# URBAN MINES - THE OTHER SIDE OF DIGITAL TRANSFORMATION

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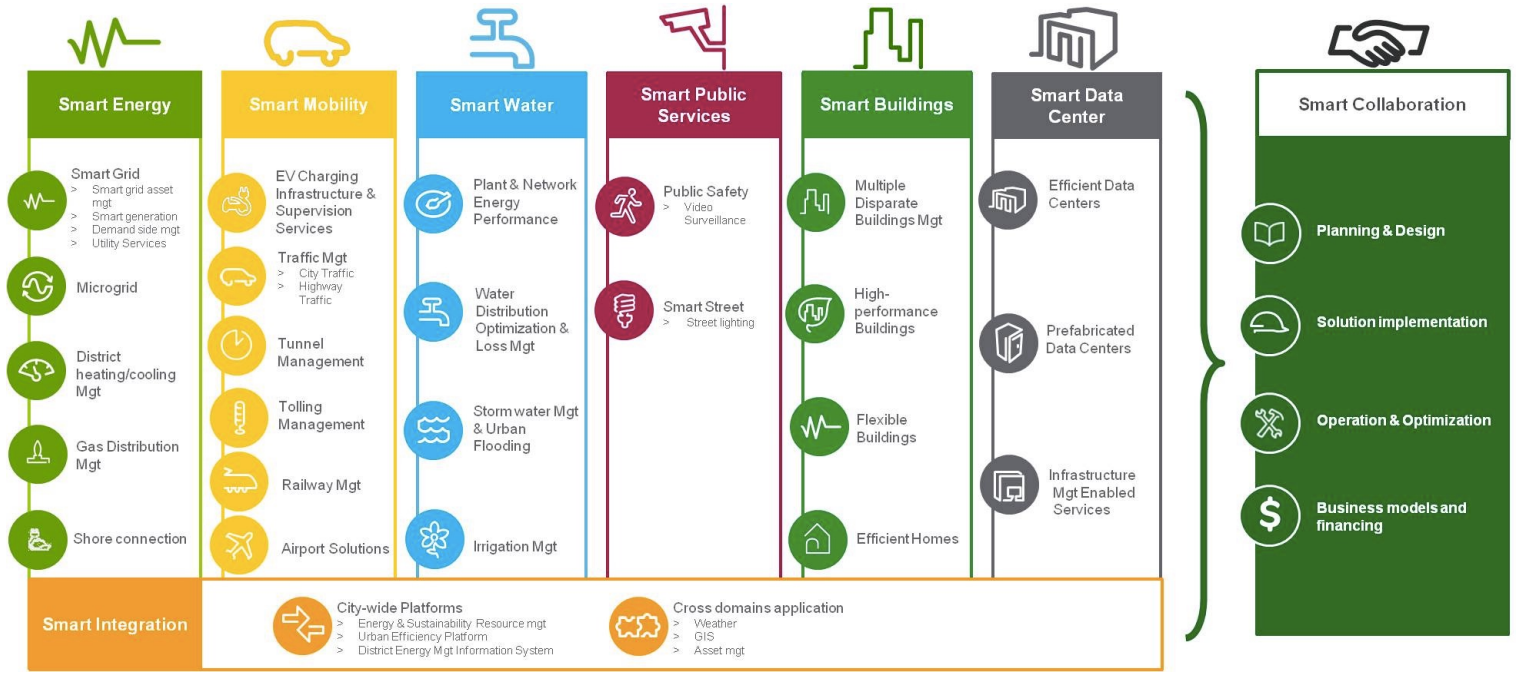
Sustainable City

Smart City

Sustainable Smart City


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 Integration
City-wide Platforms
> Energy & Sustainability Resource mgt
> Urban Efficiency Platform
> District Energy Mgt Information System
Cross domains application
> Weather
> GIS
> Asset mgt
Smart Collaboration
Planning & Design
Solution implementation
Operation & Optimization
Business models and financing

# CHALLENGES

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

# 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<br>• **human carcinogens**<br>• 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)<br>• **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<br>• **Damage to the nervous system, red blood cells, kidneys and potential increases in high blood pressure;**<br>• Incineration can result in release to the air |
| Mercury | Lighting devices that illuminate flat screen displays, switches and relays | • **Impacts the central nervous system**<br>• 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**<br>• Damage to reproductive systems |

