

A partnership allowing mineral resources and energy production contribute to sustainable development in Africa

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Outline

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2. Mineral resources for Africa – Relationship with European strategies on CRM
3. Mining Production in Africa and position with respect to the global situation
4. Focus on two big African mining countries : RSA and DRC
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Introduction

The global demand of mineral resources and its impact on economy is growing at high rate since about two decades (<http://minerals.usgs.gov/minerals/pubs/mcs>).

Ensuring industrial production needs the development of facilities to produce energy in such an amount to comply with the level of activity.

The economic activity of African countries relies mostly on the production of raw materials from natural resources: agriculture or **mining**.

Introduction (cont.)

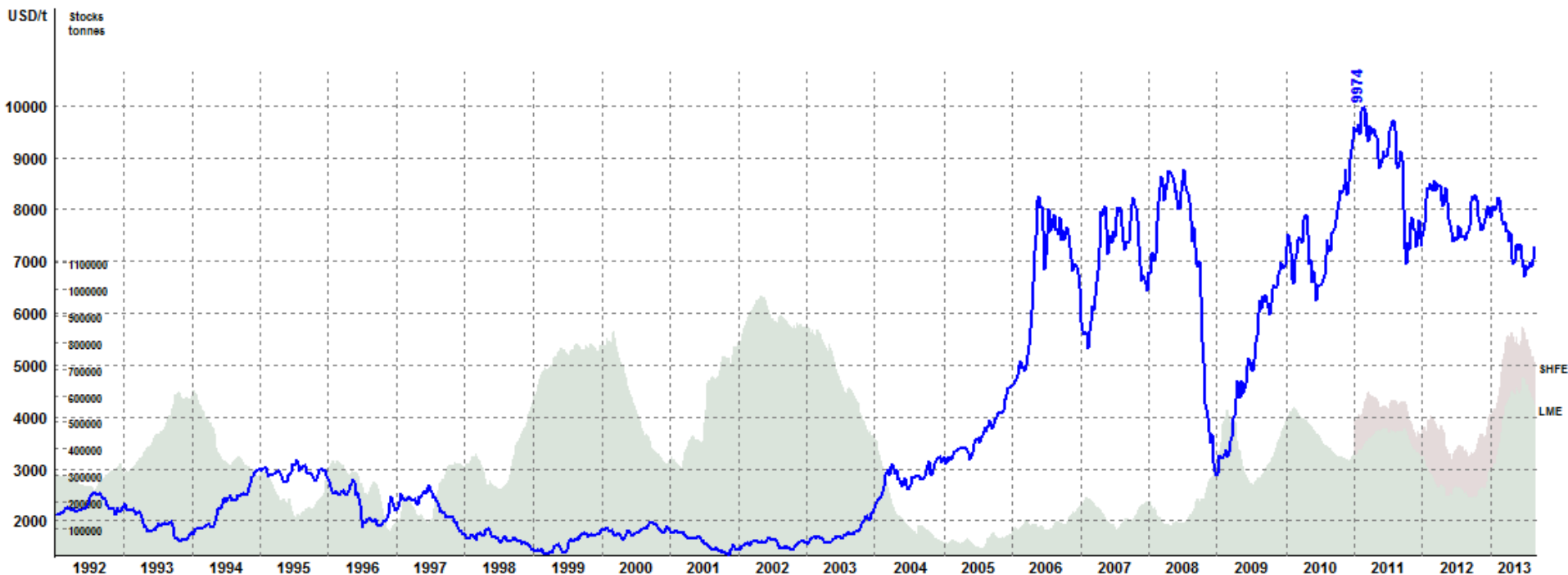
Specifically, the production of mineral resources and their transformation implies the use of **large amount of energy** :

- power supply to mines
- crushing and milling
- smelting in furnaces
- electro-winning in metallurgy...

The mining sector has to face different **challenges**:

- the increase of World population and the need to improve the standard of life
- the limited high grade resources (producing one tonne of metal will then need more energy)
- the variability of prices on the global market.

