

EFG/UNECE conference:
International cooperation on natural resources
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UNFC as an enabler for management of anthropogenic resources

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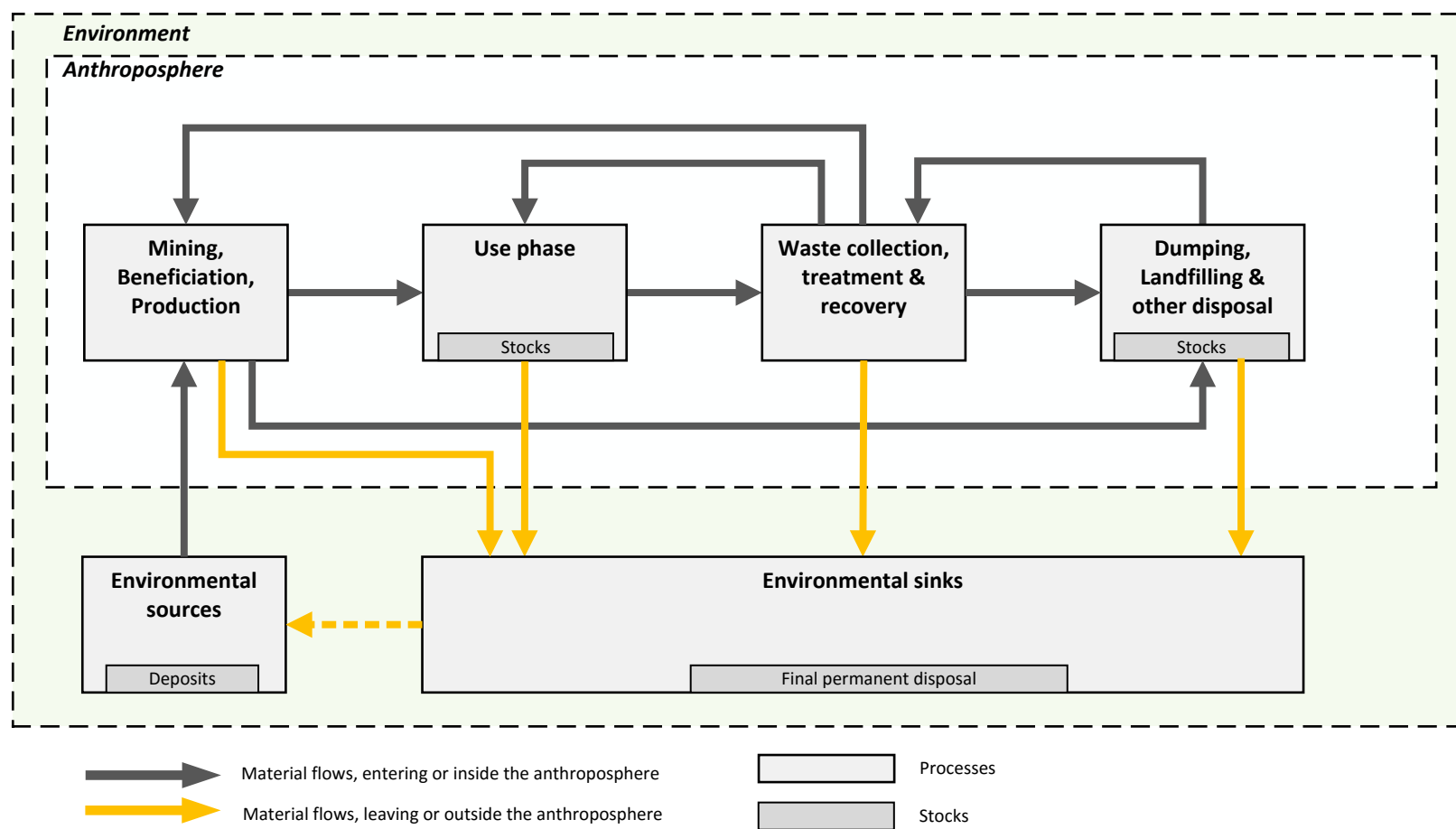
TECHNISCHE
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Resource management

Optimizing primary and secondary raw material supply, utilization and disposal.



Securing raw material access

EU Raw Materials Initiative

Fair and sustainable supply of raw materials from global markets.

Sustainable supply of raw materials within the EU.

