

The “green economy” - a new panacea?”

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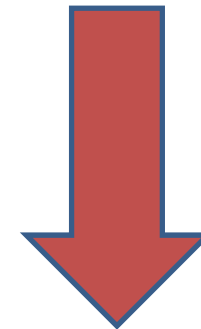
The win-win promise of a “green economy”

ITUC 2012: “Growing Green and Decent Jobs”:

“There is no choice but to transition to a greener economy, where social need and environmental protection are at the heart of decision making. Economic research by the Millennium Institute forecast that investment of 2% of GDP in the green economy over each of the next years in 12 countries could create up to 48 million new jobs”.

over 5 years:

Europe:	7 mio in 3 countries
Americas:	up to 32 mio in 3 counties
Africa:	nearly 2 mio in 3 countries
Asia-Pacific:	1.6 mio in 3 countries



but:
not all “green jobs” are decent jobs
also “green jobs” have a material base



based on:
the magic bullet of
technological innovation +
efficiency gains as “cure-all”

Trade unions logged into the Jobs vs. Energy debate!?

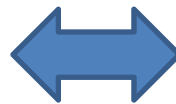


US democrats at Michigan convention: split over ballot proposed seeking a 25 renewable energy mandate in the state constitution (“25 by 2025”)

studies claim a 25% RE mandate could

- generate \$10bn in investment
- create 74,000 jobs
- greatly reduce \$ 1.7 bn spent annually on coal imports

Construction trade unions are working behind the scenes to get the endorsement removed from the platform, arguing it could lead to loss of jobs at coal power plants that generate electricity



The “green economy” - a new panacea? (1)

Concept: EU, OECD, UNEP, ILO, think tanks, part of the business lobbies

Starting point: impending threat of climate change + resource scarcity

Objective: decarbonising the global economy

Different wording: “**Green economy**” (UNEP)

“**Sustainable development and green growth**”

(OECD, WB)

“**Green New Deal**” (concept of greener economy recovery packages)

“**sustainable development and green jobs**” (ILO)

“**bioeconomy**” new concept - focus on technological innovations to enhance efficiency + use of natural resources for food, energy, pharmaceutical, chemical industry)

The “green economy” - a new panacea? (2)

Common concerns: increase efficiency of resource use - through:
technological innovation
changing consumption patterns and lifestyle

Diverse views on:
amount of economic growth needed for poverty reduction
who should pay for it
how will benefit from change

usually not reflected:

- **capitalist mode of production and exploitation,**
- **property rights ,**
- **role and limits of market regulation**
- **rules and regulations of free trade**
- **(mal)functioning of financial markets**
- **capitalist “world ecology”:** treating (biophysical and human) nature as “resources” to be appropriated

The “green economy” - a substitute for “sustainable development” (1)

UNEP : the environmental crisis is caused by a misallocation of capital - advocate: “**getting the economy right**” in the “**context of Keynesianism, active state intervention in order to achieve sustainable or green growth**”

focus on: green technologies (for renewable energy, public transport, urban development)

sustainable agriculture and fishery
forest’s Co2-binding potential
ecosystem services

by valuing/commercializing nature!

OECD : **generating millions of jobs in the field of RE generation and distribution** (wind power, solar panels, biofuels), building retrofitting, expansion of mass transit/ freight rail, building of “smart” electrical grids

focus on: high costs of energy and raw materials (**economic scarcity**)

The “green economy” - a substitute for “sustainable development” (2)

ILO approach: green jobs in key areas

assessment of occupational hazards and risks
corporate social responsibility and accountability
educational capabilities
making the environment a focus of collective bargaining

not mentioned in these concepts:

- trade regulations to be design to decarbonise the global economy
- clear statutory provisions and regulatory frameworks
- **THE BIOPHYSICAL BASE OF A GREEN ECONOMY (except UNEP)**
- **GEOPOLITICAL DIMENSIONS OF RESOURCE SCARCITY**

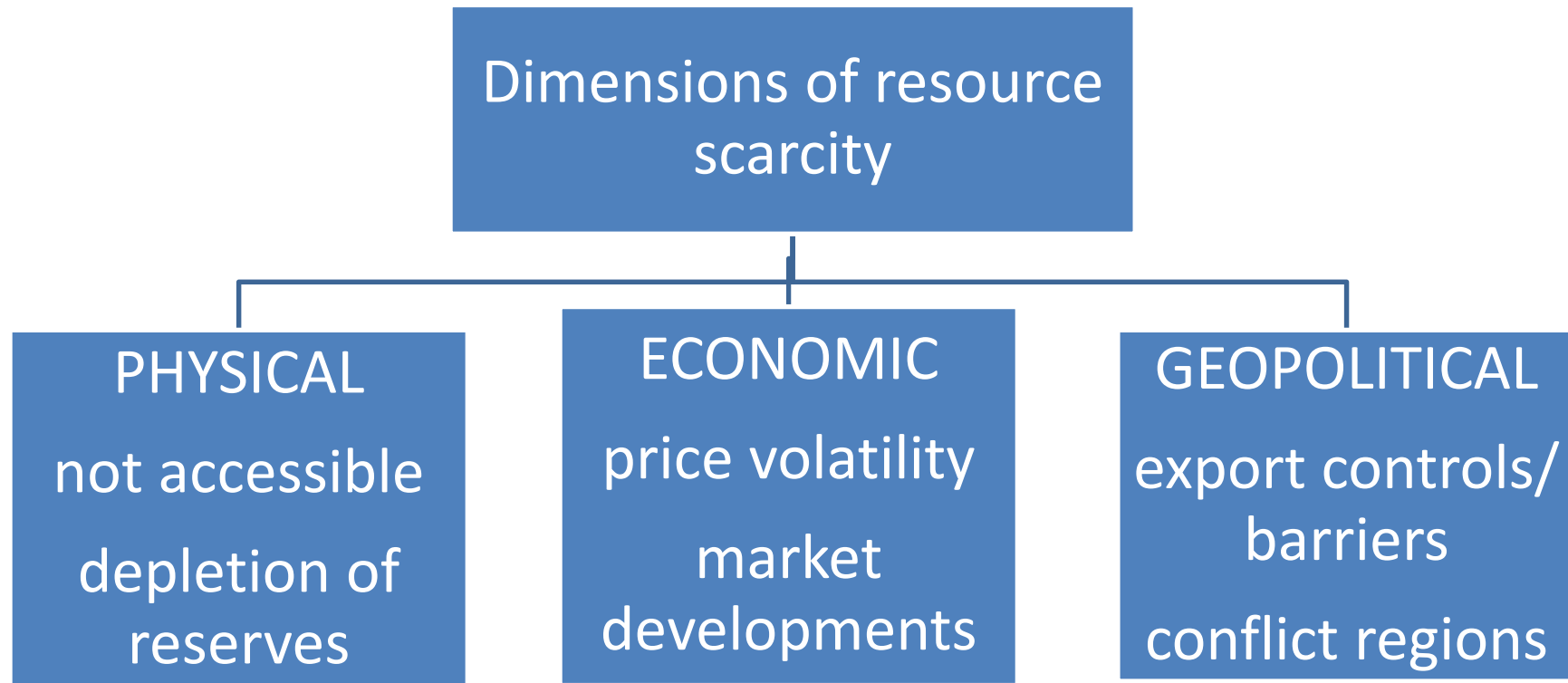
The material base of technical progress: access to „strategic resources“

“The next phase of globalisation will be defined by pressure for access to basic resources. We are in a race.””

