

# THE HIDDEN COST OF YOUR SMARTPHONE

Rapid consumption of electrical gadgets comes at a cost that's often obscured. **Aaron West** asks whether there's more we can do to reduce the global impact of our tech habits

**F**rom the mines their components come from to the landfill sites they end up in, our tech products leave deep footprints on our planet.

For this article, we've looked at the lifespan of a smartphone – the most ever-present and frequently replaced bit of tech most of us own – to find out the impact of our buying habits and whether there's anything we could, or should, be doing differently to be more responsible consumers. While we've used a smartphone here, the details are similar for other tech products.

Read on to follow its journey around the world, and find out how we and the companies we buy from can reduce our impact.



PHOTOGRAPH BY MANGU/IRON/ANDY PACE/IC PRESS/LIGHTSTOCKET VIA GETTY IMAGES

Agbogbloshie, in Accra, Ghana, has become a dumping ground for computers and electronic waste from all over the developed world. Hundreds of tonnes of e-waste end up here every month. It is broken apart, and those components that can be sold on, are salvaged

## WHAT'S IN A SMARTPHONE?

Smartphones, and most other electronics, contain more than a third of the 92 naturally occurring elements, performing a complex combination of roles. Four of these elements – tungsten, tantalum, tin and gold – are known as conflict minerals. For more on how they're used in smartphones, see right.



CENTRAL AFRICA

### Tech and conflict minerals

They're called conflict minerals because their theft and sale has funded armed groups committing mass violence in the Democratic Republic of Congo. The arising conflict – the Second Congo War – has been the deadliest since World War II.

A decade ago, pressure from activists concerned about Western use of conflict minerals increased. In 2010, the Dodd-Frank Act Section 1502 was passed in the US. This forces all US-registered companies to publish their sources for tantalum, tin, tungsten and gold. This transparency meant companies rushed to fix problems in their supply chain and the outlook has generally improved.

But many companies do still use conflict minerals without being clear about their supply chains. According to research by Ethical Consumer, and shown in detail, right, smartphone manufacturers can be ranked based on their transparency and commitment to using conflict-free minerals.



PHOTOGRAPHY: GETTY IMAGES, REUTERS

■ **Tantalum:** Thanks to its high capacitance, this is perfect for the many tiny, delicate capacitors that help control the flow of electricity in your phone's circuits.

■ **Tungsten:** With twice the density of steel, this is used as a counterweight in a spinning motor that makes your phone vibrate.

■ **Tin:** Used in soldering and circuit boards due to its low melting point compared with other metals. It's also in touchscreens, combined with indium and oxygen.

■ **Gold:** A highly efficient and reliable conductor that remains free of corrosion. Phones use very low voltages and currents that are easily interrupted by tarnishes, so there are small amounts of gold all over your phone to keep it working for years, including as a surface coating in the circuit board.

