e waste
swiss e-waste programme

Scaling up the Recovery of Secondary Resources in Colombia

What happens to a light bulb once it stops to glow?

Water & Light Conference 2012 HSG, 3-4 September 2012, St.Gallen

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs FDEA
State Secretariat for Economic Affairs SECO

Daniel Ott // Program Officer LAC // Empa
daniel.ott@empa.ch

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Materials Science & Technology

Empa – 20 years working with E-Waste

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- Federal Institute for Materials Science and Technology
- Technical auditing and applied research for Swico Recycling and SENS*
- Member of WEEE Forum since 2006
- Founding memeber of StEP
- WEEE related research projects
  - Analysis of flame retardants in plastics of WEEE
  - Flat screen recycling and processing
  - Simulation & modeling of equipment and chemical substances in WEEE (CRTs, LCDs, In, Hg, Li, etc.)
  - Analysis and development of business models for recycling and the inclusion of the informal sector
  - Best practices in Reuse
- Technical cooperation in WEEE management with emerging and developing countries

* Collective WEEE take-back systems in Switzerland

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Empa's Global E-Waste Activities

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Trinidad & Tobago:
e-Waste Management in T & T
Assessment Study

Funding Agency: Unido, Microsoft
Project Partner: MPA
Time Frame: 2010

Senegal:
e-Waste Management in Africa
Assessment Study

Funding Agency: DSF
Project Partner: SENECLIC
Time Frame: 2007 - 2008

Morocco:
e-Waste Management in Africa
Assessment Study

Funding Agency: HP
Project Partner: DSF, CMPP
Time Frame: 2007 - 2008

India:
Swiss e-Waste Programme
Implementing a Clean e-Waste Channel
Mainstreaming the informal sector
Household e-waste collection

Funding Agency: SECO
Project Partner: GTZ, MoEF
Time Frame: 2003 - 2008

Colombia:
Swiss e-Waste Programme
Assessment Study
Facilitating the development of a national e-waste management strategy

Funding Agency: SECO
Project Partner: CNPML
Time Frame: 2007 – 2012

China:
Swiss e-Waste Programme
Supporting formulation of a "technical draft" for a national e-waste law
Developing technical standards for recycling

Funding Agency: SECO
Project Partner: NDRC
Time Frame: 2003 - 2008

Peru:
Swiss e-Waste Programme
Assessment Study
Facilitating the development of a national e-waste management strategy

Funding Agency: SECO
Project Partner: IPES
Time Frame: 2007 – 2012

Kenya:
e-Waste Management in Africa
Assessment Study

Funding Agency: HP
Project Partner: DSF, KICTANeT
Time Frame: 2007 - 2008

Brazil:
Swiss e-Waste Programme
Assessment Study

Funding Agency: SECO
Project Partner: FEAM
Time Frame: 2009 - 2010

South Africa:
Swiss e-Waste Programme
Facilitating the development of a national e-waste management strategy

Funding Agency: SECO
Project Partner: ITA, EWASA
Time Frame: 2003 – 2008

Uganda/Tanzania:
e-Waste Management in Uganda and Tanzania
Assessment Study

Funding Agency: Unido, Microsoft
Project Partner: UCPC/CPCT
Time Frame: 2007 - 2011

Benin, Côte d'Ivoire, Ghana, Liberia, Nigeria:
The Basel Convention e-Waste Africa Project
Assessment Study
Training Pilot

Funding Agency: SBC, EU
Project Partner: African BCRCs, IMPEL, Öko-Institut
Time Frame: 2009-2011

Chile:
Swiss e-Waste Programme
Assessment Study

Funding Agency: EMPA
Project Partner: SUR
Time Frame: 2007-2012

e-Waste Management in Africa
Launching an e-waste recycling unit in Cape Town

Funding Agency: HP
Project Partner: DSF, Recover-e-Alliance, Envirosense
Time Frame: 2007 - 2008

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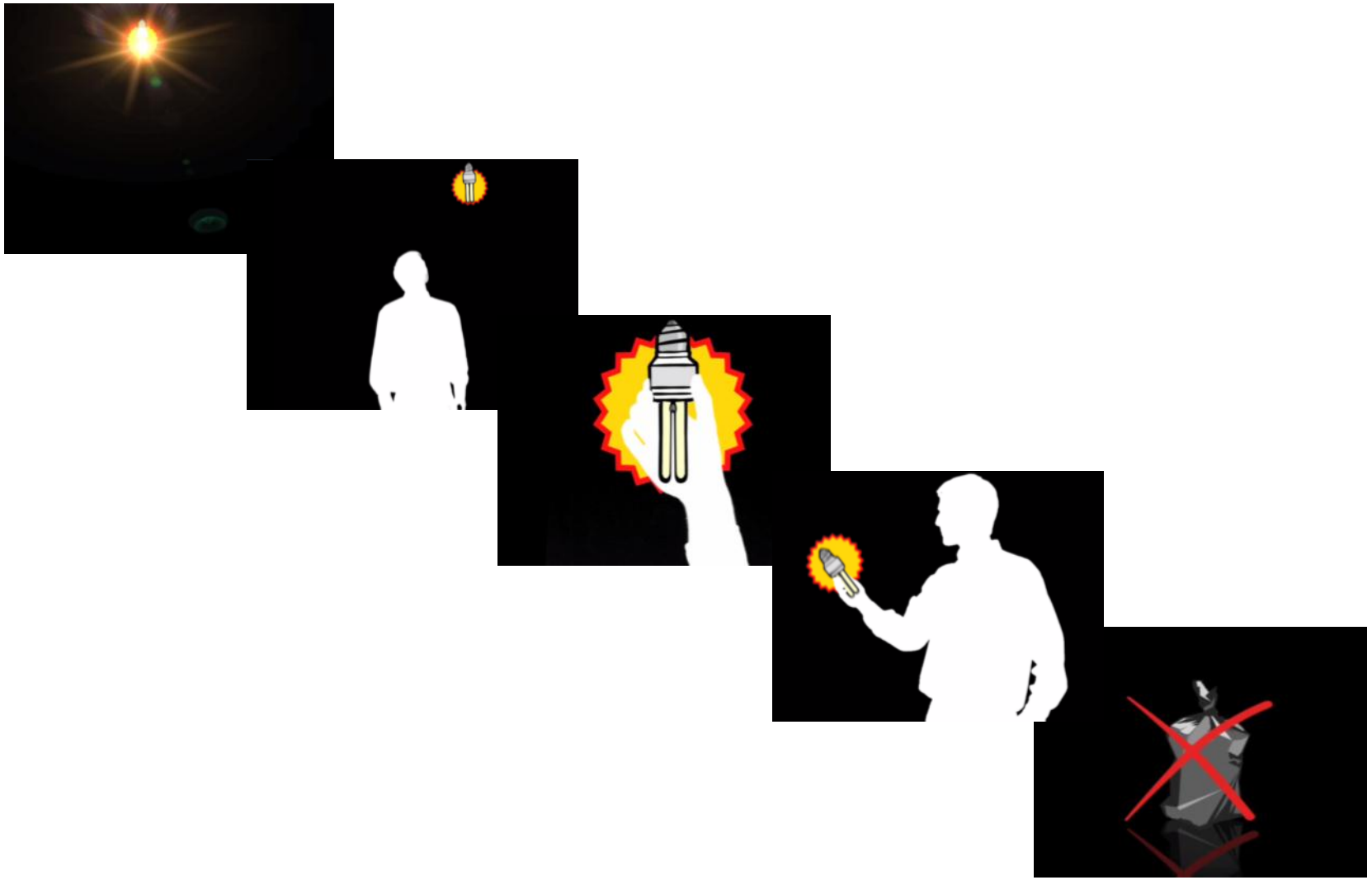
The Fate of a Light Bulb



