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Investigating alignment and potential synergies on circular economy requirements between sustainable product policy instruments

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LIST OF ABBREVIATIONS

| | |
|-------|----------------------------------------------------------|
| AFR | Annualised Failure Rate |
| BBP | Butyl benzyl phthalate |
| CFC | Chlorofluorocarbons |
| CFF | Circular Footprint Formula |
| CLP | Classification, Labelling and Packaging |
| CMR | Carcinogenic, mutagenic or toxic for reproduction |
| CRM | Critical Raw Materials |
| CPR | Construction Products Regulation |
| DBP | Dibutyl phthalate |
| DEHP | Bis(2-ethylhexyl) phthalate |
| DIBP | Diisobutyl phthalate |
| ECHA | European Chemical Agency |
| EEE | Electrical and Electronic Equipment |
| ELV | End-of-Life Vehicles |
| eMMC | embedded Multi Media Card |
| EOL | End of Life |
| EPR | Extended Producer Responsibility |
| ErP | Energy-related Product |
| EU | European Union |
| GHS | Globally Harmonised System |
| GPP | Green Public Procurement |
| GPSD | General Product Safety Directive |
| GWP | Global Warming Potential |
| HC | Hydrocarbons |
| HDD | Hard Disk Drive |
| HFC | Hydrofluorocarbons |
| ICT | Information and Communication Technologies |
| ISO | International Organisation for Standardization |
| LCA | Life Cycle Assessment |
| LLCC | Least Life Cycle Costs |
| LVD | Low Voltage Directive |
| MD | Machinery Directive |
| MEErP | Methodology for the Ecodesign of Energy-related Products |
| MSA | Market Surveillance Authorities |
| PBB | Polybrominated biphenyls |

| | |
|-------|----------------------------------------------------------------------|
| PBDE | Polybrominated diphenyl ethers |
| PBT | Persistent, bio-accumulative and toxic |
| PCB | Polychlorinated biphenyl |
| PCT | Polychlorinated terphenyls |
| PEF | Product Environmental Footprint |
| PMMA | Polymethyl Methacrylate |
| POP | Persistent Organic Pollutants |
| PV | Photovoltaics |
| RAC | Committee for Risk Assessment |
| RAPEX | Rapid Alert System for non-food dangerous products |
| RCS | Restricted Substance Controls |
| REACH | Registration, Evaluation, Authorisation and Restriction of Chemicals |
| RED | Radio Equipment Directive |
| RoHS | Restriction of Hazardous Substances |
| RRU | Reparability, Reusability and Upgradability |
| SDD | Solid State Drive |
| SEAC | Committee for Socio-economic Analysis |
| SPP | Sustainable Product Policy |
| SVHC | Substances of Very High Concern |
| VAT | Value Added Tax |
| vPvB | Very persistent and very bio-accumulative |
| WEEE | Waste of Electrical and Electronic Equipment |

1 INTRODUCTION

Requirements set under existing EU sustainable product policy tools can address different aspects associated with the life cycle of Energy-related Products (ErP), for instance: product design, materials, manufacture, use, end of life and related use of energy, water, chemicals and other resources. It is apparent that requirements improving the material efficiency of ErP (e.g. durability, reparability, and recyclability) can positively contribute to the implementation of a more circular economy in the EU. Nevertheless, such requirements have to be consistent, and possibly synergetic, with the rest of EU legislation. This means that each policy instrument should reinforce the effects of the other policy measures, as also highlighted in the Circular Economy Action Plan¹.

This report² aims to:

1. provide an overview of main characteristics of different EU policies addressing material efficiency aspects (see Section 2), and
2. investigate interactions between product policy tools, such as Ecodesign and the Energy Label, and other policy instruments. This also includes an appraisal of how different policy tools could be integrated to handle material efficiency aspects of products, possibly exploiting any existing synergies (see Section 3.1).

Furthermore, examples of material efficiency requirements in different product policy instruments (Ecodesign, Energy Label, GPP and Ecolabel) are provided, as well as guidance about how the level of ambition of criteria may be varied, depending on the policy objectives (e.g. mandatory vs. voluntary legislation) (see Section 3.2).

¹ COM(2015) 614 final, Closing the loop - An EU action plan for the Circular Economy

² This report is the formal deliverable for Task 6 of the Administrative Agreement N. 070201/2015/SI2.719458/ENV.A.1 signed within the European Commission by DG ENV and DG JRC

2 POLICY CONTEXT

2.1 Sustainable Product Policy tools

The European Commission has established a set of product policy tools with which to drive the market towards the production and consumption of more sustainable products. These tools include Ecodesign³, Energy Labelling⁴, Green Public Procurement (GPP)⁵ and the EU Ecolabel⁶ which, depending on their inherent features, can be classified as push/pull instruments as showed in Table 1.

Table 1. Classification of product policy tools

| Tool | Push/Pull | Mandatory/Voluntary |
|--------------------------|------------------|----------------------------|
| Ecodesign | Push | Mandatory |
| Energy Label | Pull (/ Push) | Mandatory |
| Ecolabel | Pull | Voluntary |
| Green Public Procurement | Pull | Voluntary |

Figure 1 represents the effect that policy tools have on the products on the EU market, taking into account their main purposes. While Ecodesign aims to push the market towards more sustainable products through the implementation of minimum requirements, GPP and Ecolabel aim to pull the market by promoting the production and consumption of more sustainable product options. In between, the Energy Label aims to differentiate products on the market with respect to their performance, enabling and incentivising consumers to choose for more sustainable products.

³ http://ec.europa.eu/growth/industry/sustainability/ecodesign_en (last access on 4 April 2018)

⁴ <https://ec.europa.eu/energy/en/energy-labelling-tools> (last access on 4 April 2018)

⁵ http://ec.europa.eu/environment/gpp/index_en.htm (last access on 4 April 2018)

⁶ <http://ec.europa.eu/environment/ecolabel/> (last access on 4 April 2018)

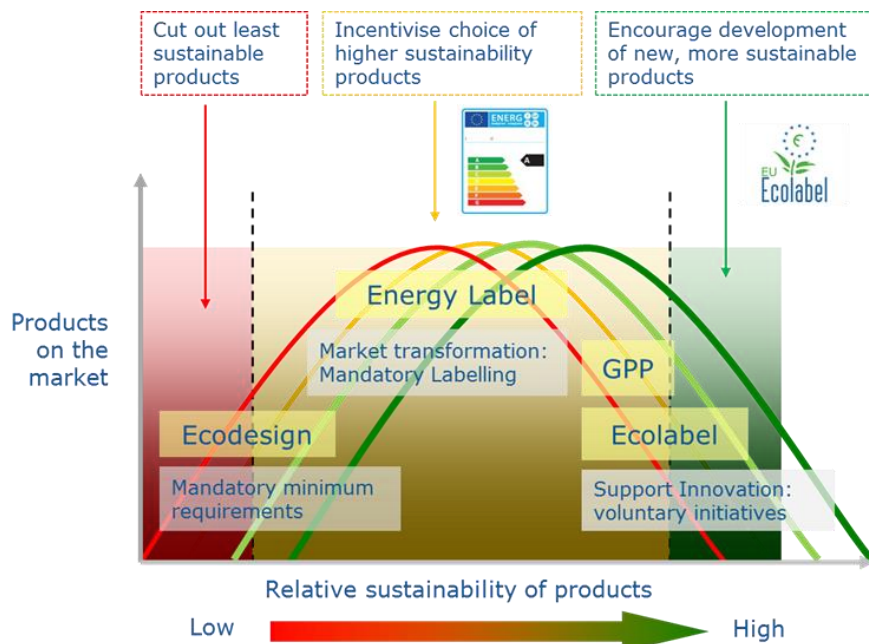


Figure 1. Objectives of different product policy tools

The common denominator for all these policy tools is that they take into consideration environmental aspects of products along the entire life cycle, including their material efficiency (see Section 3.2).

In this context, the European Commission has also been working on a harmonised approach for the assessment of the life cycle impacts of products, the so-called Product Environmental Footprint (PEF)⁷. While the policy tools mentioned in Table 1 represent well-established instruments, the PEF is currently in the end of a pilot phase, with its potential application in policy still being explored.

2.1.1 Ecodesign

Directive 2009/125/EC⁸ establishes a framework for the implementation of measures which set minimum Ecodesign requirements for energy-related products (ErP). Regulated ErP must fulfil generic and/or specific legal mandatory requirements in order to be placed on the EU market and/or to be put into service. Manufacturers and/ or importers make self-declarations regarding product conformity, with respect to appropriate conformity assessment modules. Market Surveillance Authorities (MSAs) designated by Member States are responsible for verifying the compliance of products with respect to the implementing measures of concern. This is also the case for Energy Labelling (see below) – often performed at the same time by MSAs. It is noteworthy that:

- The Directive does not apply to means of transport for persons or goods (Article 1(3)).
- The Directive, as explained in its Article 15, applies to products:

⁷ http://ec.europa.eu/environment/eussd/smcp/policy_footprint.htm (last access on 4 April 2018)

⁸ DIRECTIVE 2009/125/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

- That represent a significant volume of sales and trade within the EU, indicatively more than 200 000 units a year;
 - That have a significant environmental impact and present significant potential for their improvement without entailing excessive costs;
 - For which there is a lack of other relevant Community legislation, or where market failures make it necessary to address the issue;
 - For which there is a wide disparity in the environmental performance of models available on the market with equivalent functionality.
- Industry sectors may also sign voluntary agreements as an alternative, under the monitoring of the Commission (see Article 17 and Annex VIII, together with guidance issued by the Commission regarding Voluntary Agreements/ Self-Regulation Initiatives under the Ecodesign Directive⁹).

2.1.1.1 Parameters of possible consideration

Parameters (see Annex I - Part 1 of the Directive) of possible consideration for the implementation of the Directive include:

- a. Weight and volume of the product;
- b. Use of materials issued from recycling activities;
- c. Consumption of energy, water and other resources throughout the life cycle;
- d. Use of substances classified as hazardous to health and/or the environment;
- e. Quantity and nature of consumables needed for proper use and maintenance;
- f. Ease for reuse and recycling as expressed through: 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 reuse 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;
- g. Incorporation of used components;
- h. Avoidance of technical solutions detrimental to reuse and recycling of components and whole appliances;
- i. Extension of lifetime as expressed through: minimum guaranteed lifetime, minimum time for availability of spare parts, modularity, upgradeability, reparability;
- j. Amounts of waste generated and amounts of hazardous waste generated;
- k. Emissions to air (e.g. greenhouse gases, acidifying agents, volatile organic compounds, ozone depleting substances, persistent organic

⁹ Commission Recommendation (EU) 2016/2125 of 30 November 2016 on guidelines for self-regulation measures concluded by industry under Directive 2009/125/EC of the European Parliament and of the Council. Note: this Recommendation is likely to be updated, expected in the period 2018-2019.

- pollutants, heavy metals, fine particulate and suspended particulate matter);
- l. Emissions to water (e.g. heavy metals, substances with an adverse effect on the oxygen balance, persistent organic pollutants); and
 - m. Emissions to soil (especially leakage and spills of dangerous substances during the use phase of the product, and the potential for leaching upon its disposal as waste).

2.1.1.2 Method for setting generic Ecodesign requirements

Annex I of the Directive describes generic Ecodesign requirements, for example those requirements that aim at improving the environmental performance of products, focusing on significant environmental aspects, but without setting limit values. Generic Ecodesign requirements can include:

- Relevant Ecodesign parameters (see this report, Section 2.1.1.1).
- Information requirements such as:
 - Information on the significant environmental characteristics and performance of a product;
 - Information on how to install, use and maintain the product in order to minimise its impact on the environment and to ensure optimal life expectancy, as well as on how to return the product at end-of-life;
 - Information on the period of availability of spare parts and the possibilities of upgrading the product;
 - Information on how to disassemble, recycle, or dispose the product at end-of-life.

2.1.1.3 Method for setting specific Ecodesign requirements

Annex II of Directive 2009/125/EC describes specific Ecodesign requirements as those requirements that aim at improving selected environmental aspects of products by limiting the use of a given resource in one or more stages of the product's life cycle. These could, for instance, prescribe limit values for the amount of energy and water consumed in the product's use phase, or for the quantity of given materials incorporated in the product (i.e., in its manufacture), or requirements on its design for durability and disassembly, and diagrams and information to facilitate the latter.

The preparation of specific Ecodesign requirements must include a technical, environmental and economic analysis of the product, defining a number of representative models of the product on the market and identifying feasible options for improving the environmental performance of the product without causing any significant loss of functionality. In the case of energy consumption, the level of energy efficiency must be set aiming at minimising the life cycle costs (a "Least Life Cycle Costs" LLCC approach) for the end-users and taking into account the consequences on other environmental aspects.

2.1.1.4 Standardisation of material efficiency aspects for Ecodesign

In response to the Commission's Mandate 543¹⁰, the CEN/CENELEC JTC10 "Energy-related products – Material Efficiency Aspects for Ecodesign"¹¹ was created. CEN/CENELEC JTC10 aims to develop general standards on material efficiency aspects for Energy-related Products, which can be used to support the policy making process. The standards, planned to be published in 2019/2020, will be followed, wherever needed, by vertical (i.e., product groupspecific) implementation of relevant standards. Six working groups have been formed:

- WG1: Terminology
- WG2: Durability
- WG3: Reparability, upgradability and reusability
- WG4: Ability to Remanufacture
- WG5: Recyclability, recoverability and recycled content (including critical raw materials)
- WG6: Provision of information (including critical raw materials).

2.1.2 Energy Label

The Energy Label Directive 2010/30/EU¹², recently revised as Regulation (EU) 2017/1369¹³, established a harmonised framework for the labelling and provision of information on the consumption of energy during use. Consumption of other essential resources can also be reported, as well as supplementary information as identified in the Directive 2009/125/EC. The Energy Label complements the Ecodesign directive by allowing end-users to choose more efficient products.

The implementation of the Directive/ revised Regulation is based on product-specific delegated acts which regulate the information to provide for such product categories. Market surveillance authorities have to ensure that products placed on the market or put into service, and that are covered by a delegated act, are supplied with a label and a technical fiche. Suppliers must provide technical documentation which is sufficient to enable the assessment of the accuracy of the information contained in the label and the fiche, such as:

- A general description of the product;
- The results of design calculations carried out;

¹⁰ M/543 COMMISSION IMPLEMENTING DECISION C(2015)9096 of 17.12.2015 on a standardisation request to the European standardisation organisations as regards ecodesign requirements on material efficiency aspects for energy-related products in support of the implementation of Directive 2009/125/EC of the European Parliament and of the Council. Available at http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search_detail&id=564# (last access on 25 May 2018)

¹¹ https://www.cenelec.eu/dyn/www/f?p=104:7:1299206399119101:::FSP_ORG_ID:2240017 (last access on 1 June 2018)

¹² DIRECTIVE 2010/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products

¹³ REGULATION (EU) 2017/1369 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU

- Test reports, including those carried out by relevant notified organisations.

To fall within the scope of the Regulation, a product category must have:

- A significant potential for saving energy and, where relevant, other essential resources;
- Equivalent functionality and a wide disparity in the relevant performance levels.

General exclusions from the scope of the Energy Label comprise second-hand products (unless they are imported from a third country) and means of transport for persons or goods.

