

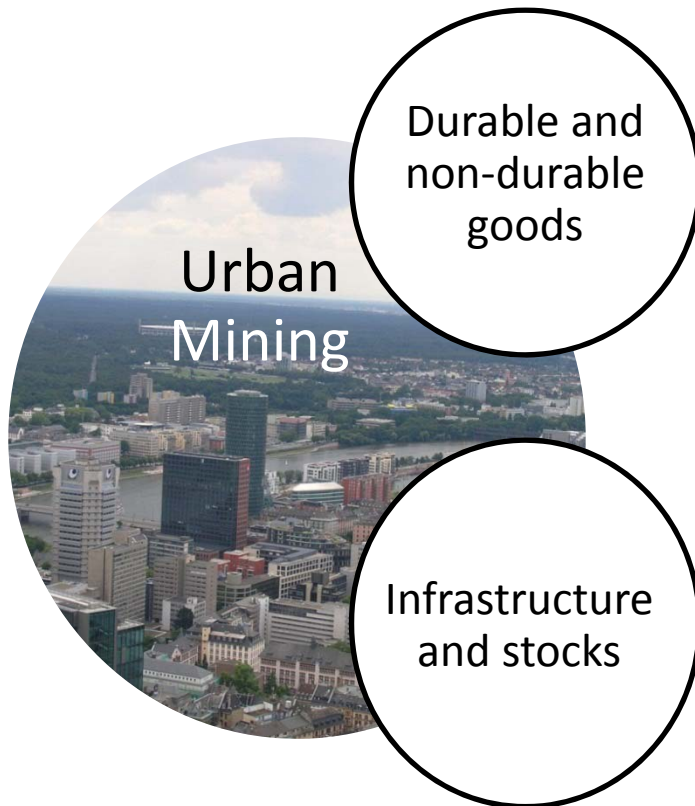
Better tracking of materials in waste: European Environmental law and raw material policies

Dr. Georg Mehlhart, Öko-Institut e.V.

TEC Workshop:
Informed policy-making through improved availability and quality of
raw materials data

