Refurbished phones

Environmental claim substantiation

Introduction

We're relaunching our Like New range of refurbished phones – focusing at times on their environmental benefits. This document was created to substantiate those claims. We're committed to making our industry more sustainable – and this refresh is just a small part of that journey.

Claims

- Buying a refurbished phone from our Like New range reduces emissions, uses fewer virgin materials and emits less CO_2, compared to buying a new one
- Buying a refurbished phone can reduce your carbon footprint compared to buying new
- Our refurbished phones have the same benefits as new ones, but with lower emissions
- Buying a refurbished phone instead of a new one helps keep e-waste out of landfill
- Buying a refurbished phone is better for the planet than buying a new one

Substantiation

As stated in:

Cordella, M. et al. (2021) Reducing the carbon footprint of ICT products through material efficiency strategies: A life cycle analysis of smartphones
https://doi.org/10.1111/jiec.13119

Introduction

This study states that the contribution of the Information and Communications Technologies (ICT) sector to the global greenhouse gas (GHG) emissions is increasing rapidly, and one of the reasons for that is the ever growing use of smartphones and their short replacement cycles. Figure 1, taken from the study, illustrates how strategies including minimising material consumption, waste production and subsequent environmental impacts can help improve material efficiencies along the life cycle of products.

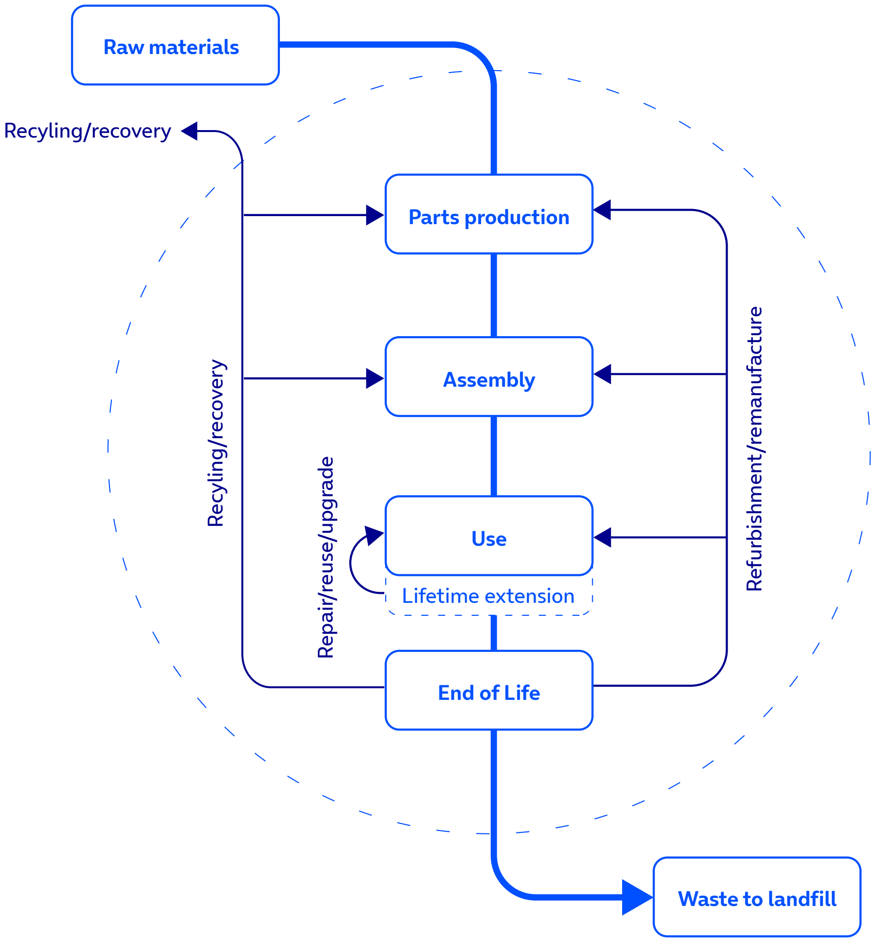

Figure 1 – Material efficiency aspects in the life cycle of a product

Abstract

Utilising a Life Cycle Assessment (LCA) model, this study investigated the carbon footprint (CF) of smartphones and lifecycle costs (LCC) for consumers in scenarios where different material efficiency strategies are implemented in Europe. Findings revealed that a significant portion of the CF associated with smartphones is attributed to the material extraction and processing, and the subsequent manufacturing of parts (10.7kg CO_2eq/year when assuming a biennial replacement cycle). It also found that LCC can vary significantly. It was calculated that the 1:1 displacement of new smartphones by used ones could decrease the CF by 52–79% (exc. communication services) and the LCC by 5–16%. The below focusses on the environmental aspects of the study.