The label is based on seven efficiency classes which in principle range from A to G, with A being the most efficient class. Energy Label legislation concerning existing products subject to the previous Directive 2010/30/EU are being gradually revised to conform to the A to G label range, where A⁺ to A⁺⁺⁺ labels (i.e., performance above "A") had become prevalent owing to innovative product design improvements over time. The 2017 framework Energy Label Regulation also provides that consumers will also have access to a database of information on products.

2.1.3 EU Ecolabel and GPP

The EU Ecolabel is a voluntary scheme, which means that producers, importers and retailers can choose whether to apply for the labelling of their products or not. The functioning of the EU Ecolabel is set via Regulation (EC) No 66/2010 of the European Parliament and of the Council¹⁴.

Product-specific criteria which set the basis for the award of the EU Ecolabel for a product group are set via Commission Decisions. These criteria aim focus on targeting the best 10%-20% products on the market, and are developed taking into account the most important environmental, health, safety and social aspects throughout the life cycle of the products examined. Articles 6(6) and 6(7) of the EU Ecolabel Regulation in particular prescribe that:

- Art. 6(6): The EU Ecolabel may not be awarded to goods containing substances or preparations/mixtures meeting the criteria for classification as toxic, hazardous to the environment, carcinogenic, mutagenic or toxic for reproduction (CMR)¹⁵, nor to goods containing substances of very high concern (SVHC)¹⁶.
- Art. 6(7): Derogations can be granted only in the event that it is not technically feasible to substitute them as such, or via the use of alternative materials or designs, or in the case of products which have a significantly higher overall environment performance compared with

¹⁴ REGULATION (EC) No 66/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2009 on the EU Ecolabel

¹⁵ In accordance with Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures

¹⁶ As referred to in Article 57 of Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency

other goods of the same category. No derogation shall be given concerning substances that meet the criteria of Article 57 of Regulation (EC) No 1907/2006 and that are identified according to the procedure described in Article 59 of that Regulation, present in mixtures, in an article or in any homogeneous part of a complex article in concentrations higher than 0.1 % by mass.

Green Public Procurement (GPP) is defined in Communication COM (2008) 400¹⁷ as "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured". The European Commission and a number of European countries have developed guidance in this area, in the form of national GPP criteria. EU GPP is a voluntary instrument, which means that Member States and public authorities can determine the extent to which they implement it.

Both Ecolabel and GPP require the inclusion of clear and verifiable selection criteria. Depending on the level of ambition of public procurement authorities, GPP criteria are classified as "core"¹⁸ or "comprehensive"¹⁹. Both *core* and *comprehensive* criteria set the minimum performance levels that products must fulfil. Award criteria are also provided in GPP for the evaluation and selection of tenderers.

Differently from Ecodesign and Energy Labelling, a 3rd party verification process is conducted by the EU Ecolabel Competent Bodies. This can require the provision of test results and other supplementary information, or certifications, from applicants and suppliers. In the case of GPP, the criteria compliance check is part of the tendering procedure conducted by the procurer, which could also imply 3rd party verification.

2.1.4 Product Environmental Footprint

The Product Environmental Footprint (PEF) is a method which, building on existing approaches and standards, aims to provide harmonised Life Cycle Assessment (LCA) rules for quantifying the relevant environmental impacts of products through their life cycle (either as "goods" or as "services").

The first official reference to the PEF is the Commission Recommendation 2013/179/EU²⁰.

A pilot phase has been conducted in order to test the process for developing product- and sector-specific category rules²¹. This also includes

¹⁷ COM(2008) 400 final, Public procurement for a better environment

¹⁸ The Core criteria are designed to allow for easy application of GPP, focussing on the key area(s) of environmental performance of a product and aimed at keeping administrative costs for companies to a minimum.

¹⁹ The Comprehensive criteria take into account more aspects or higher levels of environmental performance, for use by authorities that want to go further in supporting environmental and innovation goals.

²⁰ COMMISSION RECOMMENDATION 2013/179/EU of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations

²¹ These provide further guidance to follow when assessing a specific product/sector according to PEF: key environmental indicators to consider, data and modelling requirements, indications on hotspots, benchmarking and classes of performance

the test of different approaches for communicating and verifying information on of the life cycle environmental performance of products.

As a result, the European Commission will provide an updated methodological framework and recommendations for where and how to use PEF.

The method also includes a formula recommended to model life cycle impacts due to consumption of resources and disposal of waste along the product's life cycle. This has been called the "Circular Footprint Formula" (CFF)²².

2.2 Safety of products

2.2.1 General Product Safety Directive

The General Product Safety Directive (GPSD) 2001/95/EC²³ aim is to ensure that only safe products are made available on the market.

The GPSD applies in the absence of other EU legislation, national standards, Commission recommendations or codes of practice relating to safety of products. It also complements sector -specific legislation. Specific rules exist for the safety of toys, electrical and electronic goods, cosmetics, chemicals and other specific product groups²⁴. The GPSD does not cover pharmaceuticals, medical devices or food, which fall under separate legislation.

The GPSD establishes obligations on both businesses and Member States' authorities:

- Businesses should place only products which are safe on the market, and inform consumers of any risks associated with the products they supply. They also have to make sure any dangerous products present on the market can be traced so they can be removed to avoid any risks to consumers.
- Member States, through their appointed national authorities, are responsible for market surveillance. They check whether products available on the market are safe, ensure product safety legislation and rules are applied by manufacturers and business chains and apply sanctions when necessary. Member States should also send information about dangerous products found on the market to the Rapid Alert System for non-food dangerous products (RAPEX). This is a cooperation tool enabling rapid communication between EU and EEA authorities about dangerous products to be able to trace them everywhere on the European market.
- Market surveillance authorities cooperate closely with customs, which play a major role in protecting consumers from any imported unsafe products coming from outside the EU.

²² Product Environmental Footprint Category Rules Guidance - Version 6.3 of December 2017

²³ DIRECTIVE 2001/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 3 December 2001 on general product safety

²⁴ https://ec.europa.eu/info/business-economy-euro/product-safety-and-requirements/consumer-product-safety/standards-and-risks-specific-products_en (last access on 21 March 2018)

2.2.2 Machinery Directive

The Machinery Directive 2006/42/EC²⁵ is one of the main pieces of legislation governing the harmonisation of essential health and safety requirements for machinery at EU level. The Directive:

- Promotes the free movement of machinery within the Single Market
- Guarantees a high level of protection for EU workers and citizens through a combination of mandatory health and safety requirements and voluntary harmonised standards.

The Machinery Directive only applies to products that are to be placed on the EU market for the first time and was amended by Directive 2009/127/EC²⁶.

2.2.3 Low Voltage Directive

The Low Voltage Directive (LVD) 2014/35/EU²⁷, replacing Directive 2006/95/EC, ensures that electrical equipment within certain voltage limits provides a high level of protection for European citizens. Electrical equipment under the LVD covers a wide range of consumer and professional products (e.g. household appliances, cables, power supply units, laser equipment and some components such as fuses).

The LVD covers all health and safety risks of electrical equipment operating with a voltage between 50 V and 1000 V for alternating current, and between 75 V and 1500 V for direct current. These voltage ratings refer to the voltage of the electrical input or output, not to voltages that may appear inside the equipment.

Consumer goods with a voltage below 50 V for alternating current, or 75 V for direct current, are dealt with by the General Product Safety Directive (GPSD) 2001/95/EC.

For conformity assessment, there is no third party intervention, as the manufacturer has to undertake the conformity assessment obligations.

2.2.4 Radio Equipment Directive

The Radio Equipment Directive (RED) 2014/53/EU²⁸ ensures a Single Market for radio equipment by setting essential requirements for safety and health, electromagnetic compatibility, and the efficient use of the radio spectrum. It applies to all products using the radio frequency spectrum, including also smartphones.

²⁵ DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC

²⁶ DIRECTIVE 2009/127/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 October 2009 amending Directive 2006/42/EC with regard to machinery for pesticide application

²⁷ DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits

²⁸ DIRECTIVE 2014/53/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC

The Directive requires equipment to be constructed for efficient use of the radio spectrum, as well as electromagnetic compatibility, to avoid interference with terrestrial and orbital communications.

The Radio Equipment Directive also requires that manufacturers ensure that the radio equipment is accompanied by instructions and safety information in a language which can be easily understood by consumers and other end-users, as determined by the Member State concerned. Such information has to include, where applicable, a description of accessories and components, including software, which allow the radio equipment to operate as intended. Such instructions and safety information, as well as any labelling, have to be clear, understandable and intelligible.

Another requirement of relevance for the material efficiency is that, within certain categories or classes of product, radio equipment interacts with accessories, such as chargers, to simplify its use and reduce unnecessary waste and costs. In the recital of the Directive there is a clear reference to mobile phones and their compatibility with a common charger.

2.3 Substances and materials

2.3.1 Chemicals

Legislation on chemicals is very important for the risks posed to human health and the environment during the production, use and disposal of products as well as for the technical impact on EOL treatments and material recycling. Chemical substances of concern for health or the environment are subject to restrictions.

2.3.1.1 Classification Labelling and Packaging (CLP)

The Classification, Labelling and Packaging (CLP) Regulation (EC) No 1272/2008²⁹ is based on the United Nations' Globally Harmonised System (GHS) and its purpose is to ensure a high level of protection of health and the environment, as well as the free movement of substances, mixtures and articles.

The CLP Regulation amended the Dangerous Substances Directive 67/548/EEC³⁰, the Dangerous Preparations Directive 1999/45/EC³¹, and the REACH Regulation (EC) No 1907/2006³². Since 1 June 2015, this is the

²⁹ REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

³⁰ COUNCIL DIRECTIVE of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances

³¹ DIRECTIVE 1999/45/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations

³² REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC

only legislation in force in the EU for classification and labelling of substances and mixtures.

CLP is legally binding across EU Member States and is directly applicable to all industrial sectors. It requires manufacturers, importers or downstream users of substances or mixtures to classify, label and package their hazardous chemicals appropriately before placing them on the market.

One of the main aims of CLP is to determine whether a substance or mixture exhibits properties that lead to a hazardous classification. In this context, classification is the starting point for hazard communication. When relevant information (e.g. toxicological data) on a substance or mixture meets the classification criteria in CLP, the hazards of a substance or mixture are identified and communicated with respect to specific classes and categories of hazard, as physical, health and environmental hazards.

CLP is also the basis for many legislative provisions on the risk management of chemicals. In addition, the notification obligation under CLP requires manufacturers and importers to submit classification and labelling information for the substances which they are placing on the market to a database (the "C&L Inventory") held by the European Chemical Agency (ECHA).

2.3.1.2 REACH

The Regulation (EC) No 1907/2006³³ concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) aims to improve the protection of human health and the environment from the risks that can be posed by chemicals because of their intrinsic properties. REACH establishes procedures for collecting and assessing information on the properties and hazards of substances.

The Regulation also calls for the progressive substitution of the most dangerous chemicals (referred to as SVHC, "Substances of Very High Concern") when suitable alternatives have been identified.

2.3.1.2.1 Registration

Companies are responsible for collecting and communicating to ECHA information on the properties and uses of the substances they manufacture, import or use in their products above one tonne a year. Depending on the volume of the substance, different rules apply.

The information is included in a registration dossier containing the hazard information and, where relevant, an assessment of the risks that the use of the substance may pose and how these risks should be controlled. The

³³ REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC

registration can be done in collaboration with other companies who are registering the same substance.

2.3.1.2.2 Evaluation

ECHA receives and evaluates individual registrations for their compliance, and the EU Member States evaluate selected substances to clarify initial concerns for human health or for the environment. Authorities and ECHA's scientific committees assess whether the risks of substances can be managed. Authorities can ban hazardous substances if their risks are unmanageable. They can also decide to restrict a use or make it subject to a prior authorisation.

2.3.1.2.3 Authorisation

The authorisation process aims to ensure that SVHC are progressively replaced by less dangerous substances or technologies where technically and economically feasible alternatives are available.

The route to authorisation starts when a Member State or ECHA proposes a substance to be identified as a SVHC. Substances with the following hazard properties may be identified as SVHCs:

1. Substances meeting the criteria for classification as carcinogenic, mutagenic or toxic for reproduction (CMR) category 1A or 1B in accordance with the CLP Regulation.
2. Substances which are persistent, bio-accumulative and toxic (PBT) or very persistent and very bio-accumulative (vPvB) according to REACH Annex XIII.
3. Substances that cause an equivalent level of concern as CMR or PBT/vPvB substances.

Once a substance is identified as an SVHC, it is included in the Candidate List. The inclusion in the Candidate List brings immediate obligations, such as:

1. Supplying a safety data sheet
2. Communicating on safe use
3. Notifying ECHA if the article they produce contains an SVHC in quantities above one tonne per producer/importer per year and if the substance is present in those articles above a concentration of 0.1% by mass.

ECHA regularly assesses the substances from the Candidate List to determine which ones should be included in the Authorisation List. The prioritisation is based on information on the intrinsic properties, wide dispersive use or high volumes that fall within the scope of the authorisation requirement.

The Authorisation List (Annex XIV) includes:

1. So-called "sunset" dates after which the placing on the market and the use of substances is prohibited, unless an authorisation is granted or the use is exempt from authorisation;

2. The latest application date by which applications must be received if the applicant wishes to continue placing the substance on the market or using it after the sunset date;
3. Review periods for certain uses, if any;
4. Uses exempted from the authorisation requirement, if any.

Once a substance is included in an Authorisation List, this can be used/produced only if:

- a. The risk to human health or the environment is adequately controlled, or
- b. It can be demonstrated that the socio-economic benefits compensate the impacts, also taking into account possible alternatives.

2.3.1.2.4 Restrictions

A Member State or ECHA can start the restriction procedure when they are concerned that a certain substance poses an unacceptable risk to human health or the environment. ECHA can also propose a restriction on articles containing substances that are on the Authorisation List (Annex XIV).

The ECHA's Committee for Risk Assessment (RAC) will give its opinion on whether the suggested restriction is appropriate in reducing the risk to human health or the environment based on the dossier and the comments received during the public consultation. At the same time, the Committee for Socio-economic Analysis (SEAC) prepares an opinion about the socio-economic impacts of the suggested restrictions. The two opinions of ECHA's committees contribute to decide if a substance should be restricted or not, on the basis of the identified risk and of the benefits and costs of the proposed restriction.

A Restrictions List (Annex XVII) is periodically revised. Once a substance is included in the Restrictions List, specific or general uses of such substance are prohibited.

2.3.1.2.5 Information in the supply chain

Article 33 of REACH establishes the right of consumers to be able to obtain information from suppliers on substances in articles and also suppliers of articles are obliged to provide certain pieces of information on articles containing substances with irreversible effects on health or environment to industrial or professional users or distributors.

2.3.1.3 Persistent Organic Pollutants

The Regulation (EC) No 850/2004³⁴ implements in the European Union the commitments set out in the Stockholm Convention on Persistent Organic Pollutants (POP).

³⁴ REGULATION (EC) No 850/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC

According to the Regulation (EC) No 850/2004 and following amendments (Commission Regulations (EU) 757/2010 and 2015/20300), the production, placing on the market and use of substances listed in the Annex I of the regulation is prohibited. The list includes also POP relevant for electrical and electronic equipment, such as brominated flame retardants and polychlorinated biphenyl (PCB). Concentrations levels where a substance occurring is considered as an unintentional trace contaminant are defined. Derogations in concentration levels are introduced when products are partially or fully derived from recycled materials, or materials from waste prepared for re-use

Regulation (EC) No 850/2004 addresses also the releases of POP which are unintentional by-products of industrial processes should be identified and reduced as soon as possible with the ultimate aim of elimination, where feasible.

