UNITED NATIONS UNIVERSITY

UNU-VIE SCYCLE

Sustainable Cycles Programme

SCYCLE

Programme

Statistics on E-waste for the Circular Economy

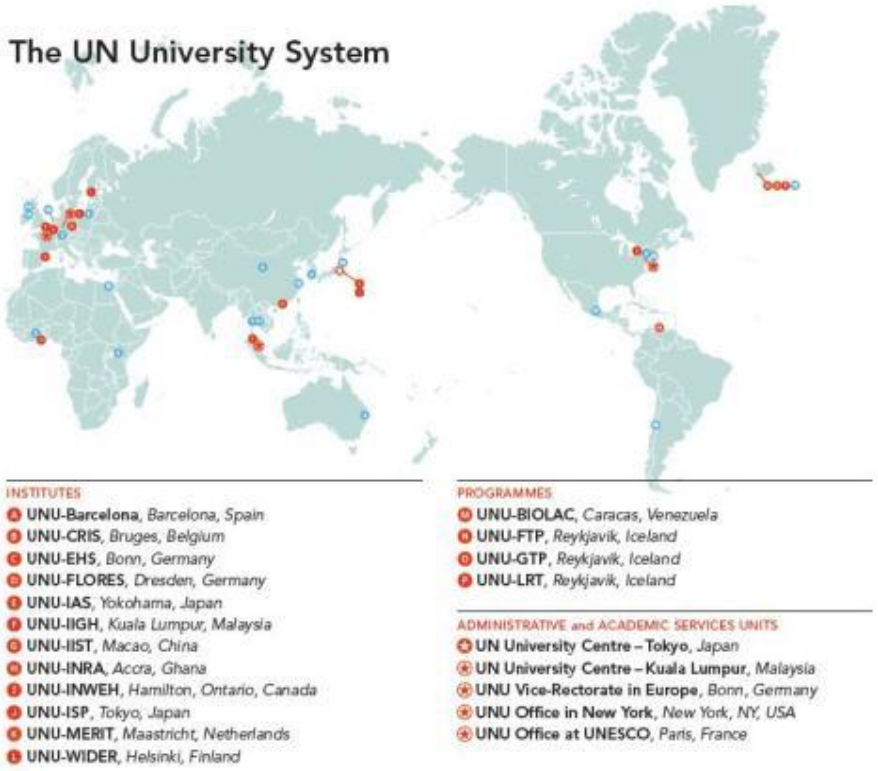
Kees Baldé

balde@vie.unu.edu

Senior Programme Officer

UNITED NATIONS UNIVERSITY

United Nations University – SCYCLE Programme



Key projects/ activities:

1. Policy advice

- 2007 Review of the EU WEEE Directive
- 2014 Common methodology WEEE Directive
- 2017 E-waste in Latin America

2. Statistics

- Global E-waste Monitor (2014, 2017)
- ProSUM (Prospecting the Urban Mine, 2017)

3. Capacity building and training

- E-waste Academies (Global, 2009-now)

4. Facilitating International Dialogue

- Hosting StEP Secretariat: Solving the e-waste problem, see: www.step-initiative.org

Products contain valuable materials

Importance of materials to economy

Need for the materials !

Where are those materials in our economy? Urban Mine !

Overview of Global E-waste Quantities

Source: The Global E-waste Monitor-2017 (UNU, ITU, ISWA)