P. Mandelson, Trade and Raw Material
Conference, Brussels , Sep 2008

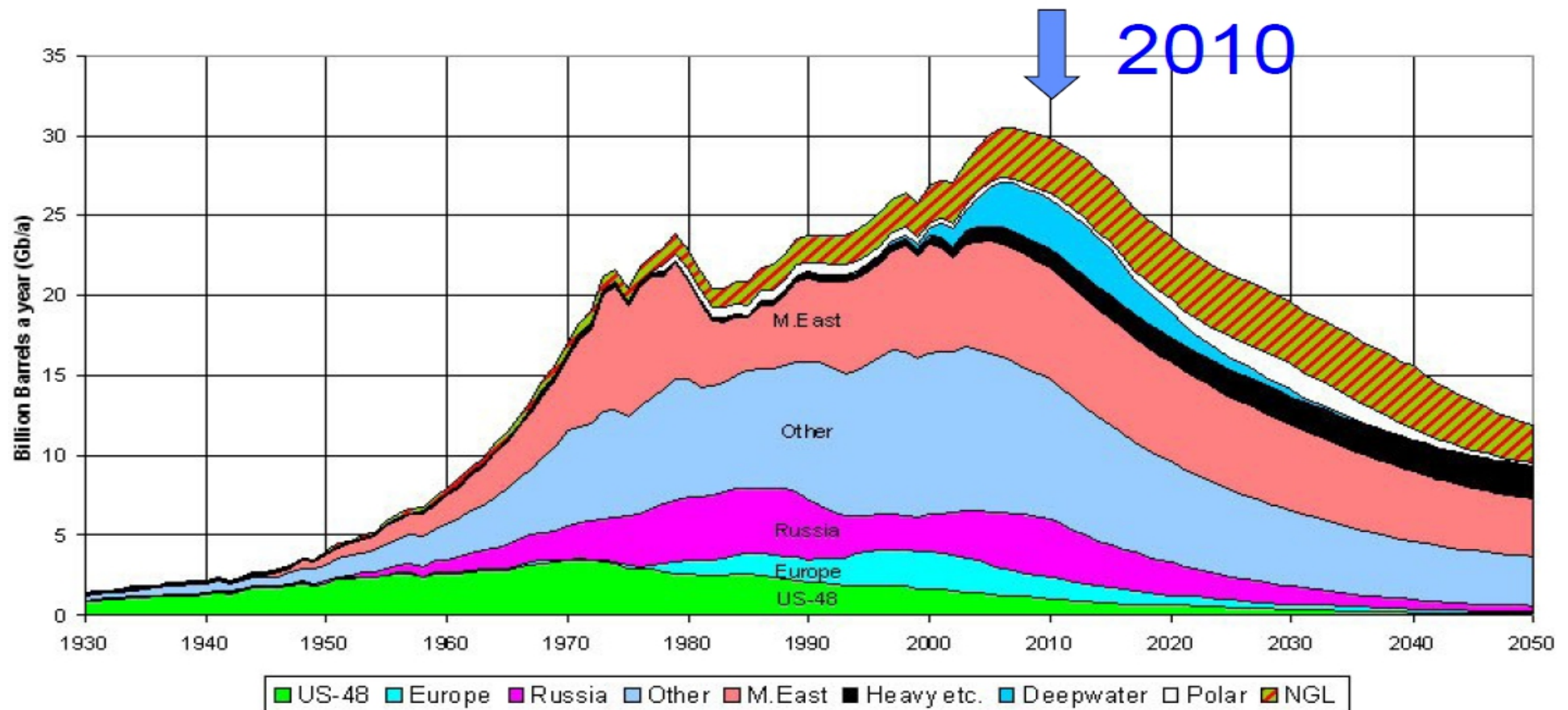
- **The geology and economics of “peak oil/gas”** leads to the renaissance of resource-based imperialism
- **Increases of oil and gas prices** create opportunities for other (low-carbon) technologies - but:
- **Mineral scarcity** parallels with “peak oil”
- **Scarcity on water** is increasing - hunt of energy alternatives to replace oil make the water problem much worse - **“water: the new oil”**
- **A “Green Economy” is highly dependent on (high-tech) metals + like any other economy on water**