Source: Dr Hywel Jones, principal research fellow, Sheffield Hallam University

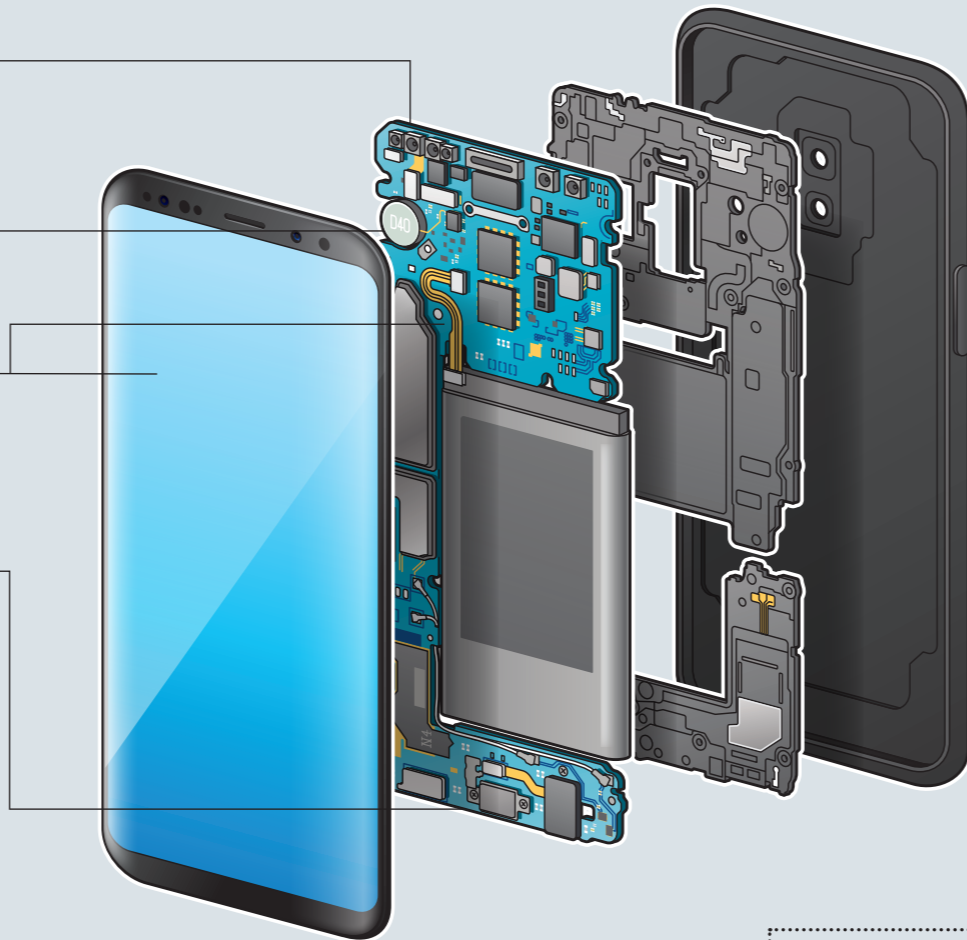


ILLUSTRATION: JAMES PROVOST

### Manufacturing and production

Once they've been sourced, the minerals and plastics in your smartphone are then processed and shipped to a manufacturer. The largest manufacturers are Samsung and Foxconn. Foxconn makes the iPhone as well as products for Sony, Intel, Microsoft and Google. Foxconn's factories are widely reported to have poor working conditions and low pay.

It's not just the conflict minerals in electronics that cause problems for those involved in their production. Other elements used include beryllium, cadmium and mercury, all of which are poisonous to humans. Toxic by-products are released during assembly, and in November 2018, Samsung publicly apologised to factory workers who had developed cancer after exposure to toxic chemicals.

While steps such as the Dodd-Frank Act on corporate transparency are moving in the right direction, it's clear that manufacturers still have a long way to go to ensure our tech products are sourced and manufactured in a responsible way.



EAST ASIA

## HOW DO SMARTPHONE BRANDS COMPARE ON CONFLICT MINERALS?

Rank	Brand	Score (out of 10)
1	Fairphone	10
2	Apple	9.5
3	Motorola <sup>a</sup>	9
4=	Google	8.5
4=	Nokia	8.5
4=	Sony	8.5
7	Samsung	7.5
8	LG	6
9	Huawei <sup>b</sup>	3.5
10	HTC	1
11=	Alcatel	0
11=	Doro	0

<sup>a</sup> as part of Lenovo  
<sup>b</sup> including Honor

Rankings based on analysis by Ethical Consumer commissioned for Which?. Research conducted Feb 2019.

■ **Apple** comes ahead of the other big brands, meeting most of Ethical Consumer's conflict mineral criteria. The only area in which it falls short is that it doesn't reveal which of its smelters have been audited and proved to be conflict-free. ■ **Samsung** misses the mark in multiple areas. It says that it will take steps to identify, assess, mitigate and respond to risks within its supply chain, but doesn't say what these steps are. ■ **Huawei** is not open at all when it comes to

conflict minerals. It gives no detail as to what steps it will take, doesn't disclose where its smelters are and shows no signs of committing to audits. ■ **Alcatel and Doro**, more well-known for simple phones, do not publicly acknowledge conflict minerals. ■ **Fairphone** is the first smartphone brand to integrate conflict-free sourcing for all four minerals. We tested a Fairphone phone, but unfortunately it doesn't compare well with other brands on performance.



