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E-waste Africa Project

Status report for Component 3

Socioeconomic study & feasibility study

Second Advisory Board Meeting, 17.05.2009, Geneva

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Objectives of Component 3:

- To study the feasibility of establishing environmentally sound materials recovery operations and promoting ESM in the context of the Basel Convention in a major informal e-waste recycling area in Africa and train local stakeholders on how to establish economic activities in the e-waste sector.

Major Activities under Component 3:

- In-depth socio-economic study on the functioning and the sustainability impacts of the e-waste sector in Nigeria; → *"Socio-economic study"*
- Meetings and interviews with leading European recycling enterprises to elaborate on the demand and quality requirements of specific e-waste fractions; → *"Feasibility study"*
- Stakeholder Workshop in Nigeria;
- Three technical trainings;
- Final presentation in Nigeria.

Timeline of Component 3:

	2009			2010											
Activity	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Component 3 „Socioeconomic study & feasibility study “															
Socio-economic study		Minimal activities						Draft report							
Feasibility Study											Draft report				
Stakeholder Workshop															
Technical Trainings									3 trainings until end 2010						
Public Presentation													Public presentation in 4th quarter of 2010		

In parallel with reconciliation meeting of Component 1 & 2

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First visit to Nigeria in October 2009:

First visit to Nigeria in October 2009:

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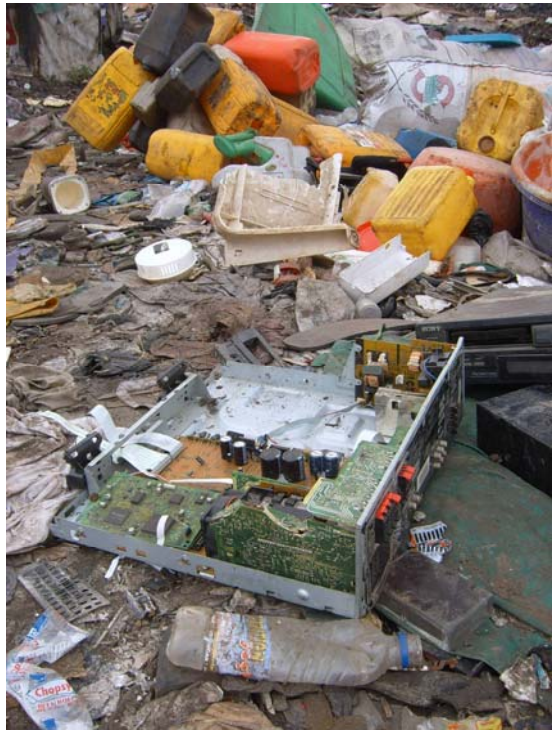
- Meetings with key stakeholders
- First Stakeholder Workshop
- Visits to second-hand markets and waste dumps
- Training of local assessment team



➡ Next visit scheduled for June 2010

Feasibility Study:

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Currently Applied Recycling Technologies