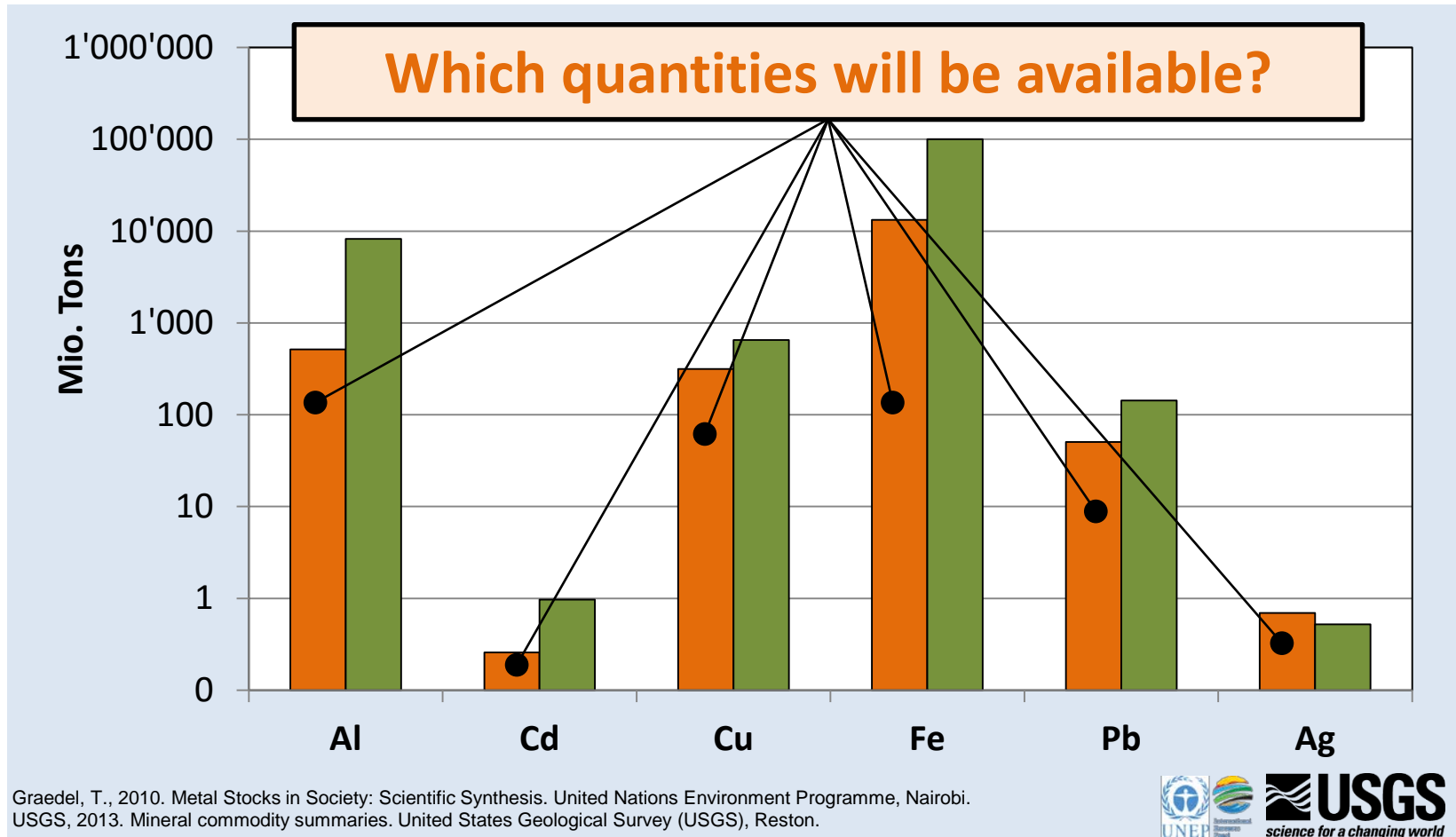
Resource efficiency and supply of "secondary raw materials" through recycling.

