

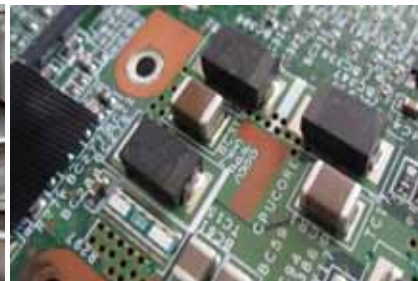


The Best of two Worlds Project (Bo2W)

Summary project achievements

Dr. Matthias Buchert, Oeko-Institut

Bo2W Closing Event, Berlin, 24 September 2015



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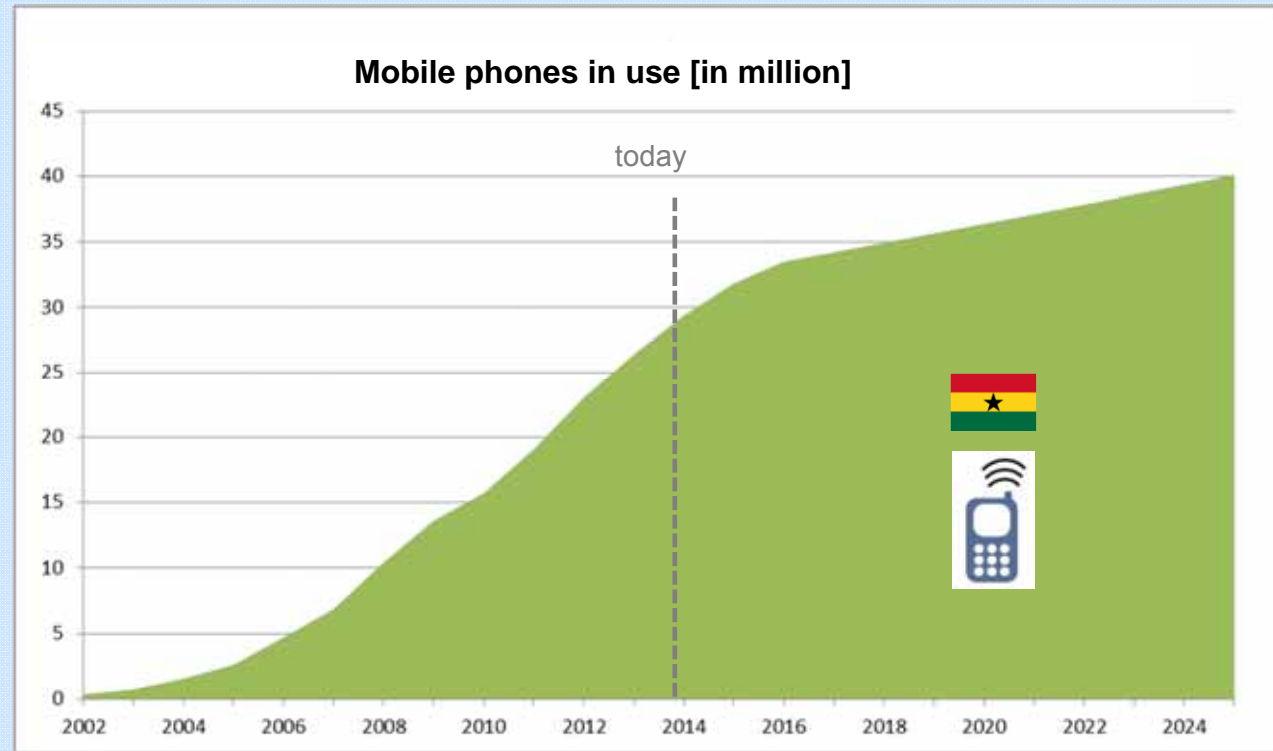
Agenda

