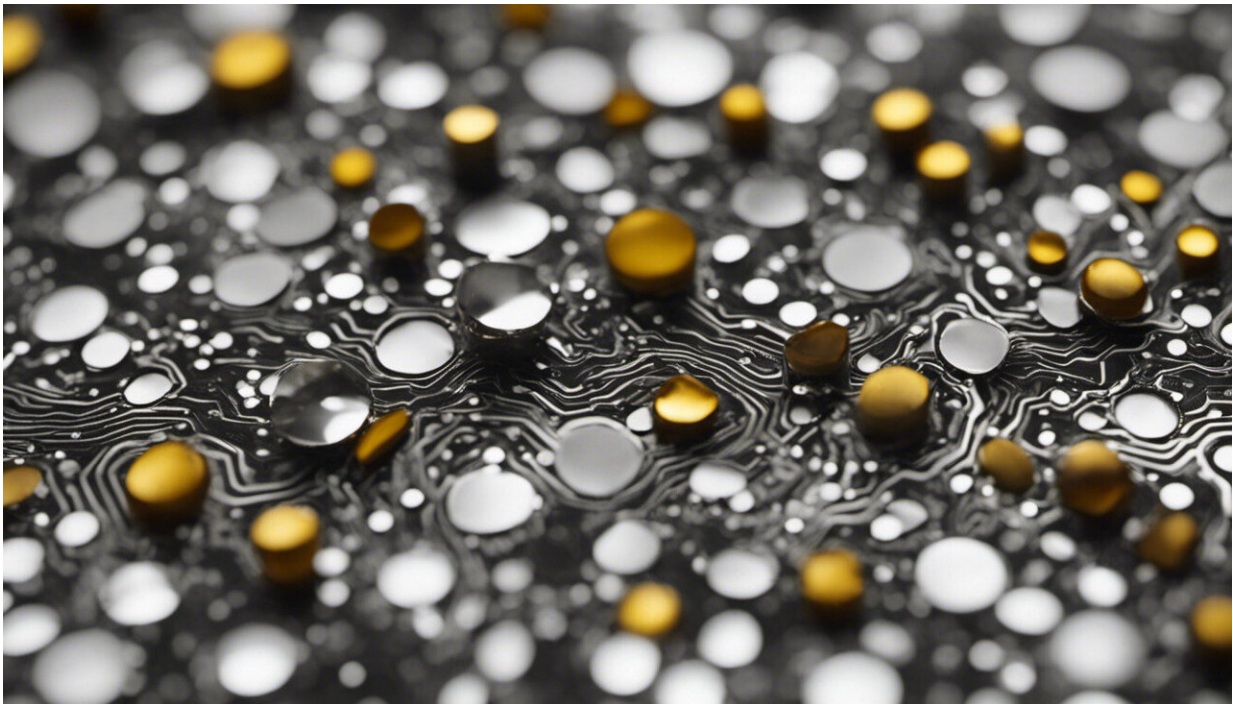


Almost everything you know about e-waste is wrong

May 16 2018, by Josh Lepawsky



Credit: AI-generated image ([disclaimer](#))

Many of us think we know what electronic waste is because we wonder what to do with devices we no longer want or need.

It's the old cellphone and its charger stuffed in the drawer.

It's that old laptop, monitor or printer packed behind the door or in the basement.

It's also all those things we throw out that are exported overseas, and picked over by people who are either [desperate for work, despite the health and environmental risks](#), or at the [forefront of a new green economy](#), depending on the narrative you hear.

But it is far more than all of that.

Waste arises ubiquitously, but unevenly, throughout the lives of [electronics](#), not only when users discard their devices. No amount of post-consumer recycling can recoup the [waste](#) generated before consumers purchase their devices.

Waste from mining

Data on waste generation typically separate producer wastes, such as those from mining, and consumer wastes such as those from households. But there are [problems with such division](#).

