

# Turning waste into a potential resource

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7 September 2023

Green Cities Forum – International Conference on Environmental Public Policy  
Qosmo Hotel, Braşov, Romania

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slido



**How many unused  
electronic devices do you  
have stored at  
home/office?**

① Start presenting to display the poll results on this slide.

slido

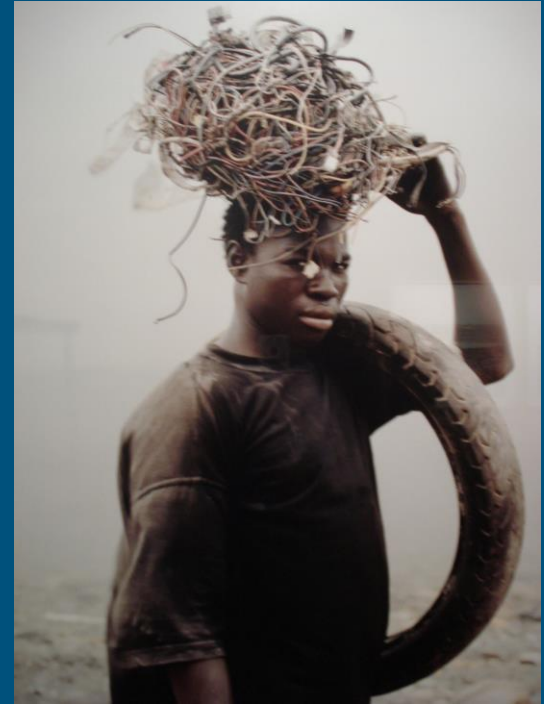


# Why did you not dispose of these unused electronic devices?

① Start presenting to display the poll results on this slide.

# Personal motto

YouTube documentary:  
Toxicity life at Agbobloshie, the world's largest e-waste dump in Ghana.

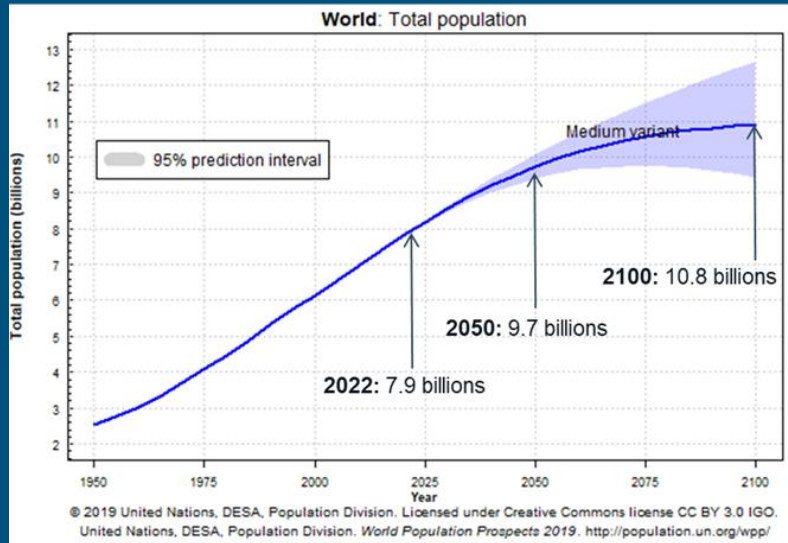


© Pieter Hugo  
Permanent Error, Agbobloshie, Ghana 2009-2010  
Fotografiska Museum, Stockholm, Sweden (2012)

# Global Challenges for Natural Resources Scarcity

## Global population growth & building development

Non-metallic minerals (e.g., sand, gravel, clay deposits)