Life Cycle Analysis (LCA) of Material Efficiency Strategies for Smartphones

An attributional LCA was carried out for the analysis of material efficiency strategies, which aimed to produce general considerations for the EU rather than compare specific devices. A number of scenarios were assessed that involved different technological and behavioural practices:

- Baseline (BL) scenario (purchase, use and disposal of new smartphones)
- Extended use scenarios with/without repair operations
- Scenarios involving the purchase of remanufactured or second-hand devices
- Scenarios involving lean design concepts

Further information for each scenario can be found in Table 1.
The CF (expressed throughout as CO_2eq) was calculated on the 100-year global warming potentials (GWP) of GHG emissions.

Scenario	Key assumptions for the CF assessment
Baseline (BL)	*Replacement cycle:* smartphones are replaced with a new device (the same model) every 2 years; new devices are bought and allocated to cover the reference lifetime (i.e., 2.25 units for a period of 4.5 years). *EOL:* the old product is kept unused at home. *Other system aspects:* impact associated to data consumption during the use phase are not considered. For sensitivity analysis, BL+ also consider: - Impact associated to the usage of communication networks during the use-phase; - End-of-Life recycling with pre-treatment for battery recovery.
Extended use (EXT)	*Replacement cycle:* compared to BL, replacement cycle increased to 3 (EXT1) and 4 years (EXT2), which results in the need of less devices along the reference lifetime (i.e., 1.5 and 1.125 units, respectively). *Other assumptions: as BL.*
Battery change (BC)	*Replacement cycle:* compared to EXT1 and EXT2, replacement cycle is the same (i.e., 3 years for BC1 and 4 years for BC2) with the change of the battery. *Other assumptions:* as EXT1 and EXT2.
Display change (DC)	*Replacement cycle:* compared to EXT1 and EXT2, replacement cycle is the same (i.e., 3 years for DC1 and 4 years for DC2) with the repair (change) of the display. *Other assumptions:* as EXT1 and EXT2.
Battery change + display change (BC-DC)	*Replacement cycle:* compared to EXT1 and EXT2, replacement cycle is the same (i.e., 3 years for BC-DC1 and 4 years for BC-DC2) with battery change and the repair (change) of the display. *Other assumptions:* as EXT1 and EXT2.
Remanufacture (RM)	*Replacement cycle:* remanufactured smartphones bought by users every 2 years, to cover the reference lifetime (i.e., 2.25 units for a period of 4.5 years). *Remanufactured device impacts:* due to battery change, display change, energy for manufacturing and transport. *EOL: the old product is kept unused at home.*
Reuse (RU)	*Replacement cycle:* reused smartphones bought by users every 2 years, to cover the reference lifetime (i.e., 2.25 units for a period of 4.5 years). *Reused device impacts:* due to battery change, display change, and transport. *EOL:* the old product is kept unused at home.
Lean design (LD)	*Device manufacturing impacts:* reduction of materials used for housing: –10% by weight (LD1), –20% by weight (LD2), –30% by weight (LD3). *Other assumptions:* as BL.

Table 1 – Scenarios considered for the assessment of material efficiency aspects in the life cycle of smartphones

Assessed scenarios and system boundaries

For each scenario, the system boundaries covered the LCA of a generic virtual product. As a BL, these stages were considered:

- **Production of parts (extraction, processing and transportation of materials, manufacturing of parts)**
- **Smartphone manufacturing (transportation of parts, device assembly)**
- **Distribution and purchase (transportation of smartphones to points of sale)**
- **Use (energy for battery recharging)**
- **End of Life (EoL) replacement (old unused device being kept at home)**

Additional scenarios integrated the following aspects: system impacts associated with communication services and EoL recycling (BL+), extended use (EXT), battery change (BC), repair and change of the display (DC), remanufacture (RM), reuse (RU), lean design (LD).

Modelling

Full considerations and assumptions for the CF modelling can be found on Pages 450–455 of the study. These include:

- Production of parts and manufacturing of the device
- Distribution and use
- End of life and
- Communication services

Results

Baseline (BL) scenario (system aspects excluded)

In the BL scenario, smartphones were typically replaced every two years within a reference period of 4.5 years, resulting in the creation and utilization of 2.25 device units. Old devices kept unused at home and the usage of communication services were not considered.

The calculated carbon footprint over 4.5 years amounted to 77.2kg CO_2eq (17.2 CO_2eq per year). The breakdown of the CF by LC stage is illustrated in Figure 2 below, with the Bill of Materials (BoM) accounting for the majority (62%), followed by device assembly (16%), distribution (11%), and use (11%).