=

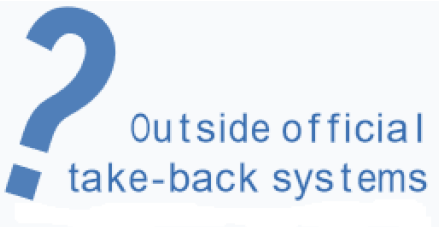
4500 Eiffel Towers

8,9 Mt

Is documented to be collected and recycled

2 Mt

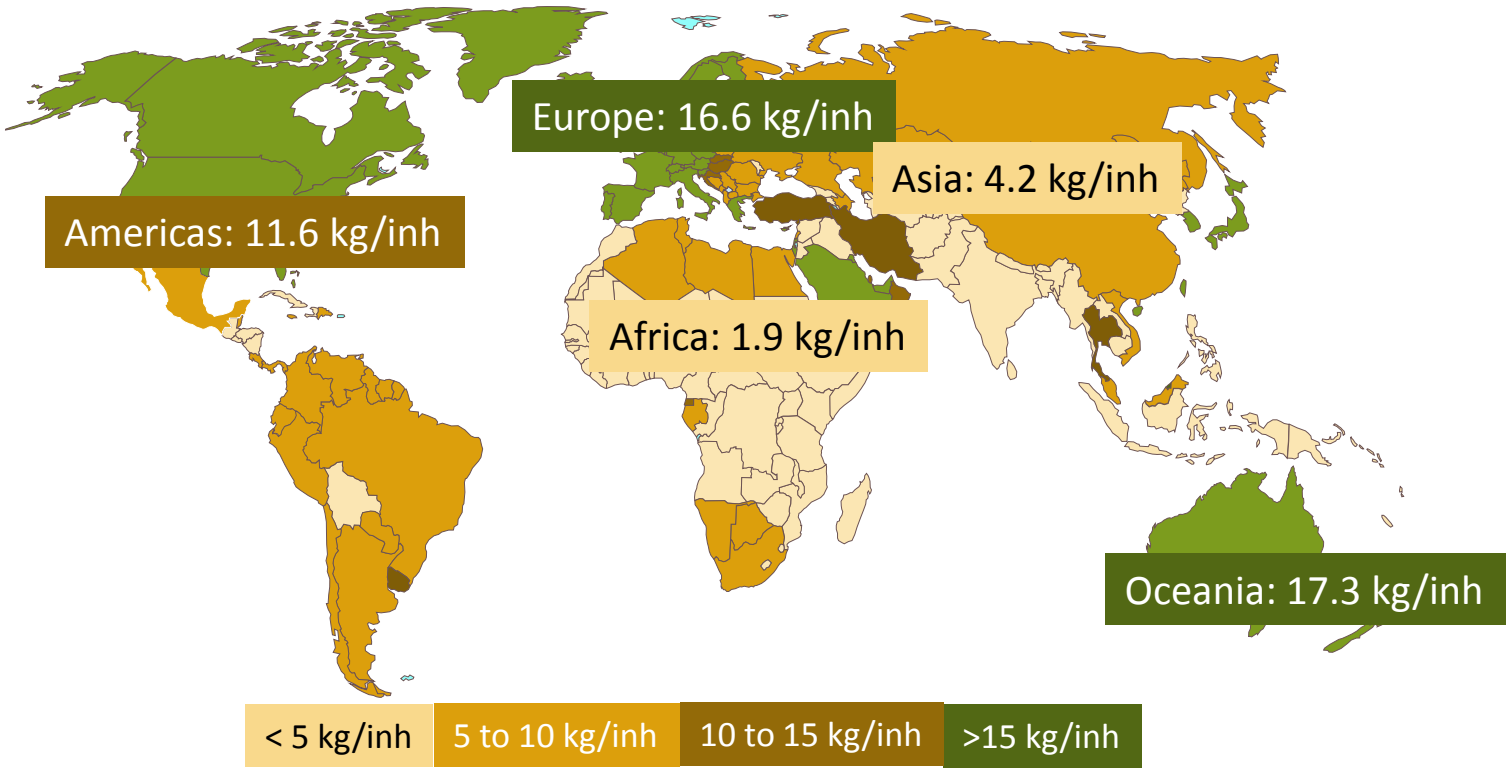
end up in waste bins



1. Collection outside official take-back systems in developed countries is still unknown
2. Transboundary movement is still unknown
3. Informal collection systems in developing countries are still unkown

