Sustainable Cities – Urban Mines

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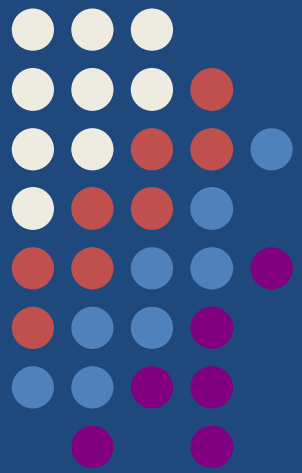
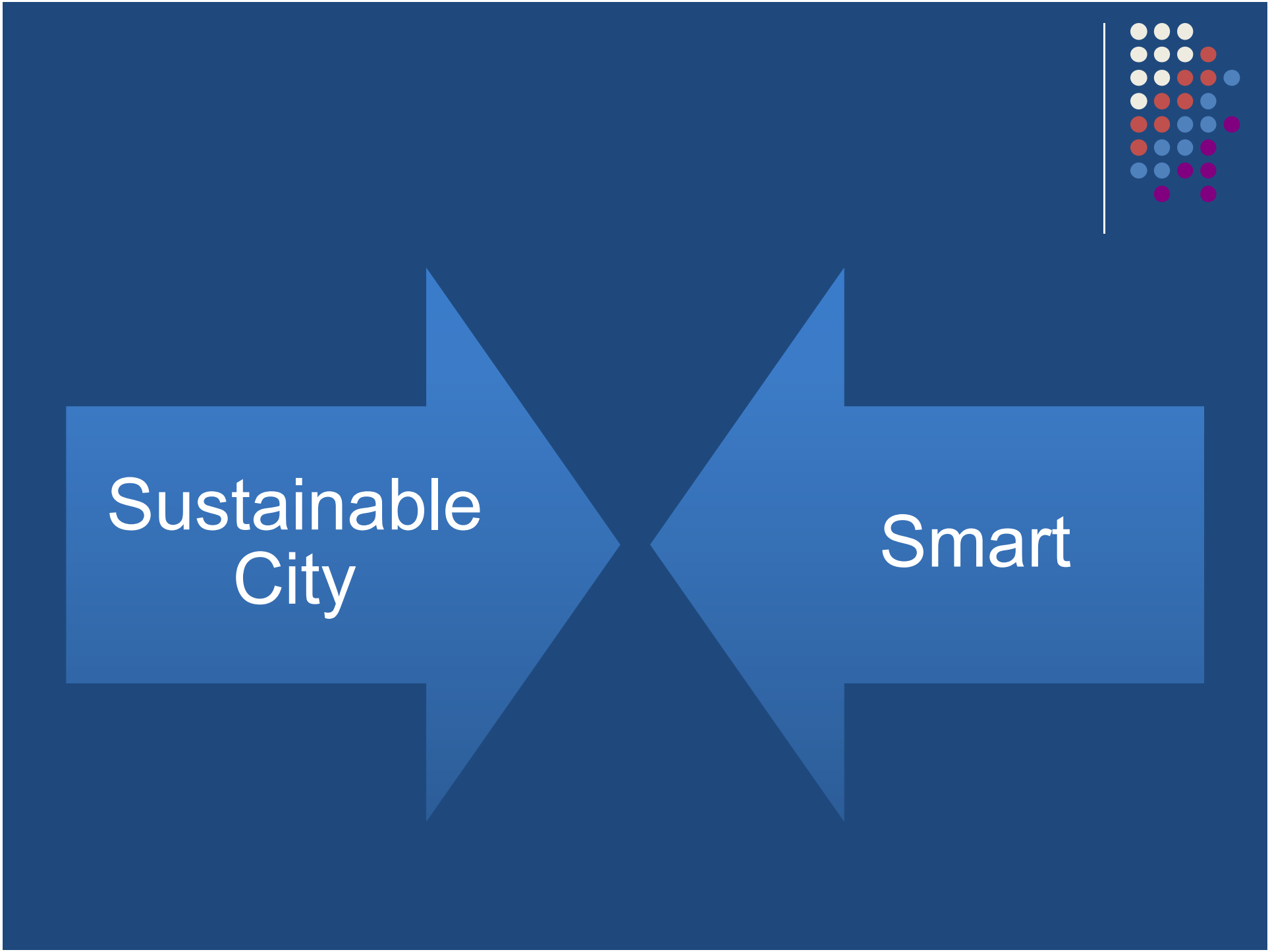
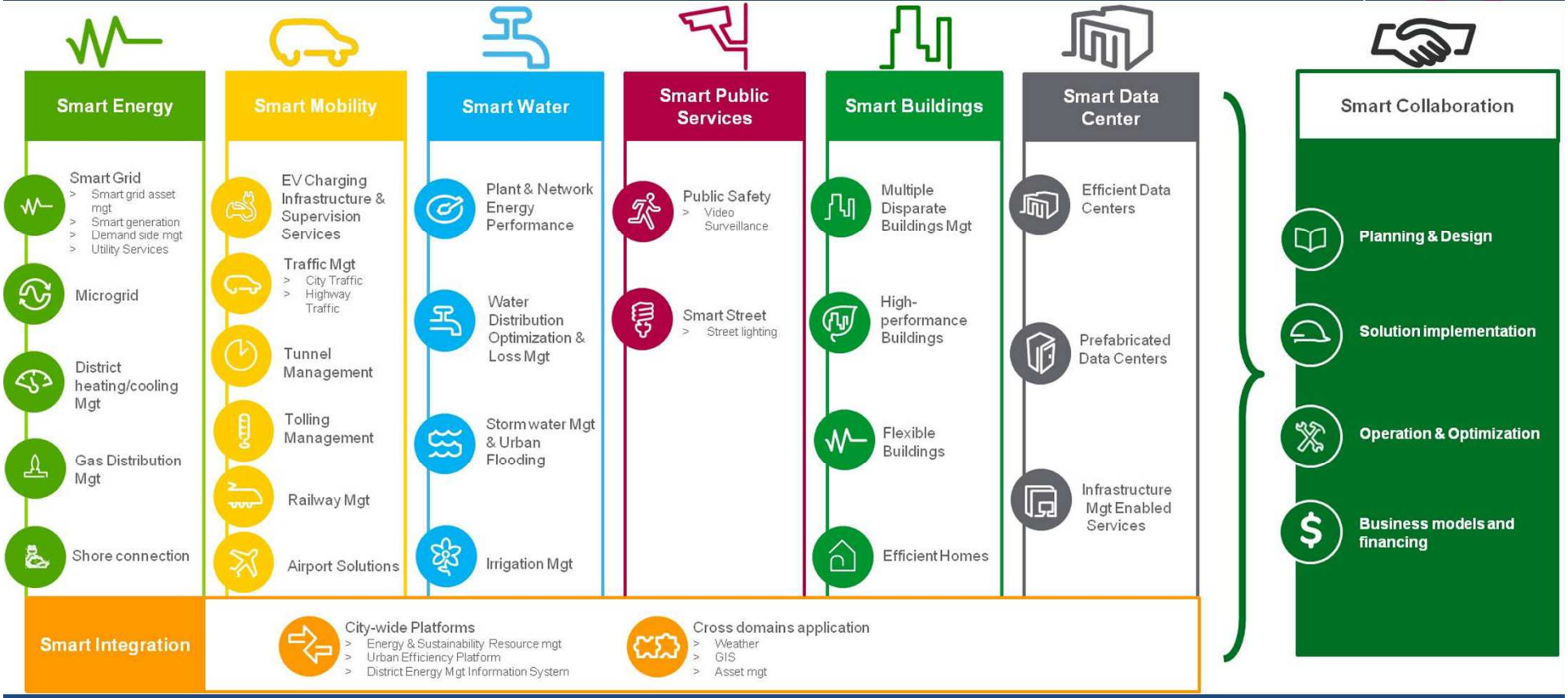
Regional Director
Sustainable Growth Programme