2.3.1.4 RoHS

EU legislation restricting the use of hazardous substances in electrical and electronic equipment (RoHS Directive 2002/95/EC³⁵) entered into force in February 2003. The legislation requires heavy metals such as lead, mercury, cadmium, and hexavalent chromium and flame retardants such as polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE) to be substituted by safer alternatives. In December 2008, the European Commission proposed a revision of the Directive, also to reduce administrative burdens and ensure coherency with newer legislation on chemicals. The resulting RoHS recast Directive 2011/65/EU³⁶ became effective on 3 January 2013.

Restricted substances are listed in Annex II of the Directive. They comprise:

- Lead (0.1 %)
- Mercury (0.1 %)
- Cadmium (0.01 %)
- Hexavalent chromium (0.1 %)
- Polybrominated biphenyls (PBB) (0.1 %)
- Polybrominated diphenyl ethers (PBDE) (0.1 %)
- Bis(2-ethylhexyl) phthalate (DEHP) (0.1 %)
- Butyl benzyl phthalate (BBP) (0.1 %)
- Dibutyl phthalate (DBP) (0.1 %)
- Diisobutyl phthalate (DIBP) (0.1 %).

The restriction of DEHP, BBP, DBP and DIBP does not apply to cables or spare parts for the repair, the reuse, the updating of functionalities or upgrading of capacity of electrical and electronic equipment (EEE) placed on the market before 22 July 2019, and of medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, placed on the market

³⁵ DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

³⁶ DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

before 22 July 2021. Further exemptions are provided in Annex III and Annex IV. It should be noted that the Annexes of RoHS are periodically updated.

2.3.2 Raw Materials

2.3.2.1 EU list of Critical Raw Materials

Critical Raw Materials (CRM) are substances of high interest because of the socio-economic aspects related to their extraction and supply. The Commission's most recent CRM communication was COM(2017) 490 "on the 2017 list of Critical Raw Materials for the EU"³⁷ indicates 27 raw materials that can be defined as critical because risks of supply shortage and their impacts on the economy are higher than those of most of the other raw materials. The list is shown in Table 2.

Table 2. EU list of Critical Raw Materials as published in September 2017

| Raw Material | | |
|----------------|----------------------|-------------------------------|
| 1. Antimony | 10. Germanium | 19. Phosphorus |
| 2. Baryte | 11. Hafnium | 20. Scandium |
| 3. Beryllium | 12. Helium | 21. Silicon metal |
| 4. Bismuth | 13. Indium | 22. Tantalum |
| 5. Borate | 14. Magnesium | 23. Tungsten |
| 6. Cobalt | 15. Natural graphite | 24. Vanadium |
| 7. Coking coal | 16. Natural rubber | 25. Platinum Group Metals |
| 8. Fluorspar | 17. Niobium | 26. Heavy Rare Earth Elements |
| 9. Gallium | 18. Phosphate rock | 27. Light Rare Earth Elements |

2.3.2.2 Import of minerals from conflict-affected and high-risk areas

EU Regulation 2017/821³⁸ establishes a Union system for supply chain due diligence in order to curtail opportunities for armed groups and security forces to trade in tin, tantalum and tungsten, their ores, and gold. Minerals and metals covered by the EU Regulation 2017/821 are listed in Table 3.

³⁷ COM(2017) 490 ' on the 2017 list of Critical Raw Materials for the EU

³⁸ REGULATION (EU) 2017/821 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas

Table 3. Conflict minerals and metals covered by the EU Regulation 2017/821

| Description | Volume threshold (kg) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Minerals</p> <ul style="list-style-type: none"> • Tin ores and concentrates • Tungsten ores and concentrates • Tantalum or niobium ores and concentrates • Gold ores and concentrates • Gold, unwrought or in semi-manufactured forms, or in powder with a gold concentration lower than 99.5 % that has not passed the refining stage | <p>5 000</p> <p>250 000</p> <p>To be adopted no later than 1 July 2020</p> <p>To be adopted no later than 1 July 2020</p> <p>100</p> |
| <p>Metals</p> <ul style="list-style-type: none"> • Tungsten oxides and hydroxides • Tin oxides and hydroxides • Tin chlorides • Tungstates • Tantalates • Carbides of tungsten • Carbides of tantalum • Gold, unwrought or in semi-manufactured forms, or in powder form with a gold concentration of 99.5 % or higher that has passed the refining stage • Ferrotungsten and ferro-silico-tungsten • Tin, unwrought • Tin bars, rods, profiles and wires • Tin, other articles | <p>100 000</p> <p>To be adopted no later than 1 July 2020</p> <p>10 000</p> <p>100 000</p> <p>To be adopted no later than 1 July 2020</p> <p>10 000</p> <p>To be adopted no later than 1 July 2020</p> <p>100</p> <p>25 000</p> <p>100 000</p> <p>1 400</p> <p>2 100</p> |

| Description | Volume threshold (kg) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <ul style="list-style-type: none"> • Tungsten, powders | 2 500 |
| <ul style="list-style-type: none"> • Tungsten, unwrought, including bars and rods obtained simply by sintering | 500 |
| <ul style="list-style-type: none"> • Tungsten wire | 250 |
| <ul style="list-style-type: none"> • Tungsten bars and rods, other than those obtained simply by sintering, profiles, plates, sheets, strip and foil, and other | 350 |
| <ul style="list-style-type: none"> • Tantalum, unwrought including bars and rods, obtained simply by sintering; powders | 2 500 |
| <ul style="list-style-type: none"> • Tantalum bars and rods, other than those obtained simply by sintering, profiles, wire, plates, sheets, strip and foil, and other | 150 |

This Regulation is designed to provide transparency and certainty as regards the supply practices of Union importers, and of smelters and refiners sourcing from conflict-affected and high-risk areas.

This Regulation lays down the supply chain due diligence obligation according to the material and the threshold for the annual import volumes. Moreover Union importers of these minerals or metals have the following disclosure obligations:

- They have to make available to Member State competent authorities the reports of any third-party audit carried out or evidence of conformity with a supply chain due diligence scheme recognised by the Commission
- They have to make available to their immediate downstream purchasers all information gained and maintained pursuant to their supply chain due diligence with due regard for business confidentiality and other competitive concerns.
- They have to report publicly (as widely as possible, including on the internet) on their supply chain due diligence policies and practices for responsible sourcing.

Where a Union importer can reasonably conclude that metals are derived only from recycled or scrap sources, with due regard for business confidentiality and other competitive concerns, it has to:

- Publicly disclose its conclusion; and
- Describe in reasonable detail the supply chain due diligence measures it exercised in reaching that conclusion.

2.3.2.3 Recycled materials³⁹

The recycling of materials can avoid consumption of virgin raw materials. Recycled raw materials, also known as secondary raw materials, can also increase the security of supply. The market for recycled materials is, however, limited.

One of the barriers faced by operators who want to use secondary raw materials concerns their potentially variable quality, which depends on the composition of the material itself and the waste management practices. The availability of material-specific standards could allow the assessment and verification of impurity levels and/or suitability for high-grade recycling.

Another very important issue for the development of secondary raw materials markets is the link with legislation on chemicals. A growing number of chemical substances are identified as being of concern for health or the environment and become subject to restrictions. However, these substances could have been present in products sold before the application of such restrictions. Because of this, chemicals of concern can be sometimes found in recycling streams. Such substances can be costly to detect or remove, creating obstacles in particular for small recyclers. The promoted use of non-toxic materials and the better tracking of chemicals of concern in products could facilitate recycling and improve the uptake of secondary raw materials.

In the context of policy making on Circular Economy there is thus a need to implement actions at EU level which can facilitate the traceability and risk management of chemicals in the recycling process without generating unnecessary burdens for recyclers. This calls for close interaction between legislations on waste, products and chemicals.

Cross-border circulation of secondary raw materials should also be facilitated to ensure that they can be traded easily across the EU. Actions in this area can include the simplification of cross-border formalities through the use of electronic data exchange or the availability of data on secondary raw materials through a Raw Materials Information System.

The key factor for creating a dynamic market for secondary raw materials is to have sufficient demand for such materials. This could be achieved by ensuring a minimum content of recycled materials in products and infrastructures. The demand for recycled materials is already high for some raw materials (e.g. paper or metal), while for others it is still limited, as it is the case of some types of plastics, where still a large amount is not recycled, and may end up in landfills, or unregulated locations such as the plastics waste detected in oceans.

No horizontal legislation has been developed to regulate this aspect, which could thus require product-specific implementing measures, where relevant. Such eventual legislation might take inspiration from other types of regulation where upstream forms of "tracking" and a due diligence chain is required, e.g., sustainable sourcing of wood.

³⁹ COM(2015) 614 final COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Closing the loop - An EU action plan for the Circular Economy

2.4 Legislation regarding General Use Phase of products

2.4.1 Packaging and packaging waste

European Parliament and Council Directive 94/62/EC⁴⁰ aims to harmonize national measures concerning the management of packaging and packaging waste and to prevent or reduce its impact on the environment. The directive lays down measures aimed, as a first priority, at preventing the production of packaging waste and, as additional fundamental principles, at reusing packaging, at recycling and other forms of recovering packaging waste and, hence, at reducing the final disposal of such waste.

In 2004, the Directive was amended to provide criteria clarifying the definition of the term "packaging" and increase the targets for recovery and recycling of packaging waste. In 2005, the Directive was revised again to grant new Member States transitional periods for attaining the recovery and recycling targets. In 2013, Annex I of the Directive containing the list of illustrative examples of items that are or are not to be considered as packaging was revised in order to provide more clarity by adding a number of examples to the list.

The latest revision of the Packaging and Packaging Waste Directive occurred on 29 April 2015 with the adoption of Directive (EU) 2015/720⁴¹ of the European Parliament and of the Council amending Directive 94/62/EC as regards the consumption of lightweight plastic carrier bags.

2.4.2 Consumer guarantees⁴²

The Consumer Sales Directive 1999/44/EC⁴³ regulates aspects of the sale of consumer goods and associated legal guarantees. According to the Directive 1999/44/EC, the term guarantee means any undertaking by a seller or producer to the consumer, given without extra charge, to reimburse the price paid or to replace, repair or handle consumer goods in any way if they do not meet the specifications set out in the guarantee statement or in the relevant advertising.

The duration of the guarantee for new products must be at least 2 years. The minimum duration is applied in the majority of EU countries. Longer minimum durations are applied in some countries (e.g. Sweden, Ireland, the Netherlands and Finland) depending on the expected lifespan of the item sold. The duration of the guarantee for second-hand goods can be lower (minimum 1 year).

The seller must deliver goods to the consumer, which are in conformity with the contract of sale, and then further specifies presumption of

⁴⁰ EUROPEAN PARLIAMENT AND COUNCIL DIRECTIVE 94/62/EC of 20 December 1994 on packaging and packaging waste

⁴¹ DIRECTIVE (EU) 2015/720 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags

⁴² https://www.europe-consommateurs.eu/fileadmin/user_upload/eu-consommateurs/PDFs/PDF_EN/REPORT-_GUARANTEE/tableau_EN_Legal_commercial.pdf

⁴³ DIRECTIVE 1999/44/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 May 1999 on certain aspects of the sale of consumer goods and associated guarantees

conformity of a number of conditions. All Member States introduced in their national law a "reversal of burden of proof" of at least 6 months. This is the period within which the lack of conformity is presumed to have existed at the time of delivery and the seller is thus liable to the consumer, i.e. the seller must prove that the item was not defective. After six months the burden of proof shifts to the consumer, i.e. the consumer must prove that the product was defective.

Article 3 of the Consumer Sales Directive indicates a list of remedies that should be provided to the consumer in the case of a defect (i.e. repair, replacement, reduction in price and rescission of contract). In the first place, the consumer may require the seller to repair the goods or he may require the seller to replace them.

In addition, Directive 2011/83/EU⁴⁴ on consumer rights defines the concept of "commercial guarantee" (also known as "warranty"), which can be offered by sellers or producers in addition to the legal guarantee obligation. This can either be included in the price of the product or at an extra cost.

2.4.3 Harmonised conditions for the marketing of construction products

The Regulation (EU) No 305/2011⁴⁵ lays down conditions for the marketing of construction products (often known as "the Construction Products Regulation", or "CPR") by establishing harmonised rules on how to express the performance of construction products in relation to their essential characteristics and on the use of CE marking on those products.

Harmonised standards are established by the European standardisation bodies on the basis of mandates issued by the Commission. When a construction product is covered by a harmonised standard, or conforms to a European Technical Assessment which has been issued for it, the manufacturer has to draw up a declaration of performance when such a product is placed on the market. The essential characteristics of construction products are laid down in harmonised technical specifications in relation to the basic requirements for construction works listed in the Annex I of the Regulation (EU) No 305/2011:

- Mechanical resistance and stability;
- Safety in case of fire;
- Hygiene, health and the environment;
- Safety and accessibility in use;
- Protection against noise;
- Energy economy and heat retention;
- Sustainable use of natural resources.

⁴⁴ DIRECTIVE 2011/83/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council

⁴⁵ REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

In particular, with respect to the sustainable use of natural resources, Regulation (EU) No 305/2011 requires that the construction works must be designed, built and demolished in such a way that the use of natural resources is sustainable and ensures:

- The reuse or recyclability of the construction works, their materials and their parts after demolition;
- The durability of the construction works;
- The use of environmentally compatible raw and secondary materials in the construction works.

Harmonised standards for construction products can introduce specific requirements on, for example, maximum emissions to air or material efficiency, including also durability aspects as in EN 14351-1⁴⁶ ⁴⁷. However, it is important to note that, where Ecodesign minimum requirements have been established via product-specific regulations, these Ecodesign requirements take legal precedence over any limits established via any relevant CPR-related standards developed under Directive 305/2011⁴⁸.

2.4.4 Durability of products

The lifetime of many products can be decreased as a consequence of technical and socio-economic reasons (e.g. product obsolescence, cost of repair, marketing), which leads to a larger consumption of resources and more production of waste.

Improving the durability, reparability and upgradability of products can extend their life span and thus their use and/or reuse. This holds the potential of bringing added value to the environment and to the economy by reducing the early replacement of products.

No horizontal legislation has yet been developed for the above aspects, which would thus need to be regulated through product-specific implementing measures, where relevant. In doing this, the pace of the technological development must be taken into due account since new products introduced on the market will generally have enhanced functionalities and increased efficiency of use of resources.

Amongst other actions and studies authored or conducted on behalf of the European Parliament⁴⁹ and the European Economic and Social Committee⁵⁰, a recent press release of the European Parliament⁵¹ showed

⁴⁶ EN 14351-1:2006 - Windows and pedestrian door sets - Product standard, performance characteristics

⁴⁷ See, for example, COMMISSION REGULATION (EU) 2015/1189 of 28 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel boilers

⁴⁸ The legal precedent is given via the principle of *lex specialis*. It should also be noted that the Ecodesign precedent over CPR also applies to the related harmonised standards, once developed, for measuring the stipulated specific Ecodesign requirements.