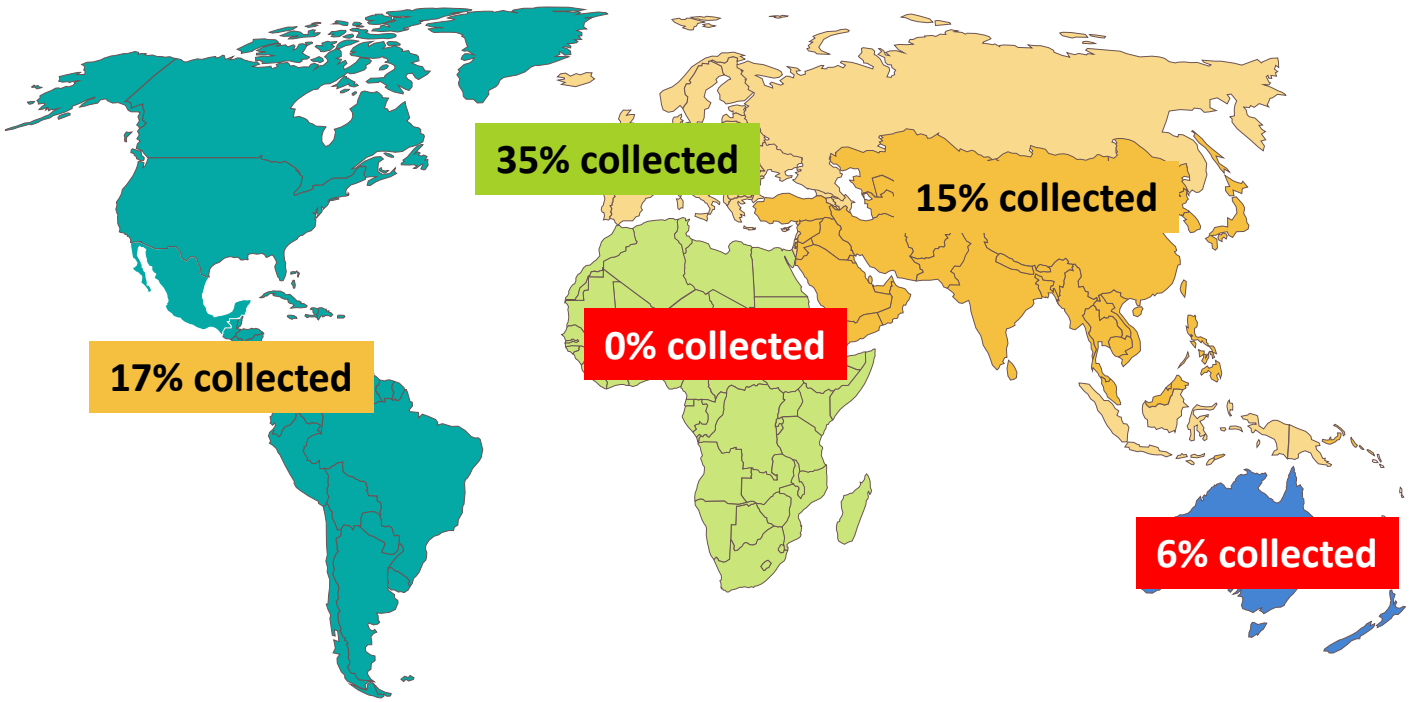
Overview of Global E-waste Quantities

Source: The Global E-waste Monitor-2017 (UNU, ITU, ISWA)



Overview of Global E-waste Quantities

Source: The Global E-waste Monitor-2017 (UNU, ITU, ISWA)