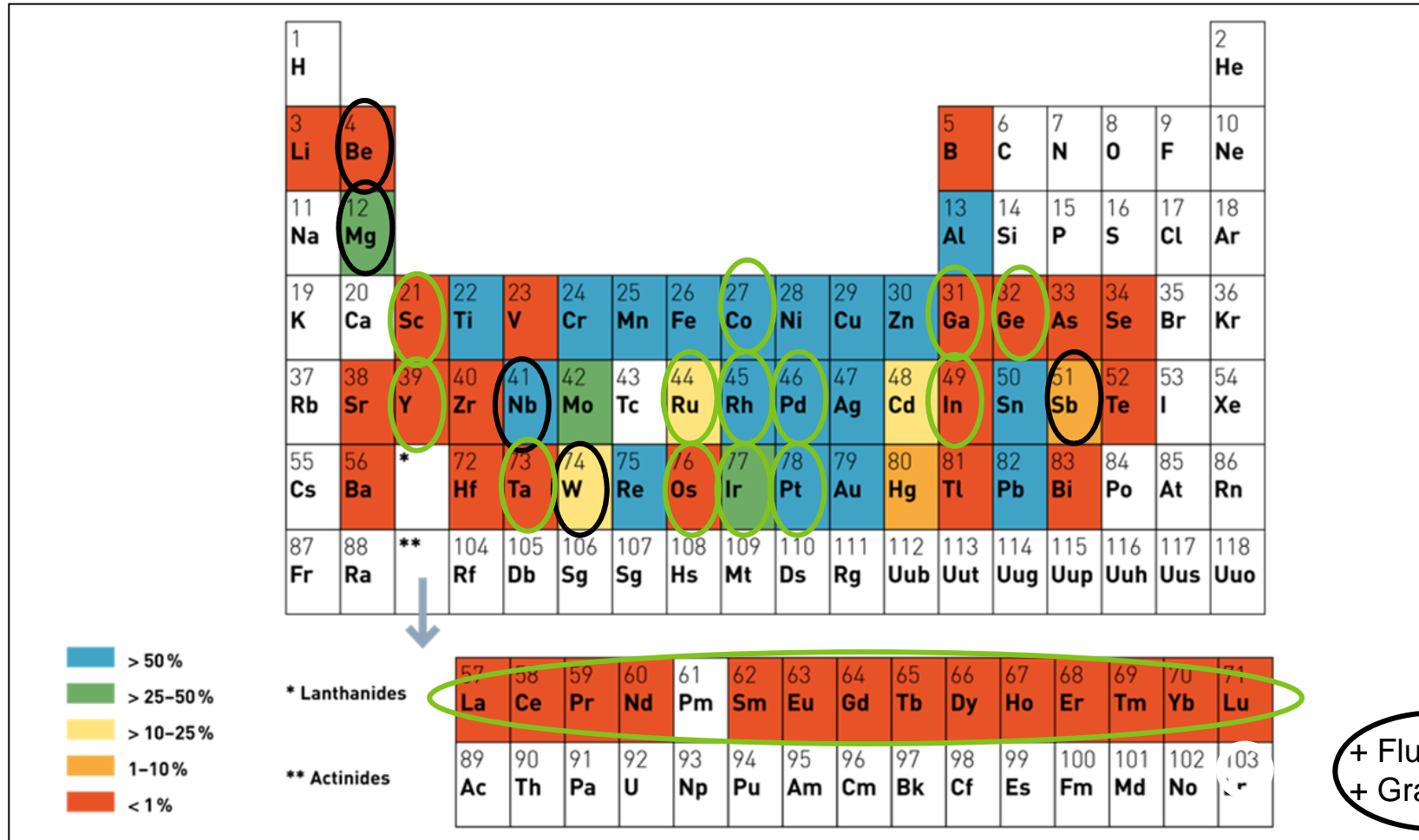
12th / 13th September 2012, Brussels

Which goods / Wastes?



	Periods of use [yr]	Total Waste in EU27 [Mio t/yr]
Packaging	< 1a	≈75-80
Electrical & electronic equipment	1-10	≈9-10
Vehicles	< 15	≈ 12
Municipal Waste	--	≈250
Construction Waste	> 15	≈850

Which materials are targeted?



What WEEE ?

2006 - 2008 (accumulation); Source: Eurostat			
	Put on the market [t/3 yr]	Collected WEEE [t/3 yr]	Lost potential (calculated) [t/3 yr]
Large household appliances	2 034 690	954 612	1 080 078
Small household appliances	451 341	178 090	273 251
IT and telecommunications equipment	936 659	375 092	561 567
Consumer equipment	919 194	389 669	529 525
Lighting equipment	235 494	(?) 940	(?) 234 554
Electrical and electronic tools	363 921	46 217	317 704
Toys, leisure and sports equipment	142 766	16 612	126 154
Medical devices	81 839	30 302	51 537
Monitoring and control instruments	46 774	5 426	41 348
Automatic dispensers	38 799	15 492	23 307
Total	5 251 477	2 012 452	3 239 025

Recent scientific studies

Recent publication of Öko-Institut: **Recycling of critical raw materials from waste electronic equipment** (02/2012)

Products / WEEE addressed:

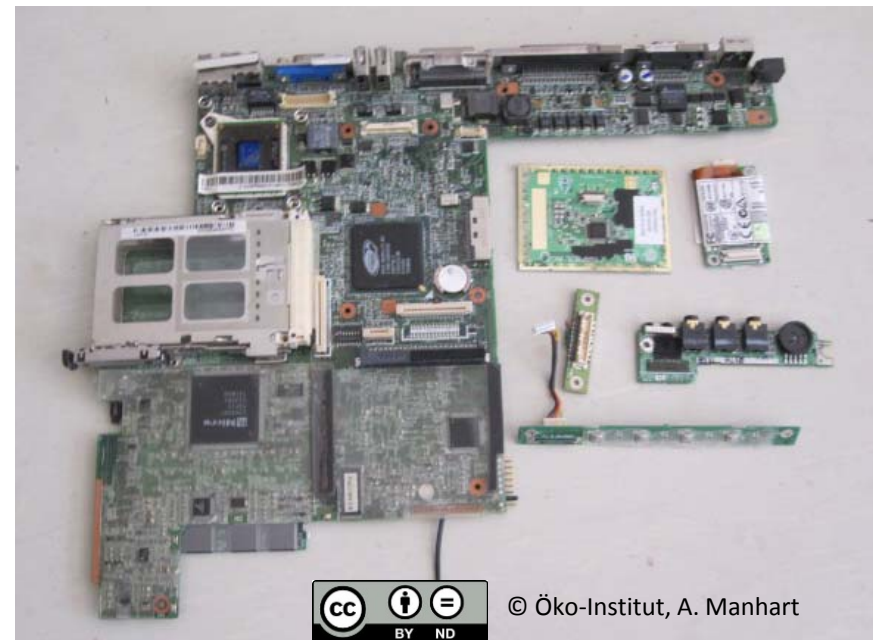
- **Notebooks**
- Flat screens
- Smartphones
- LED lights

