first place. EPR was first introduced as a voluntary tool by producers, but with its widespread adoption in Europe and Asia, it has been given the force of law in countries like Austria, Germany, Belgium, France, the Netherlands, Sweden, Japan, Korea, the UK and Canada [b-SRI-EPR].

Recommendation ITU-T L.1021

Extended producer responsibility – Guidelines for sustainable e-waste management

1 Scope

This Recommendation establishes guidelines and presents recommendations for the development of extended producer responsibility (EPR) policies for sustainable e-waste management.

This Recommendation suggests some supplementary measures and points that support the adoption of EPR policies. It also presents different models of EPR policies adopted by Europe and other developed countries that could be used as a basis for developing countries to build upon.

2 References

None.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 circular economy: An economy that is restorative and regenerative by design, which aims to keep products, components and materials at their highest utility and value at all times.

NOTE – Definition based on that appearing in the Google case study accessible from [b-EMcF]. The circular economy is a concept that distinguishes between technical and biological cycles, and is a continuous, positive development cycle. It preserves and enhances natural capital, optimizes resource yields, and minimizes system risks by managing finite stocks and renewable flows. A circular economy works effectively at every scale.

3.2.2 extended producer responsibility (EPR): A policy principle to promote total life cycle environmental improvements of product systems by extending the responsibility of the manufacturers of the product to various parts of the entire life cycle of the product, and especially to the take-back, recycling and final disposal of the product.

NOTE – Definition based on that appearing in [b-SRI-EPR].

3.2.3 e-waste: Electrical or electronic equipment that is waste, including all components, sub-assemblies and consumables that are part of the equipment at the time the equipment becomes waste.

NOTE – This definition is based on that given for "waste electrical and electronic equipment" in [b-UNEP, 2011b].

3.2.4 recycling: The recovery of materials, such as paper, glass, plastic, metals, construction and demolition (C&D) material and organics from the waste stream (e.g., municipal solid waste), along with the transformation of materials, to make new products and reduce the amount of virgin raw materials needed to meet consumer demands.

NOTE – This definition is based on that given in [b-EPA].

3.2.5 waste electrical and electronic equipment (WEEE): A complex mixture of materials and components that, because of their hazardous content and if not properly managed, can cause major environmental and health problems.

NOTE – This definition is based on that given in [b-EC-WEEE].

3.2.6 waste minimization: Lowering of quantities of waste by strict avoidance, source reduction, direct reuse, reuse and recycling.

NOTE – This definition is based on that given in [b-UNEP, 2016].

3.2.7 waste prevention: Practical actions that reduce the waste quantity and/or the hazard potential and/or the hazardous content of products and materials prior to becoming wastes. Prevention may include strict avoidance, source reduction and direct reuse.

NOTE – This definition is based on that given in [b-UNEP, 2016].

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

4R	Reduction, Reuse, Recycling and Recovery
B2B	Business to Business
B2C	Business to Consumer
C&D	Construction and Demolition
CE	Consumer Electronics
CRT	Cathode Ray Tube
DfE	Design for Environment
DVD	Digital Versatile Disc
EEE	Electrical and Electronic Equipment
EoL	End of Life
EPR	Extended Producer Responsibility
ESM	Environmentally Sound Management
FY	Financial Year
GWP	Global Warming Potential
ICT	Information and Communication Technology
IT	Information Technology
LCD	Liquid Crystal Display
NGO	Non-Governmental Organization
ODS	Ozone-Depleting Substance
PBB	Polybrominated Biphenyl
PBDE	Polybrominated Diphenyl Ether
PC	Personal Computer
PDPA	Personal Data Protection Act
POP	Persistent Organic Pollutant
PRO	Producer Responsibility Organization
R&D	Research and Development
SDG	Sustainable Development Goal
SHA	Small Household Appliance

SIM	Subscriber Identity Module
TBC	Take Back Committee
TPO	Third-Party Organization
TV	Television
VCR	Video Cassette Recorder
WEEE	Waste Electrical and Electronic Equipment

5 Conventions

None.

6 Objectives and benefits of the extended producer responsibility system

6.1 Support and incentivize improvements in product design and production systems

On the international level, experience shows that even with the introduction of voluntary EPR, producers or manufacturers (generator of products) are influenced by possible cost reductions resulting from primary material recovery through efficient EPR, i.e., take back systems.

In other words, an effective EPR system is sustainable when sufficient incentive(s) are consistently available to manufacturers of targeted products who understand the business and economic case for investing in the concept of design for environment (DfE).

Effective collection, treatment and reuse or recycling of products and quality materials are environmentally friendly and socially desirable. End-of-life (EoL) management has been the weakest link in the production responsibility chain. EoL is an important stage at which producer responsibility extends into existing EPR programmes. To be able to contribute to sustainable development, a network downstream of EPR programmes must not only be economically viable, but also environmentally friendly and socially desirable. Producers should be responsible for taking back their products for recycling and for improving their ability to recycle and repair. Municipalities and governments should encourage end users to return their products at the end of their life cycles and should facilitate the collection of (especially small) equipment items.

6.2 Benefits of extended producer responsibility systems

The benefits of EPR systems include:

- environmentally friendly or ecodesigns to encourage cost-effectiveness and pollution prevention;
- responsible usage of electronics;
- the reuse and refurbishment of used products;
- the use of nontoxic materials and processes;
- the manufacturing of more durable products;
- the manufacturing of more reusable and recyclable products;
- minimal disposal to landfills or incineration;
- safe disposal of harmful materials;
- improved resource efficiency material inputs and energy consumption;
- reduced pollution from production and waste treatment;
- innovation for more efficient design and production;
- the creation of profitable business opportunities and a recycling industry niche;

- the contribution to a circular economy that promotes sustainable production and consumption, thereby directly contributing to the fulfilment of the United Nations sustainable development goals (SDGs) [b-SRI-EPR].

7 Challenges facing the adoption and implementation of extended producer responsibility systems

Developed, emerging and developing economies differ in the way they address and implement an EPR system. This point should be carefully taken into consideration for a suitable tailored solution. The most important challenges facing developing and emerging markets include the:

- lack of knowledge and awareness of EPR and its models of implementation at the government and public levels;
- need for access to information, knowledge sharing and studies to suggest EPR frameworks suitable for different contexts;
- lack of a pool of experts that can promote and support the design and implementation of EPR schemes;
- need for a champion or a platform that can lobby for EPR-related policies with producers, manufacturers and local industrialists;
- unavailability of a market readiness study to assess the suitability and readiness of local producers in designing and adopting EPR and related take back systems;
- lack of existing incentives to encourage producers to adopt EPR-related schemes;
- lack of existing bodies that can be considered as collective producers platforms to implement and operate EPR programmes;
- lack of existing knowhow and institutional capacity to operate and support the implementation modes of EPR (both private and public);
- high cost of operation of EPR programmes due to multi-stakeholder involvement;
- need for regulations and government level policies to support the design and monitoring of EPR programmes;
- lack of integrated e-waste management including the unavailability of proper nationwide collection systems, dismantling and treatment facilities, and precious metal extraction technologies;
- predominance of the informal sector in collection and treatment of e-waste with dire health and environmental hazards. [b-SRI-EPR]

8 Extended producer responsibility implementation models in terms of responsibility and compulsiveness

EPR implementation models in terms of responsibility and compulsiveness are outlined in this clause, based on [b-SRI-EPR].

8.1 Voluntary versus legislation or compulsory

EPR implementation schemes can be implemented on a voluntary basis – often via corporate social responsibility. However, more and more countries are considering EPR as mandatory or a combination of both (such as negotiated agreements between governments and industries). Across Europe, EPR is compulsory via legislation and regulations vary from imposing physical responsibility to imposing financial responsibility.

8.2 Individual producer responsibility versus collective producer responsibility

EPR models and related legislation may also be based on the efforts of individual producers, where each producer is responsible for their line or product category, or based on collective efforts and platforms in the form of combined EPR programmes. Such programmes are known as collective EPR schemes, whereby entities such as producer responsibility organizations (PROs) or third-party organizations (TPOs) are established to conduct collection or take back, as well as dismantling and recycling on behalf of the producers at the level of an industry; alternatively, PROs organize and administer the collection and recycling of waste on behalf of producers by subcontracting collection companies and recyclers. A fee is typically charged for their services. These costs include those of collecting and processing.