Statistics are not harmonized throughout the countries

Only **41** countries in the world collect international statistics on e-waste


CZECH
GEOLOGICAL
SURVEY


wrap


SGU
Sveriges geologiska undersökning
Geological Survey of Sweden


G E U S


Geoscience for a sustainable Earth
brgm


Statistics Netherlands


EMPA
Materials Science & Technology


RECHARGE
The European Association for Advanced Rechargeable Batteries


UNITED NATIONS
UNIVERSITY


EUCOBAT


C-Tech
INNOVATION


TU Delft


CHALMERS
UNIVERSITY OF TECHNOLOGY


Technische
Universität
Berlin
berlin


weeeforum


EUROGEOSURVEYS
European
Geoscience for
Society
The Geological Surveys of Europe

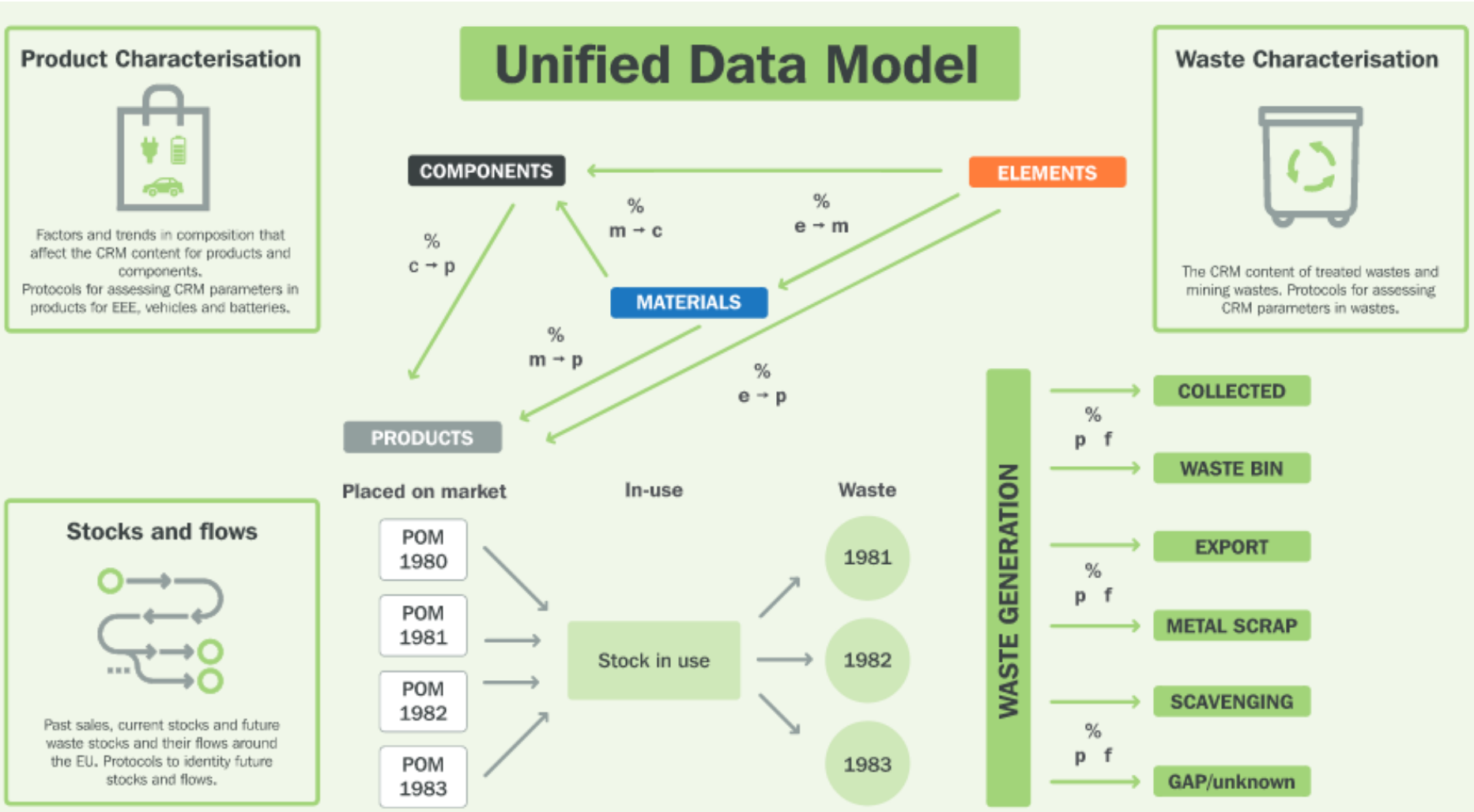

GeoZS

How?

- ✓ Definitions, concepts
- ✓ Classifications
- ✓ Measurement Framework
- ✓ Focus on Critical Raw Materials (CRM), and components with CRM

- ✓ Contains latest available data > 800 sources!
- ✓ Statistics, scientific literature, government reports, field study

Framework


Product Characterisation
Factors and trends in composition that affect the CRM content for products and components.
Protocols for assessing CRM parameters in products for EEE, vehicles and batteries.
Unified Data Model
COMPONENTS
ELEMENTS
MATERIALS
PRODUCTS
% c → p
% m → c
% e → m
% m → p
% e → p
Waste Characterisation
The CRM content of treated wastes and mining wastes. Protocols for assessing CRM parameters in wastes.
Stocks and flows
Past sales, current stocks and future waste stocks and their flows around the EU. Protocols to identity future stocks and flows.
Placed on market
In-use
Waste
POM 1980
POM 1981
POM 1982
POM 1983
Stock in use
1981
1982
1983
WASTE GENERATION
% p f
COLLECTED
WASTE BIN
EXPORT
METAL SCRAP
SCAVENGING
GAP/unknown

