



Interreg



EUROPEAN UNION

Danube Transnational Programme
MOVECO

**Extended Producer
Responsibility Schemes and
their influence on innovation
in the TransDanube region**

MOVECO PROJECT

**Mobilising Institutional Learning for Better
Exploitation of Research and Innovation for the
Circular Economy**

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Executive summary

The executive summary based on national reports...

Introduction

Extended producer responsibility is a concept first formally introduced in Sweden by Thomas Lindhqvist. It is an environmental protection strategy to decrease total environmental impact of a product, by making the manufacturer of the product responsible for the entire life cycle of the product and especially for the take-back, recycling and final disposal.

In the 2016 OECD guidance on extended producer responsibility, it was estimated that over 400 EPR schemes operate globally for different waste streams. Small consumer electronic equipment accounts for more than one third of EPR systems followed by packaging and tyres. Though the strategy seems straightforward, it is practically impossible to compare various EPR schemes as they differ not only on waste streams but also within individual waste streams with regard to fees, geographical areas covered, service coverage, management, roles of public waste services, collection and recycling possibilities to name a few.

The objective of this overview is to ascertain, if any links exist between the extended producer responsibility schemes established in the Danube region and

product design, with emphasis on eco-design and design supporting innovation for transition towards a circular economy.

Though several studies have been conducted on this subject, very limited information can be obtained from them on how EPR requirements are implemented within the Danube region.

The scope of the study is centred on extended producer responsibility schemes for packaging and packaging waste, waste electronic and electrical equipment and batteries and accumulators.

The study gives a general overview and a chapter with more detailed description of current practices and EPR characteristics for each partner country. Each national chapter is concluded by a good practice example relevant to EPR schemes and innovation and eco-design for the circular economy

The study is structured as follows:

- The first chapter provides a basic overview with a presentation of EU legislation
- A separate chapter is dedicated to each partner country and Moldova, providing basic information concerning legislation, the number of stakeholders involved and their characteristics, a good practice case and conclusion.

Methodology

Each partner conducted a desk research of relevant legislation with literature review to establish the main characteristics of implemented waste legislation relevant to extended producer responsibility within their region, identifying regional activities supporting a transition towards a circular economy

Quite a few studies have been prepared on the roles and workings of EPR schemes at both EU and global level. Beginning with the background EU studies published in 2014 at the launch of the first legislative package for a circular economy, followed by the zerowaste study on Redesigning producer responsibility and global level, with an updated guidance on extended producer responsibility having been

published in 2016. This study exposes flaws in existing collective EPR schemes, one of which is that they have had only limited impact on eco-design, which was one of the main drivers behind their creation. Though the legislative package was focused on waste and includes minimum requirements for the working of EPR schemes, the Zerowaste study determines that » In order for a product to be reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, this needs to be considered in the initial design phase of the product. Work should be done at the front-end of the production process to design waste out of the system and reinforced Extended Producer Responsibility (EPR) has to be part of the bridge between waste and products policies.

This was followed by a mapping exercise to determine potential organisations from the target groups within the partner region

○ Target groups

- producers (electrical and electronic equipment and/or components, B&A, packaging and waste packaging – the electrical and electronic as well as the B&A industry are subject to packaging requirements, so the packaging aspects could be verified with WEEE and B&A, therefore more insight on packaging and packaging waste could be gained through interviews in the food and beverage sector i.e. , where packaging presents a substantial cost) /20 to 30 visits, the final number is determined on the basis of regional characteristics which each partner describes briefly for each target group
- producers of materials applied in WEEE, packaging, B&A (for example plastics)
- producer responsibility organisations (all dealing with WEEE, PPW, B&A), the final number is determined on the basis of regional characteristics which each partner describes briefly for each target group. Where PROs do not exist or their role is performed by one (state) body, this body should be referred to as a PRO
- waste management entities the final number is determined on the basis of regional characteristics which each partner describes briefly for each target group

- recyclers and
- collectors / public and private),
- local and state/regional public authorities (municipalities/local governments, ministries

Partners performed in depth interviews with representatives from each the target group. The final number of each stakeholder was determined by each partner on the basis of regional characteristics which each partner described briefly for each target group

A guidance template provided the basic content of the in depth interviews. The template was not meant to serve as a strict questionnaire but a list of the most important topics to be covered with possible answers for the in depth interview to proceed smoothly. The template, supplemented as annex 1 to this report, is divided into three parts covering general aspects of the organisation, their cooperation with PRO and environmental priorities. Many of the general questions are closed questions, which are elaborated more with regard to environmental aspects and circular economy in the other parts of the template

The guidance template primarily targeted producers, importers, but the topics could be adapted according to the practices and needs of other organisations, PROs can be dealing with one or more material waste stream, they may have different environmental practices and objectives, that may support innovation and eco-design, this is true also for waste management activities...

Before the interview, the interviewer was instructed to prepare and gather general information about the interviewed organisation available from company websites and other public records. This will help the interviewer answer some of the organisation profile questions and prepare on which topics they need to focus on more during the interview.

Some partners opted to obtain answers through the organisation of focus group meetings / round tables, which initiated dialogue and exchange of views amongst relevant stakeholders. In this case the template was adapted according to the method of discussion and the target groups participating.

EU characteristics and legislation for extended producer responsibility

Current legislation

○ Waste framework directive 2008/98/EC

Article 8. of the existing waste framework directive defines extended producer responsibility target groups.

1. In order to strengthen the re-use and the prevention, recycling and other recovery of waste, Member States may take legislative or non-legislative measures to ensure that any natural or legal person who professionally develops, manufactures, processes, treats, sells or imports products (producer of the product) has extended producer responsibility.

Such measures may include an acceptance of returned products and of the waste that remains after those products have been used, as well as the subsequent management of the waste and financial responsibility for such activities. These measures may include the obligation to provide publicly available information as to the extent to which the product is re-usable and recyclable.