WEEE is more than Lighting Equipment…

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WEEE: The Fastest Growing Waste Stream

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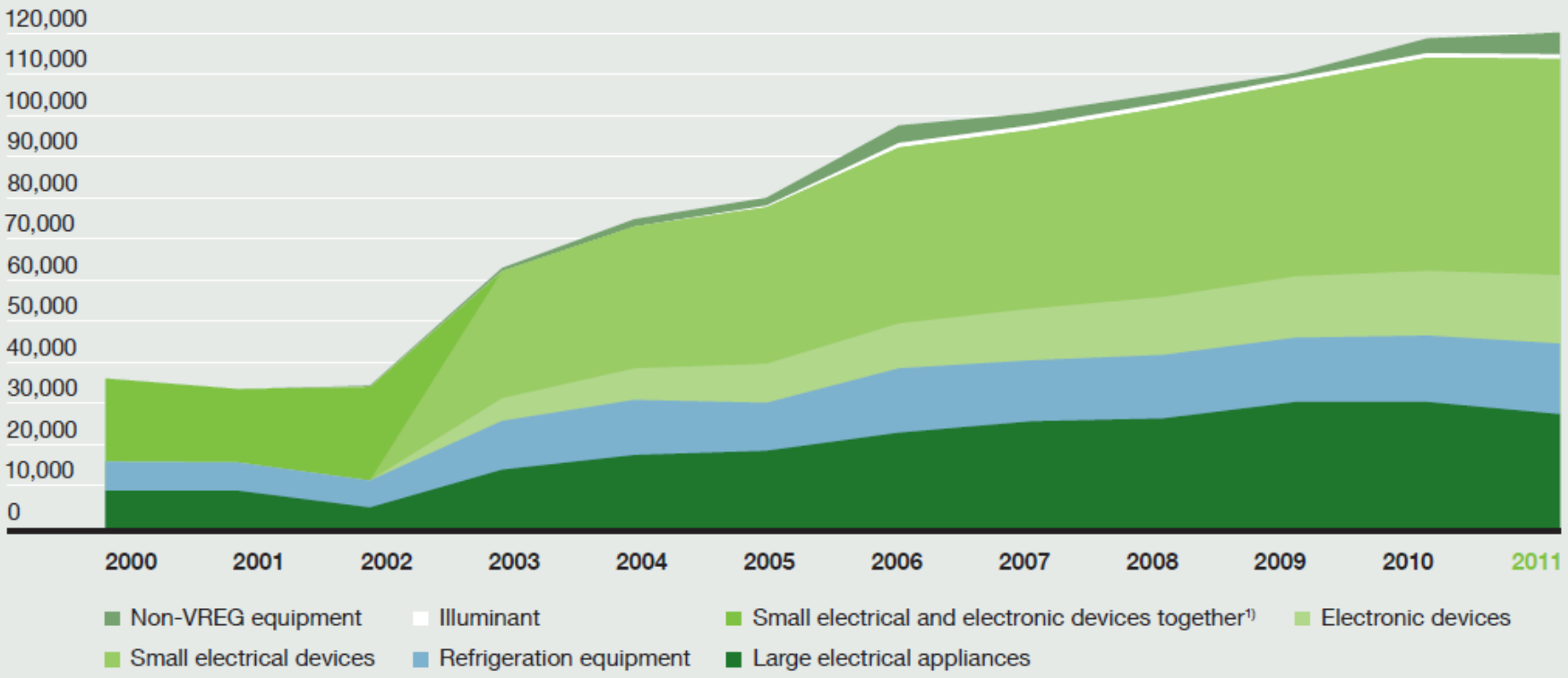
swiss e-waste programme

Fig. 2: Development of volume of appliances processed in Switzerland in tonnes



1) Until 2002, small electrical and electronic devices were classed together

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Composition of E-Waste (WEEE)

