EIT RawMaterials AWARE

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ICT4G - Fondazione Bruno Kessler

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

eit RawMaterials
Connecting matters

PROGRAMMA DEL CORSO	
MODULO 1: ETICA Introduzione al corso. Da un modello di sviluppo lineare a un modello circolare: da necessità a opportunità *Obbligatorio* **3/10/2019, 15.00 - 18.00**	**MODULO 4: SERVICE DESIGN THINKING PER L'INNOVAZIONE DIDATTICA** Seminario a cura di IPRASE sui temi della cultura progettuale del service design thinking *Obbligatorio* **22/10/2019, 15:00 - 18:00**
MODULO 2: SCIENZA E INGEGNERIA I materiali costituenti i RAEE e il loro recupero *Facoltativo* **8/10/2019, 15.00 - 18.00**	**MODULO 5: LABORATORIO DIDATTICO di PROGETTAZIONE PARTECIPATA 1** Esercitazione per la creazione di materiale didattico *(insegnanti e studenti universitari insieme)* *Obbligatorio* **13/11/2019, 15.30 - 18.30**
MODULO 3: ECONOMIA CIRCOLARE Come creare valore dai rifiuti elettronici - Modelli di business nella circular economy *Obbligatorio* **16/10/2019, 15.00 - 18.00**	**MODULO 6: LABORATORIO DIDATTICO di PROGETTAZIONE PARTECIPATA 2** Esercitazione per la creazione di materiale didattico *(insegnanti e studenti universitari insieme)* *Obbligatorio* **20/11/2019, 15.30 - 18.30**
VISITA @RELIGHT (Milano Rho) Visita con formazione presso lo stabilimento industriale *Facoltativo (senza spese aggiuntive)* **Probabile 5/11 /2019, 11.00 - 15.00**	

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Economia Lineare

Economia Lineare

- Non funziona (più)!
  - Esaurimento risorse (accumulo spazzatura)
  - volumi, velocità e accelerazione rendono la questione più urgente

Argomento di oggi …

Estrazione

approvvigionamento di materie prime per la produzione

Qualche dato

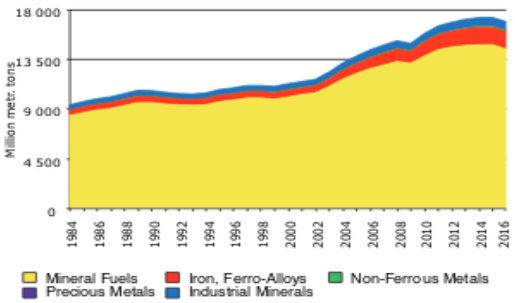
World mining production

2016
16.9 Billion metric tons

2000
11.3 Billion metric tons

1985
9.7 Billion metric tons

Total mining production 1984-2016 in Million metric tons



Decline in 2016 due to decrease in Coal production.

Total production 2016 by continents

In 2016 only Oceania shows a positive growth rate

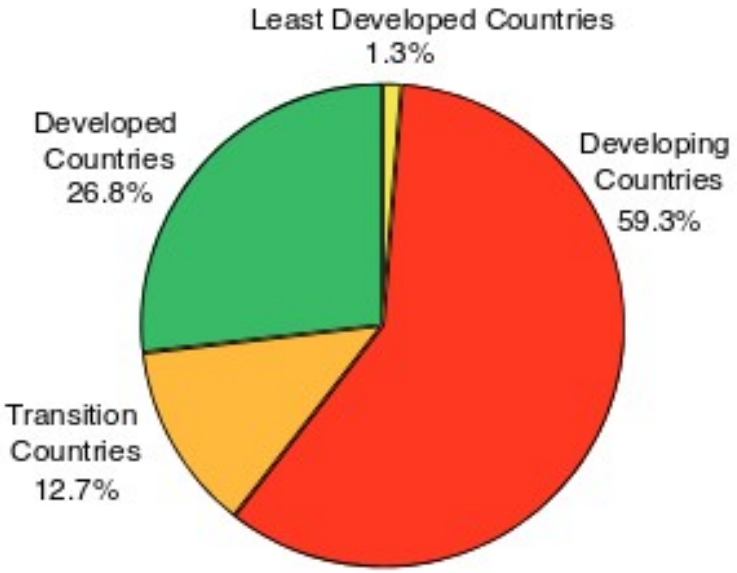
Lithium

Li_2O-ratio of brines to hard rock ore is around

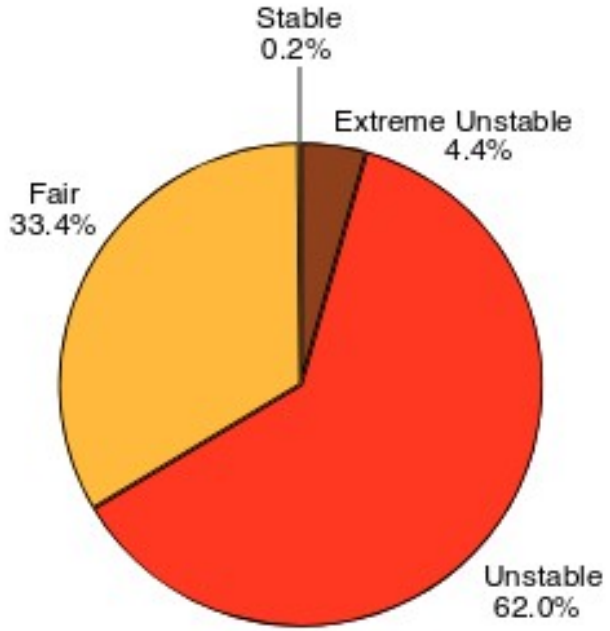
62.0 % to 38.0 %

http://www.wmc.org.pl/sites/default/files/WMD2018.pdf

Qualche altro dato



Developing countries share around 60 % of global production.



2/3 of global production is mined in politically unstable countries.