Example of variability: evolution of the copper price over 20 years

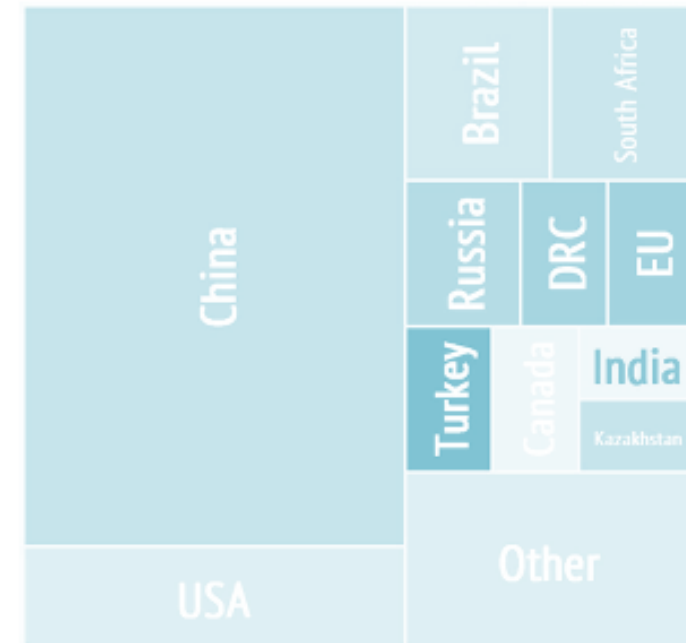


A fast increase of mining commodities demand will lead to the development of low grade (poor) deposits and by the way a more energy intensive operations.

