European Network of the Heads of Environment Protection Agencies (EPA Network) - Interest group on Green and Circular Economy

– Discussion paper –

NOTE on Service Life of Products

Countering Obsolescence

March 2018

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1 Framing the problem

Environment may benefit from the use of fewer and better products. Both energy and resource use can be reduced by extending the service life[1] of products. These may be designed and manufactured to last longer or to be easily repairable, e.g. through availability of replacement and spare parts, or they can be kept longer in the economy e.g. through re-use and re-sell. As will be exemplified later, available data show that the service life for some product categories is decreasing. For some years now, this phenomenon has been discussed under the term “obsolescence”, even as “planned obsolescence”. The term obsolescence describes several reasons as to why a product is no longer in use [1, 2]:

- defects due to lack of performance of materials or components (material obsolescence),
- lack of interoperability of software and hardware (functional obsolescence),
- refraining from carrying out repairs on grounds of cost, if the gap between the cost of repairing and the cost of a new item is too small (economic obsolescence), and
- the desire for a new item despite the fact that the old one is still functional (psychological obsolescence).

The European Economic and Social Committee, the European Parliament, the European Commission in the EU action plan for the Circular Economy as well as several organizations and Member States dealt with the issue of obsolescence and proposed recommendations for actions [3-8]. The interest group on Green and Circular Economy of the EPA network took these positions into account and explores in this paper which instruments are available and which measures may be applied as priority, in order to secure a minimum lifetime and to prolong service life of products. Thereby, acting on lifetime of products should relate to all four types of obsolescence, but in this report the focus is especially on material obsolescence, addressing quality aspects of products.

One focus of the discussion so far have been energy related products and especially electric and electronic equipment. This paper stresses the importance of this product category, but it also explores the need to widen the view to non-energy related products.

A study on behalf of the European Parliament revealed “that for the most part, the concept of a longer lifetime for products is currently not explicitly present in policies and regulations in the EU. Thus, the current policy framework does not provide sufficient mechanisms to guide and regulate longer products´ lifetime. Although initiatives promoting ecodesign, ecoinnovation and the circular economy indicate an ambition to promote redesign of products and to consider and label the durability of products, the selection of pilot products remains on the horizon” [9, p. 11].

A few product categories are currently covered by performance requirements in EU legislation including minimum requirements on lifetime, e.g. certain electric motor applications and motor vehicles. Consumer appliances are currently mainly covered by energy consumption restrictions under the Ecodesign Directive [10]. These rules are specifically applicable to energy-related products, while the rules do not apply to transport means. The directive already provides the legal basis for

[1] In this paper the term “service life“ is used synonymously to useful life. The International Electrotechnical Vocabulary – Part 192: Dependability [IEC 60050-192] defines useful life as time interval, from first use until user requirements are no longer met, due to economics of operation and maintenance, or obsolescence.

other environmentally related requirements. But that has hitherto been explored to a limited extent. Therefore the Commission underlines in its Circular Economy Action Plan, that it "will promote the reparability, upgradability, durability, and recyclability of products by developing product requirements relevant to the circular economy in its future work under the Ecodesign Directive as appropriate, and taking into account the specificities of different product groups" [6, p. 4]. The Ecodesign Work Plan for 2016-2019 [11] elaborates how this will be implemented. In order to set minimum requirements on these aspects and check for compliance, appropriate (measuring) standards are needed. Therefore the commission issued already end of 2015 the standardisation request M/543 to the European standardisation organisations [12]. The CEN-CENELEC Technical Committee 10, known as 'Energy-related products – Material Efficiency Aspects for Ecodesign' has been established to prepare the standards.[2] According to the mandate the standards should be available by March 2019. Even though the mandate addresses horizontal (not product-specific) standards, it can reasonably be expected to generate momentum for and implementations of specific product standards.

The effect of the service life on the environmental impacts caused over the entire life cycle of a product needs to be determined by the assessment of the environmental impacts[3] for each product category. E.g. on the one hand the extension of the lifetime can reduce impacts related to the manufacturing and disposal of a product. On the other hand, technological progress, like increased energy efficiency in case of energy-using products, can lead to lower environmental impacts compared to the case when less energy efficient products are used longer. However examples show, that for the reached state of energy efficiency of new energy-using products, those with a long service life are, in a majority of cases, more environmentally friendly and thus more resource-saving. For example, the cumulative energy demand and global warming potential of a short-life washing machine (lifetime 5 years) are approx. 40 % higher compared to a long-life washing machine (lifetime 20 years) [2, p. 51]. Bovea et al. [15] studied a representative sample of nine categories of small household electrical and electronic equipment, considering different types of repair for each category and the replacement of the equipment in different years of its lifespan. For all the analyzed categories, the repair & reuse strategy generally proved environmentally better performance than replacement.