Dimensions of Resource Scarcity

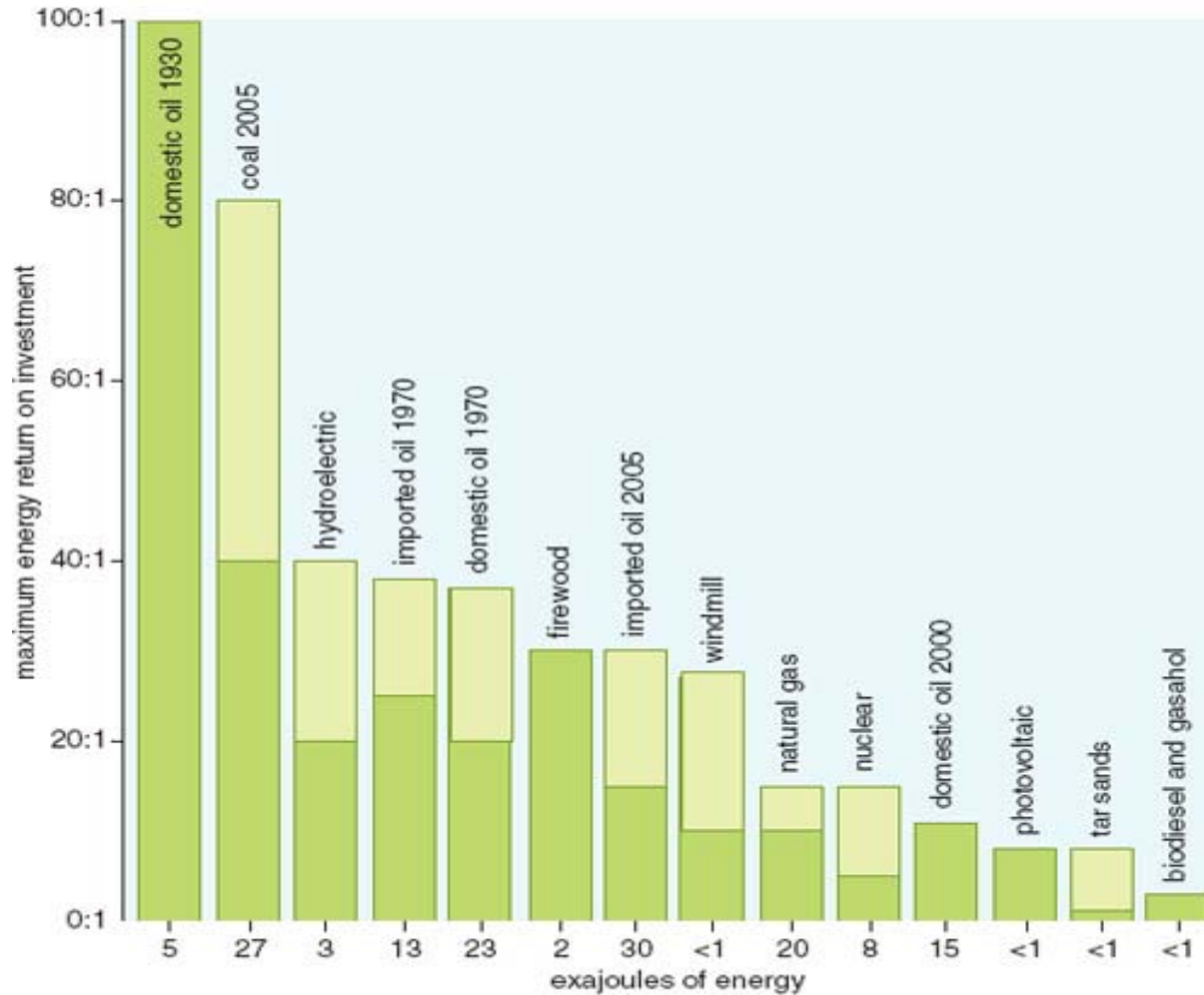


World production of oil and gas is predicted to peak within 10 - 40 years

OIL AND GAS LIQUIDS 2004 Scenario

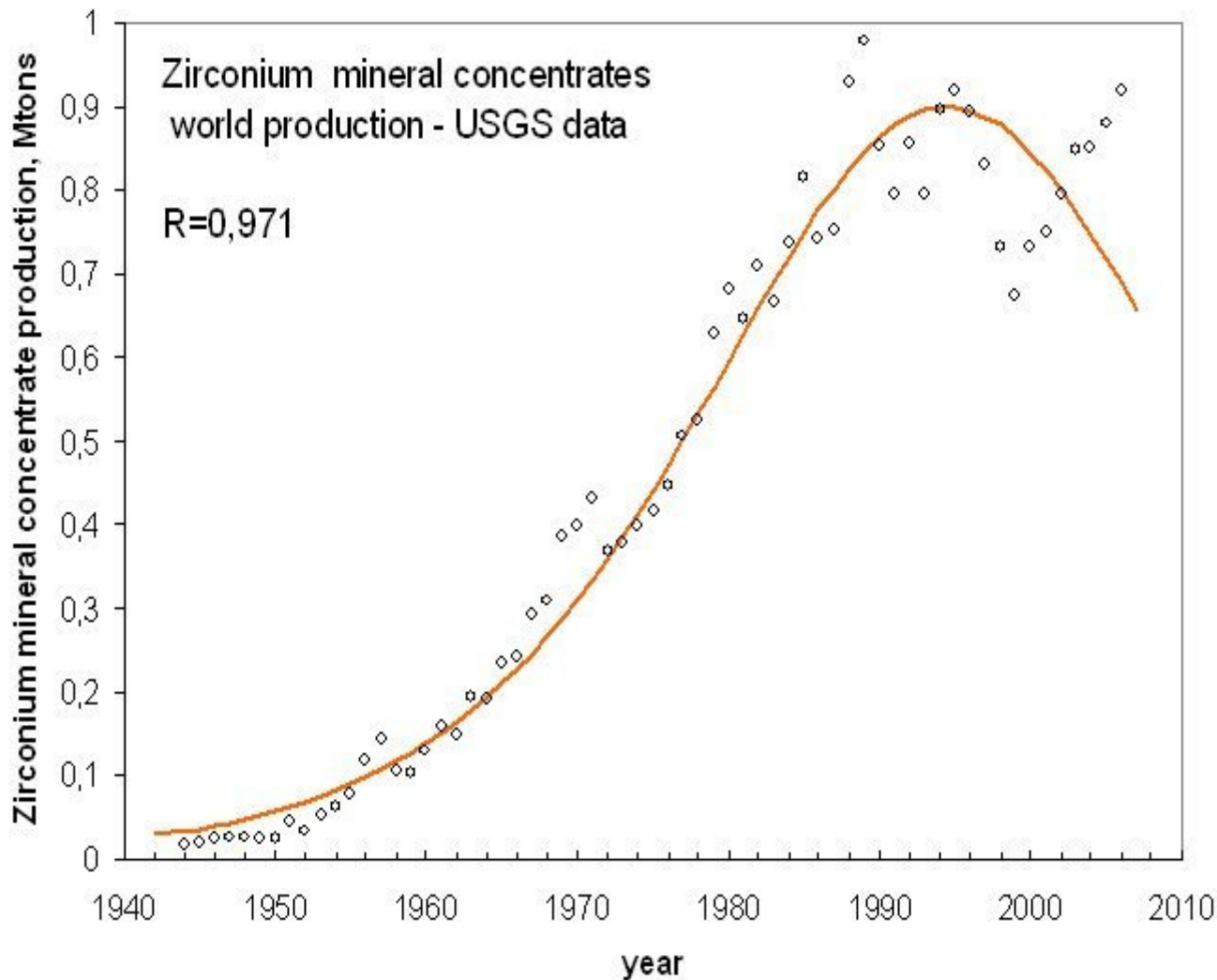


EROI of energy sources



Energy return on investment (EROI). The EROI is the energy cost of acquiring an energy resource; one of the objectives is to get out far more than you put in. Domestic oil production's EROI has decreased from about 100:1 in 1930, to 40:1 in 1970, to about 14:1 today. The EROI of most "green" energy sources, such as photovoltaics, is presently low. (Lighter colors indicate a range of possible EROI due to varying conditions and uncertain data.) EROI does not necessarily correspond to the total amount of energy in exajoules produced by each resource⁶²