1 Activities

2 Achievements

1.1 Determining volumes

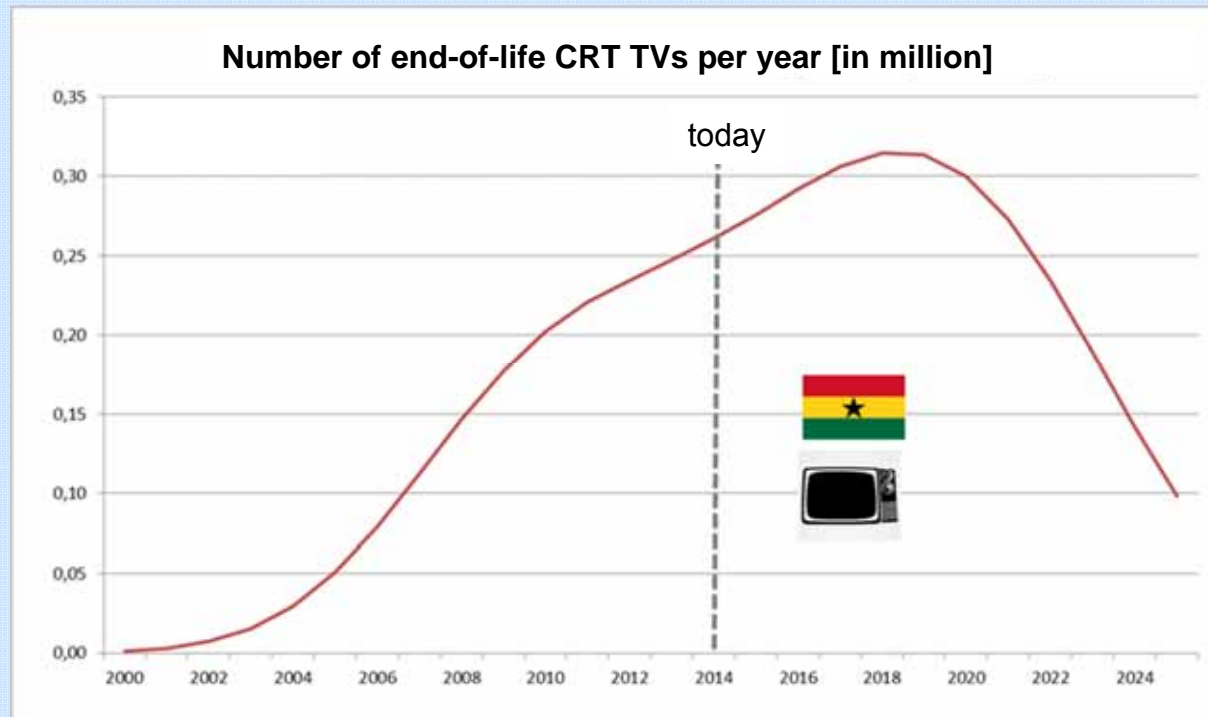
Mobile phones



- **Growing market**
- **Market saturation expected for around 2016**

1.1 Determining volumes

End-of-life CRT TVs

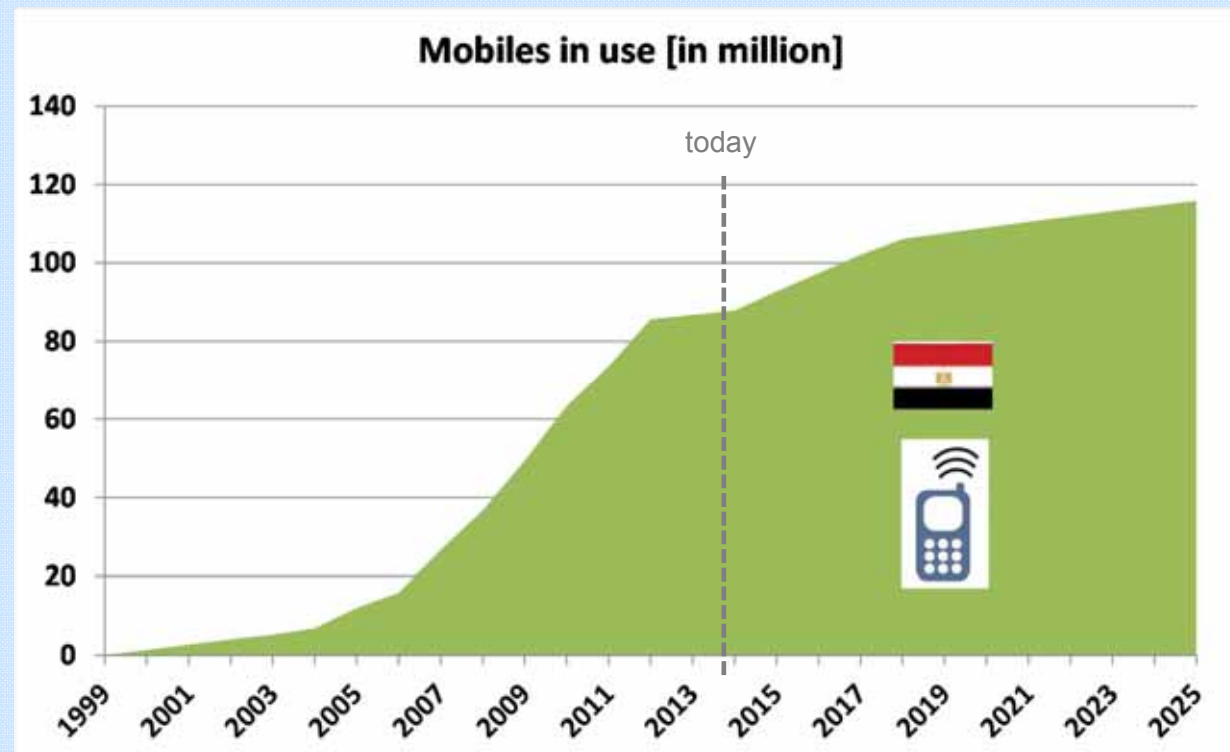


Caution: Projections are based on various assumptions.