It makes the mistake of thinking producer waste and consumer waste are two separate things instead of flip sides of the same coin in [industrial systems](#). It also makes the mistake of presuming consumers have much in the way of meaningful choice in what their electronics are made of.



Domestic e-waste generated per country (in kilotons) in 2016. Data from Global E-Waste Monitor 2017. Credit: Josh Lepawsky

Electronics contain a wide variety of materials. One important example is copper. The [electronics industry](#) is the [second-largest](#) consumer of copper. Only the building and construction sector uses more.

About [30 per cent of world copper consumption](#) is satisfied from recycling copper scrap. The rest needs to be mined. [A United States Geological Survey \(USGS\) study](#) claims that for every kilogram of copper mined, at least 210 kilograms of mine waste arise.

The same study reports that one of the largest copper mines in the world, Chuquicamata in Chile, generates a daily average of more than 298,000 metric tons of mine waste.

At that rate, it only needs to operate for about 12 hours before it generates [as much mine waste by weight as Chile](#) does e-waste in a year. After a little over 48 days of operation, the Chuquicamata mine generates about the same amount of mine waste by weight as the total annual [e-waste arising in China and the United States](#) combined.

Waste from manufacturing

Manufacturing digital devices entails [substantial tonnages of discards](#) that, by weight, far exceed what consumers dispose of as e-waste. For example, in 2014, about 3.1 million metric tons of e-waste was [collected from households in the European Union](#). Yet five times more waste, 16.2 million metric tons, arose from electronics manufacturing within the EU.

This means that even if all household e-waste collected in the EU is recycled, waste from manufacturing electronics in the same region far outstrips [the scale](#) of household e-waste.



A panoramic view of Chuquicamata, a copper mine in Chile. It is one of the world's largest open-pit copper mines, measuring 4.5 kilometres long, 3.5 kilometres wide and 850 metres deep. Credit: Diego Delso/Wikimedia

Data from [manufacturers of phones](#), [laptops](#), [desktops](#) and [tablets](#) show that in most cases the CO₂ released over a [device](#)'s lifetime predominantly occurs during production, before consumers buy their devices.

Similarly, the manufacture of flat panel displays, like those that go into televisions and computer monitors, [releases fluorinated greenhouse gases](#) (F-GHGs), some of the most powerful and persistent of the heat-trapping emissions.

Large volumes of other chemicals used in device manufacturing also don't make it into the final device. The volume of these chemicals may be [four times greater than what is included in the product itself](#).