Material scarcity parallels with Peak Oil

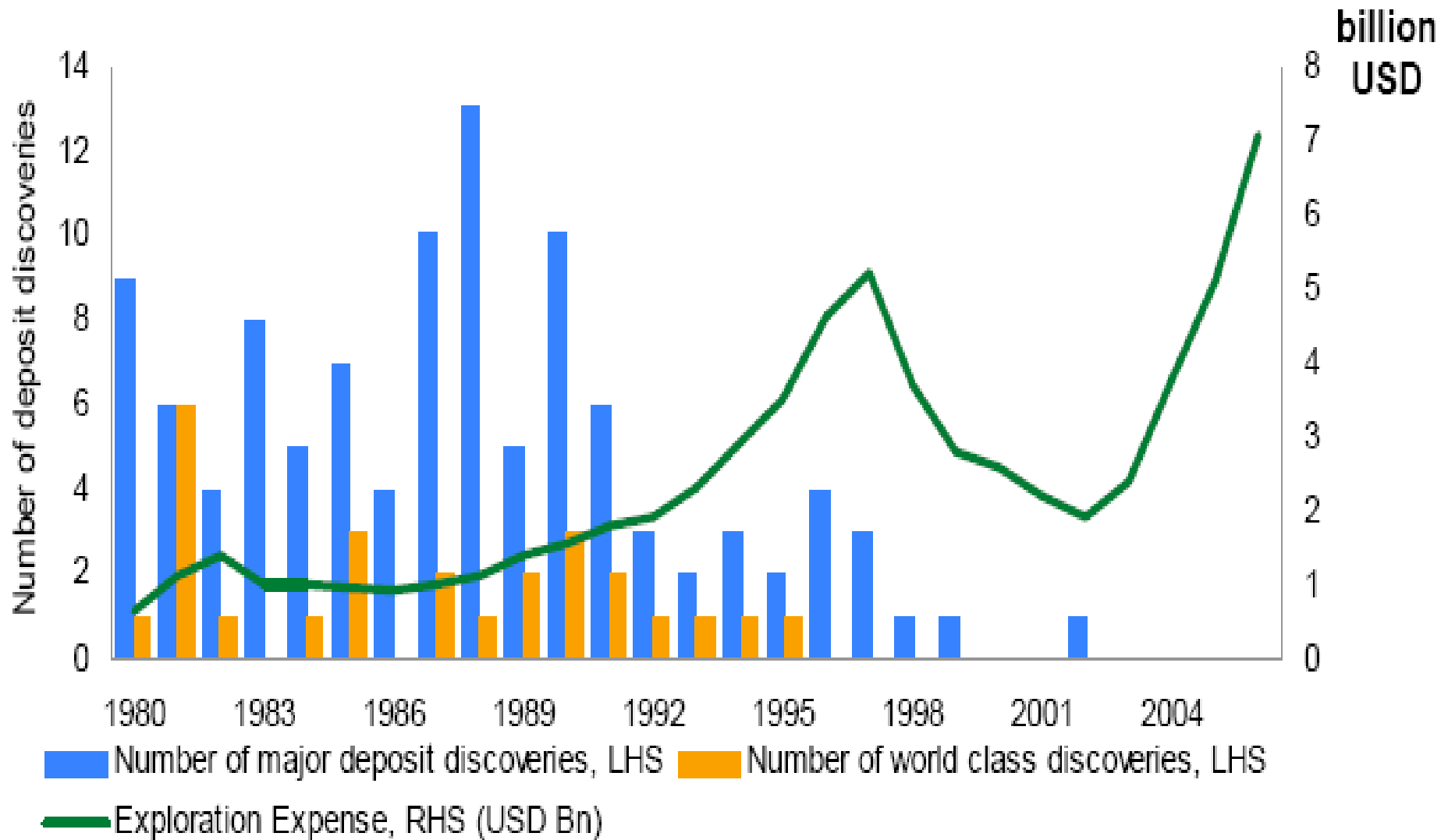


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- The time-production profile of large individual mines and of the summation hereof resembles a bell-shaped curve comparable with oil
- **The right part of the bell-shaped curve is more difficult to realize because the “low-hanging fruit” has already been harvested**
 - **It takes increasingly more energy to “harvest” the remaining energy and the remaining minerals**

Source: Diederer
2009

Discovery rate of major mineral deposits

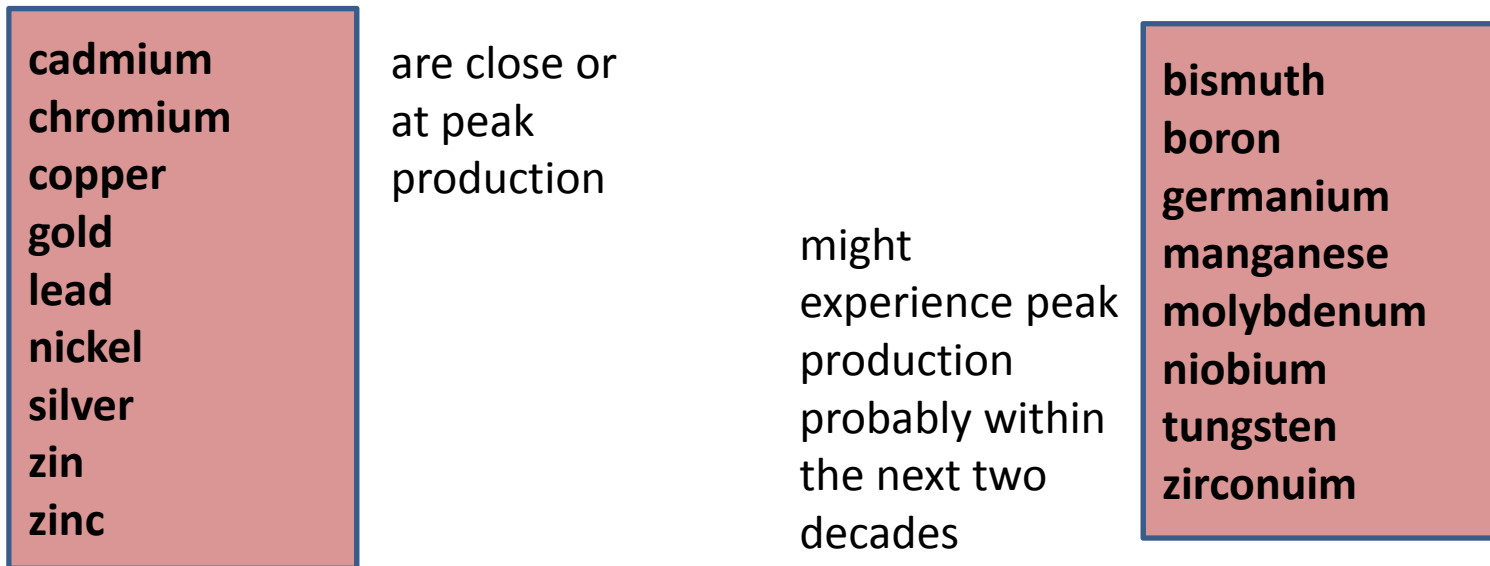


Sources: BHP Billiton, MEG, UBS WMR.

The world is heading towards an acute metal scarcity

Most metals belong to the group of scarce minerals - their extraction rate might exhibit a peak within the next several decades:

having a very low average concentration in the upper continental crust once the highly enriched deposits are exhausted, the minerals become scarce