Impatto e Conseguenze

- Effetti di lungo termine:
  - sostenibilità
  - cambiamento climatico
- Effetti di breve termine:
  - impatto ambientale
  - impatto sociale

Materiali a Rischio Esaurimento

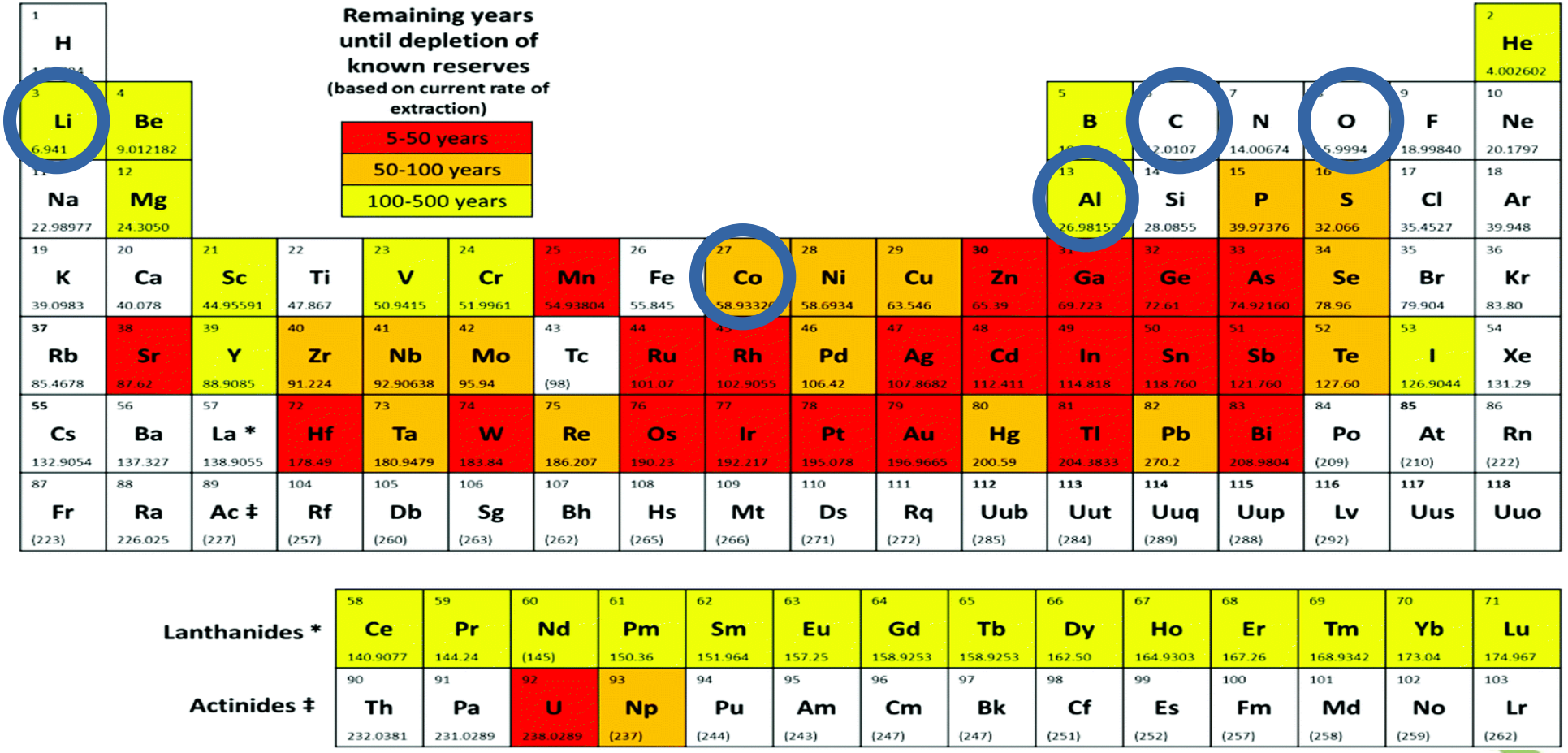
Remaining years until depletion of known reserves
(based on current rate of extraction)

- 5-50 years
- 50-100 years
- 100-500 years

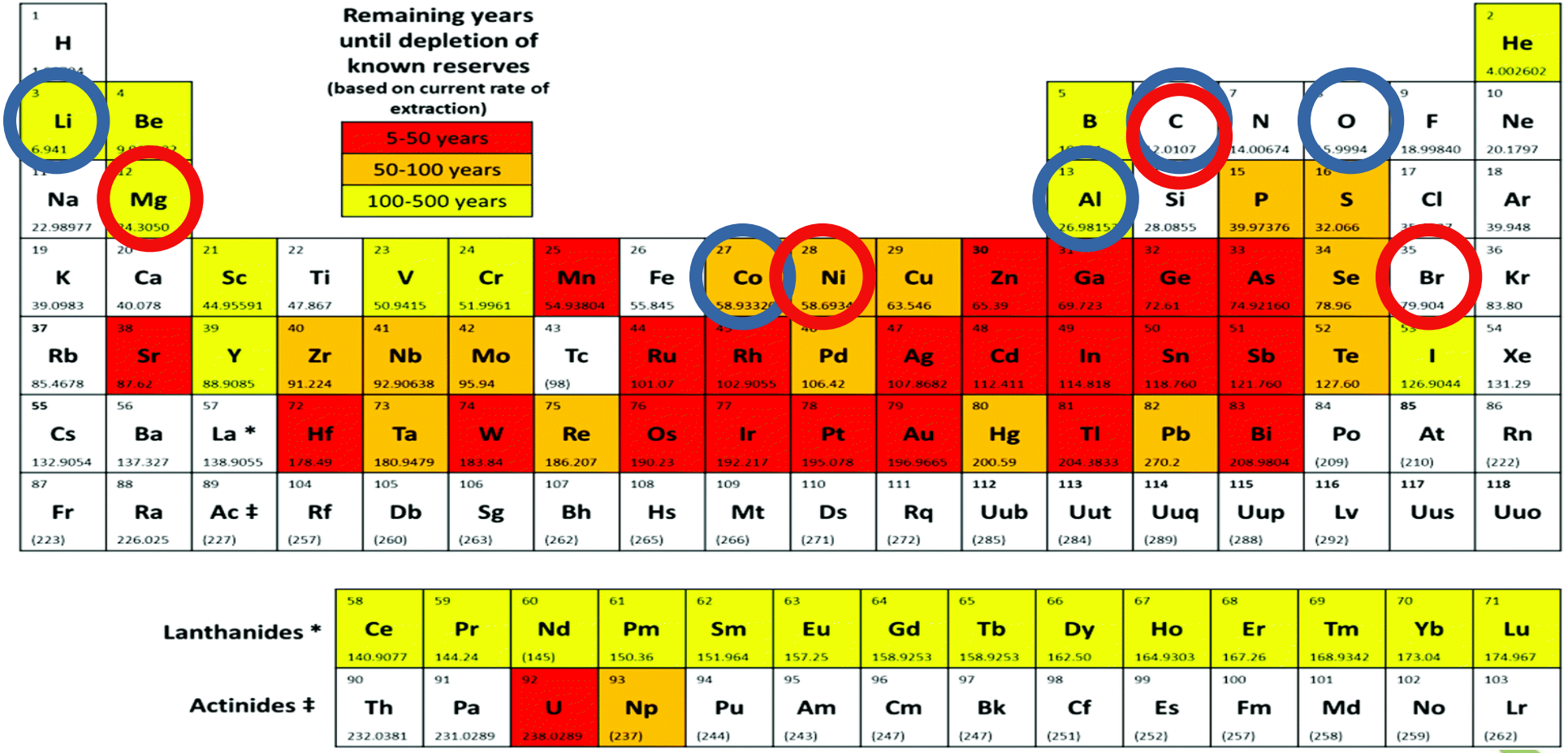
1 H 1.00794																	2 He 4.002602
3 Li 6.941	4 Be 9.012182											5 B 10.811	6 C 12.0107	7 N 14.00674	8 O 15.9994	9 F 18.99840	10 Ne 20.1797
11 Na 22.98977	12 Mg 24.3050											13 Al 26.98153	14 Si 28.0855	15 P 39.97376	16 S 32.066	17 Cl 35.4527	18 Ar 39.948
19 K 39.0983	20 Ca 40.078	21 Sc 44.95591	22 Ti 47.867	23 V 50.9415	24 Cr 51.9961	25 Mn 54.93804	26 Fe 55.845	27 Co 58.93320	28 Ni 58.6934	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.92160	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.4678	38 Sr 87.62	39 Y 88.9085	40 Zr 91.224	41 Nb 92.90638	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.42	47 Ag 107.8682	48 Cd 112.411	49 In 114.818	50 Sn 118.760	51 Sb 121.760	52 Te 127.60	53 I 126.9044	54 Xe 131.29
55 Cs 132.9054	56 Ba 137.327	57 La * 138.9055	72 Hf 178.49	73 Ta 180.9479	74 W 183.84	75 Re 186.207	76 Os 190.23	77 Ir 192.217	78 Pt 195.078	79 Au 196.9665	80 Hg 200.59	81 Tl 204.3833	82 Pb 270.2	83 Bi 208.9804	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.025	89 Ac ‡ (227)	104 Rf (257)	105 Db (260)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Ds (271)	111 Rq (272)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Lv (292)	117 Uus	118 Uuo