8.2.1 The producer responsibility organization sector

PROs are widespread in Europe, especially for the waste electrical and electronic equipment (WEEE) sector. The legal status of PROs also varies according to sector and country specific conditions. PROs can be non-profit organizations or government agencies or quasigovernmental. They can also be for-profit firms. Countries in which more than one PRO operate have developed national registers to keep track of the overall volumes sold and collected as waste within their country for each producer. In some EPR implementation countries, a single PRO is established and is responsible for all the collection and waste management activities of a sector or an industry. In other countries, companies may have the option of working independently through their own implementation programmes.

Finally, in some countries, several PROs exist and mimic a competitive market in which firms compete for business. PROs have certain advantages, including the promotion of collective bargaining, the generation of economies of scale and reduction in costs for participants. In the e-waste sector, the use of PROs is dominant and is the most popular model worldwide. Governments often stipulate a set of targets for reuse and the targets for recycling of products as part of EPR in order to monitor the impact of EPR and producer performance in relation to the volume of production.

8.3 Voluntary or mandated product take back systems

A popular EPR may receive income from the sale of recyclable materials to recycling companies. It gives the physical responsibility for electronic product disposal at the end of its useful life to the producer or a collective body of producers along with the financial responsibility of reuse, recycling and final disposal. A take back system is made up of four main features (see Table 1) including: collection; processing (including preprocessing and end processing); managing the flow of products and sustainability of the system; and financing schemes. Producers are responsible for setting up a supportive system for collection, take-back and recycling (processing). Governments may require each producer to meet specific recycling or collecting rate targets, either on a voluntary or mandatory basis. If producers do not have a direct connection with an end user and where products sold do not replace existing products, it is hard to define collection rate targets. Some EPR implementation programmes provide incentives for consumers to return the used product to a specified location, such as the selling point. In this context, take-back regulations sometimes mandate that particular product components be recovered and recycled.

It is important to note that WEEE is the most frequent target of take back regulations and systems globally. For example, the European Union (EU) has mostly adopted EPR take back systems.

8.3.1 Suggested structure for take back systems

Table 1 is adapted from Table 2 of [b-SRI-EPR], and describes the phases of the take back system.

Table 1 – Structure of take back systems

Phase	Description
Modes of collection for take back	Permanent drop off facility Special drop off events Special drop off points Door to door collection
Modes of processing	Preprocessing: separation of products, primary dismantling, secondary dismantling End processing: re use of certain components, recycling of certain components, recovery of precious metals, exporting certain components, final disposal through landfill or incineration
Modes of management	PROs Producers individually Government entities
Financing schemes	Financing methods: adopting ecodesigns that are cost-effective to offset the costs of EPR, using recycling materials to offset the costs of EPR, using recycling materials

Further details about the model are provided in Annex A.

9 Allocation of responsibilities and stakeholders

Table 2 summarizes the roles and responsibilities of the main stakeholders in the EPR system, based on Table 1 of [b-SRI-EPR].

Table 2 – Summary of stakeholders' responsibilities

Governments	Assessment of e-waste; stakeholders' buy in; regulations and laws
Producers	Design, management and finance schemes for EoL
Retailers/importers	Selection of brands and informing consumers, choice of schemes for collection
Consumers	Sustainable usage

9.1 Responsibility of producers

The responsibility of producers consists of design, management and finance schemes, as well as programmes for EoF management of their products as a condition for sale. The producer can have financial or physical responsibility or both. The producer is also held liable to environmental damage through the "polluters pay" principle and its costs, in addition to having the liability to inform retailers and customers about the environmental repercussions of their products.

9.2 The government

The regulatory and operational roles of governments are important in an EPR system for its effective operation. Generally, governments are responsible for putting regulations and mandates to introduce and enforce EPR. The government can even design EPR implementation schemes or it can be left to producers to design their own. The government should set performance requirements for producers and should act as an enforcer to ensure that EPR implementation initiatives and systems are operating with maximum efficiency, but with minimal government intervention. Governments should also be responsible for information dissemination on EPR, providing incentives to the private sector and producers, and for educating the public on EPR and its importance. Setting standards and certification

to formalize the process and putting a strategic framework for EPR mainstreaming into the e-waste management system should also be a governmental responsibility.

On an operational level, governments are also responsible for promoting and facilitating collection and recycling at EoL and to prevent the disposal of end user products in regular waste.

9.3 Retailers and vendors

Retailers and vendors can have the option of selling product brands that are made by producers that have a form of EPR implementation scheme, such as take back systems. Vendors and retailers have the responsibility to inform customers of how to access information on take back systems and the recycling of products after usage.

9.4 Consumers

Consumers have a responsibility to use electronic products in such a way as to reduce waste, promote the reuse of products and make conscious purchasing decisions based on available information about product impacts and benefits. If the products they purchase incorporate take-back or other collection and EPR programmes, then they should return the used products to ensure a safe and environmentally sound EoF management process [b-SRI-EPR].

10 Prerequisites for extended producer responsibility development: Available options

There are two different ways of implementing a producer responsibility system, one is to impose a financial burden alone and the other is to assign a physical burden based on [b-KSP].

10.1 The financial burden

In the case of a financial burden, producers pay a subsidy to compensate recycling businesses for the loss accrued in the process of complying with producer responsibility. For this there are two possible alternatives: deposit and refund system; and imposing recycling subsidies. Under the deposit system, producers are required to pay recycling costs in advance and this is refunded to producers for the volume recycled, on a pro rata basis. The unit cost of recycling is decided and announced by government. The volume recycled is checked by government, taking into account the efficiency of the recycling process. Under the recycling charge system, producers pay the subsidy for the volume the recycling business claims to have recycled. The unit subsidy amount is decided by government, who also checks the volume recycled for the recycling business to qualify for the subsidy.¹

10.1.1 The physical burden

Producers are obliged to accept a recycling volume in advance as a proportion of sales volume. Producers can themselves recycle at their own facilities and cost. Producers can also entrust their obligations to the recycling business and pay the contractual cost. Any penalty is decided on the basis of recycling cost. Since not all end user products directly replace old products (of the same volume and mass) it is hard to define the quantity.

10.2 Scope of items subject to extended producer responsibility

In the first stage, the scope of items subject to EPR are minimized for easy start up. The items generally considered in this first stage are home appliances, e.g., refrigerators, televisions (TVs), washing machines, personal computers (PCs), monitors, printers and mobile phones. These goods are widely used and some recycling facilities and businesses exist in developing countries.

¹ The recycling charge refers to the second system called "recycling subsidy".

10.3 Scope of duties

There are two kinds of duties that can be assigned to producers.

10.3.1 Precautionary duties

Precautionary duties include restrictions on the use of hazardous substances, design change (material and structure) and provision of information to recyclers. Enforcing these duties is very difficult and requires a lot of administrative work, which should be taken into account.

10.3.2 Recycling duties

Recycling duties include establishing a take-back system. A take-back system can take the form of a consumer-deposit system, free pick-ups of used goods by sellers or buy-back by producers. Each has its own merits and demerits.

10.4 Complying recycling duties

There are two modes of compliance with the recycling duties based on [b-KSP], see clauses 10.4.1 and 10.4.2.

10.4.1 Physical recycling

Physical recycling involves the recycling of a required volume and paying recycling subsidies for the quantity assigned.

10.4.2 Physical recycling duty

For the physical recycling duty of the required volume, producers are given options: self-recycling; entrust; and joint compliance. A PRO is a mechanism for joint compliance. The legal natures and organizational structures of the PRO depend on the country. Producers joining the PRO are allowed to attach green dots to their products to indicate that producers are doing their duty. Products with green dots are collected through an EPR collection scheme or recycled and counted as part of the recycled volume. Licensing and supervisory systems are needed to establish a PRO.

10.5 Subsidies

Subsidies or assistance is provided only to those recyclers who qualify. In order to be qualified, recycling must be undertaken by certified recyclers who comply with recycling standards and procedures. There must be a system for supervision and control of recycling businesses. There must also be a system to determine the subsidy and recycling charges. Subsidies can be paid quarterly or yearly.

10.6 Administration of an extended producer responsibility system

An organizational arrangement is needed to ensure compliance of certain functions in an ERP system for it to be effectively implemented and for it to function efficiently. In this regard, there must be a government organization in charge of identifying producers, checking their reports to decide sales volume, supervising recycling businesses, checking the recycled volumes claimed, paying subsidies and levying penalties.

10.7 Organizational aspects

The formation of national committees for EPR or take back system implementation is a recommended requirement that can ensure the smooth functioning of the model in different contexts. The committee should include all concerned stakeholders to secure their participation and to address any obstacles or challenges identified during the set up. Suggested terms of reference for a committee are included in Annex A.

