**Electronic waste and the Circular Economy: Environmental Audit Committee**

Written evidence submitted by Professor Tim Cooper, Sustainable Consumption Research Group, Nottingham Trent University (NTU).

1. **Executive Summary**
   1. A circular economy demands longer product lifetimes, improved upgrading, repair and maintenance services, reuse whenever appropriate, and recycling as a last resort. Most companies in the electrical and electronic goods sector use a traditional, linear, business model that is based on a high throughput of goods.
   2. The current consumption of electrical and electronic goods is unsustainable. Many such goods are unduly short-lived. Some are criticised for planned (or ‘premature’) obsolescence. Consumer expectations of product lifetimes are too low.
   3. Current product standards do not prevent the supply of electrical and electronic goods with inadequate lifetimes.
   4. Consumers need to be better informed about the anticipated lifetime and repairability of electrical and electronic goods. Labelling and differentiated warranties could be used to indicate durability and reliability.
   5. Many faulty goods are discarded because replacement is more attractive than repair. Tax reform could be used to support commercial repair and reuse services.
   6. Electrical and electronic goods need to be maintained carefully.Community repair initiatives and networked learning are enabling owners to gain skills and knowledge to repair products.
   7. Reuse improves resource efficiency and contributes to a circular economy. The WEEE Directive has not provided sufficient incentive for companies to redesign their products and does not ensure that reuse is prioritised over recycling.
   8. The proportion of discarded electrical and electronic goods that are recycled (especially small appliances) remains too low. Collection systems need to prevent damage to large items and ensure that fewer small items are discarded in residual waste streams.
   9. UK Government policy towards a circular economy needs to encourage increased product longevity alongside recycling.
2. **Submission**

This submission responds to questions laid out in the terms of reference for the inquiry published in July 2019. It focuses on topics on which experts at NTU have undertaken research over the past decade and, specifically, the longevity of electrical and electronic goods.

**Implementing a Circular Economy for Electronic Goods**

* 1. **What steps are being taken to move towards a circular economy for electronic goods? How can the UK Government support this transition?**

**Define the circular economy clearly**

* + 1. The starting point for the UK Government must be an appropriate definition of the circular economy. A strategy focussed primarily on recycling has serious limitations as, while preferable to the use of virgin materials, the recycling process also has negative environmental impacts:
    - Each stage, from collecting discarded products to sorting and disassembly, processing, and the manufacture and distribution of new products, requires resource use (e.g. industrial equipment, vehicles, energy).
    - Processing used products may release toxic materials that were previously locked up.
    - Satisfactory quality may only be achievable by mixing virgin material with recycled material, and some materials are not recyclable.
    1. Much discussion on the circular economy focusses on the recovery of materials from discarded products for use in new products. This, however, represents only one element. The Ellen MacArthur Foundation’s widely used [butterfly diagram](https://www.ellenmacarthurfoundation.org/circular-economy/infographic) shows several other loops in a circular economy: maintain and prolong, reuse and redistribute, and refurbish and remanufacture. The circular economy requires measures that will increase the intrinsic durability of electrical and electronic goods and enable product life extension through reuse, upgrading and repair (e.g. design for disassembly, improved reuse and recycling infrastructure).
    2. *A circular economy demands longer product lifetimes, improved upgrading, repair and maintenance services, reuse whenever appropriate, and recycling as a last resort. Most companies in the electrical and electronic goods sector use a traditional, linear, business model that is based on a high throughput of goods.*