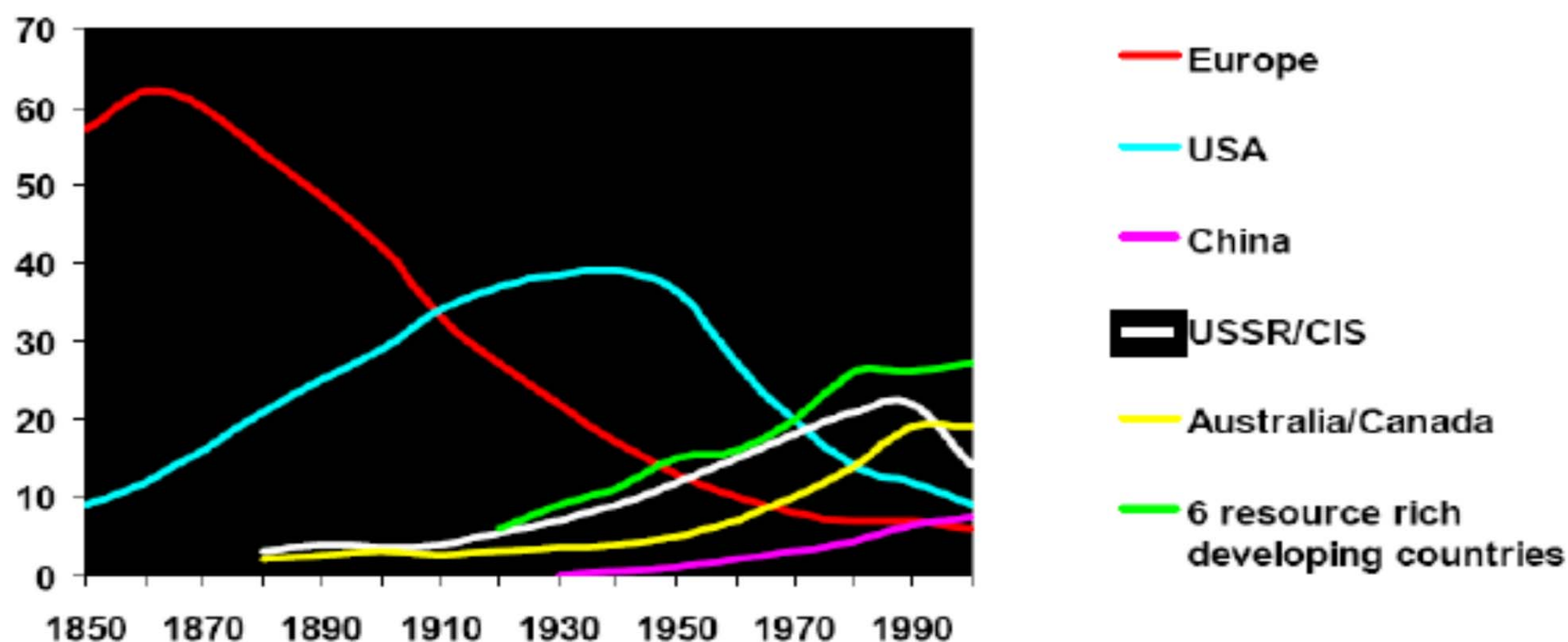


Sources: Zittel 2010, Diederer 2008, Clugston 2012

Geopolitical situation

Europe and the US have already depleted a significant part of their resources

% of global mining



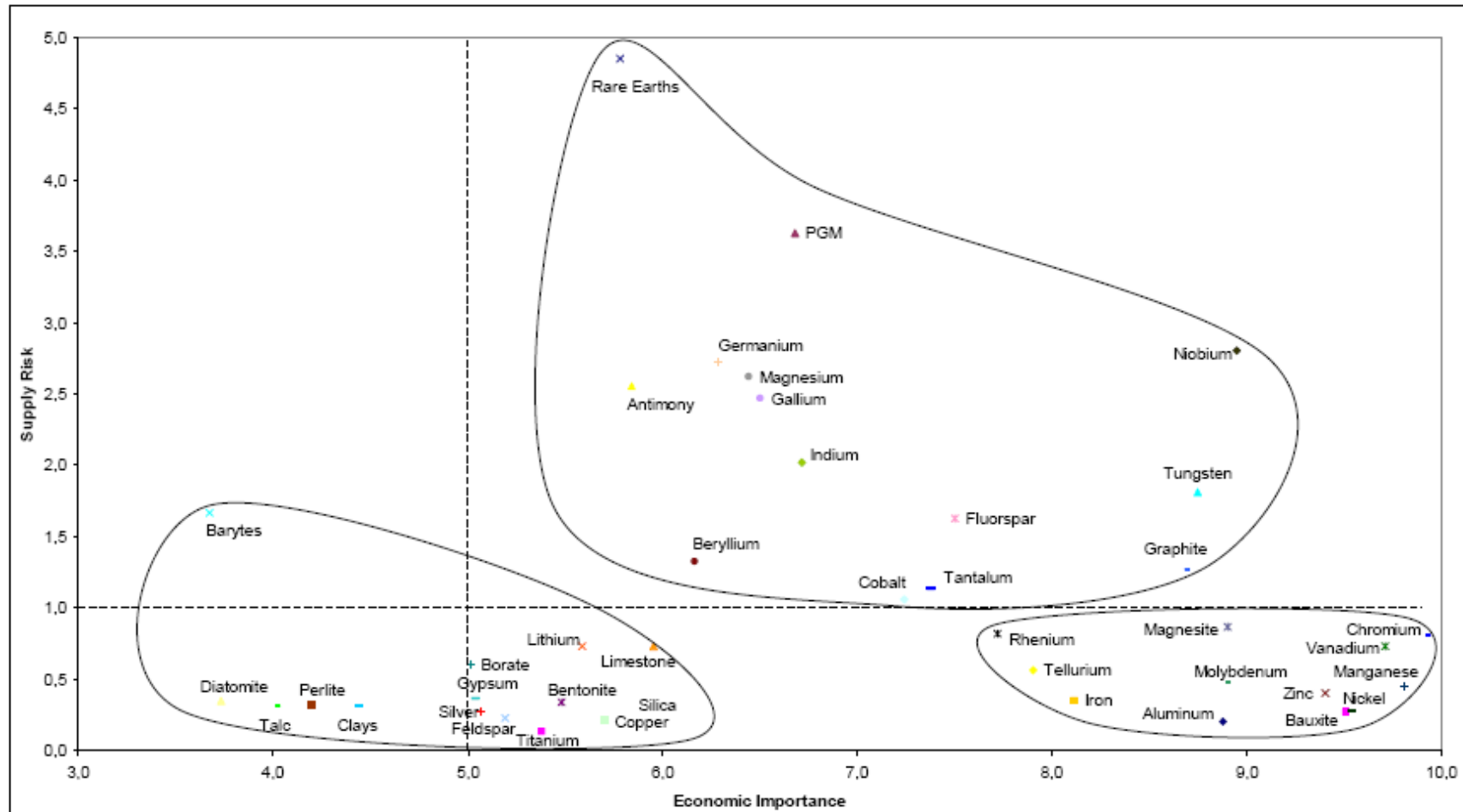
Sources: Raw Materials Data, Stockholm 2004, Sames, Raw Materials Group

EU dependence on the import of metal ores (2003)

Antimony ore	100%	Rutile	100%
Beryllium ore	100%	Vanadium ore	100%
Boron	100%	Phosphate rock	92%
Cobalt	100%	Nickel	86%
Molybdenum	100%	Iron ore	83%
Niobium ore	100%	Bauxite	80%
PGM ores	100%	Zinc ore	80%
Rare Earth ores	100%	Tungsten ore	76%
Rhenium ore	100%	Lead Ore	76%
Tantalum ore	100%	Copper Ore	74%
Ilmenite	100%	Chromium ore	53%

Source: based on BGS Data (2005)