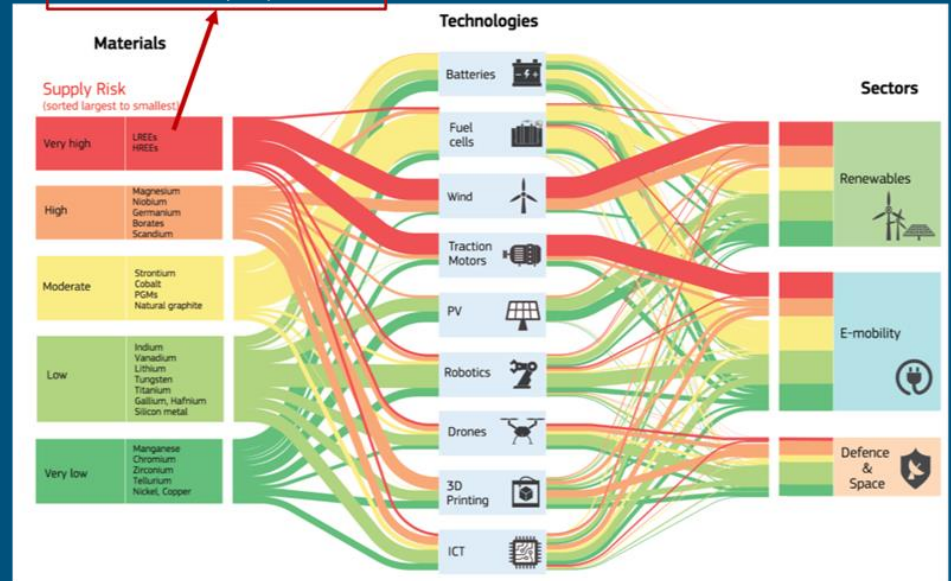
UN World Population Prospects, 2019

**Non-metallic minerals** represented **48% of global material extraction** (43.8 billion tonnes) **VS Metallic ores** represented **10% of global material extraction** (9.1 billion tonnes) (UNEP-IRP, 2019)

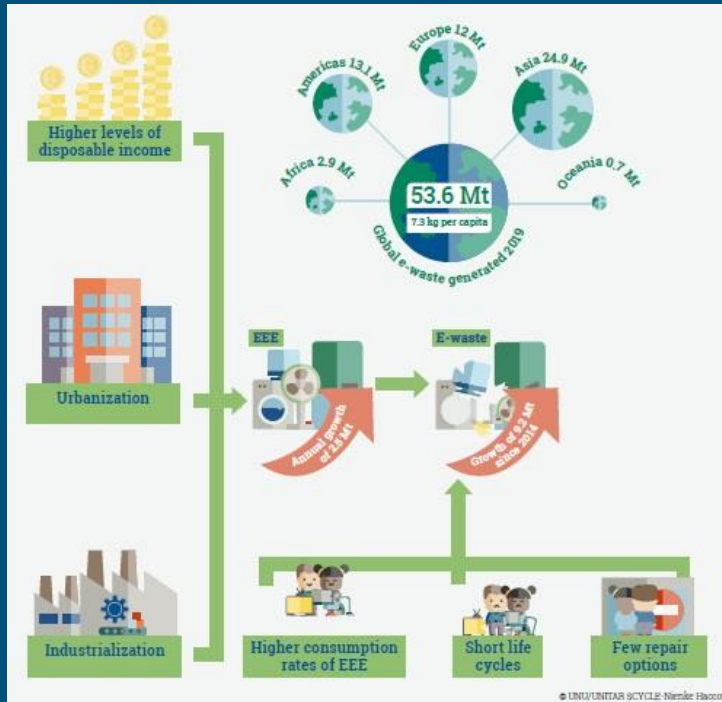
## EU technological development, energy transition & living standards

Metallic ores (e.g., base, precious, and critical metals)

**Chinese ownership (market share):**  
LREEs (99%)  
HREEs (98%)



# E-waste challenges



## Main challenges of electronic waste management:

- **High volume** (53.6 Mt in 2019 → 74.7 Mt by 2030);
- **Fastest growing waste stream** (new models release and short life span - 22 months per person for mobile phone);
- **Decentralised waste** (urban dispersion);
- **Inefficient repair/reuse/recycling schemes** (non-existing, pricey or inconvenient);
- **Lack of financial incentives** (reward sustainable practices with sustainable services/products);
- **Lack of (stricter) e-waste legislation** (78 countries covered by legislation, policy and regulation in 2019 → 97 countries by 2023).