Analysing environmental, social and economic strengths & weaknesses

Best Available Recycling Technologies

Analysing environmental, social and economic strengths & weaknesses

Best Applicable Recycling Technologies

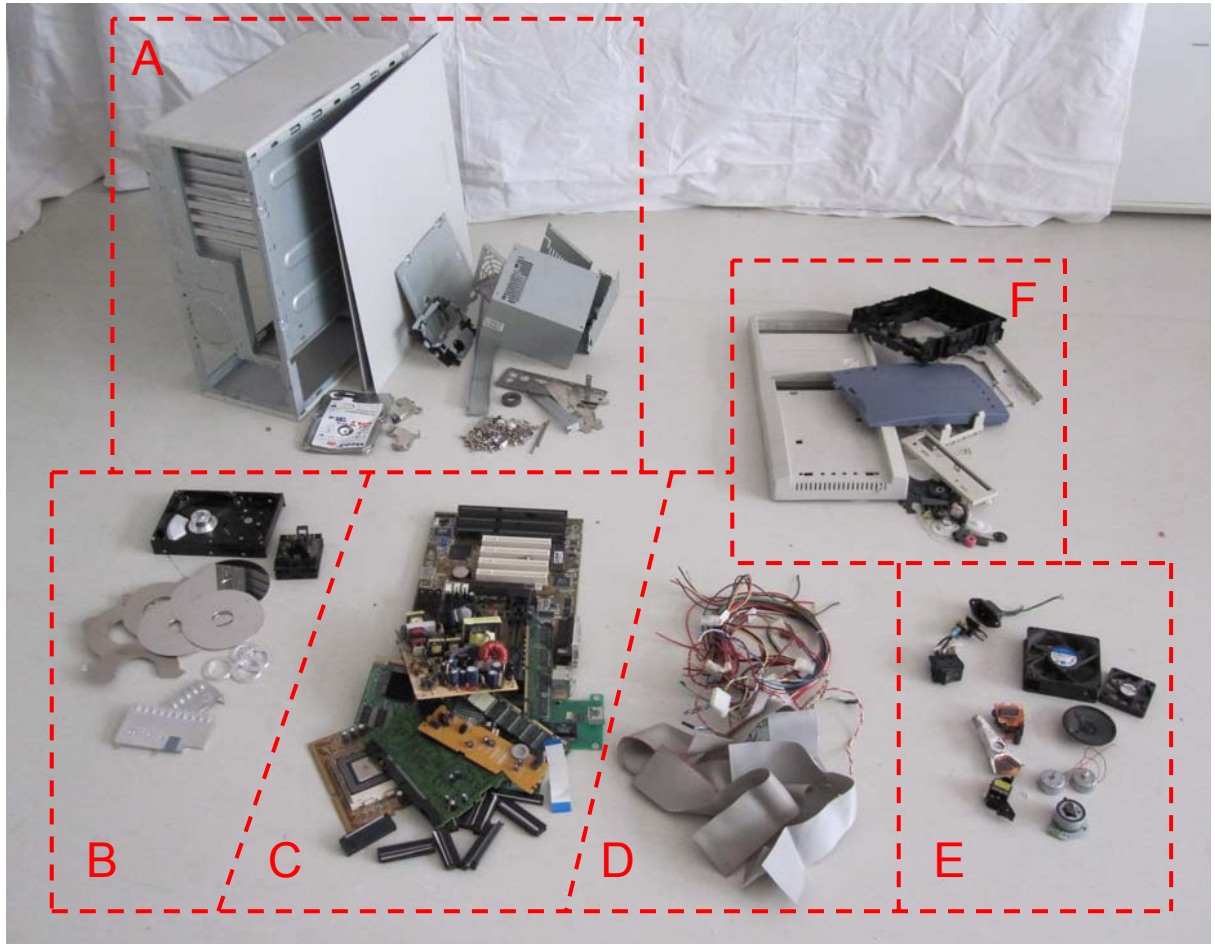
Key products:

- Desktop PCs
- Fridges & freezers
- CRT-devices (monitors & TVs)

Rationale:

- Large volumes
- High environmental impacts
- Recycling technologies also applicable for other e-waste types

Desktop PC:



A: Steel scrap
B: Aluminium scrap
C: Printed circuit boards
D: Cables
E: Copper-steel scrap
F: Plastics

How to tap these potentials?

Model 1: Indirect co-operation with one or more intermediaries

Intermediaries could act as formal joint between the widely informal e-waste sector and the refining companies.

Chances: Easy to implement

Risks: Monopoly positions, no intrinsic interest to reduce health & safety risks

Model 2: Direct co-operation between small scale recyclers and refineries

Community based or cooperative recycling structures could directly link with refining companies.