# The Global E-waste Monitor 2020

## Quantities, flows, and the circular economy potential

**Authors: Vanessa Forti, Cornelis Peter Baldé, Ruediger Kuehr, Garam Bel**

Contributions by: S. Adrian, M. Brune Drisse, Y. Cheng, L. Devia, O. Deubzer, F. Goldizen, J. Gorman, S. Herat, S. Honda, G. Iattoni, W. Jingwei, L. Jinhui, D.S. Khetriwal, J. Linnell, F. Magalini, I.C. Nnorom, P. Onianwa, D. Ott, A. Ramola, U. Silva, R. Stillhart, D. Tillekeratne, V. Van Straalen, M. Wagner, T. Yamamoto, X. Zeng

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Sustainable Cycles Programme

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United Nations Institute for Training and Research

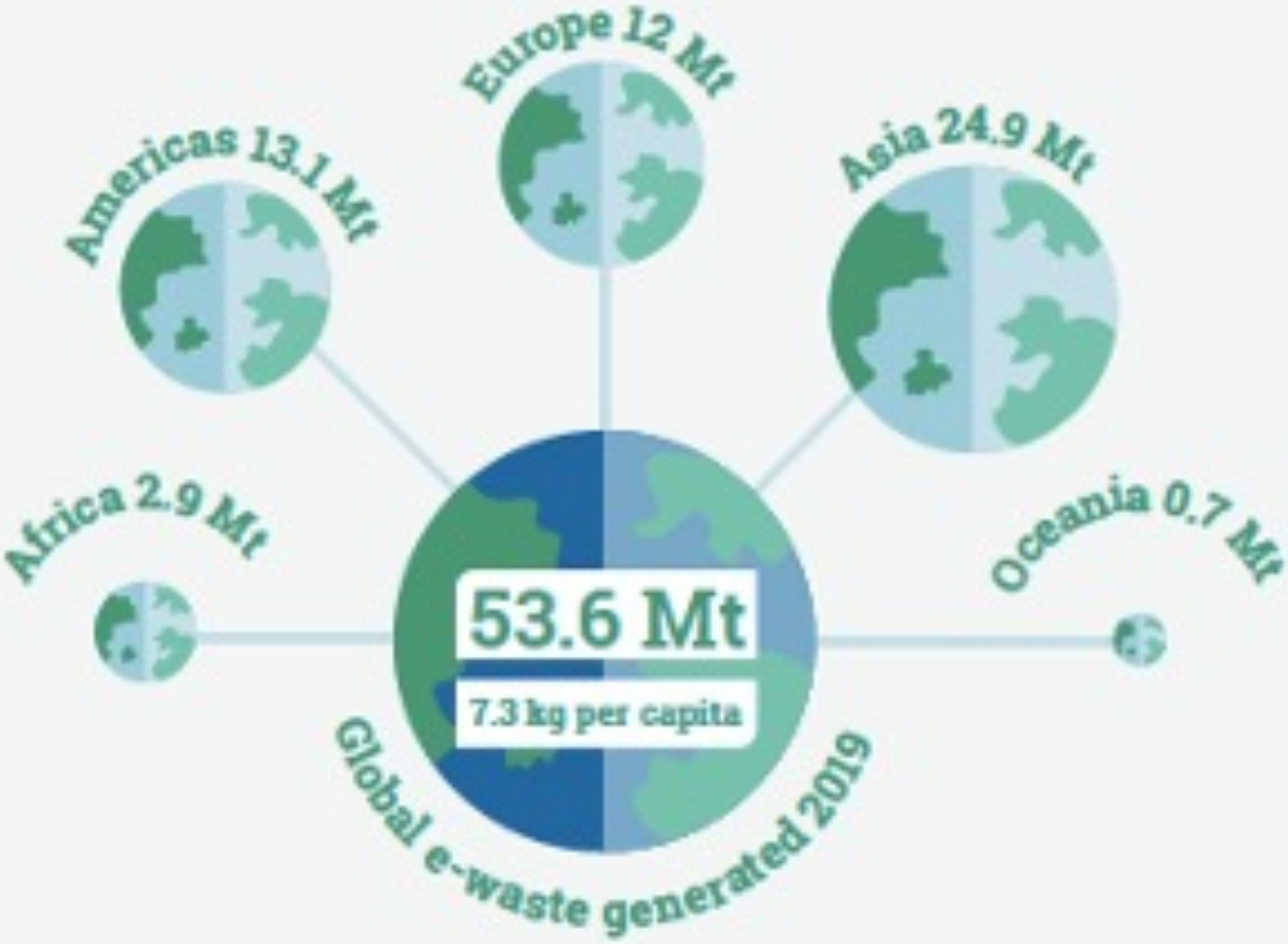
ITU

ISWA
International Solid Waste Association

Supporting Contributors:

World Health Organization

Federal Ministry for Economic Cooperation and Development


Europe 12 Mt
Americas 13.1 Mt
Asia 24.9 Mt
Africa 2.9 Mt
Oceania 0.7 Mt
53.6 Mt
7.3 kg per capita
Global e-waste generated 2019


Global E-waste Generated
44.4 Mt
6.4 kg per capita
Growth of 9.2 Mt since 2014