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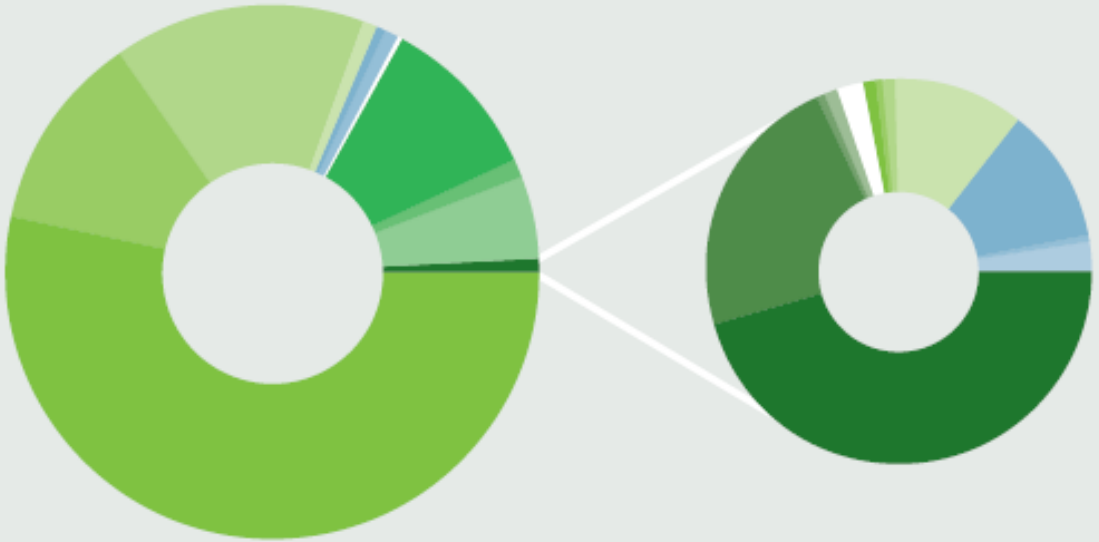
Switzerland 2011



53 %	Metals
12 %	Plastic/metal composites
15 %	Plastics
1 %	Cable
0.4 %	Toner cartridges
1 %	Printed circuit boards
0.2 %	LCDs
10 %	CR tubes
1 %	Glass
5 %	Other materials
1 %	Pollutants

0.4 %	Batteries
0.2 %	Capacitors
0.002 %	Mercury
0.01 %	Broken glass
0.02 %	Phosphorus
0.01 %	Getter pills
0.0001 %	Selenium
0.01 %	Asbestos
0.1 %	CFCs
0.1 %	Oil, all
0.005 %	Ammonia (NH_3)
0.02 %	Other pollutants

Source: SWICO and SENS Fachbericht 2011

Primary vs. Secondary Ore Deposits





	Primary Ore [g/t]	Secondary Ore [g/t]	
		Device	PWB
Gold	9	280	1’400
Palladium	5	73	370
Platinum	3	3	14
Gallium	100	23	118
Lithium	7’000-20’000	10’000-20’000 (Battery)	

Source: Empa, Graedel

Who owns the Periodic Table of the Elements?

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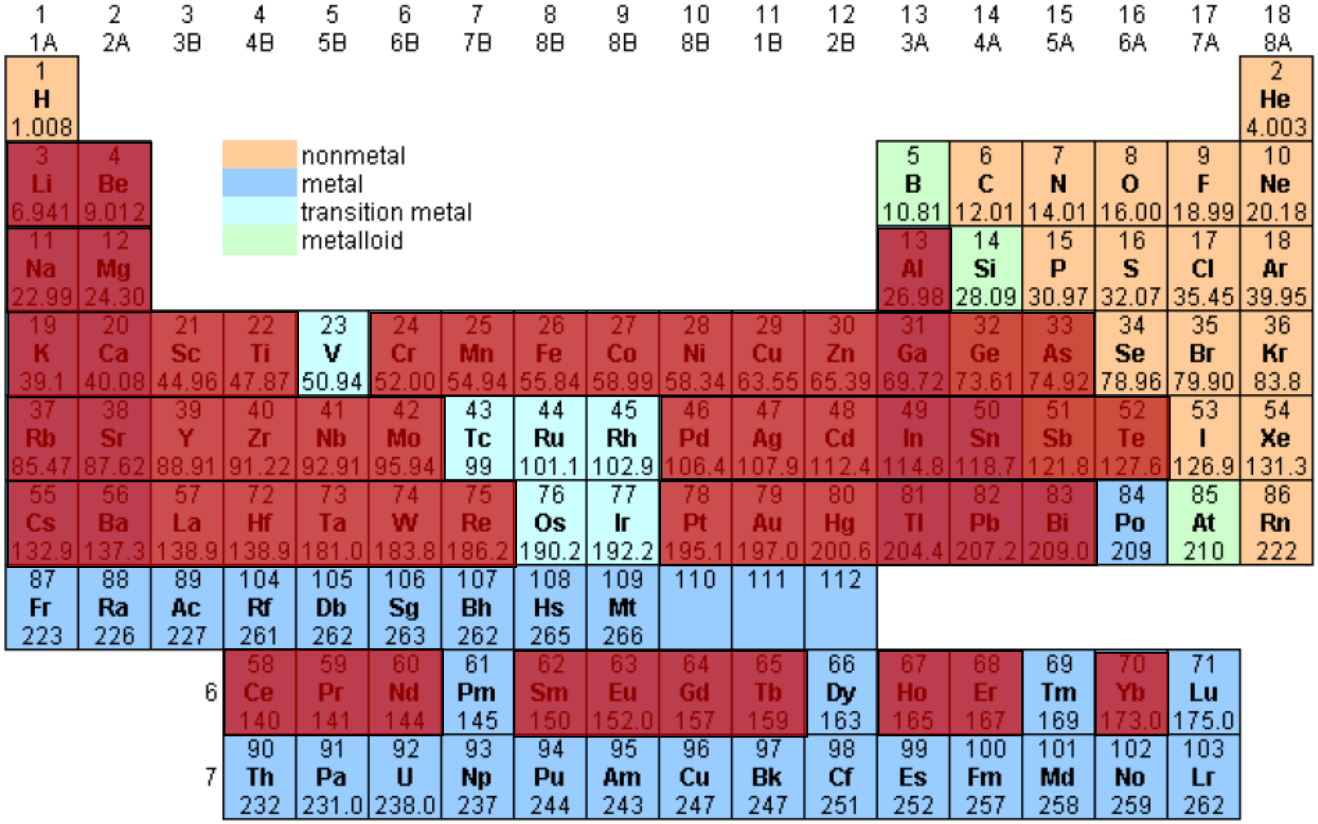