[2] The CEN-CLC/TC 10 has created 6 Working Groups that are responsible for the development of the standardisation deliverables: WG 1 Terminology, WG 2 Durability, WG 3 Upgradability, Ability to repair, Facilitate Re-Use, Use or re-used components, WG 4 Ability to re-manufacture, WG 5 Recyclability, recoverability, RRR index, Recycling, Use of recycled materials, WG 6 Documentation and/or marking regarding information relating to material efficiency of the product.
CEN = Comité Européen de Normalisation (European Committee for Standardization)
CENELEC = Comité Européen de Normalisation Électrotechnique (European Committee for Electrotechnical Standardization)

[3] See for example [13] and [14]

2 Product lifetime

2.1 Basic principles governing technical product lifetime

Consumers must be able to rely on a certain minimum product lifetime during which repairs will not be necessary, or only very rarely. Thereby it is important to differentiate between the different methods used to predict, assess and verify the lifetime of a product.

Regarding product failure rates the bathtub curve (see Figure below) is widely used for describing differenty types of failures.

- Early failures occur in the early life of a product and are mostly due to manufacturing faults. Frequent early failures indicate insufficient quality control.
- Random failures occur during the product's characteristic service life and are attributed to faulty maintenance, maloperation or critical unplanned stresses. Electronic components in particular may fail, for example, due to overheating.
- Wear-out failures occur in the late life of a product and are attributed to material ageing and material fatigue.

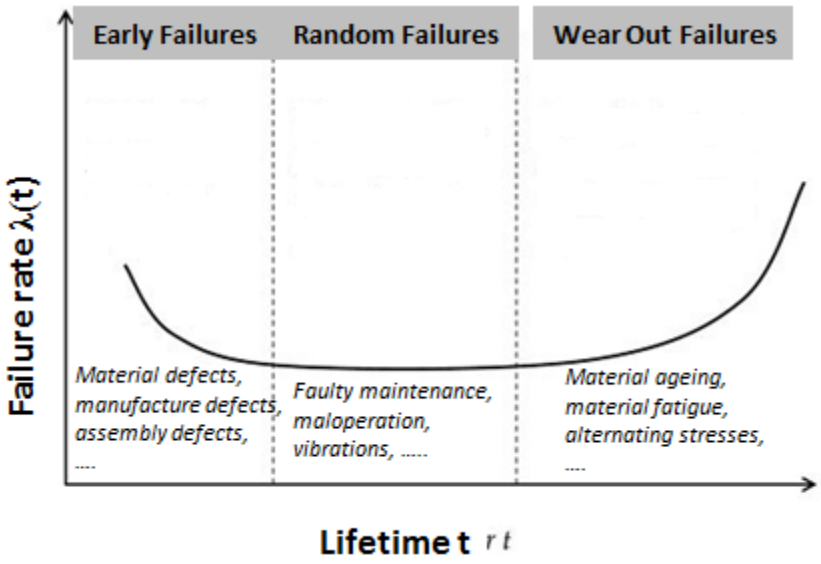

Figure 1: Bathtub curve of failure rate (Weibull distribution).

The more manufacturers design products for critical applications and the more they test externally supplied components, manufacturing processes and, where possible, also the finished products as part of their quality assurance, the more likely they will be able to eliminate or minimise the occurrence of early and random failures.

It is, for example, customary to forecast a product's Mean Time To Failure (MTTF) which, for example, is used as part of conformity assessments for the safety of machinery (under EN ISO 13849-1). It is however a statistical metric/indicator determined by modelling. It is not a factually guaranteed minimum lifetime or a timespan of guaranteed failure-free operation.

The latter can mostly only be determined or guaranteed by means of testing of the final product, which can be challenging for complex products or products with a rather long service time. For products of low usage intensity, endurance tests are feasible and are used, for example, in product tests conducted by the various consumer organisations or are part of the requirements that need to be met for a product to be awarded with an ecolabel. For example, a hairdryer must pass a 400-hour endurance test to be awarded with the German ecolabel Blue Angel (*Der Blaue Engel*). For more complex products it is necessary to conduct a range of different (reliability) tests of functions in order to be able to assess the durability of the final product. For vacuum cleaners, for example, these include the operational lifetime of the motor in hours, the impact resistance of the nozzle, the minimum durability of the hose with repeated bending, and the ability to withstand the impact of slamming into door sills and jambs.

For long-lived electric appliances (greater than 10 years) with high usage frequency (e.g. TV sets: 4 hours per day) or appliances in continuous operation (such as refrigerators and freezers), lifetime test procedures for final products are often unfeasible with regard to the duration of the test. For example, endurance testing for a TV set for a ten-year service life with four hours of operation time per day would take more than 1.5 years. *Stiftung Warentest*[4] conducts endurance tests of washing machines as part of their product tests. Assuming an average of 184 wash cycles per year, the organisation completes 1840 wash cycles representing an average ten-year lifespan, which takes approximately nine months of testing with consequent high costs.

