Energy transition in an age of fundamental geopolitical change. Ports as energy hubs for the future.

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Energy transition in geopolitical change.

1. **What is Geopolitics**? What is the Geopolitics of Energy? What is the geo-technical ensemble?
2. What are the **geopolitical implications of the accelerating global shift to renewables and green energies**? What impact for ports as energy hubs of the future?
3. What are the **foreseeable consequences** of global energy transformation on oil and gas rich countries? To what extent does the energy transformation impact **regional and global energy security**?
4. Towards a **"re-globalisation" from the bottom-up**? Are **existing institutions and fora** well suited to deal with the geopolitical consequences of the energy transformation?

Energy transition in an age of geopolitical change. Ports as energy hubs of the future.

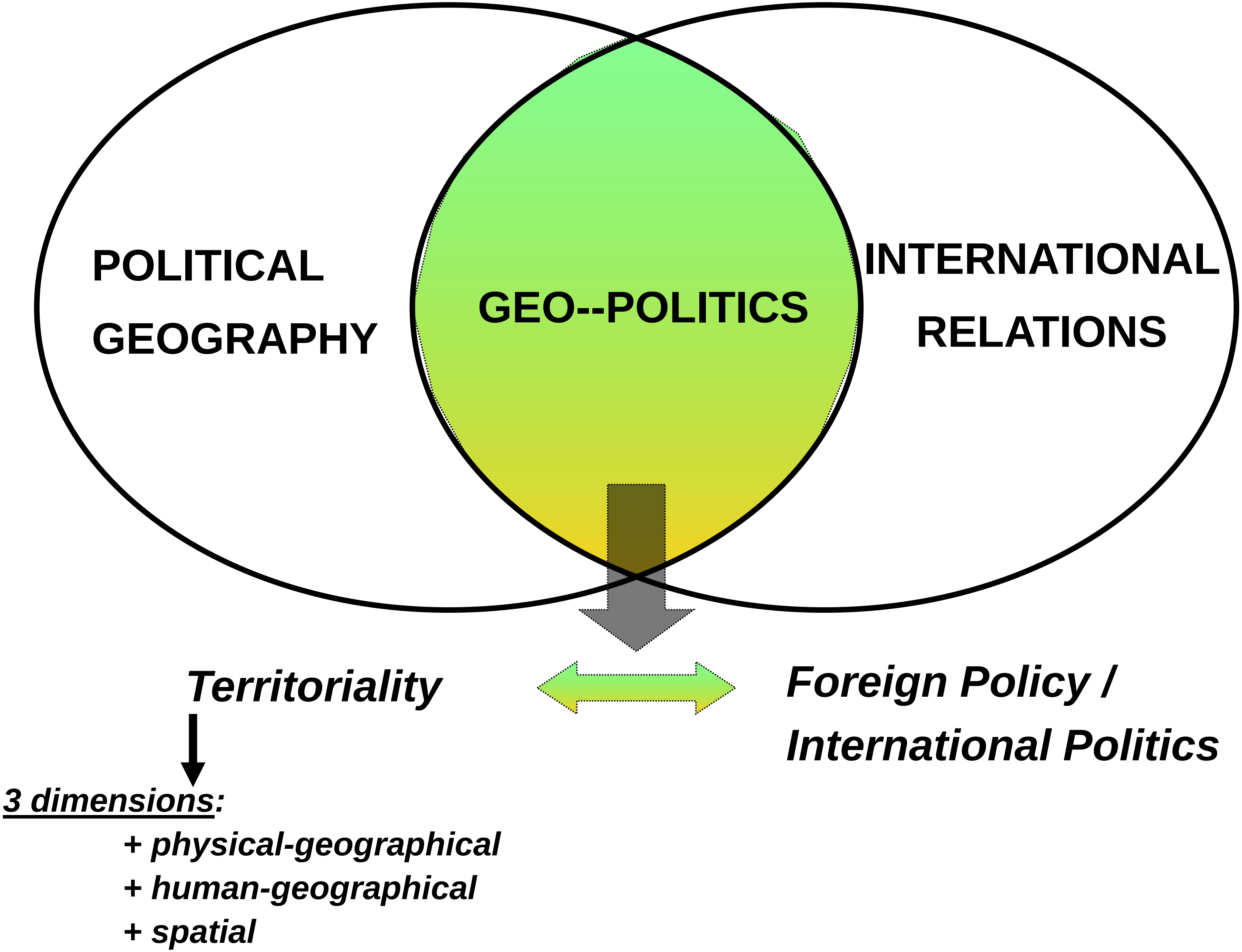
David Criekemans

1.

WHAT IS GEOPOLITICS?