⁴⁹ Amongst the studies which could be cited are the important 2016 study carried out in 2016 for the European Parliament's IMCO Committee, available at: [http://www.europarl.europa.eu/RegData/etudes/STUD/2016/579000/IPOL_STU\(2016\)579000_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/579000/IPOL_STU(2016)579000_EN.pdf) (last access on 7 September 2018)

⁵⁰ See, inter alia, the EESC lifespan labelling study: https://www.eesc.europa.eu/sites/default/files/resources/docs/16_123_duree-utilisation-des-produits_complet_en.pdf (last access on 7 September 2018)

⁵¹ <http://www.europarl.europa.eu/news/en/press-room/20170629IPR78633/making-consumer-products-more-durable-and-easier-to-repair> (last access on 21 March 2018)

that MEPs want tangible goods and related software to be easier to repair/update. The European Parliament wants to promote longer product lifespans, in particular by tackling programmed or premature obsolescence for goods and for software, and by actions related to making spare parts affordable. More specifically, recommendations include:

- "Minimum resistance criteria" to be established for each product category from the design stage
- Extension of the guarantee by an additional time period which matches the time taken to fulfil the repair satisfactorily
- Promotion of repairs and second-hand sales
- Avoidance of technical, safety or software solutions which prevent repairs from being performed by entities outside of those groups of enterprises which have the status of "approved firms", "authorised repairers" or bodies otherwise approved by manufacturers
- Ease of disassembly of essential components (such as batteries and LEDs), unless for safety reasons
- Availability of spare parts which are indispensable for the proper and safe functioning of the goods "at a price commensurate with the nature and life-time of the product"
- Introduction of an EU-wide definition of "planned obsolescence" and of a system that could test and detect the "built-in obsolescence", as well as "appropriate dissuasive measures for producers".
- Development of an EU label to inform consumers better about product's durability, ecodesign features, upgradeability in line with technical progress and reparability.

The French decree 2014-1482 published in December 2014⁵² placed new requirements on retailers to inform consumers about the durability of their products and the availability of spare parts, under the threat of a fine of 15 000 EUR. Manufacturers are required to deliver the parts needed for repairs within two months. The French decree also extends the burden of proof on the seller in the case of a fault within 24 months. Planned obsolescence is also a legal offence punishable by 300 000 EUR. Planned obsolescence is defined as "all techniques by which a producer seeks to deliberately limit product life in order to increase the replacement rate"⁵³.

Additionally, Sweden has lowered the VAT on the repair of certain products and allowed the tax deduction of repair costs. However, ICT products are not yet covered in this legislative context. A reduced VAT on repair for ICT products is instead set in Belgium⁵⁴ (i.e. 6%, against the 21% set for products and services in general⁵⁵).

⁵² Decree No. 2014-1482 of 9 December 2014 concerning Disclosure Requirements and Supply of Spare Parts

⁵³ <https://www.bioregional.com/wp-content/uploads/2018/05/Creating-sustainable-smartphone-Scaling-up-best-practice-to-achieve-SDG-12.pdf> (last access on 13 August 2018)

⁵⁴ <https://www.bioregional.com/wp-content/uploads/2018/05/Creating-sustainable-smartphone-Scaling-up-best-practice-to-achieve-SDG-12.pdf> (last access on 13 August 2018)

⁵⁵ <https://www.unizo.be/advies/welke-btw-tarieven-moet-u-toepassen> (last access on 7 September)

2.5 End of life of products

2.5.1 Waste framework directive

Directive 2008/98/EC⁵⁶, amended by Directive (EU) 2018/851⁵⁷, sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste ceases to be waste and becomes a secondary raw material (so called "end-of-waste" criteria), and how to distinguish between waste and by-products. The Directive lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest. Waste legislation and policy of the EU Member States applies as a priority order the following waste management hierarchy:

1. Prevention
2. (Preparation for) reuse
3. Recycling
4. Recovery
5. Disposal.

The Directive introduces the "polluter pays principle" and the "extended producer responsibility". It incorporates provisions on hazardous waste and waste oils, and includes two new recycling and recovery targets to be achieved by 2020: 50% preparing for re-use and recycling of certain waste materials from households and other origins similar to households, and 70% preparing for re-use, recycling and other recovery of construction and demolition waste. The Directive requires that Member States adopt waste management plans and waste prevention programmes. These also include measures to encourage the design of safer, more durable, re-usable and recyclable products.

Annex III of the Waste Framework Directive 2008/98/EC also provides properties of waste which render it hazardous:

- H 1 "Explosive": substances and preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene
- H 2 "Oxidizing": substances and preparations which exhibit highly exothermic reactions when in contact with other substances, particularly flammable substances
- H 3-A "Highly flammable"— liquid substances and preparations having a flash point below 21 °C (including extremely flammable liquids), or— substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy, or— solid substances and preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition, or— gaseous substances and

⁵⁶ DIRECTIVE 2008/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008 on waste and repealing certain Directives

⁵⁷ DIRECTIVE (EU) 2018/851 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 amending Directive 2008/98/EC on waste

preparations which are flammable in air at normal pressure, or—
substances and preparations which, in contact with water or damp
air, evolve highly flammable gases in dangerous quantities

- H 3-B "Flammable": liquid substances and preparations having a flash point equal to or greater than 21 °C and less than or equal to 55 °C
- H 4 "Irritant": non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation
- H 5 "Harmful": substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks
- H 6 "Toxic": substances and preparations (including very toxic substances and preparations) which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death
- H 7 "Carcinogenic": substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence
- H 8 "Corrosive": substances and preparations which may destroy living tissue on contact
- H 9 "Infectious": substances and preparations containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms
- H 10 "Toxic for reproduction": substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital malformations or increase their incidence
- H 11 "Mutagenic": substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence
- H 12 Waste which releases toxic or very toxic gases in contact with water, air or an acid
- H 13⁵⁸ "Sensitizing": substances and preparations which, if they are inhaled or if they penetrate the skin, are capable of eliciting a reaction of hypersensitization such that on further exposure to the substance or preparation, characteristic adverse effects are produced.
- H 14 "Ecotoxic": waste which presents or may present immediate or delayed risks for one or more sectors of the environment
- H 15 Waste capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.

The revised Directive (EU) 2018/851⁵⁹ strengthens the "waste hierarchy" by introducing new rules to prevent waste and, where this is not possible, to significantly step up recycling of municipal and packaging waste. Moreover, it will phase out landfilling. The revised 2018 Directive also

⁵⁸ As far as testing methods are available

⁵⁹ DIRECTIVE (EU) 2018/851 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 amending Directive 2008/98/EC on waste

promotes the use of economic instruments and Extended Producer Responsibility schemes.

2.5.2 Extended Producer Responsibility

To raise levels of high-quality recycling, improvements are needed in waste collection and sorting. Collection and sorting systems are often financed in part by extended producer responsibility (EPR) schemes, in which manufacturers contribute to product collection and treatment costs⁶⁰.

All Member States of the EU have implemented EPR schemes on the four waste streams for which EU Directives recommend the use of EPR policies: Electrical and Electronic Equipment (WEEE), packaging, batteries and End-of-Life Vehicles (ELVs). In addition, a number of Member States have put in place additional schemes for products that are not directly addressed in EU-wide legislation (e.g. for tyres, graphic paper, oil and medical waste)⁶¹.

2.5.3 Waste of Electric and Electronic Equipment Directive (WEEE)

Waste of electrical and electronic equipment (WEEE) such as computers, TV-sets, fridges and cell phones is one of the fastest growing waste streams in the EU. WEEE is 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. Moreover, the production of modern electronics requires the use of scarce and expensive resources (e.g. around 10% of total gold worldwide is used for their production). The improvement of collection, treatment and recycling of electronics at the end of their life is thus essential.

The first WEEE Directive (Directive 2002/96/EC)⁶² entered into force in February 2003. The Directive provided for the creation of collection schemes where consumers return their WEEE free of charge. These schemes aim to increase the recycling of WEEE and/or re-use.

In December 2008, the European Commission proposed to revise the Directive in order to tackle this rapidly increasing waste stream. The new WEEE Directive 2012/19/EU⁶³ entered into force on 13 August 2012 and became effective on 14 February 2014.

In addition, on 18 April 2017 the Commission adopted the "WEEE package", which included:

⁶⁰ COM(2015) 614 final COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Closing the loop - An EU action plan for the Circular Economy

⁶¹ OECD, The State of Play on Extended Producer Responsibility (EPR): Opportunities and Challenges, Global Forum on Environment: Promoting Sustainable Materials Management through Extended Producer Responsibility (EPR), 17-19 June 2014, Tokyo, Japan, available at: <https://www.oecd.org/environment/waste/Global%20Forum%20Tokyo%20Issues%20Paper%2030-5-2014.pdf> (last access on 6 April 2018)

⁶² DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on waste electrical and electronic equipment (WEEE)

⁶³ DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on waste electrical and electronic equipment (WEEE)

- Commission implementing Regulation 2017/699 establishing a common methodology for the calculation of the weight of electrical and electronic equipment (EEE) placed on the national market in each Member State, and a common methodology for the calculation of the quantity of waste electrical and electronic equipment (WEEE) generated by mass in each Member State.
- The report on the review of the scope of Directive 2012/19/EU on WEEE and on the re-examination of the deadlines for reaching the collection targets and on the possibility of setting individual collection targets for one or more categories of electrical and electronic equipment in Annex III to the Directive.
- The report on the re-examination of the WEEE recovery targets, on the possible setting of separate targets for WEEE to be prepared for re-use and on the re-examination of the method for the calculation of the recovery targets set out in Article 11(6) of Directive 2012/19/EU on WEEE.
- The report on the exercise of the power to adopt delegated acts conferred on the Commission pursuant to WEEE Directive.

2.5.3.1 Materials and components to be removed and collected separately according to Annex VII of WEEE

Annex VII of WEEE list a series of materials and components that are to be removed and collected separately for depollution at the EOL of products:

- Polychlorinated biphenyls (PCB) containing capacitors in accordance with Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)⁶⁴,
- Mercury containing components, such as switches or backlighting lamps,
- Batteries,
- Printed circuit boards of mobile phones generally, and of other devices if the surface of the printed circuit board is greater than 10 square centimetres,
- Toner cartridges, liquid and paste, as well as colour toners,
- Plastic containing brominated flame retardants,
- Asbestos waste and components which contain asbestos,
- Cathode ray tubes (the fluorescent coating has to be removed),
- Chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC). Equipment containing gases that are ozone depleting or have a global warming potential (GWP) above 15, such as those contained in foams and refrigeration circuits: the gases must be properly extracted and

⁶⁴ COUNCIL DIRECTIVE 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)

properly treated. Ozone-depleting gases must be treated in accordance with Regulation (EC) No 1005/2009⁶⁵,

- Gas discharge lamps,
- Liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 square centimetres and all those back-lighted with gas discharge lamps,
- External electric cables (the mercury shall be removed),
- Components containing refractory ceramic fibres as described in Commission Directive 97/69/EC of 5 December 1997 adapting to technical progress for the 23rd time Council Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances⁶⁶,
- Components containing radioactive substances with the exception of components that are below the exemption thresholds set in Article 3 of and Annex I to Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation⁶⁷,
- Electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume)⁶⁸
- These substances, mixtures and components shall be disposed of or recovered in compliance with Directive 2008/98/EC.

2.5.3.2 EEE, WEEE and Product Design – interaction with the Ecodesign Directive

According to Article 4 of the WEEE Directive, Member States must encourage cooperation between producers and recyclers and measures to promote the design and production of EEE, notably in view of facilitating re-use, dismantling and recovery of WEEE, its components and materials. In this context, Member States must take appropriate measures so that the Ecodesign requirements facilitating re-use and treatment of WEEE established in the framework of Directive 2009/125/EC⁶⁹ are applied and producers do not prevent, through specific design features or manufacturing processes, WEEE from being re-used, unless such specific design features or manufacturing processes present overriding

⁶⁵ REGULATION (EC) No 1005/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 September 2009 on substances that deplete the ozone layer

⁶⁶ COMMISSION DIRECTIVE 97/69/EC of 5 December 1997 adapting to technical progress for the 23rd time Council Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances

⁶⁷ COUNCIL DIRECTIVE 96/29/EURATOM of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation

⁶⁸ Substance of concern could be defined based on Annex II of RoHS Directive 2011/65/EU (+ exemptions in Annex III and Annex IV); Annex XVII (restriction list) and Annex XIV (authorisation list) of REACH; Annex III of the Waste Framework Directive 2008/98/EC

⁶⁹ DIRECTIVE 2009/125/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

advantages, for example, with regard to the protection of the environment and/or safety requirements.

2.5.3.3 Information for users

Article 14 of the WEEE Directive allows Member States to require producers to show purchasers, at the time of sale of new products, the costs of collection, treatment and disposal in an environmentally sound way.

Request to Member States to ensure that users of EEE in private households are given the necessary information about: (a) the requirement not to dispose of WEEE as unsorted municipal waste and to collect such WEEE separately; (b) the return and collection systems available to them, encouraging the coordination of information on the available collection points irrespective of the producers or other operators which have set them up; (c) their role in contributing to re-use, recycling and other forms of recovery of WEEE; (d) the potential effects on the environment and human health as a result of the presence of hazardous substances in EEE; (e) the meaning of the symbol shown in Annex IX.

Member States have to adopt appropriate measures so that consumers participate in the collection of WEEE and to encourage them to facilitate the process of re-use, treatment and recovery. With a view to minimising the disposal of WEEE as unsorted municipal waste and to facilitating its separate collection, Member States must ensure that producers appropriately mark EEE placed on the market with the symbol shown in Annex IX of the directive.

Member States may require that some, or all, of the information referred to is provided by producers and/or distributors, e.g. in the instructions for use, at the point of sale and through public awareness campaigns.

2.5.3.4 Information regarding treatment facilities

Article 15 of the WEEE Directive establishes that in order to facilitate the preparation for re-use and the correct and environmentally sound treatment of WEEE, including maintenance, upgrade, refurbishment and recycling, Member States must take necessary steps to ensure that producers provide information free of charge about preparation for re-use and treatment in respect of each type of new EEE placed for the first time on the market within one year after the equipment is placed on the market.

2.5.4 End-of-Life of Vehicles

Directive 2000/53/EC⁷⁰ on End-of Life Vehicles (ELV) aims at making dismantling and recycling of ELV more environmentally friendly. It sets clear quantified targets for reuse, recycling and recovery of the ELV and their components. It also pushes producers to manufacture new vehicles

⁷⁰ DIRECTIVE 2000/53/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 September 2000 on end-of life vehicles

without hazardous substances (in particular lead, mercury, cadmium and hexavalent chromium), thus promoting the reuse, recyclability and recovery of waste vehicles. The remaining specific exemptions to the prohibition of the use of hazardous substances in vehicles are listed in Annex II. These are subject to regular reviews according to technical and scientific progress.

The material efficiency of the motor vehicle sector is further regulated through the Directive 2005/64/EC on the type-approval of motor-vehicles with regards to their reusability, recyclability and recoverability⁷¹.

2.5.5 Batteries

The EU legislation on waste batteries is embodied in the Batteries Directive 2006/66/EC, which is in the process of being reviewed. It intends to contribute to the protection, preservation and improvement of the quality of the environment by minimising the negative impact of batteries, accumulators, and waste batteries and accumulators. It also ensures the smooth functioning of the internal market by harmonising requirements with regard to the placing on the market of batteries and accumulators. With some exceptions, it applies to all batteries and accumulators, no matter what their chemical nature, size or design might be.

