



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



SUSTAINABLE DEVELOPMENT GOAL 9
INDUSTRY, INNOVATION AND INFRASTRUCTURE

CIRCULAR ECONOMY: DEVELOPMENT OF RECYCLING INDUSTRIES

Plenary 5: Composite Waste Streams Recycling

Smail AL HILALI

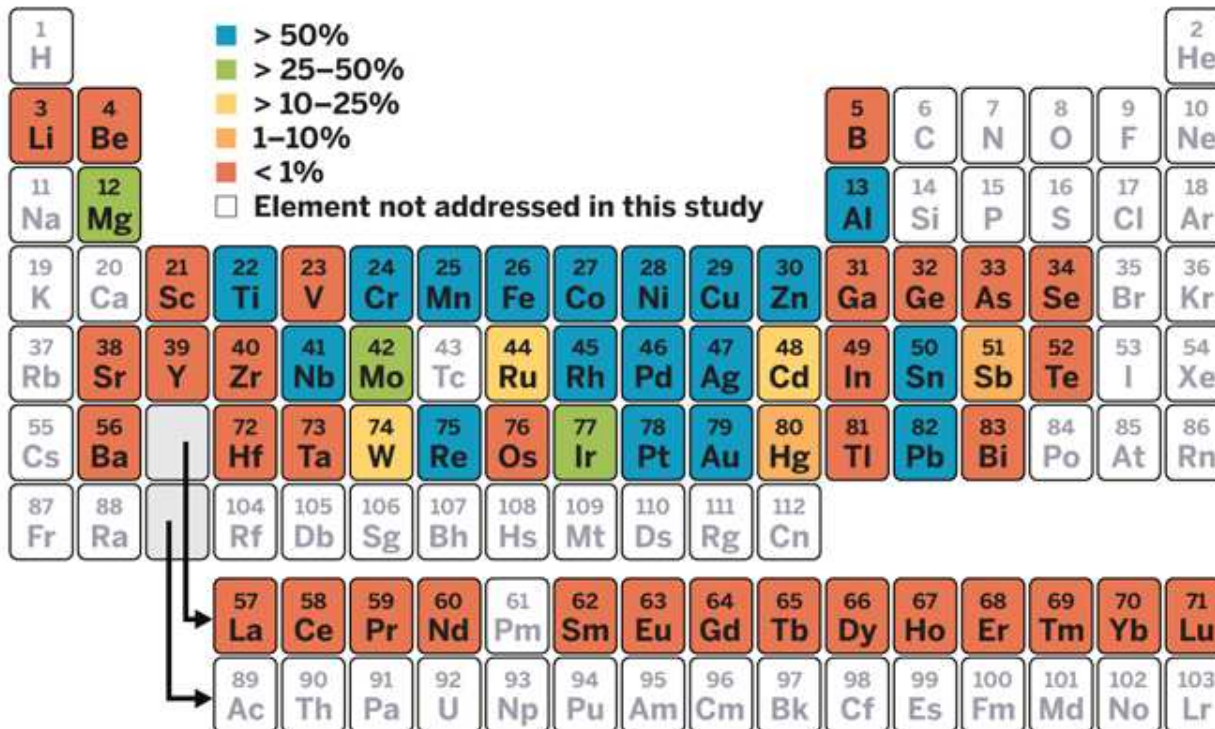
Chief, Emerging Compliance Regimes Division

Department of Environment, UNIDO



Current global recycling rates

REUSE STATS Global postconsumer recycling rates for many metals show lots of room for improvement.



SOURCE: UN Environment Program

- Most of **Lead** is recycled (vehicle and industrial batteries).
- **More than 50%:** Iron, Steel, Chromium, Nickel, and Manganese.
- **Less than 1%:** Lithium (batteries); Cerium (catalysts); and Indium (semiconductors).

The challenge: how to recover the valuables without spilling the hazards ?



© Umicore

- E-scrap, a complex mix ...
 - Ag, Au, Pd... (precious metals)
 - Cu, Al, Ni, Sn, Zn, Fe, Bi, Sb, In... (base- & special metals)
 - Hg, Be, Pb, Cd, As, ...(substances of concern)
 - Halogens (Br, F, Cl...)
 - Plastics & other organics
 - Glass, ceramics
- Environmental risk in case of landfill & inappropriate recycling
 - ⇒ Valuable metal resource

Composition of mobile phones

mobile phone substance (source Nokia)

1	1A																	18	VIIIA							
1	H																	He								
2	2	3	4	5A											10	8	9	10	11	12	13	14	15	16	17	VIIIA
2	Li	Be																	B	C	N	O	F	Ne		
3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18										
3	Na	Mg																	Al	Si	P	S	Cl	Ar		
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36								
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr								
5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54								
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe								
6	55	56	57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86								
6	Cs	Ba	La-Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn								
7	87	88	89-103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118								
7	Fr	Ra	Ac-Lr	Rf	Db	Sg	Bh	Hs	Mt	Uu	Uu	Uu	Uu	Uu	Uu	Uu	Uu	Uu								