11 Supplementary measures required to implement extended producer responsibility models

11.1 Review of existing laws and new legislation

It is necessary to revise existing e-waste regulations and to develop and integrate adapted e-waste legislation. There must be a legal clearance concerning the scope of e-waste and its legal nature. Review and revisions of the necessary processes are required for the promotion and enforcement among e-waste generators or traders. It must be stipulated whether e-waste should be regarded as waste or raw material. The time and conditions for the end-of-waste must be clearly defined for the application of regulations to the activities of collecting, transporting and treating the e-waste. The review work must include the validity of recycling authorizations (permit) and monitoring of recycling activities to bring about greater environmental compliance in the recycling industry. Standard specifications of recycling facilities, and rules and procedures to be complied with in recycling activities, must be stipulated.

11.2 Survey on the status of e-waste generation and management

Conducting an e-waste assessment study is essential to provide relevant information that would be the basis for creating an e-waste management industry. The assessment should include information about stocks and flows, as well as information on transportation and handling, estimation of the numbers of recyclers, workshops and dealers, etc., plus an assessment of the formal sector, producers and importers.

11.3 Establishing an efficient collection system

E-waste from large generators can be collected by market, ensuring efficiency motivated by commercial profits. Large business to business (B2B) consumers have already established e-waste collection systems that yield a profit by selling their waste to recyclers. Business to consumer (B2C) collectors can increase their market by expanded recycling activities by introducing an EPR system. E-waste from household and small business sectors requires a more efficient collection system. There must be incentives for generators to bring their e-waste to recycling centres or other collection points. A discharging practice can be helpful in sorting out valuable e-waste. Governments can also make use of e-waste as an initiative to establish separate streams for all kinds of waste.

11.4 Free riders and illegal dumping

As EPR systems are implemented, free riders benefit from the infrastructures built by producers with obligations and permitted recyclers. There are also opportunities for cross-subsidies among different kinds of waste. For these reasons, it is important to fine tune and make provisions to counteract illegal dumping and curtail free riders when designing the EPR system. Illegal dumping is another form of free riding. Measures for strict monitoring and regulations for illegal dumping are needed for successful EPR adoption. Education and public campaigns must be carefully planned and implemented. The process must be straightforward and easy to follow or there have to be incentives for end users.

11.5 Research and development for up-cycling

For producers with recycling duties, the primary concern is lowering the cost. Producers naturally tend to be passive in developing recycling technologies that may be a financial burden for producers. A national research and development (R&D) system is needed to develop higher valued recycling (up-cycling) [b-KSP].

11.6 Protection of data privacy

Protection of data privacy is a point to be considered to increase confidence in the waste disposal management system, thereby encouraging recycling and reuse.

Based on users' requests, manufacturers need to provide information concerning data erasure, so that personal data at the collection point and afterwards are protected. There must be a data erasure system to ensure the deletion of all information stored in the device, including, but not limited to: text, data, photos, images, and personal information stored on the device and used by applications. For clarity, this must conform to the personal data protection act (PDPA) in force in national legislations. Systems for data erasure need to be carefully designed against abuse so that data cannot be used or destroyed by other parties.

Manufacturers who may be concerned about the encryption or coding in the subscriber identity module (SIM) card of a device will then have to decide the process for SIM card disposal.

Annex A

Terms of reference for a take back committee

(This annex forms an integral part of this Recommendation.)

A.1 Structure

The information presented in this annex is based on [b-SRI Take Back, 2017].

A national e-waste take back committee (TBC) membership should consist of all relevant stakeholders, headed by the chair of the committee. To cover the wide remit of topics interlinked with the establishment of a take-back system, it is preferable to set up smaller focused working groups that discuss and consolidate inputs and put forward recommendations to the TBC for consideration. The composition and structure of the working groups are suggested to be representative of the stakeholders, yet flat and effective operationally. Three working groups (WGs) are proposed as follows.

- 1) **Working group on e-waste policy and legislation:** to examine the existing administrative, legislative and regulatory mechanism and to recommend the building blocks of an e-waste policy and draft e-waste legislation.
- 2) **Working group on e-waste financing:** to examine the cost and opportunities for financing collection, recycling/recovery and disposal, and to recommend an appropriate financing mechanism.
- 3) **Working group on standards, monitoring and capacity building:** to examine technical aspects of recycling, to set standards and evaluate the compliance with the standards.

A.2 Action

- Establish steering structure and working groups.
- Working group composition and membership.
- Establish terms of reference for each working group, including key questions or items to be discussed.
- Propose timetable for activities and deliverables from working groups.

A.3 Stakeholders

A representation of all key stakeholders is crucial in order to gather feedback and implementation challenges early on in the consultation process and to achieve buy-in from all stakeholders. In this regard, it is recommended that the host country invite the stakeholders to join the committee. These should include the representatives of at least the following:

- key government departments;
- manufacturers, producers and importers/distributors of electrical and electronic equipment (EEE);
- trade associations representing the information and communication technology/consumer electronics (ICT/CE) sectors;
- e-waste recyclers, both formal and informal;
- non-governmental organizations (NGOs) and civil society organizations working on the topic of waste management;
- academia, technical experts or consultants.

A.4 Process and indicative timeline

Figure A.1 outlines a proposal for the stakeholder process to discuss and outline a roadmap for the implementation of an e-waste take-back system.

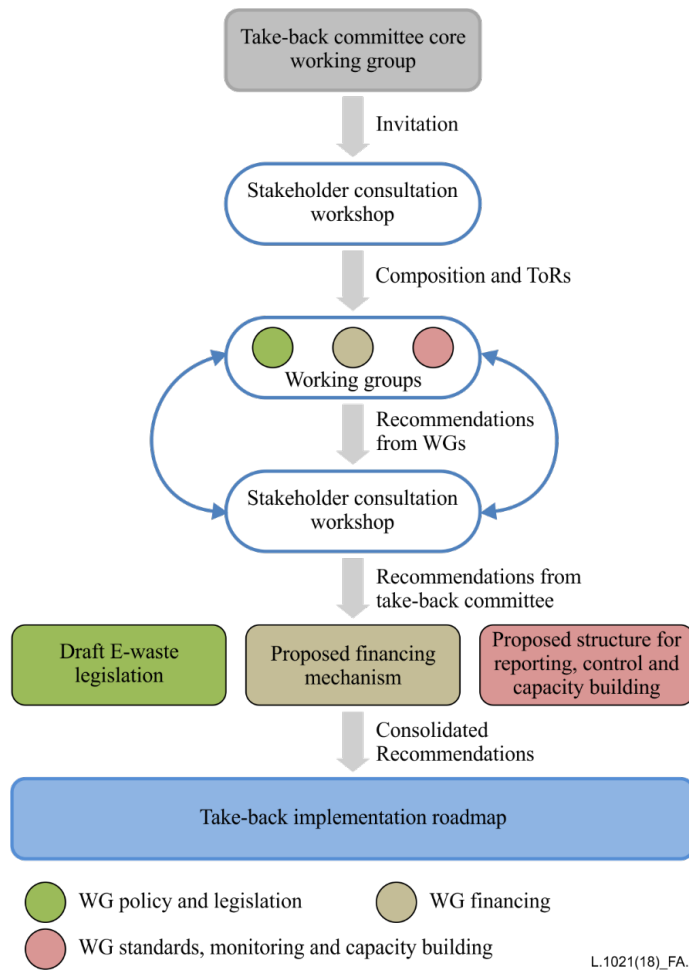


Figure A.1 – Roadmap for the implementation of an e-waste take-back system

Following the lead taken by the core group to activate the TBC, as a first step, selected stakeholders are contacted, outlining the aims and objectives of the committee and invited to participate in the first national TBC consultation workshop.

A 2 day consultation workshop is proposed, where stakeholders can meet, discuss and agree on the objectives of the TBC, the WG structure, terms of reference and composition of the WGs. The first day may be for plenary discussions, while the second day may be the first meeting of the WGs.

The WGs continue to meet independently of each other, although as all parts are interlinked, they need also to coordinate between WGs, potentially through the core working group, which may participate in all WGs.

The WGs deliver recommendations to the TBC that are discussed with all TBC members in a series of consultation workshops that provide feedback, suggestions and requests for additional information to the WGs.

A broad timeline is proposed for the roadmap.

A.5 Working group on e-waste policy and legislation

Size: Core group to set the minimum number of members to ensure representation; maximum number of members to ensure efficiency.

Composition: Core group to define the membership requirements to ensure a balance of all stakeholders.