The Batteries Directive:

- Prohibits the marketing of batteries containing some hazardous substances. (Batteries and accumulators must not have a lead, mercury or cadmium content above the fixed threshold limits of 0.004% w/w, 0.0005% w/w and 0.002% w/w respectively unless labelled in accordance with the Directive. Specific labelling requirements are outlined in the directive where these thresholds are exceeded),
- Defines measures to establish schemes aiming at high level of collection and recycling,
- Fixes targets on Member States for collection and recycling activities (minimum collection rates of 25 % by 26 September 2012, and of 45 % by 26 September 2016).
- Sets out provisions on labelling of batteries (Article 21). In particular all batteries must be marked with the symbol indicating "separate collection" (the crossed-out wheeled bin).
- Sets out provision on their removability from equipment (Article 11): Member States must ensure that manufacturers design appliances in such a way that waste batteries and accumulators can be readily removed. Where they cannot be readily removed by the end-user, Member States must ensure that manufacturers design appliances in such a way that waste batteries and accumulators can be readily removed by qualified professionals that are independent of the manufacturer.

⁷¹ DIRECTIVE 2005/64/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 October 2005 on the type-approval of motor vehicles with regard to their reusability, recyclability and recoverability and amending Council Directive 70/156/EEC

It also aims to improve the environmental performance of all operators involved in the life cycle of batteries and accumulators, e.g. producers, distributors and end-users and, in particular, those operators directly involved in the treatment and recycling of waste batteries and accumulators. Producers of batteries and accumulators and producers of other products incorporating a battery or accumulator are given responsibility for the waste management of batteries and accumulators that they place on the market.

3 POLICY ANALYSIS

3.1 The policy matrices

As described in the previous section, it is apparent that different elements of relevant EU legislation present various areas of interactions. Taking the avoidance of inconsistencies as basic principle, it is important to limit redundancies and exploit any potential synergies and similarities between policies. This can also contribute to make the policy process more effective and efficient, in a way that administrative burdens are reduced.

Interactions between product policy tools and other elements of the EU legislation are shown in Table 4. Examples of how material efficiency aspects could be addressed in product policy tools, modulating the level of ambition depending on the policy objective (i.e. mandatory vs. voluntary legislation), are shown in Table 5.

Altogether, the two tables can allow understanding how synergies between different instruments could be exploited for the development of relevant and coherent criteria addressing the material efficiency of products.

As a general rule, a higher level of ambition should be achieved with voluntary tools. Repetition of mandatory regulation in voluntary tools is in fact meaningless. Nevertheless, this could be cited, via cross-references or in the actual legal text, as the "starting point" for any additional voluntary measures. This would ensure that at no point there is any deviation from minimum mandatory requirements, as different versions/ revisions of the relevant policy instruments evolve over time.

Table 4. Interactions on material efficiency aspects between EU legislation and product policy tools

| EU legislation | Product Policy Tool | | |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Safety of products</p> <ul style="list-style-type: none"> • GPSD • MD • LVD • RED | Ecodesign | Energy Label | Voluntary tools (Ecolabel and GPP) |
| | <p>Safety is the minimum mandatory condition that all products on the EU market must satisfy.</p> <p>On the one hand, safety issues do not need to be translated into product-specific requirements under Ecodesign, Energy Label and other voluntary tools. Rather, requirements on products must be developed in a way they do not undermine the safety of products</p> <p>On the other hand, potential consequences on resource efficiency and the environment have also to be considered when defining measures on safety.</p> | | |
| <p>Hazardous substances and priority materials</p> <ul style="list-style-type: none"> • CLP • REACH | Ecodesign | Energy Label | Voluntary tools (Ecolabel and GPP) |
| | <p>If hazardous materials need to be identified and/or regulated, CLP would be one of the legal key references to take into account.</p> <p>REACH is an overarching framework which regulates the use of substances in products. However, if hazardous materials need to be identified and/or regulated, REACH would be one of the legal references to take into account, for instance for the definition of SVHCs.</p> <p>Moreover, Article 33 of REACH establishes the obligation of suppliers to inform about the substances used in products, especially in case of substances causing irreversible effects</p> | | <p>CLP is one of the key elements referred to in the implementation of Articles 6.6 and 6.7 of the EU Ecolabel Regulation, which foresees the restrictions on chemicals based on their hazardous properties⁷².</p> <p>REACH is one of the key elements referred to in the implementation of Articles 6.6 and 6.7 of the EU Ecolabel Regulation, which foresees the restrictions on chemicals based on their hazardous properties.</p> <p>Voluntary tools should be more ambitious than mandatory legislation. This can be achieved by restricting the use of SVHCs</p> |

⁷² Note: Possibilities should be explored to harmonise the terminology used for chemicals in the Ecolabel and GPP decisions with that used in the CLP terminology. This could be for instance achieved via standardisation fora.

| EU legislation | Product Policy Tool | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li data-bbox="237 440 488 464">• ROHS and POP <li data-bbox="237 735 477 759">• Raw Materials | <p data-bbox="616 312 1404 408">on health or environment. Whenever relevant, the implementation of this aspect could be facilitated with product policy tools as Ecodesign and/or Energy Labelling.</p> <p data-bbox="616 440 1411 699">These two legislative references, respectively restricting the use of hazardous substances in EEE, and reducing the unintentional releases of POP, are important to understand which materials and components can carry a hazard. Whenever relevant, the implementation of this aspect could be facilitated with product policy tools as Ecodesign and/or Energy Labelling (e.g. through the mandatory provision of information about the product)</p> <p data-bbox="616 735 1420 858">Because of the socio-economic aspects related to their extraction and supply, CRM and materials from conflict-affected areas, as defined in the respective EU legislation, should be:</p> <p data-bbox="616 879 1420 943">(1) Limited to those applications where they are essential and no feasible alternatives exist,</p> <p data-bbox="616 963 1146 991">(2) Recovered at the EOL and recycled.</p> <p data-bbox="616 1011 1420 1134">The implementation of strategy 1 could be in particular difficult to regulate with tools as Ecodesign and Energy Label which would be applied mandatorily to all products on the market.</p> <p data-bbox="616 1155 1397 1278">The implementation of the two strategies would require detailed information on specific materials contained in the product (e.g. which ones, how much, where). In practice, requirements could refer to:</p> <p data-bbox="616 1299 1330 1326">(1) limitations in the use of specific materials, unless</p> | <p data-bbox="1444 312 2033 408">included in the candidate list (not regulated as substances included in the authorisation and restriction lists).</p> <p data-bbox="1444 440 2024 635">Voluntary tools should be more ambitious than mandatory legislation (e.g. early adoption of restriction requirements, operation of Restricted Substance Controls (RSC) along the supply chain for the products).</p> <p data-bbox="1444 735 2040 895">The implementation of strategy 1 (see left column) could require limitations in the use of specific materials, when appropriate. This could be easier to implement in voluntary tools.</p> |

| EU legislation | Product Policy Tool | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>recycled, which would be difficult to implement at mandatory level.</p> <p>2) the extraction of product's components containing such materials</p> | | |
| Use of products | Ecodesign | Energy Label | Voluntary tools (Ecolabel and GPP) |
| <ul style="list-style-type: none"> <li data-bbox="237 560 510 619">• Packaging and packaging waste <li data-bbox="237 786 589 815">• Consumers' guarantee <li data-bbox="237 1078 577 1203">• Harmonised conditions for the marketing of construction products | <p>Ecodesign requirements on packaging could be potentially considered if market failures were identified (e.g. systematic breakage of some products in the logistic process)</p> <p>Consumer guarantees operate in conjunction with Ecodesign but cannot be integrated as part of the requirements. They are neither suitable for energy labelling neither, as the "additional information" that could be considered for the label has to be, according to the Labelling Regulation, "based on data relating to physical product characteristics that are measurable and verifiable by market surveillance authorities".</p> <p>Specific requirements on material efficiency of construction products can be introduced by harmonised standards developed under the framework of the Regulation 305/2011. If any potential requirements for construction products will be set under the ecodesign directive (e.g. for windows), they should be consistent.</p> | | <p>Depending on the importance of packaging in the product, the implementation of a broad set of requirements could be explored (e.g. recycled content, type of plastics used, presence of phthalates, quantity of primary packaging used).</p> <p>This could be used in voluntary tools as a measure influencing indirectly the durability and reparability of products.</p> <p>Harmonised standards developed under the framework of the Regulation 305/2011 could be used as basis to develop requirements on material efficiency, whenever relevant.</p> |
| End of Life | Ecodesign | Energy Label | Voluntary tools (Ecolabel and GPP) |

| EU legislation | Product Policy Tool |
|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Waste framework directive • EPR • WEEE • Batteries | <p>This directive provides a waste management hierarchy that can be used to prioritise requirements at product level. Moreover, Annex III indicates which properties can make waste considered as hazardous.</p> <p>Potential requirements on take-back systems could be considered.</p> <p>Annex VII of WEEE list a series of materials and components to remove and collect separately for depollution at the EOL of products. Extraction of such parts should be facilitated through, for instance, provision of information for users and recyclers (see art. 14 and 15 of WEEE) and product designs allowing the easy identification and disassembly of such parts (see art. 4 of WEEE).</p> <p>Directive 2006/66/EC prohibits the marketing of batteries containing some hazardous substances, defines measures to establish schemes aiming at high level of collection and recycling, and fixes targets for collection and recycling activities. The Directive also sets out provisions on labelling of batteries and their removability from equipment.</p> <p>Information and design requirements can be introduced for facilitating the disassembly and/or dismantling of batteries, as wells as performance requirements on life cycle of rechargeable batteries (e.g. Ecolabel for computers).</p> |

Table 5. Potential handling of other material efficiency aspects in EU product policy tools

| Aspect | Product Policy Tool | | |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Environmental impact assessment | Ecodesign | Energy Label | Voluntary tools (Ecolabel and GPP) |
| | <p>According to MEErP⁷³, different design options and material efficiency aspects of an analysed product have to be assessed in a preparatory study with the aid of LCA. An Excel-based tool (i.e. the Ecoreport tool) has been developed in this context.</p> <p>For assessment purposes, the guidance of PEF could be potentially considered for verifying synergies with the Ecoreport tool, during the upcoming MEErP revision.</p> | | <p>LCA is used for hot-spot identification, and the definition and assessment of environmental requirements along the life cycle of products. No official method is required apart from following the prescriptions of ISO 14040/44. The PEF guidance could be also taken into consideration, if needed, as well as the consideration of product-specific (PEF) Category Rules and the Circular Footprint Formula (to support the calculation of LCA benefits associated with material recycling).</p> <p>The LCA information developed with the Ecoreport tool could be integrated in the criteria development process in the case of ErP.</p> |
| <ul style="list-style-type: none"> Recycled materials | <p>Recycling of plastics and other materials could be for instance increased by</p> <ul style="list-style-type: none"> Setting minimum content requirements for recycled materials, when suitable recycled material is available on the market but has low uptake in the product manufacture⁷⁴; Setting minimum recyclability thresholds, when there is lack of suitable recycle material and there is the intention to promote the creation of such market; Marking of materials for recycling; Limiting the use of substances and materials that can hamper the recycling process; Promoting concepts of design for recycling (e.g. which can facilitate separation and recovery of high quality material). | | |

⁷³ http://ec.europa.eu/growth/industry/sustainability/ecodesign_en (Last access on 11 April 2018)

⁷⁴ However, requirements on the recycled material content could be more suitable for voluntary tools due to: (i) lack of verification methods to prove the recycled content, and (ii) possible problems in securing reliable sources of recycled content to cover the quantities needed in production processes.

| Aspect | Product Policy Tool |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Durability (including reparability, upgradability and reusability) | <p>A series of requirements could be explored, as shown in the examples provided in Section 3.2 (below). This can for instance cover: requirements on minimum lifetime, resistance to stresses, provision of information.</p> |
| <ul style="list-style-type: none"> • Recyclability | <p>Requirements on recyclability could take inspiration from the ELV directives:</p> <ol style="list-style-type: none"> 1. Restrictions on the use of particular hazardous substances (in particular lead, mercury, cadmium and hexavalent chromium) that could hamper reuse, recyclability and recovery of waste vehicles; 2. Setting minimum requirements (targets) on reusability, recyclability and recoverability, which would require measurable and verifiable metrics for these parameters. |

3.2 Material efficiency requirements in different product policy tools

Requirements addressing material efficiency aspects have been implemented in different product policy tools. Examples of such requirements, which cover aspects as durability, reparability, reusability, upgradability and recyclability for both ErP and non-ErP, have been compiled in Table 6 (for durability), Table 7 (for reparability, reusability and upgradability), Table 8 (for materials and end of life), and Table 9 (for provision of information). It has to be noted that these tables contain only a summary of the requirements. Further details of the requirements can be found in the referenced documents. A brief description of what has been identified in Tables 6, 7, 8 and 9 is included in the following paragraphs.

In general, requirements on material efficiency aspects have been developed for a broad set of products. Compared to Ecodesign, which currently encompasses a broad range of ErP, voluntary tools like Ecolabel and GPP to date have a more limited coverage of electronic products. However, Ecolabel and GPP do establish material efficiency criteria for other types of product, including already a wide range of material efficiency aspects.

As general rule, products are not regulated systematically through the entire set of product policy tools analysed in this document (i.e. Ecodesign, Energy Label, GPP, EU Ecolabel). A combined study is being performed on solar PV products⁷⁵ aimed at developing a common evidence ground informing about the possibility of implementing one or more product policy instruments.

Requirements aiming at extending the lifetime of products can be categorised as follows:

1. Durability:
 - Fitness-for-use,
 - Stress resistance,
 - Endurance,
 - Reliability,
 - Extended guarantee,
 - Provision of information (e.g. lifetime indications).
2. Reparability, reusability and upgradability (RRU):
 - Product design,
 - Spare parts availability,
 - Provision of repair and maintenance information, as well as safety information.

Examples of requirements on endurance, reliability and resistance to stresses can be found in Ecodesign, GPP and Ecolabel, although the way in which they are implemented depends on the product, the policy tool, as well as the moment in time during which the requirements were developed (since newer requirements can build on the experience gained).

Resistance to specific stresses is tested for different product groups. Depending on the product group, examples of stress conditions include:

⁷⁵ http://susproc.jrc.ec.europa.eu/solar_photovoltaics/index.html (last access on 7 September 2018)

physical dropping (i.e., inducing a mechanical shock), vibrations, thermal shocks, weathering, fungal and algal attacks and abrasions. Resistance to stresses is in general assessed as conservation of the product's functionalities and/or absence of clear damages. For example, GPP requirements for computers require testing both accidental drops, to check if external signs of damages occurred, and the following reboot of the device.

Assessing the ability of maintaining a satisfactory functional performance during the lifetime of the product is also important for endurance testing (e.g. lumen maintenance of lamps, battery endurance of computers, height and firmness of bed mattresses).

Reliability instead measures the probability that a product will perform its intended function(s) under given conditions of use over a certain time period (e.g. lamp survival factor at x hours; projected annualised failure rate for computers).

Requirements that make reference to the lifetime of products or parts are expressed in the appropriate units (e.g. hours for the motor and oscillations for hoses in vacuum cleaners, switching cycles for lamps).