1 1A	2 2A	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
1 H 1.008																	2 He 4.003
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 18.99	10 Ne 20.18
11 Na 22.99	12 Mg 24.30											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.1	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.84	27 Co 58.99	28 Ni 58.34	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 73.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.8
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc 99	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 138.9	73 Ta 181.0	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po 209	85 At 210	86 Rn 222
87 Fr 223	88 Ra 226	89 Ac 227	104 Rf 261	105 Db 262	106 Sg 263	107 Bh 262	108 Hs 265	109 Mt 266	110	111	112						

6	58 Ce 140	59 Pr 141	60 Nd 144	61 Pm 145	62 Sm 150	63 Eu 152.0	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173.0	71 Lu 175.0
7	90 Th 232	91 Pa 231.0	92 U 238.0	93 Np 237	94 Pu 244	95 Am 243	96 Cu 247	97 Bk 247	98 Cf 251	99 Es 252	100 Fm 257	101 Md 258	102 No 259	103 Lr 262

Elements can be found in EEE

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Environmental Challenges

- WEEE also contains hazardous substances (Pb, Cd, Sb, BFRs, etc.)
- Through inappropriate recovery of valuable fractions from WEEE hazardous substances can be emitted

Logistic Challenges

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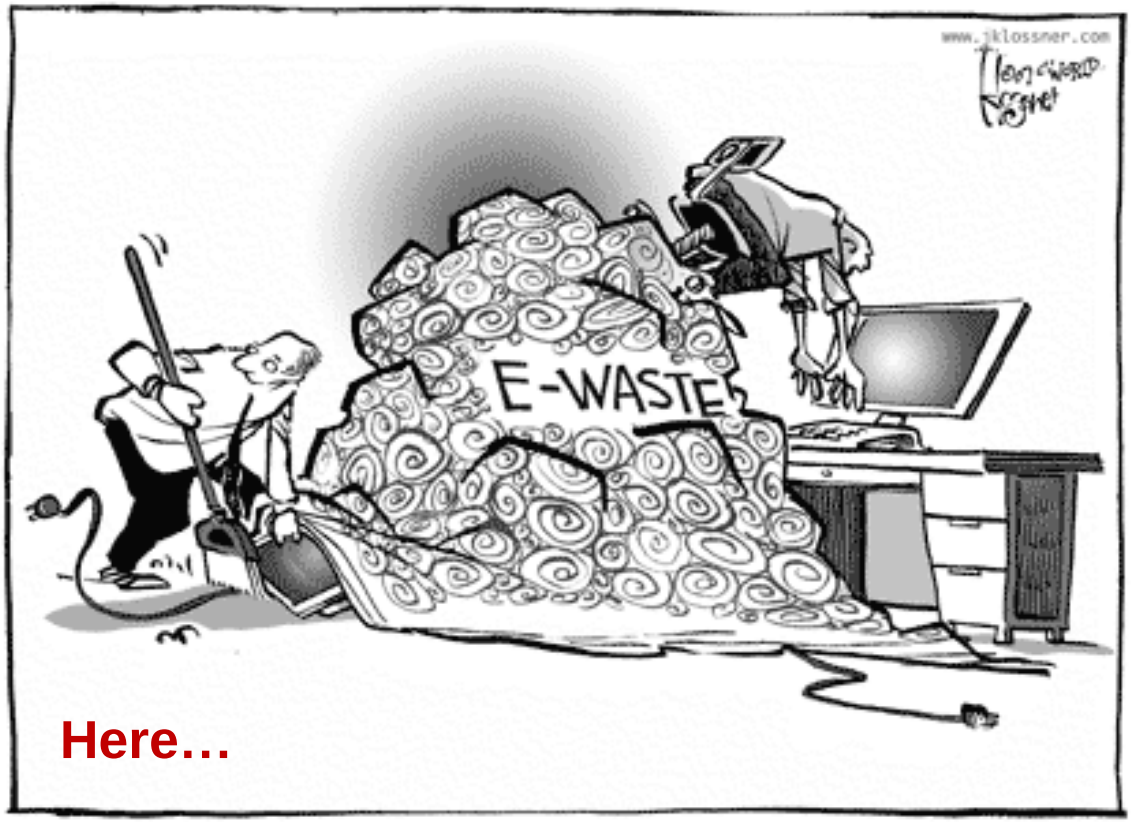
Where are our secondary resources?