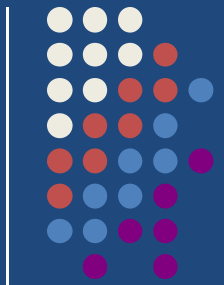


Centre for Environment and Development for the Arab Region and Europe


Sustainable City
Smart


Smart Energy
Smart Grid
> Smart grid asset mgt
> Smart generation
> Demand side mgt
> Utility Services
Microgrid
District heating/cooling Mgt
Gas Distribution Mgt
Shore connection
Smart Mobility
EV Charging Infrastructure & Supervision Services
Traffic Mgt
> City Traffic
> Highway Traffic
Tunnel Management
Tolling Management
Railway Mgt
Airport Solutions
Smart Water
Plant & Network Energy Performance
Water Distribution Optimization & Loss Mgt
Storm water Mgt & Urban Flooding
Irrigation Mgt
Smart Public Services
Public Safety
> Video Surveillance
Smart Street
> Street lighting
Smart Buildings
Multiple Disparate Buildings Mgt
High-performance Buildings
Flexible Buildings
Efficient Homes
Smart Data Center
Efficient Data Centers
Prefabricated Data Centers
Infrastructure Mgt Enabled Services
Smart Collaboration
Planning & Design
Solution implementation
Operation & Optimization
Business models and financing
Smart Integration
City-wide Platforms
> Energy & Sustainability Resource mgt
> Urban Efficiency Platform
> District Energy Mgt Information System
Cross domains application
> Weather
> GIS
> Asset mgt

Challenges



- Volumes
  - Increasing sales of EEE, decreasing lifetimes
- Material Content
  - Valuable and energy-intensive precious metals
  - Toxic materials

A Chinese child sits amongst a pile of wires and e-waste. Children can often be found dismantling e-waste containing many hazardous chemicals known to be potentially very damaging to children's health.

A migrant worker strips plastic from wires to extract useful metals. The plastic on the wires is often PVC which contains toxic chemicals and produces large amounts of pollution when disposed, often by burning in the open air.

Close up of a huge pile of computer keyboards waiting to be scrapped. These are likely to have been thrown away in Europe, US or Japan and then dumped in China because it is cheaper to dump this hazardous waste in China than dispose of it properly.

Chinese man smelts computer parts in the open air to extract metals. Open air burning of computer waste releases large amounts of toxic fumes.

Chinese woman smelts computer circuit boards over an open stove to extract metals. The fan is vain attempt to disperse the highly toxic fumes created by the smelting.

Chinese women dismantle computer circuit boards in an e-waste scrap yard. After sorting the circuit boards they will be burned over open fires to extract metals. The smelting releases large amounts of poisonous gases.

Owner of an e-waste scrapping yard stands in front of a mountainous pile of computer waste waiting to be scrapped to recover useful plastics and metals.

Piles of cables and computer waste awaiting scrapping.

Piles of circuit boards from hazardous computer waste stretch into the distance near an e-waste scrap yard. The circuit boards will be smelted by hand to extract metals. Smelting releases highly poisonous gases and pollutes the environment.

Truck overloaded with hazardous computer waste on the way to scrapping yards.

A boy winces at the smoke rising from the computer motherboards being melted over open fires in electronics waste recycling yard in Delhi.

A worker in a electronics waste recycling yard in Delhi.