For the full report (and several others) please refer to:
<http://www.resourcefever.org/news/items/new-report-on-recycling-critical-raw-materials-from-waste-electronic-equipment.html?page=2>



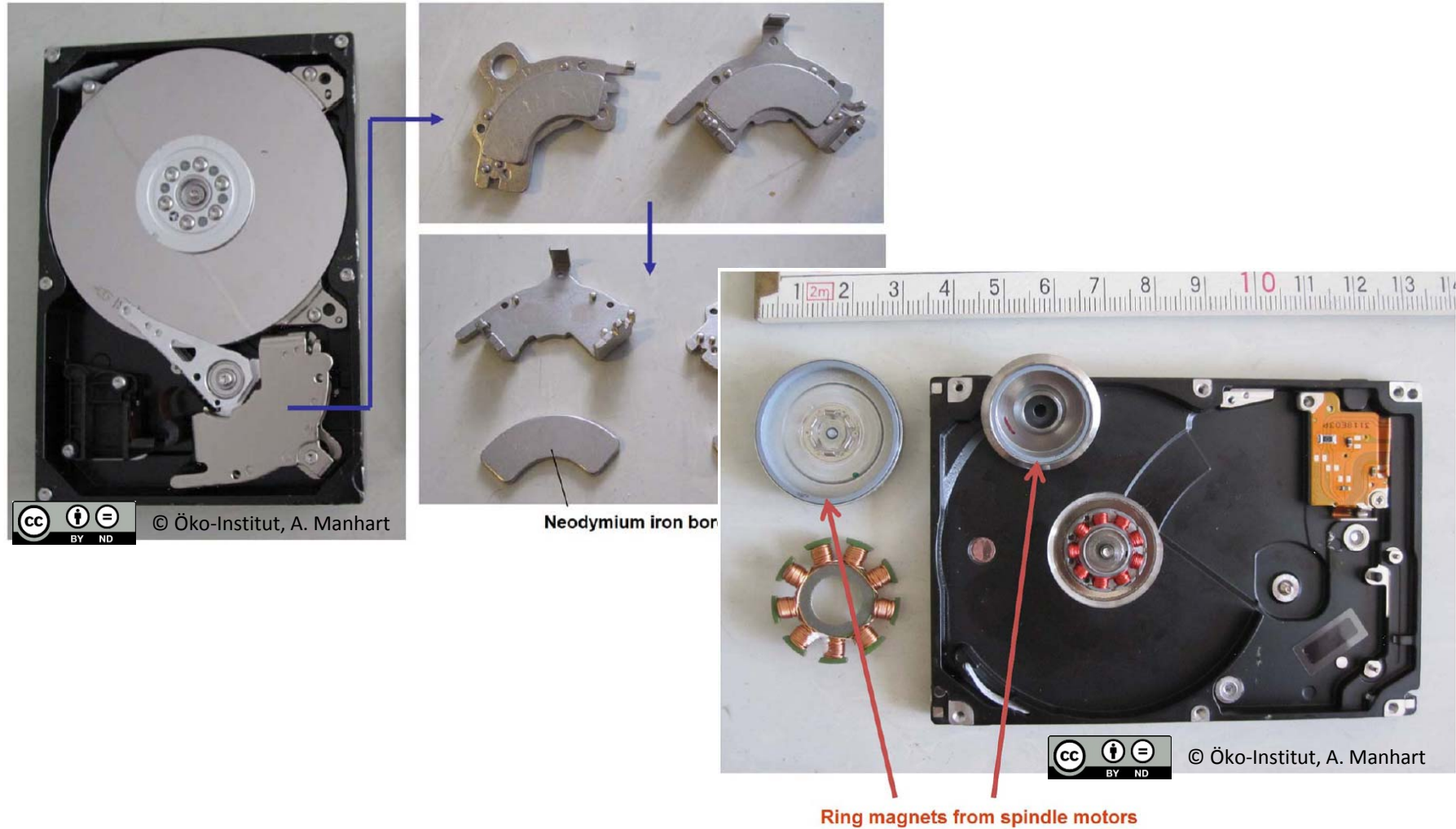
Precious metals in Notebooks:

- Motherboards
- Memory Cards
- Small circuit boards
- Circuit boards of hard disk drive
- Circuit board of optical drive
- Circuit board of display

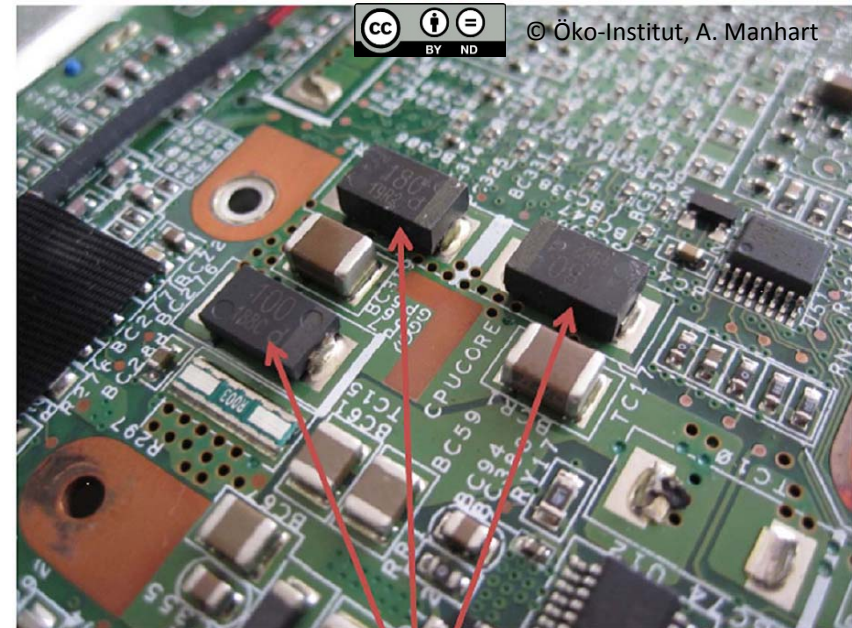


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Neodymium in Notebooks



Cobalt and Tantalum in Notebooks



Ta capacitors

What is recycled?

Metal		Content in all 2010 in Germany sold Notebooks [t]	Losses during collection	Losses during pre-processing	Losses during end-processing	Recovery in Germany [t]
Cobalt	Co	461.31	50%	20%	4%	177
Neodymium	Nd	15.61	50%	100%	100%	0
Tantalum	Ta	12.06	50%	100%	5%	0
Silver	Ag	3.11	50%	70%	5%	0.443
Praseodymium	Pr	1.94	50%	100%	100%	0
Gold	Au	0.74	50%	70%	5%	0.105
Dysprosium	Dy	0.43	50%	100%	100%	0
Indium	In	0.29	50%	20%	100%	0
Palladium	Pd	0.28	50%	70%	5%	0.040
Platinum	Pt	0.028	50%	100%	5%	0
Yttrium	Y	0.012	50%	40%	100%	0
Gallium	Ga	0.010	50%	40%	100%	0
Gadolinium	Gd	0.0048	50%	40%	100%	0
Cerium	Ce	0.00069	50%	40%	100%	0
Europium	Eu	0.00028	50%	40%	100%	0
Lanthanium	La	0.00008	50%	40%	100%	0
Terbium	Tb	0.00003	50%	40%	100%	0