WEEE

2015 Precious Metals in tonnes

Stock

EEE = Cooling & Freezing
C&F Freezing
Ag - Silver: 2.8 ton
Au - Gold: 1.2 ton
Pd - Palladium: 0.1 ton

EEE Products in Stock EU28+2

128 million ton

C&F = 27 million ton Cooling and Freezing
Screens = 10 million ton of Displays
Lamps = 0.5 million ton of Energy Saving Lamps
LHA = 51 million ton Large Household Appliances
SHA = 33 million Small Household Appliances
IT = 6 million ton Information Technology

Placed on Market

EEE - C&F
Ag - Silver: 0.2 ton
Au - Gold: 0.1 ton

EEE Lamps
Ag - Silver: 1.4 ton
Au - Gold: 1.1 ton
Pd - Palladium: 0.3 to

EEE - Screens
Ag - Silver: 43.2 ton
Au - Gold: 10.6 ton
Pd - Palladium: 1.9 ton

EEE - Lamps
Ag - Silver: 0.2 ton
Au - Gold: 0.1 ton

EEE - LHA
Ag - Silver: 16.7 ton
Au - Gold: 1.4 ton
Pd - Palladium: 0.2 ton

EEE- SHA
Ag - Silver: 21.3 ton
Au - Gold: 2.5 ton
Pd - Palladium: 0.7 ton

EEE - IT
Ag - Silver: 48.9 ton
Au - Gold: 10.9 ton
Pd - Palladium: 2.6 ton
Pt - Platinum: 0.1 ton

Products POM EU28+2
11.6 million ton

EEE Screens
Ag - Silver: 508.2 ton
Au - Gold: 106.5 ton
Pd - Palladium: 22.0 ton

EEE LHA
Ag - Silver: 235.0 ton
Au - Gold: 20.9 ton
Pd - Palladium: 3.2 ton
Pt - Platinum: 0.2 ton

EEE SHA
Ag - Silver: 230.0 ton
Au - Gold: 20.7 ton
Pd - Palladium: 7.2 ton
Pt - Platinum: 0.2 ton

EEE IT
Ag - Silver: 371.8 ton
Au - Gold: 82.6 ton
Pd - Palladium: 18.9 ton
Pt - Platinum: 0.7 ton

Waste + used products
10.3 million ton

Ag - Silver: 165.1 ton
Au - Gold: 31.3 ton
Pd - Palladium: 7.5 ton
Pt - Platinum: 0.2 ton

Ag - Silver: 117.7 ton
Au - Gold: 23.2 ton
Pd - Palladium: 5.3 ton
Pt - Platinum: 0.1 ton

Waste Generated

Ag - Silver: 47.4 ton
Au - Gold: 8.1 ton
Pd - Palladium: 2.2 ton
Pt - Platinum: 0.1 ton

3.8 million ton

Collected and Reported

6.4 million ton

Unaccounted waste flows

Elements in reported collection

WEEE - C&F
Ag - Silver: 0.1 ton

WEEE - Screens
Ag - Silver: 17.5 ton
Au - Gold: 1.9 ton
Pd - Palladium: 0.7 ton

WEEE - Lamps
Ag - Silver: 0.0 ton

WEEE - LHA
Ag - Silver: 2.0 ton
Au - Gold: 0.2 ton

WEEE- SHA
Ag - Silver: 6.8 ton
Au - Gold: 0.9 ton
Pd - Palladium: 0.4 ton

WEEE - IT
Ag - Silver: 21.0 ton
Au - Gold: 5.1 ton
Pd - Palladium: 1.2 ton

ProSUM

Disclaimer:

a. The elements presented are a selection of the metal content. Battery content is excluded.
b. Uncertainty is high for reported collection.
c. Unknown and other whereabouts includes export of used products outside the EU and complementary recycling within the EU. It does not imply materials are 'lost'.
d. See the meta-data at the ProSUM portal for more details, incl. an overview of all data sources used and their constraints.
e. Most values rounded to two significant numbers.

Ag-Silver

Au-Gold

Pd-Palladium

Pt- Platinum

Data with high uncertainty!