In general, when developing requirements about the durability of products, the assessment and verification of the requirement concerns the entire product, although there are cases in which the testing focuses on specific parts (e.g. durability of motor and hoses for vacuum cleaners). This is because those parts have been identified as critical when analysing the entire product, and because testing those parts separately from the entire product would be still representative of real use conditions.

Requirements on fitness-for-use, on the offer of extended commercial guarantees and, where relevant, on the commitment to provide spare parts, have been moreover introduced systematically in Ecolabel and GPP.

Regarding RRU criteria, this seems to be a well-explored area in the product policy tools of Ecolabel and GPP, and is increasingly being explored in the revision of existing Ecodesign and Energy Label regulations (e.g., washing machines and washer-dryers, dishwashers), and new Ecodesign draft regulations (e.g., welding equipment, servers). Existing requirements on RRU focus mainly on two goals:

1. Facilitating the replacement of a part either through design actions or provision of information;
2. Ensuring the availability of spare parts after the purchase of the product.

With respect to the first goal, the requirements widely cover the following aspects:

- Accessibility of parts (e.g. computer batteries)
- Type of tools needed to replace parts (e.g. computers and monitors, water based heaters, furniture)
- Glueing and soldering of parts (e.g. batteries and other parts of computers, bed mattresses)
- Provision of disassembly and repair instructions and information (e.g. computers, furniture, sanitary tapware).

Requirements regarding the availability of spare parts are implemented for different product groups, taking into account also the lifetime of products and the ambition level of the policy tool. For instance, the availability of spare parts after the purchase of the product must be:

- 10 years for water-based heaters (Ecolabel);
- 7 years for televisions (Ecolabel), sanitary tapware (GPP comprehensive);
- 5 years for computers and monitors (Ecolabel, GPP comprehensive), new furniture (Ecolabel, GPP comprehensive), imaging equipment (GPP core and comprehensive), sanitary tapware (GPP core);
- 3 years for computers and monitors (GPP core), new furniture (GPP core); refurbished furniture (GPP comprehensive);
- 2 years for textiles (GPP core and comprehensive), refurbished furniture (GPP core).

Provision of information about RRU has been so far the main requirement implemented in Ecodesign for this aspect. The other examples of requirements on RRU which have been identified in Ecolabel and GPP, can serve as an inspiration for the implementation of future Ecodesign measures, wherever appropriate. In fact, as mentioned, Ecodesign measures to ensure that the design of a product does not prevent the disassembly of its relevant parts are under discussion for some product groups which are anticipated to be voted on in 2019 and subject to the co-legislators' scrutiny (e.g. servers and storage products, washing machines).

The considerations made for RRU in the former paragraphs also apply to requirements aimed at removing barriers to the recycling of products and materials. The focus on this area can thus be on:

- The ease of dismantling of products (e.g. computers, televisions);
- The ease of identification and removal of materials and parts to collect separately (for depollution and/or for the efficiency of the recycling process);
- The avoidance/identification of hazardous substances and other substances impeding the recyclability.

Requirements facilitating the separation of materials and the recycling process can include the marking of plastic parts (e.g. in televisions and computers). Marking of plastic parts is under discussion also in some draft Ecodesign Regulations, as that for Displays. Together with plastics, also the marking of brominated and fluorinated flame retardants, and other hazardous substance, can be important since they represent a major issue for the recycling process.

More ambitious requirements have been set under GPP and Ecolabel in the area of materials used. For example, some product groups are requested:

- To reduce the consumption of materials during the life cycle of products (e.g. the quantity of waste generated in the manufacturing stage of absorbent hygiene products; the size of the containers used for paints, the minimisation of the paint wastage during the use phase and the incentive to recovery unused paint).
- To use recycled materials (e.g. computers, furniture)

- To fulfil requirements on take-back systems (e.g. water-based heaters).

So far, requirements about the use of critical raw materials and the recyclability of products are only addressed indirectly despite being both topics object of extensive discussion. One of the few cases where criticality of raw materials is indirectly addressed is for example the Ecodesign Regulation on ventilation units, which refers to permanent magnet motors, which can contain CRM. However, this is an aspect which is being explored in several new draft Ecodesign regulations/ revisions, building on the experience of the ventilation units example.

Table 6. Examples of product policy requirements on durability for ErP (white cells) and non-ErP (grey cells) at September 2018

| Aspect | Ecodesign | GPP | Ecolabel |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Endurance, stress resistance, and fitness for use | <p>Lamps^{76, 77, 78}</p> <ul style="list-style-type: none"> - Lumen maintenance after x hours <p>Vacuum cleaners⁷⁹</p> <ul style="list-style-type: none"> - Operational motor lifetime greater than or equal to 500 hours. - Durable hose, if any, still useable after 40 000 oscillations under strain. | <p>Computers and monitors⁸⁰</p> <ul style="list-style-type: none"> - Points proportionally awarded for improved battery endurance greater than 300 or 500 cycles (depending if core/comprehensive requirements are considered) with 80% capacity retention. - Durability tests to verify that computer models function as specified and meet the stipulated performance requirements (see Ecolabel). <p>Indoor lighting⁸¹</p> <ul style="list-style-type: none"> - Minimum lifetime (expressed in working hours) for lamps in new and renovated installations, and replacement of lamps in existing installations. | <p>Computers (batteries)⁸²</p> <ul style="list-style-type: none"> - Notebooks, tablets and two-in-one computers provide the user with a minimum of 7 hours of rechargeable battery life after the first full charge. - Models in which rechargeable batteries can be changed without tools maintain 80 % of their declared minimum initial capacity after 750 charging cycles. - Models in which rechargeable batteries cannot be changed without tools maintain 80 % of their declared minimum initial capacity after 1 000 charging cycles. <p>Computers⁸³</p> <ul style="list-style-type: none"> - Durability tests to verify that computer models function as specified and meet the stipulated performance requirements. <p>Tests:</p> <ol style="list-style-type: none"> 1) resistance to shock (mandatory for |

⁷⁶ Regulation (EU) No 1194/2012

⁷⁷ Commission Regulation (EC) No 244/2009

⁷⁸ Commission Regulation (EC) No 245/2009

⁷⁹ Commission Regulation (EU) No 666/2013

⁸⁰ http://ec.europa.eu/environment/gpp/pdf/EU_GPP_criteria_for_computers_and_monitors.pdf (last access on 12 April 2018)

⁸¹ http://ec.europa.eu/environment/gpp/pdf/criteria/indoor_lighting.pdf (last access on 12 April 2018)

⁸² Commission Decision (EU) 2016/1371

⁸³ Commission Decision (EU) 2016/1371

| Aspect | Ecodesign | GPP | Ecolabel |
|--------|-----------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>notebook computers)</p> <p>2) resistance to vibration (mandatory for notebook computers)</p> <p>3) accidental drop (mandatory for notebook computers, tablet computer models and the table component of a two-in-one computer model)</p> <p>4) temperature test (additional for notebook computers)</p> <p>5) screen resilience (additional for notebook computers, mandatory for tablet computer models and the table component of a two-in-one computer model)</p> <p>6) water spill ingress (additional for notebook computers)</p> <p>7) keyboard lifespan (additional for notebook computers)</p> <p>8) screen hinge lifespan (additional for notebook computers)</p> <p>Tests methods described in specific standards.</p> <p>Computers (Notebook computers)⁸⁴</p> <p>- Primary data storage drive used in notebooks designed to protect both the drive and data from shock and vibration. Options:</p> <p>- Hard Disk Drive (HDD) designed to</p> |

⁸⁴ Commission Decision (EU) 2016/1371

| Aspect | Ecodesign | GPP | Ecolabel |
|--------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>withstand a half sine wave shock of 400 G (operating) and 900 G (non-operating) for 2 ms without damage to data or operation of the drive.</p> <p>- HDD head retracting from the disc surface in less than or equal to 300 milliseconds upon detection of the notebook having been dropped.</p> <p>- Use of a solid state storage drive technology such as SSD (Solid State Drive) or eMMC (embedded Multi Media Card).</p> |
| | | <p>Paints, varnishes and road marking⁸⁵</p> <p>- Depending on the type of product certain performance tests must be passed for paints and varnishes:</p> <ul style="list-style-type: none"> • Wet scrub resistance (only indoor paints) – EN 13300 and EN ISO 11998 or their equivalent. • Weathering resistance (only outdoor paints) – ISO 2813, ISO 4628-6, ISO 4628-5, ISO 4628-4, ISO 4628-2, ISO 4628-3. | <p>Absorbent Hygiene Products⁸⁷</p> <p>- Satisfactory efficiency and quality of the product, at the least equivalent of products already on the market. Fitness-for-use to be tested with respect to specific characteristics and parameters.</p> <p>Bed Mattresses⁸⁸</p> <p>- Satisfaction of the consumer's needs (e.g. fulfilment of specific functional characteristics, respect of thermo-hygrometric wellness requirements). Functional characteristics measured according to EN 1957:</p> |

⁸⁵ http://ec.europa.eu/environment/gpp/pdf/criteria_for_paints_varnishes_and_road_marking.pdf (last access on 13 April 2018)

⁸⁷ Commission Decision 2014/763/EU

⁸⁸ Commission Decision 2014/391/EU

| Aspect | Ecodesign | GPP | Ecolabel |
|--------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <ul style="list-style-type: none"> • Fungal and algal resistance of the film (only outdoor paints, for applications where fungal and algal resistance of the film are needed) – EN 15457 and/or EN 15458. • Abrasion resistance (floor paints) – EN ISO 7784-2. <p>- The following tests apply to road markings:</p> <ul style="list-style-type: none"> • Quality and durability of road marking system defined as maintaining minimum performance requirements for night time visibility, day time visibility, skid resistance and erosion, after a defined number of wheel passages – E N 1824, EN 13197. <p>Textiles⁸⁶</p> <p>- Depending on the type of textile product, textiles must meet relevant durability requirements:</p> <ul style="list-style-type: none"> • Dimensional change - EN ISO 6330, ISO 15797, EN ISO 5077 • Washing colour fastness - ISO | <ul style="list-style-type: none"> • Loss of height < 15 % • Loss of firmness < 20 % <p>Paints and varnishes⁸⁹</p> <p>- Depending on the type of product, performance tests must be passed:</p> <ul style="list-style-type: none"> • White pigment and Wet Scrub Resistance • Spreading rate (only for white and light coloured paints, including the white base paints used in tinting systems)) – ISO 6504/1 • Resistance to water – ISO 2812-3 • Adhesion – EN 24624 • Abrasion – EN ISO 7784-2 • Weathering – EN 11507/EN 927-6 • Water vapour permeability – EN ISO 7783 • Liquid water permeability • Fungal resistance – EN 15457 • Algal resistance – EN 15458 • Crack bridging – EN 1062-7 • Alkali resistance – ISO 2812-4 • Corrosion resistance – EN ISO 12944-2 and 12944-6, ISO 9227, ISO 4628-2 and 4628-3 <p>Textiles⁹⁰</p> |

⁸⁶ http://ec.europa.eu/environment/gpp/pdf/criteria/textiles_2017.pdf (last access on 13 April 2018)

⁸⁹ Commission Decision 2014/312/EU

⁹⁰ Commission Decision 2014/350/EU

| Aspect | Ecodesign | GPP | Ecolabel |
|--------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <p>15797, ISO 105 C06</p> <ul style="list-style-type: none"> • Perspiration colour fastness - ISO 15797, ISO 105 E04 • Wet rubbing colour fastness - ISO 15797, ISO 105 X12 • Tensile strength - EN ISO 13934 • Seam strength - EN ISO 13935 • Water, dirty and stain repellency - ISO 6330, ISO 15797, ISO 4920, ISO 14419, ISO 22958 • Flame retardancy - ISO 6330, EN ISO 10528, EN ISO 12138, BS 5651 | <p>- Depending on the type of product, performance tests must be passed:</p> <ul style="list-style-type: none"> • Dimensional changes during washing and drying - EN ISO 6330, EN ISO 5077, ISO 15797. • Colour fastness to washing - ISO 105 C06, ISO 15797 • Colour fastness to perspiration (acid, alkaline) – ISO 105 E04 • Colour fastness to wet rubbing – ISO 105 X12 • Colour fastness to dry rubbing – ISO 105 X12 • Colour fastness to light – ISO 105 B02 • Wash resistance and absorbency of cleaning products – EN ISO 6330, EN ISO 9073-6 • Fabric resistance to pilling and abrasion – ISO 12945-1, ISO 12945-2 • Durability of functions (water, oil and stain repellent functions – ISO 6330, ISO 15797; flame retardants – ISO 6330, EN ISO 10528, EN ISO 12138; easy-care ISO 7768) |
| Reliability | <p>Lamps^{91, 92, 93}</p> <p>- Depending on the type of</p> | | <p>Computers (Desktop computers, workstations, thin clients and small-</p> |

⁹¹ Commission Regulation (EU) No 1194/2012

⁹² Commission Regulation (EC) 244/2009

⁹³ Commission Regulation (EC) 245/2009

| Aspect | Ecodesign | GPP | Ecolabel |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>lamp:</p> <ul style="list-style-type: none"> • Lamp survival factor at x hours • Rated lamp lifetime at x% lamp survival <p>-Number of switching cycles before failure > x</p> <p>-Premature failure rate at x hours</p> | | <p>scale servers)⁹⁴</p> <ul style="list-style-type: none"> - Projected Annualised Failure Rate (AFR) of less than 0.25 % for data storage drive or drives used in desktops, workstations and thin clients marketed for business use. - Projected AFR of less than 0.44 % and Bit Error Rate for non-recoverable data of less than 1 in 1016 bits for small-scale servers. |
| <p>Guarantee issues</p> | | <p>Computers and monitors⁹⁵</p> <ul style="list-style-type: none"> - Additional points proportionally awarded to each additional year of warranty and service agreement offered that is more than the minimum technical specification. <p>Imaging equipment⁹⁶</p> <ul style="list-style-type: none"> - Repair or replacement of the product covered by the warranty terms for minimum five years. <p>Sanitary tapware⁹⁷</p> <ul style="list-style-type: none"> - The tenderer shall give a | <p>Computers⁹⁹</p> <ul style="list-style-type: none"> - A minimum of three year guarantee effective from purchase of the product is provided at no additional cost, including a service agreement with a pick-up and return or on-site repair option for the consumer. - A minimum two year commercial guarantee is provided for defective batteries. <p>Televisions¹⁰⁰</p> <ul style="list-style-type: none"> - A commercial guarantee is offered to |

⁹⁴ Commission Decision (EU) 2016/1371

⁹⁵ http://ec.europa.eu/environment/gpp/pdf/EU_GPP_criteria_for_computers_and_monitors.pdf (last access on 12 April 2018)

⁹⁶ <http://ec.europa.eu/environment/gpp/pdf/criteria/imaging/EN.pdf> (last access on 12 April 2018)