2. Member States may take appropriate measures to encourage the design of products in order to reduce their environmental impacts and the generation of waste in the course of the production and subsequent use of products, and in order to ensure that the recovery and disposal of products that have become waste take place in accordance with Articles 4 and 13.

Such measures may encourage, inter alia, the development, production and marketing of products that are suitable for multiple use, that are technically

durable and that are, after having become waste, suitable for proper and safe recovery and environmentally compatible disposal.

3. When applying extended producer responsibility, Member States shall take into account the technical feasibility and economic viability and the overall environmental, human health and social impacts, respecting the need to ensure the proper functioning of the internal market.
4. The extended producer responsibility shall be applied without prejudice to the responsibility for waste management as provided for in Article 15(1) and without prejudice to existing waste stream specific and product specific legislation.

○ Directive on packaging and packaging waste 94/62/EC

Article 4, second paragraph regarding prevention determines, that preventive measures may consist of national projects to introduce producer responsibility to minimise the environmental impact of packaging or similar actions adopted, if appropriate in consultation with economic operators, and designed to bring together and take advantage of the many initiatives taken within Member States as regards prevention. They shall comply with the two main objectives of the directive, to reduce the impact of packaging on the environment and to support the functioning of the internal market.

Article 9 determines the essential requirements for packaging. The essential requirements are specified in annex II of the directive, where they are categorised according to requirements specific to the:

- Manufacturing and composition of packaging
- Reusable nature of packaging

- Recoverable nature of packaging with packaging recoverable in the form of:
 - Material recycling
 - Energy recovery
 - Composting and
 - Biodegradable packaging.

Article 11 of the directive defines concentration levels of heavy metals present in packaging. These should not exceed 100 ppm by weight except for specified lead crystal glass.

○ **Directive 2012/19/EU on waste electrical and electronic equipment (WEEE)**

Article 4 Product design, member states shall encourage cooperation between producers, recyclers and measures to promote design and production of EEE, notably in view of facilitating re-use, dismantling and recovery of WEEE, its components and materials. Eco-design requirements for reuse and treatment of WEEE must be applied and producers do not prevent through specific design features or manufacturing processes present overriding advantages.

Article 7 on collection rates implements the producer responsibility principle.

Article 15 information for treatment facilities requires producers provide information free of charge about preparation for re-use and treatment.

○ **Directive 2011/65/EU on the restriction of the use of certain hazardous substances**

in electrical and electronic equipment (RoHS-2)

The second RoHS directive, which is currently under revision, provides the framework for the gradual extension of the requirements to all electrical and electronic equipment (EEE), including cables and spare parts. It introduces restrictions of new substances and presents a methodology for the assessment of new hazardous substances in EEE with restrictions mainly based on waste-related criteria. It provides a review of the list of restricted substances, new substance restrictions and clearer, more transparent rules for granting, renewing or revoking exemptions, with the obligation of manufacturers to apply for exemptions and to carry out the necessary assessment. Annex 2 to the directive sets limit values by weight for homogeneous materials for contents of Mercury (Hg:0.1%), Cadmium (Cd:0.01%), Lead (Pb:0,1%), Chromium VI (Cr6+: 0,1%), polybrominated biphenyls (PBB: 0.1%), and polybrominated diphenyl ethers (PBDE: 0.1%). Annex III contains a list of exemptions to this requirement.

- **Directive 2009/125/EC**
establishing a framework for
the setting of eco-design
requirements for energy-
related products.

Eco-design is defined as the integration of environmental aspects into product design with the aim of improving the environmental performance of a product throughout its whole lifecycle.

The directive refers to generic and specific eco-design requirements; generic requirements are requirements originating from the environmental profile of the product without set limit values for particular environmental aspects, while specific eco-design requirements are quantified requirements relating to a particular environmental aspect of a product, such as energy consumption during use, calculated for a given unit output performance.

A list of generic eco-design requirements is published in annex I based on phases of the product life cycle. Amongst the requirements contained in the list are: ease for reuse and recycling through the number of materials and components used, use of standard components, time necessary for disassembly, complexity of tools necessary for disassembly, use of component and material coding standards for the identification of components and materials suitable for reuses and recycling (including marking of plastic parts in accordance with ISO standards), use of easily recyclable materials, easy access to valuable and other recyclable components and materials; easy access to components and materials containing hazardous substances together with incorporation of used components, avoidance of hazardous substances detrimental to reuse and recycling, lifetime extension implementing availability of spare parts, modularity, upgradeability, reparability, reference to chemical legislation with regard to hazardous substances; all of which resonate with the design requirements for transition towards a circular economy.

Item 14 of Article 1 of the directive defines reuse as any operation by which a product or its components, having reached the end of their first use, are used for the same purpose for which they were conceived, including the continued use of a product which is returned to a collection point, distributor, recycler or manufacturer, as well as reuse of a product following refurbishment. Part 2 of this annex determines information which must be supplied to consumers on maintenance, extended life expectancy measures, end-of-life measures and information for treatment facilities concerning disassembly, recycling or disposal at end-of-life.

○ **Directive 2006/66/EC on batteries and accumulators**

and waste batteries and accumulators repealing Directive 91/157/EEC

Article 4. Prohibition of batteries or accumulators on the market containing more than:

- 0,0005% Hg by weight, except for button cells where the limit is 2% by weight
- 0,002% Cd by weight, except for emergency and alarm systems, including emergency lighting, medical equipment or cordless power tools.

Article 11: Member States shall ensure that manufacturers design appliances in such a way that waste batteries and accumulators can be readily removed. Appliances into which batteries and accumulators are incorporated shall be accompanied by instructions showing how they can be removed safely and, where appropriate, informing the end-user of the type of the incorporated batteries and accumulators. These provisions shall not apply where, for safety, performance, medical or data integrity reasons, continuity of power supply is necessary and requires a permanent connection between the appliance and the battery or accumulator.