Lanthanides *	58 Ce 140.9077	59 Pr 144.24	60 Nd (145)	61 Pm 150.36	62 Sm 151.964	63 Eu 157.25	64 Gd 158.9253	65 Tb 158.9253	66 Dy 162.50	67 Ho 164.9303	68 Er 167.26	69 Tm 168.9342	70 Yb 173.04	71 Lu 174.967
Actinides ‡	90 Th 232.0381	91 Pa 231.0289	92 U 238.0289	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

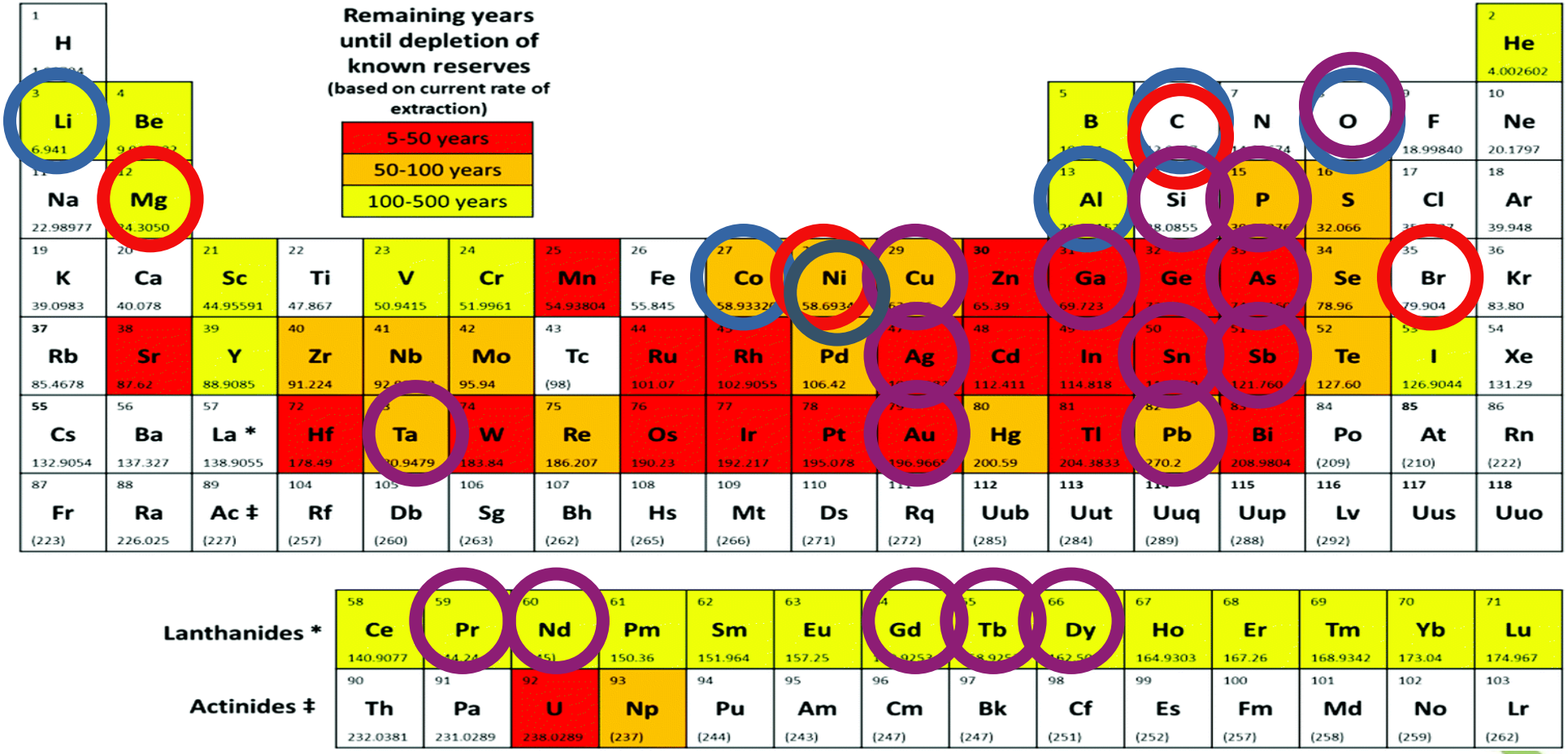
Materiali usati in un Telefonino (Batteria)