The Foxconn factory in Shenzhen, China, is the size of a town and employs hundreds of thousands of workers to produce most of Apple's iPhones

Brand	Reliability Score
Huawei	87%
Nokia <sup>a</sup>	86%
OnePlus	83%
Samsung	82%
Apple	81%
Alcatel	80%
Motorola	80%
HTC	76%
Vodafone	76%
BlackBerry	74%
Google	74%
LG	74%
Microsoft <sup>b</sup>	74%
Doro	73%
Sony <sup>c</sup>	71%

<sup>a</sup> non Windows phone  
<sup>b</sup> including Nokia Lumia  
<sup>c</sup> Xperia, Sony Ericsson



UNITED KINGDOM

## USING YOUR SMARTPHONE

Once your tech arrives at home, the best way to use it responsibly is to keep it in action for as long as possible. Of course, that's only possible if it lasts for as long as you need it to.

In June and July 2018, we rated tech products for their reliability. We surveyed 6,404 smartphone owners to ask about any faults they had experienced within the past four years. On average, respondents stated that they would expect a smartphone to last four years.

The two most common faults reported were: phones not charging or losing charge too quickly (18%) and phones regularly freezing, making them unusable (13%).

When it comes to product reliability – or how long your phone is likely to last – Huawei is the most reliable brand. Lots of other brands scored highly in our survey though, including Apple, Motorola, Nokia, OnePlus and Samsung. Sony was the least reliable brand, but according to our survey four in five of its smartphones were still fault-free after four years.

But despite this reliability, many of us change our smartphones much more frequently than we need to.

A 2016 report by Kantar Worldpanel estimated the average smartphone life cycle in the UK to be 23.5 months. At that rate, those getting their first phones at 14 and living to the UK average of nearly 81 years, would own 35 smartphones over their lifetimes.

When we surveyed 1,627 Which? members in December 2018, 46% had bought themselves a new mobile phone within the past two years, and 63% within the past three years. >

## FIVE THINGS YOU CAN DO TO REDUCE YOUR IMPACT

While the outlook may seem bleak, small shifts in consumer demand can change the supply chain drastically. Here are our top tips for what you can do:

**1 / Don't upgrade your current phone sooner than you need to.** Most smartphones come on a 24-month contract, after which your provider is likely to encourage you to upgrade to a new handset. But switching to a Sim-only tariff for your existing handset will be a lot cheaper, and more environmentally friendly.

**2 / If your phone's battery isn't lasting as long as it used to, consider getting it replaced.** This can also help if you think your phone has slowed down. New batteries will be available through the official manufacturer, as well as third parties.

**3 / When it really is time for an upgrade, consider using a refurbished or used phone rather than a new one.** These are available from most major retailers.

**4 / As for your old phone, you can sell it yourself, give it to a refurbishing or recycling company, or donate it to charity.** Just don't forget to restore it to its factory settings before giving it away.

**5 / You're more likely to hold onto a phone if it's a Best Buy model from a company with a good reliability record.** Use our online reviews and reliability data to find out which phones you'll be happy to hang onto for longer.



Workers at a recycling factory in Wuhan, Hubei province, sift through piles of electronic waste to collect batteries



## DISPOSING OF YOUR SMARTPHONE

Despite buying plenty of new models, less than half of the 1,627 Which? members we surveyed in December 2018 have ever got rid of an old mobile phone. Indeed, some estimates put the number of phones abandoned in drawers and attics around the UK at as many as 90 million.

While some may be saving them for a rainy day, it's likely that many of us just aren't sure what to do with our old phones. Of those in our survey that had disposed of one, 29% sold or gave it to a friend or family member, 28% recycled it through an independent company and 22% through a retailer. And 7% just threw it in the bin.