WEEE

2015 Precious Metals in tonnes

Stock

EEE = Cooling & Freezing
C&F Freezing
Ag - Silver: 2.8 ton
Au - Gold: 1.2 ton
Pd - Palladium: 0.1 ton

EEE Products in Stock EU28+2

128 million ton

C&F = 27 million ton Cooling and Freezing
Screens = 10 million ton of Displays
Lamps = 0.5 million ton of Energy Saving Lamps
LHA = 51 million ton Large Household Appliances
SHA = 33 million Small Household Appliances
IT = 6 million ton Information Technology

Placed on Market

EEE - C&F
Ag - Silver: 0.2 ton
Au - Gold: 0.1 ton

EEE Lamps
Ag - Silver: 1.4 ton
Au - Gold: 1.1 ton
Pd - Palladium: 0.3 to

EEE - Screens
Ag - Silver: 43.2 ton
Au - Gold: 10.6 ton
Pd - Palladium: 1.9 ton

EEE - Lamps
Ag - Silver: 0
Au - Gold: 0.

EEE - LHA
Ag - Silver: 1
Au - Gold: 1.
Pd - Palladiu

EEE- SHA
Ag - Silver: 2
Au - Gold: 2.
Pd - Palladium: 0.7 ton

EEE - IT
Ag - Silver: 48.9 ton
Au - Gold: 10.9 ton
Pd - Palladium: 2.6 ton
Pt - Platinum: 0.1 ton

Products POM EU28+2

Placed on Market 25,6 t

Stock 230 t

Waste 31,3 t

Waste Generated

Ag - Silver: 47.4 to
Au - Gold: 8.1 ton
Pd - Palladium: 2.2
Platinum 0.1 t

Pd - Palladium: 5.3 ton
Pt - Platinum: 0.1 ton

6.4 million ton

Collected and Reported

Collected and Reported 8,1 t

Not Reported 23,2 t

Unaccounted waste flows

Elements in reported collection

WEEE - C&F
Ag - Silver: 0.1 ton

17.5 ton
1.9 ton
ium: 0.7 ton

0.0 ton

WEEE - LHA
Ag - Silver: 2.0 ton
0.2 ton

6.8 ton
0.9 ton
ium: 0.4 ton

21.0 ton
5.1 ton
ium: 1.2 ton

Disclaimer:

a. The elements presented are a selection of the metal content. Battery content is excluded.
b. Uncertainty is high for reported collection.
c. Unknown and other whereabouts includes export of used products outside the EU and complementary recycling within the EU. It does not imply materials are 'lost'.
d. See the meta-data at the ProSUM portal for more details, incl. an overview of all data sources used and their constraints.
e. Most values rounded to two significant numbers.