# What do WEEE-DO?



Giving unused electronic devices a better home.

Utrecht,  
NL



Dispose of  
Your Unused  
Electronic  
Devices



Use Existing  
Low-Carbon  
Delivery  
Systems



Make Use of  
Unused Storage  
Capacity of  
Delivery  
Systems



Condition  
Assessment  
Scan



Repair & Resell  
Recycle



Earn Credits in  
Our Circular  
Shop and  
Delivery  
Partners



# What do WEEE-OFFER?



Giving unused electronic devices a better home.

Utrecht,  
NL



## Individuals/Companies

- Direct Pick-Up System
- Free Up Storage Space
- Reward (online shop credit)
- Report on device's end-use



## Repair & Recycling

- Customer Supply



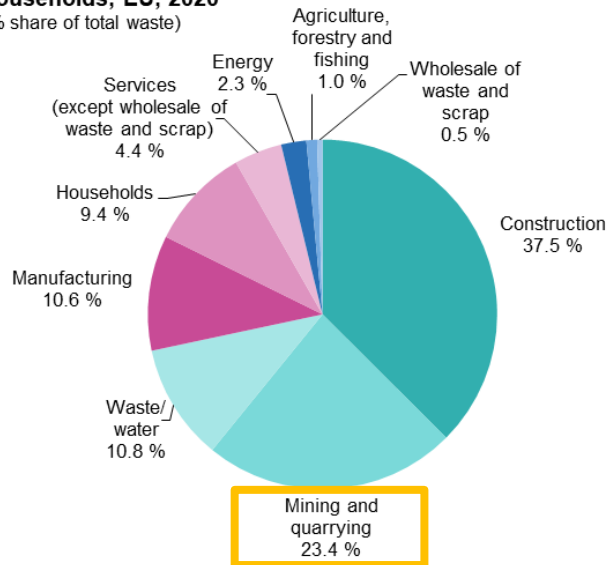
## Delivery Companies

- CSR
- Green Branding
- Client Retention
- Reverse Logistics

# Mine waste challenges

## Waste generation by economic activities and households, EU, 2020

(% share of total waste)



2<sup>nd</sup> biggest waste stream in the EU!

Source: Eurostat (online data code: env\_wasgen)