### The hidden £8 billion

According to the United Nations University, only 20% of global electronic waste was documented to be collected and officially recycled in 2016. In higher-income countries, 4% of our electronic waste is thrown into bins. The remaining 76% – equating to

34.1 megatonnes – is unaccounted for, possibly dumped, traded, or recycled in poor conditions. The raw material value of the 435 kilotonnes of wasted mobile phones globally is over £8 billion.

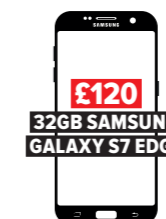
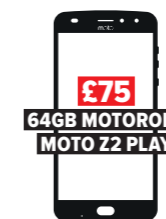
### Recycling isn't the only solution

When it comes to electronics, while they certainly shouldn't end up in landfill, recycling should be considered a last resort for products that really have reached the end of their usable lives. A lot of our electronic waste (or e-waste) is exported to countries such as Vietnam, China, Nigeria and Ghana, where they end up in huge – sometimes illegal – e-waste sites (as pictured on p38-39). Communities make a living by separating them out and reselling the precious metals. But it's not easy to break them back down into their constituent parts.

The quickest and most common way to separate e-waste into raw materials is to burn it, releasing harmful chemicals including lead, cadmium and numerous carcinogens. The air above e-waste sites is often turned aqua blue by thick toxic smoke.

Most old electrical items will be perfectly usable to someone else. If you can't find someone to sell yours to, or if it needs to be fixed first, think about selling it on to a dedicated refurbishing programme. These schemes will give you a good sum of money for your old phone and then sell it on again, after refurbishing it (see right).

### PRICES FOR OLD PHONES THROUGH REFURBISHING SCHEMES



Based on best price on comparemymobile.com, 6 March

## THE FUTURE OF SMARTPHONE SUSTAINABILITY

While we can do our part to buy more responsibly and make sure our products go on to a good home when we no longer have use for them, there is clearly a need for better practice on the part of manufacturers and governments.

We want smartphone manufacturers to take seriously the issue of repairability, and to make access to repair cheaper and easier. When it comes to software, they should be doing more to protect older models with security updates even when they can no longer support the latest software.

We spoke to the Department for Environment, Food and Rural Affairs (Defra), which told us that the government is committed to the UK becoming a world leader in using resources efficiently and cutting the amount of waste we create. This includes prolonging the lives of the materials and goods that we use, and moving away from the traditional 'linear'

economic model of 'take, make, use, and throw'.

According to Defra, the government will match or, where economically practicable, exceed the ambition of the EU's proposed Ecodesign standards. These standards will force manufacturers to:

- design products that are more easily dismantled and re-used;
- make spare parts available to repairers and users;
- provide information on the length of commercial guarantees;
- provide information on how to repair;
- provide information on critical raw material content to help recycling.

Here at Which?, we also want to look more closely at the sustainability practices of the companies we use every day, giving you recommendations for not just the best products, but also the most responsible brands. For more on our work towards this, see p15.

### THE BOTTOM LINE

There's no way of buying a 100% sustainable smartphone. But we can all take steps to reduce our impact, including buying products to last, less often and finding a new home for your tech when you no longer need it, rather than throwing it away or sending it to be recycled into its raw parts.

### FIND OUT MORE

- On Which.co.uk
- Reviews of all smartphones we've tested: [which.co.uk/smartphones](http://which.co.uk/smartphones)
- Use our guide to compare how reliable each smartphone brand is, and find out more on common problems: [which.co.uk/reliablephones](http://which.co.uk/reliablephones)
- Find out how to buy a second-hand or refurbished phone in our guide: [which.co.uk/refurbishedphones](http://which.co.uk/refurbishedphones)

- Use our guide on repairing a phone: [which.co.uk/phonerepair](http://which.co.uk/phonerepair)
- Get the best Sim-only phone deal: [which.co.uk/simonlydeals](http://which.co.uk/simonlydeals)

### Recent articles in Which?

- 'Don't get caught out by overpriced tech', January 2019, p52
- 'The tech brands you can rely on', November 2018, p38
- 'How to use less plastic and help save the planet', August 2018, p18
- 'The problem with cordless appliances', August 2018, p26