Scope: The scope of work for the WG should be limited to e-waste policy and legislation at the national level.

Points for discussion: The step guiding legislative principles can be used to structure the deliberations. Some issues to cover and deliverables for the WG may be as follows.

- *Links to other legislation:* Examine and report to the TBC on existing and upcoming legislation that may have links and impacts on e-waste management, e.g., import-export controls like hazardous waste management, transport and treatment requirements. This would also provide the legal basis for a take-back regulation and definitions in accordance with existing laws.
- *International best practice on policy and legislation:* Examine and report on e-waste legislation in other countries, as well as the relevance and adaptability to a specific context and opportunity for harmonization or international alignment.
- Examine obligations of the country to comply with international conventions on hazardous products and wastes, example conventions.
- *Product coverage:* The products to be included in the legislation; and whether application to products should be phased manner or simultaneous.
- *Roles and responsibilities:* The respective roles and responsibilities of the key stakeholders, including producers, consumers, retailers, collection and treatment providers, as well as regulatory bodies.
- *Targets:* If any, and if so, the basis of calculation of the target and the minimum rate.
- *Policy level incentives:* Especially for creating favourable conditions for investment in a recycling infrastructure.

A.6 Working group on e-waste financing

Size: Core group to set minimum number of members to ensure representation; maximum number of members to ensure efficiency.

Composition: Core group to define the membership requirements to ensure a balance of all stakeholders.

Scope: The scope of work for the WG should be limited to e-waste policy and legislation at the national level. Within this scope, it is for the EG to recommend which products for inclusion in the e-waste policy and those for exclusion.

Points for discussion:

- *Overall system cost:* Assessment of financing requirement of the overall system, including the costs at various stages of access to waste, cost of collection, transport and aggregation, treatment and disposal, as well as overheads and revenue streams, and assessing possible sources of income (import fee, advanced recycling fee, producer membership, etc.).
- *Allocation of costs:* Assess the options of allocating overall system costs across all EEE that is commercially available – e.g., either flat rate for all, based on mass and on price.
- *Incentives:* Provide incentives for access to waste as well as ensuring it flows into the right channel.

- *Product categorization*: Analyse the impact on costs and revenues, especially with regard to cross-subsidization across products.
- *Financial flows*: Assess the political and technical options for financial flows with respect to collection and disbursement of fees or eco-levies, etc. Determine which organization would be responsible for the financing mechanism, and administratively how this would be done (e.g., whether through a state-run organization or a privately run compliance scheme).
- *Balancing competition*: Assessing the balance between a competitive recycling sector without creating a capacity glut and race to the bottom (e.g. whether allocation of e-waste to a recycler should be done per region or competitive bidding, etc.).
- *Review mechanism*: Propose a mechanism in order to ensure regular review of the financing so that it remains sufficient and fair for all stakeholders, especially in order to balance market volatility of commodity prices (e.g., through indexed rates etc.).

A.7 Working group on standards, monitoring and capacity building

Size: Core group to set minimum number of members to ensure representation; maximum number of members to ensure efficiency.

Composition: Core group to define the membership requirements to ensure a balance of all stakeholders.

Scope: The scope of work for the WG would be to provide inputs on technical treatment and disposal standards as well as the administrative framework for the regulatory, reporting and monitoring setup. The WG will also be tasked with the identification of capacity gaps and required training needs in order to implement the road map and proceed with operations.

Points for discussion

- *Permitting/licensing/registration structure*: Clearly defined requirements for collection centres/dismantlers/recyclers/treatment plants, etc.
- *Reporting and data collection*: By whom, at which frequency and which type of data and in which format (e.g. a centralized clearing house or individual compliance schemes).
- *Technical requirements and treatment standards*: With regard to treatment and processing, and especially the disposal of hazardous fractions based on existing facilities and international best practice.
- *Auditing, enforcement and penalties*: To ensure deterrence and prevent free riding in the system, while ensuring that the administrative burden of compliance is as low as possible.
- *Integration of informal sector*:
 - framework for continued stakeholder engagement;
 - information needs for tracking indicators on the implementation of the national strategy;
 - capacity gaps: identification and assessment of capacity building with various stakeholders, and proposal for training and raising awareness.

Appendix I

Extended producer responsibility in Europe

(This appendix does not form an integral part of this Recommendation.)

The process of formulating national policies on e-waste recycling in Europe was significantly affected, both directly and indirectly, by the policies of international organizations like OECD and the EU. Particular examples of factors having a major direct bearing on the formation of e-waste recycling policies include: [b-OECD], [b-EC-WEEE], [b-EC-RoHS] and [b-EC-REACH].

At the EU level, three directives introduce EPR as a policy approach: on end of life vehicles [b-EC-ELV], on WEEE (Directive 2012/19/EU accessible from [b-EC-WEEE]) and on batteries [b-EC-BA]. EPR is also widely used in support of the implementation of the packaging and packaging waste directive [b-EC-PAC], although [b-EC-PAC] itself does not impose the principle. In addition, article 8 of the waste framework directive [b-EC-WF] sets some principles regarding the implementation of EPR by European member states.

European waste legislation currently gives a global framework for the implementation of EPR in the region. The member states, through their national legislation, are responsible for the implementation of EPR, including regulating its operational aspects. The number of countries adopting EPR is increasing. EPR policies have been designed and implemented in a very heterogeneous manner across Europe with a large variety of implementation models. Examples of implementation models are take-back requirements, deposit/refund, advance disposal fees, material taxes and upstream combination tax/subsidy.

In practice, EPR implies that producers take over the responsibility for collecting or taking back used goods and for sorting and treating them for eventual recycling. Such responsibilities may be merely financial or organizational as well. The policy first appeared in the early 1980s in a few European member states, especially for packaging waste, and since then it has continuously spread around the EU (and abroad). EPR should aim at internalizing environmental externalities and should provide an incentive for producers to take into account environmental considerations throughout the lifetime of products, from the design phase to their EoF.

As such, EPR is to be considered to be a major instrument in support of the implementation of the European waste hierarchy, and therefore for the increase of, by priority: prevention, reuse and recycling. Along with other key economic instruments, EPR can encourage a change in the behaviour of all actors involved in the product value chain: product-makers, retailers, consumers-citizens, local authorities, public and private waste management operators, recyclers and social economy actors.

In Europe, resellers have the obligation to take back products. For large products (washing machines, refrigerators), end users use this facility. For small devices with emotional value like smart-phones, it is very hard to encourage end users to give back their equipment. Based on Directive 2012/19/EU (accessible from [b-EC-WEEE]), countries report on volume (in mass) put on market and volumes collected per type of product, but there is no obligation for end users to give back their products for recycling or re-use [b-KSP].

Appendix II

Extended producer responsibility in France

(This appendix does not form an integral part of this Recommendation.)

II.1 General background information on French regulation [b-Orange-France, 2017]

II.1.1 Extended producer responsibility

Directive 2002/96/EC (accessible from [b-EC-WEEE]) introduced the concept of EPR, which means that producers of electrical and electronic household appliances are accountable for the end-of-service life of appliances that they have placed on the market. Furthermore, collection targets for used equipment and recycling and recovery target rates have also been set. Being a member of a take-back organization allows producers to transfer their WEEE responsibilities.

A producer of EEE in France:

- **manufactures and sells** EEE under its own brand in France;
- **resells** equipment made by someone else under its own brand (if the maker's brand appears on the equipment of which they are the producer);
- **imports** EEE on a commercial basis into France;
- is established outside France and supplies EEE directly to the French market by **distance selling** (e.g., online, mail order, phone).

II.1.2 A decree for the French industry

Each country transposes the European WEEE Directive in different ways. This is why the French Decree includes national specificities. In July 2005, the publication of the Decree defined the main WEEE industry principals for France. The obligation to affix an identical visible fee passed onto the consumer was introduced.

II.1.3 The French specifications of the eco-fee

When a new electrical and electronic appliance is purchased in a shop or on the Internet, each consumer pays an eco-fee (see Figure II.1), which varies according to the product purchased and the type of treatment it requires once it has reached its service EoL. In compliance with French law, the eco-fee is visibly indicated on labels and is separate from the product price.

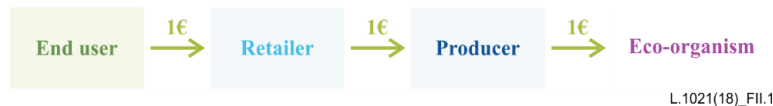


Figure II.1 – French eco-fee system

The eco-fee is then paid to a take-back organization accredited by public authorities, such as eco-systems, which recover used appliances in order to decontaminate and recycle them. The eco-fee is not paid to public authorities and is therefore not a tax.