**Address premature obsolescence**

* + 1. Research studies in the Netherlands and Germany have concluded that electrical and electronic goods do not last as long as in the past. Our own research, [*Consumer expectations of product lifetimes around the world: a review of global research findings and methods*](http://ebooks.iospress.nl/volume/plate-product-lifetimes-and-the-environment-conference-proceedings-of-plate-2017-8-10-november-2017-delft-the-netherlands), indicated that consumers’ expectations of product lifetimes are in decline, and that those in the United Kingdom appear to be lower than those in other parts of the world.
    2. Almost 20 years ago a study by Tim Cooper and Kieren Mayers, [*Prospects for Household Appliances*](http://irep.ntu.ac.uk/id/eprint/6671/1/201121_7265%20Cooper%20Publisher%20rescanned.pdf), found that almost one half of householders interviewed (45%) indicated that, in general, appliances did not last as long as they would like. They most frequently identified wet appliances (e.g. washing machines, dishwashers), small work or personal care appliances and vacuum cleaners as products that they would like to last longer. Similar research is shortly to be undertaken to see how the situation has changed over this period.
    3. Planned obsolescence (latterly renamed ‘premature’) has long been a concern of consumers. The *EU Action Plan for the Circular Economy* commits the European Commission to an independent testing programme to help identify issues relating to planned obsolescence and ways to address them.
    4. In 2013 the European Economic and Social Committee proposed “a total ban on products with built-in defects designed to end the product's life.” Within two years the French Government had passed legislation making planned obsolescence - defined as a range of techniques through which a product has its life intentionally reduced by a producer in order to increase its replacement rate - an offence punishable by a substantial fine and two years' imprisonment.
    5. Concern about planned obsolescence is especially evident with regard to mobile phones. Our research on mobile phones and the circular economy for the forthcoming [*Oxford Handbook of Mobile Communication and Society*](https://www.oxfordhandbooks.com/) has exposed many of the issues raised and highlighted the potential for change as exemplified by the Fairphone. In 2018 AGCM, the Italian competition authority, used legislation on unfair commercial practices to fine Apple and Samsung on the grounds that software updates had slowed the performance of older phones “causing serious malfunctions and … thus accelerating phones’ substitution.”
    6. *The current consumption of electrical and electronic goods is unsustainable. Many such goods are unduly short-lived. Some are criticised for planned (or ‘premature’) obsolescence. Consumer expectations of product lifetimes are too low.*

**Maintain standards set under the Ecodesign Directive**

* + 1. In 2013 a provision was introduced to the Ecodesign Directive (2009/125/EC) allowing “extension of lifetime” to be used as a parameter for improving the “environmental aspect” of products, and was applied to vacuum cleaner motors and hoses. Extension of lifetime can be expressed through a minimum guaranteed lifetime, minimum time for availability of spare parts, modularity, upgradeability and reparability.
    2. In responding to the European Parliament’s resolution ‘on a longer lifetime for products: potential benefits for consumers and companies’ (2016/2272(INI)), the European Commission (SP/2017/619) reaffirmed that durability and reparability will be considered in future implementation of the Ecodesign Directive and noted that European Standardisation Organisations are developing generic standards to underpin criteria for circular design (including durability, upgradeability, ability to repair and facilitate reuse).
    3. *Current product standards do not prevent the supply of electrical and electronic goods with inadequate lifetimes.*

**Enhance environmental labelling**

* + 1. Consumer awareness of anticipated product longevity could be increased through the introduction of lifetime labels. In 2016 the European Economic and Social Committee explored whether such labels might influence consumers' purchasing decisions using four possible types of label (lifespan in years or months, useful lifespan in terms of cycles, cost per year, a longevity scale from A to G). The research suggested that such labels would influence purchasing decisions in favour of products with longer lifespans.
    2. In 2018 a European Commission report found that the provision of durability information led consumers to be nearly three times more likely to choose products with the highest level of durability, and also indicated their willingness to pay a premium for additional durability. It thus confirmed a survey for WRAP in 2013 which found that around one half of respondents would be willing to pay more for a fridge, washing machine or vacuum cleaner with a longer advertised lifetime.
    3. The *EU Action Plan for the Circular Economy* promised a labelling system for energy-related products that will “allow for the displaying to consumers of information on the environmental performance, including durability, of energy-related products.”
    4. *Consumers need to be better informed about the anticipated lifetime and repairability of electrical and electronic goods. Labelling could be used to indicate durability and reliability.*