Moreover, there is the problem of illegal imports

1.1 Determining volumes

Mobile phones

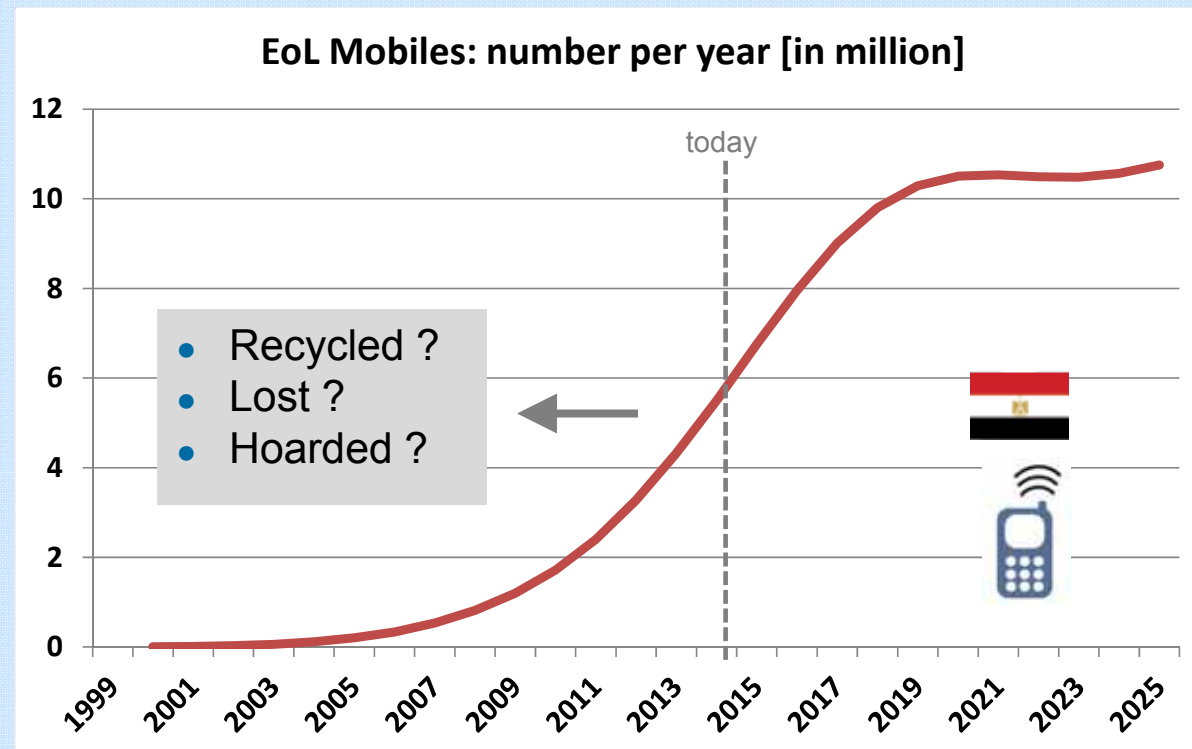


Caution: Projections are based on various assumptions.

- Increasing mobile phone market projected
- > 115 million mobiles projected for 2025

1.1 Determining volumes

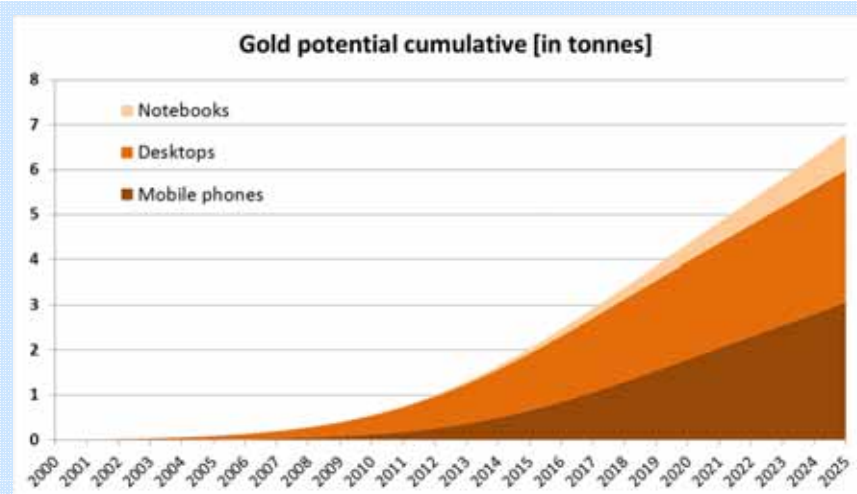
Mobile phones