II.1.4 The obligations of producers of electrical and electronic household appliances

Each EEE item placed on the market after 13 August 2005 must carry a "crossed out bin" symbol (see Figure II.2). If this cannot be affixed to the equipment due to its dimensions, the symbol must be displayed on the equipment's packaging and on its warranty document and user manual.

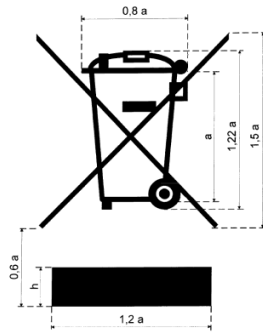


Figure II.2 – Crossed out bin symbol

II.1.5 Contributing to WEEE collection

Producers must contribute to the collection of household WEEE pro rata to equipment that they place on the market, either by implementing an individual waste collection system or by participating in a collective collection system implemented by a take-back organization accredited by the public authorities.

II.1.6 Declaring and invoicing

Electrical and electronic equipment placed on the market in France is subject to a declaration to a take-back scheme operator and the eco-fee must be visibly displayed on invoices. Not informing buyers with a mention of unit cost corresponding to WEEE management on a new household EEE sales invoice may result in a fine for the retailer or vendor of up to €2 250 for each non-compliant product.

II.2 Eco-fee modulation according to manufacturer's eco-design efforts

For the different EEE categories, several modulation criteria have been set up in order to promote eco-design. These criteria have been defined based on consultation involving several stakeholders, such as manufacturers, retailers, recyclers, NGOs and public authorities.

In addition, these criteria have been designed to:

- focus on key products according to sales (considering total mass or number of units);
- consider all the different EEE categories [information technology (IT), household appliances, power tools, etc.];
- include items on lifespan increasing, better repair capabilities, and use of recycled materials;
- set threshold values in order to identify best practices (e.g., only 10 or 20% of products should be able to obtain the eco-fee modulation, it should not be awarded to every product).

Manufacturer's declarations on the eco-fee modulation are checked by independent external auditors.

Table II.1 lists details of eco-fee modulation for the different EEE categories. For example, for refrigerators and freezers if one (or more) of the three criteria [refrigerant Global Warming Potential (GWP), technical document availability, spare parts availability] apply/applies to the EEE, the contribution is increased by 20%.

For criterion No. 1 (presence of refrigerant with GWP >15) the assessment is defined as follows:

GWP values are defined in [b-IPCC]. These are direct GWP values based on a time horizon of 100 years. Failing IPCC data on hydrocarbons, such as isobutane and propane, the GWP values of these fluids are considered to be less than 15. The fluids concerned are contained in not only refrigerant circuits, but also foam insulation.

Supporting documentation is to be provided on request during inspections, and on the technical data sheet of the appliance including the type of gases used.

Table II.1 – WEEE eco-fee modulation for the different EEE categories

Category 1 – Large household appliances			
Subcategory	Modulation criteria	Net mass (kg)	Amount (€ excl. VAT)
Refrigerator – Freezer	Refrigerant with GWP ≤ 15 <i>and</i> availability of technical documentation for authorized repairers <i>and</i> availability of spare parts essential for the equipment use	>80 kg	16.67
		≤ 80 kg and >40 kg	13.33
		≤ 40 kg	6.67
	Refrigerant with GWP >15 <i>or</i> unavailability of technical documentation for authorized repairers <i>or</i> unavailability of spare parts essential for the equipment use	>80 kg	20.00
		≤ 80 kg and >40 kg	16.00
		≤ 40 kg	8.00
Large cooling appliance (excluding refrigerator, freezer and air conditioner)	N/A	>80 kg	16.67
		≤ 80 kg and >40 kg	13.33
		≤ 40 kg	6.67
Heat pump Air conditioner Thermodynamic water heater	N/A	N/A	6.67
Washing machine Dishwasher	Availability of spare parts essential for the equipment use for 11 years <i>or</i> integration of postconsumer recycled plastic (minimum threshold of 10%)	N/A	6.00
	Unavailability of spare parts essential for the equipment use for 11 years <i>and</i> no integration of postconsumer recycled plastic (minimum threshold of 10%)	N/A	7.50
Large appliance excluding cooling appliance (excluding washing machine and dishwasher)	N/A	N/A	7.50
Microwave oven	N/A	N/A	2.50
Medium-sized appliance (hoods, hobs ...)	N/A	N/A	3.33
Ventilation equipment	N/A	>5 kg	1.67
		≤ 5 kg and >500 g	0.83
		≤ 500 g	0.17
Storage water heater, tank, boiler	N/A	N/A	5.00
Appliance for electrical heating	N/A	>5 kg	1.67
		≤ 5 kg	0.83

Table II.1 – WEEE eco-fee modulation for the different EEE categories

Category 1 – Large household appliances			
Passive equipment (cable...) with required connections to link up devices	N/A	N/A	0.02

Category 2 – Small household appliances (SHAs)			
Subcategory	Modulation criteria	Net mass (kg)	Amount (€ excl. VAT)
Vacuum cleaner	Lack of plastic parts >25 g containing brominated flame retardants <u>and</u> availability of technical documentation for authorized repairers <u>and</u> availability of spare parts essential for the equipment use	N/A	0.83
	Presence of plastic pieces >25 g containing brominated flame retardants <u>or</u> unavailability of technical documentation for authorized repairers <u>or</u> unavailability of spare parts essential for the equipment use	N/A	1.00
SHA (excluding vacuum cleaner)	N/A	N/A	0.83
Coffee maker Kettle Tea maker	Availability of spare parts essential for the equipment use during 5 years <u>and</u> availability of technical documentation for authorized repairers	N/A	0.20
	Unavailability of spare parts essential for the equipment used during 5 years <u>or</u> unavailability of technical documentation for authorized repairers	N/A	0.25
Small SHA (excluding coffee maker, kettle, tea maker)	N/A	N/A	0.25
Very small SHA, hygiene, beauty and healthcare product	N/A	N/A	0.08
Passive equipment (cable) with required connections to link up devices	N/A	N/A	0.02

Category 3 – IT and telecommunications equipment			
Subcategory	Modulation criteria	Net mass (kg) or screen size (")	Amount (€ excl. VAT)

Category 3 – IT and telecommunications equipment			
Monitor	N/A	>5 kg	2.08
	N/A	≤5 kg	1.25
Laptop computer	Lack of paints and coatings incompatible with the recycling and reuse on plastic parts >100 g <i>and</i> integration of postconsumer recycled plastic (minimum threshold of 10%) <i>and</i> upgrading of the appliance with common tools, including memory drives, microchips and circuit boards/cards	≥7"	0.34
	Presence of paints and coatings incompatible with the recycling and reuse on plastic parts >100 g <i>or</i> no integration of postconsumer recycled plastic (minimum threshold of 10%) <i>or</i> no upgrading of the appliance with common tools, including memory drives, microchips and circuit boards/cards	≥7"	0.42
Tablet	Lack of plastic parts >25 g containing brominated flame retardants <i>and</i> presence of software updates, compatible with each other and essential for the good working of the appliance	≥7"	0.42
	Presence of plastic parts >25 g containing brominated flame retardants <i>or</i> lack of software updates, compatible with each other and essential for the good working of the appliance	≥7"	0.84
Personal computer	Lack of paints and coatings incompatible with the recycling and reuse on plastic parts >100 g <i>and</i> integration of postconsumer recycled plastic (minimum threshold of 10%) <i>and</i> upgrading of the appliance with common tools, including memory drives, microchips and circuit boards/cards	N/A	1.00
	Presence of paints and coatings incompatible with the recycling and reuse on plastic parts >100 g <i>or</i> no integration of postconsumer recycled plastic (minimum threshold of 10%) <i>or</i> no upgrading of the appliance with common tools, including memory drives, microchips and circuit boards/cards	N/A	1.25
Printer	Disassembly possibility with standard tools commercially available <i>and</i> spare parts supply (parts likely to break down during a standard use of the printer) ensured for 5 years after the end of production	N/A	0.79
	No disassembly possibility with standard tools commercially available <i>or</i> no spare parts supply (parts likely to break down during a standard use of the printer) ensured for 5 years after the end of production	N/A	1.00
IT equipment (excluding printer)	N/A	N/A	0.83
Small IT equipment	N/A	<7"	0.08