The Ecodesign Directive already offers a suitable legal framework for laying down product-specific requirements for the lifetime of energy-related products. Initial requirements have been established for example for vacuum cleaners with a minimum operational motor lifetime of 500 hours [16]. In case an endurance test of the final product is impractical, minimum requirements for the quality or lifetime of particularly important components or for components which are most likely to fail or design requirements improving reparability, can be important steps forward.

Manufacturers voluntarily offer warranty coverage, e.g. 2-10 years for selected refrigerator compressors or motors of washing machines, but these differ from manufacurer to manufacturer, as well as within different member states markets. Thus, warranty coverage may be used as indication for roughly setting up a minimum lifetime range as initial specification. For a refrigerator, this could cover important parameters like lifetime of the compressor (e.g. tested in an accelerated test) and number of door opening and closing [17]. These parameters could be set to ensure a minimum lifetime for example in the range of 7-10 years.

Similarly, software content (such as smartphone app steering devices, etc.) has to be considered part of the lifetime coverage. If a fridge is for example equipped with computer programming, it has to be conformed to the lifetime requirements. This would mean that there should be no digital programming installed which gets outdated or disables functions before the average expected lifetime of the fridge. A product even more reliant on computer capacity and programming – a typical case is the LED smart TV – should have to be equipped with lasting computer design and be able to get updating of programs for at least a certain service life.

[4] German consumer organisation engaged in investigating and comparing goods and services

2.2 Lifetimes: Satisfaction, Desires and Expectations

Studies conducted in Austria [18, 19] collected data on the service life of durable goods (including clothes, consumer electronics, small and large household appliances, furniture) and the acquisition, usage, and disposal of mobile phones in order to investigate on satisfaction, expectations and reality on consumer goods lifetime.

Opinions are divided over whether the durability of durable goods is considered satisfactory or not. Whereas about 45 % of the respondents indicated to be (rather) satisfied with current product lifetimes, almost 30 % indicated to be (rather) unsatisfied. The lowest level of satisfaction is expressed for consumer electronics. It was found out that consumers generally assume that products will last only for relatively short periods. The study describes a downward spiral of consumer expectations with regard to product lifetime as follows: “A vicious circle … arises in the interaction of consumers and manufacturers: the consumers’ bad experiences when it comes to product lifetime reinforce their suspicion that “planned obsolescence” is a real thing and thus diminish the consumers’ trust as well as their willingness to spend more money on a long-lasting products or to have an item repaired. Moreover, advertising and rapid product development cycles impact social standards and lead consumers to feel that they are old-fashioned and lagging behind technological developments. At the same time, the low demand for long-lasting products in turn reinforces the producers’ perception that consumers always want the latest product, which results in the manufacturing of products with even shorter lifespans. This interaction thus results in a continuous and worrying downward spiral of consumer expectations with regard to lifetime and producer expectations with regard to service life, which finds expression in ever faster cycles of replacement purchases” [18, p. 75].

A consumer survey conducted as part of the study Prakash et al. [2] showed that approximately one third of the interviewees were dissatisfied with the products’ lifetime. Table 1 shows the results for the product groups TV, washing machine, notebook, hand mixer and kettle and the correlation between the reached product lifetime and customer satisfaction.

Table 1: Customer satisfaction with life time of devices based on an internet-survey [2][5]

How satisfied were you with the lifespan	TV		Washing machine		Notebook		Hand mixer		Kettle		Ø
	%	years	%	years	%	years	%	years	%	years	
I was positively surprised.	16 %	14	18 %	17	10 %	7	14 %	17	7 %	10	13 %
It met my expectations.	43 %	11	38 %	13	24 %	6	36 %	12	36 %	7	36 %
It was time to replace the device	21 %	10	12 %	11	28 %	5	10 %	10	17 %	6	18 %
I expected a longer duration of use.	11 %	7	18 %	8	23 %	4	21 %	6	24 %	4	19%
The lifespan was much too short.	6 %	4	11 %	5	13 %	3	13 %	3	12 %	2	11 %
I do not know.	3 %	7	3 %	9	2 %	4	6 %	8	4 %	5	3 %
Number of total respondents (n)	878		734		660		501		692		

2.3 Reparability

The repair of a product during its period of use, e.g. by replacing failed components or even just a single wear part, avoids the entire product turning into waste, contributes to the extension of product lifetime, and is often a precondition for reuse. This contributes in particular to reduce the intensive utilisation of environmental resources used to manufacture the product, and to reduce the quantity of resources used per service unit. Moreover, the expansion of repair offers can make relevant contributions to jobs creation and may also encourage a stronger bond between owner and product. The repair sector has seen major structural change in recent years. There has been a significant decline in product repair service offered by specialist and professional craftsmen, i.e. the "classic" repair entities, and the major manufacturers' service offers are focussed on fewer and fewer centralised maintenance centres. At the same time, however, self-organised repair initiatives are springing up in more and more locations, and specialised internet-based fora for information exchange are being established [20]. This applies e.g. especially for smartphones. Research in Nordic