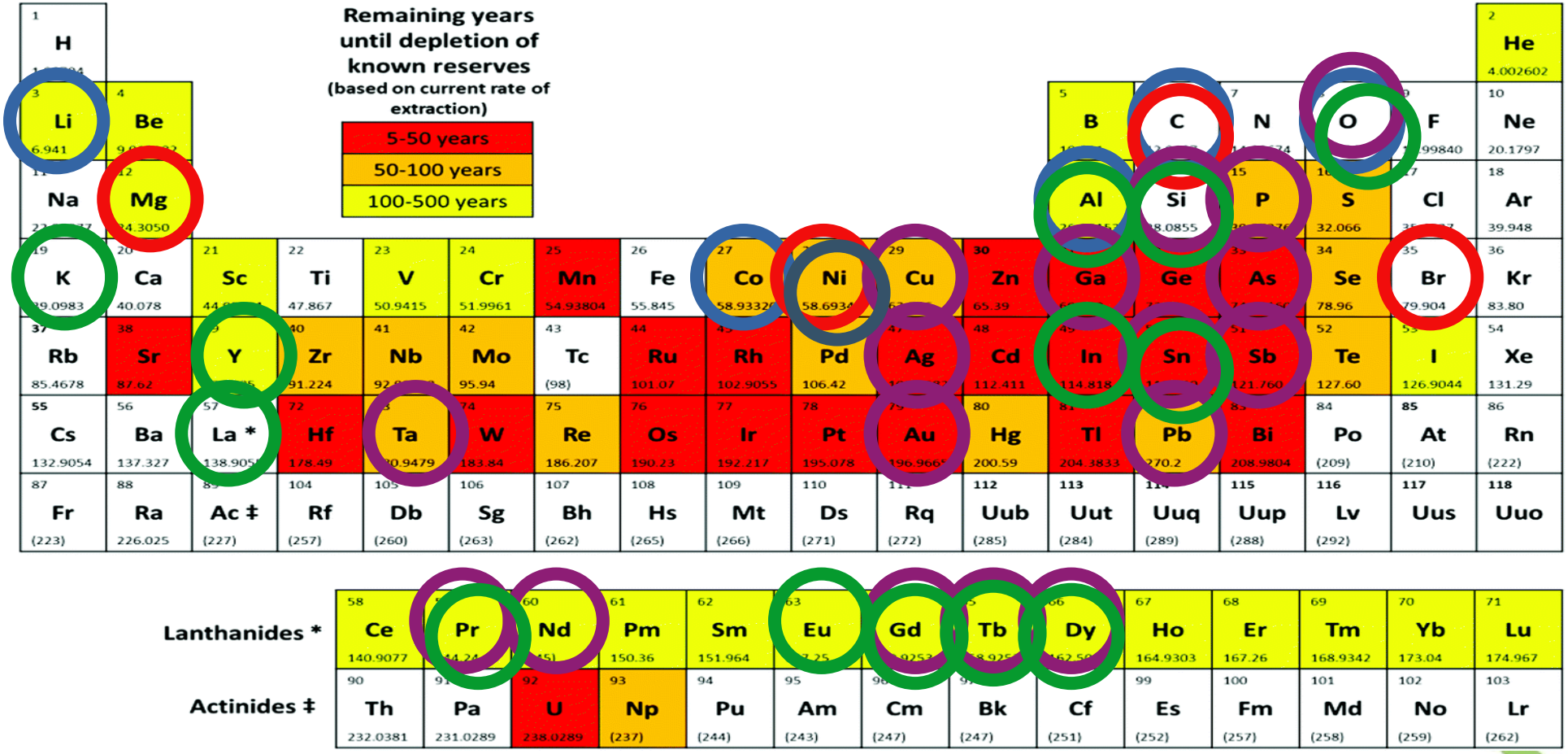
Materiali usati in un Telefonino (Involucro)



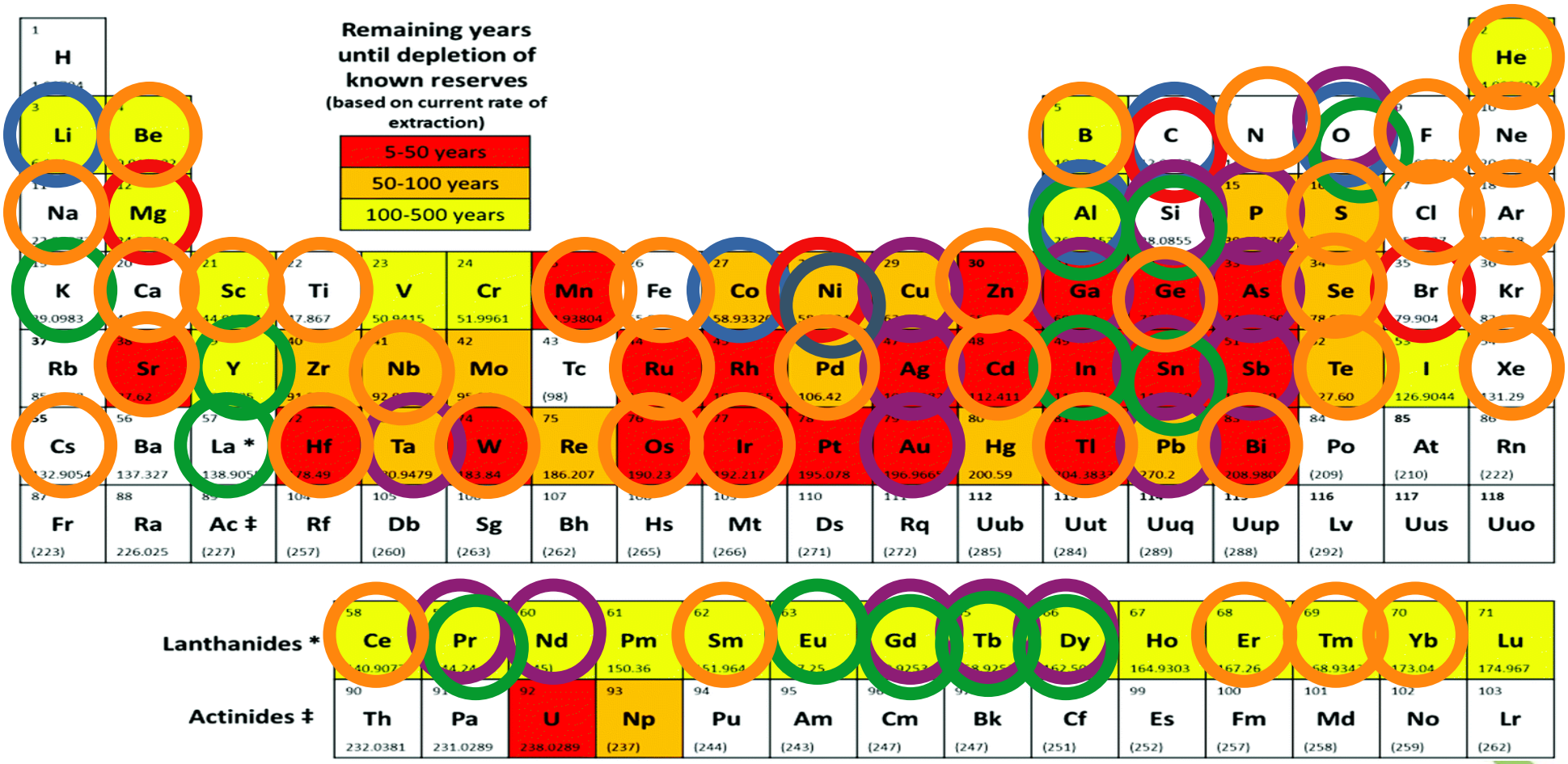
Materiali usati in un Telefonino (Elettronica)