Chances: High development potential for the informal sector

Risks: Informal structures might have difficulties fulfilling the necessary administrative criteria

Fridges & freezers:

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➡ Possibility to finance environmentally sound recycling via emission reduction trading schemes

Clean Development Mechanism (CDM):
• CFCs are not eligible

Climate Action Reserve (CAR):
• Does account for CFC from cooling circuits but not from foams
• R22 (CFC used in many air conditioners) is not eligible
• CFCs must be shipped to the USA for destruction

Voluntary Carbon Standard (VCS):
• Does account for CFC from cooling circuits and from foams
• Recovery & destruction efficiency ≥ 85% → high standards for foam treatment

2.8 t $CO_{2\text{-equ}}$ x 0.9 x 5 US$/t = 12.60 US$

~ 50% achievable with medium investments (280,000 US$)

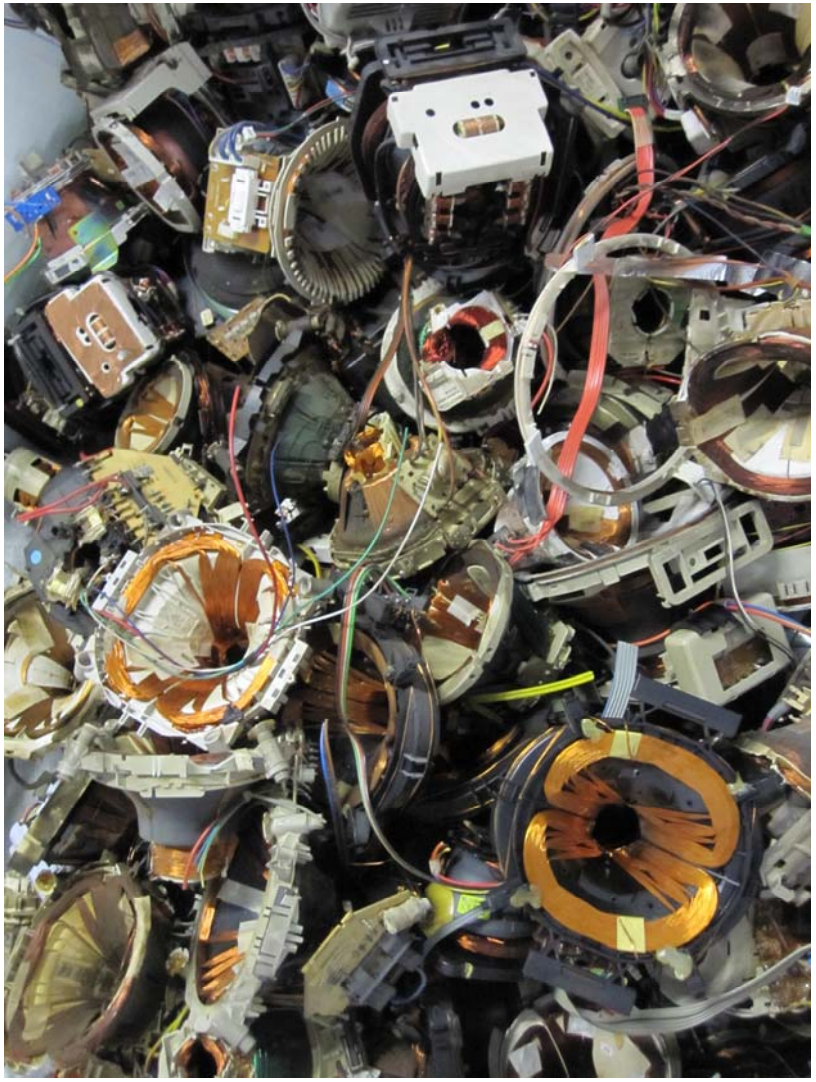
~ 50% achievable with high investments (6,300,000 US$)

Not very labour intensive (~ 6-8 people to operate and maintain the machinery)

CRT-devices:

CRT-glass: - 160 US$/t

- 2.73 $/device



Copper: + 7231 US$/t

+ 5 $/device

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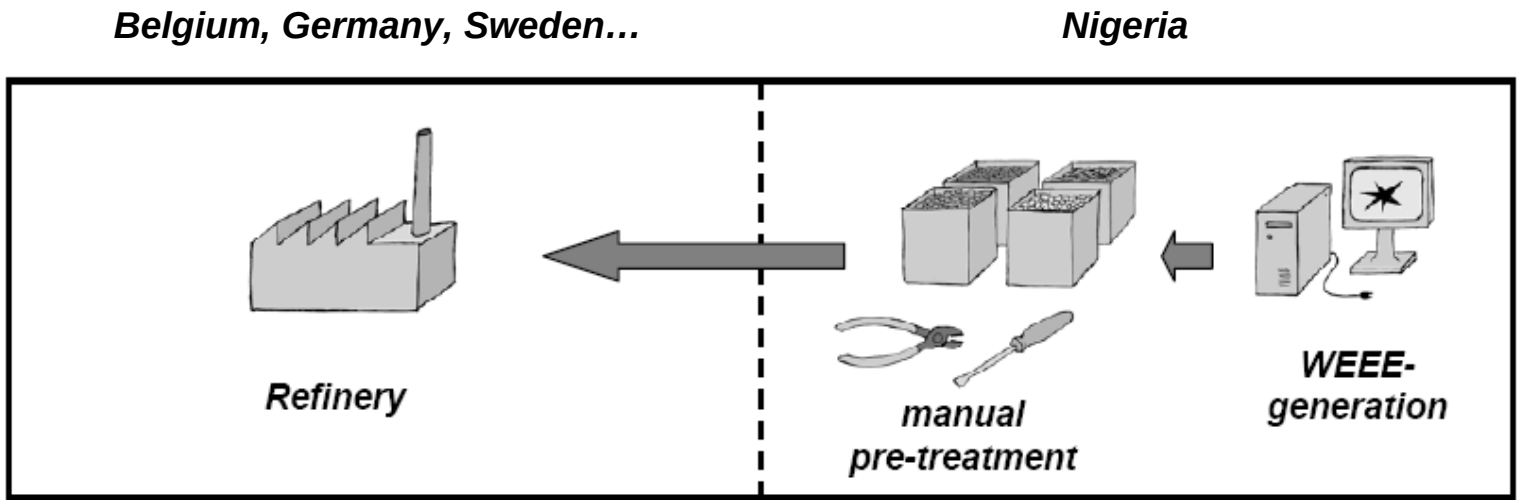
	Amount in a PC [g/unit]	Average material price 2007 [$/t]	Intrinsic material value 2007 [$/unit]	Estimated recovery rates with presently applied techn.	Estimated recovery rates with best applicable techn.	Net material value with present. applied techn. [$/unit]	Net material value with best appl. tech. [$/unit]
Steel	6737.501	253*	1.70	95%	95%	1.62	1.62
Plastics	1579.545	310**	0.49	0%	0%	0	0
Al	550.212	2700	1.49	88%	78%	1.31	1.16
Copper	413.225	7231	2.99	85%	98%	2.54	2.93
Zinc	25.940	3400	0.09	0%***	0%***	0	0
Tin	19.573	19800	0.39	0%	0%***	0	0
Antimony	18.577	5660	0.11	0%	0%***	0	0
Nickel	12.700	37200	0.47	0%***	0%***	0	0
Lead	6.585	2730	0.02	0%	0%***	0	0
Silver	1.702	550000	0.94	0%	87%	0	0.81
Gold	0.260	22400000	5.82	0%	93%	0	5.42
Pd	0.120	11488748	1.38	0%	91%	0	1.25
Cr	0.015	2010	0.00	0%***	0%***	0	0
Ceramics & others	371.909	-	-	-	-	-	-
Sum	**9737.860**		**15.88**			**5.47**	**13.19**

** Prices for iron & steel scrap*
*** Prices for mixed plastic*
**** Partly indirectly recovered together with other metals*

Source: Gmünder 2007, USGS 2009a, USGS 2009b, CSR 2009.

