

Mobile Phone Recycling

- Chances and challenges from a recycler's view

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Material composition of mobile phones

a complex mix of:

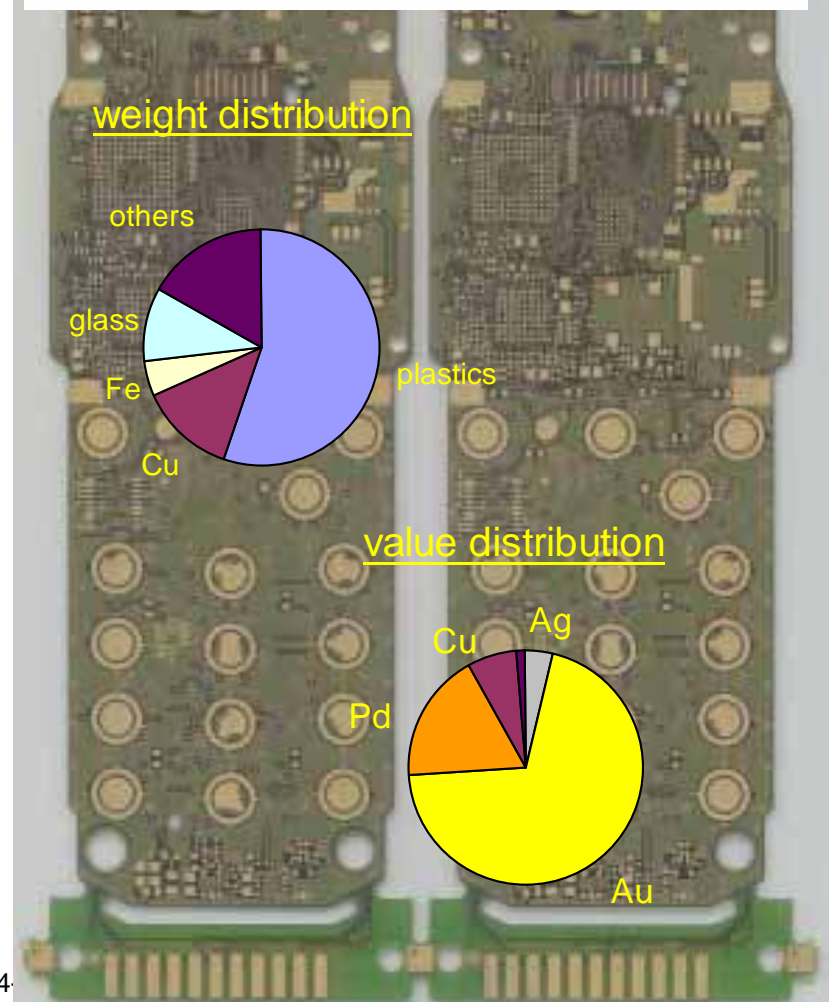
- Ag, Au, Pd, ... (precious metals)
- Cu, Ni, Co, Sn, Al, Fe, Ti, Ta, Bi, ...
(base and special metals)
- Be, Pb, Cd, As, Sb, Cr, In, ...
(metals of concern)
- Halogens (Br, Cl, F, ...)
- Glass & combustibles (plastics)

Why recycling:

- Toxic control
- Value recovery
- Resource conservation

→ maximise precious metal yields
and toxic control !