Materiali usati in un Telefonino (Schermo)



Materiali usati per Elettronica



https://www.pcworld.com/article/2013092/the-periodic-table-of-tech.html
https://www.compoundchem.com/2015/09/15/recycling-phone-elements/

Materiali Critici

- Periodicamente Stati Uniti e Unione Europea elencano i materiali critici secondo due criteri: **importanza economica, rischi nell'approvvigionamento**
- 2011 → 14
  2014 → 20
  2017 → 27
  (https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en)

- Proviamo ad immaginarci un mondo

  …. senza elettronica

- Proviamo ad immaginarci un mondo in cui i materiali per costruire circuiti elettronici

  …. si trovassero solo in Cina
  …. si trovassero solo in … (un paese a vostra scelta)

- (il 90% delle terre rare è estratto dalla Cina)

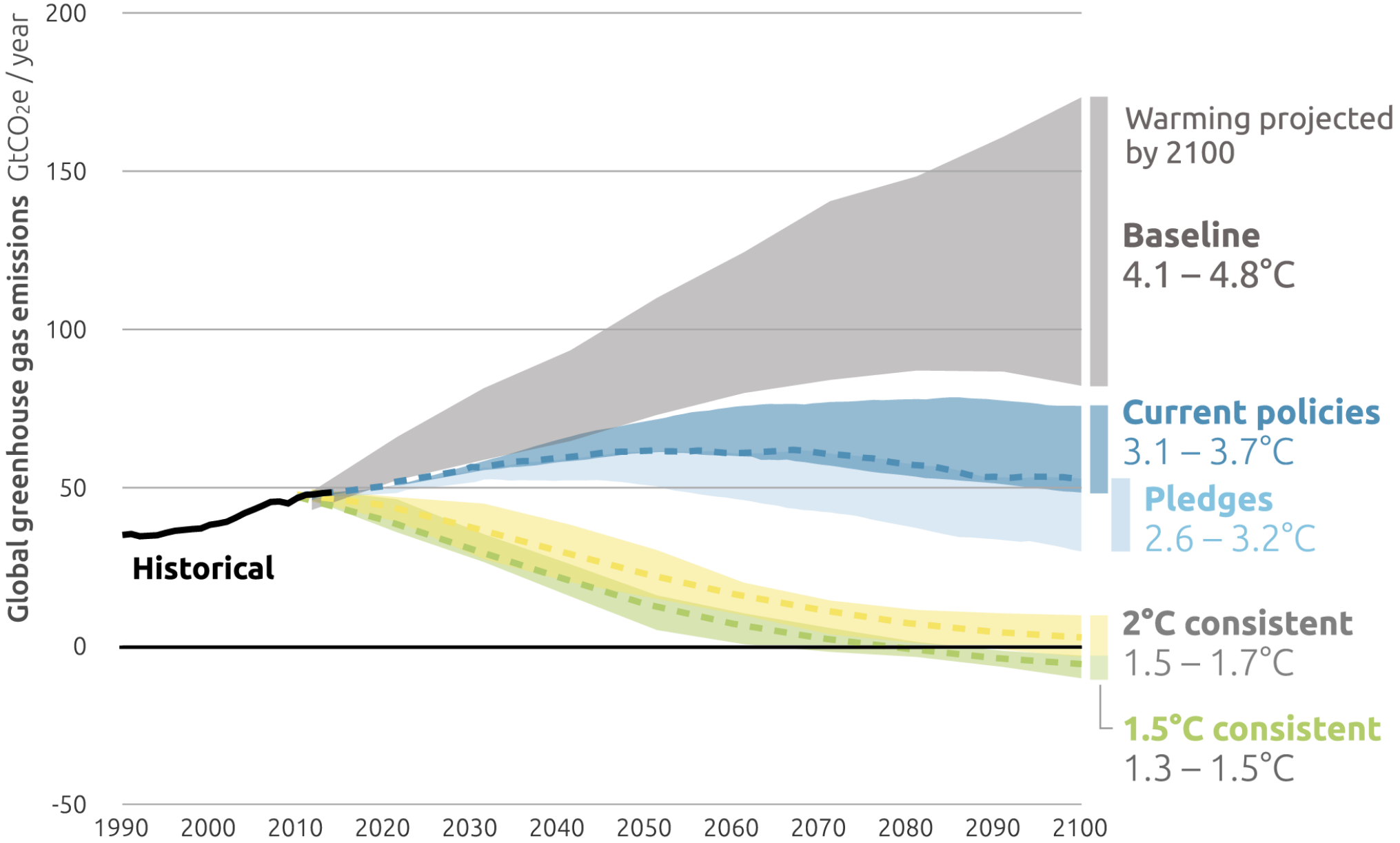
