OPERATING AND MAINTAINING PRODUCTS IN A WAY THAT PROLONGS USE
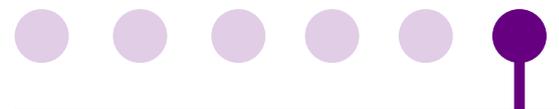
ELLEN
MACARTHUR
FOUNDATION

Discarded consumer products represent a substantial economic and resource loss and contribute to unsustainable resource consumption and waste generation. Solutions to maximise product use in cities can counter these negative impacts. Prolonging the use of products and their component parts is key and can be achieved by models that enable maintenance, repair, refurbishment, and cascaded use where products and parts are resold at reduced prices.

CASE FOR CHANGE

23% of electronic and electrical equipment (EEE) items taken to recycling collection sites in the UK could be resold immediately or viably repaired and then resold[1]

Over their lifecycle EEE items purchased in the UK emit **196 million tonnes** of CO_2[2]

$10bn

15 Mt of furniture are discarded annually in the US. Only **2%** is recovered while the actual potential in the used furniture market has been estimated as **USD 10 billion** per year.[3]

Raw materials account for around **40%** of the cost base of European manufacturing firms. This could be significantly reduced by switching to models that enable the reuse of products, the remanufacture of components, and the recycling of materials[4]

50%

Up to **50%** of people would, under the right conditions, be willing to have used or refurbished products[5]

EXAMPLES OF CIRCULAR ECONOMY OPPORTUNITIES

Empowering repair to extend product cycles

Even though the commercial repair market is well established, products are increasingly discarded when they break because repair seems practically impossible or financially unattractive.[6] However, promoting individual, community, and commercial repair activities can increase product life and resource efficiency while strengthening the local economy. The introduction of digital manufacturing, such as 3D printing, also makes repair more feasible as individuals and businesses can make spare parts locally.[7]
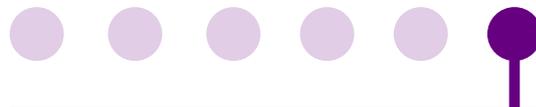
Refurbishing products for reuse

Many products are discarded despite still being functional – perhaps a sofa looks worn or a phone is replaced because a newer model is released. Many of these discarded products are stored for years, losing further value, before finally being disposed of.[8] Recovering these items to upgrade or refurbish[9] to a condition that makes them suitable for resale and reuse is economically feasible and entails little resource consumption for many product groups. While refurbishing might include repair, it can also cover simpler actions such as cleaning or repainting. Certified refurbishing schemes that can guarantee 'as new' product standards with a warranty are increasing in popularity, as they can reduce production costs and purchase prices. Artificial intelligence can help automate and optimise the sorting, classifying, and pricing of recovered items.[10]

EXAMPLES OF WHAT URBAN POLICYMAKERS CAN DO

Through **public procurement**, city governments can support the market for repaired and refurbished products. This could be combined with product-as-a-service schemes where city governments procure access to products in a service contract that includes repair, upgrade, and take-back. **Capacity building** through education and skills development in repair and refurbishment, along with the provision of open repair guides and workshop space, is also key to ensure the local labour market can meet the demand. **Regulations** and **fiscal measures** can incentivise longer use phases, such as via Extended Producer Responsibility (EPR) schemes or tax breaks on repaired or refurbished products.

To explore further see **Policy Levers**

EXAMPLES OF LINKS TO OTHER SYSTEMS AND PHASES

Products: Accessing Product-as-a-service business models will benefit from and incentivise product longevity and thereby increase demand for repair and refurbishment expertise and services.

Products: Designing Design for disassembly to ease repair and refurbishment will be crucial to the business case of these activities.

RELEVANT CASE EXAMPLES

Global platforms for repairers

iFixit is an open-source website and global community of repair technicians and fixers that teaches people and businesses how to fix almost anything. To do this, iFixit is building partnerships with manufacturers to help them create repair organisations, both internally and with their customers.[11]

Inclusive repair programme in Brazilian cities

Through the national Computers for Inclusion programme, cities such as Belo Horizonte and Curitiba are tackling electronic waste, digital exclusion, and youth skill gaps and unemployment simultaneously. The project aims to train young, vulnerable people to refurbish computers that will equip public libraries and schools with fully functioning IT equipment to support digital inclusion of low-income groups.[12] (see Cities case study: *Belo Horizonte*).