Here…

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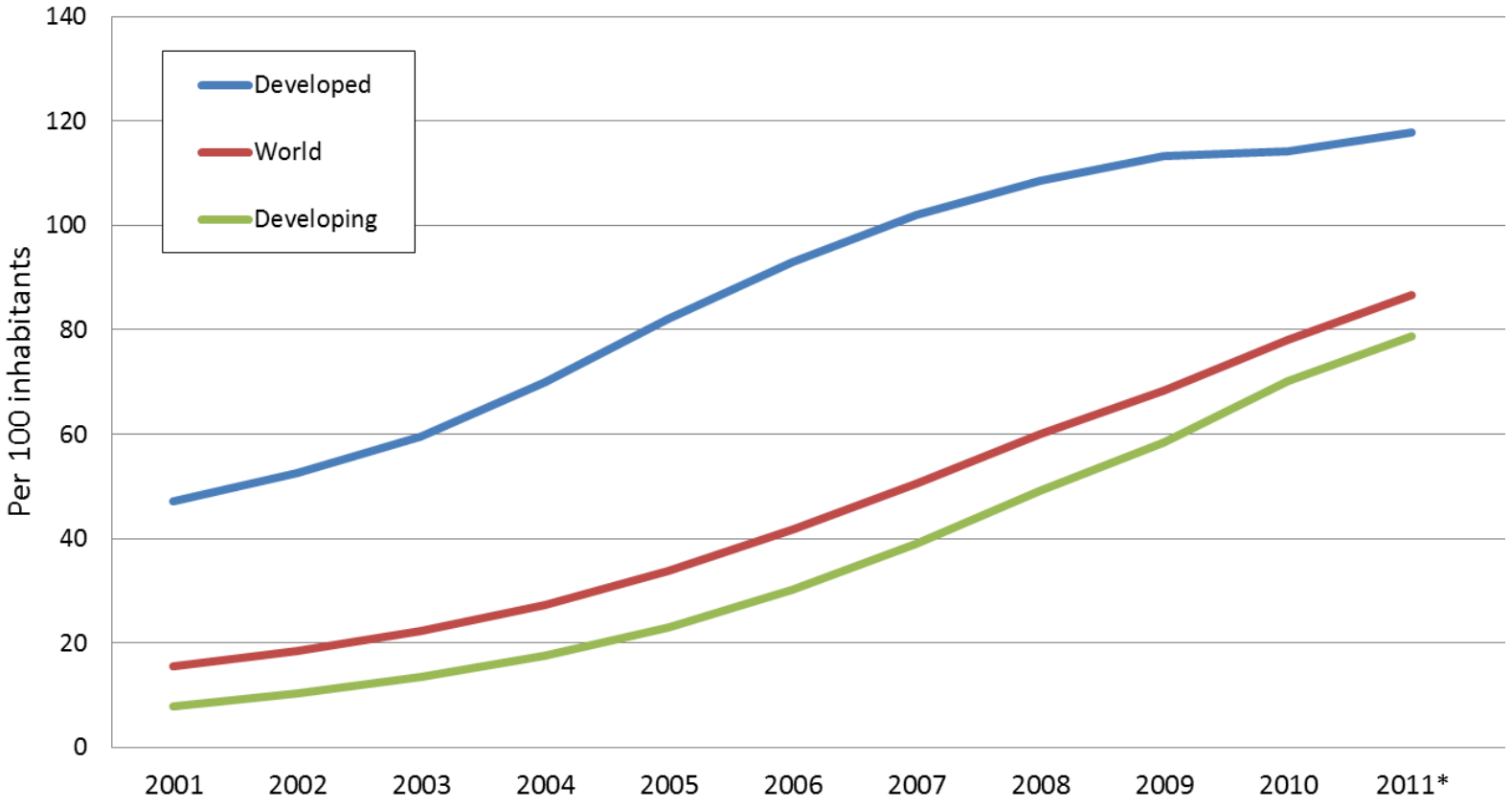
Importance of the 2nd and 3rd World

Mobile Phone Users (2001 – 2011)



* Estimate.
The developed/developing country classifications are based on the UN M49, see:
http://www.itu.int/ITU-D/ict/definitions/regions/index.html
Source: ITU World Telecommunication /ICT Indicators database

The Dark Side of WEEE Recycling

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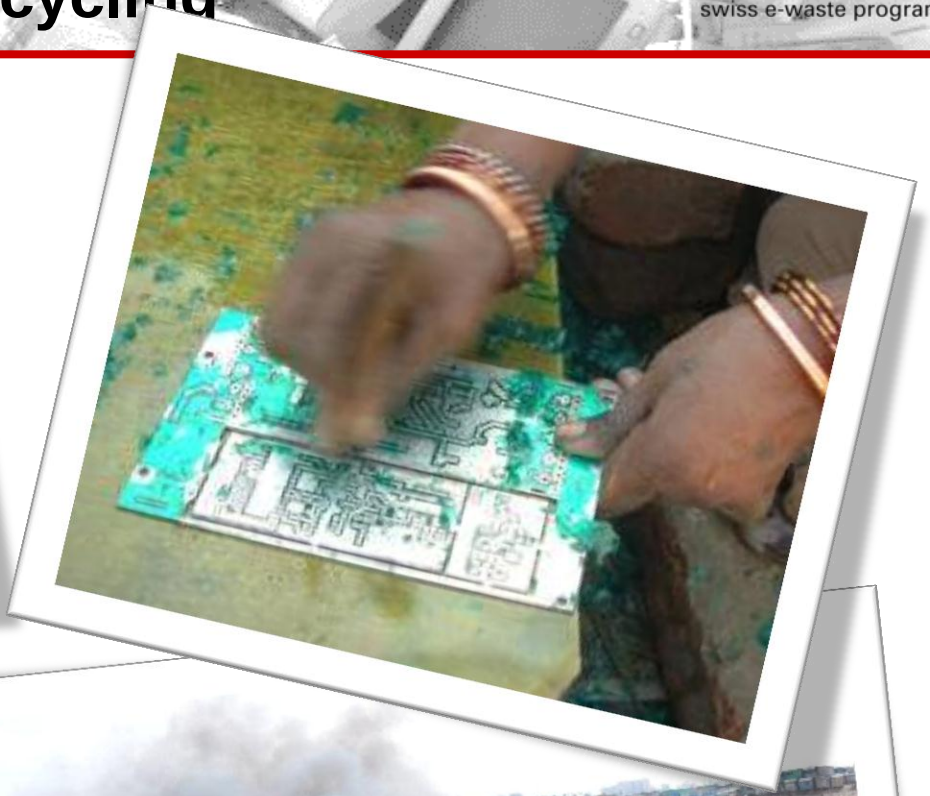