WEEE Directive 2012/19

Targets for collection and treatment:

	by 31.12.2006	by 1.1.2016	by 1.1.2019
Collection ¹⁾	4 kg per capita and year	45% of EEE put on the market ²⁾	65% of EEE put on the market ^{2) 3)}
Recovery	75% for IT and TC	80% for IT and TC	Some more categories with some improved targets
Reuse and Recycling	65% for IT and TC	70% for IT and TC	

1) Total for all categories

2) Ø of EEE put on the market for the 3 preceding years

3) Alternatively 85% of WEEE generated on the territory of the country

Strength of WEEE Directive

- Producers responsibility established in principle. This is important to ensure collection and separation of components if it is not economically viable.
- List of components obligatory to be separated (with relevance for CM): Batteries, printed circuit boards (PCB) *“of mobile phones generally, and of other devices if the surface of the printed circuit board is greater than 10 square centimetres”*.
- Establishment of minimum requirements for shipment, in force since 15. August 2012. This is important to distinguish used EEE and WEEE and to avoid illegal export of WEEE.

Weakness of WEEE Directive (1)

- a) **Critical metals are irrelevant to meet the current collection and recycling targets.** Mass targets will be met with mass materials as steel and aluminum (and to some extent with the concrete in the washing machines).
- b) Enforcement of separation obligations is crucial. Once separated, treatment of batteries and PCB is +/- economically viable (at least compared to disposal). Otherwise critical metals are lost with shredder material.
- c) The reasoning for components to be separated is mainly to reduce hazard components in the recycling stream. In result interesting critical metals as Nd (magnets) or Ta (capacitors) are not addressed to be separated and lost with the shredder material.

Weakness of WEEE Directive (2)

- d) No particular treatment target (recycling / recovery) for the separated components (batteries, PCBs)
- e) Enforcement of minimum requirements for shipment is crucial but difficult to implement.
- f) No regulation for “Design for Reuse / Recycling” (easy & quick dismantling): Discussions if the “Eco-Design Directive” might be expanded.
- g) The RoHS Directive does address only a very limited scope of hazardous to be kept out from new EEEE and is from the methodology currently not appropriate to be expanded for regulations on design “Design for Reuse / Recycling”.

Potentials to improve

- i. Research on separation and recycling technologies
- ii. Establishment of deposit fees e.g. for mobiles, notebooks and similar devices: voluntary or regulation?
- iii. More leasing for consumer products
- iv. Substitution by economic reasons or by Life-Cycle-Thinking (regulations needed?)
- v. International cooperation like UN StEP Initiative (“Solving the E-Waste Problem”) or the Best-of-two worlds approach (Bo2W).