**Lengthen warranties**

* + 1. In the absence of access to information on the technical life of products, the length of guarantees (or ‘warranties’) can serve as a proxy for intrinsic durability. Our research paper [*Evaluating approaches to resource management in consumer product sectors: An overview of global practices*](https://www.sciencedirect.com/science/article/pii/S0959652619309047) concluded that, in practice, many manufacturers do not use guarantees to differentiate the quality of their products from those of competitors, and that guarantees do not reflect the technical lifetime of products such as washing machines and refrigerators. Our research identified a range of guarantees on large kitchen appliances and, in the case of small appliances, some long guarantees on parts (for instance a 30-year warranty on motors of food processors and juicers).
    2. A report in 2017 by the European Parliament’s Policy Department for Citizens’ Rights and Constitutional Affairs argued that “existing EU law meets the requirements of a policy to support sustainable consumption with regard to the lifespan of consumer goods in only a very limited way.” It developed an EU lifespan guarantee model, which could be implemented through amendments to consumer legislation and the Ecodesign Directive.
    3. *Differentiated warranties could be used to indicate the durability and reliability. of electrical and electronic goods.*

**Introduce tax reform**

* + 1. Reforming the tax system is essential in order to progress towards a circular economy. Environmental tax reform (or ‘green fiscal reform’), switching taxes from labour to natural resources, need not imply any change in overall tax revenue.
    2. RREUSE, The European Re-use and Recycling EU Social Enterprises network, has [reported](http://www.rreuse.org/wp-content/uploads/RREUSE-position-on-VAT-2017-Final-website_1.pdf) that many countries in Europe incentivise repair and reuse through the tax system. For example, in 2017 the Swedish Government reduced the rate of VAT on repair work on bicycles, clothes, household linen, leather goods and shoes from 25% to 12% and introduced a tax allowance for households to encourage them to repair large appliances. In 2019 the Czech Government announced similar measures. The UK lacks such incentives. Although donated items that are re-sold are VAT exempt if sold by a registered charity or by a person (or company) who has agreed in writing to give all profits to a charity, any organisation that is not a charity has to charge VAT.
    3. *Many faulty goods are discarded because replacement is more attractive than repair. Environmental tax reform could be used to support commercial repair and reuse services.*

**Repair and maintenance initiatives**

* + 1. Design affects both the technical feasibility and cost of repair and maintenance. Once purchased, owners need to maintain electrical and electronic goods carefully for their anticipated lifetimes to be realised. There has been a rapid increase in community repair initiatives in response to concern that many people lack the skills, ability or confidence to repair, even for relatively simple issues such as fixing loose wiring or replacing components.
    2. Our [report](https://therestartproject.org/wp-content/uploads/2018/03/Community-Repair-Research-2018-Report-NTU-Restart.pdf) for the Restart Project, based on a survey of its Repair Party participants, found that such events enable people to gain knowledge and skills, including laptop servicing skills, device disassembly, how to locate repair manuals, and how to recycle devices. Some respondents also reported that attendance improved their confidence to undertake repairs on their own.
    3. In our research study for Defra, [*Dirt, Damage, Servicing and Repair*](http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=19371#Description), we explored the maintenance of vacuum cleaners, the second largest source of embodied emissions among electrical products in the UK, which consumers, on average, expect to last only 5 years. Survey evidence revealed that:
* Consumers do not always use products carefully (20% “vacuum quickly to get the job done even if it risks causing marks on the machine”; 43% “do not care if the vacuum shows visible signs of wear”).
* Many consumers do not undertake regular maintenance or have products serviced (only 62% regularly “ensure the brush head is free of hair or dirt”; 67% believe that either vacuums “do not need servicing” or “servicing is unrealistic”).
* Some consumers are reluctant to repair faulty products (29% “do not worry about an unusual noise or smell”; 14% “do not consider that vacuums are worth repairing”).
* Consumers may discard products prematurely (44% stopped using their vacuum because “it didn’t work efficiently”, only 34% because “it didn’t work at all”).
  + 1. Our recent, as yet unpublished, research on repair suggests that, with many goods being outsourced from the Far East, collaboration between stakeholders - including suppliers, manufacturers, retailers, repair service providers and consumers - is vital in order to strengthen markets for repairable products and repair services. Potential benefits to industry stakeholders could be a more sustainable revenue stream and enhancement of brand awareness and loyalty.
    2. A report in 2018 by the European Commission on consumer engagement in the circular economy proposed policies to make repair easier, create financial incentives for reparability and durability, and make durability and reparability information available at the point of sale.
    3. *Electrical and electronic goods need to be maintained carefully. Community repair initiatives and networked learning are enabling owners to gain skills and knowledge to repair products.*