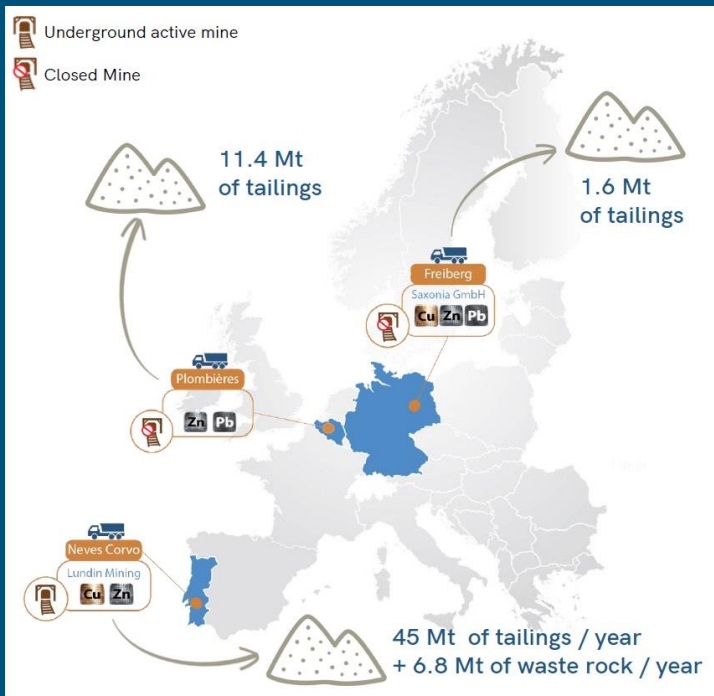
eurostat 

## Main challenges of mine waste management:

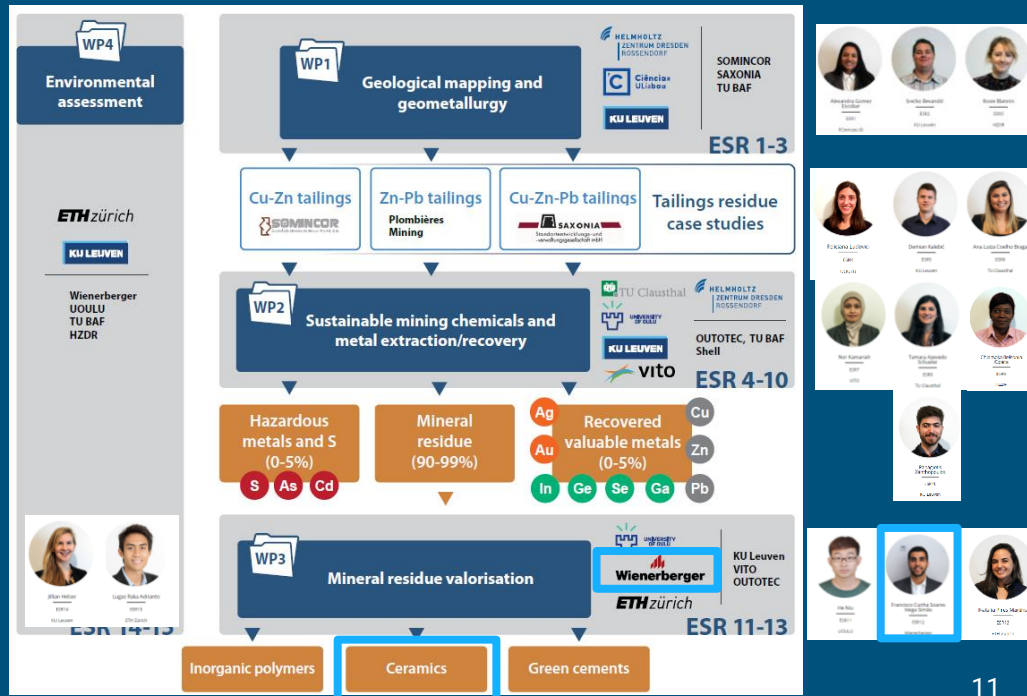
- **High volume** (~600 Mt/year + 28 Bt old stockpiles in the EU);
- **Heavy weight** (Brumadinho tailings pond collapse, Brazil);
- **Open air disposal:**
  - **Environmental threat** (acid/alkaline mine drainage, affecting ecosystem and food chains);
  - **Health hazards** (fine tailings particles can affect visual and respiratory systems);
  - **Social prejudice** (noise/traffic for populations nearby).
- **Low-impact techniques to valorise mine waste** (recover valuable metals and bulk mineral residue).

