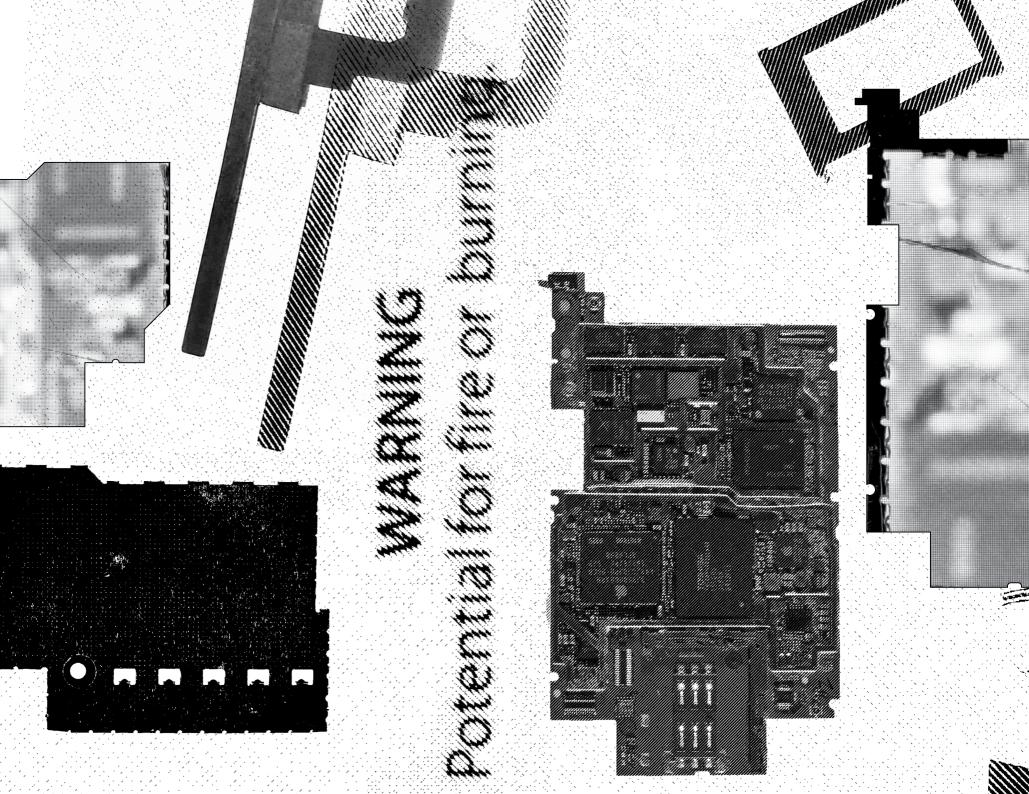
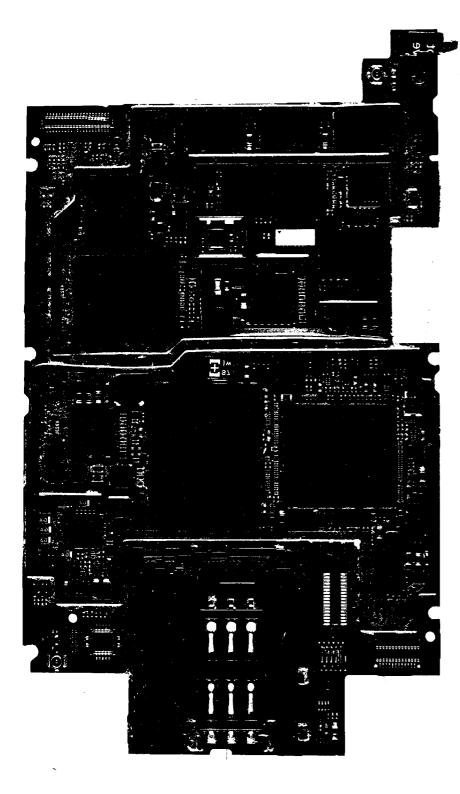
# Times of Waste The Leftover





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# Times of Waste

This exhibition is an extract from the *Times of Waste* project, which claims that we live in the time of refuse. We must settle in the waste, live with it, not against it. The times of repression are over.