Need for information

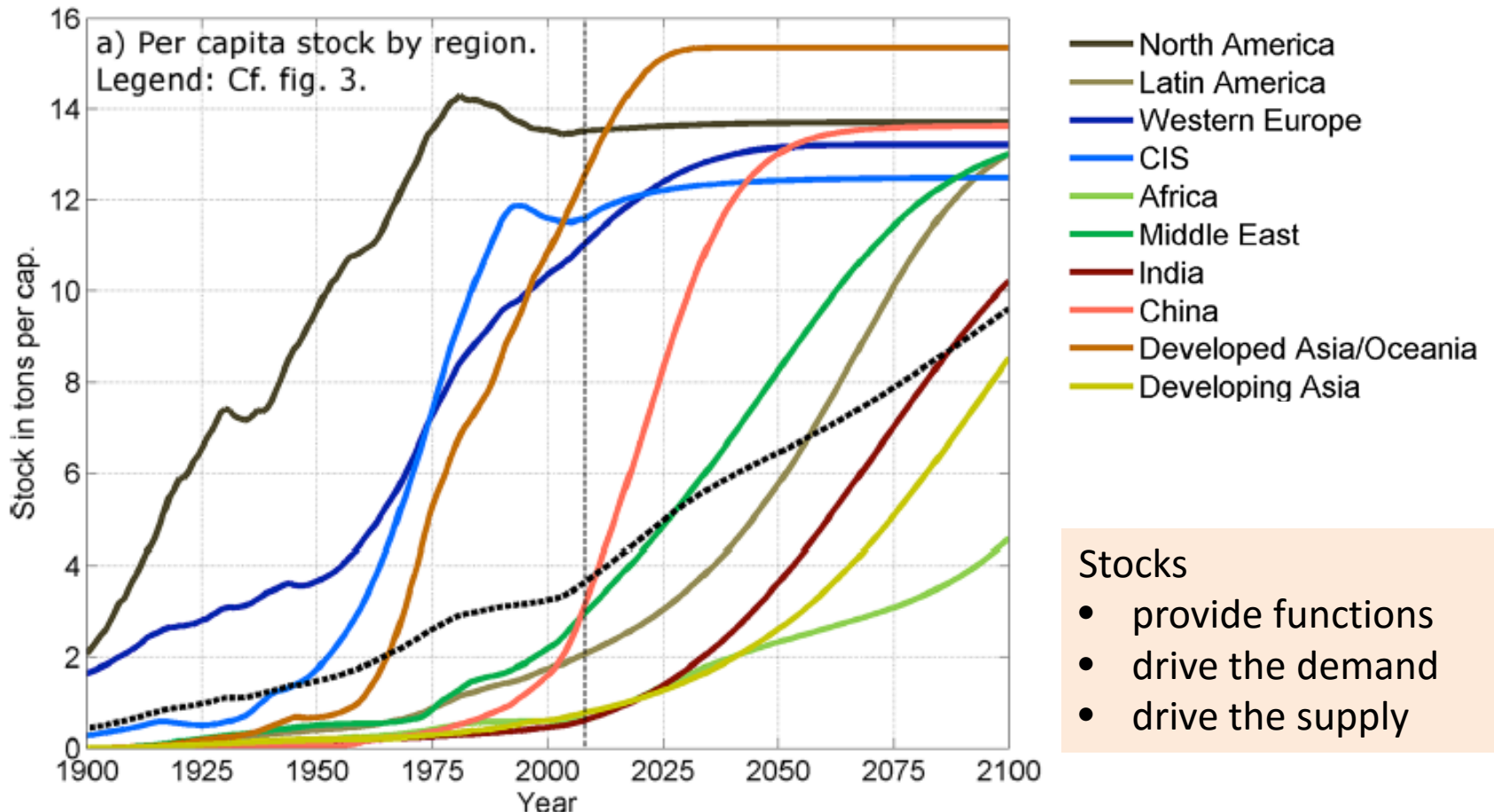
Integrated information on the **availability** of primary & secondary **materials** that reach future commodity markets.