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WEEE in Latin America

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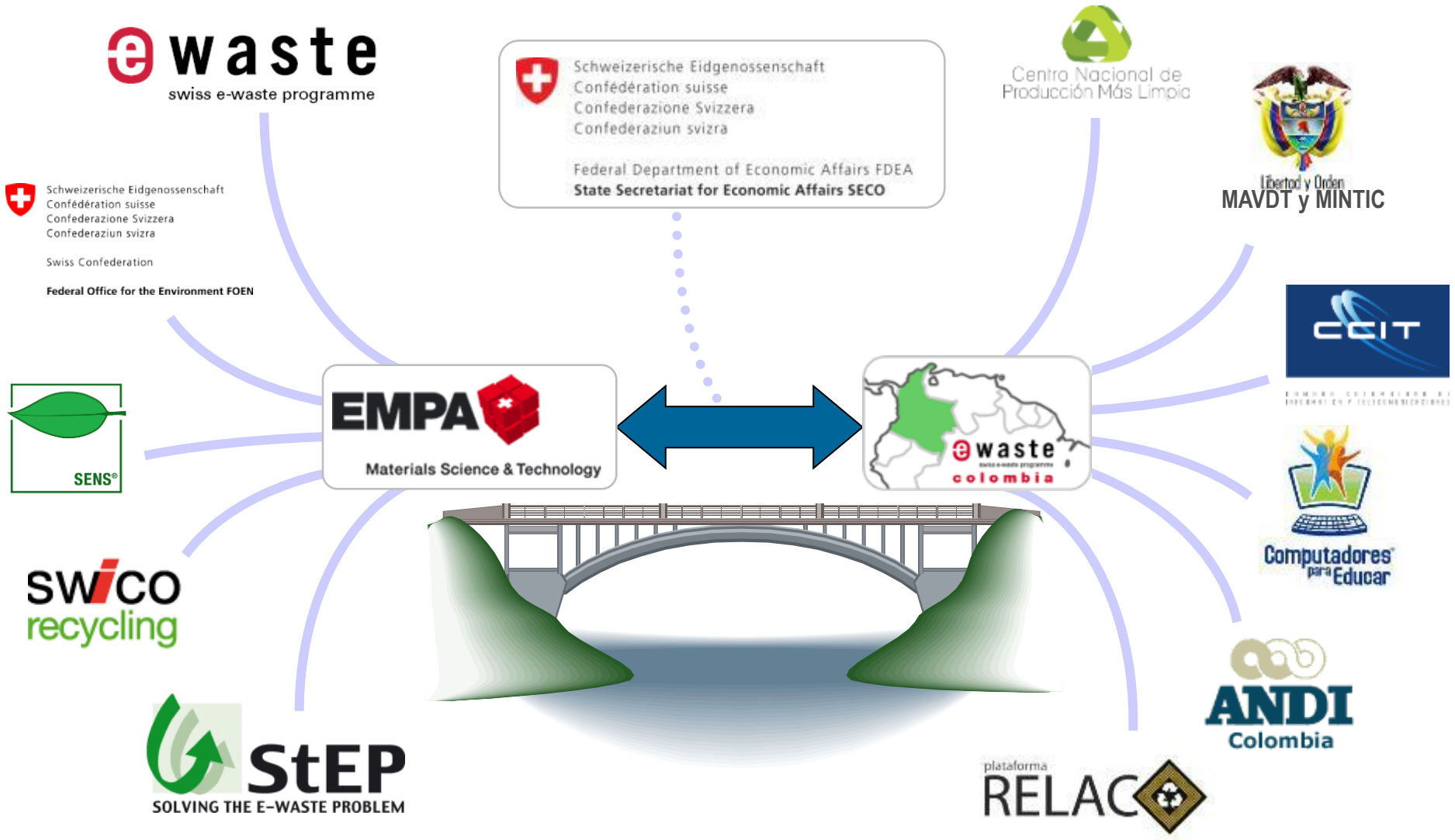
WEEE Cooperation Switzerland - Colombia

e-waste swiss e-waste programme



Scaling-up Sustainable WEEE Management

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Awareness Campaigns

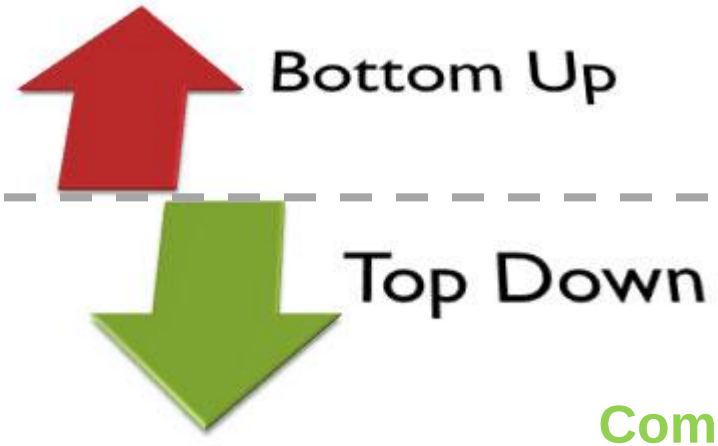
Manual Dismantling

Local / Regional Pilot Projects

Inclusion of Informal Sector

Decontamination

Refurbishment



Legal Framework

Compliance Schemes

Monitoring & Control

Extended Producer Responsibility

Technical Standards for Recycling

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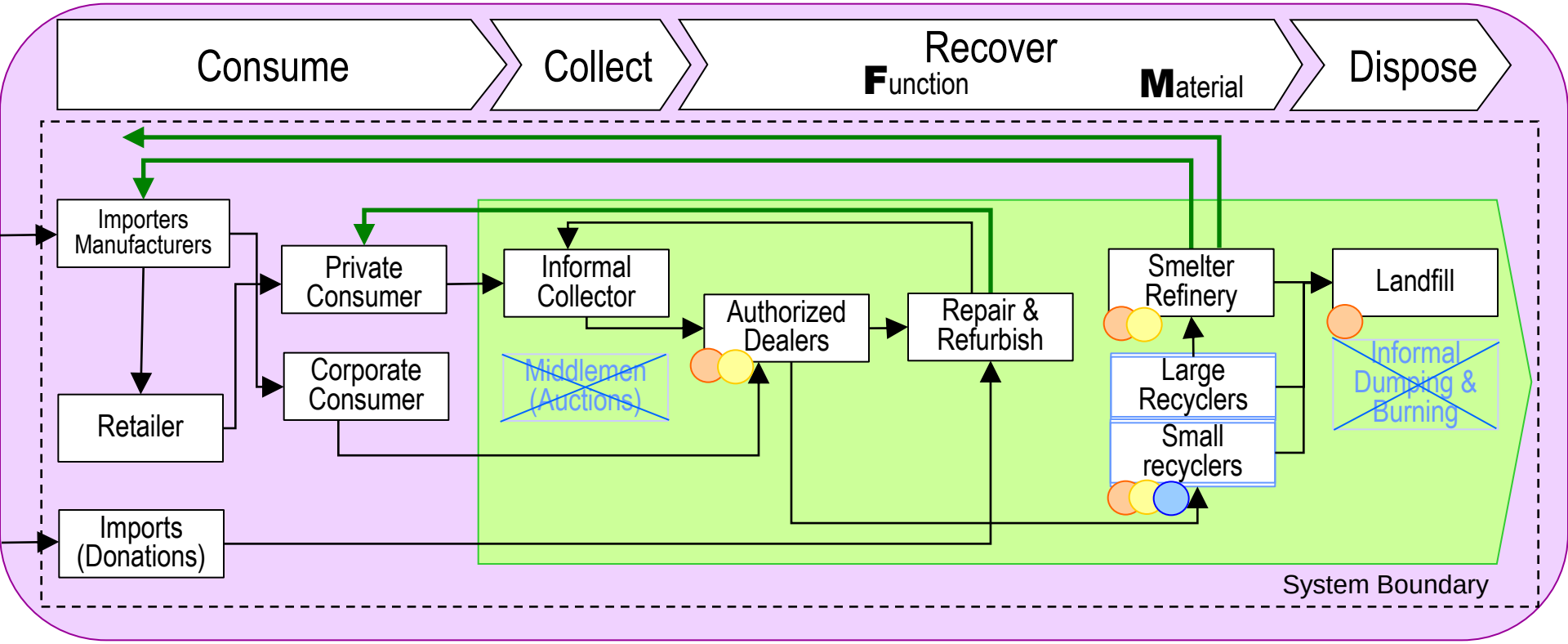
WEEE System