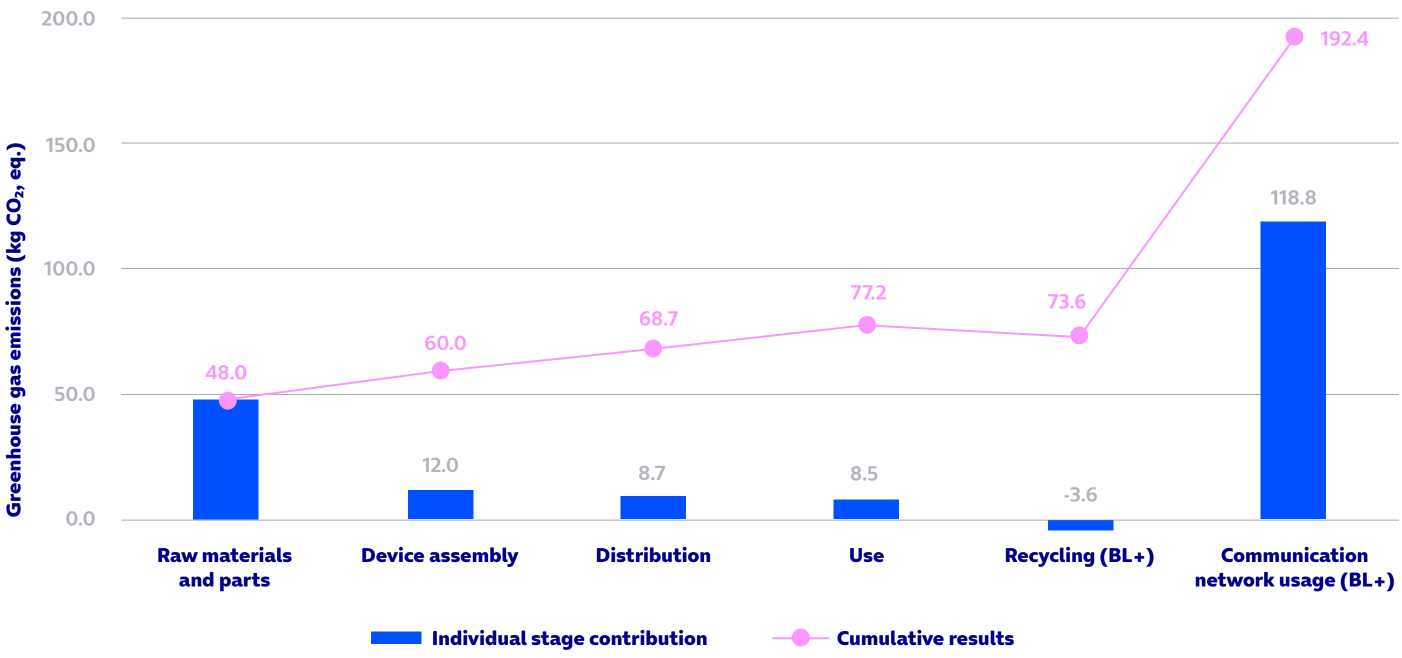

Figure 2 – Carbon footprint results for the baseline scenario(s) (reference 4.5 years, 2.25 smartphone units)

Figure 2 shows the effects of including EoL recycling and usage of communication services in the scenario BL+. Recycling reduced the CF by 5% compared to BL, due to factors such as the recovery of materials and energy.