Metal deposits

Anthroposphere vs. Lithosphere



Steel stocks-in-use

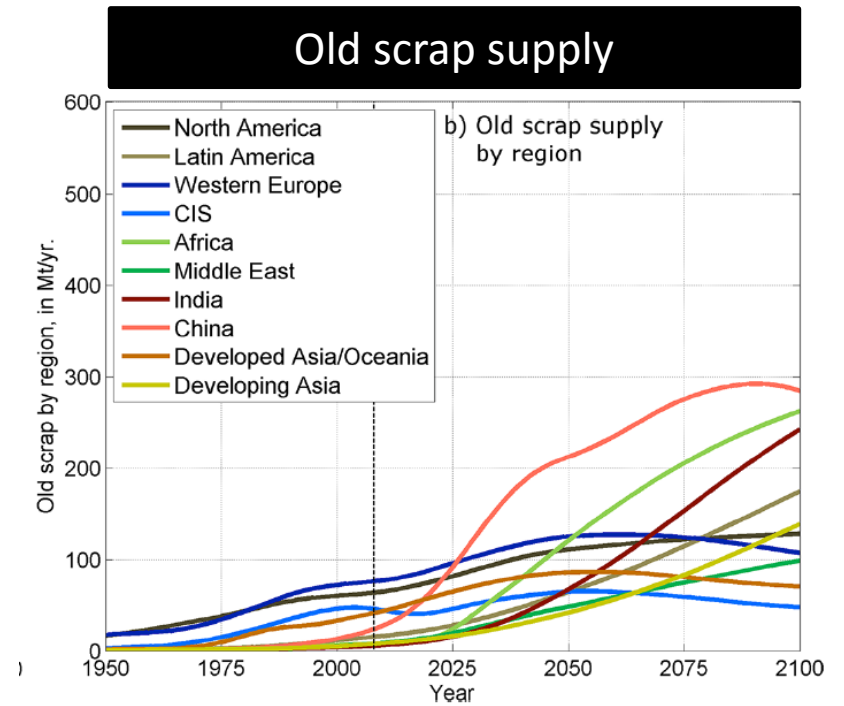
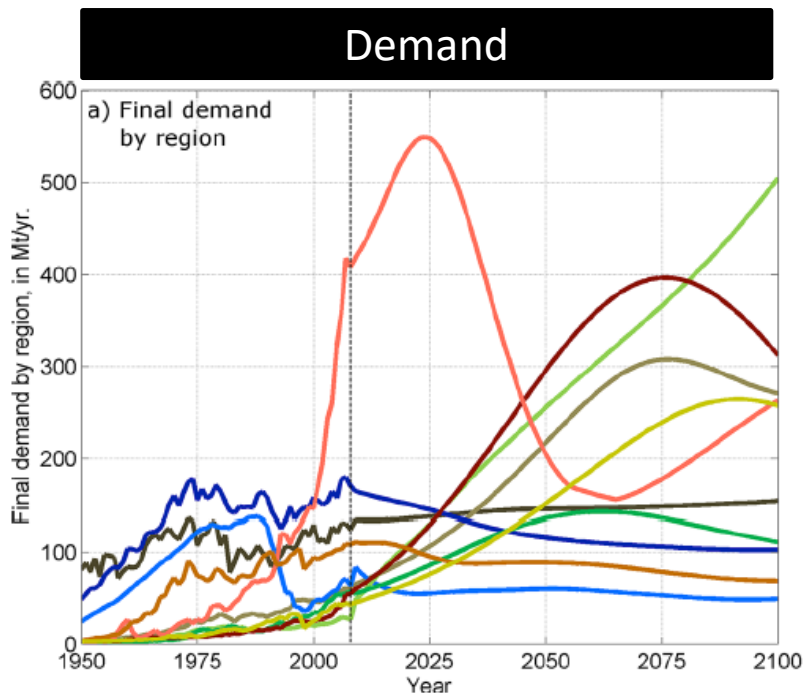


Stocks

- provide functions
- drive the demand
- drive the supply

Pauliuk, S., R. L. Milford, D. B. Müller and J. M. Allwood (2013). "The Steel Scrap Age." *Environmental Science & Technology* **47**(7): 3448-3454.

Steel demand and supply



Pauliuk, S., R. L. Milford, D. B. Müller and J. M. Allwood (2013). "The Steel Scrap Age." *Environmental Science & Technology* **47**(7): 3448-3454.

Knowledge on anthropogenic material cycles

US (Top Left) JP (Top Right)
EU (Bottom Left) CN (Bottom Right)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Uub	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo
	Lanthanide Series			57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
	Actinide Series			89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