⁹⁷ <http://ec.europa.eu/environment/gpp/pdf/criteria/sanitary/EN.pdf> (last access on 2 May 2018)

| Aspect | Ecodesign | GPP | Ecolabel |
|--------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <p>warranty for repair or replacement of minimum four years.</p> <p>Water-based heaters⁹⁸</p> <ul style="list-style-type: none"> - Repair or replacement of the product covered by the warranty terms for minimum four years. - Availability of genuine or equivalent spare parts (direct or via other nominated agents) for at least ten years from the date of purchase. Not applying to unavoidable temporary situations beyond the manufacturer's control such as natural disasters. | <p>ensure that the television will function for at least two years from the date of delivery to the customer.</p> <p>Water based heaters¹⁰¹</p> <ul style="list-style-type: none"> - Repair or replacement of the product covered by the warranty terms for at least five years |
| | | <p>New Furniture¹⁰²</p> <ul style="list-style-type: none"> - A minimum three-year (core) or five-year (comprehensive) warranty is provided which is effective from the date of delivery of the product. This warranty covers repair or replacement of the product, and includes a service agreement with options for pick-up | <p>Bed Mattresses¹⁰³</p> <ul style="list-style-type: none"> - A list of recommendations on how to use, maintain and dispose the mattress to be reported in the warranty documentation. The warranty for the mattress is valid for a period of at least 10 years (not required for cot mattresses). <p>Furniture¹⁰⁴ / Wood, cork, bamboo floor</p> |

⁹⁹ Commission Decision (EU) 2016/1371

¹⁰⁰ Commission Decision 2009/300/EC

⁹⁸ http://ec.europa.eu/environment/gpp/pdf/waste_water_criteria.pdf (last access on 12 April 2018)

¹⁰¹ Commission Decision 2014/314/EU

¹⁰² http://ec.europa.eu/environment/gpp/pdf/toolkit/furniture_gpp.pdf (last access on 13 April 2018)

¹⁰³ Commission Decision 2014/391/EU

| Aspect | Ecodesign | GPP | Ecolabel |
|--------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <p>and return or on-site repairs. The warranty guarantees that the goods are in conformity with the contract specifications at no additional cost.</p> <p>- To encourage furniture producers to provide longer warranties, an award criterion has been set where maximum points (x) are awarded to anyone who commits to a warranty that is at least 4 years longer than the minimum technical specification set by the procurer. Points are proportionally awarded for shorter extended warranties (i.e. 0.75x points for 3 years extra, 0.50x points for 2 years extra and 0.25x points for one year extra warranty).</p> <p>Refurbished Furniture</p> <p>- The same approach has been made as for new furniture with the one difference being that the minimum requirements are less (2 and 3 years instead of 3 and 5 years for core and comprehensive levels).</p> | <p>coverings¹⁰⁵</p> <p>- A minimum of a five year guarantee is provided at no additional cost, which is effective from the date of delivery of the product. This guarantee is provided without prejudice to the legal obligations of the manufacturer and seller under national law.</p> |

¹⁰⁴ Commission Decision (EU) 2016/1332

¹⁰⁵ Commission Decision (EU) 2017/176

Table 7. Examples of product policy requirements on reparability, reusability and upgradability for ErP (white cells) and non-ErP (grey cells) at September 2018

| Aspect | Ecodesign | GPP | Ecolabel |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Design for reusability | Note: Remanufacturing of cartridges is under discussion in the latest version of the Voluntary Agreement for Imaging Equipment | Imaging equipment¹⁰⁶ - The product is designed in a way that remanufactured toner and/or ink cartridges can be used. - No devices and practices that would prevent reutilisation of cartridges (sometimes referred to as anti-reutilisation devices/practises) are present or applied. | |
| | | Textiles¹⁰⁷ - Garments must be designed so that any logos or distinctive identification features can be easily removed or overprinted without damaging the item. | |
| Design for repair and upgrade | Information for disassembly are requested for vacuum cleaners and for disassembly of professional refrigeration products. Note: several draft product regulations (in the process of adoption in 2018-2019) | Computers and monitors¹⁰⁸ - Parts to be easily accessible and replaceable by the use of universally available tools (i.e. such as a screwdriver, spatula, pliers or tweezers): <ul style="list-style-type: none"> • Computers: i) HDD/SSD, ii) Memory, iii) Rechargeable battery, iv) Screen assembly and LCD backlight | Computers¹¹¹ - Criteria to fulfil for upgrading older components or undertaking repairs and replacements of worn out components or parts: (i) Components to be easily accessible and exchangeable by the use of universal tools (i.e. widely |

¹⁰⁶ <http://ec.europa.eu/environment/gpp/pdf/criteria/imaging/EN.pdf> (last access on 12 April 2018)

¹⁰⁷ http://ec.europa.eu/environment/gpp/pdf/criteria/textiles_2017.pdf (last access on 13 April 2018)

¹⁰⁸ http://ec.europa.eu/environment/gpp/pdf/EU_GPP_criteria_for_computers_and_monitors.pdf (last access on 12 April 2018)

¹¹¹ **Commission Decision (EU) 2016/1371**

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| | <p>contain similar provisions to GPP for computer and monitors (e.g., servers, welding equipment, dishwashers, washing machines – washer-dryers).</p> | <p>(comprehensive), v) Keyboard and mouse pad (comprehensive)</p> <ul style="list-style-type: none"> • Displays: i) Screen assembly and LCD backlight, ii) Power and control circuit boards, iii) Stands (excluding those integrated with the enclosure) • Tablets and two-in-one notebooks: exempted for computer parts (i) and (ii). <p>- Clear disassembly and repair instructions (e.g. hard or electronic copy, video) are provided to enable a non-destructive disassembly of products for the purpose of replacing key components or parts for upgrades or repairs. This is made available in hard copy or via the manufacturer's webpage.</p> <p>- Points awarded for products that incorporate the following features:</p> <p>(i) Soldered RAM memory with a minimum capacity of 4GB (core) or 8 GB (comprehensive), or the potential to replace and upgrade the RAM (not suitable for devices designed to run their main applications from the cloud).</p> <p>(ii) Expandable mass storage by using slots supporting mass storage media, or additional mass storage incorporated into the keyboard (for all-in-one notebooks).</p> <p>- Criterion not to be used to compare differing solutions i.e. integrated or cloud</p> | <p>used commercially available tools such as a screwdriver, spatula, plier, or tweezers): Data storage (HDD, SSD or eMMC), Memory (RAM), Screen assembly and LCD backlight units (where integrated), Keyboard and track pad (where used), and Cooling fan assemblies (in desktops, workstations and small-scale servers);</p> <p>(ii) Rechargeable batteries are not glued or soldered into a product and there are no metal tapes, adhesive strips or cables that prevent access in order to extract the battery. - The rechargeable battery pack is easy to extract by one person (either a non-professional user or a professional repair service provider) as follows:</p> <ul style="list-style-type: none"> • For notebooks and portable all-in-one computers it is possible to extract the rechargeable battery manually without tools; • For sub-notebooks it is possible to extract the rechargeable battery in a maximum of three steps using a screwdriver; • For tablets and two-in-one notebooks it is possible to extract the rechargeable battery in a maximum of four steps using a screwdriver and |
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| | | <p>storage.</p> <p>Sanitary tapware¹⁰⁹</p> <p>- The product shall be designed in such a way that its exchangeable components can be replaced easily by the end-user or a professional service engineer, as appropriate. Information about which elements can be replaced shall be clearly indicated in the information sheet attached to the product. The tenderer shall also provide clear instructions to enable the end-user or trained experts, as appropriate, to undertake basic repairs.</p> <p>Water-based heaters¹¹⁰</p> <p>- Points will be awarded to water-based heaters that are easy to dismantle by professionally trained personnel using commonly available tools, for the purpose of repairs and replacements of worn-out parts, upgrading older or obsolete parts, and separating parts and materials, ultimately for reuse or recycling.</p> | <p>spudger.</p> <p>Water-based heaters¹¹²</p> <p>- The product is designed in such a way that its exchangeable components can be replaced easily by service personnel.</p> |
| | | | <p>Bed Mattresses¹¹³</p> <p>- The mattress can be dismantled for the following purposes:</p> |

¹⁰⁹ <http://ec.europa.eu/environment/gpp/pdf/criteria/sanitary/EN.pdf> (last access on 2 May 2018)

¹¹⁰ http://ec.europa.eu/environment/gpp/pdf/waste_water_criteria.pdf (last access on 12 April 2018)

¹¹² Commission Decision 2014/314/EU

¹¹³ Commission Decision 2014/391/EU

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| | | | <ul style="list-style-type: none"> • undertaking repairs and replacements of worn-out parts, • upgrading older or obsolete parts, • separating parts and materials for the potential recycle of them. <p>- The following actions could facilitate the dismantling of the mattress: preferring sewing to the application of glue; using removable covers; using single and recyclable materials for each homogeneous part.</p> <p>Furniture¹¹⁴</p> <p>- Furniture products consisting of multiple component parts/materials are designed for disassembly with a view to facilitating repair, reuse and recycling. Simple and illustrated instructions regarding the disassembly and replacement of damaged component parts/materials to be provided.</p> <p>- Disassembly and replacement operations must be capable of being carried out using common and basic manual tools and unskilled labour.</p> |
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¹¹⁴ Commission Decision (EU) 2016/1332

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| | | | <p>Wood, cork, bamboo floor coverings¹¹⁵</p> <ul style="list-style-type: none"> - Information for repair/replacement operations to be included in the consumer instructions or the manufacturer's website and made accessible to users and installers. - For floor coverings that are not glued down, the flooring must be designed for disassembly with a view to facilitating repair, reuse and recycling. Simple and illustrated instructions regarding the disassembly and replacement of damaged elements to be provided. - Disassembly and replacement operations must be capable of being carried out using common and basic manual tools. |
| <p>Spare parts and cost of repair</p> | <p>Note: Similar elements to the GPP and Ecolabel requirements are being explored in draft Ecodesign and Energy Label regulations in the process of adoption (2018-2019), e.g., washing machines-washer-</p> | <p>Computers and monitors¹¹⁶</p> <ul style="list-style-type: none"> - As core requirements, the availability of spare parts must be guaranteed by the tenderer for at least three years from the date of purchase. This is extended to five years for comprehensive requirements. The price list must also be provided. Target | <p>Computers¹¹⁹</p> <ul style="list-style-type: none"> - Original or backwardly compatible spare parts, including rechargeable batteries (if applicable), are publicly available for at least five years following the end of production for the model. |

¹¹⁵ Commission Decision (EU) 2017/176

¹¹⁶ http://ec.europa.eu/environment/gpp/pdf/EU_GPP_criteria_for_computers_and_monitors.pdf (last access on 12 April 2018)

¹¹⁹ **Commission Decision (EU) 2016/1371**

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| | dryers and dishwashers. | <p>components:</p> <ul style="list-style-type: none"> • Computers: i) HDD/SSD, ii) Memory, iii) Rechargeable battery, iv) Screen assembly and LCD backlight (comprehensive), v) Keyboard and mouse pad (comprehensive) • Displays: i) Screen assembly and LCD backlight, ii) Power and control circuit boards, iii) Stands (excluding those integrated with the enclosure) • Tablets and two-in-one notebooks: exempted for computer parts (i) and (ii). <p>- Indicative labour costs for replacements carried out by the tenderer's authorised service providers is provided. Points to be awarded according to the most cost-competitive offers. Additional component parts to be added if considered important to the price comparison.</p> <p>Imaging equipment¹¹⁷</p> <p>- Genuine or equivalent spare parts are available (direct or via other nominated agents) for at least five years from the date of purchase.</p> <p>Sanitary tapware¹¹⁸</p> | <p>Water based heaters¹²⁰</p> <p>- Genuine or equivalent spare parts are available for at least 10 years from the date of purchase.</p> <p>Television¹²¹</p> <p>- The availability of compatible electronic replacement parts is guaranteed for seven years from the time that production ceases.</p> |
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¹¹⁷ <http://ec.europa.eu/environment/gpp/pdf/criteria/imaging/EN.pdf> (last access on 12 April 2018)

¹¹⁸ <http://ec.europa.eu/environment/gpp/pdf/criteria/sanitary/EN.pdf> (last access on 2 May 2018)

¹²⁰ Commission Decision 2014/314/EU

¹²¹ Commission Decision (EU) 2016/1371

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| | | - The tenderer shall ensure that spare parts are available for at least five years (seven years for comprehensive criterion) from the date of purchase. | |
| | | <p>Furniture¹²²</p> <p>- Availability of spare parts, or elements which achieve an equivalent function, guaranteed for a period of at least three years (core) or five years (comprehensive) from the date of delivery of the furniture product. Contact details that should be used in order to arrange the delivery of spare parts to be provided.</p> <p>Textiles¹²³</p> <p>- Spares available of all parts and accessories (e.g. zips, buttons, fasteners) that form part of the products are available for a minimum of two years after product delivery or the duration of the supply contract (whichever is the longest). An indicative price list for these parts and accessories must also be provided.</p> | <p>Furniture¹²⁴</p> <p>- Spare parts available to customers for a period of at least 5 years from the date of delivery of the product. The cost (if any) of spare parts to be proportional to the total cost of the furniture product. Contact details that should be used in order to arrange the delivery of spare parts to be provided.</p> |

¹²² http://ec.europa.eu/environment/gpp/pdf/toolkit/furniture_gpp.pdf (last access on 13 April 2018)

¹²³ http://ec.europa.eu/environment/gpp/pdf/criteria/textiles_2017.pdf (last access on 13 April 2018)

¹²⁴ Commission Decision (EU) 2016/1332

Table 8. Examples of product policy requirements on materials and end of life treatments for ErP (white cells) and non-ErP (grey cells) at September 2018

| Aspect | Ecodesign | GPP | Ecolabel |
|--------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Use of materials</p> | | <p>Paints, varnishes and road marking¹²⁵</p> <p>- Paints to be delivered in containers of (no smaller than) x litres (to be decided by the public authority in order to reduce packaging)</p> | <p>Absorbent Hygiene Products¹²⁶</p> <p>- The quantity of waste generated during the manufacture and packaging of the products, at the net of the fraction that is reused or converted into useful materials and/or energy (calculated as the difference between the amount of waste produced and the amount of waste recovered), must not exceed:</p> <ul style="list-style-type: none"> • 10% by weight of the end products for tampons, • 5% by weight of the end products for all the other products. <p>Paints and varnishes¹²⁷</p> <p>- Text to show on the packaging: "Minimise paint wastage by estimating how much paint you will need; Recover unused paint for re-use; Reuse of paint can effectively minimise the products' life cycle environmental impact".</p> |

¹²⁵ http://ec.europa.eu/environment/gpp/pdf/criteria_for_paints_varnishes_and_road_marking.pdf (last access on 13 April 2018)

¹²⁶ Commission Decision 2014/763/EU

¹²⁷ Commission Decision 2014/312/EU

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| <p>Design for recycling</p> | <p>Note: A number of similar disassembly elements to the GPP and Ecolabel requirements are being explored in draft Ecodesign and Energy Label regulations in the process of adoption (2018-2019), e.g., displays, servers, welding equipment, washing machines-washer dryers, dishwashers.</p> <p>See also "Information Requirements" in Table 9 below. Information facilitating dismantling, recovery and recycling are requested for electric motors, industrial fans, water pumps, circulators, ventilation units, space and water heaters, professional refrigeration products, and vacuum cleaners.</p> | <p>Computers and monitors¹²⁸</p> <ul style="list-style-type: none"> - Parts must not contain moulded-in or glued-on metal inserts unless they can be removed with commonly available tools. Disassembly instructions must show how to remove them. - The presence of paints and coatings must not significantly impact upon the resilience of plastic recyclate produced from these components upon recycling and when tested according to ISO 180 or equivalent. | <p>Computers¹²⁹</p> <ul style="list-style-type: none"> - Parts must not contain molded-in or glued-on metal inserts unless they can be removed with commonly available tools. Disassembly instructions must show to remove them. <p>For parts with a weight greater than 25 grams for tablet computers and 100 grams for all other computers, the following treatments and additives must not result in recycled resin with a > 25 % reduction in the notched izod impact when tested according to ISO 180: Paints and coatings; Flame retardants and their synergists.</p> <ul style="list-style-type: none"> - Existing test results for recycled resin can be accepted provided that the recycled resin is derived from the same input material that the plastic parts of the product are composed of. - For recycling purposes computers must be designed so that target components and parts can be easily extracted from the product. A disassembly test must be carried |
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¹²⁸ http://ec.europa.eu/environment/gpp/pdf/EU_GPP_criteria_for_computers_and_monitors.pdf (last access on 12 April 2018)