- A strong increase in yearly numbers is projected
- After 2018 the number of EoL mobiles is projected to be around 10 million EoL mobiles per year

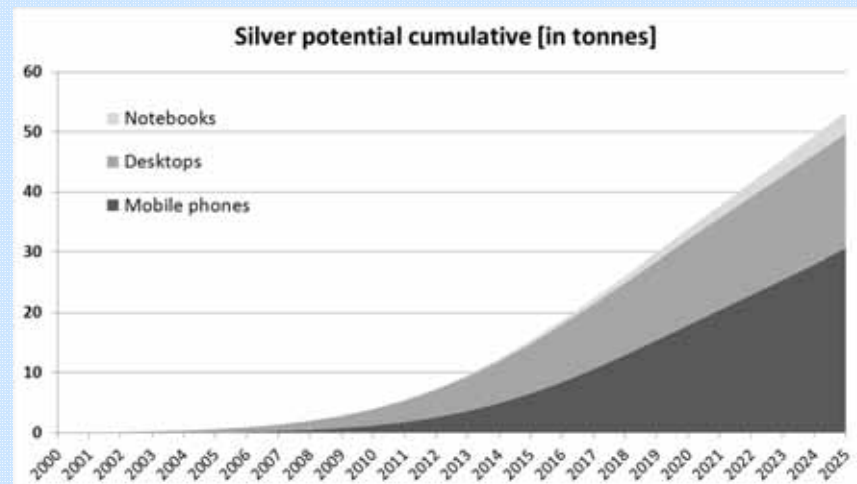
Projection of Gold and Silver in EoL Mobiles, Desktops and Notebooks (cumulative)

**Desktops,
Notebooks,
Mobiles**



Caution: Projections are based on various assumptions.