Global e-waste generated
53.6 Mt
7.3 kg per capita
Global e-waste generated
74.7 Mt
9 kg per capita
2014
2019
2030
17.0% | 7.5 Mt
Global e-waste documented to be collected and properly
Growth of 1.8 Mt since 2014
17.4% | 9.3 Mt
Global e-waste flows that are not documented
82.6% | 44.3 Mt
43.7 Mt
pf e-waste is unknown; this e-waste is likely dumped, traded, or recycled in a non-environmentally sound way
0.6 Mt
is estimated to end up in waste bins in EU countries

# Arab Countries

## Countries with the highest e-waste generation per sub-region

### Eastern Africa

0.3 Mt | 0.8 kg per capita | 1.3% | 0.004 Mt | 383

| | |
|---|---|
| Ethiopia | 55.2 kt |
| Kenya | 51.3 kt |
| Tanzania | 50.2 kt |

### Middle Africa

0.2 Mt | 2.5 kg per capita | 0.03% | 0.0001 Mt | 80

| | |
|---|---|
| Angola | 125.1 kt |
| Cameroon | 26.4 kt |
| Congo | 18.3 kt |

### Northern Africa

1.3 Mt | 5.4 kg per capita | 0% | 0 Mt | 240

| | |
|---|---|
| Egypt | 585.8 kt |
| Algeria | 308.6 kt |
| Morocco | 164.5 kt |

### Southern Africa

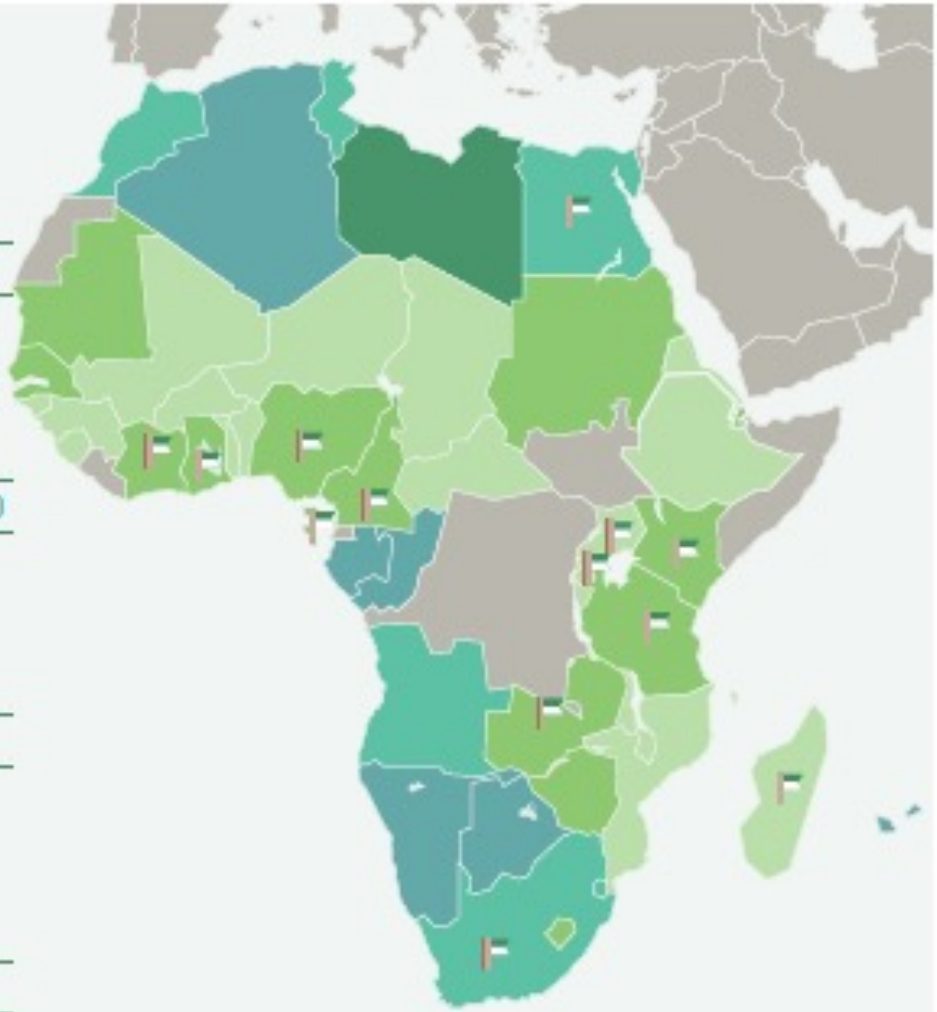
0.5 Mt | 6.9 kg per capita | 4% | 0.02 Mt | 67