¹²⁹ Commission Decision (EU) 2016/1371

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| | | | <p>out which records the number of steps required and the associated tools and actions required to extract target components</p> <p>Televisions¹³⁰</p> <p>- To facilitate the dismantling:</p> <ul style="list-style-type: none"> • Fixtures within the television must allow for its disassembly, e.g. screws, snap-fixes, especially for parts containing hazardous substances. • Plastic parts must be of one polymer or be of compatible polymers for recycling and have the relevant ISO 11469 marking if greater than 25 g in mass. • Metal inlays that cannot be separated must not be used. • Data on the nature and amount of hazardous substances in the television must be gathered in accordance with Council Directive 2006/121/EC and the Globally Harmonised System of Classification and Labelling of |
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¹³⁰ Commission Decision 2009/300/EC

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| | | | Chemicals(GHS). |
| | | Textiles¹³¹ - Points awarded if the design of the final textile product facilitates ease of separation for polyester fabrics at the end of a product's service life. | |
| Recycled content | | | Computers¹³² - The product must contain on average a minimum 10% content of post-consumer recycled plastic measured as a percentage of the total plastic (by weight) in the product excluding Printed Circuit Boards and display optical plastics. Where the recycled content is greater than 25% a declaration may be made in the text box accompanying the Ecolabel |
| | | Textiles¹³³ - Polyester fibre product(s) to be used in fulfilment of the contract must be manufactured using a minimum recycled content of 20 %. Points awarded in case of | Furniture¹³⁴ - If the total content of plastic material in the furniture product exceeds 20% of the total product weight (excluding packaging), the |

¹³¹ http://ec.europa.eu/environment/gpp/pdf/criteria/textiles_2017.pdf (last access on 13 April 2018)

¹³² Commission Decision (EU) 2016/1371

¹³³ http://ec.europa.eu/environment/gpp/pdf/criteria/textiles_2017.pdf (last access on 13 April 2018)

¹³⁴ Commission Decision (EU) 2016/1332

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| | | <p>higher content of polyester and polyamide (nylon) recycled content. Third party certification of the recycled content and its traceability to be provided for the production lines of the products to be delivered and the recyclate feedstock according to ISO 14021, ISO 9001 or equivalent. Verification in accordance with parts 4.4 of EN 15343.</p> | <p>average recycled content of plastic parts (not including packaging) must be at least 30 % w/w. The declaration of recycled content from the plastic manufacturer(s) must be supported by traceability documentation for plastic recyclates. An option would be to provide batch delivery information as per the framework set out in Table 1 of EN 15343.</p> <p>Textiles¹³⁵</p> <p>- Minimum recycled content of polyester and polyamide (nylon), from pre and/or post-consumer waste. Recycled content must be traceable back to the reprocessing of the feedstock and verified by independent certification of the chain of custody or by documentation provided by suppliers and processors.</p> |
| Take back system | | | <p>Water-based heaters¹³⁶</p> <p>The product is taken back free of charge at end-of-life for proper recycling or material recovery of the product, while non-recyclable product parts are disposed of in an</p> |

¹³⁵ Commission Decision 2014/350/EU

¹³⁶ Commission Decision 2014/314/EU

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| | | | environmentally acceptable manner. The product information provides the details of the take-back scheme in place. |
| | | <p>Furniture¹³⁷</p> <p>- Tenderers must collect the furniture directly from a site specified by the contracting authority and provide a re-use and recycling service for furniture that has reached the end of its service life. The tenderer must provide a description of how they will extend the service life of the furniture by supplying it for reuse. Special scenarios are given for recycling and energy recovery.</p> <p>Textiles¹³⁸</p> <p>- Points awarded if a voluntary take-back route for the textile product is provided so that the contracting authority can return polyester fabrics to be recycled or reused.</p> | |

¹³⁷ http://ec.europa.eu/environment/gpp/pdf/toolkit/furniture_gpp.pdf (last access on 13 April 2018)

¹³⁸ http://ec.europa.eu/environment/gpp/pdf/criteria/textiles_2017.pdf (last access on 13 April 2018)

Table 9. Examples of product policy requirements on information related to material efficiency aspects for ErP (white cells) and non-ErP (grey cells) at September 2018

| Aspect | Ecodesign | GPP | Ecolabel |
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| <p>Information</p> | <p>Air heating products¹³⁹ /Circulators¹⁴⁰ /Electric motors¹⁴¹ /Fans¹⁴² /Solid fuel boilers¹⁴³ /Refrigerated storage cabinets¹⁴⁴ /Space heaters¹⁴⁵ /Water pumps¹⁴⁶</p> <p>- Information concerning disassembly, recycling, or disposal at end-of-life of components and materials for treatment facilities.</p> <p>Domestic ovens, hobs and range hoods¹⁴⁷ /Vacuum cleaners¹⁴⁸</p> <p>- Information relevant for non-destructive disassembly for maintenance purposes and information relevant for</p> | <p>Computers and monitors¹⁵⁶</p> <p>- Disassembly instructions must show how to remove parts.</p> <p>- External plastic casings, enclosures and bezels with a weight greater than 25 grams for tablet and portable all-in-one notebooks and 100 grams for computers and monitors and in all cases a surface area greater than 50 cm² to be marked in accordance with ISO 11469 and ISO 1043, sections 1 and 4.</p> <p>Sanitary tapware¹⁵⁷</p> <p>The product shall be supplied with the following information in printed (on the packaging and/or on documentation accompanying the product) and/or electronic format:</p> <p>(a) installation instructions, including</p> | <p>Computers¹⁵⁹</p> <p>- Information about known factors influencing the lifetime of rechargeable batteries, as well as instructions on how the user can prolong battery life, included in factory installed energy management software, written user instructions and posted on the manufacturer's website.</p> <p>- Clear disassembly and repair instructions (e.g. hard or electronic copy, video) to be provided to enable a non-destructive disassembly of products for the purpose of replacing key components or parts for upgrades or repairs. This is to be publicly available or by entering the</p> |

¹³⁹ Commission Regulation (EU) No 2016/2281

¹⁴⁰ Commission Regulation (EU) No 622/2012

¹⁴¹ Commission Regulation (EU) No 4/2014

¹⁴² Commission Regulation (EU) No 327/2011

¹⁴³ Commission Regulation (EU) 2015/1189

¹⁴⁴ Commission Regulation (EU) 2015/1095

¹⁴⁵ Commission Regulation (EU) No 813/2013

¹⁴⁶ Commission Regulation (EU) No 547/2012

¹⁴⁷ Commission Regulation (EU) No 66/2014

¹⁴⁸ Commission Regulation (EU) No 666/2013

| Aspect | Ecodesign | GPP | Ecolabel |
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| | <p>dismantling, in particular in relation to the motor, if applicable, and any batteries, recycling, recovery and disposal at end-of-life.</p> <p>Lamps^{149, 150, 151}</p> <ul style="list-style-type: none"> - Information to be made publicly available on free-access websites and in any other form the manufacturer deems appropriate: Nominal life time of the lamp in hours (not higher than the rated life time); Number of switching cycles before premature lamp failure; if the lamp contains mercury; Lamp mercury content as x mg; Instructions on how to clean up the lamp debris in case of accidental lamp breakage. - Recommendations on how to dispose of the lamp at the end of its life for recycling in line | <p>information on the specific operating pressures that the product is suitable for,</p> <p>(b) recommendations on the proper use and maintenance (including cleaning and decalcification) of the product, mentioning all relevant instructions, particularly:</p> <ul style="list-style-type: none"> (i) advice on maintenance and use of products, (ii) information about which spare parts can be replaced, (iii) instructions concerning the replacement of washers if taps drip water, (iv) advice on cleaning sanitary tapware with appropriate materials in order to prevent damage to their surfaces, (v) advice on regular and proper service of aerators. <p>Water-based heaters¹⁵⁸</p> <p>Recommendations on appropriate disposal</p> | <p>product's unique serial number on a webpage. Additionally, a diagram is to be provided on the inside of the casing of stationary computers showing the location of target components and how they can be accessed and exchanged.</p> <ul style="list-style-type: none"> - For portable computers a diagram showing the location of the battery, data storage drives and memory is made available in pre-installed user instructions and via the manufacturer's website for a period of at least five years. - Information should be included in the user instructions or on the manufacturer's website to let the user know where to go to obtain professional repairs and servicing of the computer, including contact details. During the guarantee period this may be limited to the applicant's Authorised Service Providers. |

¹⁵⁶ http://ec.europa.eu/environment/gpp/pdf/EU_GPP_criteria_for_computers_and_monitors.pdf (last access on 12 April 2018)

¹⁵⁷ <http://ec.europa.eu/environment/gpp/pdf/criteria/sanitary/EN.pdf> (last access on 2 May 2018)

¹⁵⁹ **Commission Decision (EU) 2016/1371**

¹⁴⁹ Commission Regulation (EU) No 1194/2012

¹⁵⁰ Commission Regulation (EC) No 244/2009

¹⁵¹ Commission Regulation (EC) No 245/2009

| Aspect | Ecodesign | GPP | Ecolabel |
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| | <p>with Directive 2012/19/EU.</p> <p>Notebook Computers¹⁵²</p> <p>- If a notebook computer is operated by battery/ies that cannot be accessed and replaced by a non-professional user, the technical documentation of the product has to include the following information "The battery(ies) in this product cannot be easily replaced by users themselves".</p> <p>Ventilation units¹⁵³</p> <p>- Availability of detailed instructions, inter alia, identifying the required tools for the manual disassembly of permanent magnet motors, and of electronics parts (printed wiring boards/ printed circuit boards and displays > 10 g or > 10 cm²), batteries and larger plastic parts (> 100 g) for the purpose of efficient materials recycling, except for</p> | <p>at product's end-of-life.</p> | <p>- Plastic parts with a weight greater than 25 grams for tablet computers and 100 grams for all other computers must be marked in accordance with ISO 11469 and ISO 1043, sections 1-4. The markings must be large enough and located in a visible position in order to be easily identified.</p> <p>Televisions¹⁶⁰</p> <p>- Repair information regarding who is qualified to repair televisions, including contact details as appropriate.</p> <p>- End-of-life instructions for the proper disposal of televisions at civic amenity sites or through retailer take-back schemes as applicable, compliant with Directive 2002/96/EC.</p> <p>Water based heaters¹⁶¹</p> <p>- Information about which elements can be replaced is clearly indicated in the information sheet attached to</p> |

¹⁵⁸ http://ec.europa.eu/environment/gpp/pdf/waste_water_criteria.pdf (last access on 12 April 2018)

¹⁵² Commission Regulation (EU) No 617/2013

¹⁵³ Commission Regulation (EU) No 1253/2014

¹⁶⁰ Commission Decision 2009/300/EC

¹⁶¹ Commission Decision 2014/314/EU

| Aspect | Ecodesign | GPP | Ecolabel |
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| | <p>models of which less than 5 units per year are produced.</p> <p>Water heaters¹⁵⁴ and Solid fuel boilers¹⁵⁵</p> <p>- Specific precautions to be taken when the product is assembled, installed or maintained</p> <p>Note: other draft regulations in the process of adoption (2018-2019) contain sections with the heading "Resource Efficiency Requirements" (e.g., washing machines – washer-dryers).</p> | | <p>the product.</p> <p>- The product information provides the details of the take-back scheme in place.</p> |
| | | <p>Furniture¹⁶²</p> <p>- Clear disassembly and repair instructions (e.g. paper or electronic copy, video) must be provided to enable a non-destructive disassembly of the furniture product for the purpose of replacing component parts/materials. Instructions to be provided in a hard copy together with the product and/or in electronic copy via the manufacturer's website. Disassembly and</p> | <p>Wood, cork, bamboo floor coverings¹⁶³</p> <p>- Information for repair/replacement operations to be included in the consumer instructions or the manufacturer's website and made accessible to users and installers.</p> <p>- Information/recommendation of keeping spare floor covering</p> |

¹⁵⁴ Commission Regulation (EU) No 814/2013

¹⁵⁵ Commission Regulation (EU) 2015/1189

¹⁶² http://ec.europa.eu/environment/gpp/pdf/toolkit/furniture_gpp.pdf (last access on 13 April 2018)

¹⁶³ Commission Decision (EU) 2017/176

| Aspect | Ecodesign | GPP | Ecolabel |
|---------------|------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| | | replacement operations should be capable of being carried out using common and basic manual tools and unskilled labour. | elements in stock for possible event of repair to be provided. |

4 CONCLUSIONS

This report provides an analysis of how different policy tools addressing material efficiency aspects of products could interact in a more harmonised way. Areas have been identified where similarities and synergies between different policy tools could be exploited to improve the material efficiency of products, without compromising their safety and functionality.

With a more specific focus on product policy tools, it is also apparent that requirements on material efficiency aspects are more established for voluntary instruments, due to their broader scope and ambition level. So far, material efficiency requirements are implemented to a lesser extent in Ecodesign, also because of the priority given traditionally to energy-efficiency aspects. The current emphasis on Circular Economy aspects is driving the development of material efficiency requirements in the mandatory product policy tools, as is apparent from the analysis of the draft product regulations in the process of being adopted during 2018-2019. The experience gained with voluntary policy tools provides practical examples of how requirements in this area could be set. Opportunities are larger still in the case of the Energy Label, for which no material efficiency aspects have been explicitly communicated through this policy tool to date, apart from water consumption. It should be noted here that Energy Labelling regulations often build on the requirements for Ecodesign for the same product groups, i.e., it is "taken for granted" that the Ecodesign CE mark-related provisions are mandatory, and for this reason they are not repeated in the provisions of the product-specific Energy Label regulations.

In terms of criteria areas, it seems that some aspects related to material efficiency are implemented quite widely in product policy tools (e.g. functionality of products, resistance to stresses, provision of information) and their application should this be consolidated. Further effort is instead necessary for a systematic and coherent coverage of other aspects (e.g. minimum lifetime of products, design for disassemblability, selection of key parts and availability of spare parts, selection and sourcing of materials, take-back systems, design for recycling, recyclability), especially in the case of mandatory tools. The implementation of material efficiency aspects could be facilitated by appropriate standardisation work, such as the CEN/CENELEC activities currently ongoing under the mandate M543¹⁶⁴, in order to harmonise concepts, methods and nomenclatures applied in different policies. However, relevance and feasibility of requirements should be evaluated on a case-by-case basis, taking into account the specificities of the regulated product and the desired level to be achieved with different policy tools, and not simply transferred from a tool and/or a product to another. In particular, the level of ambition should be modulated appropriately when requirements are integrated for the same product in both mandatory and voluntary tools.

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https://www.cenelec.eu/dyn/www/f?p=104:7:2052581571145301:::FSP_ORG_ID,FSP_LANG_ID:2240017,25
(last access on 7 September 2018)

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