CircBrief
Electronics and circular economy

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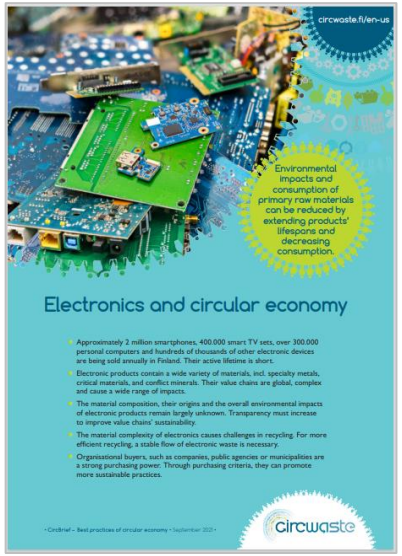
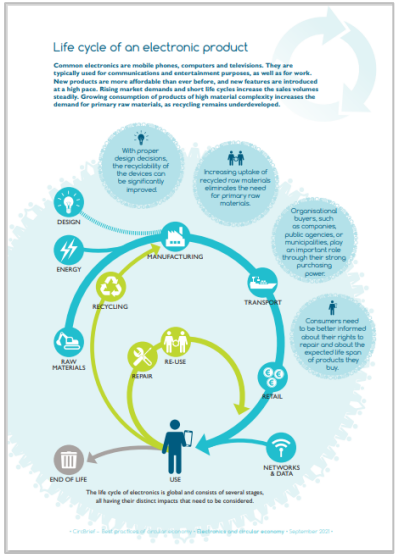
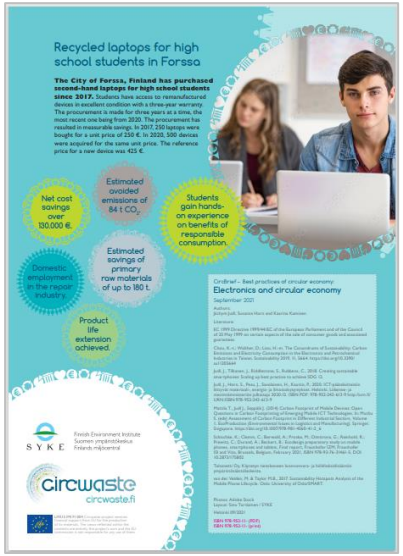
Circwaste-project receives financial support from EU for the production of its materials. The views reflected within the contents are entirely the project's own and the EU commission is not responsible for any use of them.

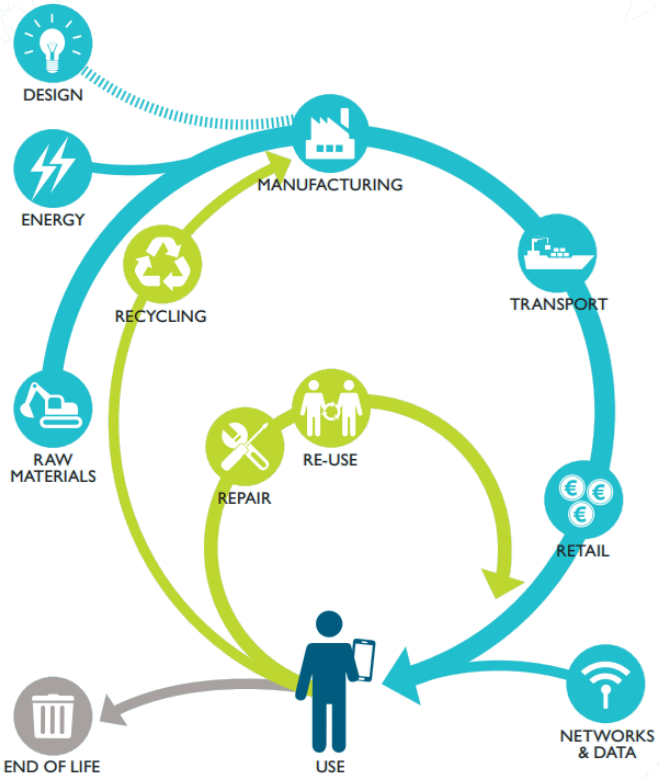
Structure of a CircBrief







A life cycle of an electronic product



Product development and design

Environmental impacts are determined already during the design phase. Besides aesthetics, design defines functionality, technical specifications, selection of materials and components, in-use energy consumption, durability, repairability, and recyclability. Design determines the software support and updatability. Design decisions are driven by consumers' preferences, business strategy, value chain as well as by regulations and legislations.

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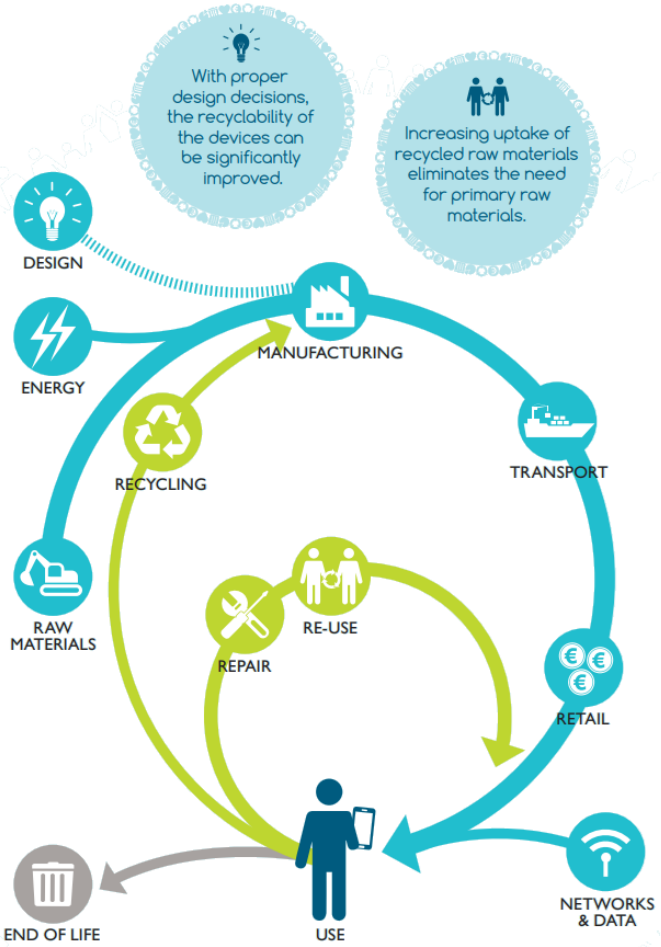
Raw materials