Raw Material Initiative in Europe

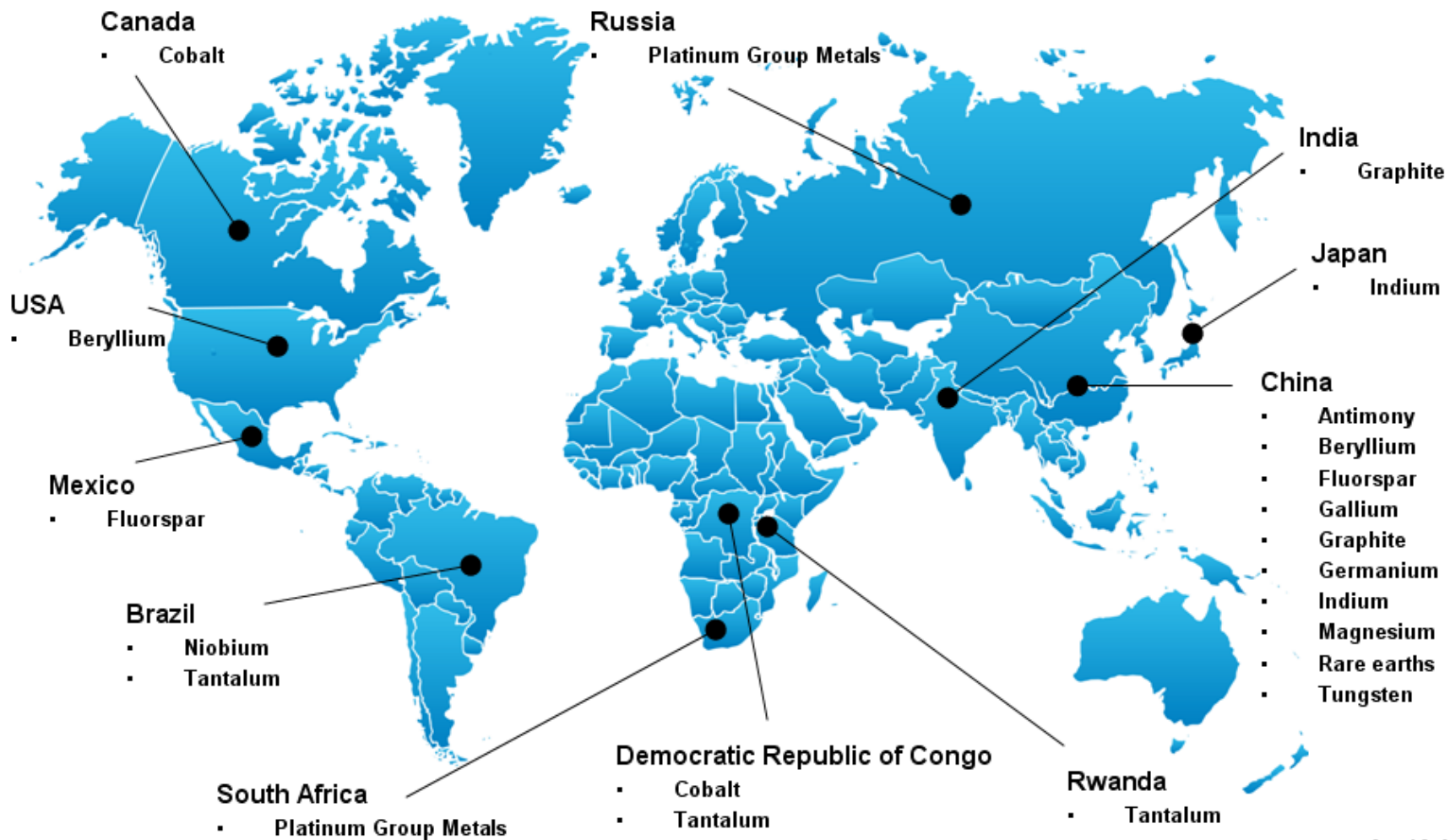
Relationship with Africa

- EU is strongly dependant on raw material imports for metals, industrial minerals and fuels
- Critical Raw Materials (CRMs) = high economic importance to the EU + high risk associated with their supply
- 2010: Europe's dependancy on metal imports
 - 100% for antimony, **cobalt**, ilmenite, molybdenum, **PGM's**, rare earth elements, rutile, **tantalum** and vanadium
 - 70 to 90% for most other metals
- 2014 : update with 20 critical raw materials



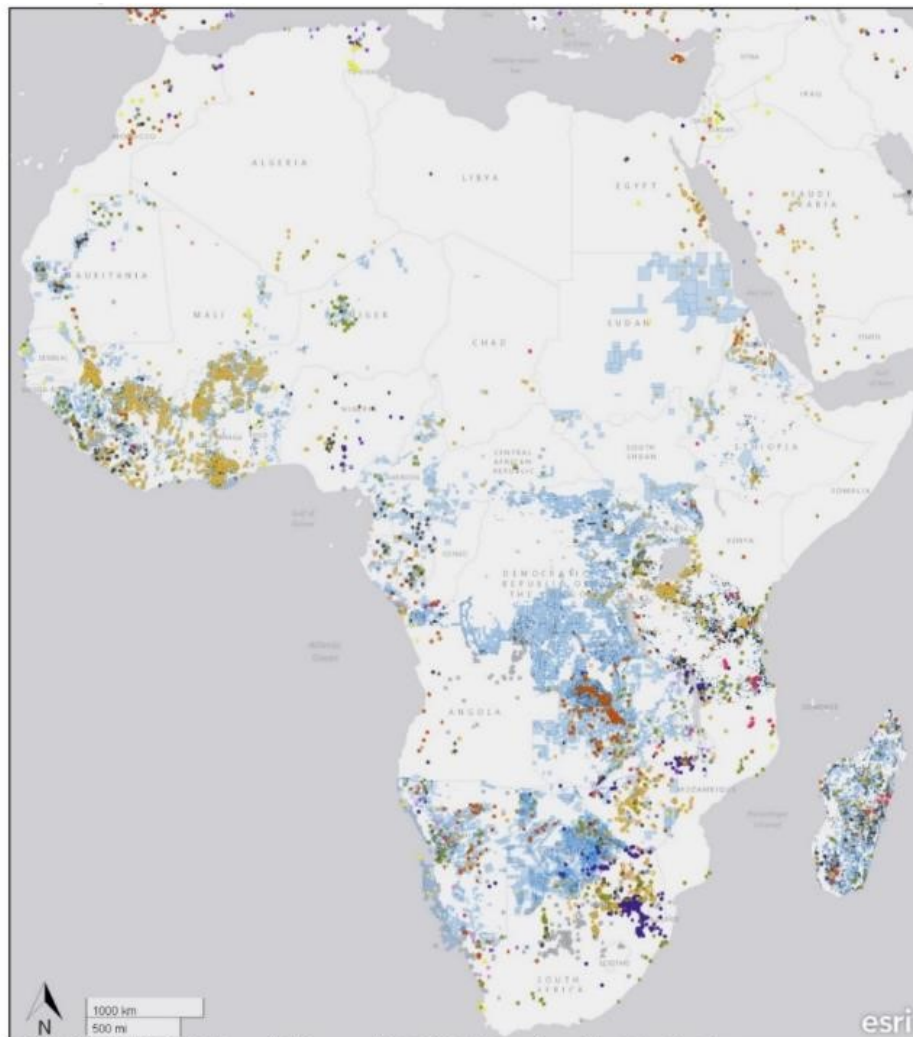
World primary supply of the 20 critical raw materials

Production concentration of critical raw mineral materials



www.europa.eu

African mineral resources and properties (2017)