E-waste flows to developing countries



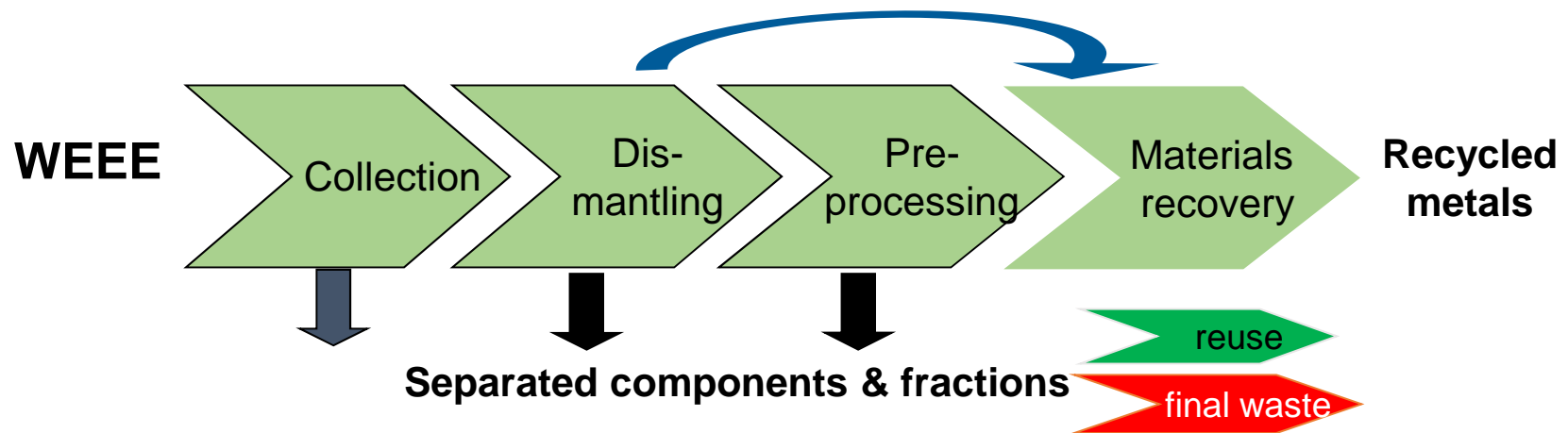
Source: Basel Action Network, Silicon Valley Toxics Coalition



Recycling chain: system approach is key for optimum value recovery

Example: 50% x 90% x 80% x 95% = 34%

Batteries, circuit boards, ...



Total efficiency determined by weakest step in the chain

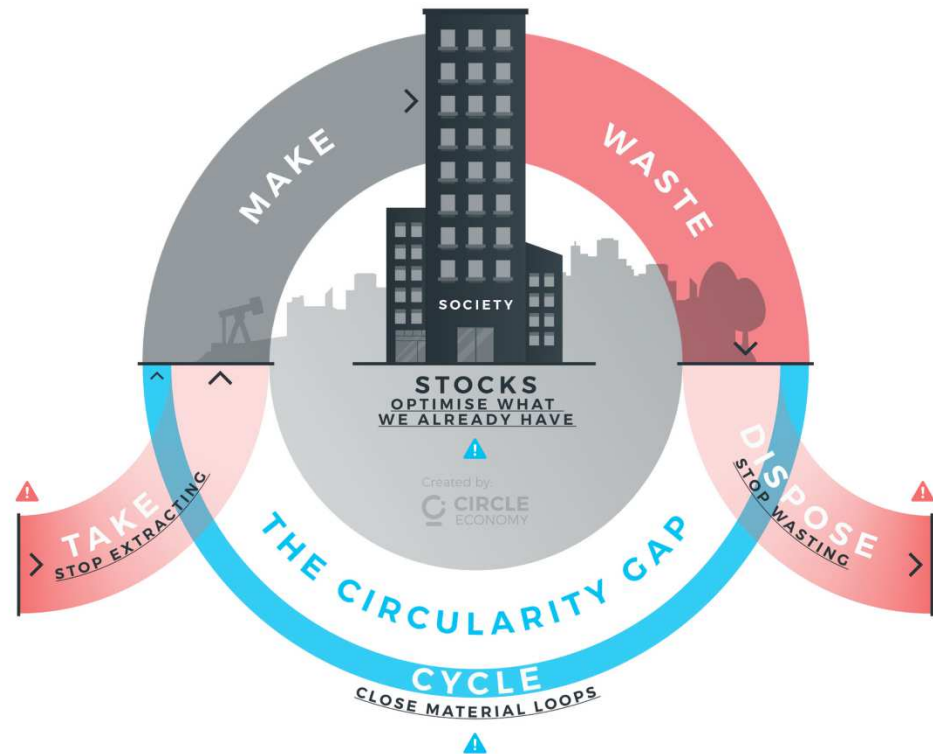


How circular is the global economy today?