Most toxic & most valuable metals
are contained in the circuit boards



Environmentally sound recycling - efficient technologies already exist

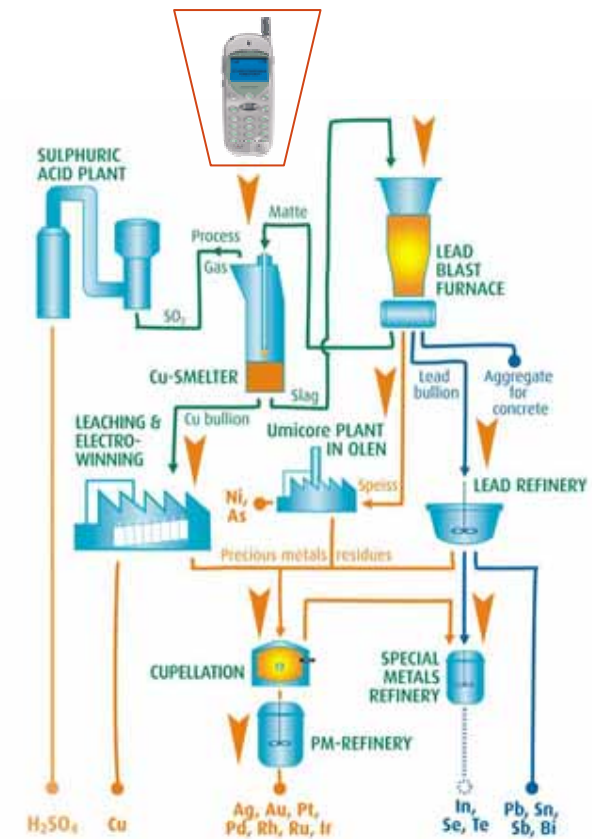
- Removal of batteries, treatment in specialised processes to recover Ni & Co
- Treatment of handsets in specialised pyrometallurgical operations
 - After manual/mechanical separation of components or
 - Direct treatment in integrated metal smelters with highly efficient offgas purification for toxic control

→ Efficient & environmentally sound treatment of cell phones is technological demanding and capital intensive → not economic to duplicate in any country (like manufacturing).

→ Globally, a handful of appropriate recovery plants exist, offering sufficient capacity.

→ International division of labour needed for recycling, EOL-phones to be shipped to integrated smelters (like with global distribution of new phones from manufacturers)

→ Recycling generates a positive economic value if the right path is chosen (max. PM-yields, avoid inefficiency costs)



Example: Flowsheet of Umicore's integrated smelter at Antwerp/Belgium (recycling of e-scrap, catalysts & other precious metals containing materials)

What must be avoided in end-of-life treatment

- Landfill or any other kinds of disposal
- Incineration
- Backyard recycling („open sky“ incineration, cyanide leaching, ...)
- „Fake“ recycling (→ it needs more than a nice building, ISO & OHSAS certificates, and some dismantling → check material streams to the final destination)
- Treatment in smelters without the appropriate offgas purification installations → most copper smelters cannot recycle mobile phones in an environmentally sound way.