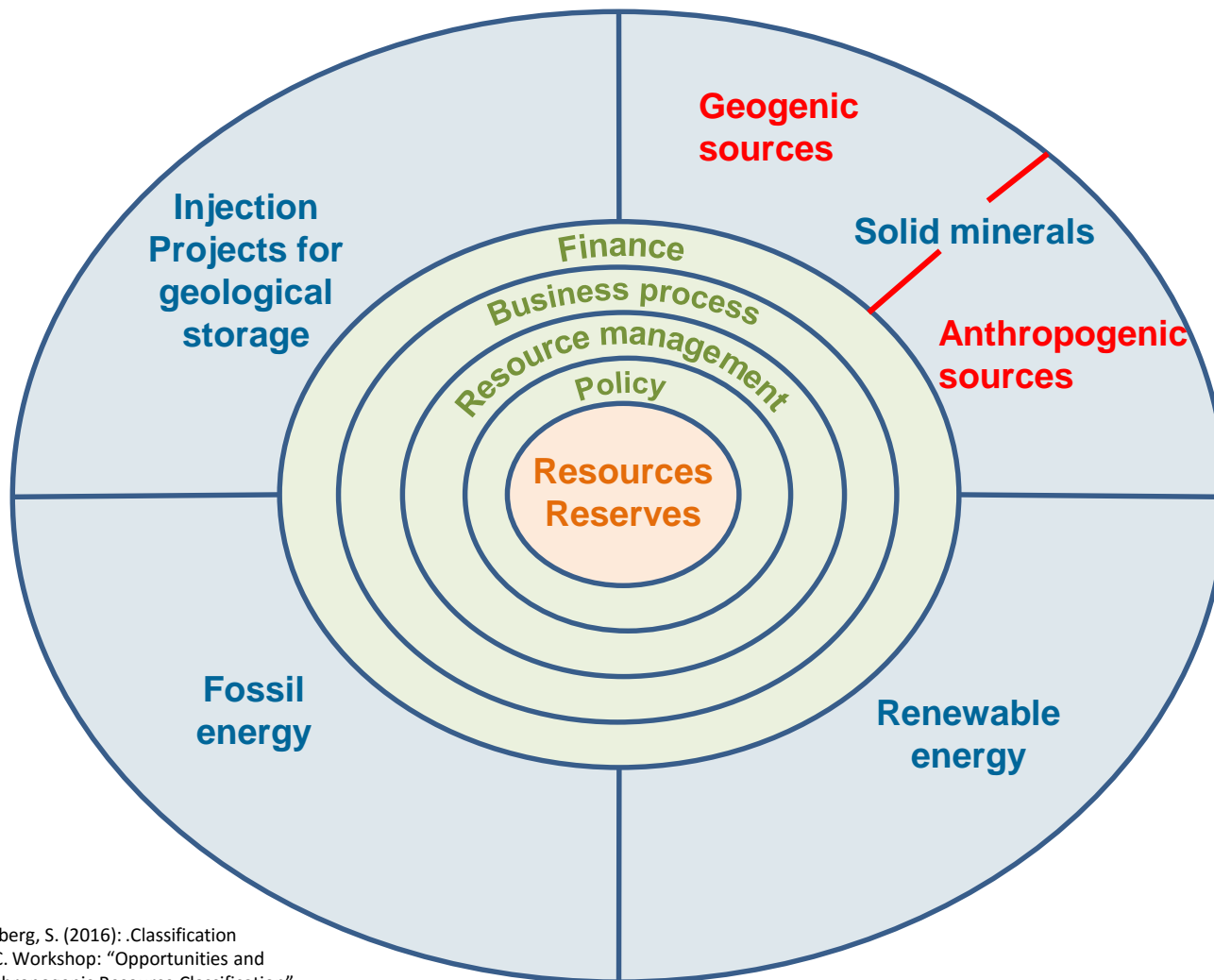
Only Static Cycle Available
 Only Dynamic Cycle Available
 Both Static and Dynamic Cycles Available

Chen, W.-Q. and T. E. Graedel (2012). "Anthropogenic Cycles of the Elements: A Critical Review." *Environmental Science & Technology* **46**(16): 8574-8586.

Lack of harmonized knowledge

- Multiple studies and data sources available.
- No common methodology to determine the availability of anthropogenic resources
 - Characterize stocks & flows in terms of quantity, quality and location.
 - Assess the feasibility for recovery
 - Assess the socio-economic viability

UNFC-2009: Domains of application



Adopted from Heiberg, S. (2016): .Classification according to UNFC. Workshop: "Opportunities and Challenges for Anthropogenic Resource Classification", Budapest, 6. October 2016.