# EU H2020 MSCA-ITN-ETN SULTAN

## Case study locations + mine waste stocks



## Early Stage Researchers (ESRs) + Work Packages (WPs)



# SULTAN PhD Research

Cradle-to-gate LCA



# Learning outcomes

## WEEE-DO, giving unused electronics a better home:

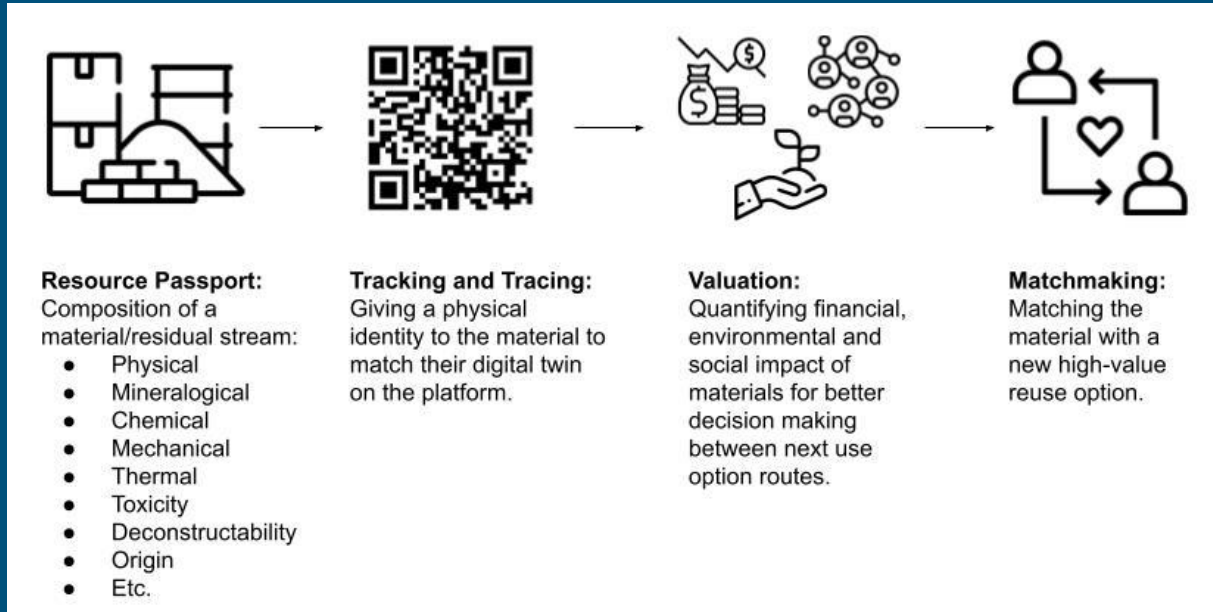
- Individuals need a financial reward to more easily dispose of their unused electronic devices;
- Companies/Institutions only need a collection service with follow-up report on the 2<sup>nd</sup> life of devices;
- Roadblocks: electronics producers take-back system, privacy data issues, technical access to devices, higher repair costs than resell price;
- EU regulations on recycling targets w/ minimum amounts of kg/capita (boosting reuse/recycling of e-waste).

## SULTAN, turning mining waste into a ceramic resource:

- Up to 40wt% of untreated mine waste used as partial/total alternative material for recyclable ceramics;
- Treatment/leaching techniques need optimisation for elements separation depending on valorisation route;
- Roadblocks: mine waste is stored in open air with chemical-mineralogical modifications, economic benefit for ceramic industry, environmental recover already done in old mining sites (how to re-mine?);
- EU regulations for responsible mining in coming years (boosting recycling of mine waste).

# We need more “Tinders” for alternative raw materials!

Database of alternatives materials (EU DPP initiative)



Adapted from Excess Materials Exchange (EME) Platform

A dating platform, where excess materials meet demands.

[excessmaterialsexchange.com](https://www.excessmaterialsexchange.com)

# Food for thoughts



During my PhD research around 120 trees were planted. Join the movement and use [ecosia.org](https://www.ecosia.org) as your default web search engine for surfing the web while planting trees!

50 searches = 1 tree

During this presentation:



**Roof tiles**

8470 pcs<sup>1</sup> / 15 min

<sup>1</sup> Considering 2/2 Belgian production plants (5 production lines)



**Blocks**

324 pcs<sup>2</sup> / 15 min

<sup>2</sup> Considering 1/3 Belgian production plant (1 production line)



**Waste**



???

Mt



**Resource**

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# Thank you for your attention & remember: It's a waste to waste waste!



Funded by the  
European Union

JUMPSTARTER

## WEEE-DO

This project has received funding from the EIT Climate-KIC Greenhouse Pre-Incubation Programme 2019 and the EIT Jumpstarter Competition Phase 2 2019.



## SULTAN

This project has received funding from the EU's Framework Programme for Research and Innovation Horizon 2020 under Grant Agreement No 812580.