Category 3 – IT and telecommunications equipment			
Mobile phone	Presence of standardized cabling (charger and other connection cables) <u>and</u> presence of software updates, compatible with each other and essential for the good working of the appliance	N/A	0.02
	Lack of standardized cabling (charger and other connection cables) <u>or</u> lack of software updates, compatible with each other and essential for the good working of the appliance	N/A	0.04
Very small IT equipment and Passive equipment (cable...) with required connections to link up devices	N/A	N/A	0.02

Category 4 – Consumer equipment			
Subcategory	Modulation criteria	Net mass (kg) or screen size (")	Amount (€ excl. VAT)
TV	Availability of technical documentation for authorized repairers and spare parts essential for the equipment use (electronic circuit boards) over 5 years <u>or</u> integration of postconsumer recycled plastic (minimum threshold of 10%)	>25 kg	10.00
		≤25 kg and >17 kg	7.34
		≤17 kg and >12 kg	4.66
		≤12 kg and >7 kg	3.34
		≤7 kg and ≥7"	2.00
	Unavailability of technical documentation for authorized repairers and spare parts essential for the equipment use (electronic circuit boards) over 5 years <u>and</u> no integration of postconsumer recycled plastic (minimum threshold of 10%)	>25 kg	12.50
		≤25 kg and >17 kg	9.17
		≤17 kg and >12 kg	5.83
		≤ 12 kg and >7 kg	4.14
		≤ 7 kg and ≥7"	2.50
Large consumer equipment	N/A	N/A	1.67

Category 4 – Consumer equipment			
Medium-sized consumer equipment	N/A	<7"	0.42
Small consumer equipment	N/A	N/A	0.08
Very small consumer equipment and passive equipment (cable...) with required connections to link up devices	N/A	N/A	0.02

Category 5 – Electrical and electronic tools			
Subcategory	Modulation criteria	Net mass (kg)	Amount (€ excl. VAT)
Large tool (non-portable or stationary tool)	N/A	N/A	2.08
Drill/screw gun	Availability of technical documentation for authorized repairers <i>and</i> availability of spare parts essential for the equipment use	N/A	0.42
	Unavailability of technical documentation for authorized repairers <i>or</i> unavailability of spare parts essential for the equipment use	N/A	0.50
Small tool (portable tool, excluding drill/screw gun)	N/A	N/A	0.42

Category 6 – Toys, leisure and sports equipment			
Subcategory	Modulation criteria	Net mass (kg)	Amount (€ excl. VAT)
Game console	Availability of technical documentation for authorized repairers <i>and</i> availability of spare parts essential for the equipment use <i>and</i> lack of brominated flame retardants in the appliance's housing, mouldings	>500 g	0.17
		≤500 g	0.08
	Unavailability of technical documentation for authorized repairers <i>or</i> unavailability of spare parts essential for the equipment use <i>or</i> presence of brominated flame retardants in the appliance's housing, mouldings	>500 g	0.20
		≤500 g	0.10
Toy, leisure and sports equipment (excluding game console)	N/A	>10 kg	1.67
		≤10 kg and >500 g	0.17
		≤500 g	0.08

Category 7 – Medical devices			
Subcategory	Modulation criteria	Net mass (kg)	Amount (€ excl. VAT)
Medical device	N/A	>5 kg	1.67
	N/A	≤5 kg	0.08

Category 8 – Monitoring and control instruments			
Subcategory	Modulation criteria	Net mass (kg) or screen size (")	Amount (€ excl. VAT)
Monitoring and control equipment	N/A	<7"	0.12
Passive equipment (cable...) with required connections to link up devices	N/A	N/A	0.02

Category 9 – Automatic dispensers
For household automatic dispensers (Ex: Automated animal feeding systems), please refer to Category 2 of the present tariff schedule. For professional automatic dispensers, refer to the professional tariff schedule

Appendix III

Extended producer responsibility in South Korea: Eco-assurance system

(This appendix does not form an integral part of this Recommendation.)

III.1 Background and development [b-KSP]

Background factors unique to South Korea (other than common factors of increased e-waste volume and the accompanying shortage of landfill and environmental impact) in the policy-making process include the oligopoly on the home EEE industry held by the nation's three major companies (Samsung, Daewoo and LG). Another factor is also consumer criticism of improper disposal of e-waste led by environmental NGOs that have influenced companies, concerned about their brand image, to enter into voluntary agreements with the government in which they have undertaken greater producer responsibility. Consumer criticism of corporations led by environmental NGOs has had a substantial impact on the formation of the country's e-waste recycling system.

South Korea introduced regulations on e-waste with the adoption of the Waste Deposit-Refund System in 1992 based on the Law for Promotion of Resource Saving and Reutilization (LRSR). Under this Deposit-Refund system, manufacturers of recyclable products, materials and containers are required to pay a deposit for the cost of waste recovery and processing, which is subsequently refunded once the waste has been properly collected and processed. However, this system did not distinguish e-waste from other types of waste, such as containers and packaging. The system was reviewed in 2003, leading to the adoption of the EPR system that imposed mandatory recycling rates on 21 products, including home EEE, containers and packaging, tyres and batteries. Nonetheless, this scheme also failed to distinguish e-waste from other types of waste. From 2008, the mandatory recycling of e-waste as well as waste vehicles was separated from the EPR system and stipulated under the Act on the Resource Circulation of Electrical and Electronic Equipment and Vehicles for Resource Implementation procedures known as the Eco-assurance System (EcoAS).

III.2 Items under the Eco-assurance System

EEE: TVs, refrigerators, washing machines (home use only), air conditioners, PCs (including monitors) (2003), audio equipment, mobile phones (2005), printers, copying machines, fax machines (2006), water purifiers, electric ovens, microwave ovens, food disposal units, dish washers, bidets, air cleaners, electric heaters, rice cookers, water softeners, humidifiers, irons, fans, mixers, vacuum cleaners, video cassette recorders (VCRs), digital versatile disc (DVD) players, vending machines (2014).

Automobiles: Cars, passenger van and trucks of 3 t or less

III.3 Scope of producers under obligation

Manufacturers, importers, sellers, those with sales amount under ₩1 000 000 000 (₩300 000 000 in the case of importers) are exempted.

III.4 Duties of producers

III.5 Precautionary duties

Businesses are encouraged to create a precautionary management system that includes:

- the assessment of compliance of standards on inclusion of harmful substances [restriction on use of hazardous substances: Pb, Hg, Cr⁶⁺, polybrominated biphenyl (PBB), polybrominated diphenyl ether (PBDE): under 1 000 ppm, Cd: under 100 ppm]
- the assessment of compliance with year-by-year reusability of automobiles;
- the enhancement of material composition of electrical and electronic products; and

- the provision of information on recycling.

III.6 Recycling duties

All manufacturers, importers and sellers are required to fulfil recycling responsibilities, which include the following.

- Recycle e-waste not less than the required rate sales volume (Mandatory recycling rate)
NOTE 1 – The recycling rate was changed to mass per capita, beginning in 2014 (3.9 kg/capita) and was increased to 4.5 kg/capita in 2015.²
- Mandatory take back
 - Sellers are required to collect e-waste above the required rate of sales volume
 - Manufacturers and importers are required to take back used e-goods free of charge when asked.

NOTE 2 – Failure to meet the target rate is subject to penalty, recycling charges [b-EcoAS].

² The target mass was estimated on the basis of statistics on the recycled amount of e-waste in the previous year (2013). For the increase there is no formula. There had been a negotiation between producers and government on how much will be added to actual recycled mass considering the prospect of sales and capacity of recycling business.

Appendix IV

Extended producer responsibility in Japan: Home Appliance Recycling Act

(This appendix does not form an integral part of this Recommendation.)

IV.1 Background to the Home Appliance Recycling Act 2001

Driven by the increase in consumption and the permeation of the throwaway culture that increased the types and quantities of waste in Japan, efforts to improve legislation concerning various kinds of waste and their recycling were undertaken. The habits of consumers were due to changing lifestyles, which in turn were associated with: i) rapid economic growth and the urbanization of Japan; and ii) the advent of the consumer era that was made possible by the so-called "economic bubble" during the 1980s.

Until the Home Appliance Recycling Act came into force in 2001, the increase in both the types and quantities of WEEE made it more and more difficult for municipalities alone to manage WEEE in an environmentally sound manner. Due to its incombustibility, WEEE was comminuted to recover some recyclables. The remaining residues (comminuted dust) were disposed of in controlled landfill sites because of the hazardous materials they contained. There was a general consensus that this contributed to the increasing scarcity of final disposal sites. As larger appliances with a complex structure and composition were increasingly coming on to the market, the efficient collection and proper management of home appliances by municipalities was made even more difficult.