**The UK’s Electronic Waste Sector**

* 1. **How can secondary markets for electrical goods be improved? What incentives are required to implement these markets?**

**Is UK public awareness of e-waste recycling satisfactory? If not, how can it be improved?**

**Increase reuse**

* + 1. Our waste reduction research, summarised in a briefing note for the Centre for Industrial Energy, Materials and Products (CIE-MAP) entitled [*Resource efficiency and lower carbon emissions through waste reduction*](https://www.ntu.ac.uk/research/groups-and-centres/centres/centre-industrial-energy-materials-products), used stakeholder interviews in the waste sector to gain the following insights.
    2. Reuse takes place through many different routes and involves many actors. This complexity makes monitoring and increasing reuse challenging.
    3. Recycling is commonly preferred to reuse by waste managers, reflecting a systemic problem with the collection and handling of discarded goods.
    4. A life-cycle approach is needed to increase reuse, from changing design to improving reverse logistics operations for discarded items.
    5. Recovery routes and practices should enable discarded items to remain in good condition. Improved reverse logistics, including more convenient disposal points for unwanted goods, would benefit consumers and enable manufacturers to recover value from discarded items.
    6. Recovery is generally limited at present to materials that are easily salvageable. Recycling processes need to recover critical raw materials present in small quantities.
    7. Legislation should address barriers to repair, individual producer responsibility, and appropriate standards in the reuse sector.
    8. Upcycling is mostly limited at present to small scale, craft-based enterprises but has potential to be scaled-up considerably.
    9. *Reuse improves resource efficiency and contributes to a circular economy.* *The WEEE Directive has not provided sufficient incentive for companies to redesign their products and does not ensure that reuse is prioritised over recycling.*

**Increase public understanding of waste options**

* + 1. The aforementioned CIE-MAP research concluded that information for consumers concerning repair, reuse and recycling remains inadequate. There is confusion around collection networks, particularly for small electrical goods, which often end up in residual waste streams.
    2. *The proportion of discarded electrical and electronic goods that are recycled (especially small appliances) remains too low. Collection systems need to prevent damage to large items and ensure that fewer small items are discarded in residual waste streams.*

1. **Recommendations**

*UK Government policy towards a circular economy needs to encourage increased product longevity alongside recycling.*

* 1. **The circular economy**

**Define the circular economy clearly**

* + 1. The UK Government report *Our Waste, Our Resources: A Strategy for England* defined the circular economy primarily in terms of product life extension activity (e.g. repair, reuse): “keeping resources in use as long as possible.” It said little about the need to design products for longevity from the outset. This essential dimension of the circular economy should be included in future pronouncements.
  1. **Design and Manufacture**

**Address premature obsolescence**

* + 1. In the light of recent debate on premature obsolescence the UK Government should indicate whether it recognises the existence of premature obsolescence in the electrical and electronic goods sector and, if so, how it will be addressed after Brexit.
    2. Circular business models that promote longevity need to be developed and the case for their implementation promoted. WRAP should receive adequate funding to ensure the success of its Electrical and Electronic Equipment Sustainability Action Plan 2025.