Impatto Climatico

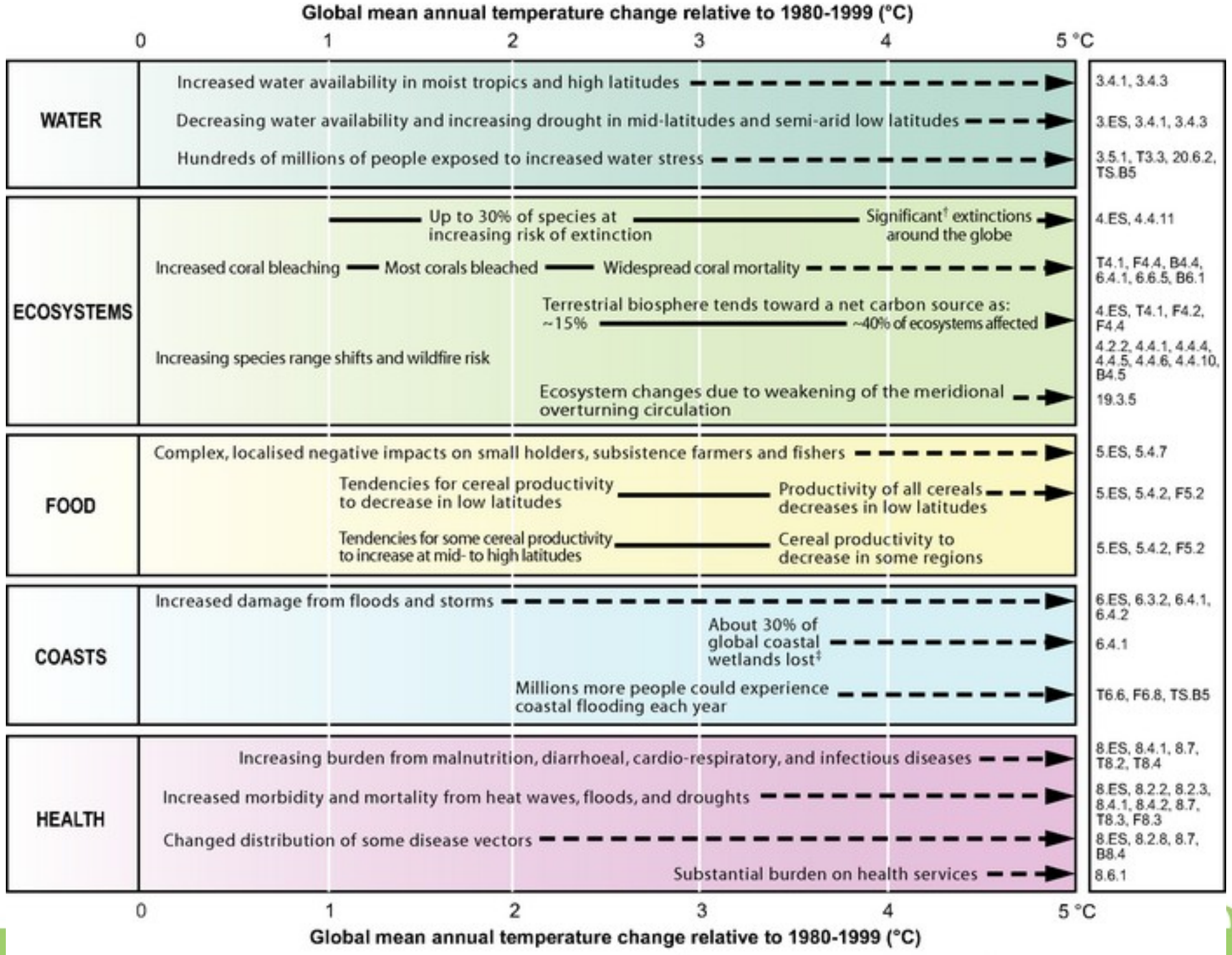
https://en.wikipedia.org/wiki/An_Inconvenient_Truth
https://www.imdb.com/title/tt6322922/videoplayer/vi1430763033?ref_=tt_pv_vi_aiv_1

2100 WARMING PROJECTIONS

Emissions and expected warming based on pledges and current policies

Climate Action Tracker





† Significant is defined here as more than 40%.

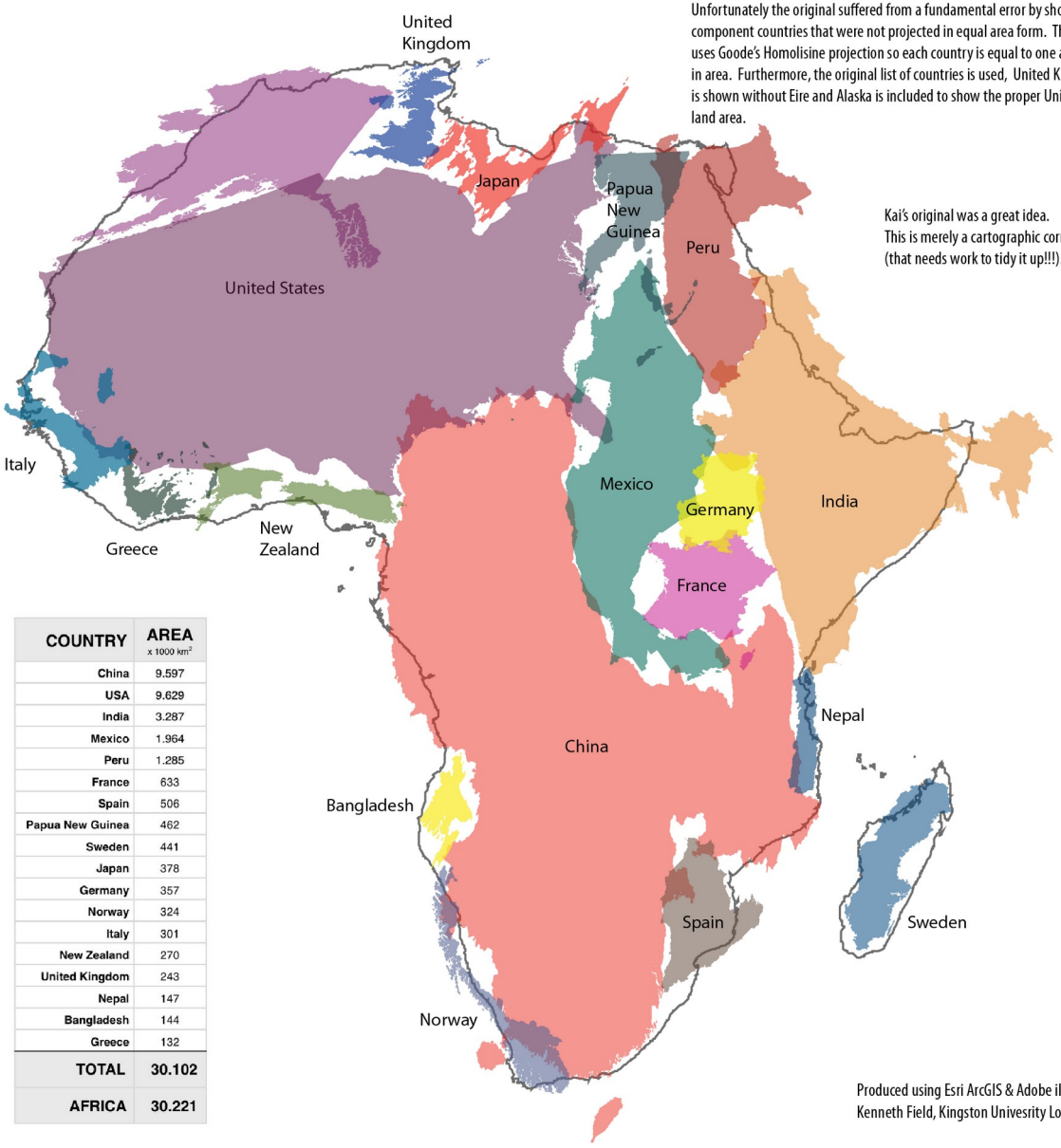
‡ Based on average rate of sea level rise of 4.2 mm/year from 2000 to 2080.

The **True Size** of **Africa**

Correcting the fight against immappancy

The original image by Kai Krause was designed to graphically illustrate the true size of the continent of Africa in relation to various countries mapped by land area. The intention was to counter *immappancy* - that is *insufficient geographical knowledge*.