Mining Properties

Primary Commodity

- Gold
- Copper
- Coal
- Iron Ore
- Diamonds
- Nickel
- Zinc
- Silver
- Lanthanides
- Platinum
- Lead
- Molybdenum
- Phosphate
- Graphite
- Tin
- Potash
- Aluminum
- Lithium
- All Others

Development Stage

- Exploration
- Operating
- Grassroots
- Reserves Development
- Target Outline
- Advanced Exploration
- Closed
- Feasibility
- Prefeas/Scoping
- Preproduction
- Expansion
- Satellite
- Limited Production
- Construction Started
- Feasibility Complete
- Feasibility Started
- Commissioning
- Residual Production
- All Others
- NA

Mineral Occurrences

- Mineral Occurrences

Global metal reserves and position of African countries: Pt, Co, Cu and Au (SNL, 2017)

Country Ranking by Reserves & Resources

Country	Aggregate Platinum in Reserves & Resources (oz)	Active Projects
South Africa	1 696 176 022	56
Zimbabwe	153 911 922	4
Russia	91 685 962	9
USA	17 425 867	7
Canada	15 576 458	24
China	4 022 000	2
Finland	2 819 810	3
Botswana	2 488 009	2
Australia	1 678 915	7
Greenland	677 784	1

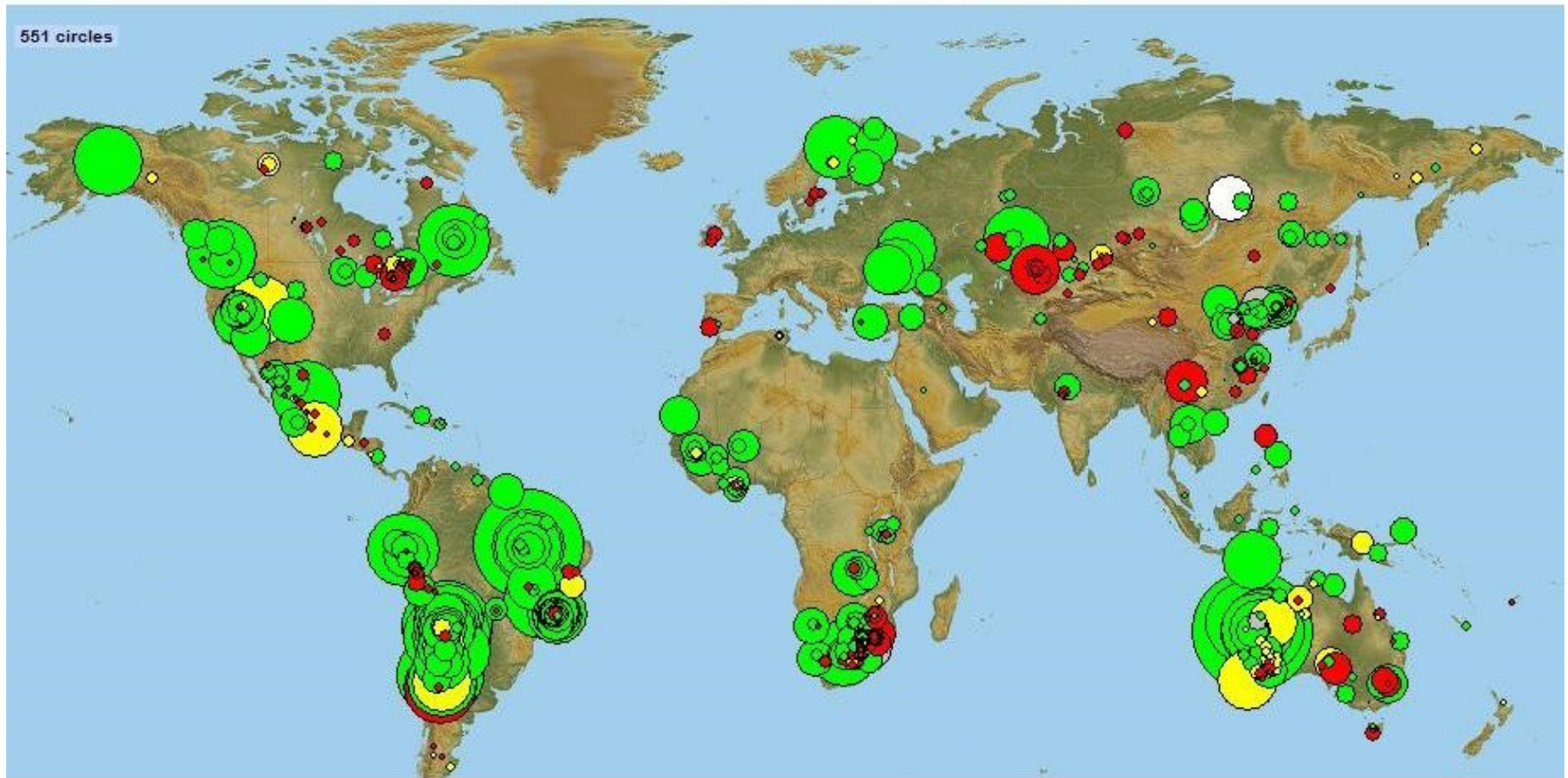
Country	Aggregate Copper in Reserves & Resources (t)	Active Projects
Chile	819 860 998	69
Peru	190 205 003	66
USA	179 735 012	88
Australia	131 483 762	153
D.R. Congo	118 820 546	30
Russia	99 408 578	41
Canada	77 151 188	196
Argentina	65 808 569	13
Mexico	62 718 079	54
Zambia	62 158 437	22