Dimension cumulative in 2025 around **6.8 tonnes Gold**



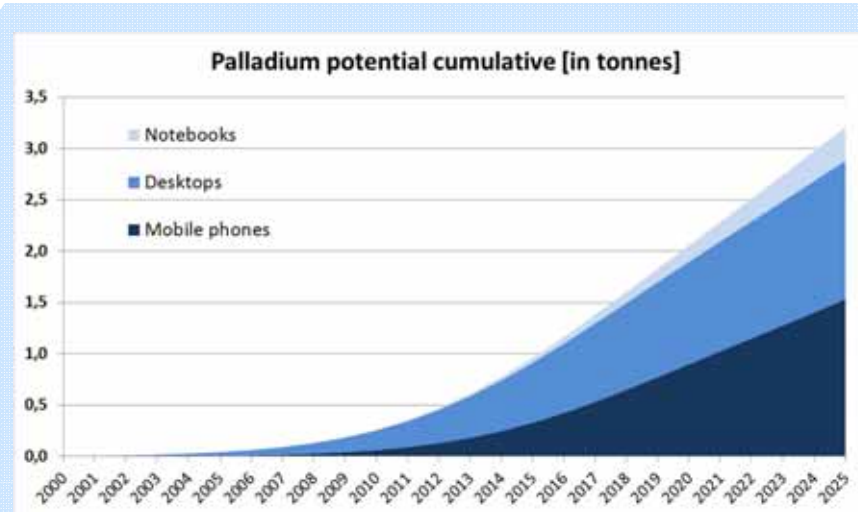
Caution: Projections are based on various assumptions.

Dimension cumulative in 2025 around **53 tonnes Silver**



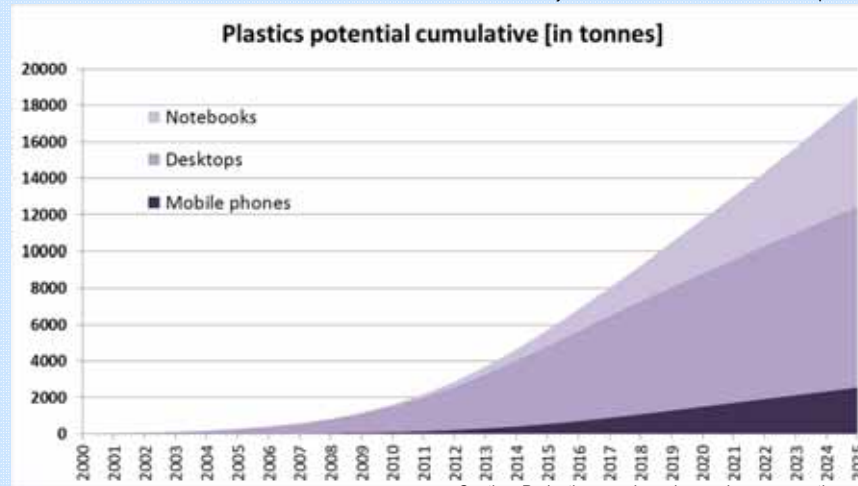
Projection of Pd and Plastics in EoL Desktops, EoL Notebooks and EoL Mobile phones cumulative

**Desktops,
Notebooks,
Mobiles**



Caution: Projections are based on various assumptions.

Dimension cumulative in 2025 around **3.2 tonnes Palladium**



Caution: Projections are based on various assumptions.