The exhibited materials are an attempt in the form of assemblages, a fragmentarily composed archive of remnants and parts, through images, narratives and sounds, to associate up close to the matter and waste a smartphone leaves behind. The theme frays off in all directions, develops eons of time and spatial dimensions and sometimes just abruptly ends.

*Times of Waste* is both about movements and is in movement. It is *work in progress* that urgently points to *progress*, and is a thinking of progressing. It is about progress of another kind, in which ecological, social and mental activities have equal place.

The projected maps show that there are simultaneities in which both giant and small-scale distances are covered, and that some paths remain open. Here, we received no information. Much of it seems to be fragmented, unclear, opaque and global – distributed in many ways across infrastructures and actors.

Yet in these manifold and interwoven characteristics there are opportunities. Ways of acting that reject the singular global solution. Actions which use the small-scale and small parts that grow, distribute, infect others. According to the philosopher Isabelle Stengers, it is the posing of <u>uncomfortable questions</u> to those responsible (business leaders, managers, government officials, etc.) that is one of the first steps to be taken to raise the issue of whether everything is as often claimed in fact under control. In this sense we ask the following:

- Where do the leftovers go?
- Who pays for this?
- And do we want to endlessly consume through perfect recycling?

Despite promising innovations and reasonably good means there is still even today no real solution to the enormous volume of permanently accruing e-waste. There is no ultimate solution. Waste does not resolve itself. It always wastes anew - this too is work in progress.

With smartphones the greatest waste happens not after but rather before use. <u>Neodymium</u> oxide, which is taken here as exemplary, is an essential material in the production of the loudspeakers, microphones and vibrators in smartphones.

Listen here to the audio-essay "Objectbiography Smartphone/Neodymium"

Neodymium magnets are also important components for modern wind turbines or in the batteries of electric cars.

This powder has generated waste in no way less harmful than what is displayed here.

Alternatives to Neodymium are already being studied. However, these "alternatives" will also generate their own waste and have unforeseen effects, too. Times of Waste, the times of rubbish, are the times of the Anthropocene, an age in which the traces of humans are geological. The term was coined in 2000 and is controversial because in its uncritical application it gives man a wide-ranging role in the earth, spreads a crippling crisis, and suggests that our humanmade problems can only be solved by technical means.

From the critical perspective of the materials gathered here - most of which will outlive us - the Anthropocene concept is also apt. It makes clear that "nature" supplies the raw material for technology. This means that a smartphone is an accumulation of rock, which after its use leaves a further accumulation of rock - and in between there will be the short interval of the techno-loving human, who had the temerity to attempt to master nature.

The waste sector is a growing and innovative sector in the green economy and industry. Through applying the resources of the capitalist market economy, it attempts to tame the excessive exploitation of raw materials and the abandonment of toxic waste: waste becomes raw material which can finally be turned into material of use, when a shortage of raw materials occurs, and thus its value increases.

In this respect, not only new recycling methods, but also new business models are being developed: circular economies, where producers are involved in recycling, and leasing models instead of ownership conditions, which allow for regulated disposal of obsolete equipment.

Germany has one of the best waste disposal systems in the world. However, after incineration a full refuse bag still leaves about a fifth of its contents. Of this, around 2.5% is highly toxic and is stored in national or international underground dumps: the mercury-containing electrostatic dust generated by flue gas systems, and the filter cake that remains in the waste water filters of treatment plants.

The rest is **slag** (21%). It is not immediately dangerous, but contains poisonous heavy metals, especially lead, copper, and zinc, in considerable quantities. These can be activated by acid rain. Landfill sites are therefore protected with drainage pipes. These feed into sewage treatment plants; the heavy metals are fixed in the sewage sludge, after they remain in the burnt ash. This is then stored.

In landfills with state-of-the-art metal recovery plants, however, most of these metals are extracted: this amounts to about 11% of the slag; of this 1.4% are non-ferrous metals, which may contain components of mobile phones that have been disposed of in household rubbish. Metal salts, though, remain in the stored slag.