Country	Aggregate Cobalt in Reserves & Resources (t)	Active Projects
D.R. Congo	9 636 855	17
Australia	1 520 416	43
Tonga	1 519 000	1
Canada	846 745	32
Zambia	623 938	6
Cuba	454 000	2
Finland	348 105	5
Cote d'Ivoire	290 480	2
Philippines	272 550	6
China	235 926	9

Country	Aggregate Gold in Reserves & Resources (oz)	Active Projects
Canada	629 729 847	442
South Africa	621 203 583	64
USA	500 323 762	209
Australia	448 045 548	361
Russia	358 114 629	108
Indonesia	210 392 920	28
Chile	195 604 857	44
Mexico	168 932 742	132
China	162 356 981	131
Papua New Guinea	149 223 506	22

World Mining Economy - 2013

Mines of the world. Sized by ore production.



Source: Raw Materials Data 2013.

Type ● open pit ● underground ● mixed open pit / underground ○ others (placer, tailings, offshore) ● unknown

Production of main african countries in 2016

Country	Copper		Gold	
	Production (tonnes)	Proportion mond.%	Production (oz)	Proportion mond.%
Congo R.D	873 700	4,343	800 000	0,831
RSA	79 100	0,393	4 631 287	4,81
Ghana			2 534 561	2,633
Zambia	778 900	3,872	150 930	0,157
Total	1 771 910	8,808	8 344 905	8,668