Fulfilment of extended producer responsibility requirement through collection schemes is defined in article 8 of the directive, with free take back requirements. The schemes can run together with schemes for waste electrical and electronic equipment where this is feasible. Collection targets of 45% until 26. September 2016. Treatment and recycling are defined in article 12, and detailed in annex III of the directive.

Article 20. details required information for end-users with regard to awareness raising, available collection and recycling schemes, meaning of symbols regarding recycling and chemical contents.

This is continued in article 21 with labelling and marking requirement laid out in paragraph 3 stating compulsory marking with the chemical symbols Hg, Cd or Pb for batteries, accumulators and button cells containing more than 0,0005% of Mercury(Hg), more than 0,002% Cadmium (Cd) or more than 0,004% of lead (Pb).

○ **Proposed future legislation**

○ **draft for new waste**

framework directive in 2015

Amends article 8 to be more binding and introduces article 8.a with minimal requirements extended producer responsibility schemes / product responsibility organisations must fulfil. Article 8 is amended as follows:

(a) in paragraph 1, the following sub-paragraph is added:

'Such measures may also include the establishment of extended producer responsibility schemes defining specific operational and financial obligations for producers of products.';

(b) the second sentence of paragraph 2 is replaced by the following:

'Such measures may encourage, inter alia, the development, production and marketing of products that are suitable for multiple use, that are technically durable and that are, after having become waste, suitable for preparation for re-use and recycling in order to facilitate proper implementation of the waste hierarchy. The measures should take into account the impact of products throughout their life cycle.';

(c) the following paragraph 5 is added:

'5. The Commission shall organise an exchange of information between Member States and the actors involved in producer responsibility schemes on the practical implementation of the requirements defined in Article 8a and on best practices to ensure adequate governance and cross-border cooperation of extended producer responsibility schemes. This includes, inter alia, exchange of information on the organisational features and the monitoring of producer responsibility organisations, the selection of waste management operators and the prevention of littering. The Commission shall publish the results of the exchange of information.';

Subsequently a new Article 8a is inserted:

Article 8a

General requirements for extended producer responsibility schemes

1. Member States shall ensure that extended producer responsibility schemes established in accordance with Article 8, paragraph 1:

- define in a clear way the roles and responsibilities of producers of products placing goods on the market of the Union, organisations implementing extended producer responsibility on their behalf, private or public waste operators, local authorities and, where appropriate, recognised preparation for re-use operators;
 - define measurable waste management targets, in line with the waste hierarchy, aiming to attain at least the quantitative targets relevant for the scheme as laid down in this Directive, Directive 94/62/EC, Directive 2000/53/EC, Directive 2006/66/EC and Directive 2012/19/EU;
 - establish a reporting system to gather data on the products placed on the Union market by the producers subject to extended producer responsibility. Once these products become waste, the reporting system shall ensure that data is gathered on the collection and treatment of that waste specifying, where appropriate, the waste material flows;
 - ensure equal treatment and non-discrimination between producers of products and with regards to small and medium enterprises.
2. Member States shall take the necessary measures to ensure that the waste holders targeted by the extended producer responsibility schemes established in accordance with Article 8, paragraph 1, are informed about the available waste collection systems and the prevention of littering. Member States shall also take measures to create incentives for the waste holders to take part in the separate collection systems in place, notably through economic incentives or regulations, when appropriate.
3. Member States shall take the necessary measures to ensure that any organisation set up to implement extended producer responsibility obligations on behalf of a producer of products:
- (a) has a clearly defined geographical, product and material coverage;
 - (b) has the necessary operational and financial means to meet its extended producer responsibility obligations;

(c) puts in place an adequate self-control mechanism, supported by regular independent audits to appraise:

- the organisation's financial management, including the compliance with the requirements laid down in paragraph 4(a) and (b);
- the quality of data collected and reported in accordance with paragraph 1, third indent, and the requirements of Regulation (EC) No 1013/2006.

(d) makes publicly available the information about:

- its ownership and membership;
- the financial contributions paid by the producers;
- the selection procedure for waste management operators.

4. Member States shall take the necessary measures to ensure that the financial contributions paid by the producer to comply with its extended producer responsibility obligations:

(a) cover the entire cost of waste management for the products it puts on the Union market, including all the following:

- costs of separate collection, sorting and treatment operations required to meet the waste management targets referred to in paragraph 1, second indent, taking into account the revenues from re-use or sales of secondary raw material from their products;
- costs of providing adequate information to waste holders in accordance with paragraph 2;
- costs of data gathering and reporting in accordance with paragraph 1, third indent.

(b) are modulated on the basis of the real end-of-life cost of individual products or groups of similar products, notably by taking into account their re-usability and recyclability;

(c) are based on the optimised cost of the services provided in cases where public waste management operators are responsible for implementing operational tasks on behalf of the extended producer responsibility scheme.

5. Member States shall establish an adequate monitoring and enforcement framework with the view to ensure that the producers of products are implementing their extended producer responsibility obligations, the financial means are properly used, and all actors involved in the implementation of the scheme report reliable data.

Where, in the territory of a Member State, multiple organisations implement extended producer responsibility obligations on behalf of the producers, Member State shall establish an independent authority to oversee the implementation of extended producer responsibility obligations.

6. Member States shall establish a platform to ensure a regular dialogue between the stakeholders involved in the implementation of extended producer responsibility, including private or public waste operators, local authorities and, where applicable, recognised preparation for re-use operators.'
7. Member States shall take measures to ensure that extended producer responsibility schemes that have been established before comply with the provisions of this article within twenty-four months of that date.;

○ **Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive**

94/62/EC on packaging and packaging waste

Article 4, such measures may consist of national programmes, incentives through extended producer responsibility schemes to minimise the environmental impact of packaging or similar actions adopted, if appropriate in consultation with economic operators, and designed to bring together and take advantage of the many initiatives taken within Member States as regards prevention. They shall comply with the two main objectives of the directive, to reduce the impact of packaging on the environment and to support the functioning of the internal market.