With the latest processing equipment installed, as in the Swiss land-fill site DHZ Lufingen, non-ferrous metals such as aluminum and heavy metal mixtures (copper, zinc, lead, gold, silver) are refined and sold directly to smelters such as Umicore or Aurubis. At the waste incineration power station MHKW Ruhleben Berlin the scrap metal separation is processed directly in the incineration plant and not in the land fill. Slag is business: since it has the same purity as copper ore from mines in the Democratic Republic of the Congo, such processing is considered "urban mining Eldorado".

In Holland and Belgium the contaminated slag is used in the construction industry.

Germans produced 426 kg of household refuse and 633 kg municipal solid waste per person in 2017 (Genesis), ranking 5th in Europe (Eurostat). Every year, 14,000 tonnes of toxic filter dusts and boiler ash accumulate in the waste incineration plant Ruhleben Berlin, which is deposited in underground storage sites. The total amount of incinerated waste is 534,000 tonnes per year, of which 500 tonnes is tar and non-municipal waste.

In Germany, 22.8 kg of e-waste accumulate per person annually (statista 2018). On average, that is 1.7 million tonnes of electronic waste per year (Quarks.de), ranking Germany in fifth place worldwide (statista 2018).

Listen to the soundscape to see what the processing of household and electronic waste sounds like, the wall projection brings you visually closer to these materials

Waste is what is mixed: the undifferentiated. Depreciation occurs through **mixing:** what is mixed is not specific, so tends to worthlessness. With waste, everything is similar. Grey-brown indifference. That's why shredding seems primitive. It just throws everything together. In Germany, all used electrical and electronic equipment are tested for reuse in one of the approximately 400 certified primary treatment plants, or passed on directly to a secondary smelting plant after the batteries have been removed. Mechanical material sorting of metals from the devices or the printed circuit boards only happens later.

Raw materials for high-performance equipment must be pure. This makes waste and its recycling unattractive. Most materials lose their quality, or any valuable materials exist in very small proportions. But it is the same situation with raw material mining. Recycling is downcycling. Even though some transformations are strategically called upcycling. For we live in the Times of Waste.

Raw material production is waste production. Seen in this way, a new smartphone is always already waste.

A mobile phone has about 0.4g neodymium onboard (loudspeaker, vibrator, microphone), the sources vary. How great the concentration is in the Chinese mines, where most of the mining is taking place, is not made available by the People's Republic of China. In the production of neodymium, it is not primarily the small quantity obtained from large quantities of rock that is the greatest problem (as in the case of gold), but the radioactivity and acidity. In China, some of the most elementary safety precautions for occupational health and safety are missing. Dust enters the lungs of the workers and pollutes the surrounding fields. A further problem is tailings, waste-sludge lakes that stretch for miles around the mines and settlements in Baotou. What is to be done with this radioactively charged material and whether the water discharge from these lakes is at least partially decontaminated is unclear.

The recycling rate of the metals in a smartphone ranges from 0% to over 50%. Certain rare metals such as indium could be recycled, but it is cheaper to extract and refine them under the most precarious environmental and social conditions from raw material. Indium is virtually "anyway" a by-product of zinc production. In the case of the rare earth metal neodymium, progress has not gone beyond laboratory tests, and industrial recycling is not worthwhile financially. This is why the magnet is not removed during disassembly. The average rate of gold recycling is 15-50%. When modern recycling processes are applied, this can be carried out practically without loss.

- 1 cell phone contains 20-25 mg of gold, depending on the model and year, the equivalent extraction of which would require 8.75 kg of ore.
- 40-50 mobile phones produce 1g of gold.
- It would take around 40,000 50,000 old mobile phones to produce the 1kg Umicore gold ingot mounted on the metal plate.

