Right2Repair and Policies for More Circular Electronic Products

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Who am I?
Circular Economy

‘circular economy’ means an economic system whereby the value of products, materials and other resources in the economy is maintained for as long as possible, enhancing their efficient use in production and consumption, thereby reducing the environmental impact of their use, minimising waste and the release of hazardous substances at all stages of their life cycle, including through the application of the waste hierarchy”

Why do we need more circular electronics?
Electronics products and impact

To accurately measure a company's environmental footprint, you must look at the impact that company's products have on the planet. Apple uses comprehensive life cycle analysis to determine exactly where our greenhouse gas emissions — all 10.2 million metric tons of them — come from.

Source: Apple, 2009
https://www.apple.com/environment/
Challenge: impacts shift upstream in lifecycle

Images: Pixabay
Material use has changed over time

**Elements of a Smartphone**

**Screen**
- Indium tin oxide is a mixture of indium oxide and tin oxide, used in a transparent film in the screen that conducts electricity. This allows the screen to function as a touch screen.
- The glass used on the majority of smartphones is an alumino silicate glass, composed of a mix of alumina (Al₂O₃) and silica (SiO₂). This glass also contains potassium ions, which help to strengthen it.
- A variety of rare earth element compounds are used in small quantities to produce the colours in the smartphone's screen. Some compounds are also used to reduce UV light penetration into the phone.

**Electronics**
- Copper is used for wiring in the phone, whilst copper, gold and silver are the major metals from which microelectrical components are fashioned. Tantalum is the major component of micro-capacitors.
- Nickel is used in the microphone as well as for other electrical connections. Alloys including the elements praseodymium, gadolinium and neodymium are used in the magnets in the speaker and microphone. Neodymium, terbium and dysprosium are used in the vibration unit.
- Pure silicon is used to manufacture the chip in the phone. It is oxidised to produce non-conducting regions, then other elements are added in order to allow the chip to conduct electricity.
- Tin & lead are used to solder electronics in the phone. Newer lead-free solders use a mix of tin, copper and silver.

**Battery**
- The majority of phones use lithium ion batteries, which are composed of lithium cobalt oxide as a positive electrode and graphite (carbon) as the negative electrode. Some batteries use other metals, such as manganese, in place of cobalt. The battery's casing is made of aluminum.

**Casing**
- Magnesium compounds are alloyed to make some phone cases, whilst many are made of plastics. Plastics will also include flame retardant compounds, some of which contain bromine, whilst nickel can be included to reduce electromagnetic interference.
Critical raw materials

Source: EU Commission, 2014
Mining has environmental impacts

1 mobile phone gives rise to 86 kg of waste material

– IVL report, 2015

Images: Unknown Fields Project
Mining has social impacts

Conflict

Tantalum
Tin
Tungsten
Gold

Cobalt
Mica

Source: Ethical Consumer
THE FUTURE OF E-WASTE

- **2018**: 48.5 million tonnes
- **2021**: 52 million tonnes
- **2050**: 120 million tonnes

- **2020**: 25-50 billion connected devices
- **2040**: PCs, laptops, monitors, smartphones and tablets will reach 14% of total emissions.
- **2060**: Overall consumption of materials across all sectors set to double
Total collection rate for waste electrical and electronic equipment (EEE), 2019
(% of the average weight of EEE put on the market in the three preceding years (2016-2018))

Share of WEEE collected (% of EEE put on market in the three preceding years)  
Target 45%  
Target 65%

(1) Eurostat estimate.  
(3) 65% target not applicable, since Luxembourg and Hungary have chosen the calculation methodology based on share of WEEE generated. See Figure 2b.  
Source: Eurostat (online data code: env_waseleec and env_waselee)
Barriers to repair

1) Fundamental legal and non-legal barriers preventing accessible repair;
2) the total price of repair and other competitive factors deterring consumers from choosing repair as an economic and convenient option;
3) consumer preferences and attitudes not favoring repair.
Design Barriers: examples

• Product Design
  • Premature Obsolescence
  • Adhesives, proprietary screws
  • Software doping, serialisation, etc.