| | |
|---|---|
| South Africa | 415.5 kt |
| Botswana | 18.8 kt |
| Namibia | 15.7 kt |

### Western Africa

0.6 Mt | 1.7 kg per capita | 0.4% | 0.002 Mt | 382

| | |
|---|---|
| Nigeria | 461.3 kt |
| Ghana | 52.9 kt |
| Côte d'Ivoire | 30.0 kt |



**Legend**

- E-waste generated (in Mt and kg per capita)
- E-waste documented to be collected and properly recycled
- Population (in millions)

**E-waste generated**

- 0 to 1 kg per capita
- 1 to 3 kg per capita
- 3 to 6 kg per capita
- 6 to 10 kg per capita
- 10+ kg per capita

# Arab Countries


## Countries with the highest e-waste generation per sub-region

### Western Asia

2.6 Mt | 9.6 kg per capita | 6% | 0.2 Mt | 272

| | |
|---|---|
| Turkey | 847 kt |
| Saudi Arabia | 595 kt |
| Iraq | 278 kt |

### Central Asia

0.2 Mt | 7.1 kg per capita | 5% | 0.01 Mt | 31

| | |
|---|---|
| Kazakhstan | 172 kt |
| Turkmenistan | 39 kt |
| Kyrgyzstan | 10 kt |

### South-Eastern Asia

3.5 Mt | 5.4 kg per capita | 0% | 0 Mt | 656

| | |
|---|---|
| Indonesia | 1.618 kt |
| Thailand | 621 kt |
| Philippines | 425 kt |