ProSUM

Ag-Silver

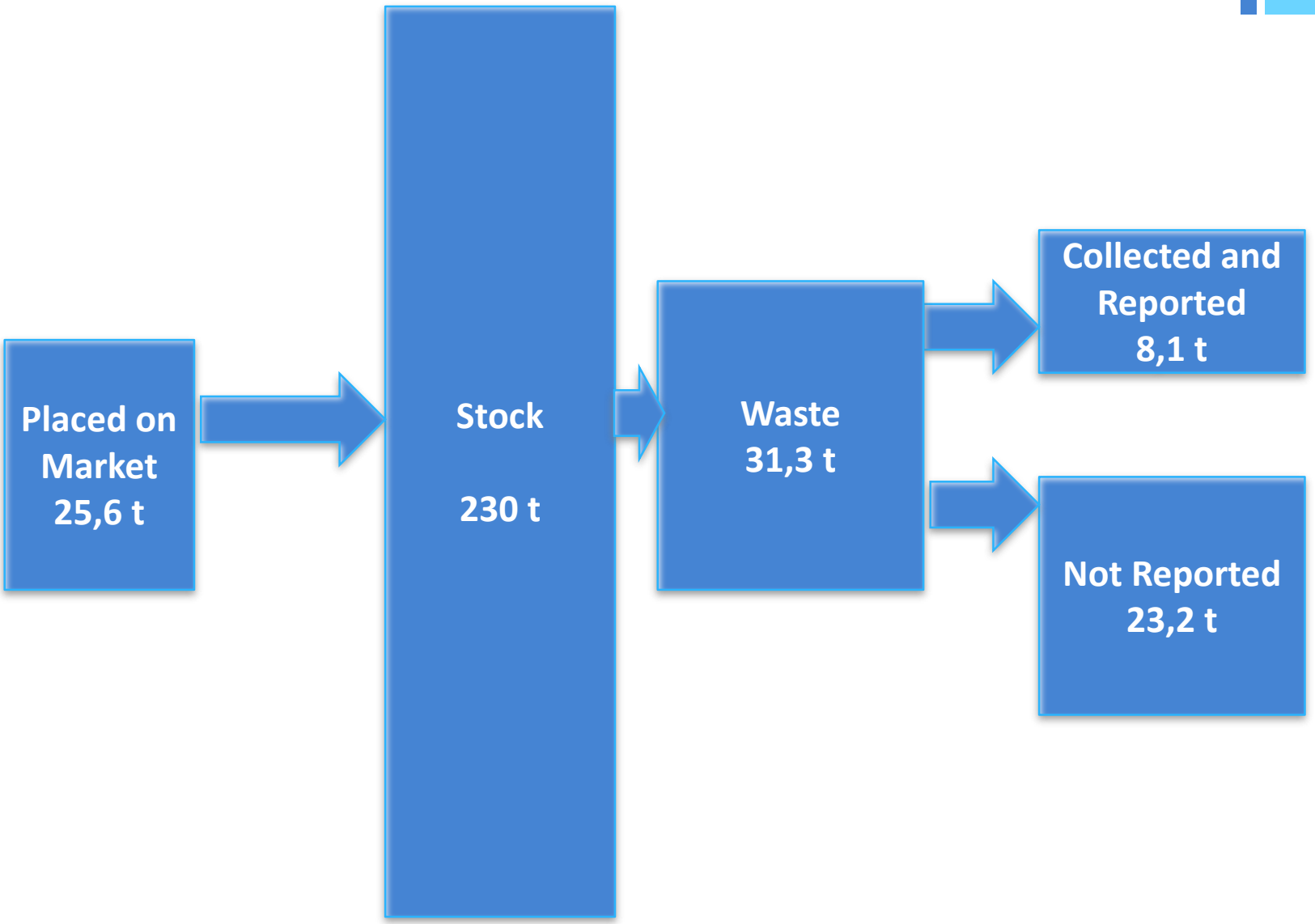
Au-Gold

Pd-Palladium

Pt- Platinum

Data with high uncertainty!

Gold in WEEE

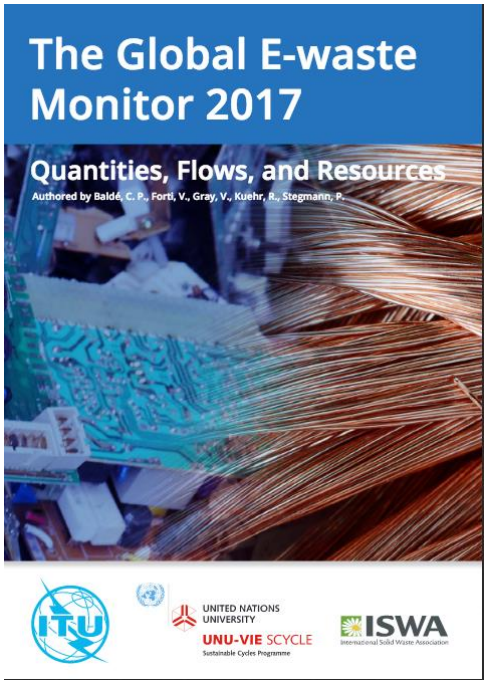

Placed on Market 25,6 t
Stock 230 t
Waste 31,3 t
Collected and Reported 8,1 t
Not Reported 23,2 t

Global E-waste data for circular economy

- One stop show for all Raw Material information in the European Urban Mine
  - www.urbanmineplatform.eu
- Freely available, detailed, georeferenced
- Helps **recycling** industry: to know which products are found in their waste streams
- **Manufacturers** looking to see which recycled materials and components they can use
- **Policy Makers** on how to create and monitor an EU that is greener, circular, more competitive, less dependent on CRM

Join the Global Partnership for e-Waste Statistics!

- Improve the world through data and evidence based policies
- Raise awareness
- Global workshops + e-learning
- Measure impact on circular economy, SDG and Connect2020
- Looking for sponsors to extend circular economy data to regions outside EU



UNITED NATIONS UNIVERSITY
UNU-VIE SCYCLE
Sustainable Cycles Programme

ITU

ISWA
International Solid Waste Association

financially supported by
Federal Ministry for Economic Cooperation and Development