Dimension cumulative in 2025 around **18 500 tonnes Plastics**



1.2 Know-how transfer



Source: Oeko-Institut

Packaging Lead-Acid Batteries for Bulk Transports

Health & Safety

- Wear personal protective equipment *
- Avoid damages to batteries †
- Change clothes after work
- Maintain high personal hygiene standards

Apply caps on isolation tape to the positive poles (v) of all batteries

Close any holes with plastic or rubber material

Place damaged batteries in heavy weight poly-ethylene plastic bags

Choose strong and intact pallets for transport †

Place a layer of rigid board between every battery layer (also on the pallet)

Stack all batteries upright and avoid poles getting in contact

Make sure that all batteries are placed within the horizontal limits of the pallet

Do not stack higher than 3 layers, place max. 1,000 kg on pallet, place damaged batteries in top layer

Cover the top layer with cardboard and wrap with shrink wrap as many times as necessary to stabilize the load

Step 10: Mark each pallet with the following warning labels: † Hazard orientation † Hazard label: Class 8, Corrosives † UN 2794 BATTERIES, WET, FILLED WITH ACID † Overpack

Load the stacks into a container in a way that pallets are protected from sliding † Only load one layer of stacked pallets and avoid overloading †

Step 12: Mark container on all 4 sides with the following labels: † Hazard label: Class 8, Corrosives † UN 2794 BATTERIES, WET, FILLED WITH ACID

Footnote information: www.emsolutions.de

supported by the Federal Ministry of Education and Research

1.2 Know-how transfer



Source: Johnson Controls

- Training on responsible lead-acid battery recycling
- Training on proper e-waste dismantling

1.3 Research on negative value fractions

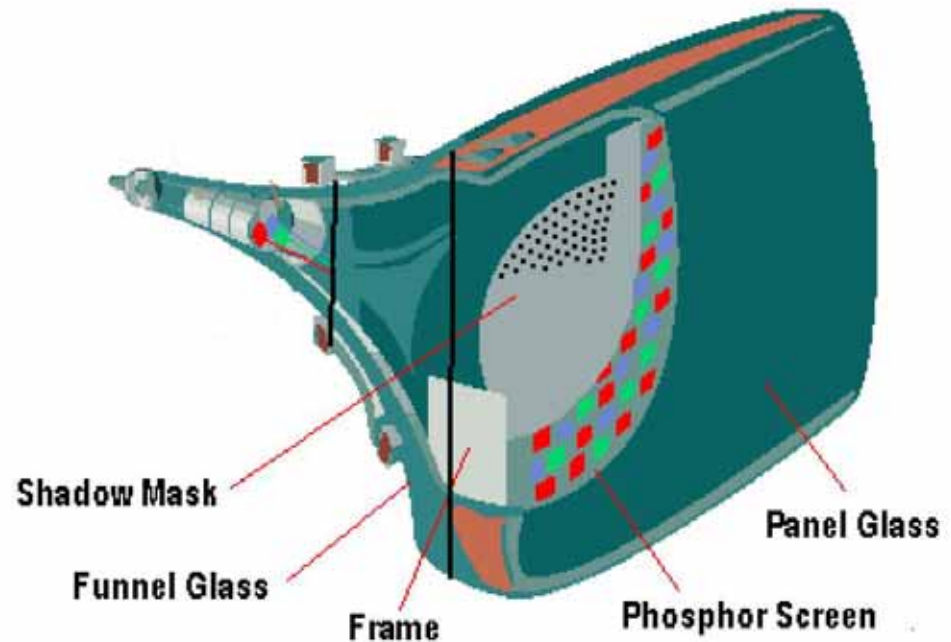


Source: Oeko-Institut

1.3 Research on negative value fractions

CRT unit after dismantling:

- funnel glass
- panel (screen) glass
- metal frame
- shadow mask (inside unit)



Source: Townsend et al. 1999: Characterization of Lead leachability from Cathode Ray Tubes using the toxicity characteristic leaching procedure