### Eastern Asia

13.7 Mt | 8.6 kg per capita | 20% | 2.7 Mt | 1590

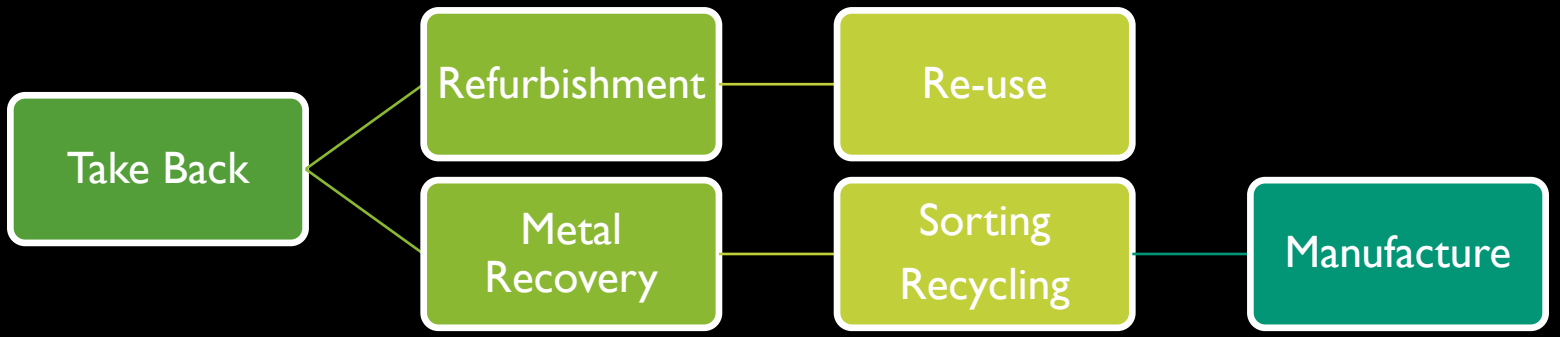
| | |
|---|---|
| China | 10.129 kt |
| Japan | 2.569 kt |
| Republic of Korea | 818 kt |

### Southern Asia

4.8 Mt | 2.6 kg per capita | 0.9% | 0.04 Mt | 1896

| | |
|---|---|
| India | 3.230 kt |
| Iran (Isl. Rep.) | 790 kt |
| Pakistan | 433 kt |