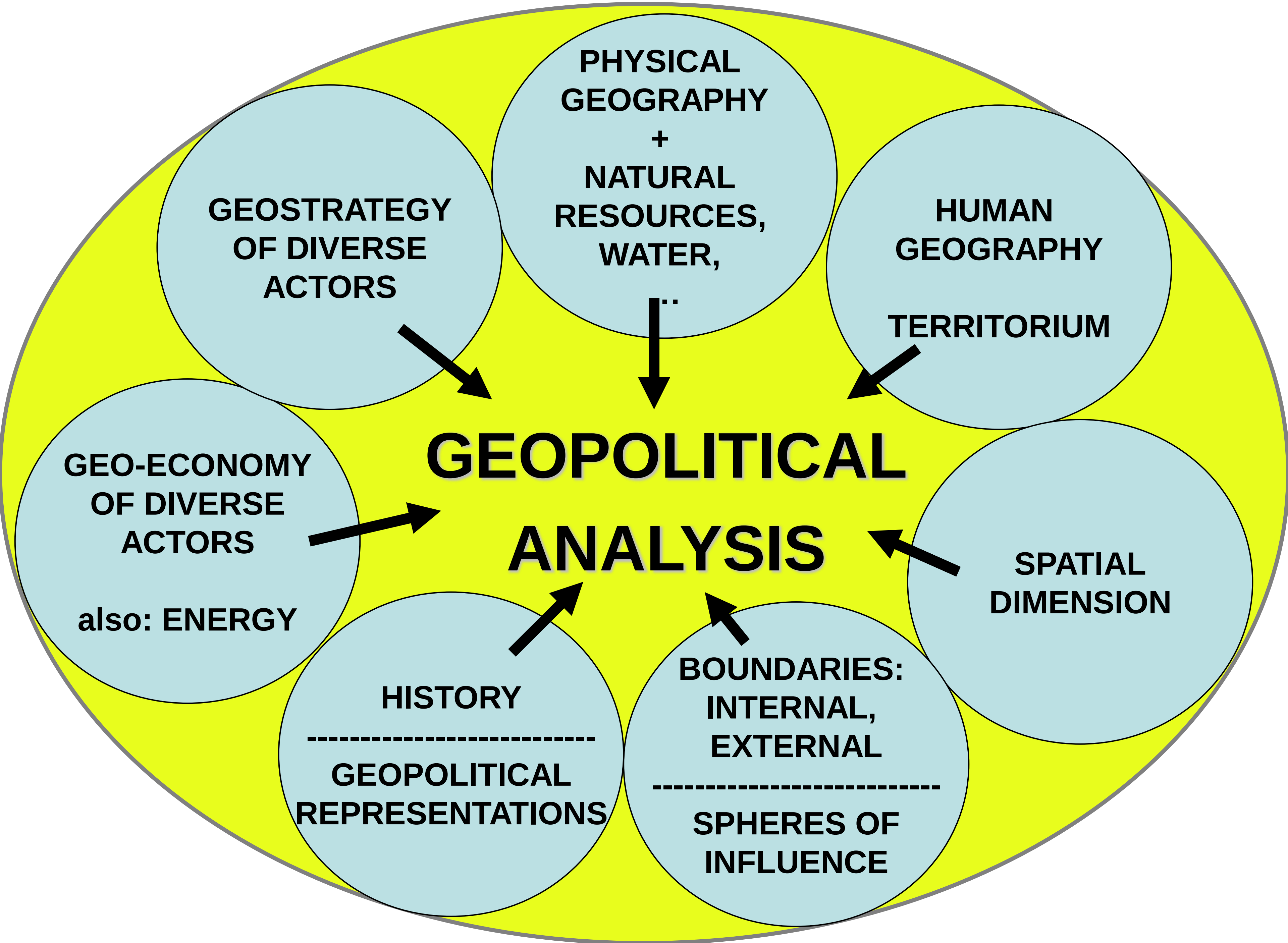
WHAT IS THE GEOPOLITICS OF ENERGY?

WHAT IS THE GEO-TECHNICAL ENSEMBLE?


POLITICAL
GEOGRAPHY
GEO--POLITICS
INTERNATIONAL
RELATIONS
Territoriality
Foreign Policy /
International Politics
3 dimensions:
+ physical-geographical
+ human-geographical
+ spatial

Criekemans 2008:

"Geopolitics is the scientific field of study belonging to both Political Geography and International Relations, which investigates the interaction between politically acting (wo)men and their surrounding territoriality (in its three dimensions; physical-geographical, human-geographical and spatial)."