[5] The column "%" shows, how much percent of the total respondents (n) provided the respective answer. The column years shows the average use time, which the devices of the respective respondents reached. For example 6 % of 878 respondents, which had disposed a washing machine, answered that the lifespan was too short. The average lifespan of this devices has been 4 years, while the average lifespan of the washing machines where the respondents have been positively surprised was 14 years.

countries revealed, that high purchase price and lack of further disruptive new features have slowed down consumer replacement rates of older phones with new. This has also led to increased demand for repair services and for second-hand phones as consumers become aware of their high commodity value. And businesses are exploiting the new opportunities by developing circular business models and services that gain value from extending the lifetime of phones [21].

2.3.1 Socioeconomic impacts

A study on behalf of the European Commission [22] investigated the potential socioeconomic impacts of different measures to support repair for four product groups (washing machines, dishwashers, vacuum cleaners and coffee machines). The investigated scenarios covered measures to ensure:

- availability of spare parts for at least a certain amount of years,
- provision of information to consumers on possibilities to repair the product,
- provision of technical information to repair professionals and
- provision of technical information to consumers to facilitate simple self-repairs.

The assessment revealed positive social impacts for the EU, while the impacts of all scenarios are distributed differently among stakeholders: “A small slowing down on the projected increase of the turnover appears, especially on manufacturers and retailers. Specifically for manufacturers part of this loss will appear outside the EU where a large share of products are manufactured. On the other hand, the gains of turnover on the repair sector will occur largely on SMEs and social enterprises located in the EU. This increase might be partially absorbed by retailers and manufacturers as new opportunities for the development of in-house retail services might appear. In addition, research and development activities are expected to increase so that any technology-related requirements needed to implement the scenarios are met. Simultaneously, the administrative burdens both for businesses and public authorities will be limited” [22, p. 86].

With regard to the impact on jobs the study concluded “As in the case of the economic impacts, there will be some reductions on the projected increase of jobs, part of which will occur outside the EU. However, the creation of a significant amount of jobs in the repair sector corresponds to the development of quality jobs, largely in SMEs and smaller companies” [22, p. 86].

2.3.2 Taxation rebate

In order to promote repair, it is necessary to balance the unfavourable price relationship between labour-intensive repair work and the purchase of new products, which are often produced in automated manufacturing or low-wage countries.

The value added tax (VAT) rate represents a potential point of intervention. The EU Directive on the value added tax system [23] provides the possibility for member states to apply reduced VAT rates for locally provided labour-intensive repair services (repair services for bicycles, shoes, leather goods, clothing and household linen including mending and alterations).

In addition to VAT, income tax is also a suitable instrument for this purpose. Labour costs for the repair of household items (including large electrical appliances) can in some member states already be claimed as craftsmen’s services within the frame of tax relief.

Sweden brought both instruments into force to support longer product service life: 1) a reduction of VAT from 25 % to 12 % for consumer goods repair, such as bicycles and clothes, 2) an income tax credit for repair of household appliances, such as washing machines and refrigerators. The latter may give 50 % of the cost of work performed up to a yearly limit. The measures apply from 1 January 2017 and are expected to be evaluated in the near future.[6]

2.4 Consumer information on lifetime and guarantee

Lifetime is one of several planning parameters taken into account in the process of designing and manufacturing components and parts of appliances. Since consumers do not have access to these parameters, this lack in transparency results in consumers not being able to make purchasing decisions based on their own needs (asymmetric information). Therefore measures to improve consumer information are important instruments that allow consumers to make purchasing decisions in favour of long-lived products. However, it must be feasible for the market surveillance authorities to verify compliance with such information requirements. The Ecodesign Directive provides for example information requirements on the lifetime of lamps [24] or the number of charging cycles that the batteries of notebook computers can withstand [25]. However, longer lasting products are subject to restrictions with regard to verifiability of lifetime information as described in Chapter 2.1.

As part of the debate on obsolescence there are currently discussions on a potential extension of the statutory legal guarantee period (beyond a two-year period), possibly in combination with an extension of the period for the reversal of the burden of proof (beyond a six-month period). Adjustments to the statutory legal guarantee period and the period for the reversal of the burden of proof are generally legally permissible. However, there are limitations and therefore there are certain doubts as to whether the legal guarantee legislation is indeed suited to sufficiently addressing premature product failure.

A legal guarantee as in the EU-Consumer Rights Directive [26] affects the relationship between buyer and seller. However, it is the manufacturer who has a direct impact on product characteristics such as the product's lifetime. Moreover, a legal guarantee only covers defects that existed at the time of delivery (i.e. the passing of the risk); it does not cover subsequent wear and tear.