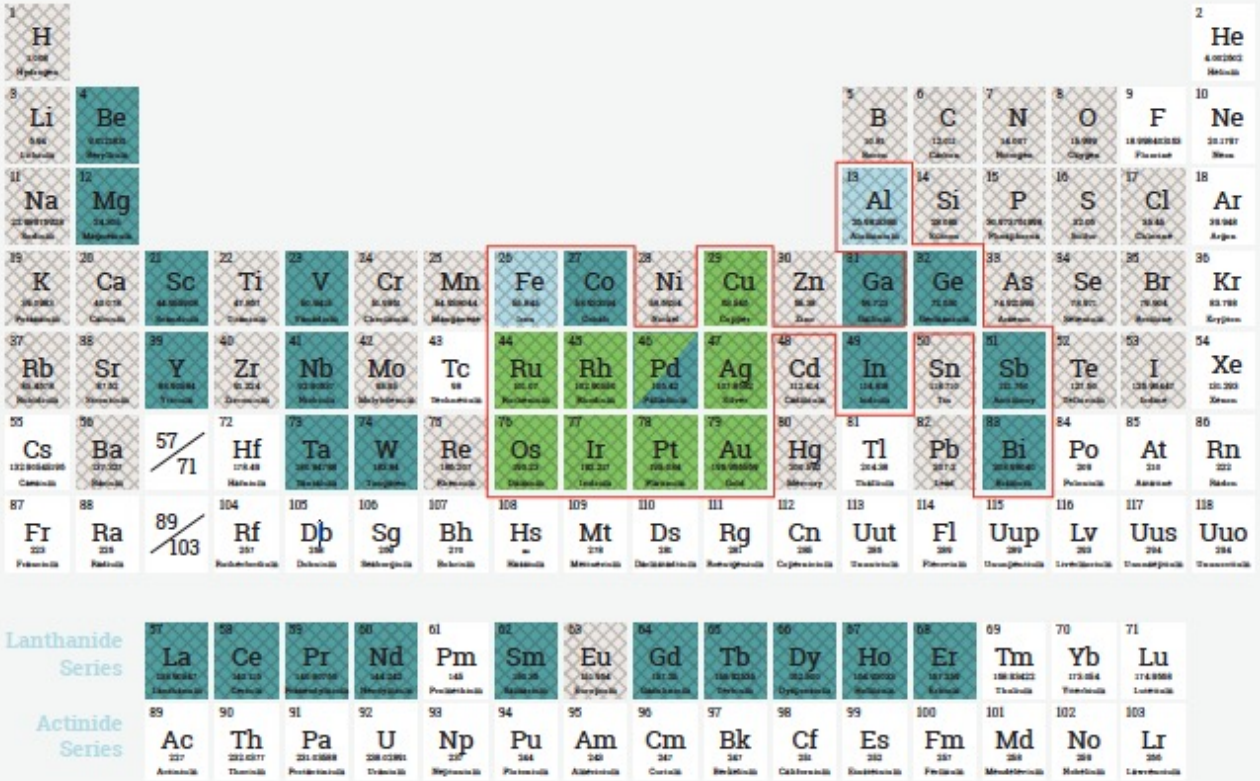
# ELECTRONIC WASTE LIFE CYCLE



# E-WASTE PROPOER MANAGEMEN BENEFITS

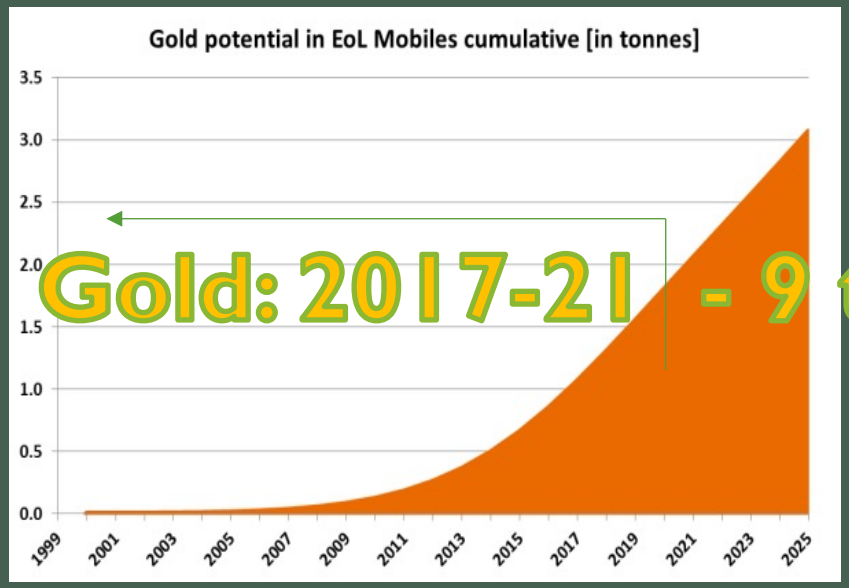
- Increase Job opportunites
- Extracting precious materials
- Refurbishment: Reduce energy consumption for producing new products – thus assist in the Climate change issue