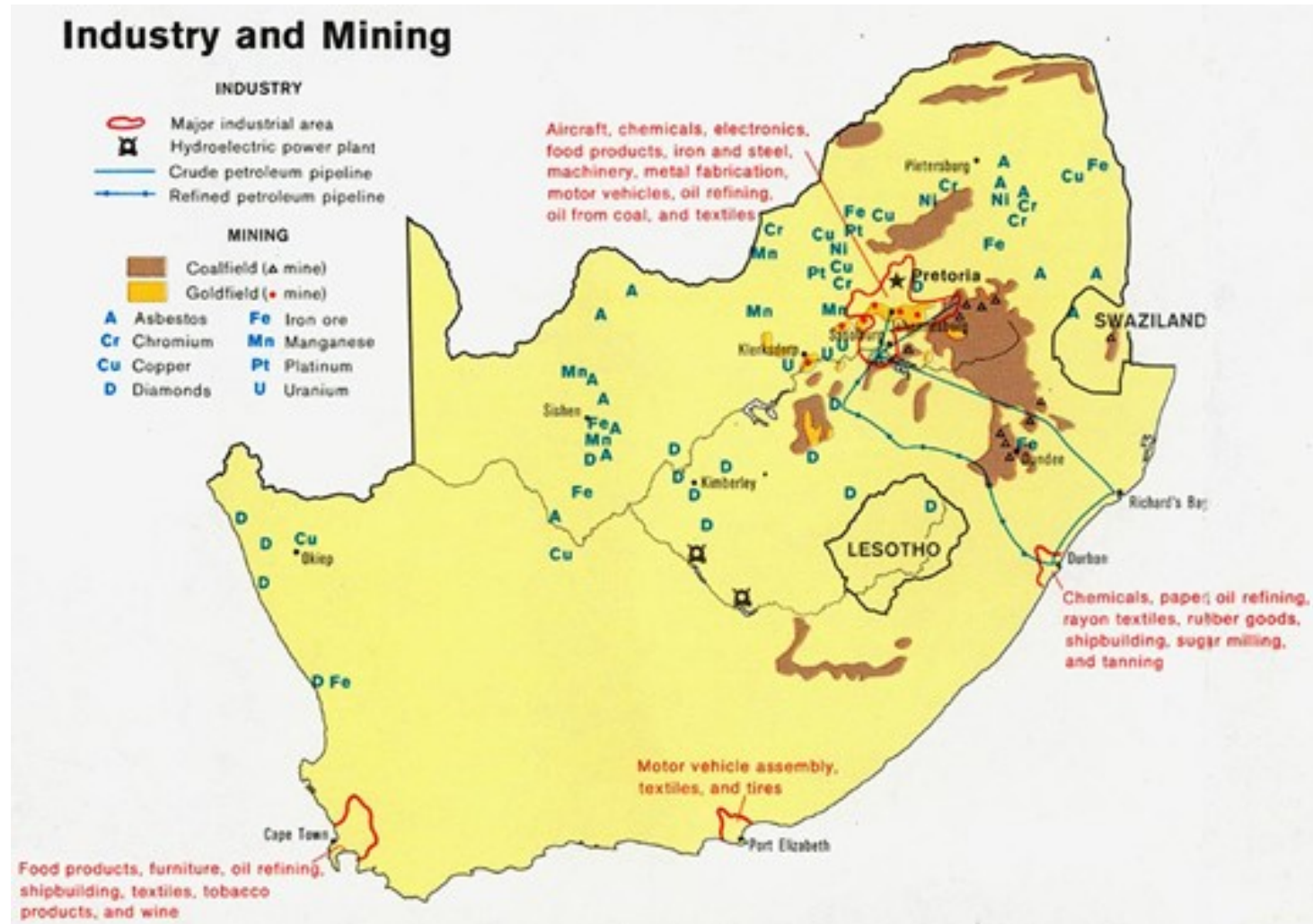
Production of main african countries in 2016

Country	Cobalt		PGM (Platinum)	
	Production (tonnes)	Proportion mond. %	Production (tonnes)	Proportion mond. %
Congo R.D	75 616	62,069		
RSA	851	0,698	4 325 850	71,55
Zambia	3 888	3,191		
Zimbabwe			488 192	8,075
Total	80 355	65,958	4 814 042	79,625

In 2016, Africa produced :

- about 9% of the global production of copper and gold
- 66% of cobalt
- 80% of platinum

Focus on South Africa



Top producing mining projects in 2016

Top Projects by Production Value - 2016		
<i>Project</i>	<i>Commodity(s)</i>	<i>Production Value: All Commodities (\$M)</i>
Secunda Mining Complex	Coal	2 883,75
Grooteegeluk	Coal	1 695,08
Sishen	Fe	1 613,97
New Vaal	Coal	1 192,11
Middelburg	Coal	1 125,00
Mogalakwena	Pt, Pd, Rh, Au, Ni, Cu	904,41
Marikana	Pt, Pd, Rh, Au, Ru, Ir, Cu, Ni	842,97
Impala	Pt, Pd, Rh, Au, Ni, Co, Cu	842,79
Khumani	Fe	753,53
Palabora	Cu, Fe, Ni, Mt, Ag, Au, Ti, U3O8	753,26

After SNL Database

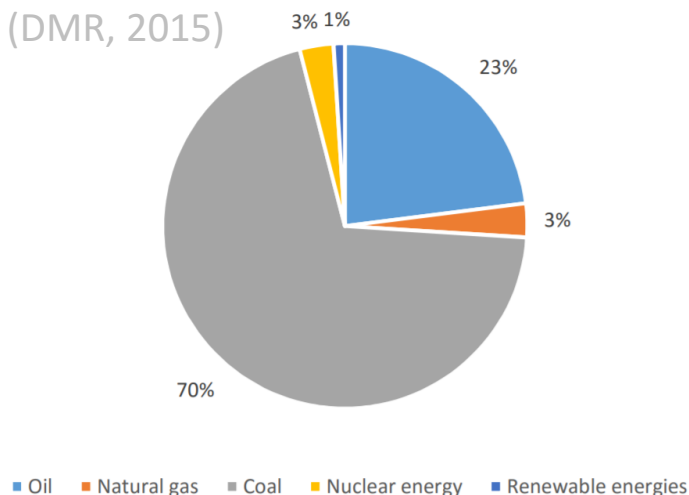
Energy in South Africa

Coal is the mainstay of the South African energy system, meeting around **70% of primary energy demand** and accounting for **more than 90% of domestic electricity output**.