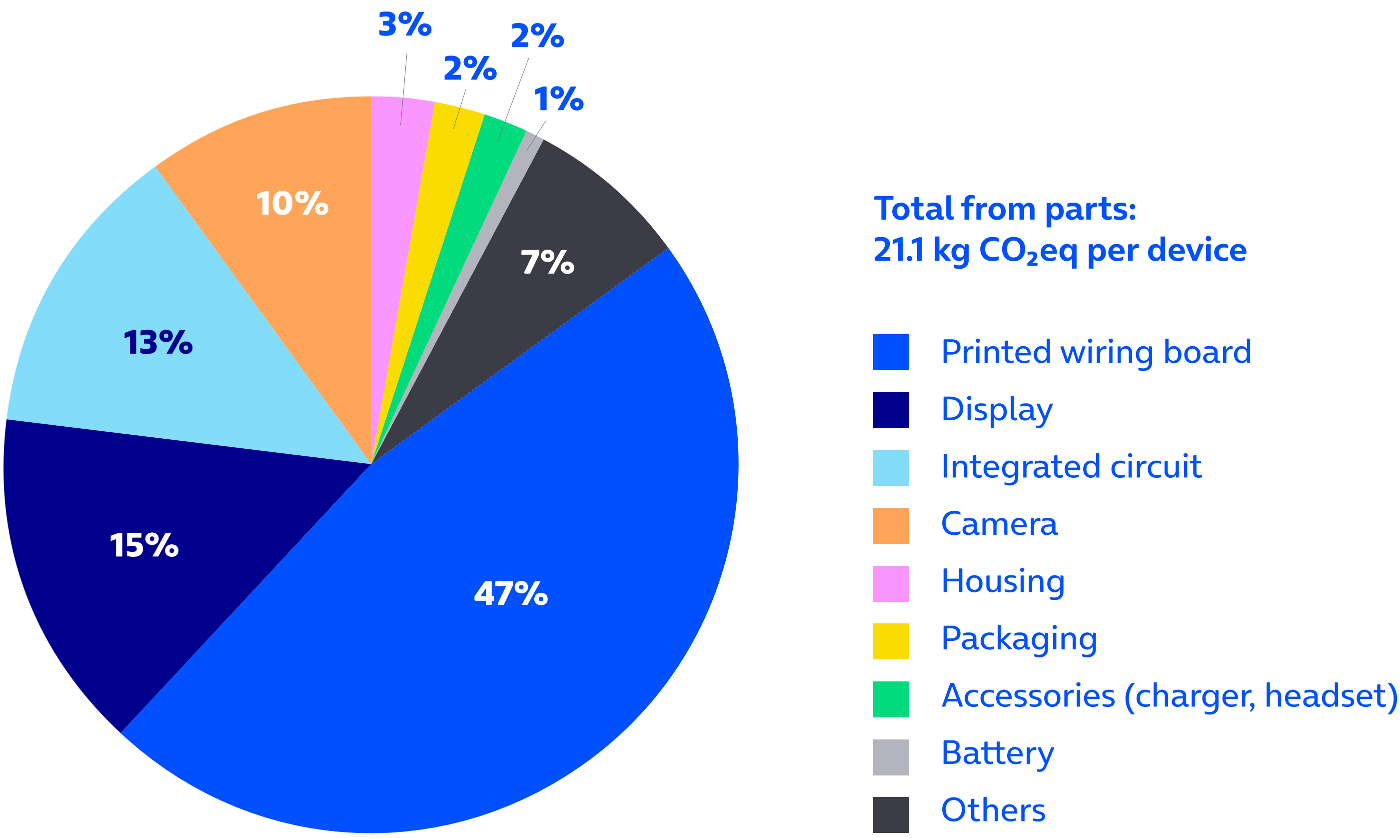

Figure 3 – Carbon footprint associated to the Bill of Materials of one smartphone unit and contribution of different parts. Baseline (BL) scenario (system aspects included)

Figure 3 shows the breakdown of the CF associated to materials for different parts of smartphones. Notable contributors include the printed wiring board, display, integrated circuit and camera.

Comparison between scenarios implementing material efficiency strategies

The study shows that CF can be significantly decrease by extending the average replacement cycle of devices from 2 to 3 years (EXT1: -30%) or 4 years (EXT2: -44%). The reduction was associated with fewer devices (and subsequently parts and materials) being allocated to the reference time (4.5 years).

In the instance of battery and display change in the first two years of use, CF increased by 1% and 9% respectively, compared to BL. When the change of battery came with an extension of 3 years (BC1) or 4 years (BC2), the CF decreased by 29% and 44%, respectively. When the display change came with an extension of 3 years (DC1) or 4 years (DC2), the CF decreased by 23% and 40%, respectively.

The CF decreased to about half of BL when considering the purchase of remanufactured devices (RM) and the same energy consumption for producing new and RM. The study found that the CF decrease could be more significant if less energy were needed for the preprocessing of devices.

Results support the importance of material efficiency strategies for smartphones. In particular, considerable CF decreases were associated with strategies orientated to extend the lifetime of a device or its parts. Results for the aforementioned can be found in Table 2 below.

	Greenhouse gas emissions ($kgCO_2eq$)		
Scenario	4.5 years	1 year	Relative (%)
BL: baseline (2-year replacement cycle)	77.3	17.2	100
BL+: as BL + system aspects	192.4	42.8	249
EXT1: as BL with replacement cycle increased to 3 years	54.4	12.1	70
EXT2: as BL with replacement cycle increased to 4 years	42.9	9.5	56
BC: as BL with battery change	77.9	17.3	101
BC1: as EXT 1 with battery change	54.8	12.2	71
BC2: as EXT 2 with battery change	43.2	9.6	56
DC: as BL with display change	84.5	18.8	109
DC1: as EXT1 with display change	59.2	13.2	77
DC2: as EXT2 with display change	46.5	10.3	60
BC-DC: as BL with battery and display change	85.1	18.9	110
BC-DC1: as EXT1 with battery and display change	59.6	13.2	77
BC-DC2: as EXT2 with battery and display change	46.8	10.4	61
RM: Purchase of remanufactured device	37.0	8.2	48
RU: Reuse (purchase of second-hand device)	16.3	3.6	21
LD1: as BL with 10% lighter housing and display	75.5	16.8	98
LD2: as BL with 20% lighter housing and display	73.7	16.4	95
LD3: as BL with 30% lighter housing and display	71.9	16.0	93

Table 2 – Carbon footprint results for different scenarios implementing material efficiency strategies