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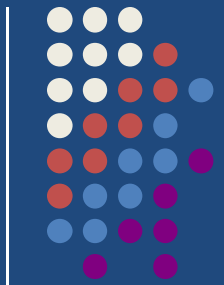
Environmental & occupational safety problems

Ramifications:

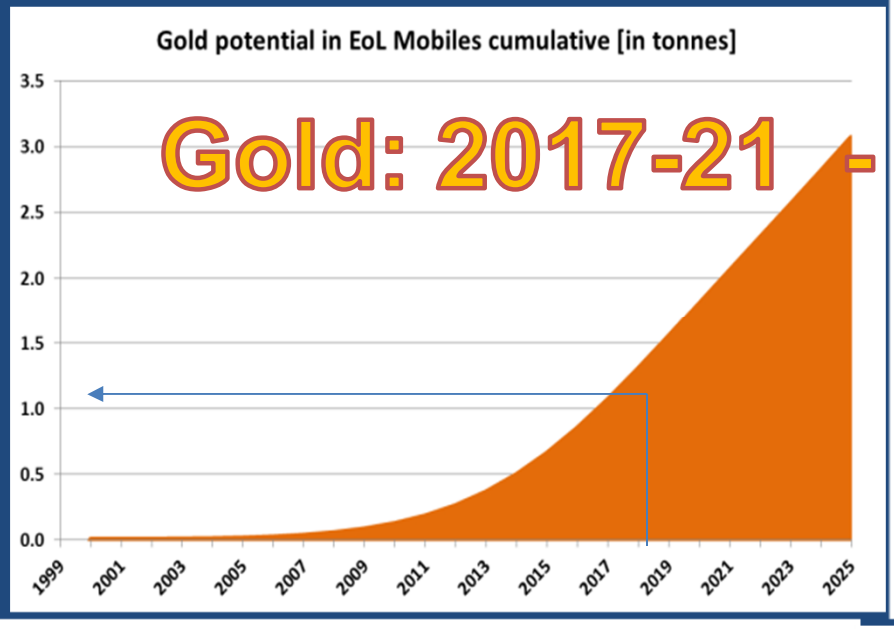
- Toxic emissions from burning
- Soil & water contamination from chemical disposal
- Inefficient recovery of precious metals

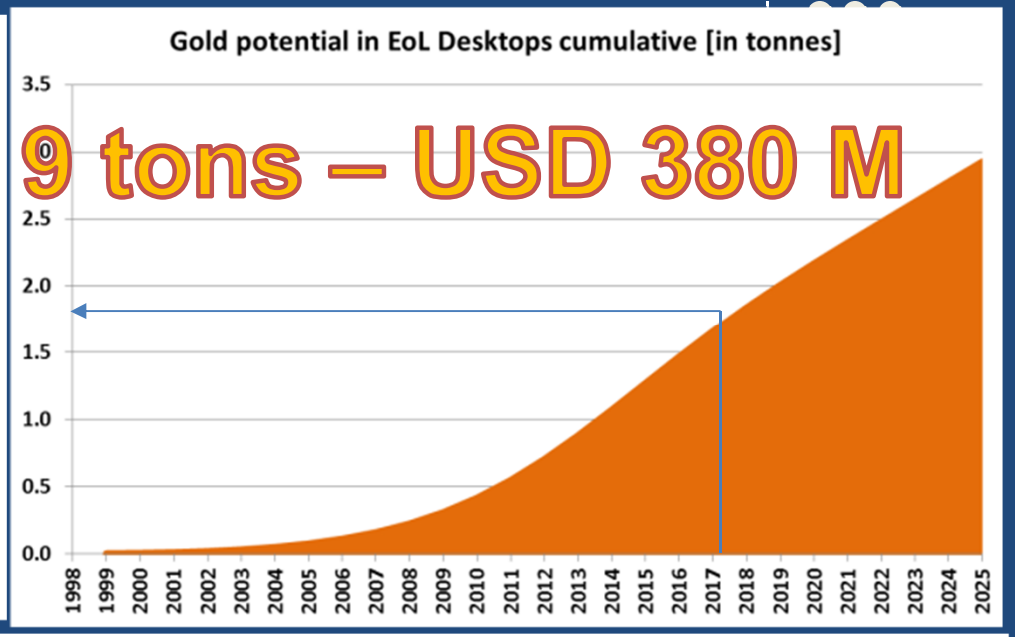
Material	Occurrence in E-waste	Health and Environmental Impact
Beryllium (OECD 2003, Taylor et al. 2003)	copper-beryllium alloys, springs, relays and connections;	• beryllium sensitization/chronic beryllium disease • **human carcinogens** • released as beryllium oxide dust or fume during high temperature metal processing
Cadmium	Contacts, switches, nickel-cadmium (Ni-Cd) batteries, printer inks and toners	• persistent and mobile in aquatic environments (ATSDR 2000) • **damage to the kidneys and bone toxicity**, released if plastic is burned or during high temperature metal processing
Lead	Circuit boards/ cathode ray tubes CTR (1 – 3 kg per CRT);	• Risk for small children and fetuses • **Damage to the nervous system, red blood cells, kidneys and potential increases in high blood pressure;** • Incineration can result in release to the air
Mercury	Lighting devices that illuminate flat screen displays, switches and relays	• **Impacts the central nervous system** • Land filling and incineration of flat panel displays results in the release to the environment
PCBs (polychlorinated biphenyls)	Insulating fluids for transformers and capacitors, flame-retardant plasticizers	• **Suppression of the immune system, liver damage, cancer promotion, damage to the nervous system** • Damage to reproductive systems