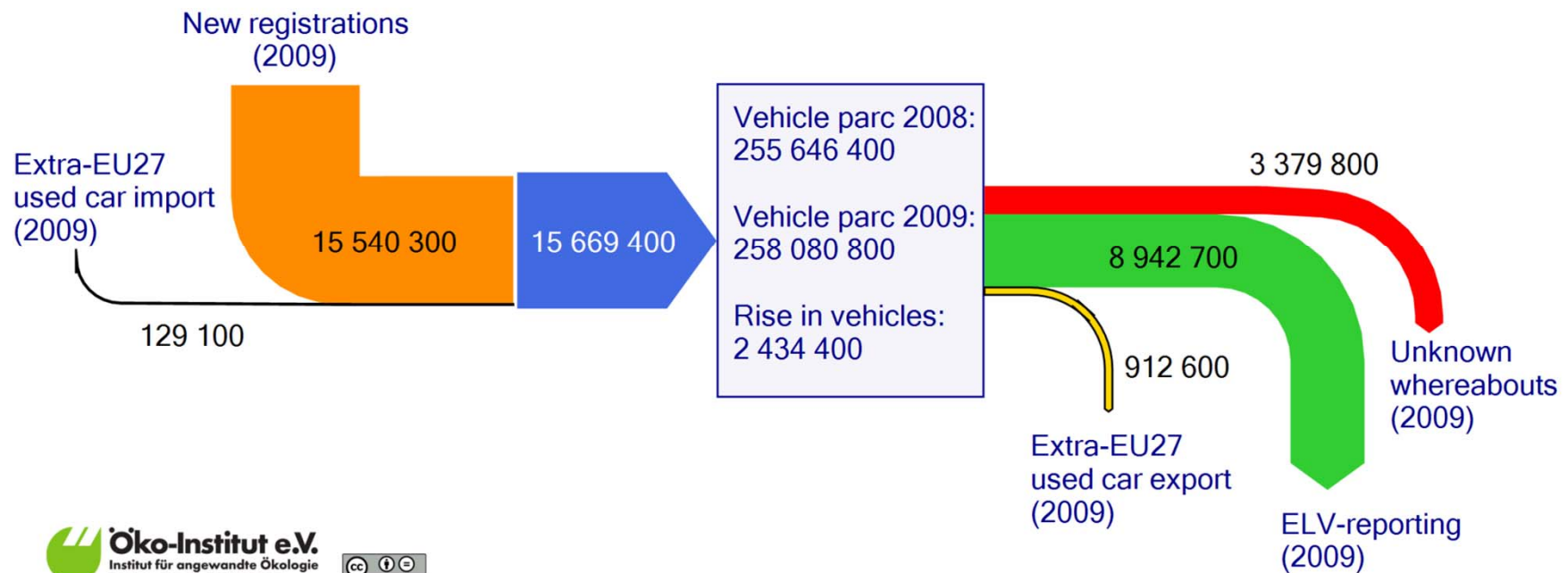
End-of-Life Vehicles (ELV Directive 2000/53)

Targets for collection and treatment:

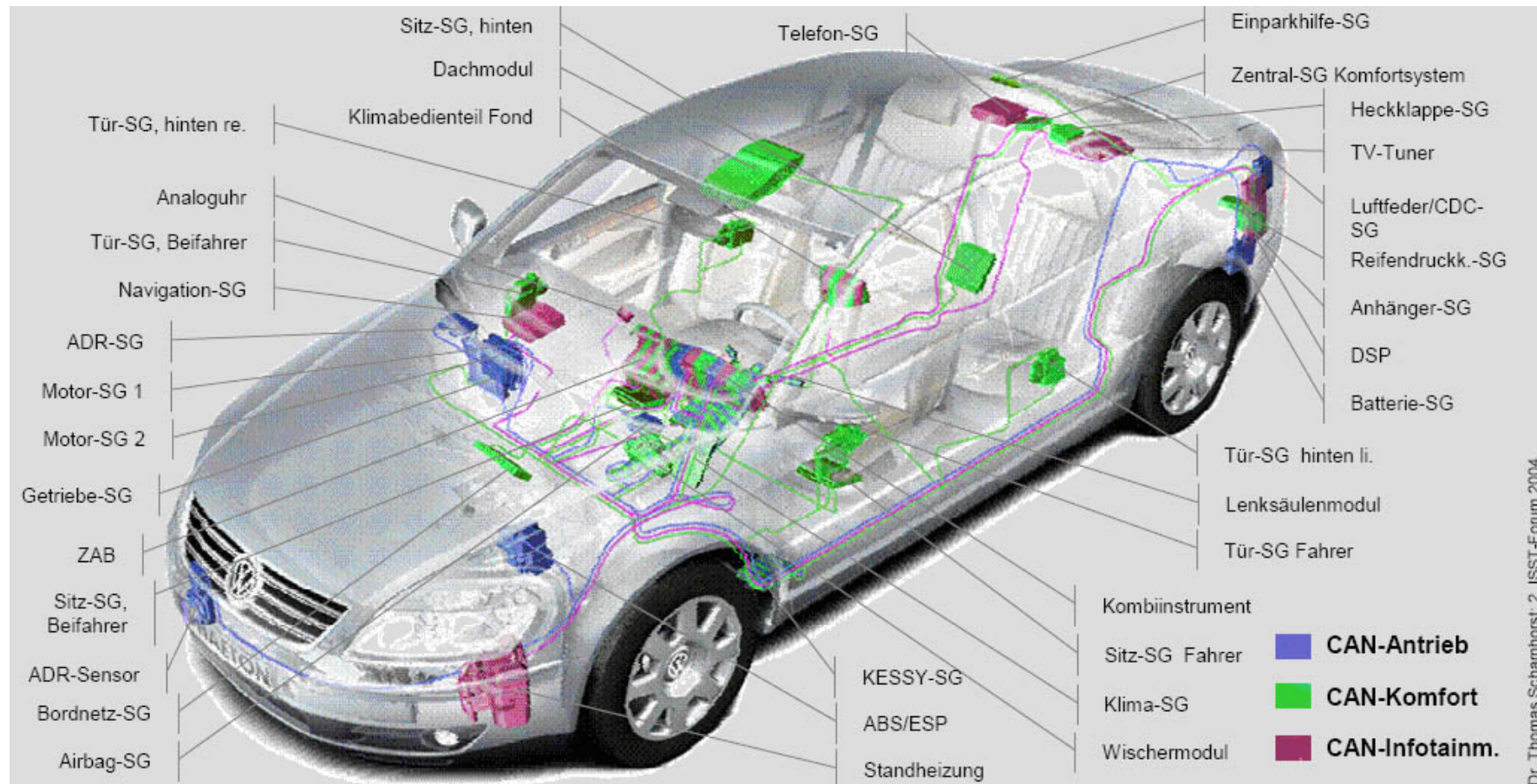
	by 1.1.2006	by 1.1.2015
Collection	100% of ELVs (implicitly)	100% of ELVs (implicitly)
Reuse and Recovery	85%	95%
Reuse and Recycling	80%	85%