2.5 Eco-labels and durability

Ecolabels are an established means of guiding consumer choices towards product and service options with better environmental performance. The award criteria of ISO Type I product-specific ecolabels are based on life cycle approaches and aim at steering the market into an environmentally less harmful direction.

Requirements on durability, reparability and availability of spare parts have been important requirements for Type I ecolabels like the European Ecolabel, the Nordic Swan, the Blue Angel, the Austria Ecolabel and others since their implementation.

Suikkanen and Nissinen [27] analysed Product Group Specific Criteria Documents of two ISO Type I Ecolabelling Schemes: the EU Ecolabel (Flower) and the Nordic Ecolabel (Swan). Product-group-specific criteria included requirements on durability, upgradability and reparability. Many of the EU

6 Information from Swedish Tax Agency.

Ecolabel product groups include requirements for design for reparability and availability of spare parts. The criteria then require design that allows a professional engineer or service personnel to change parts with tools that are normally available for them. The criteria for Flushing Toilets, Water Based Heaters, Imaging Equipment, Computers, Televisions, Furniture and Mattresses have an obligatory commercial guarantee period, which ranges from 2 to 10 years depending on the product group. Other durability requirements include product quality, durability testing and mechanical resistance criteria. A similar approach can be found for the other type I Ecolabel like Nordic Swan, Blue Angel and Austrian Ecolabel.

Suikkanen and Nissinen remind that the underlying motivation in the transition to circular economy is to create more value from fewer resources, and that one approach to value creation is increasing the amount of time during which a resource provides value [29].

2.6 Product Group examples

2.6.1 Data on electrical and electronic appliances

The service life of many electrical and electronic appliances, such as refrigerators, smartphones or television sets, are indeed getting ever shorter. This has been shown in a study commissioned by the German Environment Agency and conducted by the Öko-Institut e. V. and the University of Bonn [2], which investigated 13 product groups of electrical and electronic appliances. There are many reasons for premature new purchases. Especially in the area of consumer electronics and in information technology, technological leaps or the desire for a new device often trigger new purchases (i.e. psychological obsolescence). At the same time, however, increasing numbers of appliances fail within the first five years of their service life – for example, the number of large household appliances being replaced within the first five years of their service life due to a defect (i.e. material obsolescence) increased from 3.5 % in 2004 to 8.3 % in 2013 (see Figure 2). This phenomenon was evidenced in another study on obsolescence, which highlighted that smartphones are replaced more often than T-shirts due to a variety of reasons, which include restricted functionality (of the old smart phone) and desire for a new product in the first place. Interestingly, the leading reason for a new purchase depends on the investigated target group (e.g. over 30 versus under 20), [17].

Journalistic investigations highlighted also that in certain cases, failures of products are due to the employment of very cheap, low-quality components (such as condensers or resistances in electronical appliances, etc.) during the production phase [30]. The investigations also highlighted that such failures might be even easy and cheap to be detected and repaired; but often, consumers are discouraged by the perceived burdens to bring the appliance to repair (e.g. high repair costs, lack of time, etc.) causing the replacement of the appliance with a new purchased one.

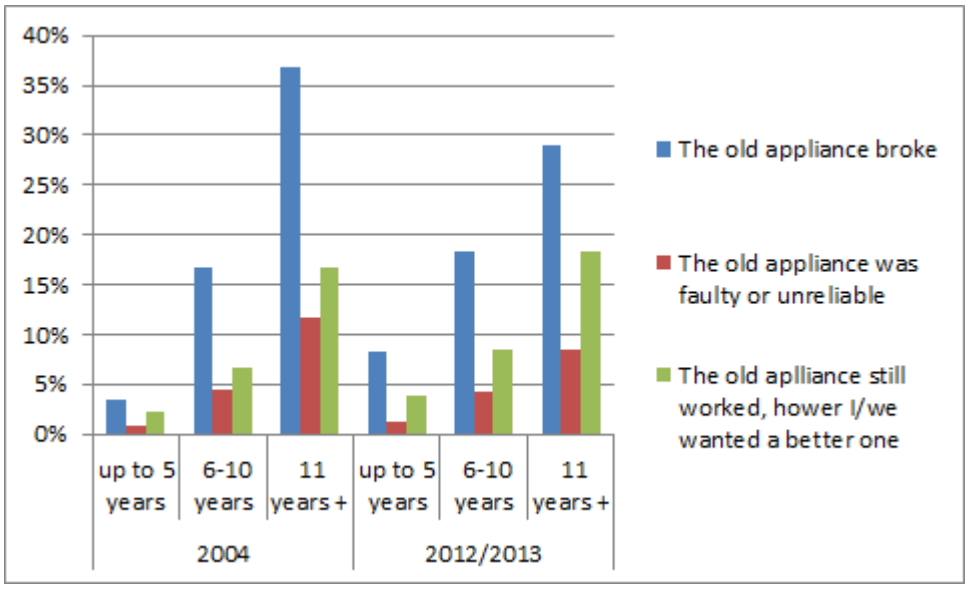

Figure 2: Percentages of replaced large household appliances according to age and reason for replacement [2].