Andreas Kappler's research team in Geomicrobiology at the University of Tübingen is working on metal extraction processes from slag which is left over in refuse incineration. They are experimenting with microorganisms from the Rio Tinto in Spain, which has suffered acid pollution through mining, and from a copper-bearing mine area in China. The microorganisms' abilities to dissolve or collect metals have been successfully replicated at the laboratory stage for the purification of slags. The same principle is to be used in future for the recycling of rare earths and other metals. Due to the low raw material prices, however, the process has not yet been industrially implemented on a larger scale, as the Tübingen-based company Novis GmbH had planned to do in cooperation with the university.

In the wall video projection microscope images of various microorganisms can be seen from the laboratory of the University of Tübingen

"The used mobile phone market can be compared with the secondhand car market: once the market becomes saturated, the used market begins. This situation has occurred in the western countries. But the return in Switzerland is still low." RS Switzerland used mobile supplier

# How does the used mobile phone market work in Germany?

In Germany there is a large used equipment market. On the one hand, various online platforms such as clevertronic.de, asgoodasnew.com, rebuy.de or (small) retailers such as tamtam-berlin.com buy devices for resale. On the other hand, initiatives such as the German Environmental Aid (DUH), the German Nature Conservation Union (NABU) / Telefónica or manufacturers like Telekom collect used phones and sell functioning or repaired devices. The proceeds of sales or a percentage of them are used to promote charitable and ecological projects.

The international company Asgoodasnew offers equipment on specific websites for the German, French, Austrian, Polish and Spanish markets. Devices are delivered to all EU countries. Offers are also available on ebay and other marketplaces. Clevertronic offers simultaneous purchase and sale of mobile phones. Trading takes place in Germany and other European countries such as Austria, Belgium, Holland, the UK, France, and Denmark. In a comparative test by the technology magazine Connect (10/2019) Clevertronic took first place. Portals such as rebuy bring together various suppliers, including verkauf.ch, a Swiss pioneer of used equipment. They have, like other companies, an in-house repair service.

Private providers advertise mostly through classifieds such as ebay. In order to place themselves in this comprehensive range regarding quality, prices and guarantees, finanztip.de or idealo.de offer information and price comparisons.

In resale, mobile phones are returned in so-called mono collections. For example, the 'Mobile Box' has over 1000 collection points in Germany and works

among others along with Environmental Action Germany. Of the collected devices, about 15% are suitable for resale. Their data are deleted, factory re-set and any damage is repaired. Generally it is keyboards or displays that are replaced – such devices do not have to be 'disposed of'.

Overseas trade is carried out by different intermediaries; most traders come from the countries to which they export. Local markets are an important point of sale in Africa. *Helvetrade SA*, a Swiss company whose proceeds largely go to *Terre des Hommes*, also works in this way. *Helvetrade SA* supplied equipment to Pakistan and Hong Kong 7-8 years ago, from there they went to the low-income regions of China. In the meantime, Hong Kong and Pakistan have been replaced by African countries. Thus, multiple and multiplying paths and economies develop.

The projected maps show some of these intricate routes

The used mobile phone market attracts people who do not always... want to own the latest thing or those who have to live on a small budget. It actually benefits from the growth ideology, since only a fast throughput guarantees equipment replenishment. "Large companies, such as Samsung, use the secondhand market and they support it as much as possible. For this is how people become "tied" to their devices, and if later they earn more, they will perhaps buy a new device of the same brand. Small companies like us are the dooropeners of the big companies". verkaufen.ch Companies like Samsung or Apple do not get into the second-hand business for ecological reasons, but rather to participate in a different market.

With the smartphone, alternatives are difficult. It is a sealed up minicomputer whose **reparability** and recyclability are problematic. Nevertheless, it is possible to repair about 15 smartphone components. Devices such as Fairphone or Shiftphone are a cut above the others because their components are designed to be replaceable.

The life span of 5-6 years of a smartphone, compared to the average first usage of 12-24 months, is not bad, especially considering that the small size of the device means leaving little electronic waste.

Although the smartphone is designed as a short-use, throw-away product, you can actually use it individually "quite a bit" differently. There is a potentiality that, in spite of everything, makes the smartphone interesting, especially for the increasingly relevant collectively lived DIY cultures of repairing. In these DIY cultures, the common activities of "the patch" are understood as forms of a post-growth society which, in a playful and non-ascetic way, relativize life in excess.