The proposal defines targets for preparation for reuse and recycling, while the currently valid directive speaks of recovery, re-use and recycling. With this rewording the definitions are more aligned with the definitions from the waste framework directive.

- **Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directives 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU**

on waste electrical and electronic equipment

The proposal amends implementation reporting requirements for member states and sets new targets for recycling and preparation for reuse.

National report Slovenia

Regional facts

Table 1 Basic country data for Slovenia

Country/Region	Slovenia
Area	20.273 km ²
Population	2.065.895 ¹
GDP	38570 million EUR ¹
GDP per capita	18.693 EUR ¹
GDP growth	2,5% ¹
No. of companies	134.541 (99% micro and small) ¹
Main economic sectors relevant to the study	Electrical and electronic components/products producers
	Batteries and Accumulator producers
	Food and beverage producers
	Producers of materials used for packaging, EEE and B&A
	Waste management operators

¹ <http://www.stat.si/StatWeb/File/DocSysFile/9199>

National statistics on waste management and recycling for EPR relevant waste streams packaging and waste packaging, electrical and electronic waste, batteries and accumulators

In 2015, 275.259 tons of waste packaging was produced. This is roughly 30% of all collected municipal waste. Approximately 60% or 164.309 tonnes of waste packaging occurred in the manufacturing sector and service sector, while the remaining 40% or 110.950 was collected from households, resulting in around 133 kg of packaging waste per inhabitant.

Waste packaging is collected either as mixed waste packaging or separately according to packaging materials. In 2015, 34% of the packaging waste was collected as mixed waste packaging; 29 % consisted of paper and cardboard, 16% was glass, 9% was plastic, 7% was wood, with 5% of other materials.

Packaging waste occurring in the manufacturing and service sectors consisted predominantly (42%) of paper and cardboard, while the waste packaging collected through household collection was predominantly (61%) classified as mixed.

Municipal waste collection services collected 121.771 tonnes of waste packaging, or 6% more than in 2013.

In total 30% of the waste packaging material was recycled in Slovenia, while 1,5% was subject to energy recovery. A major part of packaging is not recovered in Slovenia (no facility for recycling glass...) and is exported. Waste packaging has not been sent to landfill since 2010.

In 2014, almost 210.000 tonnes of waste packaging was produced, consisting of paper and cardboard, 27% plastic and 15% glass, of the waste packaging collected, 148.000 tonnes of it was recycled, both in domestic and external recycling facilities, to which a total of 86.000 tonnes of packaging waste was exported.

In 2014, 4,105 kg of waste electronic and electrical equipment was collected per capita, which just exceeds the target threshold of 4kg per capita set by the EU. This amounts to almost 9.700 tonnes, of which 82% were reused or recycled. In 2014, almost 35.000 tonnes of new equipment entered the market of which, 60% were large household appliances, while the rest was IT and communication equipment and small domestic appliances.

Waste batteries and accumulators must not enter the municipal waste stream of mixed wastes and they must be collected separately. In 2015, 633 tons of portable batteries and accumulators were sold in Slovenia, while 247 tonnes of portable batteries were collected as waste.

In 2015, 4522 tonnes of batteries² were collected, which is 781 more than in 2014, when 3741 tonnes of waste batteries were collected.

In 2015, 5848 tonnes of lead batteries and accumulators were recycled.

Existing EPR schemes in Slovenia

General national legislative overview relevant to EPR schemes, with emphasis on PPW, WEE and B&A

Extended producer responsibility obligations are being enforced for eight waste streams including packaging and waste packaging, batteries and accumulators, waste electric and electronic equipment, end-of-life vehicles, pharmaceuticals, phytopharmaceuticals, tyres and grave candles.

[The environmental protection act \(ZVO-1\)](#) Official Journal RS, no. 41/2004, 20/2006, 49/2006, 70/2008, 108/2009, 48/2012, 57/2012, 92/2013, 38/2014, 37/2015, 56/2015,

² <http://www.stat.si/StatWeb/News/Index/6361>

102/2015, 30/2016, 42/2016 is an umbrella act which makes reference to the relation between products, waste and extended producer responsibility in paragraph 7 of article 20. It states that the government may decide to prescribe cases and conditions when legal or physical entities developing, making, selling or importing products may be subject to extended producer responsibility. The producer must partially or completely take responsibility to manage products and their waste in such a manner as to encourage reuses and waste minimisation, recycling and other modes of waste treatment. They should at least:

- Take back used products and waste to ensure appropriate treatment
- The modes and conditions for individual or collective fulfilment of responsibility
- The extent of producer obligations, the obligation of their associations or other economic entities to fulfil producer obligations
- Establish and maintain an information system to monitor the fulfilment of producer obligations
- Inform the public of possibilities for reuses, recycling and other forms of waste treatment.

[The decree on management of packaging and waste packaging](#) Official Journal RS, no.84/2006, 106/2006, 110/2007, 67/2011, 68/2011, 57/2015, 103/2015, 2/2016, 35/2017

The decree applies to both commercial packaging and household packaging. The obligations apply for entities packaging goods or introducing packaged goods into the Slovenian market or producing packaging. An exemption, if less than 15 tonnes of packaging is placed on the market per year. Waste packaging ending up in household waste collection systems is collected by municipal public collection services. The decree determined the conditions collective and individual packaging schemes. Entities introducing more than 5 and less than 15 tonnes to the market, which do not have an obligation to join any of the packaging schemes, must nevertheless prepare an annual report concerning the packaging they have placed on the market and send it to the Environmental Agency before the 31. of March for

the previous year. According to article 6 of the decree, the packaging placed on the market must be compliant with the essential packaging requirements. The essential packaging requirements, defined also in the PWP directive, are:

1. prevention by source reduction (requirements specific to manufacturing and composition), supported by standard SIST EN 13428:2004,
2. packaging reuse, supported by standard SIST EN 13429:2004;
3. packaging recycling, supported by standard SIST EN 13430:2004,
4. energy recovery, supported by standard SIST EN 13431:2004 and
5. packaging suitable for composting and biodegradable packaging, supported by standard SIST EN 13432:2004.