Overall critically results of the EU “Raw materials Initiative” study

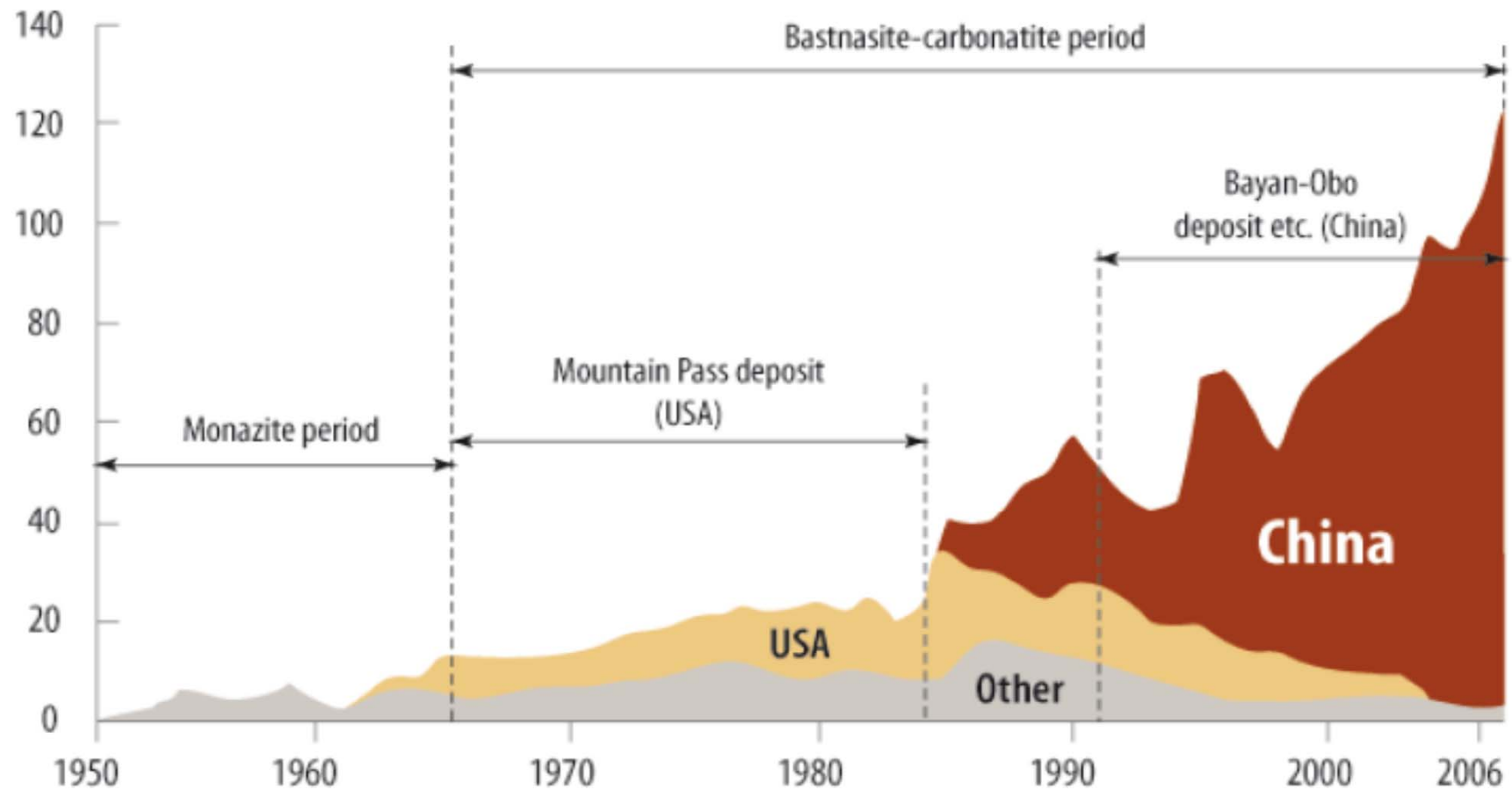


Source: EC -Ad hoc Working Group on defining critically raw materials 2010
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Dependence of a “green economy” on low carbon technologies - “rare earth” issue

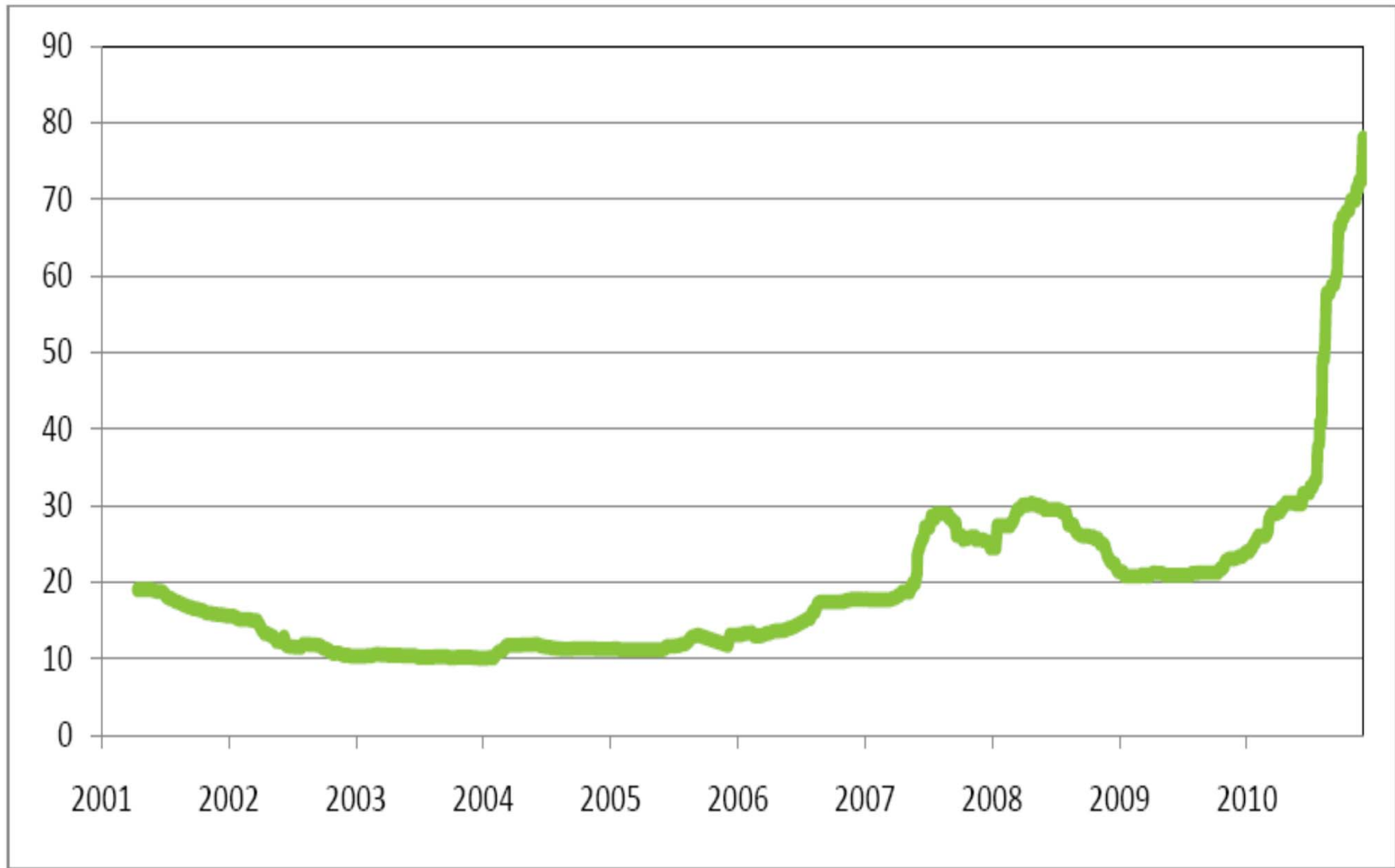
- concentrated in **a few number of counties - 90% production** in China - due to low mining costs
- the renewable energy sector, car industry, telecommunication and defence **compete on the minerals**
- **saw sky rocking prices** due to **increased global demand** and reduction of Chinas exports
- **demand forecasted to increase 2-3 times in only 10 years**
- some of the reserves will be opened up to production
- but **substantial risk to the environment** are associated with mining and separating rare earth,
- **Working condition (heath and safty) are even worst**

World Production of Rare Earth Metal Oxides (in 1,000 t)