Intervention Mechanisms:

Policy & Legislation

- Legal Framework
- Licensing

Business & Finance

- Take back scheme
- Technical control and fixed contracts
- New business models

Technology & Skills

- Knowledge and technology transfer
- Formalizing the informal sector
- Trainings

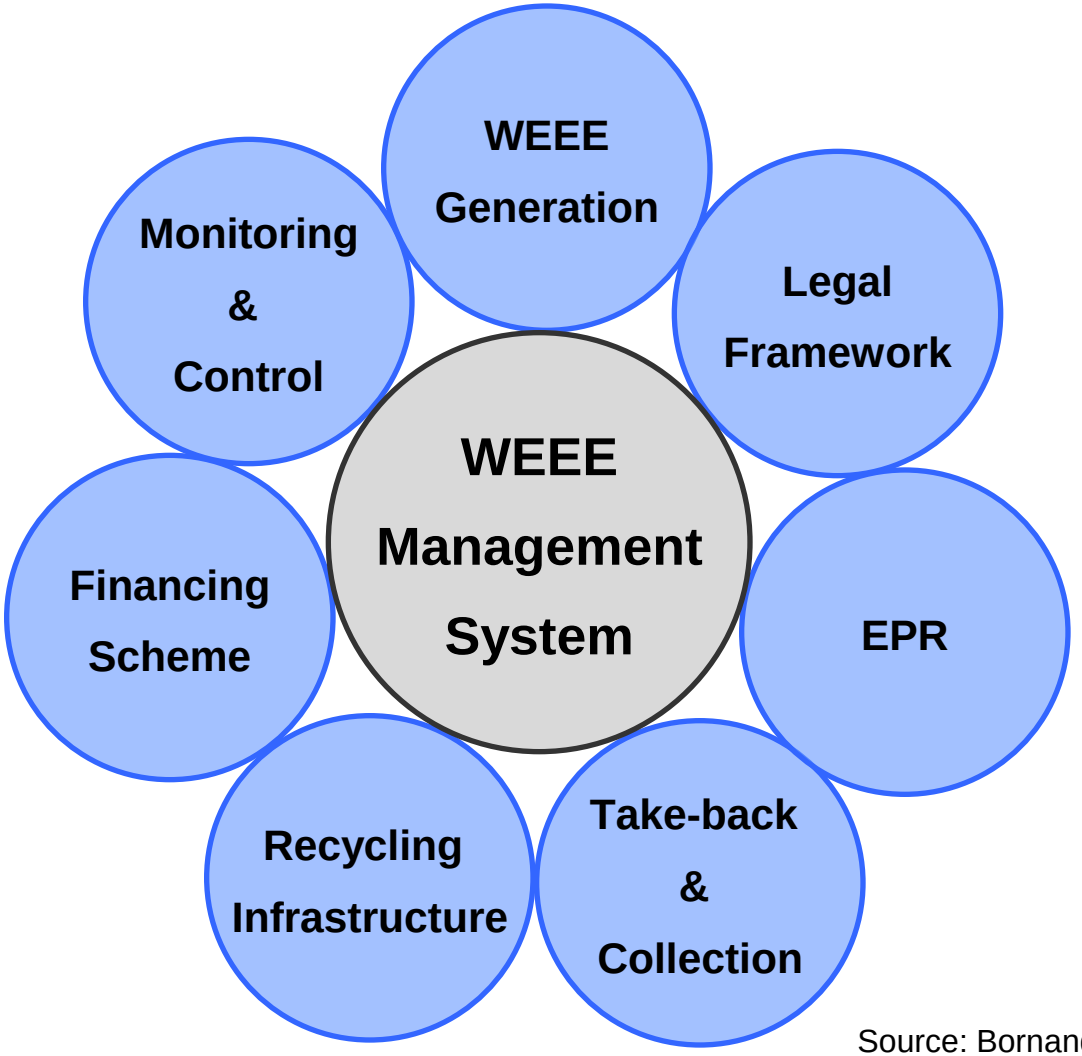
Monitoring and Control

- Standards
- Audits
- Monitoring Massflows

Marketing & Awareness

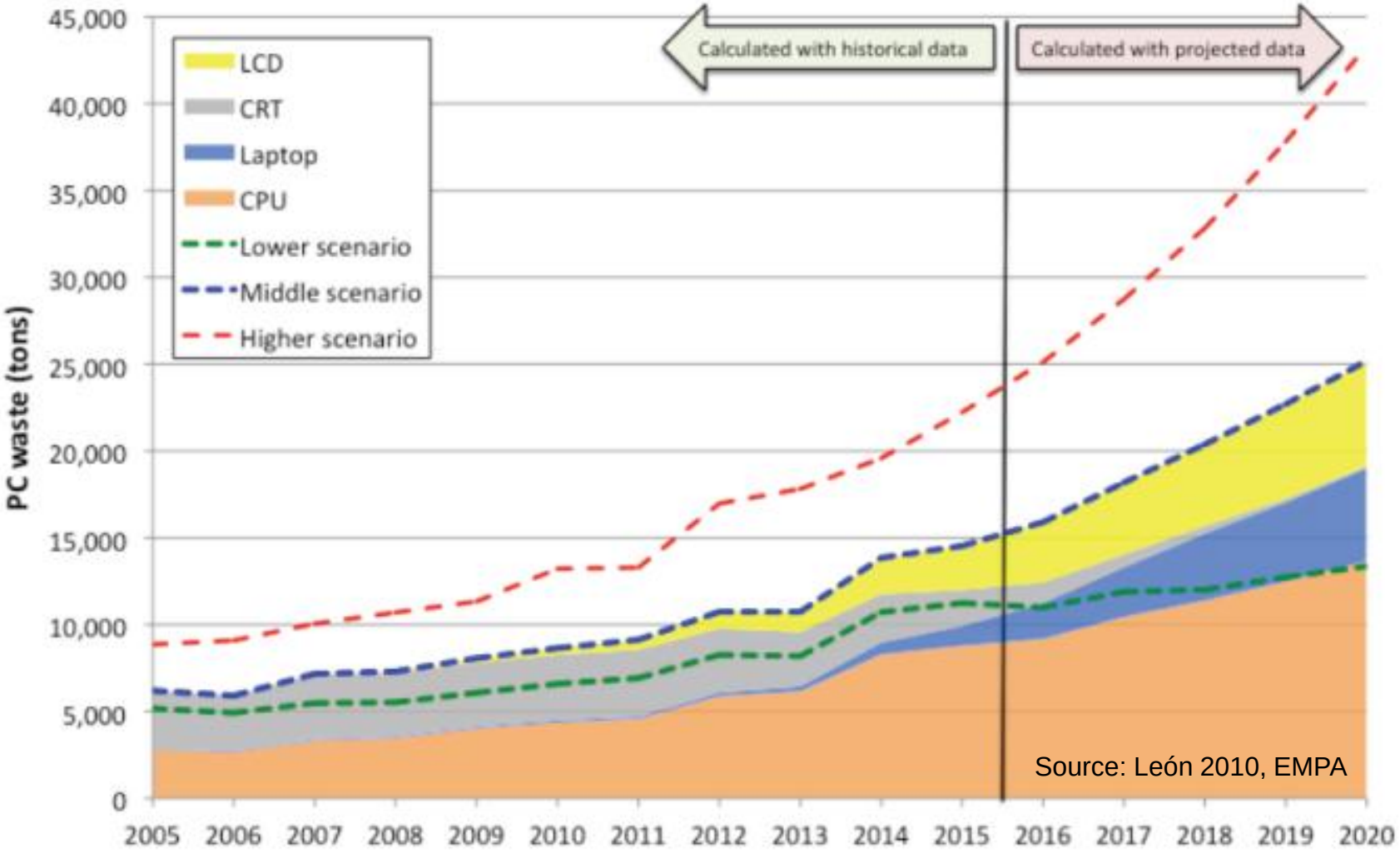
- Information Campaigns on all levels

The 7 Pillars of WEEE Management



Source: Bornand 2007, SWICO

Colombia: E-Waste Generation



Legal Framework

- Set of Decrees published in 2010 which establish the Return, Take-back and Disposal of :
  - Decree 1512: Computaters and Peripherals
  - Decree 1297: Batteries and portable accumulators
  - Decree 1511: Lighting Equipment
- Law Projects 17 of 2010 (only President's approval still due):
  - Includes all WEEE Categories
  - Principios: REP, corresponsabilidad, Estímulos, Responsabilidades de los actores

EPR: Collective WEEE Compliance Schemes

ECOCOMPUTO

- Association for the Integrated Management of IT Waste
- Currently 43 members: OEMs, importers, local assemblers and retailers
- Market share of approx. 45%, open to new members
- Operative since January 1st 2012, official launch June 13, 2012

LUMINA

- Association for the Integrated Management of Lighting Equipment
- Members are important producres and importers of Lighting Equipment
- Operative since January 1st 2012

Take-Back & Collection

- The consumer (= user = «disposer») is key!
- But: No incentives for «quick success», establish long term collection systems and focus on education and «change mindset»
- Permanent solutions for the «disposer», not only intermittent take-back campaigns