While packaging must adhere to prevention by source reduction and its waste management must comply with one of the standards on recycling, energy recovery, composting or biodegradability, reuse is optional.

The decree has no reference to support eco-design or eco-innovation drivers and does not have clear design objectives or references to design supporting reuse, technical longevity or recycling other than mandatory compliance with essential requirements and limited contents of hazardous substances. Some quite substantial changes were introduced into the decree, coming into force in July 2017. While enterprises placing less than 15 tons of packaging on the market per annum are still exempt from the requirements to manage their waste through a producer responsibility organisation; they are facing increased reporting requirements to the Environmental Agency.

[The decree on environmental tax for pollution from waste packaging](#) Official Journal RS, no.32/2006, 65/2006, 78/2006, 19/2010

A tax is paid for both commercial packaging and household packaging. The obligations apply for entities packaging goods or introducing packaged goods into the Slovenian market or producing packaging. An exemption, if less than 15 tonnes of packaging is placed on the market per year.

The tax is paid per kg of material, with a differentiation for PVC plastic packaging where the tax is 1.500 greater per kg of packaging material and for packaging made of biodegradable plastics, where the tax is 10 times lower per kg of packaging material. The tax is paid when the product is put on the market in Slovenia.

The decree on waste electrical and electronic equipment Official Journal RS no. 55/2015, 47/2016

The decree determines extended producer responsibilities for entities placing electronic and electrical equipment onto the Slovenian market, whether they produce electronic and electrical goods or sell them. It prescribes the consideration of environmental requirements during design. Producers need to supply consumers with information on reuse and waste treatment including composition and content of hazardous substances. It determines targets for collection and treatment. In 2015, the target was 4 kg of collected WEEE per capita; in 2016, the target was at least 41% of the average yearly amount, which was placed on the market during the last three years. In 2012, this target will increase to 65% of the average yearly amount, which was placed on the market during the last three years. The decree requires producers to cooperate with recyclers and to design products in such a way, that EEE may be reused, disassembled and recycled either to components or materials, but offers no guidelines, incentives, controls or benchmarks what is expected under this cooperation. European standards are being developed for the treatment of WEEE; which are oriented to marking of electrical and electronic equipment, treatment requirements for end-of-life household appliances etc.

The decree on environmental tax for pollution caused from waste electrical and electronic equipment Official Journal RS, no. 32/2006, 65/2006, 78/2008

The tax is paid for products regulated by the decrees on waste electrical and electronic equipment and on management of batteries and accumulators and waste batteries and accumulators. WEEE and batteries and accumulators are divided into ten grades, with large household and other appliances subject to 0,546 tax units per kg and smaller products like batteries, subject to 5,619 units per kg. The tax is paid when the product is put on the market in Slovenia.

[The decree on management of batteries and accumulators and waste batteries and accumulators](#) Official Journal RS, no. 3/2010, 64/2012, 93/2013, 103/2015

The decrees restricts the use of hazardous substances, with the content of Hg limited to 0,0005% of the total mass and the Cd content limited to 0,002% of the total mass. Equipment containing batteries and accumulators must be designed in such a manner, which enables easy removal of the battery or accumulator. The producer must offer instructions for their removal. If the equipment contains batteries or accumulators, the battery or accumulator type must be stated.

PRO schemes may be individual or collective, while they are distinguished also according to the types of batteries and accumulators collected:

1. portable batteries and accumulators
2. car batteries and accumulators
3. industrial batteries and accumulators.

[The decree on environmental tax for pollution caused from waste electrical and electronic equipment](#) Official Journal RS, no. 32/2006, 65/2006, 78/2008, also defines tax for batteries and accumulators placed on the market.

Established EPR schemes for PPW and their characteristics

According to public records dated march 2017, 1155 legal entities were paying tax for packaging, placed on the market. The entities made 1588 payments as some of them find themselves in multiple roles (placing packaged goods on the market, filling packaging...) and pay a tax according to their different roles.

Currently six collective extended producer responsibility schemes are offering their services for management of waste packaging. The schemes also take the responsibility for their member to report to the Ministry of Finance on the quantities of packaging being placed on the market.

PRO schemes operating in the first half of 2017 in Slovenia are

- [SLOPAK d.o.o.](#), Vodovodna cesta 100, 1000 Ljubljana

- [INTERSEROH](#) zbiranje in predelava odpadnih surovin d.o.o., Brnčičeva ulica 45, 1231 Ljubljana Črnuče
- [GORENJE SUROVINA](#) družba za predelavo odpadkov d.o.o., Ulica Vita Kraigherja 5, 2000 Maribor
- [DINOS d.d.](#), Šlandrova 6, 1000 Ljubljana
- [RECIKEL](#), družba za ravnanje z odpadno embalažo, d.o.o., Brnčičeva 31, 1231 Ljubljana Črnuče
- [EMBAKOM d.o.o.](#), Pod hrasti 33, 1218 Komenda

Except for Slovak, which has published a price list on its webpage, no other PRO publishes their prices publicly, as prices are negotiated with clients. According to clients the final price depends on the quantity of transport and other packaging which occurs onsite, that has a value and the amount of packaging put on the market with consumer goods that ends up in household collection bins that presents pure cost. Some of the PRO also offer their services to help companies optimise their management of waste packaging onsite.