Some Facts

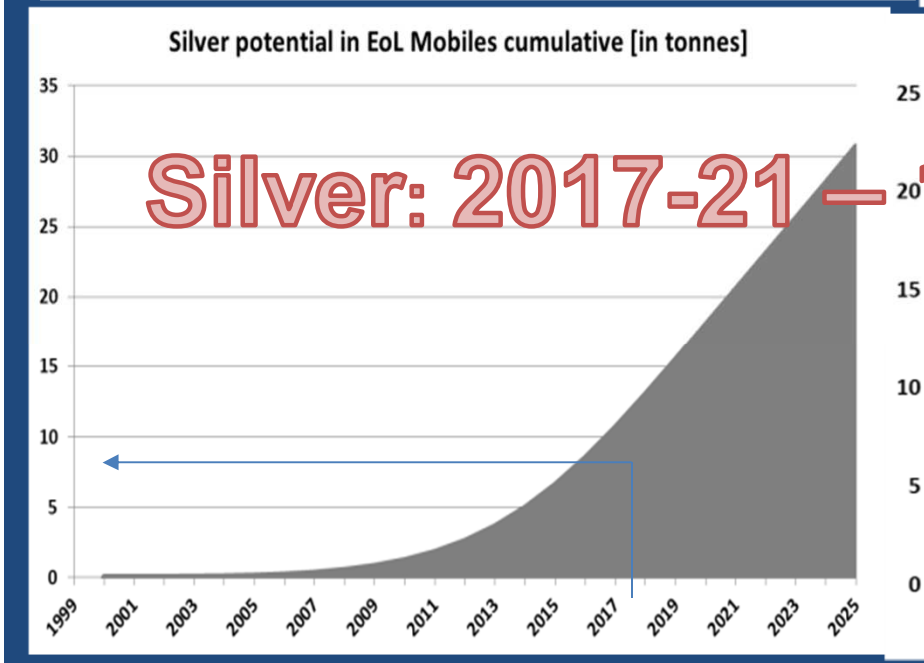


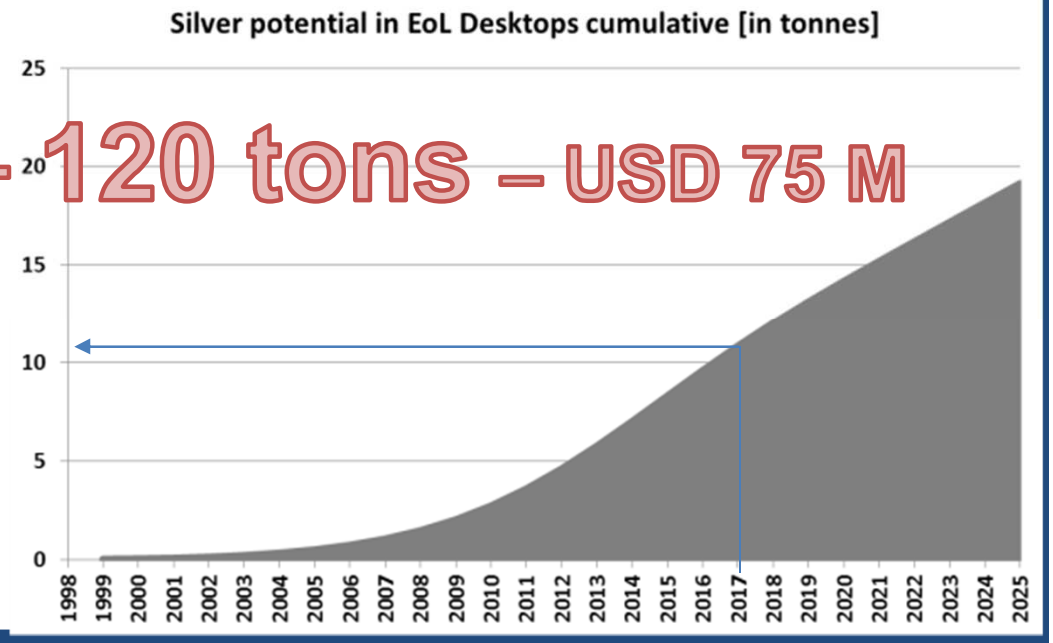
- One tone of recycled cell phones can generate up to 230 grams of gold
- More than 70% of a mobile phone can be recycled.
- Current mass of phones being recycled is only about 0.001-0.003% of the total weight of waste electronic equipment each year.