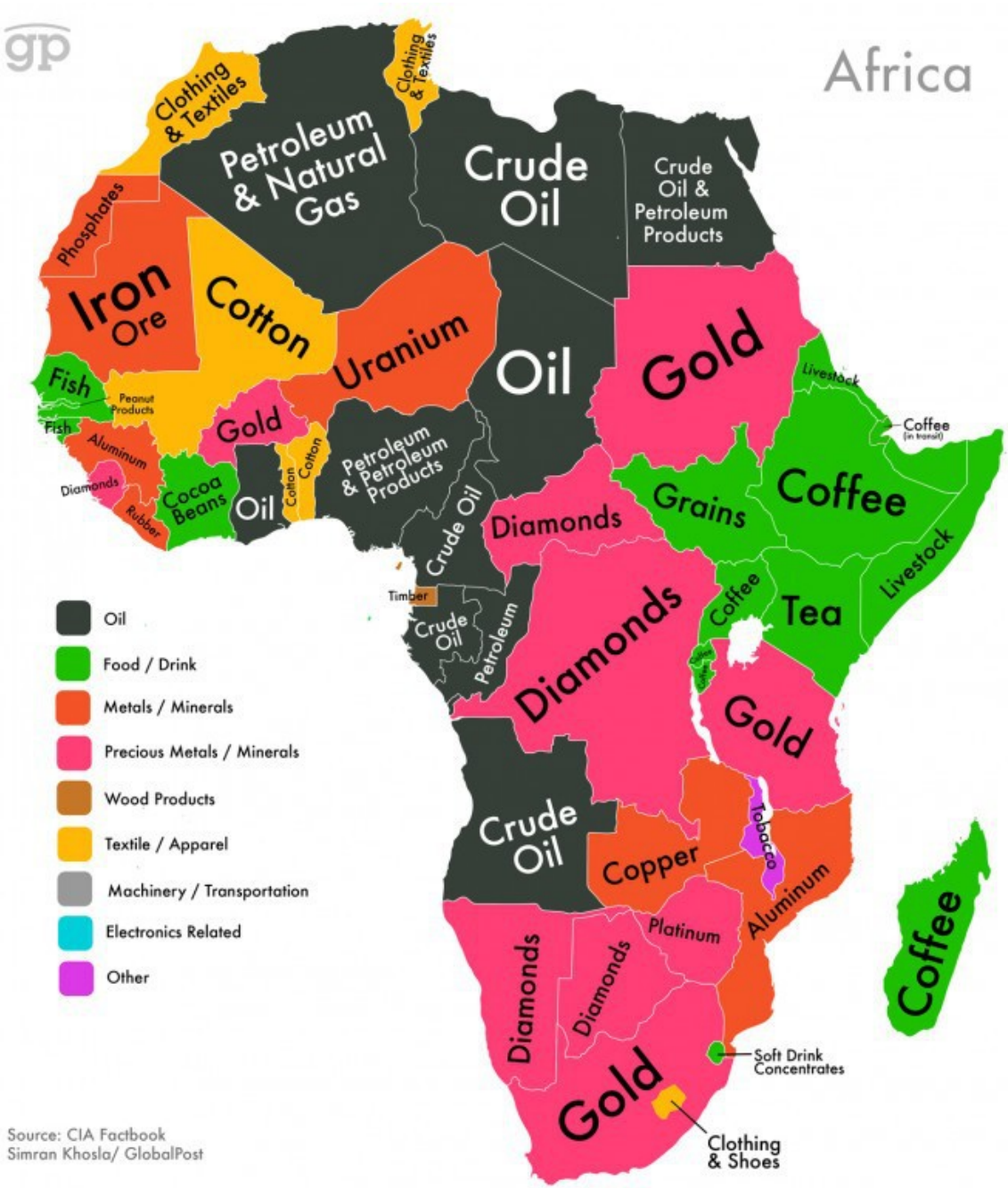
Unfortunately the original suffered from a fundamental error by showing component countries that were not projected in equal area form. This map uses Goode's Homolisine projection so each country is equal to one another in area. Furthermore, the original list of countries is used, United Kingdom is shown without Eire and Alaska is included to show the proper United States land area.



Kai's original was a great idea.
This is merely a cartographic correction
(that needs work to tidy it up!!!).

COUNTRY	AREA x 1000 km²
China	9.597
USA	9.629
India	3.287
Mexico	1.964
Peru	1.285
France	633
Spain	506
Papua New Guinea	462
Sweden	441
Japan	378
Germany	357
Norway	324
Italy	301
New Zealand	270
United Kingdom	243
Nepal	147
Bangladesh	144
Greece	132
TOTAL	**30.102**
AFRICA	**30.221**

Produced using Esri ArcGIS & Adobe illustrator
Kenneth Field, Kingston Univesrity London


gp
Africa
Clothing & Textiles
Petroleum & Natural Gas
Clothing & Textiles
Crude Oil
Crude Oil & Petroleum Products
Phosphates
Iron Ore
Cotton
Uranium
Oil
Gold
Livestock
Coffee (in transit)
Fish
Peanut Products
Fish
Aluminum
Diamonds
Rubber
Cocoa Beans
Oil
Gold
Cotton
Cotton
Petroleum & Petroleum Products
Crude Oil
Diamonds
Grains
Coffee
Livestock
Timber
Crude Oil
Petroleum
Diamonds
Coffee
Tea
Livestock
Gold
Crude Oil
Tobacco
Copper
Aluminum
Platinum
Diamonds
Diamonds
Gold
Soft Drink Concentrates
Clothing & Shoes
Coffee
Oil
Food / Drink
Metals / Minerals
Precious Metals / Minerals
Wood Products
Textile / Apparel
Machinery / Transportation
Electronics Related
Other
Source: CIA Factbook
Simran Khosla/ GlobalPost

… quindi, come mai l’Africa è un continente sottosviluppato? (*)

(*) approssimando un po’

La maledizione delle risorse?

- **Resource curse:** regioni con un'abbondanza di risorse naturali, in particolare di risorse non rinnovabili, tendono ad avere minore crescita economica e peggiore sviluppo
- Motivi
  - Conflitti
  - Corruzione
  - Maggiore volatilità dovuta ai prezzi delle risorse
  - Mancanza di diversificazione
  - ...