Electronics contain a wide variety of materials, especially metals, some classified as rare earth metals or conflict minerals. Their mining is associated with social issues and environmental degradation. Geological deposits of some of the key primary raw materials in electronics are very local, causing supply security risks. The transparency of supply chains and due diligence need to improve to support informed decision making.



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Manufacturing

Knowledge about environmental impacts of manufacturing is limited. Rapid technological development and short product cycles make any assessment soon outdated. Unfavourable working conditions, insufficient environmental protection and a lack of transparency have risen concerns in countries where electronic products are made. Energy mix in manufacturing countries remains carbon intensive. That, together with increasing consumption, compensates for improvements in manufacturing efficiency.

Use phase

Electronic products are powerful and sophisticated devices that require electricity to operate. Growing screen sizes and computational power increases energy consumption of devices.

Despite their sophistication, the lifespan of electronic products is often short. Limited repairability and availability of spare parts are issues hindering longer lifespans, as is software obsolescence. Modern electronic products are often connected devices and generally are software dependent. Functioning devices may become quickly obsolete once software support is discontinued.

Networks and data

Connected devices serve as a gateway to online services and rely on telecommunication networks, core network and on data centres. The infrastructure is complex and mostly invisible to users. Its material and energy inputs, and consequently environmental impacts, can be only roughly estimated. Depending on the user profile, environmental impacts of the infrastructure can likely be greater than those of a device itself. For example, streaming high-definition video content is energy intensive and requires sizeable online storage.

Product life extension

A short lifespan of most electronics can be extended through design, responsible use, re-use and repair. Products that are designed as modular, upgradeable, updateable, and affordably repairable are likely to reach longer lifespans. Yet, a common practice is that form and function are prioritized over repairability and recyclability.

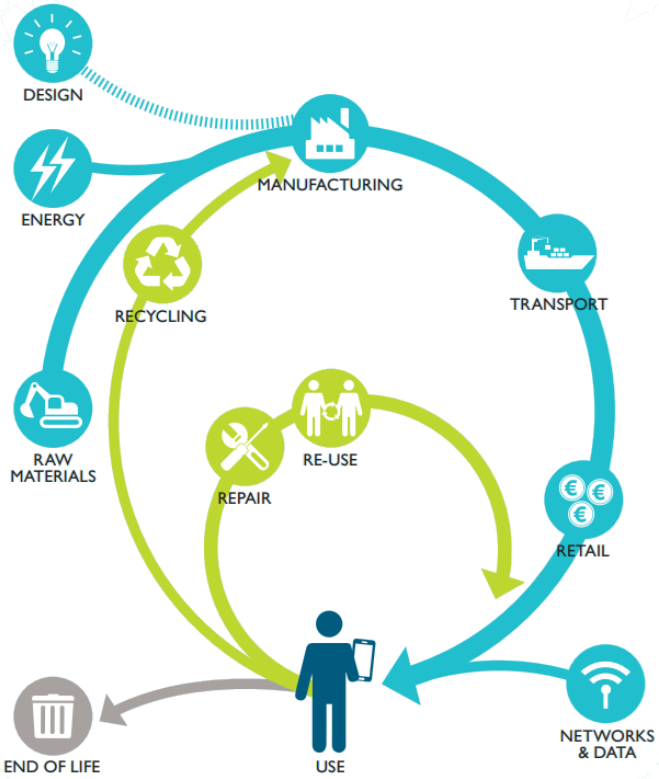
To keep existing devices in use for longer, consumers need to be better informed about their rights to repair and about the expected life span of products they buy.

Coupled with a longer warranty, refurbished used devices, products-as-a-service and third-party repairs are examples of consumer-friendly services effectively extending the lifespan of products.

Recycling

Increasing uptake of recycled raw materials eliminates the need for primary raw materials. In general, metals are endlessly recyclable. However, the material complexity of electronic products is one of the reasons why recycling is challenging. With currently existing recycling technologies it is difficult, even impossible, to achieve a full recovery of all metals. The lack of information about material composition of used products hinders efficient recycling processes further.

A recycling system requires a stable flow of end-of-life devices to be efficient and economically feasible. Yet, due to a high perceived and emotional value, and because of a small size, some electronic products reach recycling with a significant delay.


DESIGN
ENERGY
MANUFACTURING
RECYCLING
TRANSPORT
RAW MATERIALS
REPAIR
RE-USE
RETAIL
END OF LIFE
USE
NETWORKS & DATA

Best practice example

750 refurbished laptops for high school students in Forssa

- Net savings of 130 000+ €
- Domestic employment in the repair industry
- Students' hands-on experience on responsible consumption and on a circular business model

- Estimated avoided emissions of 84 t CO_2 *
- Estimated savings of primary raw materials of up to 180 t *

* Taitonetti Oy, Käytetyn tietokoneen luonnonvara- ja hiilidioksidisäästön ympäristösäästölaskenta

Thank you!

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