Actuating the classification



MINING the
EUROPEAN
ANTHROPOSPHERE www.minea-network.eu



Working Group “Classifying Anthropogenic Material Resources”

Submitting Draft Specifications to apply UNFC-2009 on Anthropogenic Material Resources

Guidelines

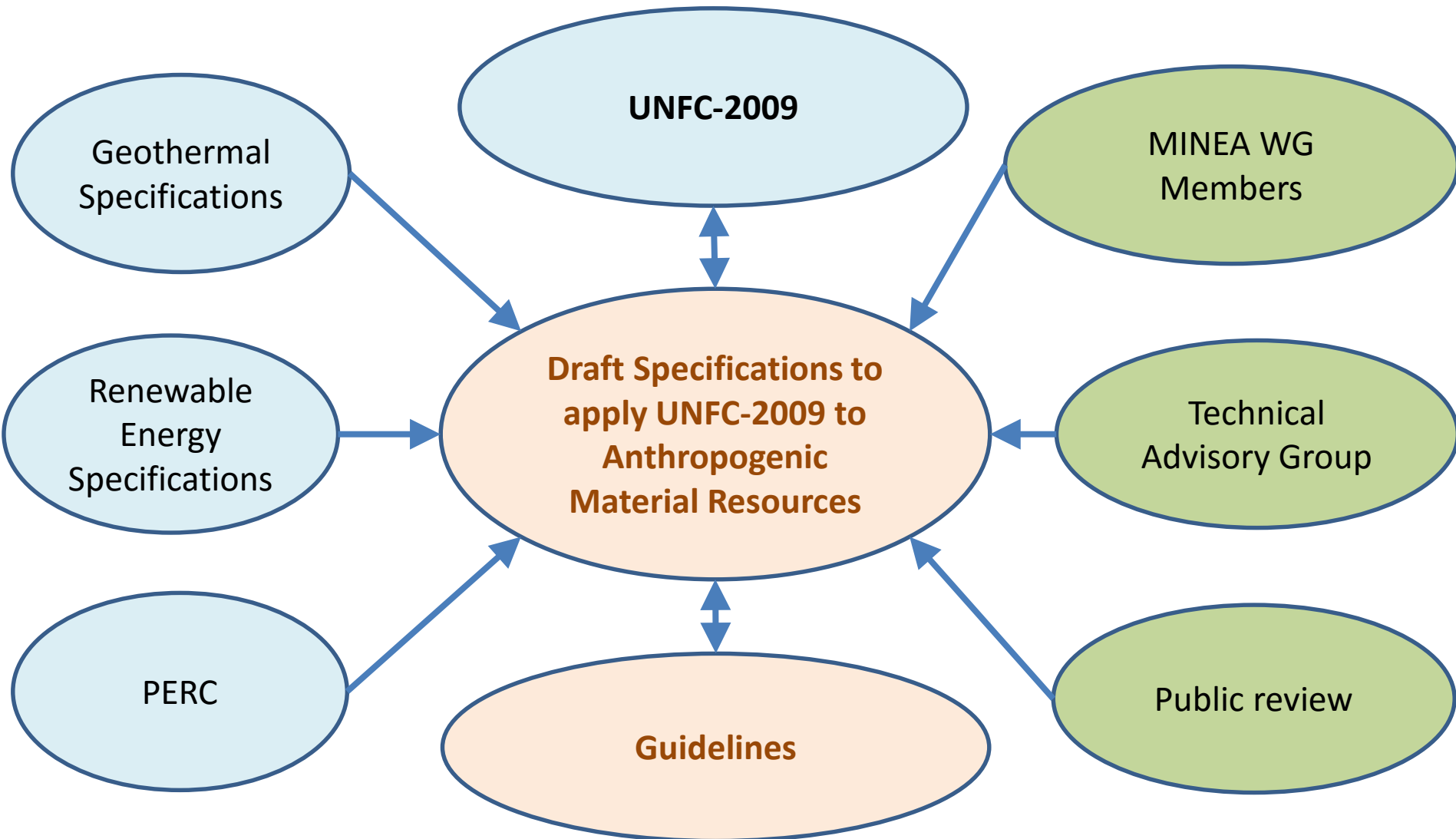
Final Draft

Public comments

Official approval



Developing the Draft Specifications



Draft Generic Specifications ToC

I. Introduction

II. Anthropogenic Resource Definitions

- Terms: Anthroposphere, Material System, Material stock, Material flow, Material Source, Material Product(s)
- Classes, Projects, Project lifetime etc.