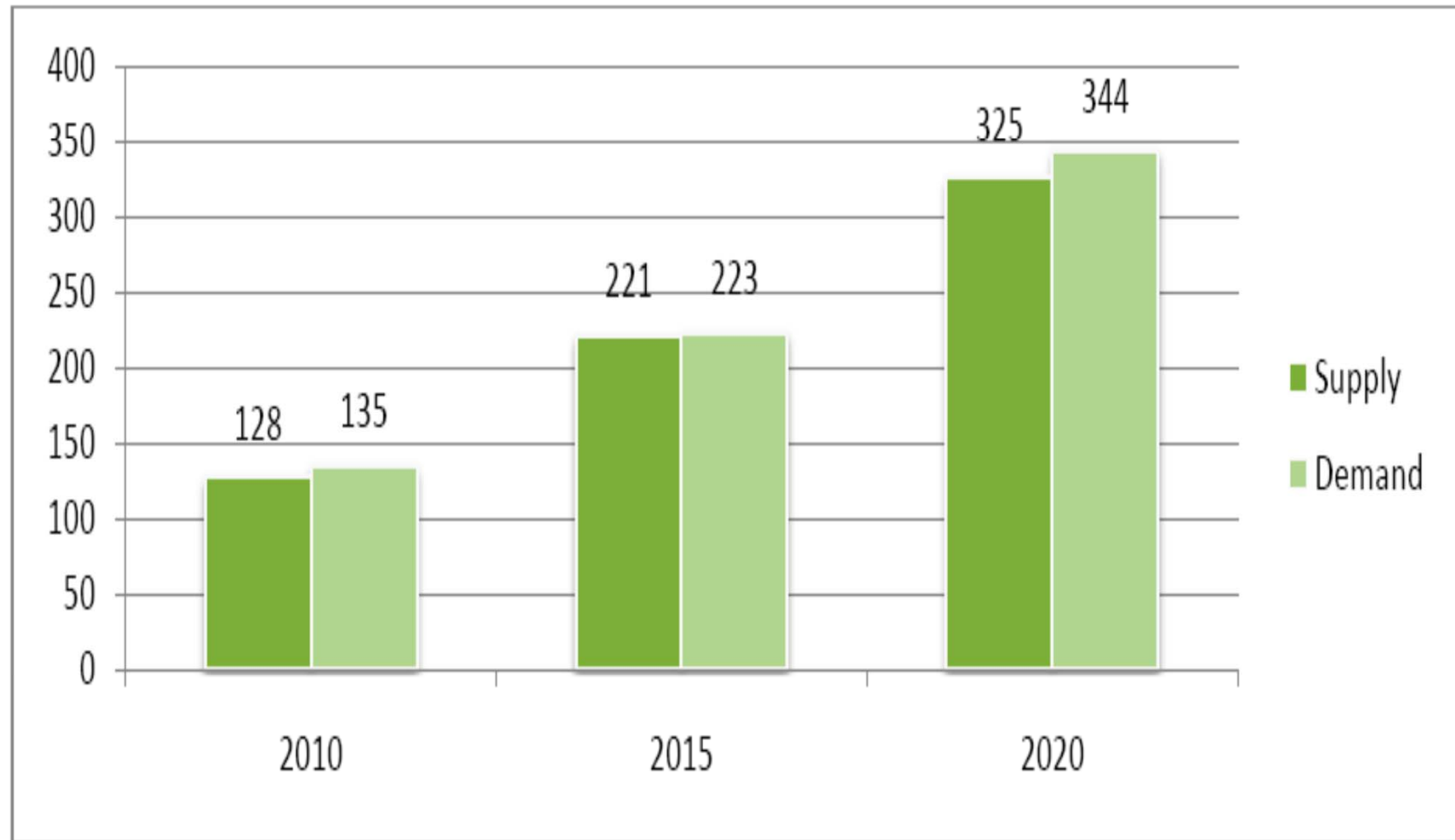
The World's Production of Rare Earth Metal Oxides (in 1,000 t). Source: USGS

Figure 44: Rare Earth Oxide Prices Developments (composite of 9 metals^a), min. 99% Purity^b on an FOB China Basis (US\$/kg)



Source: Metal Prices

Figure 43: Rare Earth Supply and Demand Forecasts (kt)

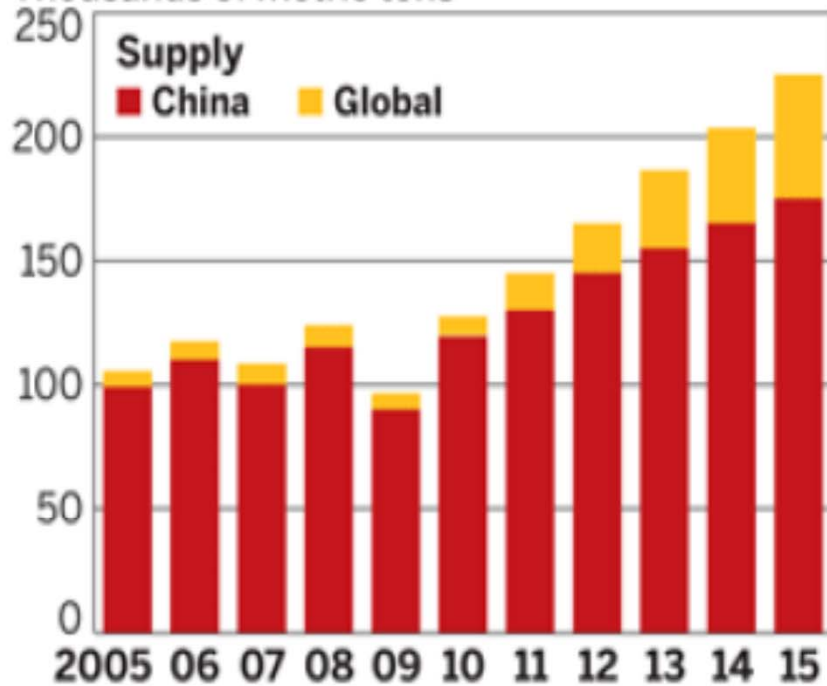


Sources: Own Calculations based on IMCOA, Öko-Institut

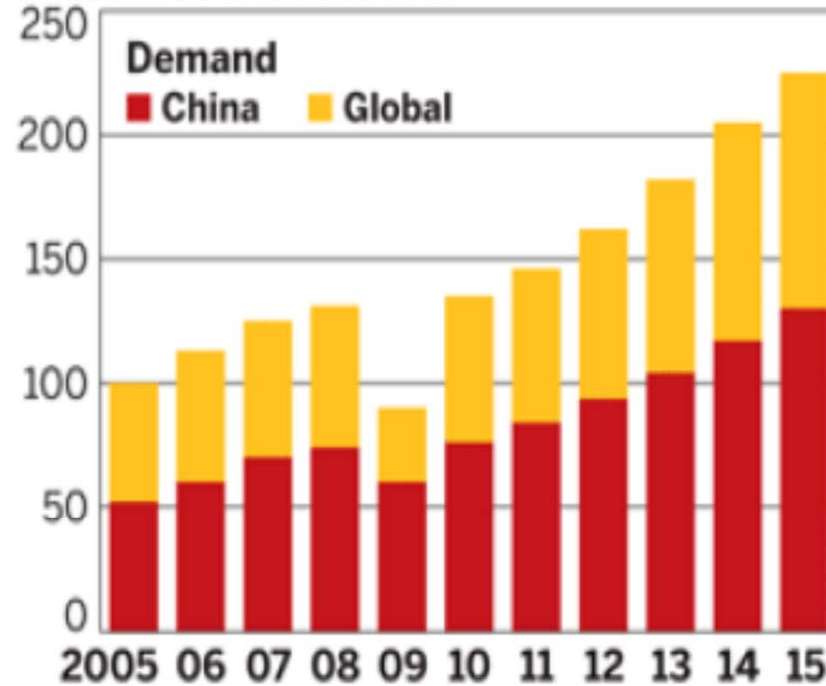
Rare Earth Supply and Demand

China's increasing demand for its own rare earth materials is predicted to drive production in other countries