Alcuni effetti “collaterali” della produzione e dell’estrazione…

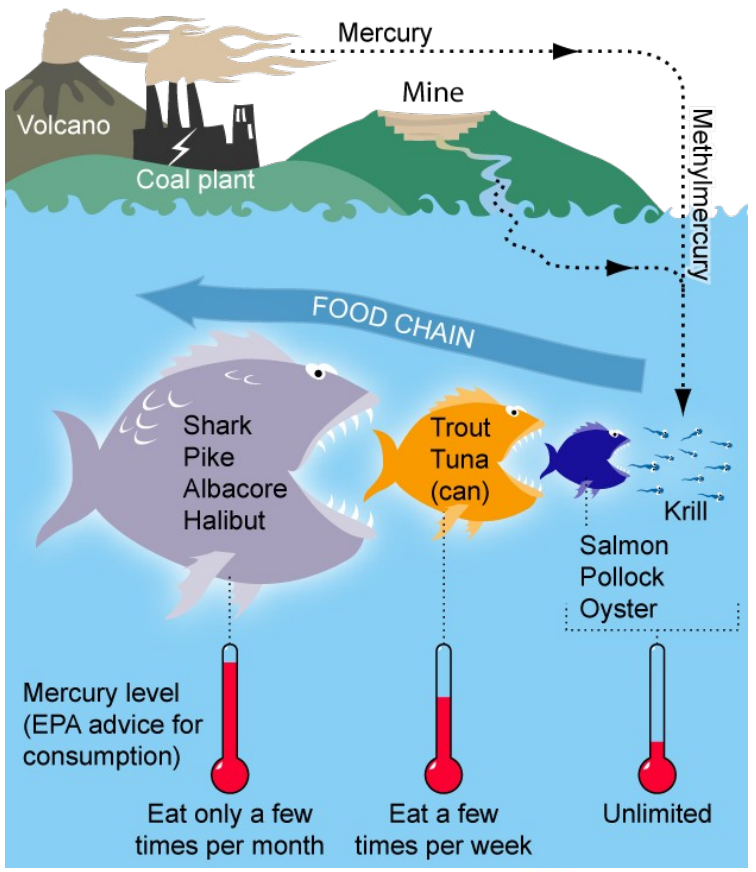
… da subito

- Ogni fase del ciclo di vita di un prodotto ha effetti **ambientali** e **sociali**
  (positivi o negativi… e in tanti casi alcuni positivi e altri negativi)
- Quali sono quelli dell’estrazione, secondo voi?

Impatto Ambientale

- Cambio d’uso del territorio (siti, infrastrutture, ...)
- Inquinamento (rifiuti e scarti dell’estrazione)
- Salute

- **Conseguenze locali e globali**



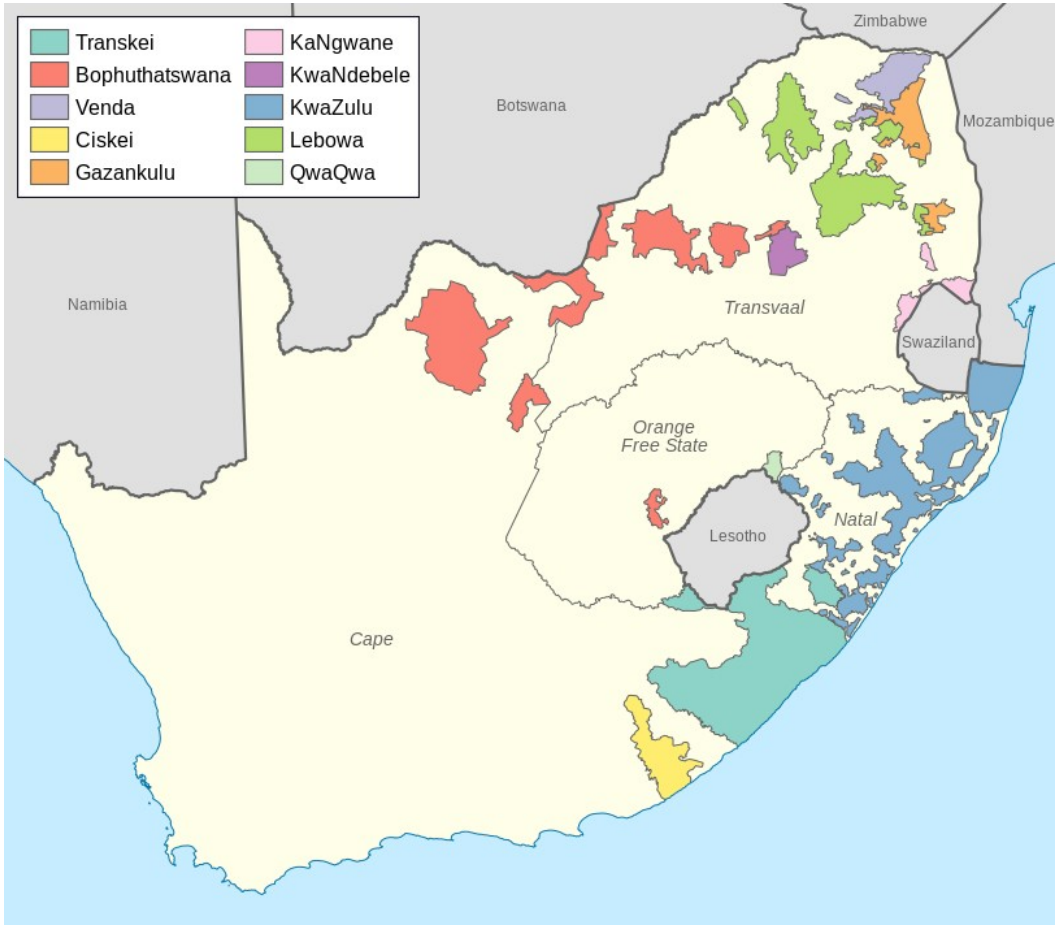
Impatto Sociale

- Dislocamento di persone e popoli per accedere alle risorse

Apartheid

- Sistema di “separazione” in vigore in Sudafrica dal dopoguerra fino agli anni novanta
- Petty apartheid e Grand apartheid

Grand Apartheid



By Htonl - Own work. Bantustan boundary data from the Directorate: Public State Land Support via Africa Open Data, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=25392438

Impatto Sociale

- **Condizioni di lavoro**

- Estrazione **“artigianale”**: 10 to 25 percent of the world’s cobalt production and about 17 to 40 percent of production in Congo

- Shenzen e lavorazione con prodotti pericolosi (pulizia schermi con materiali tossici)

Impatto Sociale

- **Conflitti**

- supply chain complessa

Impatto Sociale

- **Distribuzione degli introiti**
- Esempio: Cobalto
  - Kolwezi, Congo ($2-$3 / day)
  - Musompo ($881 / ton 16% cobalt rock)
    Zambia, Tanzania
  - Zhejiang Huayou Cobalt, Cina
  - $20,000 to $26,000 a ton
  - LG Chem
  - Tesla, Apple, Amazon, ...

https://www.google.it/maps/place/Kolwezi,+Repubblica+Democratica+del+Congo/@-0.8896887,23.9204147,3.59z/data=!4m5!3m4!1s0x1979e57971072e4f:0xa23ff3e3cd0d2277!8m2!3d-10.7275273!4d25.5088914

CSR

- **Corporate Social Responsibility**

Che cosa possiamo fare?

- Come consumatori
- Come cittadini
- Come politici
- Come imprenditori
- Come comunicatori

Supported by:

RawMaterials

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