Meanwhile 12 companies³ have opted to apply for a permit to manage their own packaging waste. These are predominately transport-packaging wastes that arrive to their production sites with incoming production materials. To obtain a permit to manage their waste packaging, companies need to prove they are capable of achieving required recycling targets. Most companies deciding to manage their own packaging waste do not produce large quantities of consumer packaging that ends up in household collection bins. The waste packaging is clean and well sorted and has a value on the market. As the waste packaging is delivered to them on site by their suppliers, this is not a relevant driver for eco-design and eco-innovation.

The Ministry for Environmental and Spatial Planning performs monitoring and enforcement together with the Environmental Agency and Inspectorate. No clearinghouse has been established.

Established EPR schemes for WEEE and their characteristics

³ <http://www.arso.gov.si/varstvo%20okolja/odpadki/podatki/embala%C5%BEa%2015052017.pdf>

The registry published by the Environmental Agency on the 2nd of June contains a list⁴ of almost a thousand (993) companies, which have registered as producers or producer representatives placing products on the market in Slovenia. An [application form](#) to be included in the registry is available on the agencies web page, unfortunately it is only available in Slovene. Five PROs offer collective schemes, three of which were also mentioned as PROs for packaging and waste packaging, namely

- Interseroh,
- Slopak and
- Recikel, additional PROs specialising in waste electronic and electrical equipment are
- [ZEOS](#), d.o.o , Šlandrova ulica 14, 1231 Ljubljana – Črnuče and
- [Trigana](#), razvojni inženiring, d.o.o. Dunajska cesta 136, 1000 Ljubljana. There are currently no individual schemes for waste electronic and electrical equipment.

ZEOS is very active on the aspect of awareness raising, and are currently performing their second project on communication and awareness raising under the LIFE + programme financed by the EU and the Ministry for Environment and Spatial Planning, “E-cikliraj”⁵ The ZEOS webpage offers a lot of comprehensive information also in English, with a list of [WEEE waste](#)

The environmental agencies web site also contains a list⁶ of drop off collection sites managed by each scheme and information on further waste management.

The Ministry for Environmental and Spatial Planning performs monitoring and enforcement together with the Environmental Agency and Inspectorate. No clearinghouse has been established.

⁴ http://www.arso.gov.si/varstvo%20okolja/odpadki/podatki/evid_proizv_EEO02062017.pdf

⁵ <http://e-odpadki.zeos.si/en/>

⁶ <http://www.arso.gov.si/varstvo%20okolja/odpadki/podatki/Evidenca%20na%C4%8Drto%20ravnanja%20z%20EEO%2002062017.pdf>

Established EPR schemes for B&A and their characteristics

The environmental register lists 586 of producers of batteries and accumulators on their website⁷

PRO schemes may be individual or collective, while they are distinguished also according to the types of batteries and accumulators collected:

1. portable batteries and accumulators

Five PROs

- Interseroh,
- Slopak,
- Recikel,
- Zeos and
- Trigana all offer services in their collective schemes for portable batteries and accumulators, and
- [Tabakum Export-Import d.o.o.](#) Podbevškova ul.5 8000 Novo mesto; which is an additional individual sixth scheme

2. car batteries and accumulators

A total of eight EPR schemes manage cars and batteries, four are collective

- Tabakum Export_Import d.o.o.,
- Interseroh d.o.o.
- Trigana d.o.o. and
- [TAB d.d](#) Polena 6, 2392 Mežica. is also a producer of high quality Pb batteries, is takes care of removal and recycling of used batteries in its subsidiary company [MPI Recycling](#).

⁷<http://www.arso.gov.si/varstvo%20okolja/odpadki/podatki/Evidenca%20proizvajalcev%20BA%2002062017.pdf>

and four individual

- VELOG D.O.O, Brnčičeva 31, 1231 Ljubljana – Črnuče
- Trevira d.o.o., Zagrebška cesta 20, 2000 Ljubljana
- Mides International d.o.o. Železna cesta 14, 1000 Ljubljana and
- C.I.A.K d.o.o. Celovška cesta 492, 1210 Ljubljana Šentvid. Velog, Trevira and Mides are all wholesalers and retailers, while C.I.A.K a dealership for spare car parts

3. industrial batteries and accumulators

Eight EPR schemes manage cars and batteries, of which three are collective

- Interseroh d.o.o.
- Trigana d.o.o. and
- [TAB d.d](#) Polena 6, 2392 Mežica. is also a producer of high quality Pb batteries, is takes care of removal and recycling of used batteries in its subsidiary company [MPI Recycling](#).

and five individual

- VELOG D.O.O, Brnčičeva 31, 1231 Ljubljana – Črnuče
- Mides International d.o.o. Železna cesta 14, 1000 Ljubljana and
- C.I.A.K d.o.o. Celovška cesta 492, 1210 Ljubljana Šentvid
- TABAKUM EXPORT_IMPORT d.o.o and
- [MOLSON ELEKTRO d.o.o.](#), Partizanska pot 40, 1270 Litija

Producers of batteries and accumulators also need to register, before placing their products on the market in Slovenia. The [application form](#) for registration is published on the website of the Environmental Agency.

The Ministry for Environmental and Spatial Planning performs monitoring and enforcement together with the Environmental Agency and Inspectorate. No

clearinghouse for any waste stream subject to extended producer responsibility has been established.

Target group perception on influence of extended producer responsibility

General characteristics of stakeholders along the extended producer responsibility, waste stream, value chain

Stakeholders

The stakeholders along the value chain are manufacturers of electrical and electronic equipment and components, food and beverage producers, recycling operators, public and private waste collectors, producer responsibility organisations, public and private authorities.

Innovation

Most stakeholders are aware of the importance of innovation. As expected larger, manufacturing companies have a more systematic approach to innovation, which has been formally established within their organisations. This is especially true for companies manufacturing electronic and electrical equipment. It seems that the eco-design and RoHS, together with strong, global competition has more of an influence on innovation within the sector than extended producer responsibility. Private companies within the waste sector also manage innovation systematically. The private sectors seem to be more advanced in innovation management than public ones.