Available recorded data for certain products show their perceived service life. Dissemination of actually perceived lifespan could inform users and support longer lasting use of a product. Some of the widespread disbelief about product endurance could be overcome.

Table 2: Average service life of products. Experience values in years[7]

Product	***Durability, years***
freezer	> 15
domestic oven	14-19
printers, PC, etc.	~ 5
LCD TV-set/screen	4-7
average washing machine, dish-washer, wash dryer, fridge and freezer	> 10

The table gathers some reported use experience data. Data for this kind of long lasting products are available from households and manufacturers.

2.6.2 Textiles Useful Life

The environmental and resources saving potential by extending textiles useful life is high. Prolonged use of garments and other textiles would have various implications for the production system, recycling, and reuse. But today much of these aspects are neither implemented in practice, nor promoted by any kind of policy measure. In fact, trends go in the opposite direction, and growing amount of products which are not adapted for a longer use time enter the market.

[7] See [2], [9] and Gifam.fr

Design, aesthetics and fashion may have a role in promoting current consumption patterns, but they might also leverage and promote more sustainable use of textiles. A garment is normally not worn out until after 100-200 wearing occasions, but the actual use pattern today is by far much shorter.

Quality aspects of textiles are not yet adressed by any EU mandatory instrument. Different instruments may be considered e.g., the textile fibre labelling regulation [31] could be complemented with provisions addressing textile performance. Possible parameters relating to useful life are quality requirement based on e.g. a "tear and wear"-test and number of washing cycles and loss of fibres[8]. Recycled material content and sustainability of material employed in the production phase could be other factors to be considered. It has been suggested to set up a regulatory instrument on labelling textile products for the content of dangerous chemicals [32]. As an option, such an instrument may also include useful life-related parameters.

2.6.3 Regulation for Motor Vehicles

Useful life definitions are set for exhaust emission control systems in road vehicles. These may be expressed as limits for minimum years of use, distance driven, and/or engine running times. The requirements are performance based. The principle is that the emission limit values should be complied, and parts of the vehicle that belongs to the emission control system should not need repair or replacements before the useful life of the exhaust emission control system is reached. For cars, these limits have been already extended a couple of times to take into account improvements in available technical solutions, responding to environmental concerns and consumers demand. Figure 3 sums up aspects of the development in a simplified way. It displays durability requirements for stages of emission control technology for petrol-fuelled cars starting with the introduction of catalysts. The regulation on type approval of motor vehicles (euro 5 and euro 6), [33] requires that durability testing of pollution control devices for type approval shall cover 160 000 km.

[8] E.g. based on ASTM D3181 Tear & Wear Test, ASTM 4966 or ISO 12947-2:2016 Abrasion Test.

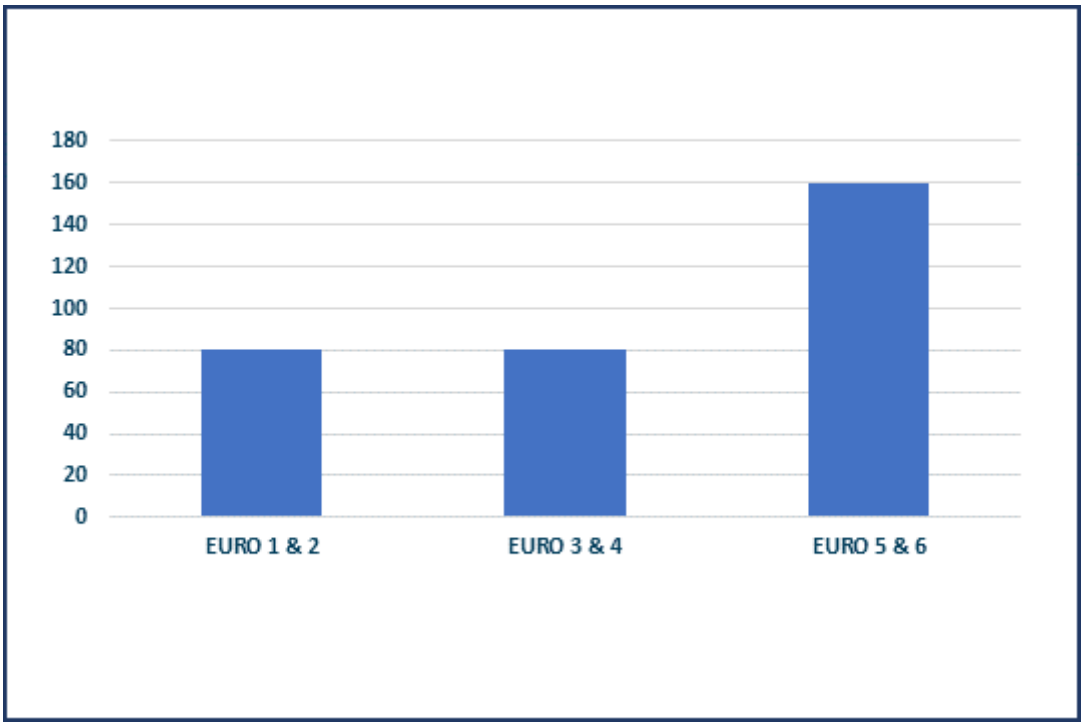

Figure 3: Car Emission Technology Useful Life compliance at x1000 km.