**Maintain standards set under the Ecodesign Directive**

* + 1. Government, industry and NGOs should work together to develop agreed standards for longevity that remove unduly short-lived electrical and electronic goods from the market.
    2. The UK Government should commit to technical co-operation with the EU on the Ecodesign Directive and apply equivalent product standards and rules after Brexit. Such standards should be recognised in any future trade deals beyond the EU, e.g. with the USA.
  1. **Purchase**

**Enhance environmental labelling**

* + 1. Labelling is an important means of communicating information to consumers. The UK Government should introduce measures requiring producers to provide information on anticipated product lifetimes and the repairability of goods at the earliest opportunity.

**Lengthen warranties**

* + 1. The UK Government should promote the use of longer and differentiated warranties that signal the intrinsic durability of goods with greater consistency. It should also review the EU lifespan guarantee model in the aftermath of Brexit, including the possible need to amend consumer legislation.
  1. **Use**

**Introduce tax reform**

* + 1. Repair and reuse should be incentivised through the tax system. As such services are labour-intensive, environmental tax reform could take the form of reducing employers’ national insurance contributions for repair and reuse companies and zero-rating VAT.
    2. More generally, the UK Government should reconsider introducing variable weight charging for waste collection in order to discourage a throwaway culture and to correct the market failure which allows the environmental cost of consumption to be paid by third parties (households) rather than directly by consumers.

**Repair and maintenance initiatives**

* + 1. The UK Government should work with industry to encourage better maintenance of products through, for example, ensuring access to repair manuals for independent repairers and owners, and the availability of spare parts at reasonable cost.
    2. Local authorities should be encouraged and enabled to increase their support for community repair initiatives.
    3. The decline in support for design and technology education needs to be reversed.
  1. **Disposal**

**Increase reuse**

* + 1. The UK Government could improve the operation of secondary markets by:
    - Introducing incentives for repair (such as environmental tax reform) that will enable faulty products to be offered for reuse.
    - Creating increased certainty for consumers through improved product information (such as lifespan labelling and requiring new products to be marked with their date of manufacture) and encouraging longer guarantees for second-hand goods.
    - Enabling free or cheap PAT testing of products for the general public and charities to give confidence in buying and ensure that used electrical and electronic goods are safe to use.
    - Strengthening the WEEE Directive to encourage companies to design electrical and electronic goods for longer product lifetimes and to prioritise reuse over recycling.

**About the author**

**Tim Cooper** is Professor of Sustainable Design and Consumption at Nottingham Trent University. Professor Cooper has specialised in research on product lifetimes for over 25 years, much of it focussed on the electronic goods and clothing industries. During the past decade his research team has undertaken a series of projects on the design, manufacture, maintenance and repair of products aimed at increased product longevity, including a project on vacuum cleaners for Defra entitled *Dirt, Damage, Serving and Repair*. Professor Cooper is author of two recent book chapters, *Mobile Phone Waste and the Circular Economy* and *Slower cycles: An Essential Characteristic of the Circular Economy.* He submitted written evidence to the Environmental Audit Committee Enquiry into *Sustainable Fashion* in 2018 and the Energy and Climate Change Select Committee Enquiry into the *5th Carbon Budget* in 2016, and gave oral and written evidence to the House of Lords Science and Technology Committee Enquiry into *Waste Reduction* in 2008. He served as Specialist Adviser to the Environment, Transport and Regional Affairs Committee for its Enquiry *Reducing the Environmental Impact of Consumer Products* in 1998-99.

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Professor Cooper’s team would be pleased to supply further information to committee members or present oral evidence to the committee. Contact: Rich Pickford at [richard.pickford@ntu.ac.uk](mailto:richard.pickford@ntu.ac.uk) or on 0115 848 2266.