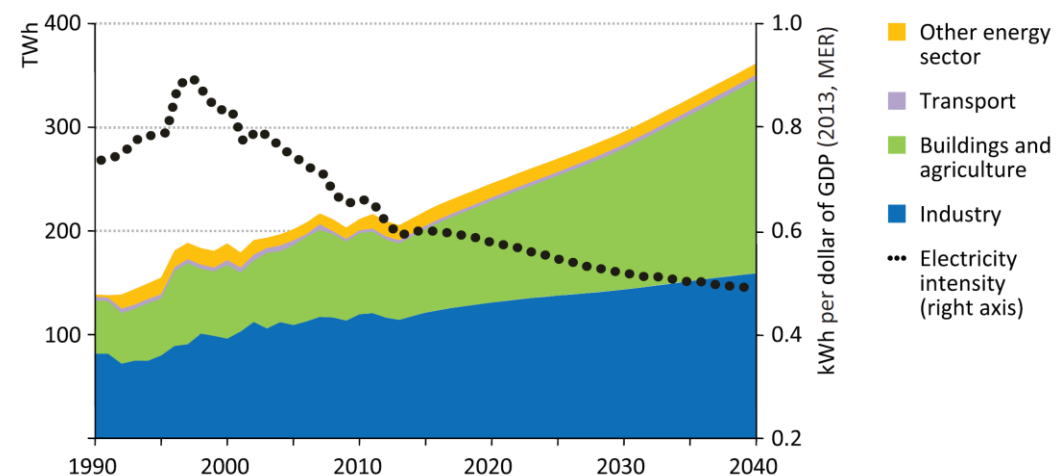
Most South African coal comes from the mature **Witbank coal fields** in the north-eastern Mpumalanga province, and coal deposits are depleting.

Primary energy consumption in RSA

(DMR, 2015)



Electricity demand growth by sector in RSA in the New Policies Scenario



South African mines at a glance: Au, Pt



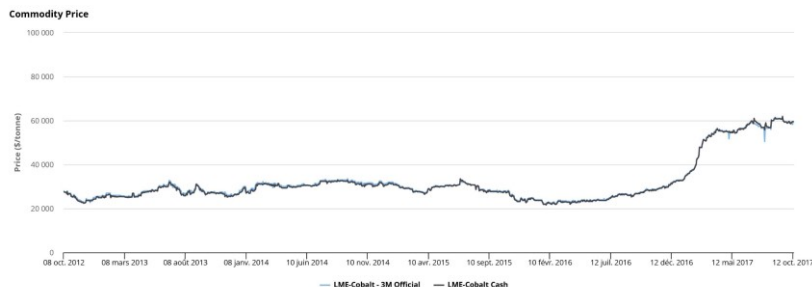
Université de Mons



Top producing mining projects in 2016

Top Projects by Production Value - 2016

Project	Commodity(s)	Production Value: All Commodities (\$M)
Mutanda	Cu, Co	1 663,10
Tenke Fungurume	Cu, Co	1 460,90
Kibali	Au	731,24
Frontier	Cu, Au, Co	394,65
Kinsevere	Cu, Co	392,94
Boss	Co, Cu, U3O8	283,70
Congo Mines and Infrastructure Construction	Cu, Co	243,61
Ruashi	Cu, Co	242,89
Luiswishi	Co, Cu	178,24
Lubumbashi Slag Hill	Co, Cu, Zn	140,05



The price of cobalt doubled since late 2016 mainly because of demand for electric cars.

Consequence of prices boom: Artisanal mining in Katanga : 150 000 people (World Bank, 2007)



Power availability in DRC (After SNEL)