• Repair system
  • Limited provision of spare parts information, diagnostics, software

Jibo social robot announced in March 2019: “The servers out there that let me do what I do will be turned off soon.” (Photo: Jibo)

Mobile phones often have designs with adhesives. Photo: iFixit, 2013

Replacing camera modules with non-OEM parts or even swapping might decrease functionality. Photo: iFixit, 2020

Diagnostic software restrictions for tractors and military vehicles
Legal Barriers: examples

Intellectual Property law preventing unauthorized repair, disassembly and/or use of non-OEM parts, enforced under:

• Patent law
• Copyright Law (manuals)
• Trademark Law (logos on parts)
Legal barriers: examples

Contract law

• End-user license agreements with repair restrictions
• Clarity on interpretation lacking
Legal Barriers: examples

Consumer Law
• Repair as a remedy
  • not always followed or accepted

• Lack of awareness
  • Guarantee or warranty?
  • Misleading information, e.g. warranties
Other Barriers: examples

• Waste and recycling laws/systems
  • recycling targets, not reuse/repair targets
  • waste treatment handling
Economic barriers

• Repair costs vs replace costs
  • Individual local production v global economies of scale
Economic barriers

“This study demonstrated that there is no potential for preparing for re-use in the WEEE that is collected.”

“Financially, there is no incentive to look for functioning products in the WEEE collection”

“This study demonstrated that there is no potential for preparing for re-use in the WEEE that is collected.”

“The study shows that the best kind of re-use of a product is re-use which happens before the product is discarded as waste”

Sample of WEEE from cage collection

Source – El Kretsen Functionality test 2015
Economic barriers

Apple's own battery blunder may be to blame for its earnings miss

A report claims that Apple CEO Tim Cook told staff the company had carried out 11 million battery replacements under the $29 program that was rolled out, compared to the 1 to 2 million that would normally be carried out in a year.

Written by Adrian Kingsley-Hughes, Contributing Writer on Jan. 15, 2019

What was behind Apple’s first profits warning since 2002? Was it the weakening Chinese market, in combination with pressures from the ratcheting of the US-China trade war and supply chain constraints, or did Apple bring it upon itself with the $29 iPhone battery replacement program?

https://www.zdnet.com/article/apples-own-battery-blunder-may-be-to-blame-for-its-earnings-miss/
Other Barriers: examples

• Consumer culture
  • expectations for fast innovation cycles
  • fashion obsolescence
  • (lack of) relationship to products

Barbara Kruger, 'I Shop Therefore I am' (1990).
Enabling Repair

- Consumer preferences, culture and attitudes are for repair.
- The total price of repair and other competitive factors promote consumers to choose repair.
- No fundamental legal and non-legal barriers preventing accessible repair.
Stakeholder interests in upscaling repair

Policies enabling repair

EU:

• Ecodesign regulations
  • Availability of spare parts and manuals
  • Repairable with common tools
  • Minimum lifetimes (some products)
  • Software support
  • Disassembly

Example: spare parts for household washing machines must be available for at least 10 years:

Available to professional repairers and end-users (at least)

• doors
• door hinges and seals
• other seals
• door locking assembly
• plastic peripherals

Available to professional repairers (at least)

• motor and motor brushes
• transmission between motor and drum
• pumps
• shock absorbers and springs
• washing drum, drum spider and ball bearings
• heaters and heating elements
• piping and related equipment
• printed circuit boards
• electronic displays
• pressure switches
• thermostats and sensors
• software and firmware including reset software

Example: spare parts for household washing machines must be available for at least 10 years:

Example: spare parts for smartphones must be available for at least 7 years after being put on market

• Software supports must be provided for minimum 5 years
• Battery should be removable (but only non-durable batteries available to end-users)
Policies enabling repair

EU:
• Green procurement repairability criteria
  • Availability of spare parts and manuals
  • Repairable with common tools
  • Longer warranties

Member states:
• Longer Guarantees
  - Length (2 years currently)
  - Burden of proof (6 months)
• VAT reductions
• Repair funds
• Repairability scores
EU Circular Economy Policy Package

- Ecodesign Working Plan 2022-2024
  - Higher energy efficiency and circularity for energy-related products
  - New rules for consumer electronics (smartphones, tablets, solar panels)

- Ecodesign for Sustainable Products Regulation
  - Performance and information requirements for greener products
  - Tackle the destruction of unsold goods
  - Waste prevention and reduction
  - Mandatory criteria for green public procurement
  - Digital Product Passport and new labelling rules
  - Stronger market surveillance