Digitalisation

Digitalisation shares many common guiding principles with the circular economy, such as systems thinking, innovation, collaboration, value optimisation and transparency. The transition towards both is quite complex, requiring knowledge, resources and support from top management, which is not yet in place. The interviewees were usually not people directly involved in digitalisation processes.

They track waste transport digitally together with issued procurement and sale processes. Most stakeholders are managing administrative actions linked to

finances, sales and procurement digitally. Many interviewees reported that digital tracking ceased with waste handling and manipulation onsite, within the organisation, though general input and output of waste is tracked through waste transfer notes, that are registered in the state waste information system. The private sectors seem to have more experience with digitalisation than public ones. Larger companies and OEM are more aware of digitalisation, and the need to reassess their operations in light of it.

Environmental goals

Manufacturing companies are interested in the reuse of more durable packaging such as pallets and IBCs. The food and beverage sector is interested in bio-based and compostable packaging materials, but they are not economically viable for them yet. Their costs are usually higher than cost for more conventional materials, such as PET, PP etc. Additionally small and medium sized companies need technical assistance to adapt their packing lines to these new materials. Due to relatively smaller procured quantities this is not offered by the packaging material manufacturer. Additionally the food and beverage sector needs to test and control each new material coming into contact with food according to food contact requirements.

Packaging and waste packaging

The stakeholders within the packaging and waste packaging stream do not generally agree on the problems in this area. A common denominator of agreement is that the decree on packaging and waste packaging and the system it implements are obsolete. They do not clearly support the goals for transition to a circular economy, such as durability, longevity, preparation for reuse. A literal implementation, interpretation of the standard for packaging reuse according to EN standard 13429, on reuse presents an administrative, economic and logistic challenge. It would be prudent to reuse long-term packaging such as wooden pallets and IBCs. Currently, if the standard is followed literally, this implies the operator must manage longer-term packaging circulation, storage and repair together with packaging reuse. This can pose a problem for companies working with multiple suppliers and buyers and SMEs. The administrative burden exceeds the value of the packaging, making it cheaper to dispose of it. I.e. returning pallets

or IBC to the original owner requires collection, storage and transport. Both types of packaging are relatively light with high volume, making efficient storage and logistic arrangements not viable in economic terms or efficient in accordance with their value. A road lorry capable of carrying 24 tonnes of goods can only carry 5000 tonnes of wooden pallets, rendering such a solution inadequate and not attractive to either the initial owner or subsequent user.

Glass bottles, their rotation and reuse is not common. Beverage manufacturers report that this type of packaging is rejected by consumers. If the company decides to fill their beverages into reusable bottles they need to manage a system to collect them back, clean them, inspect them for defaults and replace flawed bottles with new ones. They must pay a special market fee per bottle to participate in a rotating, reusable bottle scheme, which is separate from the extended producer responsibility fee and is not paid to producer responsibility organisations.

Enterprises placing less than 15000 kg per year of packaging on the market are not obliged to enter an extended producer responsibility scheme or pay fees linked to extended producer responsibility. Most stakeholder pointed out that this is an anomaly shifting costs for waste management to enterprises participating in the scheme and increasing scheme management costs. The threshold also offers a hideout for free riders.

Prices are not available publicly except for one PRO, Slovak. Contracts are revised annually and negotiated between enterprises and PRO. Different prices are negotiated for onsite packaging the enterprises obtain through raw material procurement and the packaging travelling with the product to the consumer, usually ending up in household collection bins.

Most packaging waste materials have a positive value, though it is not clear how this value measures up to waste management costs. The only exception is plastic packaging, with emphasis on packaging contaminated with food residues, small packaging (pouches) that is difficult to collect and multilayer plastic packaging, difficult to collect and recycle. Some of the waste packaging can be a mixture of all the troublesome waste plastic packaging.

The huge variety of plastic packaging materials and shapes also makes sorting and recycling more expensive. It is estimated that a maximum of 30% of this packaging could be sorted out accordingly and recycled.

The current system supports collection and sorting of packaging waste for most waste materials. Consumer plastic waste packaging is an exemption placing the economic viability of sorting and any additional actions to question, if it is comprised of packaging containing food residues, small pouches or multi-layered packaging. This plastic packaging can often be mixed with other undesirable, unrecyclable household residues, which increase waste management cost additionally.

Waste electrical and electronic equipment

While EPR has improved collection rates and increased levels of recycling of WEEE, official statistics show that EO countries collect less than 50% of total EEE put on the market with collection rates falling in smaller products. There is still a lot to be done to improve recyclability. In addition to more common materials, such as aluminium, lead and tin and precious metals such as gold, silver or palladium and indium, electrical and electronic equipment contains rare metals such as neodymium, dysprosium, praseodymium and tantalum, which still cannot be recovered using current processes of preparation and recovery. Innovative waste management technologies are lacking to support cleaning waste streams, especially those with older products, which still contain more hazardous components. Public waste collection systems report that WEEE does not present a burden on their collecting and storage capacities, as is typical for packaging waste, especially plastic waste packaging. The impact on eco-design and innovation may be attributed to the demands of Eco-design directive and RoHS directive, but there are discrepancies between requirement for product safety and the push for a circular economy with regard to reuse and preparation for reuse. The standards for product safety are high for producers of electronic and electrical equipment as are demands for transparency regarding content of hazardous substances in materials and components.