Repair and resale community hub in Munich

Halle 2 is a repurposed shoe shop in Munich that has been turned into a multi-purpose hub where residents can purchase second-hand items, access repair services, and take part in events and seminars where they can learn how to repair products themselves. Seven months after its launch, Halle 2 has agreements with 11 partners, allowing it to recruit and train more people. Halle 2 has sent around 3,600 electronic devices for checking, earning EUR 50,000 from the eventual sale of these devices, and has sold a total of 3,250 other items, which have generated EUR 350,000 in revenue.

Remanufacture of office furnishings in Wales

By incorporating reuse specifications in the public tender for its new office fit-out (including office equipment, furniture, and flooring), Public Health Wales (PHW) diverted 41 tonnes of waste from landfill – with a CO_2 saving of 134 tonnes. Additionally, through the careful selection of suppliers, permanent jobs for several disabled and long-term unemployed people were created.[13]

Certified refurbished and pre-owned products

Amazon Renewed is Amazon's platform for used products. The products listed as Certified Refurbished, Pre-Owned, and Open-Box have been inspected and graded to 'Like New' condition and come with a 12 month warranty. The refurbishment process typically includes a full diagnostic test, replacement of any defective parts, a thorough cleaning and inspection process, and repackaging by the seller. Besides being a new revenue channel for Amazon, the platform also helps individual refurbishers to scale their businesses and offers customers cheaper products with a guarantee of quality.[14]

'Pre-consumer waste' – a BRL 7.7 billion opportunity

In Brazil, around 5% of electronic products worth BRL 7.7 billion are returned to their manufacturers due to a flaw or imperfection after which they cannot be sold as new products, because of local regulations. eStoks is a company tapping into this opportunity. They collect the returned products and make use of them. In volume terms, 50–55% of products are refurbished and re-sold and 20–25% are repaired and re-sold. The remaining 10–15% – the most damaged – are dismantled, their components are used to repair other products. eStoks has its own retail stores that offer electronic products at affordable prices, thus opening up technology and high-quality home appliances to lower-income consumers.[15]
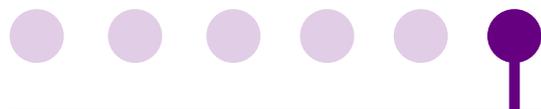
EXAMPLE OF BENEFITS

ECONOMIC PRODUCTIVITY

Capturing additional business opportunities

By only selling products once, brands and retailers are missing out on the opportunity to serve other customer segments. WRAP estimates that the value of 1–3 year-old electrical and electronic products (which cost GBP 2,400 to purchase) in a typical household is roughly GBP 400.[16] Based on this, WRAP estimates the UK market for pre-owned products of these types could be up to GBP 3 billion.[17]

Increasing economic activity

Every 1% increase in activities related to longer product lifetimes (maintenance, repair, rental services, etc.) in Europe has a total net value added of EUR 6.3 billion.[18]

JOBS, SKILLS, AND INNOVATION

Creating jobs in electronics refurbishment

Refurbishing 1,000 tonnes of electronics creates 13 times more jobs than recycling the same amount.[19]

Creating jobs through reuse

In Scotland, up to 150,000 tonnes of reusable materials are currently either being disposed of or being sent to lower-value recycling. Capturing just a quarter of these additional materials could benefit the Scottish economy by GBP 104 million per year and generate an extra 3,000 full-time jobs.[20]

COMMUNITY AND SOCIAL PROSPERITY

Increasing access and inclusion

Pre-used items, such as IT equipment, have a lower cost which makes them more accessible to customers, which is especially beneficial to lower-income groups.[21]

HEALTH AND ENVIRONMENT

Reducing CO_2 emissions through product reuse

WRAP estimates that modest changes in the UK EEE manufacturing and retail sector, which increase reuse by 10%, could reduce CO_2 emissions by 220,000 tonnes.[22]

Reducing CO_2 emissions from EEE and furniture remanufacturing

In Europe remanufacturing of consumer electronics, white goods, and furniture reduced CO_2 emissions by 308,000 tonnes in 2015.[23]

RESOURCE USE

Reducing resource demand in the EEE sector

WRAP estimates that modest changes in the UK EEE manufacturing and retail sector, designed to increase product reuse by 10%, could reduce resource demand by 30,000 tonnes per year.[24]