In a Swiss high-security duty free warehouse near Zurich Airport, Schweizerische Metallhandels AG Germany stores strategic **metals** as asset investments. In (financial) crises, they are protected from expropriation by the German state. Metals such as indium, hafnium or gallium have comparatively low annual production. Their prices are determined on commodity exchanges; they increase with scarcity. Due to the often irretrievable implementation of these rare metals in high-tech products, investors expect an increase in the value of their investments. In turn, research laboratories are working intensively on the recovery of rare metals such as indium, in order to prevent possible future shortages, and in addition to reduce the degradation of these raw materials, which are mined and extracted under conditions damaging to both health and the environment.

You can see the price developments of raw materials contained in smartphones in the online graphics on the tablet.

### Price explosion of rare earth metals

In 2010, prices for rare earth metals (REMs) increased dramatically. The reason for the price explosion: The People's Republic of China, then producer of 98% of world demand for REMs, imposed export restrictions. As a result, new mining projects started up around the world (California, Australia, Greenland, various African states) and millions were invested into the **substitution** of REMs (among others Fraunhofer Institute Germany), or in **increased efficiency**, e.g. in the field of magnet manufacture (Japan). These measures pushed prices down and Chinese market share fell to 90% of world production.

The export restrictions were sparked off by the dispute between China and Japan over the Senkaku Islands northeast of Taiwan. To respond to the Japanese electronics industry that had invented FeNdB magnets, and hold valuable patents in this sector, China stopped exporting REMs. The subsequent price explosion affected practically every industrial nation and made the dependence of high-tech producers on China visible.

The **Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and their Disposal entered into force in 1989. It is an environmental agreement that regulates the export of hazardous waste.

According to the Basel Convention, waste, such as e-waste, can only be transported from countries of the "Global North" to countries of the "Global South" and vice versa, if these nations are parties to the agreement. It is only in this way that the rules of the convention apply, which means there must be "state of the art" recycling facilities in the destination country. The consignment of the waste requires the consent of the importing and exporting countries, as well as all transit countries. Such consent and settlement is subject to a thorough notification procedure.

In short, the Basel Convention prohibits the export of e-waste to countries of the "Global South".

Switzerland signed the agreement in 1990. Around 170 countries are members, including China. The US, which according to Wikipedia ship 80% of their dangerous waste abroad, has never ratified the agreement; so these rules do not apply to them.

### What options do governments have?

The e-waste problem is increasingly becoming a political issue. Around the world it is addressed in different ways:

### The Swiss Business Responsibility Initiative

calls for Swiss-domiciled companies to respect internationally recognized human rights and environmental standards in their foreign operations; they are liable for the misconduct of their subsidiaries and the companies they control. This also applies to the production of raw materials for electronic products, e.g. the mining company Glencore based in Zug.

A statutory initiative on the part of Bündnis 90/The Greens in Germany calls for legal measures against planned obsolescence. Obviously short-lived designs, built-in flaws or fail points, and construction methods that prevent or complicate the repair of equipment are to be prohibited by law.

The **EU-norm for chargers** has already been implemented: from now on, there is an end to the cable chaos for charging devices for smartphones, electric toothbrushes, shaving devices, etc.

In the USA, the **Dodd-Frank Act** was passed in 2010. It prohibits, among other things, the purchase of cobalt and other metals from the Congo. This is intended to prevent the US and other countries from unintentionally supporting civilian war militias in the Democratic Republic of the Congo that operate the extraction of tin, cobalt or tantalum exploiting child labour and without proper health and safety regulations. However, the law is problematic because it takes away jobs in the Congo when no raw materials at all are allowed to be exported.

## The International Tin Supply Chain Initiative

(ITSCI), which is supported by tin producers worldwide, has succeeded in making 95% of the tin production in Central Africa traceable, thus largely forcing the militias out of business. The initiative started with a mine in 2011, since then more than 1,500 companies in the Democratic Republic of the Congo, Burundi, Rwanda and Uganda are involved. ITSCI received the *edie sustainable award* 2017 in the "sustainable supply chains" category. However, should Donald Trump and the Republican Party, as announced in the run-up to the elections, overturn the Dodd-Frank Act, the further participation in the initiative for US firms – and these are smartphone producers like Apple – would no longer be binding.