ELV: Lost secondary raw materials: EU27 2009

Vehicle parc development in Europe - 2009
 (M1+N1 - vehicles)



Electric and electronic components in vehicles



Dr. Thomas Schamhorst, 2. ISST-Forum, 2004

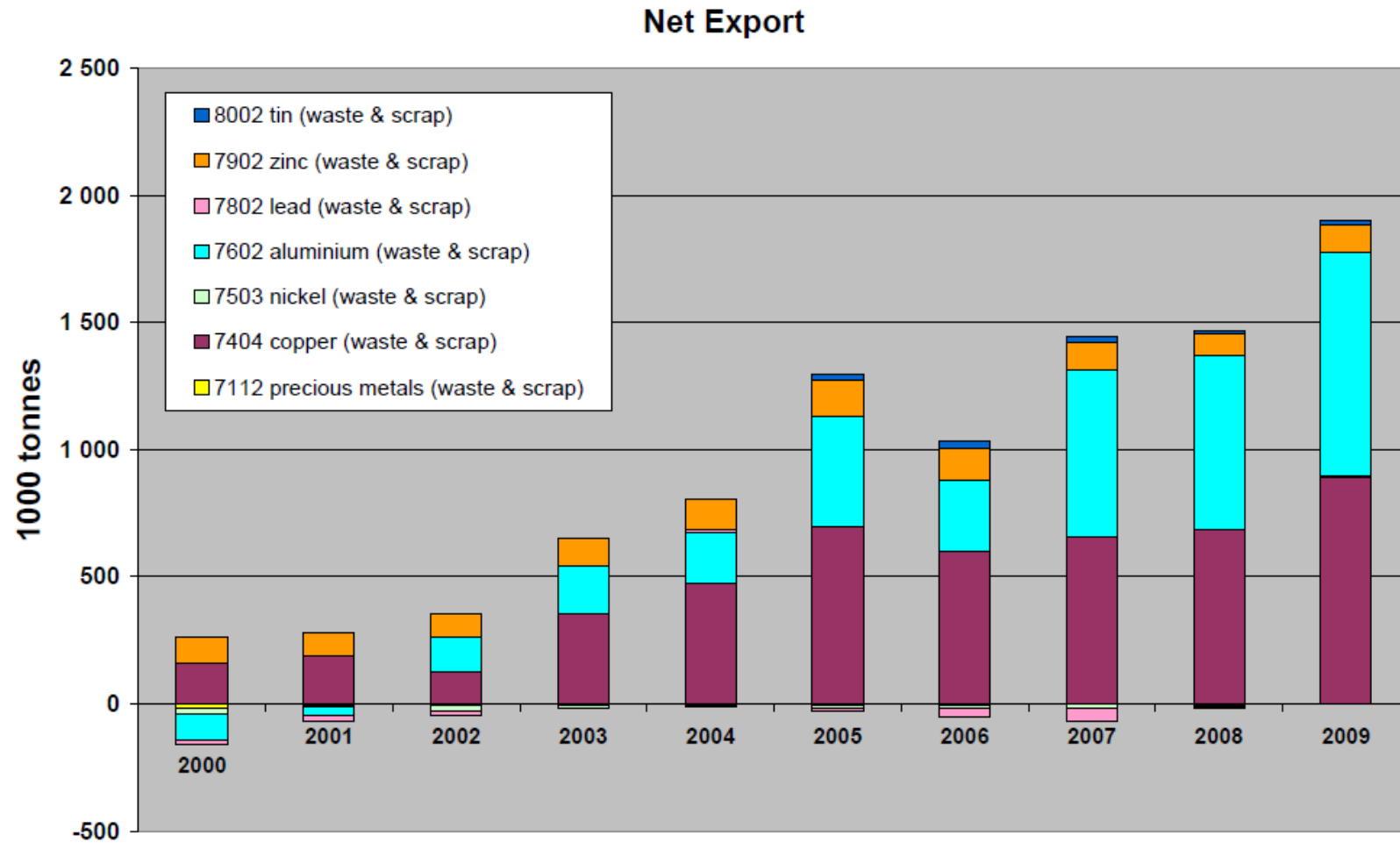
Weakness of ELV Directive (1)