Saving materials by remanufacturing

In Europe remanufacturing and refurbishment of consumer electronics, white goods, and furniture reduced demand for materials by 226,000 tonnes in 2015.[25]

Saving resources in printer production

A study comparing a standard printer with a modular one found that for the standard model remanufacturing achieved a 25% saving of materials and energy compared to manufacturing a new product, while the equivalent savings for a modular printer, designed for disassembly and remanufacturing, were 50% for materials and 65% for energy.[26]

ENDNOTES

1   WRAP, *Switched on to value: Powering business* (2017) p. 17 http://www.wrap.org.uk/sites/files/wrap/Switched%20on%20 to%20value%20-%20Powering%20business%20change_0.pdf

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3   Ellen MacArthur Foundation, *Furnishare The final stop for quality furniture,* Case Studies https://www.ellenmacarthurfoundation.org/case-studies/the-final-stop-for-quality-furniture

4   WRAP, *Electricals industry could realise £billions in financial benefit,* wrap.org.uk (July 18 2017) http://www.wrap.org.uk/content/electricals-industry-could-realise-%C2%A3billions-financial-benefit

5   Ellen MacArthur Foundation, *Circular Consumer Electronics: An Initial Exploration* (2018)

6   In 2018 US professional electronic and computer repair generated USD 18 billion in revenue, 57,035 companies and 138,866 jobs. Source: IBIS*World, Electronic & Computer Repair Services Industry in the US* (2018) https://www.ibisworld.com/industry-trends/market-research-reports/other-services-except-public-administration/repair-maintenance/electronic-computer-repair-services.html

7   Circulate, *Brands team up to see how 3D printing can revolutionise repair* (November 8 2018) https://medium.com/circulatenews/brands-team-up-to-see-how-3d-printing-can-revolutionise-repair-86d882d2a95d,

8   For example in Australia there are almost as many mobile phones in storage (23 mill) as there are people (25 mill) Source: E. Dominish et al., *"Slowing" and "Narrowing" the Flow of Metals for Consumer Goods: Evaluating Opportunities and Barriers,* Sustainability (2017) p. 7

9   Refurbishing products is here used synonymously with remanufacture and reconditioning as these terms are used interchangeably depending on the product group. Upgrading refers to adding a new component that improves performance or aesthetics, for example adding a new camera in pre-used smartphone.

10   See for example Teleplan case study. Ellen MacArthur Foundation/Google, *Artificial Intelligence and the Circular Economy* (2019) p. 31

11   Ellen MacArthur Foundation, *iFixit,* CE100 member (n.d.) https://www.ellenmacarthurfoundation.org/ce100/directory/ifixit

12   City of Curitiba, *Computadores para Inclusão forma 960 jovens e foca a economia circular,* curitiba.pr.gov.br (May 29 2018) http://www.curitiba.pr.gov.br/noticias/computadores-para-inclusao-forma-960-jovens-e-foca-a-economia-circular/46304

13   European Commission, *Public procurement for a circular economy Good practice and guidance* (2017) p. 11 http://ec.europa.eu/environment/gpp/pdf/Public_procurement_circular_economy_brochure.pdf

14   Amazon Renewed, *Shop Refurbished, Pre-Owned and Open-Box Products on Amazon Renewed,* amazon.co.uk https://www.amazon.co.uk/b/ref=UK_CR_helppage-link/?node=8362590031

15   Ellen MacArthur Foundation, *'Pre-consumer waste' - a GBP 1.9 billion opportunity awaits,* Case studies https://www.ellenmacarthurfoundation.org/case-studies/pre-consumer-waste-a-gbp-1-9-billion-opportunity-awaits

16   WRAP, *Switched on to Value* (2013) p. 12

17   WRAP, *Switched on to Value* (2013) p. 11

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22   WRAP, *Switched on to Value* (2013) p. 8

23   European Commision, *Remanufacturing Market Study* (2015) p. 45 https://www.remanufacturing.eu/assets/pdfs/remanufacturing-market-study.pdf

24   WRAP, *Switched on to Value* (2013) p. 8

25   European Commision, *Remanufacturing Market Study* (2015) p. 45 https://www.remanufacturing.eu/assets/pdfs/remanufacturing-market-study.pdf

26   E. Dominish et al., *"Slowing" and "Narrowing" the Flow of Metals for Consumer Goods: Evaluating Opportunities and Barriers,* Sustainability (2017) p. 7