Gold: 2017-21 – 9 tons – USD 380 M

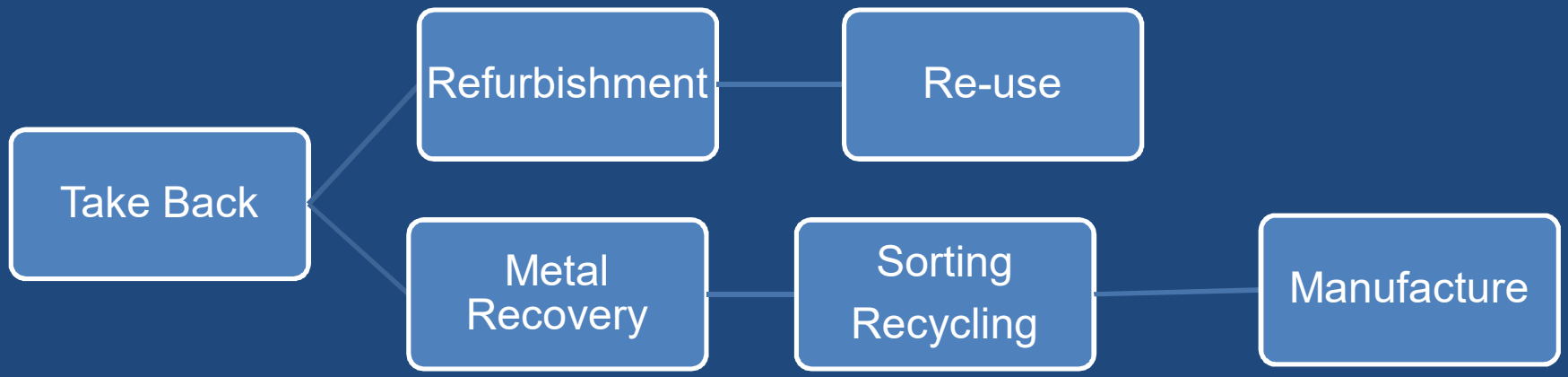




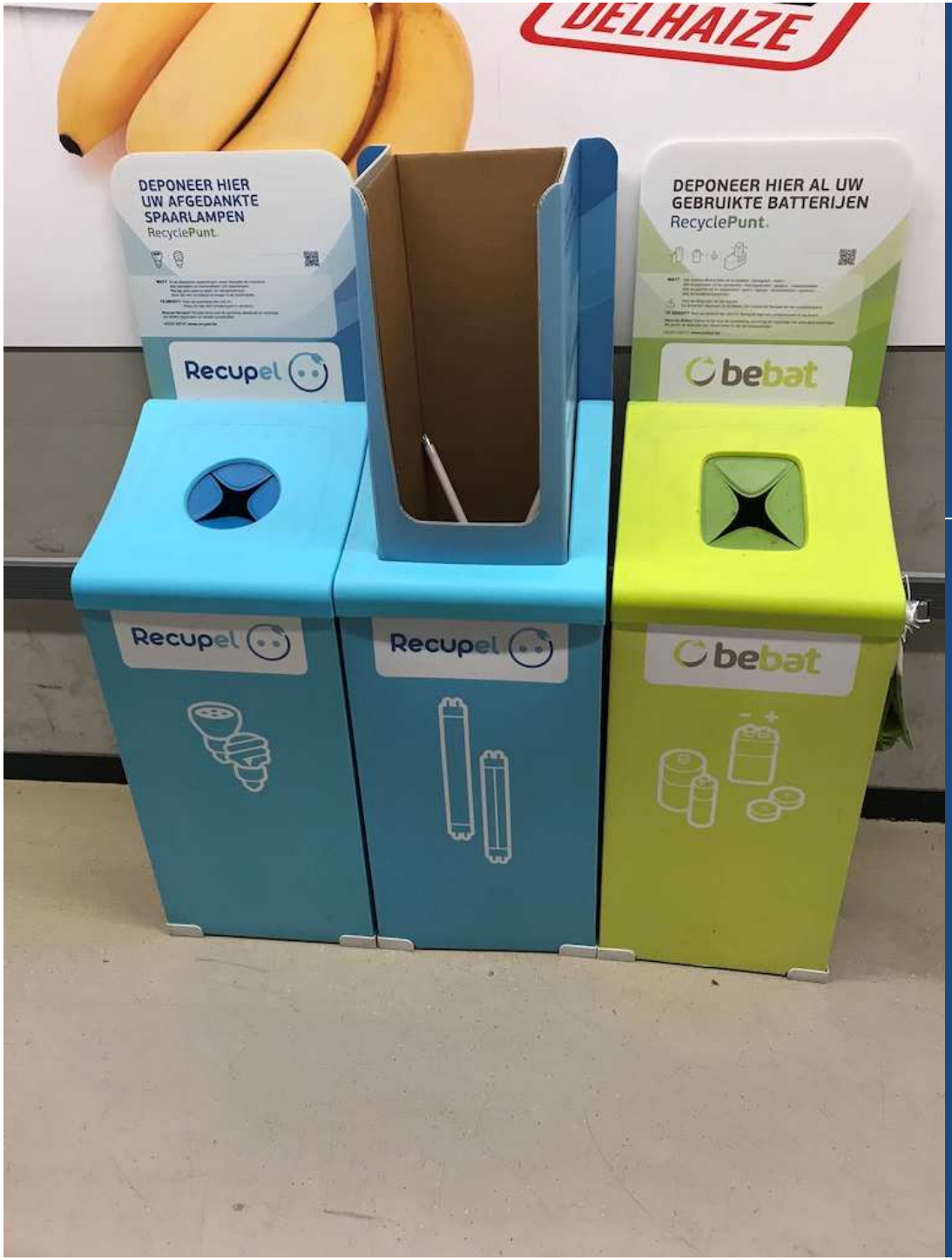
Silver: 2017-21 – 120 tons – USD 75 M

Source: Projections by Oeko-Institut

Electronic Waste Life Cycle



Cartes électroniques 1
3C
A dépolluer


DELHAIZE
DEPONEER HIER
UW AFGEDANKTE
SPAARLAMPEN
RecyclePunt.
DEPONEER HIER AL UW
GEBRUIKTE BATTERIJEN
RecyclePunt.
Recupel
bebat
Recupel
Recupel
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Thank you