3 Core actions and policy instruments

In order to decrease environemtal impacts and increase resource conservation, it would be beneficial to introduce measures countering obsolescence. The following core recommendations address stakeholder, and especially policy and decision makers at the European level. They are intended to support and inspire the present debate on circular economy and the development of adequate policy measures.

A priority must be a reliable minimum product lifetime during which repairs will only very rarely be necessary if at all. Moreover, there is a need to lowering barriers to repairing. This is not only meant as the technical feasibility of repairing an item (product reparability), but also as the availability of repair services, of the information required to carry out repairs including diagnostic software tools, as well as of the provision of affordable spare parts for adequate periods of time. The increasing complexity of modern products and remote-controlled software-based error diagnostics is a great challenge for independent repairers. Therefore, there is a need to improve the framework conditions for independent repair services.

Other important instruments include measures to improve consumer information (e.g. on the availability of spare parts or unambiguous declarations of wearing parts) with a view to supporting decisions by consumers to purchase products with longer lifespans.

However, consumers must also make their contribution by using products for as long as possible, by repairing (e.g. in repair cafés) items or letting them be repaired, or by passing items they no longer use on to other users (e.g. in swap shops). Moreover, legal horizontal provisions are recommended, like a manufacturers' duty to declare and commit to a self-determined guaranteed product lifespan (duty to issue a guarantee statement).

1. **Establishment of product requirements with regard to minimum lifetime and reparability, potentially initially for product components as a first step:**

The EU Ecodesign Directive [10] already offers a suitable regulatory framework for product-specific requirements in terms of the lifetime of energy-related products. When existing regulations are under review or new regulations are being passed, requirements for product lifetime or at least for the lifetime of components particularly prone to defects should be set out where appropriate and verifiable.

With its Action Plan for the Circular Economy [6] the EU Commission announced that it will promote, amongst other aspects, the reparability, upgradability and durability of products and develop, as appropriate, product requirements in its future work under the Ecodesign Directive. When establishing minimum requirements under the Ecodesign Directive, it will be important to ensure verifiability (reproducibility and testing effort) so as to enable market surveillance authorities to verify compliance with such requirements.

Therefore, lifetime should be considered as an important aspect when regulations are adopted or reviewed. However, it will probably not be possible that product-specific implementation measures will be adopted for all energy-related products, especially for smaller devices, for which an implementing measure might not be developed. Moreover, the scope of the Ecodesign Directive is currently limited to energy-related products. Complementary measures such as the manufacturer's duty to issue a guarantee statement (see point 3 below) could mitigate these limitations as well as the constraints in terms of verifiability described earlier.

When setting up requirements for new products or revising regulations under the Ecodesign Directives, requirements on providing information on production date on the name plate may be introduced. For example, such information are available already for pumps. But a drawback is that this is very patchy, due to separate law making for each product types, e.g. fridges are not required to carry the production date.

Aspects of durability and reparability should be further strengthened in Ecolabels. Future revisions of product-specific criteria present further opportunities to apply requirements on extended product life times, and especially upgradability and reparability, for a broader range of product groups. In addition to increase the requirements on longer life spans of products, various models of value creation by using more durable ecolabelled products should be researched. This could include, for example, creating ecolabel criteria for sharing economy services.

The evaluations of the Ecodesign Directive [34, 35] did not recommend the extension of the Ecodesign Directive to non-energy related products. However, under the perspective of resource efficiency, it need to be investigated again which reduction of environmental impact could be tackled for non-energy-related products. It is particularly important to seek ways to improve the use patterns of large volume products with potentially large environmental burden. An example are textile products, for which requirements for the various aspects of durability have been prepared by several Type I eco-labels, like the EU Ecolabel (Flower) and the German Blue Angel, and the Nordic Ecolabel (Swan). A recent project funded by the Nordic Council of Ministers drafted possible eco-design requirements for textiles and furniture [36].

2. Information on reparability:

Consumers would be able to better to assess the reparability of a product during the purchase if they were given information on the period of time for which spare parts will continue to be available and on their costs. Therefore the Interest Group on Green and Circular Economy supports the EU Commission's announcement to explore the possibility of relevant horizontal requirements under the Ecodesign Directive. Moreover in general, methods should be developed to communicate the reparability of products to the consumer at the point of sale, including availability of spare parts and repair services as well as technical reparability (e.g. accessibility and exchangeability of components).