It was under these circumstances that the Home Appliance Recycling Act was enacted in June 1998 and came into force in April 2001.

IV.2 Objectives of the Act

The objective of the Home Appliance Recycling Act is defined by Article 1, which states:

"This legislation shall have the objective of contributing to the maintenance of the living environment and the healthy development of the national economy, by taking steps to secure the environmentally sound disposal of waste and effective utilization of resources through the introduction of measures for proper and smooth collection, transportation, and recycling of specific household appliance waste by retail traders or manufacturers of specific household appliances, with the aim of achieving a reduction in the volume of general waste and sufficient utilization of recycled resources."

To achieve this objective, the Home Appliance Recycling Act is designed to solve the following problems.

- Environmentally sound disposal of wastes (hazardous wastes): WEEE that is disposed of as bulky waste contains hazardous materials and pollutants. These include chlorofluorocarbons as both greenhouse gases and ozone-depleting substances, oil in motors and compressors, and heavy metals used in making printed circuit boards. Illegal dumping of such products causes even greater environmental risks. Thus, a system to manage WEEE in an environmentally sound manner was expected to be developed. In addition, since environmentally sound management of these wastes was often beyond the capacity of individual local governments, the manufacturers of these appliances were expected to participate in the process of managing these wastes.
- Effective use of recyclable materials: WEEE contains large amounts of iron, aluminium, copper and glass. These can be an effective source of materials if they can be recovered efficiently.

IV.3 Targeted products

This act covers the following four categories of home appliances:

- air conditioners;
- TV sets [the cathode ray tube (CRT) and liquid crystal display (LCD) types, excluding those designed to be incorporated into a building and those that do not use primary batteries or storage batteries for their power source, as well as the plasma type];
- electric refrigerators and freezers;
- electric washing machines and clothes dryers.

(Flat-screen TV sets (the LCD and plasma types) and clothes dryers were added to the designated categories in April 2009.)

Among other typical WEEE, personal computers are managed under different legislation, the Promotion of Effective Utilization of Resources Act. Also, small electronic appliances, e.g., mobile phones, have been managed under a new law since 2013, the Small Electrical and Electronic Equipment Recycling Act.

IV.4 Responsibilities under the Act

The Home Appliance Recycling Act defines the responsibilities of consumers, retailers, and manufacturers as follows.

- Consumers as disposers [cost-bearing and transfer]:
Consumers and businesses that wish to dispose of home appliance waste are responsible for paying fees for both collection and transportation and recycling, as well as for their proper return to the retailers from whom they were bought.
- Retailers [collection from disposers and transfer to manufacturers, etc.]:
Retailers are responsible for collecting the home appliances that they sold or, at the request of customers who buy a replacement appliance from them, taking back the old appliances owned by these customers, as well as transferring these EoF products to the responsible manufacturers, etc.
- Manufacturers and importers of home appliances [collection and recycling]:
Manufacturers have the obligation to collect and recycle the home appliances they manufactured or imported.
However, small and medium-sized manufacturers can contract out this responsibility to other bodies designated under the Act ("designated bodies"). The Act defines the size of small and medium-sized manufacturers as having manufactured or imported less than the number of units shown in the following in the previous 3 years (for domestic shipments only):
 - less than 900 000 air conditioners;
 - less than 900 000 TV sets (CRT, LCD and plasma types);
 - less than 450 000 electric refrigerators and freezers;
 - less than 450 000 electric washing machines and clothes dryers.
- Responsibilities of the national government:
The national government is responsible for supporting activities, which is necessary for proper and effective collection, transport and environmentally sound recycling, including promoting R&D, providing information, developing related facilities, providing technical assistance, conducting environmental education and implementing information dissemination activities.
- Responsibilities of municipalities:
Municipalities are responsible for managing municipal waste. They are therefore responsible for managing waste home appliances or WEEE outside the scope of the collection and

management obligations of the producers under the Home Appliance Recycling Act. Municipalities can transfer the targeted household appliance waste under this Act that they have collected to manufacturers who have the obligation to collect such waste. Or, if local governments wish, they can also recycle it themselves.

IV.5 Cost-bearing mechanism

Consumers pay fees for both collection and transportation and recycling when they dispose of their WEEE. The collection and transportation fee is set by the retailers, and the recycling fee by the manufacturers.

The Act stipulates that the recycling fee shall not exceed the cost of recycling. The collection and transportation fee represents the primary logistics fees. In the case of collection by a retailer, this consists of: i) the fee for collection of home appliance waste at the end of the equipment's life cycle from the consumer's home and its transportation to a retailer's shop; and ii) the fee for transportation from the retailer's shop to a designated collection site. In the case of collection by a local government, the collection and transportation fee represents the fee for the collection of discarded home appliances from the consumer and their transportation to a designated collection site. Note that the collection and transportation fee does not include the fee for secondary logistics, i.e., transportation from a collection site designated by manufactures to a recycling plant. Retailers and local governments set their own collection and transportation fees depending on the transportation distance, as well as the type and size of the home appliance waste (see Table IV.1). Some retailers charge only the second fee described in the foregoing when customers buy a replacement appliance from them. Many major mass retailers charge ¥525 per unit regardless of the type and size of the waste generated from home appliances.

Different manufacturers charge different recycling fees, which are subject to regular review.

However, leading manufacturers have been charging uniform amounts, as shown in Table IV.2.

Table IV.1 – Average collection and transportation fees that retailers charge for collecting the four categories of home appliance waste (unit: JPY)

Target Item	Collection/transportation fees (Primary logistics)
Air conditioners	2 450
TV sets	2 000
Refrigerators and freezers	2 600
Washing machines	2 050

NOTE – Except for remote islands.

Source: Compiled from the Association for Electric Home Appliances (AEHA) Annual report on home appliance recycling for financial year (FY) 2012 [in Japanese] [b-Japan].

Table IV.2 – Trends in the recycling fees for major manufacturers (unit: JPY)

FY		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Air conditioners		3,675							3,150		2,625		2,100		1,575
TV sets	16 inch~	2,835							2,835						
	~15inch								1,785						
Refrigerators	171 L~	4,830							4,830						
	~170 L								3,780						
Washing machines		2,420													

Source: Compiled from the AEHA, Annual report on home appliance recycling for FY2012 [in Japanese] [b-Japan]

When the recycling Act initially entered into force, the recycling fee was at a flat rate for each of the target items regardless of size, for convenience. This, however, created a sense of unfairness among consumers. In 2008, a joint advisory council between the Ministry of Economy, Trade and Industry (METI) and the Ministry of the Environment (MoE) stated that manufacturers should further explore the possibility of reducing the recycling fee. This statement was made in their *Report on the evaluation and review of the process in the implementation of the home appliance recycling system* [in Japanese]. In the same year, leading manufacturers set different fees for different sizes of waste generated from home appliances. Some manufacturers set up two categories of sizes for LCD and plasma televisions, which were newly added to the target items. The recycling fee for air conditioners has been reduced several times by some manufacturers.

IV.6 Targets set under the Home Appliance Recycling Act

Under this Act, plants that recycle the target products are required to achieve statutory recycling targets (see Table IV.3). The recycling target for each category is expressed as the percentage recovered from the WEEE for recycling (recyclables) of the total mass of the components and materials in the WEEE. The statutory recycling targets shown in Table IV.3 exclude thermal recovery, although this is considered a form of cyclical use under the Act.

Table IV.3 – Statutory recycling targets

	Statutory recycling targets	
	FY2001-2008	FY2009
Air conditioners	60%~	70%~
TV sets (CRT)	55%~	55%~
TV sets (flat screen)	–	50%~
Refrigerators and freezers	50%~	60%~
Washing machines	50%~	65%~

Source: Compiled from the AEHA, Annual report on home appliance recycling for FY2012 [in Japanese] [b-Japan]

The statutory recycling targets have been revised once in FY2009. The target for CRT televisions, however, remained at 55%, since the resource value of CRT glass was undergoing a significant decline.

IV.7 Penalties

Retailers and manufacturers who neglect their obligations for collecting and recycling as stipulated in the recycling Act, provide false information or impose unlawful charges, are subject to corrective measures, corrective orders or penalties. Monetary penalties range from a fine of up to ¥100 000 to a fine of up to ¥500 000. Individuals who commit illegal dumping are subject to up to 5 years in prison or a fine of up to ¥10 000 000 (or ¥300 000 000 for corporations) under the Waste Management and Public Cleansing Act.