Waste batteries and accumulators

The collection of batteries and accumulators is still quite a challenge, with some such as lead car batteries have good collection and recycling rates, other batteries and accumulators lagging behind from the collection phase on. There has been a plant to recycle lead car batteries in Slovenia since 1991 and over 90% of these batteries are recycled. With growing quantities of Lithium ion batteries, where new battery chemistries and applications are under development, Eurobat⁸ has issued a safety notice for battery collectors, handlers and sorters across Europe and North America, highlighting the serious risk of fire and explosions if lithium batteries enter the lead battery collection and recycling process. The problem of identification between the battery chemistries is made particularly difficult as lithium and lead batteries can appear similar, especially when received in pallets or bins containing thousands of used batteries. Current labelling requirements serve to identify heavy metal content of batteries and not the electrochemical system. Due to Lithium's light weight and high voltage applications and lowering production costs it is predicted their market share will increase in the following years as will their presence in the waste streams. The share of lithium ion batteries of different battery chemistries (LiNiCoAlO₂, LiNiMnCoO₂, LiCoO₂, LiFePO₄, LiMn₂O₄, Li₄Ti₅O₁₂, LiNiCoAlO₂, Li-S and lithium ion polymer...) is growing in three categories of use:

- Handheld, under 5 kg for mobile phones, laptop computers, hand tools...
- Electric vehicle to power electric cars (ranked as industrial batteries according to current legislation)
- Photovoltaic panel electricity storage to solar power from photovoltaic cells.

Conclusion

The minimal requirements for article 8a of the new framework waste directive proposal pinpoint the main issues pointed out by interviewed stakeholders regarding how extended producer responsibility schemes should be improved.

⁸ www.ila-lead.org

Drafts of new legislation relevant for EPR, PRO, innovation and eco-design

Environmental protection Act draft, published on the Environmental Ministries web page on the 10th of July 2017 until September 11th 2017. Second paragraph, Clause 28 states that product design, production, distribution and usage must be done in a manner, which supports prevention of waste generation and increases the likelihood of preparation for reuse and recycling, once these products have become waste.

Extended producer responsibility is defined in clause 31. The Government determines cases and conditions, where a legal or private entity that develops, manufactures, treats, sells or imports products (subsequently referred to as producer) is subject to extended producer responsibility requirements. The product manufacturer must partially or completely ensure handling of the product or the product when it becomes waste, which enables waste prevention, waste recycling and other waste treatment, with emphasis on:

1. Take back of used products and waste, that ensues after product use ensuring prescribed waste management
2. The mode and conditions for individual or collective fulfilment of producer requirements
3. The extent of producer or producer association requirements which are mandatory and the targets which must be fulfilled
4. Establishment and maintenance of an information system to monitor how the producer's mandatory requirements are being met
5. Awareness raising and provision of information for the general public on possibilities for product reuses and recycling together with other waste treatment options, for the products once they have become waste.

Selection of case studies in EPR, innovation, eco-design and the circular economy

Iskraemeco through the lens of circularity

Iskraemeco produces advanced residential and ICG managements devices, fitted for smart grid application. The company supports its production with communication and software solutions. Iskraemeco is situated in Kranj, Slovenia and was founded in 1945 in the town's industrial area consisting of former textile and machinery factories, where electricity meters were part of the manufacturing program. In 1946 the company was renamed Iskra, starting with a regular production of single-phase meters in 1948. In 1996 the company became known as Iskraemeco.

Systems thinking

In recent years, Iskraemeco has incorporated a holistic approach to improve its business, technical and market processes. This has helped them identify key stakeholders within their value chain and comply with increasing legislative requirements in their sector and customer demands. Through this approach, Iskraemeco recently developed an innovative smart meter platform, enabling seamless integration of next generation smart metering functions into the smart grid concept. The platform addresses common functional smart metering requirements set at European level, including amongst others end customer data availability, remote meter-reading, two-way communication and secure data communication. This enables easy and cost-effective adaptability to national market requirements. The platform addresses key challenges customers face during their transition into a smart grid environment, while supporting and improving the operation of their smart meters.

Innovation

Iskraemeco has a strong R&D team, with a systematic, interdisciplinary approach to innovation. Innovation is key to comply with the ever-increasing demands stemming from the eco-design and RoHS directives, customer demands and company values.

With an approach to innovation, which incorporates systems thinking their technical solutions have transcended eco innovation to a more circular approach. In the fair meter project, they needed to confront not only demands for changes in

design, increasing product longevity, improving waste product disassembly and recyclability but also improve cooperation along their value chains.

Stewardship

Iskraemeco is part of the United Nations Compact initiative, a network, reinforcing human rights, labour, environment and anti-corruption, supporting sustainable development practices.

The Fair meter project also adheres to these values as it addresses energy intensity, labour standards, use of conflict materials (3TG), material scarcity and E-waste

Collaboration

The company is a partner of the Fair Meter project addressing crucial elements of the first large-scale smart metering implementation in the Netherlands.

With this partnership they have begun forging new relationships, not only with customers, emphasised through their partnership with Dutch utilities, Aliander, Stedin, DELTA Netwerkbetrijf and Westland Infra, but also changes in their relationships with suppliers, to secure the absence of conflict materials and reduce the content of hazardous ones. The new production line installed with the platform has improved working conditions, but the innovation process has led to the reorganisation of the development department, within which an independent team has been established comprising not only of technical development engineers; but also of production engineers, sales and procurement personnel, product leaders and top management.

Value optimization

The platform has supported improvements to internal procedures within the company, its modular design enabling shorter production times and better product yields. This has subsequently allowed optimisation resulting in increased energy and resource efficiency in the production process. The smart meter design makes its installation and maintenance throughout the product use cycle easier, lowering costs for their users.

Transparency

The company implements transparency of input materials and their characteristics throughout the supply chain, this is part of their circular business model, which consists of:

1. Product life extension, with the life cycle of meters increased 20 years. Effort for product life prolongation are supported with communication activities
2. Circular supplies, with product material inputs consisting of electronic components, metals, plastic, they are building full transparency over the chemical composition of all components. As the use of some so-called conflict materials and hazardous materials is currently unavoidable, efforts have been made to limit their content to a minimum, while maintaining a technically viable product. The company is looking to the future and working with suppliers to develop components without scarce materials as well as components from recycled materials. Even with increased longevity, end-of-life product management is important and improved design supports easy disassembly and recyclability.