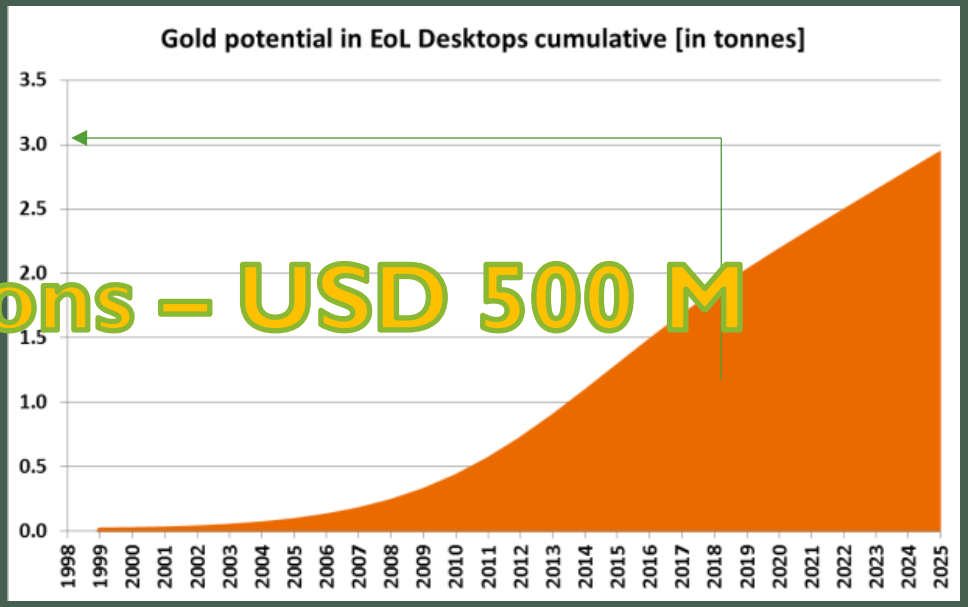
# GOOD NEWS



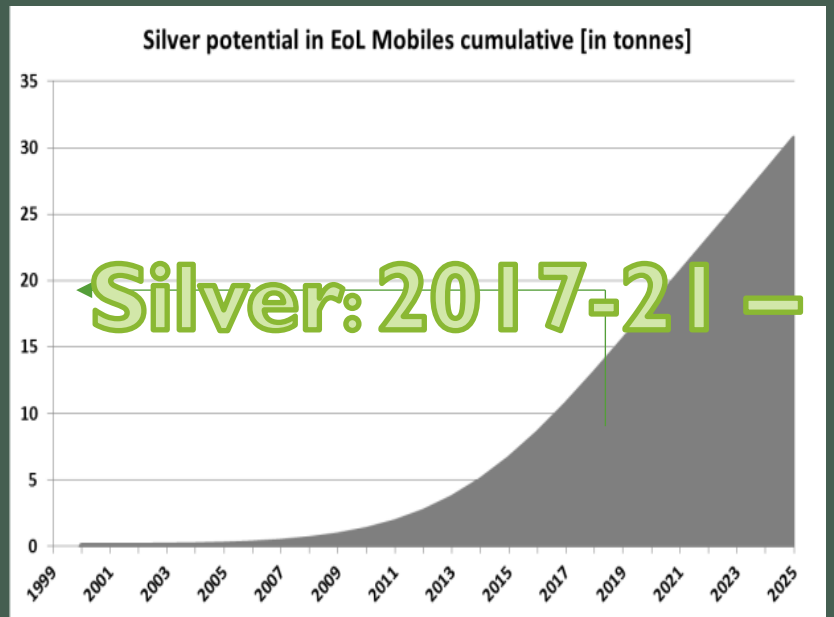

Source: Deubzer et al. 2019

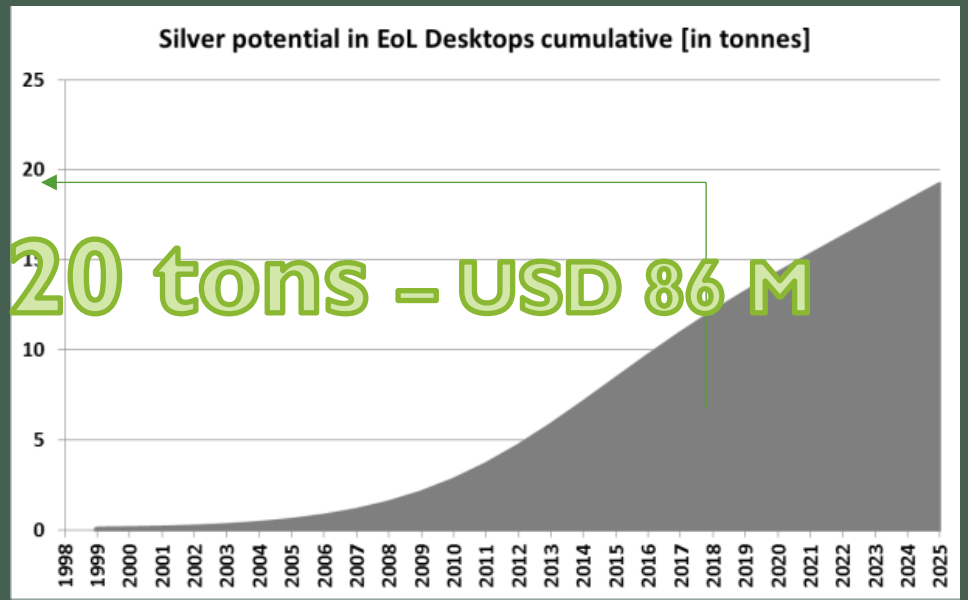
# EGYPT - BO2W Project




**Gold: 2017-21 - 9 tons – USD 500 M**




**Silver: 2017-21 – 120 tons – USD 86 M**

# EGYPT - CASE STUDY

- Ewaste Proper handling is a Pillar of the National Digitial Transformation Strategy
- Updating Formal Recyclers' Definition
- Establishing Goveronment Collection and Refurbishing Center
- Regulations
- Capacity Building

SRI SUSTAINABLE RECYCLING INDUSTRIES

# THANK YOU


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