1.3 Research on negative value fractions

CRT-glass: Costs for Recycling or Landfilling

Recycling path	Description	CPT* Cost (EURO/ton)
rp 2	funnel and screen glass to landfill	~ 26
rp 2 & rp 4	funnel glass to landfill & screen glass for other applications	~ 42-70
rp 3.1	funnel glass to lead smelter	~ 50
rp 3.1 & rp 4	funnel glass to lead smelter & screen glass for other applications	~ 50-75
rp 3.2	recovery of lead and glass	~ 150

Costs for transport and notification (Ghana to Deutschland) approx. 120 €/t

1.3 Research on negative value fractions



Source: Oeko-Institut

1.3 Research on negative value fractions

Proposed Process Optimization for Ghana and Egypt

- Reliable separation in plastic type and BFR content cannot be done without **technical equipment**.
- Pre-separation into **black TV plastics** (PS) and **white computer plastics** (predominantly ABS), will reduce separation efforts for plastic recyclers.
- **Pure ABS/PC** is the most valuable plastic fraction (~ 400 €/t).
- **Baling and shredding** of material needs to be organized prior to shipment.
- **No need for notification** if plastic content > 90 %.

→ Cost-neutral solution might be feasible.

1.4 Stakeholder consultation

- Policy
- Authorities/Administration
- Civil society
- Industry

Main events

- Stakeholder workshop in June 2013 in Accra
- Several workshops with Green ICT Group in Cairo
- Milestone Workshop in November 2013 in Hoboken
- Final stakeholder workshop in July 2015 in Accra
- Closing Event in September 2015 in Berlin



Source: Oeko-Institut

1.5 Pilot implementation: City Waste



Source: Oeko-Institut

1.5 ITG: Storehouse



Source: Oeko-Institut



1.5 ITG: Dismantling



Source: Oeko-Institut



1.5 Motherboards in Hoboken



Source: Umicore

1.5 RecycloBekia: Dismantling training



Source: Oeko-Institut



Agenda

1 Activities

2 Achievements

2.1 Achievements – business

- Start **business relationships** between Ghana/Egypt and Europe for environmental sound e-waste and car waste recycling
- Transfer the **Bo2W-Approach into practice**: first shipments of complete lead acid batteries as well as dismantled PWBs for environmental sound metal recovery in Europe: learning curve
- Calculate the additional costs of **negative value fractions** and suggest solutions
- Continue dialogue with the **informal sector** in Ghana and business stakeholders in Egypt
- Engage first steps for **B2B approaches** with “waste producing companies” in Ghana

2.2 Achievements – science & policy

- Establish a **trustful relationship** between Egyptian/Ghanaian authorities (EPA etc.) and the involved business partners in Ghana and Europe
- Assess the main existing **barriers** for environmental sound management and recycling of car waste and e-waste
- Provide **detailed recommendations** to overcome the main barriers
- Bring different stakeholder groups together to **communicate** the project results and discuss the next urgent steps (events in Accra, Cairo, Antwerp and Berlin)
- Agreed **Memorandum** on further strategies and activities to mitigate negative effects from unsound management of e-waste and used lead-acid batteries in Ghana (Final Bo2W Workshop in Accra 22 July 2015)
- Tests demonstrate that more specific dismantling and improved knowledge on the value of components provides options for **additional revenues** (see report on HDD dismantling coming soon)

2.3 Achievements – society

- **Inform a broader audience** about the bigger picture of the Ghanaian recycling sector (film about lead acid battery recycling)
- **Support the knowledge and skills** of Egyptian/Ghanaian partners by training activities and know-how transfer
- **Inform about health and safety risks** related with the handling of e-waste and car-waste and provide measures to reduce the risks
- Provide easy **understanding material** (dismantling posters) in local languages for appropriate and safe handling and dismantling of e-waste and lead acid batteries

Many Thanks for Your Attention!



Find more information about the
Best of two Worlds Project (Bo2W):
www.resourcefever.org