- House-to-house collection of e-waste;
- Manual pre-treatment, including deep dismantling until the level of parts;
- Refinery of steel- and aluminium-fraction in domestic plants;
- Refinery of high grade precious metals fraction in pyrometallurgical refineries;



- Further manual pre-treatment of cables and low grade copper fraction;
- Refinery of Cu and low-grade Cu fraction in copper- or steel-copper refineries;
- Controlled incineration / energy recovery of remaining plastic fraction.

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Type and amount of refrigerant and foaming agent according to year of manufacture

Date of manufacturing	before 1988	1988 – 1993	1993 - 1997	from 1994
Refrigerant	R12	R12	R134a	R600a
Amount in „small“ appliance	140g	105g	95g	36g
Amount in „large“ appliance	332g	249g	226g	85g
Foaming agent (PUR-foam)	R11	R11	R134a	Cyclopentane
Amount in „small“ appliance	358g	247g	165g	194g
Amount in „large“ appliance	851g	587g	392g	460g
GHG-potential of refrigerant & foaming agent [CO_2-equ]				
$CO_{2\text{-equ}}$ in „small“ appliance	3.23 t	2.32 t	0.37 t	0.0022 t
$CO_{2\text{-equ}}$ in „large“ appliance	7.66 t	5.50 t	0.88 t	0.0053 t

Sources: Gabel et al. 1998; Rüdenauer & Gensch 2007; IPCC 2007.

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	Amount contained in a fridge [kg/unit]	Average material price 2007 [US$/t]	Intrinsic material value 2007 [US$/unit]	Estimated recovery rates with presently applied technology	Estimated recovery rates with best applicable technology	Net material value with presently applied techn. [US$/unit]	Net material value with best applicable technology [US$/unit]
Steel	20	253*	5.06	99%	99%	5.01	5.01
Plastics	16	310**	4.96	0%	65%	0	3.22
Copper	1.6	7231	11.57	92%	92%	10.64	10.64
Aluminium	1.2	2700	3.24	92%	92%	2.98	2.98
Glass	0.4	31	0.01	92%	92%	0.01	0.01
Others	0.8	-	-	-	-	-	-
Sum	**40**		**24.84**			**18.65**	**21.87**

** Prices for iron and steel scrap ** Prices for mixed plastics Sources: DTI 2006; USGS 2009, CSR 2009*

2.8 t $CO_{2\text{-equ}}$ x 0.9 x 5 US$/t = 12.60 US$

~ 50% achievable with medium investments (280,000 US$)

~ 50% achievable with high investments (6,300,000 US$)

Not very labour intensive (~ 6-8 people to operate and maintain the machinery)

CRT-devices:

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Material content, intrinsic and net values of an average CRT-TV

	Amount contained in a CRT-TV [g/unit]	Average material price 2007 [$/t]	Intrinsic material value 2007 [$/unit]	Estimated recovery rates with presently applied techn.	Estimated recovery rates with best applicable techn.	Net material value with presently applied techn. [$/unit]	Net material value with best applicable techn. [$/unit]
Glass	17043	0	0	0%	0%	0	0
Plastics	6880	310**	2.13	0%	0%	0	0
Steel	2990	253	0.76	95%	95%	0.72	0.72
Copper	900	7231	6.51	85%	98%	5.53	6.38
Al	598	2700	1.61	88%	88%	1.42	1.42
Tin	31	19800	0.62	0%	0%***	0	0
Lead	22*	2730	0.06	0%	0%***	0	0
Nickel	6.7	37200	0.25	0%***	0%***	0	0
Silver	0.62	550000	0.34	0%	87%	0	0.30
Gold	0.04	22400000	0.85	0%	93%	0	0.79
Pd	0.02	11488748	0.26	0%	91%	0	0.23
Ceramics & others	1434	-	-	-	-	-	-
Sum	**29900**		**13.38**			**7.67**	**9.84**

- 160 $/t

- 2.73 $/device

** Only lead contained in the TV-board ** Prices for mixed plastic*
**** Partly indirectly recovered together with other metals*