3. Introduction of a mandatory obligation to indicate a guaranteed lifespan (manufacturer's duty to issue a guarantee statement):

It should be made mandatory for manufacturers to indicate a manufacturer's guarantee statement for their products [37, 38]. This should include the possibility to make a so-called "zero statement", i.e. to indicate a "zero" period and thus to not offer guarantee cover. In contrast, a period greater than "zero" would represent a material guarantee that is binding for the manufacturer. If the product's lifetime falls short of the stated period, the buyer should have the right to claim product repair under the commercial guarantee (e.g. repair, reimbursement of the sales price, or replacement of the item). While the legal guarantee under sales law governs the relationship between seller and buyer, such an instrument would allow for claims to be made directly against the manufacturer, thus holding liable those that are responsible for the product's constitution. The fact that the product would be guaranteed to be free of defects not only at the time of purchase but for the entire commercial guarantee period, would be another advantage. This instrument should preferably be established at the European level where it could be linked to the Consumer Sales Directive [39], which in its Article 6 establishes minimum requirements for voluntarily given guarantees set out in consumer contracts. In accordance with Article 8 (2), Member States may adopt more stringent provisions, therefore the instrument could also be introduced at national level. This option for Member states should be preserved at the present decission about a Proposal for a Directive on certain aspects concerning contracts for the (online) sales of goods[9].

Additionally, a prolongation of the general legal guarantee is useful especially with an extension of the period for the reversal of proof to two years. However for products with a traditional much longer life time (for example large household appliances), further measures are needed. While we expressively support the activities for standardization to pave the way for minimum lifetime requirements, we recognize the limitations to measure life time and to execute market surveillance. Therefore we would be in favour of the obligatory commercial guarantee statement. In case a commercial guarantee statement is not supported, we recommend prolonging legal guarantee rights for explicitly named product categories.

4. Improved framework conditions for repairs:

Available spare parts, repair instructions and diagnostic software should always be available also to independent repairers and repair initiatives as well as to re-use centres. The provisions in force with

[9] COM(2015) 635 final. The Commission has adopted an amended Proposal (COM(2017) 637 final), which extends the scope of the initial proposal to cover also face-to-face sales.

respect to motor vehicles[10] set an example in this regard. The relevant provisions should also be applied to electrical and electronic appliances.

Additionally, a significant number of repair initiatives have been established based on civil society engagement. For reasons of cost it is likely that repairs of appliances in certain product groups will only be carried out if the consumers themselves are able to do so (e.g. changing a smartphone display), which also necessitates access to repair instructions and spare parts.

Furthermore the development of repair- and reuse networks should be supported by information and education measures and funding.

5. Reduced value added tax for repair services:

The EU Directive on the common system of value added tax [23] already permits the use of reduced VAT rates for locally provided, labour-intensive repair services (e.g. repair services for bicycles, shoes, clothing and household linen). An examination of the possibility of extending reduced VAT rates to other repair services may be undertaken and discussed. These aspects could be introduced into the current discussion on the proposal of the Commission to modernize the value added tax system, by establishing the destination principle and by granting member states more leeway for setting VAT-rates.

Member states can also decide that labour costs for repairs of household equipment (repaired within and outside the household) are tax-deductible in the context of income tax. For this purpose, a catalogue of household goods may be drawn up (particularly including electrical and electronic equipment), for which labour costs of repair (outside the household) can be taken into account within the tax return.

6. Strengthening product appreciation:

Psychological obsolescence due to fast fashion trends is often a reason for consumers to dispose goods which are still fully functioning. Awareness campaigns targeting both producers and consumers would be necessary. This should inter alia make clear what impact virgin production have on environment and health, including the use of water, energy, chemicals, etc.

Measures and initiatives contributing to extended product service live and joint use of products should be afforded greater support. This includes e.g. structural funding for such initiatives. Measures to promote re-use should be strengthened as part of the advancement of the circular economy. The potential for reuse might be particularly relevant for a variety of goods and products such as electric and electronic appliances, furniture, vehicles, toys, etc.

For example, www.willhaben.at is an Austrian platform for private, second hand sell of goods of any kind, with an average of 100.000 insertions per day and over 4.7 million insertions registered. It was visited over 40.2 million times since its creation in 2006. Clearly, the digitalization of market places boosted the possibilities for private selling of goods. Hence the potential of online, second hand markets for tackling the consumption model “buy – use- throw away” should also be taken into account. This also suggests that in the future, “second hand markets for broken goods” might be

[10] Regulation (EC) No. 715/2007 [33], the respective implementing regulation (EC) No. 692/2008 [40] as well as the amendment of both by regulation (EU) No. 566/2011 [41].

established for the supply of spare parts needed from repair centres. This would bring an economic value also to unwanted end of life goods.

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