TO BRIDGE **THE CIRCULARITY GAP** WE NEED TO:

- ▲ Stop extracting
- ▲ Stop wasting
- ▲ Optimise what we already have
- ▲ Cycle more and better



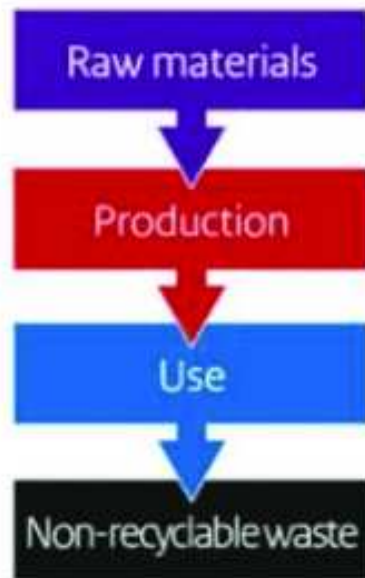
- Stop extracting
- Stop wasting

Source: <http://shiftingparadigms.nl/wp-content/uploads/2017/11/the-circularity-gap-report-2018.pdf>



From a linear to a circular economy

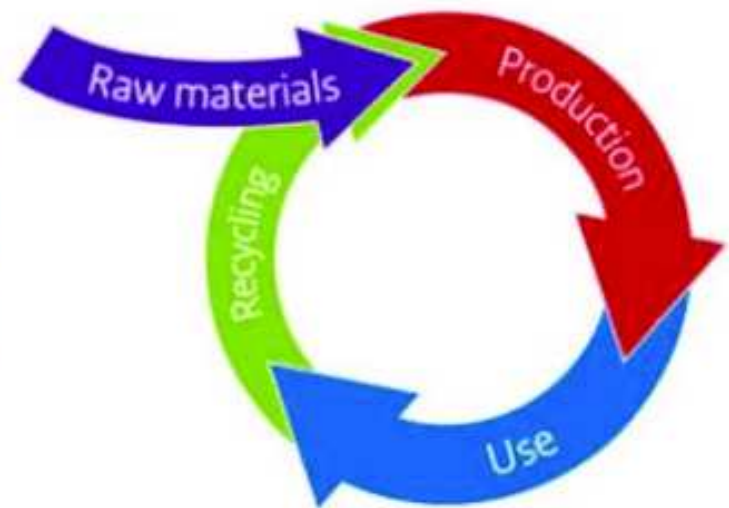
Linear economy



Reuse economy



Circular economy



<https://www.government.nl/topics/circular-economy/from-a-linear-to-a-circular-economy>



Mr. Alfredo Cueva



Mr. Alfredo Cueva joined UNIDO in July 2011. He currently holds the post of Industrial Development Officer at the Stockholm Convention Division, Department of Environment.

Alfredo holds a PhD in Environmental Science and Engineering from the University of North Carolina at Chapel Hill and has over 33 years of professional experience.

Mr. Cueva has advanced knowledge of environmental engineering, environmental policy and management; project and program design and management, and institutional capacity development.



Mr. Chris Slijkhuis



Chris Slijkhuis is part of the Müller-Guttenbrunn Group, the Joint-Venture partner of MBA Polymers in Austria, where his activities are related to Public Affairs and E-Waste.

He has a Master of Business Administration and worked as European Business Development Manager for Chep in numerous EU countries. He founded a number of Chep companies in the Central and Eastern European region in the 90's

He is a board member of the European Electronics Recyclers Association EERA and is the spokesperson for the E-Waste plastics recycling in EERA.



Ms. Sonia Valdivia



Sonia Valdivia is a Programme Manager at the World Resources Forum since August 2014 on the areas of 'sustainable recycling industries' and 'life cycle management'.

She is also Steering Committee member of the UN Life Cycle Initiative and Multi-Stakeholder Advisory Committee Member of the Consumer Information Program of the 10YFP on SCP since 2017.

She holds an Honorary Professorship from the Leuphana University of Luneburg. She is also Editorial Board Member of the Int. Journal of Life Cycle Assessment. She has a PhD in environmental waste management and policies from the Technical University of Karlsruhe.



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



SUSTAINABLE DEVELOPMENT GOAL 9
INDUSTRY, INNOVATION AND INFRASTRUCTURE

Thank you