- Strategy for Sustainable and Circular Textiles
  - Binding eco-design requirements, incl. durability, reparability, and recycled fiber content
  - Stop microplastics pollution
  - Tackle fast fashion, textile waste, and the destruction of unsold products
  - Accurate green claims
  - Sustainable global value chains

- New rules to empower consumers for the green transition
  - Protection against greenwashing and the deliberate planning or design of products with limited lifespans
  - Information on product durability and reparability

- Global action
  - Global sustainable consumption and production forum
  - Corporate sustainability due diligence

- Support for circular business models
  - European circular business hub
  - Guidance to businesses
Community Repair: Repair Cafes

Move slow and fix things.
Individuals’ roles in circular consumption

Avoid unnecessary purchasing
Buy durable, high-quality and repairable products
Buy re-used, repaired and 2-hand
Use product labels and life cycle information
Choose: services over products, sharing over leasing and leasing over buying

Avoid replacing functioning products
Proper use; maintenance; updates
Repair instead of buying new through repair ‘services, communities or DIY’
Re-sell, exchange or give away instead of throwing away

Return for 1. re-use and repair & 2. recycling
Properly sort & collect products

Source: O. Mont. Based on (Maitre-Ekern and Dalhammar 2019)
Digital product passports (ESPR & Battery Regulation)

Supporting standards for products, materials, reporting and monitoring etc.
Legal framework for sustainable finance, e.g. reporting and taxonomy
Product Environmental Footprint (PEF)

Upstream – supply chains
- Conflict Minerals Regulation
- Carbon border adjustment mechanism
- Timber Regulation
- Directive on Corporate Sustainability Due Diligence
- Regulation on deforestation-free products
- Proposal: Regulation on prohibiting products made with forced labour on the EU market
- Proposal: Critical Raw Materials Act

Examples of EU policies
- Ecodesign Directive
- REACH, RoHS, ELV Directive etc.
- Battery Regulation
- Proposal Ecodesign Regulation (ESPR)

Examples of national, regional and local policies
- Supply Chain Due Diligence Act (Ger)
- Fashion Sustainability and Social Accountability Act (NY State)
- Corporate responsibility for human rights (Can)
- Transparency Act (Nor)
- Mandatory labeling information (Fra)
- Repair fund (Fra)
- Repair index (Fra)
- Proposed durability index (Fra)
- Criminalisation of planned obsolescence (Fra)
- Repair vouchers & repair networks (Austria)
- Repair fund (Fra)
- Tax reductions on repairs (Swe)

Design, production, information
- Ecodesign Directive
- REACH, RoHS, ELV Directive etc.
- Battery Regulation
- Proposal Ecodesign Regulation (ESPR)

Examples of national, regional and local policies
- Repair index (Fra)
- Proposed durability index (Fra)
- Longer guarantees in consumer law (several EU MS)
- Voluntary eco-labels
- Mandatory labeling
- EU Eco-label (voluntary)
- Rules on consumer rights, guarantees, marketing
- Proposals for consumer information: Empowering consumer green transition
- Proposal: labeling in proposal for Ecodesign Regulation (ESPR)
- Proposal: Directive on Green Claims

Product destruction
- Rules on reporting/bans on unsold goods in proposal for Ecodesign Regulation (ESPR)
- Partial ban, destruction on unsold goods (Fra)

Examples of national, regional and local policies
- Duty of Care (Ger)
- No VAT on donated goods (Bel)

Use phase
- Legal proposal on right-to-repair in consumer law
- Battery Regulation: easier to replace batteries in products
- Rules on right-to-repair in Ecodesign Directive (and forthcoming ESPR): provision of spare parts, tools, manuals etc.

Examples of national, regional and local policies
- Repair fund (Fra)
- Tax reductions on repairs (Swe)

End-of-use
- Rules on producer responsibility and packaging, labeling
- Standards on e.g. remanufacturing
- New legal definition on e.g. refurbishment & remanufacturing, ESPR

Examples of national, regional and local policies
- Re-use options at recycling stations
- Public procurement of remanufactured goods
- Local re-use centers and support to second-hand
- National labeling

Adapted and updated based on Dalhammar & Milios
Thanks!

Questions?

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https://repairsociety.blogg.lu.se/