III. Definition of categories and supporting explanations

IV. Generic specifications

Examples of discussion

- Corporate vs. National Reporting
- Projects with multiple Anthropogenic Material Products
- e-axes
 - Definition of the system boundaries for economic and environmental assessment of the recovery project.

Guidelines

Developing case studies

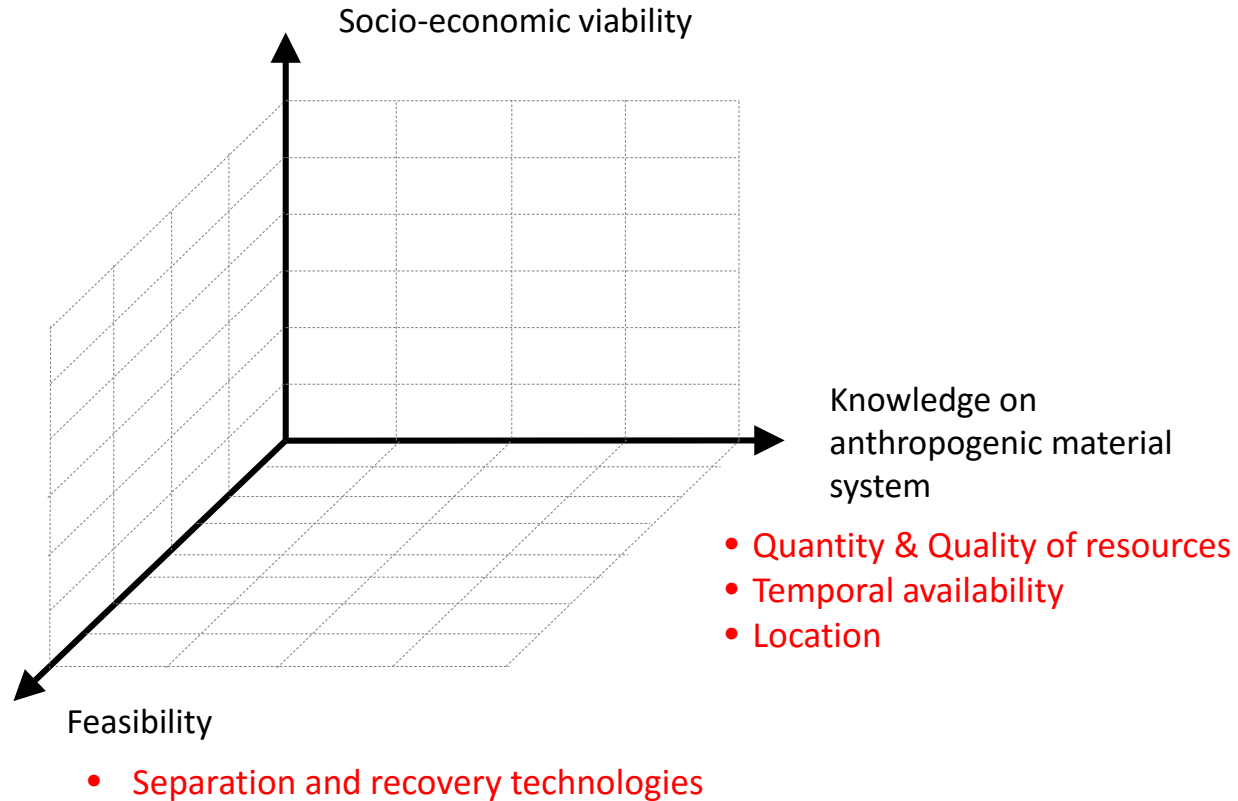
- Domain of application
- Commodity-specific
- Source-specific

- Environmental profile
- Costs & revenues
- Ownership (legal access to the resource)
- Legal permissions (plant operations)

Identification of critical factors for the viability of material recovery projects

Looking for

- Existing case studies
- Candidates



We do not need natural resources ...

“...as such, but we need their functions or physical and chemical properties. To find solutions for functions, there are **three reservoirs**: the combined resources of the geosphere and the technosphere and the unlimited resource of human ingenuity.”

Wellmer, F.-W. (2012). Discovery and Sustainability. Non-Renewable Resource Issues: Geoscientific and Societal Challenges. R. Sinding-Larsen und F.-W. Wellmer, Springer Netherlands.

Classification frameworks and the EGRC/MINEA stakeholders have the power to integrate the three reservoirs.