IV.8 Transparency of the selection of the collectors

As far as the primary logistics are concerned, retailers do not have to obtain a licence for waste collection and transportation of the waste generated from home appliances. They can also contract out this operation, but only to operators with a licence for the collection and transportation of municipal or industrial waste. Secondary logistics, i.e., transportation from a designated collection site to a recycling plant, however, requires certification by the competent ministry or a licence for the collection and transportation of both municipal and industrial waste. These licence and certification systems ensure transparency of the selection of collectors.

IV.9 Other related policies

- The AEHA's assistance projects for the collection of the waste generated from home appliances from remote islands and the prevention of illegal dumping. In 2006 and 2009, discussions were held to review the Home Appliance Recycling Act. These discussions culminated in a *Report on the evaluation and review of the process in the implementation of the home appliance recycling system*. The report, released in February 2008, pointed out two major issues. One was the need "to build a framework in which manufacturers provide financial and other support to municipalities that take active measures to prevent illegal dumping." The other was the need "for manufacturers to provide financial and other support to help improve the collection and transport of the waste generated from home appliances from remote islands in relation to the cost of marine transport if certain conditions are met." To help meet these needs, AEHA launched two discrete projects in FY2009.

In the first project, AEHA subsidizes the cost of the collection and transport of the waste generated from home appliances, which tends to be higher on remote islands where the total amount of waste generated home appliances is often much less. The idea is to reduce the financial burden on consumers in such areas. AEHA also offers related information and advice.

In the second project, AEHA provides support to municipalities that implement projects designed to prevent the illegal dumping of waste generated from home appliances or those for collecting illegally dumped home appliances and transferring them to the manufacturers. Such support takes the form of sharing good practices, offering information and advice, or providing subsidies.

- Eco Point policy

From 2009 to 2011, the government introduced the Eco Point system designed to encourage consumers to replace their existing home appliances with new ones that are more energy efficient. This system, along with the contemporaneous shift to terrestrial digital television broadcasting, resulted in large amounts of waste generated from home appliances handled in the collection and management systems under the Home Appliance Recycling Act.

- Guidance on the industrial health environment

No guidance on the industrial health environment that is particular to the Home Appliance Recycling Act is offered at the recycling plant level. Special health check-ups are unnecessary for workers at recycling plants, who receive regular health check-ups as other workers do. Yet recycling plants work to improve and maintain the industrial health environment in an effort to avoid work-related accidents and injuries as well as health hazards (by, for example, promoting the use of face masks, goggles, and interlocks) [b-Japan, 2014].

Appendix V

Information on international convention

(This appendix does not form an integral part of this Recommendation.)

The Basel Convention developed guidance on the environmentally sound management (ESM) of mobile phones and computing equipment in the context of two partnerships: The Mobile Phone Partnership (MPPI) and the Partnership for Action on Computing Equipment (PACE). The Basel Convention adopted technical guidelines on transboundary movements of e-wastes and used EEE, in particular regarding the distinction between waste and non-waste under the Basel Convention [b-UNEP, 2011b].

The Minamata Convention on mercury entered into force in August 2017 and applies to mercury-containing wastes, such as lamps and switches.

Some e-wastes contain persistent organic pollutants (POPs), such as polybrominated flame retardants (PBDEs) and require special attention. The Basel Convention, in cooperation with the Stockholm Convention on POPs, developed technical guidelines on POP wastes which provide guidance on how to recognize and address this specific- waste stream ([b-UNEP, 2011a]; [b-UNEP, 2008]).

The Montreal Protocol on ozone-depleting substances (ODSs) is also relevant for e-wastes such as refrigerators and other equipment [b-UNEP, 2011b].

Bibliography

- [b-ITU-T L.1010] Recommendation ITU-T L.1010 (2014), *Green battery solutions for mobile phones and other hand-held information and communication technology devices*.
- [b-ITU-T L.1400] Recommendation ITU-T L.1400 (2011), *Overview and general principles of methodologies for assessing the environmental impact of information and communication technologies*.
- [b-ITU-T L.1410] Recommendation ITU-T L.1410 (2014), *Methodology for environmental life cycle assessments of information and communication technology goods, networks and services*.
- [b-ITU-T L.Suppl.4] ITU-T L-series Recommendations – Supplement 4 (2016), *Guidelines for developing a sustainable e-waste management system*.
- [b-ITU-T L.Suppl.28] ITU-T L-series Recommendations – Supplement 28 (2016), *Circular economy in information and communication technology; definition of approaches, concepts and metrics*.
- [b-EC-BA] Directive 2006/66/EC, *On batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC*.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:266:0001:0014:en:PDF>
- [b-EC-ELV] Directive 2000/53/EC, *On end-of life vehicles (amended)*.
<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02000L0053-20130611&qid=1405610569066&from=EN>
- [b-EcoAS] EcoAS (2015). [in Korean]
https://www.ecoas.or.kr/recy/ecoaRecy0110_View.jsp
- [b-EC-PAC] Directive 94/62/EC, *On packaging and packaging waste*.
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31994L0062&from=EN>
- [b-EC-REACH] Regulation (EC) No 1907/2006, *Concerning the registration, evaluation, authorisation and restriction of chemicals (REACH)*.
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02006R1907-20140410&from=EN>
- [b-EC-RoHS] Directive 2011/65/EU, *On the restriction of the use of certain hazardous substances in electrical and electronic equipment (amended)*.
<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02011L0065-20160715&from=EN>
- [b-EC-WEEE] European Commission (2018). *Waste electrical and electronic equipment (WEEE)*.
http://ec.europa.eu/environment/waste/weee/index_en.htm
- [b-EC-WF] Directive 2008/98/EC, *On waste and repealing certain Directives*.
<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN>
- [b-EMcF] Ellen McArthur Foundation. *Circular economy overview*. Cowes: Ellen McArthur Foundation.
<https://www.ellenmacarthurfoundation.org/circular-economy/overview/concept>
- [b-EPA] US EPA (2018). *Recycling economic information (REI) report*. Washington, DC: United States Environmental Protection Agency.
<https://www.epa.gov/smm/recycling-economic-information-rei-report>

- [b-IPCC] Intergovernmental Panel on Climate Change (2007). *The physical science basis*, Working Group I Fourth Assessment Report.
https://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm
- [b-Japan] Hotta, Y., Santo, A., Tasaki, T. (2014). *EPR-based Electronic Home Appliance Recycling System under Home Appliance Recycling Act of Japan*. EPR Case Study: Japan
https://www.oecd.org/environment/waste/EPR_Japan_HomeAppliance.pdf
- [b-KSP] Ministry of Strategy and Finance, Korea Development Institute, Korea Institute of Public Administration (2015). *2014/15 Knowledge Sharing program with Egypt: Policy consultation to strengthen Egyptian economy's capacity*. Sejong: Ministry of Strategy and Finance. 149 pp.
- [b-OECD] OECD (2001). *Extended producer responsibility: A guidance manual for governments*. Paris: Organisation for Economic Co-operation and Development. 162 pp.
- [b-SRI-EPR] Hbous, S (2017). *Sustainable recycling industries: Extended producer responsibility assessment report*, SRI project Egypt, April 2016-December 2017.
<http://web.cedare.org/wp-content/uploads/2017/09/Extended-Producer-Responsibility-Assessment-Report.pdf>
- [b-SRI Take Back, 2017] *Sustainable Recycling Industries; Roadmap for e-waste take back committee*, SRI project Egypt, June 2017
- [b-UNEP, 2008] UNEP (2008). *Stockholm Convention*. www.pops.int
- [b-UNEP, 2011a] UNEP (2011a). *Basel Convention*. www.basel.int
- [b-UNEP, 2011b] UNEP (2011b). *Basel Convention: Technical guidelines (UNEP/CHW.12/5/Add.1/Rev.1)*
<http://www.basel.int/Portals/4/download.aspx?d=UNEP-CHW.12-5-Add.1-Rev.1.English.pdf>
- [b-UNEP, 2016] UNEP (2016). *Basel Convention: Draft practical manuals for the promotion of the environmentally sound management of wastes UNEP/CHW/CLI_EWG.5/INF/4*
<http://www.basel.int/Implementation/CountryLedInitiative/Meetings/EWG5onESM/Overview/tabid/5189/Default.aspx>

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	Tariff and accounting principles and international telecommunication/ICT economic and policy issues
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling, and associated measurements and tests
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities
Series Z	Languages and general software aspects for telecommunication systems