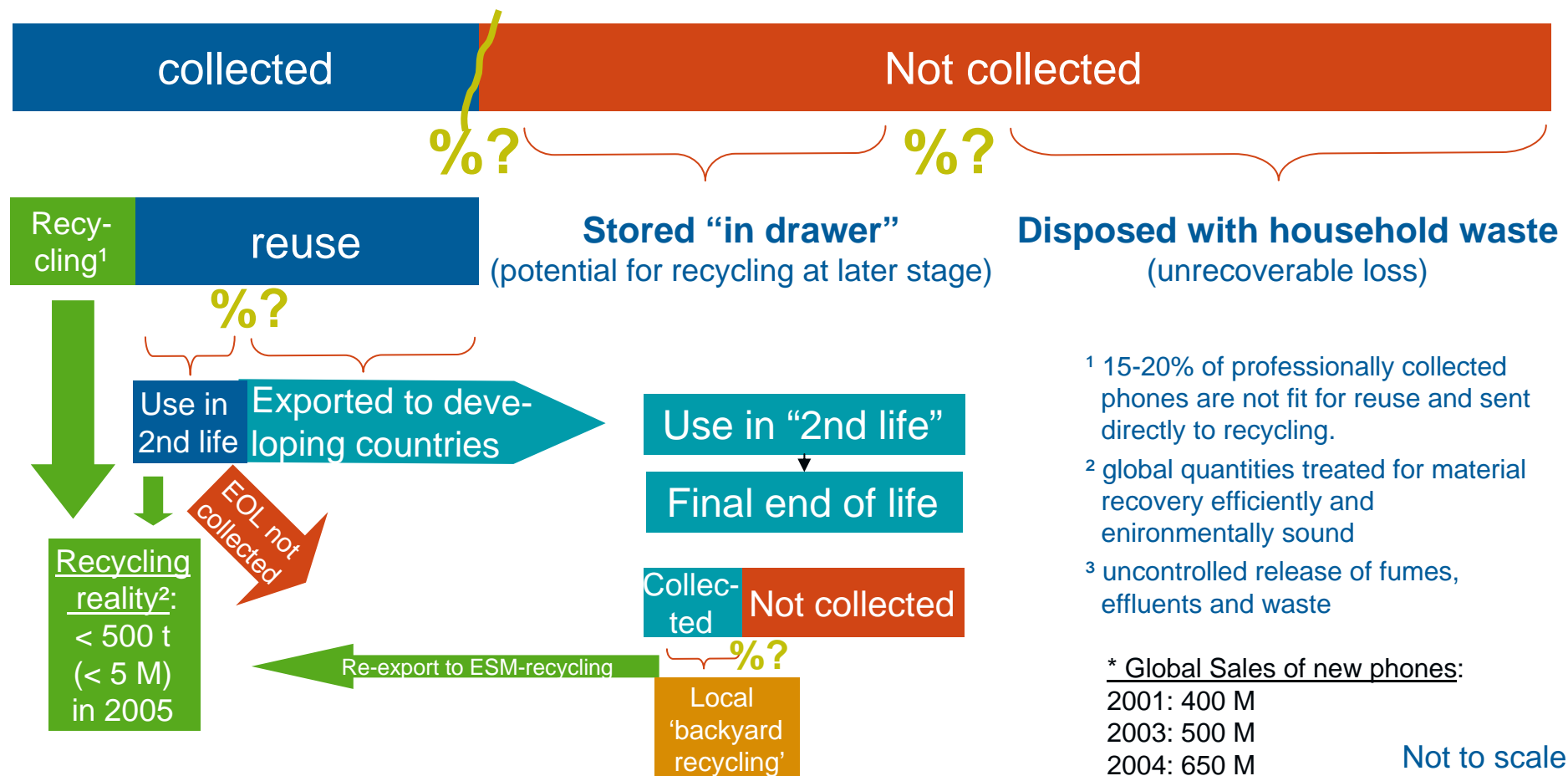


- Today: Large exports of old phones from industrial countries all around the globe.
- Often falsely labelled as “reuse” (to circumvent restrictions on waste exports). Insufficient controls of real physical streams.
- Reuse is only a temporary solution → will lead to scrap that needs to be recycled.
- No recycling without awareness, adequate infrastructure and some minimum technology & experience.
→ otherwise, exports even for “real reuse” are environmentally counterproductive.

Recycling volumes

- praxis falls a long way short of theory

Recycling potential 2005*: 400 million units per anno x 100 g = 40,000 t/a



¹ 15-20% of professionally collected phones are not fit for reuse and sent directly to recycling.

² global quantities treated for material recovery efficiently and environmentally sound

³ uncontrolled release of fumes, effluents and waste

* Global Sales of new phones:

2001: 400 M

2003: 500 M

2004: 650 M

2005: 800 M

Not to scale

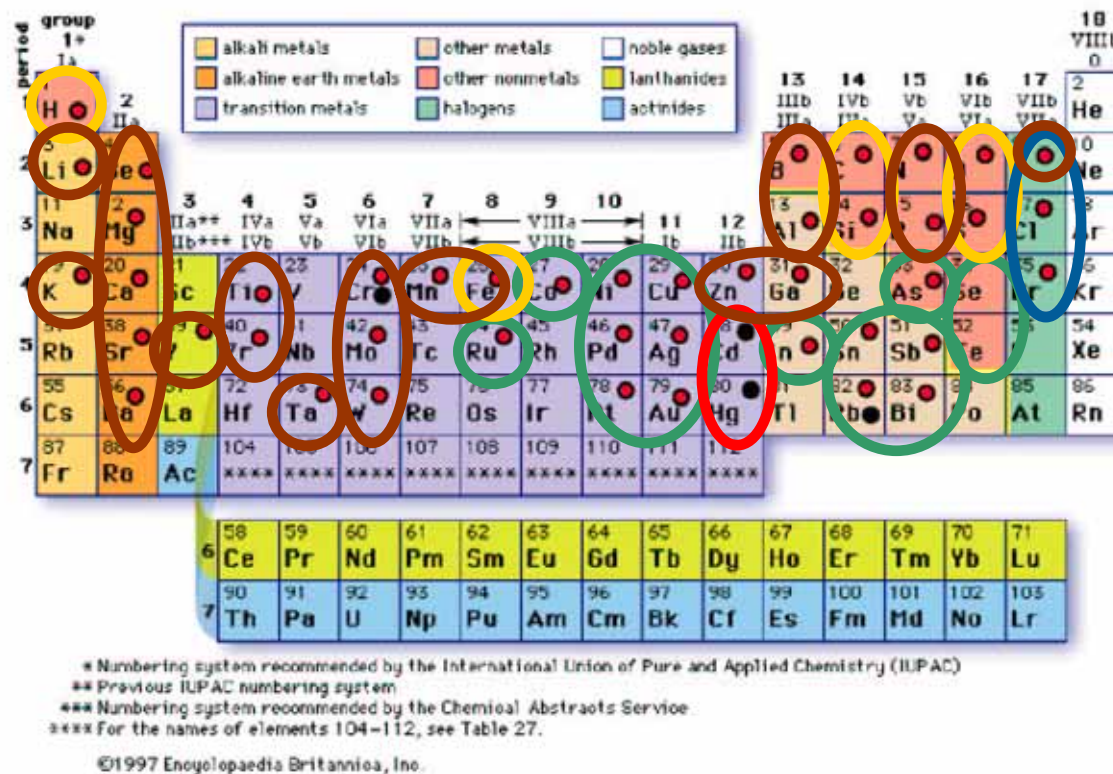
Requirements to improve mobile phone recycling



- Increase collection rate of used mobile phones (awareness campaigns, incentives, ...).
- Mobilise stock of used mobile phones from 'drawers' and direct these into professional recycling channels.
- Stop - and penalise - uncontrolled exports of used mobile phones to developing countries ('fake reuse' to circumvent waste export regulations).
- Increase collection rate of all kinds of EOL-phones in developing countries (incentives, awareness campaigns, ...).
- Make sure that phones are really recycled at their final end-of-life (integrate real and proven recycling outlets into reuse programmes).
→ No export of reuse phones to countries where final recycling is unlikely.
- Stop 'backyard recycling' / environmentally doubtful recycling of EOL phones.
- Promote re-export of EOL phones from other countries to environmentally sound managed metallurgical recovery plants ...
... and adapt Basel convention mechanisms to facilitate such shipments (target to reduce transboundary movements of waste is here counterproductive, it indirectly promotes less efficient and more polluting local "recycling").

A state-of-the-art recycling process maximises value recovery and toxic control

Material Content of Mobile Phone



Umicore process

- Recovered as metal
- Chemical use as process additive
- Transfer into an inert slag (product)
- Neutralised in effluents
- Isolation and safe deposit

● RoHS substance

● Mobile phone substance

It needs a global network of partners ...



... to offer much more than just technical solutions.

Join us to increase recycling effectiveness, promoting best-practice quality standards, as well as profitabel and environmentally sound operations.

Umicore Precious Metals Refining

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