Taux de disponibilité de puissance

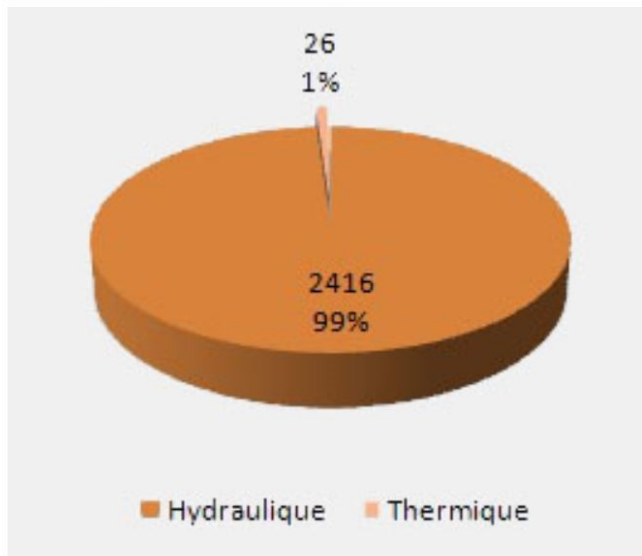
2012 52.60 %
MW

2015

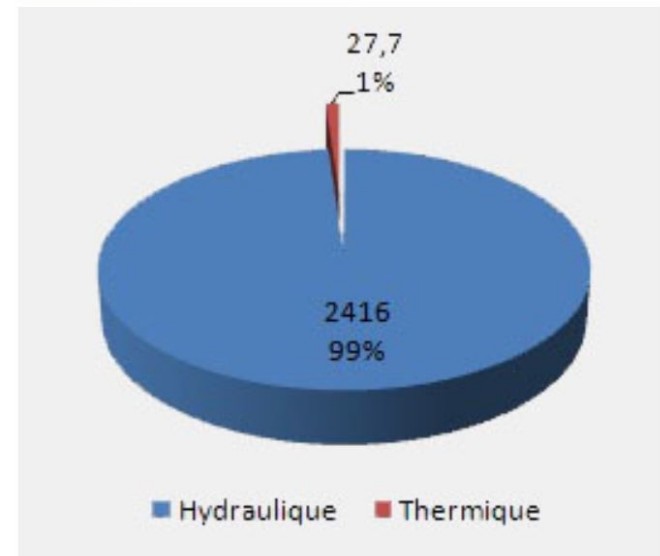
2013 61.40 %

Puissance installée en MW

2012 2 442.00 MW



2013 2 443.70 MW



Remarks and conclusions

In a partnership with energy, the mining activities can play a triple role: as end-user, as producer and as an actor in the development of renewable technologies (i.e. lithium and cobalt for batteries)

A sustainable development of Africa must include the mining activities. The continent has a huge potential for mining development and is a major actor in the global mining economy. Despite big recent progress, investments in exploration and development remain limited for several reasons:

- Political instability and armed conflicts
- Threats of revision of Mining laws despite the recent positive evolution (RSA, DRC...)
- Continual strikes due to demands from unions (platinum mines in RSA)

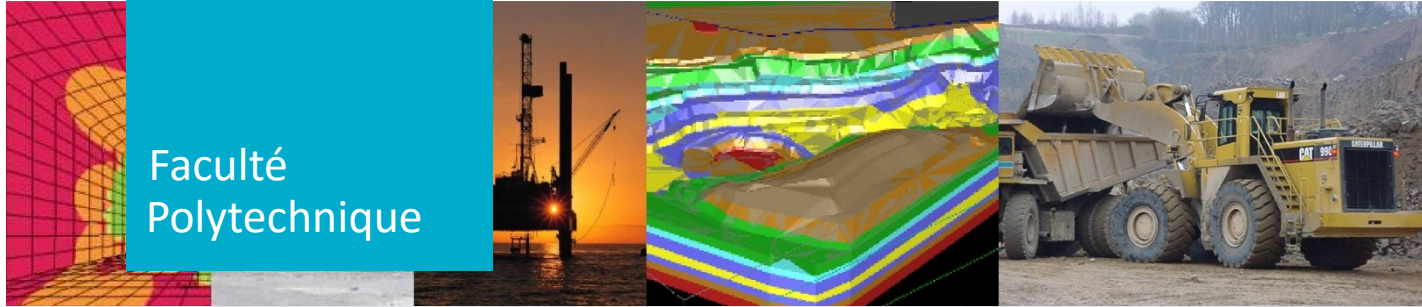
Remarks and conclusions (continued)

The South-African mining sector is mature but the energy supply still relies on coal, mainly from the Mpumalanga province; the deposits are depleting and the production must switch to more environmentally acceptable technologies.

The D.R. Congo for which the mining production has been struggling for a while is revitalizing since the early 2000 years, but the lack of electricity is still a weakness for the development of operations. The energy installed capacity is not completely operational and the huge capacity of Inga is still to be developed.

In anyway, a big challenge for the mining sector in Africa is, beside the energy supply, a better distribution of wealth, and a better compliance with the environment.

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Thank you for attention