- **Critical metals are irrelevant to meet the current collection and recycling targets.** Mass targets will be met with mass materials as steel and aluminum.
- Annex I gives minimum requirements for dismantling. Regarding critical metals only the removal of batteries (as far as others than lead batteries are applied) and catalysts are of interest. **For all electric and electronic components there is no (!) obligation to separate it.**
- No obligatory reference for illegal shipment in place (only the correspondence guideline of the Waste Shipment Regulation). However enforcement of correspondence guideline is practically not existent.

Weakness of ELV Directive (2)

- Tracking of used cars / ELV within EU is comparatively weak.
- No regulation for “Design for Reuse / Recycling” (easy & quick dismantling).

Green listed Waste (1)



Green listed Waste (2)

- A lot of non-ferrous metals, partially containing also critical metals are exported to plants with less developed technical (gain rate of recyclables) and environmental standards.
- Accordingly there is a (technical and environmental) need to establish a level playing field.
- The Waste Shipment Regulation stipulates in Article 49 that exported waste shall be managed in an environmentally sound manner throughout the period of shipment, including recovery or disposal in the third country of destination. Enforcement is difficult as no detailed regulation or guidance is in place to define what is an “environmentally sound manner”.
- To establish such guidance a discussion is ongoing to establish a **certification** scheme for EU and extra EU plants, designated for the treatment of such (green listed) waste

Conclusions (1)

- Major pieces for the implementation of a better use of secondary resources are in place (incl. “waste hierarchy”).
- Enforcement is crucial to improve the gain of secondary resources.
- Targets for WEEE and ELV focus on mass metals and not on critical materials.
- Collection targets are for many countries not challenging enough. In particular more detailed targets are required for different categories instead of an overall (mass) target and more obligatory separation of components is needed.

Conclusions (2)

- ELV Directive needs adjustment regarding shipment, tracking of used cars / ELVs and more detailed dismantling requirements (electric and electronic).
- Further instruments are needed as deposit fees, support of leasing, consideration of “design for reuse / recycling” and certification of treatment plants for (green listed) waste.
- Research is in particular needed for the processing of 2ndary critical metals
- International cooperation like Bo2W approach are promising aspects to improve collection rate and gain.

Contact:

Dr. Georg Mehlhart g.mehlhart@oeko.de

Dr. Matthias Buchert m.buchert@oeko.de

Andreas Manhart a.manhart@oeko.de

www.oeko.de

www.resourcefever.com

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