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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

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**

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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.

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* 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/11.1002/1000/113458>.

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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, Taiwan, 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