Thousands of metric tons



Thousands of metric tons



SOURCE: Dudley Kingsnorth/Industrial Minerals Co. of Australia

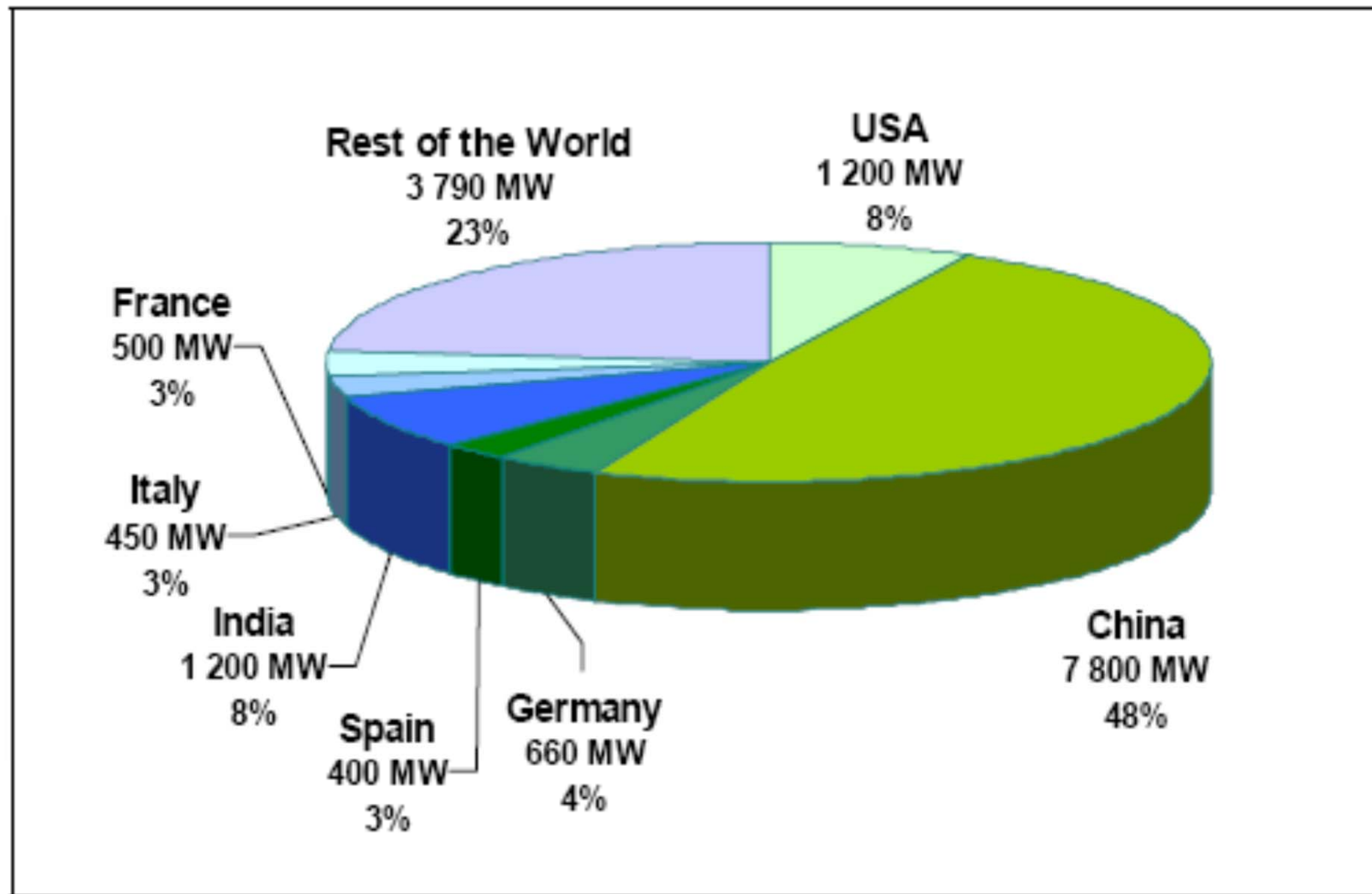


Figure 21 Newly installed wind power capacity in the first half of 2010 (WWEA 2010b)

Geostrategic panic about China's dominance in rare earth

- **China puts its own supply needs first** (when cutting exports - quotas work like a tax)
- Export taxes are lower than for finished products such as rare earth magnets - **foreign companies can not compete**
- It **cleaned up many illegal mines** in the South that produced the “heavy” and heavily polluting rare earth elements (used for special magnets)
- **US, EU and Japan are bringing a case against China to the WTO**

EU: support environmental regulations, but not through export restrictions
- it's just about replacing foreign demand by local demand

Consequences of metals scarcity

- Less affordable mass-produced electronic products
mobile phones, flatscreen TV's, PC's, ...
- Large-scale conversion towards alternative energy sources - highly questionable
- Forget large-scale electrification of land-based transport
- Chemical compounds will become more expensive
- Construction and machining will become more expensive

Metal scarcity will aggravate with energy scarcity!

The “green economy” - adequate in view of civilization shift? (1)

1. The “Jevons paradox” - renamed as “rebound effect” - is still relevant:

- **increased energy/material efficiency** make a given commodity cheaper
- free household's income
- either spend in more consumption of the same commodity or in other sectors
- **pull up economic growth** : more resource extraction (inputs) + waste/pollution (outputs)

2. “Decoupling” economic growth from resource extraction and CO2 emissions is a myth

- Only in some countries, for some (not the most relevant) ecological problems “relative decoupling” was possible
- But “absolute decoupling” at world wide level does not happen

The “green economy” - adequate in view of civilization shift? (2)

3. Substitution of one sort of resource by another may still increase overall resource extraction:

- Resource extraction: aggregate of metal ores, industrial and construction minerals, fossil fuels, biomass
- Resource extraction in one of these sectors could be limited because of substitution effects
- But substitution would increase resource extraction in other sectors
- Thus causes new challenges and dangerous political and ecological conflicts

4. The most urgent problem : on the output side of the word economy (waste and pollution)

waste and pollution cannot decline until material extraction stabilises

Conclusions and solution framework (Dierderen)

Conclusions

- Grave consequences of energy scarcity is metal scarcity and metal scarcity will aggravate energy scarcity
- Metal scarcity directly undermines our ability to sustain our current level of material prosperity
- Technology alone will not solve our problem
- We need to coordinate our efforts towards a collective goal of sustainability

Solution framework

- Longer product lifetime
- Recycling and reuse of materials
- Substitution of materials - use “elements of hope”
- Stockpiles
- **Use less or “managed austerity”**



Free market
economy?

China solution?

Green socialism of the
21st century?