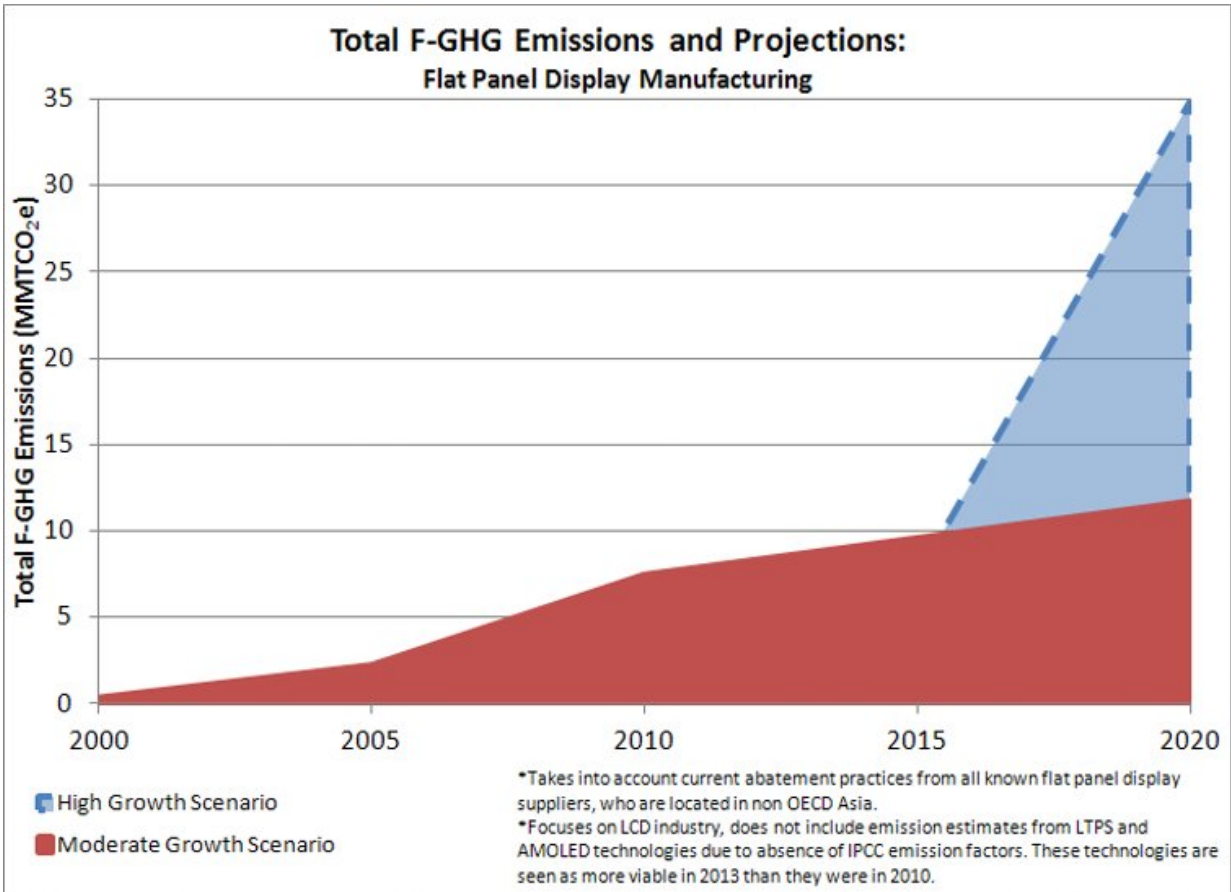
Some of these chemicals are [released into the environment](#), and [make their way](#) into [workers' bodies](#).

Waste from use

Once they're in use, it can be [tricky to measure](#) the environmental impact of energy use by electronics. The electricity the device uses may be generated by coal, hydro or solar power plants. But [it's clear that the environmental impact of cyberspace is anything but "virtual."](#)

Minting a [new bitcoin](#), for example, can produce [seven to 12 tonnes](#) of CO₂ per coin. [Researchers estimate](#) that electricity use for electronics in

businesses and homes are responsible for about two per cent of total global greenhouse gas emissions. By 2040 those emissions could account for [six to 14 per cent](#) of total global greenhouse gas releases.



Global emissions of fluorinated greenhouse gases from flat panel display manufacturing, including projections under moderate growth and high growth scenarios. Credit: U.S. Environmental Protection Agency

Fixing the e-waste issue

Post-consumer recycling of electronics will never be enough, we need to

be able to repair —and upgrade —the devices we already have, if we are to slow our production of e-waste.

Innovative initiatives that facilitate [reuse and repair](#) while also [finding ways](#) to [offset e-waste](#) that arises do exist. More are needed.

In the U.S., the [Repair Association](#) is doing the hard work of advocating for consumers to have the right to repair the devices they purchase by enshrining those rights into law. That said, an [e-waste](#) recycler in California now [faces a 15-month prison sentence and a US\\$50,000 fine](#) in his efforts to extend the lives of computers.

The [automobile](#), [food and pharmaceutical](#) industries have to show their products meet certain safety standards before they are put on the market. Why not demand the same of the electronics industry?

Requiring electronics manufacturers to make products that are materially safer, durable and repairable would be important steps in mitigating waste from electronics throughout their life cycle in ways that post-consumer recycling on its own will never achieve.

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