### What options do individuals have?

At www.buyaware.org you can see what environmental and social impact a smartphone has. The best thing to do is to use the **Fairphone**, which tries to use components that are as environmentally and socially compatible as possible. Apart from that Fairphone respects modularity: individual defective components should be replaced as easily as possible. This extends the life of the smartphone. The reality is that Fairphone, too, has its limits: even the committed Dutch makers were only able to trace the origin of the metals used completely in one case (tin). And working conditions at the production site of China despite Fairphone intervention (no more than 12 hours of work per day) are critical.

When faced with a purchase decision, the longevity of a device should be considered and the retailer quizzed on points such as: removable batteries, sturdy materials, standardization for easy repair and the possibility of software updates.

After equipment is purchased, individual efforts can be made to extend use: a quick resale of still functional used equipment or its repair – or, if this is not possible, the proper disposal of defective equipment in mono collections. Leaving devices lying around in drawers reduces the resale value of such used equipment. According to an estimate by Environmental Action Germany (DUH), about 124 million cell phones are lying around unused in German homes.

One of the most important initiatives against irresponsible raw material production facilities is **STOP-Lynas.** The activists in Malaysia do not accept that radioactive polluted rare earth metals mined in Australia are shipped to Malaysia in order to be further processed there, bypassing environmental and social standards.

Jim Puckett from the **Basel Action Network** BAN tracks illegal movements of e-waste both inside and outside the USA.

To this end, various technically innovative methods are used, such as the tracking of waste with transmitters, the photographing of e-waste containers and their numbers as well as publicly effective interventions on the spot. For example, how e-waste illegally crossed the Hong Kong-China border has been filmed.

# Sustainability scale of material use and material production

The *Times of Waste* project has developed a comprehensive sustainability scale on the use of materials. The list also includes overarching considerations such as sufficiency, i.e. the self-constraint of one's own needs to an environmentally compatible measure- the most environmental-ly-friendly product/material is the one that does not have to be produced:

- 1. Sufficiency and sharing models
- 2. Longevity of products
- 3. Use of second-hand products

- 4. Repair of defective equipment
- 5. Re-use of individual parts/component recycling (e.g. magnets in smartphones)
- 6. Various levels of material utilization (e.g. smelting of metals)
- 7. Energy utilization (plastic, paper, etc.)
- 8. Regulated landfilling (traceable, retrievable for later recycling)
- 9. Illegal landfill

Remarkably, classical recycling, i.e. material recycling, is only ranked sixth.



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#### Impressum

The exhibition is part of the research project Times of Waste; the project is realized by Flavia Caviezel, Mirjam Bürgin, Anselm Caminada, Adrian Demleitner, Marion Mertens, Yvonne Volkart and Sonia Malpeso, funded by the Swiss National Science Foundation, and located in the Institute of Experimental Design and Media Cultures / Critical Media Lab of the Academy of Art and Design FHNW.

In collaboration with: Museum of Decorative Arts, Staatliche Museen zu Berlin

This booklet was contextualized for the exhibition at the Museum of Decorative Arts, Staatliche Museen zu Berlin.

Graphic Design: Sonia Malpeso Design Updates: Andrea Zaccuri English translation: Peter Burleigh

https://times-of-waste.ch https://objektbiografie.times-of-waste.ch/en

https://times-of-waste.ch/en/exhibition/kunstgewerbemuseum-berlin/





Fachhochschule Nordwestschweiz Hochschule für Gestaltung und Kunst



Schweizerischer Nationalfonds Fondo nazionale svizzero Swiss National Science Foundation



Kunstgewerbemuseum Staatliche Museen zu Berlin



Times of Waste The Leftover

The Museum of Decorative Arts, Staatliche Museen zu Berlin 25.1.-22.3.2020