- Take-back through different channels (B2B, private and public collection points, retailers, etc.)
- Take advantage of local framework conditions (e.g. high collection rate in the informal sector)

Examples of Take-back Campaigns

Recycling Infrastructure

- Approx. 5 licensed companies
- Formal recycling capacity of about 10% (higher for computers)
- A few dozen enterprises in the informal sector (up to 50% of e-waste)
- Companies mainly provide services to businesses (B2B)
- “Common practices”: disassembly, plastics recycling, copper recycling, ferrous metal recycling, export of printed circuit boards, disposal of hazardous and non hazardous wastes
- Over 40% of e-waste is stored (in households and/or second/third use)




Up-coming Challenges

- Development and adoption of technical recycling standards
  - Regional standards?
- Implementation of a monitoring and control system
  - Auditing process, licensing, etc.
- Development of technical local solutions for certain fractions
  - CRT glass, plastics with flame retardants, CFCs
- Inclusion of the informal sector
  - Improve collection, stop pollution
- Changing the mind-set and awareness creation
  - Long term more important than “quick success”

EEE = Deposits of Secondary Resources

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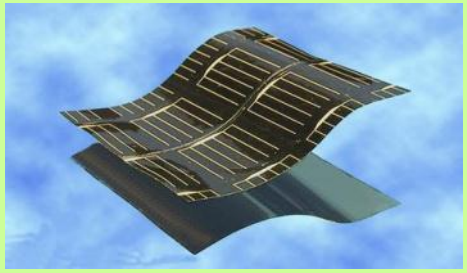
Energy Technologies



Mobility

Electronic Products

Luminaires

WEEE in LAC

plataforma RELAC

www.residuoselectronicos.net

ewaste swiss e-waste programme

www.ewasteguide.info

ewaste colombia

www.raee.org.co

Tecno Recicla Perú

www.raee-peru.org

Centro Nacional de Producción Más Limpia

www.cnpml.org

IPES PROMOCIÓN DEL DESARROLLO SOSTENIBLE

www.ipes.org.pe

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The Life Cycle of a Light Bulb