PHYSICAL GEOGRAPHY + NATURAL RESOURCES, WATER, ...
GEOSTRATEGY OF DIVERSE ACTORS
HUMAN GEOGRAPHY
TERRITORIUM
GEOPOLITICAL ANALYSIS
GEO-ECONOMY OF DIVERSE ACTORS
also: ENERGY
SPATIAL DIMENSION
HISTORY
GEOPOLITICAL REPRESENTATIONS
BOUNDARIES: INTERNAL, EXTERNAL
SPHERES OF INFLUENCE

GEO-POLITICS

What impact do “geographically embedded factors” have such as climate change, energy(sources), water, ethnicity, religion, but also ‘regional & local instability’, etc.?

+ GEO-TECHNICAL ENSEMBLE:

new technologies can change the meaning and role of these factors (e.g. fracking-technology, batteries)

= an ensemble of “GEO-POLITICAL RISKS”

ANOTHER WAY OF LOOKING AT GEOPOLITICS:

- **Geo-economics**
- **Geo-strategy**
- **Geo-culture**
- **“Geo-information”**

POLITICAL IMPLICATIONS

Geopolitical tensions East-West

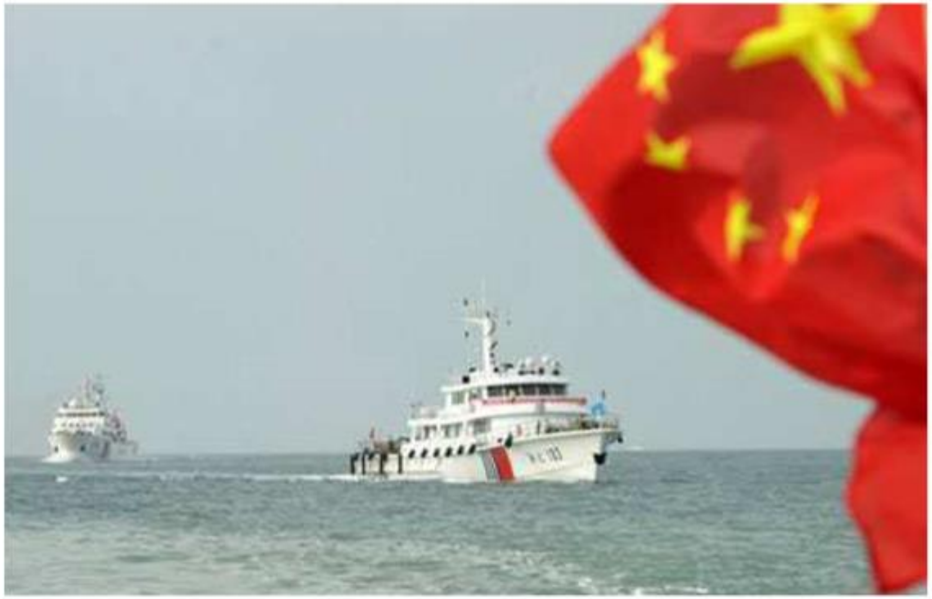
BLACK SEA


NOVOROSSIYA 2.0
That's New Russia(Novorossiya), to use the terminology of the tsarist Russia: Kharkov, Lugansk, Donetsk, Kherson, Nikolaev and Odessa were not part of Ukraine back then. These territories were given to Ukraine in the 1920s by the Soviet Government. Why? God knows! (Vladimir Putin)
BELARUS
POLAND (NATO)
Kyiv
LUGANSK PEOPLE'S REPUBLIC
Buffer zone between Rebels and Govt.
Lviv
Kharkov
Dnieper
SLOVAKIA (NATO)
UKRAINE
TRANSNISTRIA (DE FACTO RUSSIAN PROTECTORATE INSIDE MOLDOVA)
Lugansk
HUNGARY (NATO)
Dnepropetrovsk
Donetsk
Krivoy Rog
Zaporozhye
MOLDOVA
Rostov-on-Don
PUTIN'S NOVOROSSIYA
ROMANIA (NATO)
Nikolaev
DONETSK PEOPLE'S REPUBLIC
GAGAUZIA (PRO-RUSSIAN-LED AUTONOMOUS REGION IN MOLDOVA)
Kherson
Odessa
SEA OF AZOV
RUSSIAN FEDERATION
CRIMEA (ANNEXED BY THE RUSSIAN FEDERATION)
BLACK SEA
BUDJAK (PRO-RUSSIAN REGION IN UKRAINE; A POSSIBLE « BESSARABIAN PEOPLE'S REPUBLIC »)
Simferopol
Sevastopol
0 200 km
0 100 miles
© 2015 Cristian Ionita

Expanding Reach

China's overseas investments are cultivating a network of potential naval ports

Source: Center for a New American Security. This graphic was updated to more precisely plot port locations.





TRADE
5G
AI
MILITARY


Fit for 55


STRATEGIC
AUTONOMY
pathways to progressive action


Press release | 18 May 2022
REPowerEU:
European
Commission


Special
European Council
17-18-19-20 July 202
Repair
Reform
Remodel

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2.

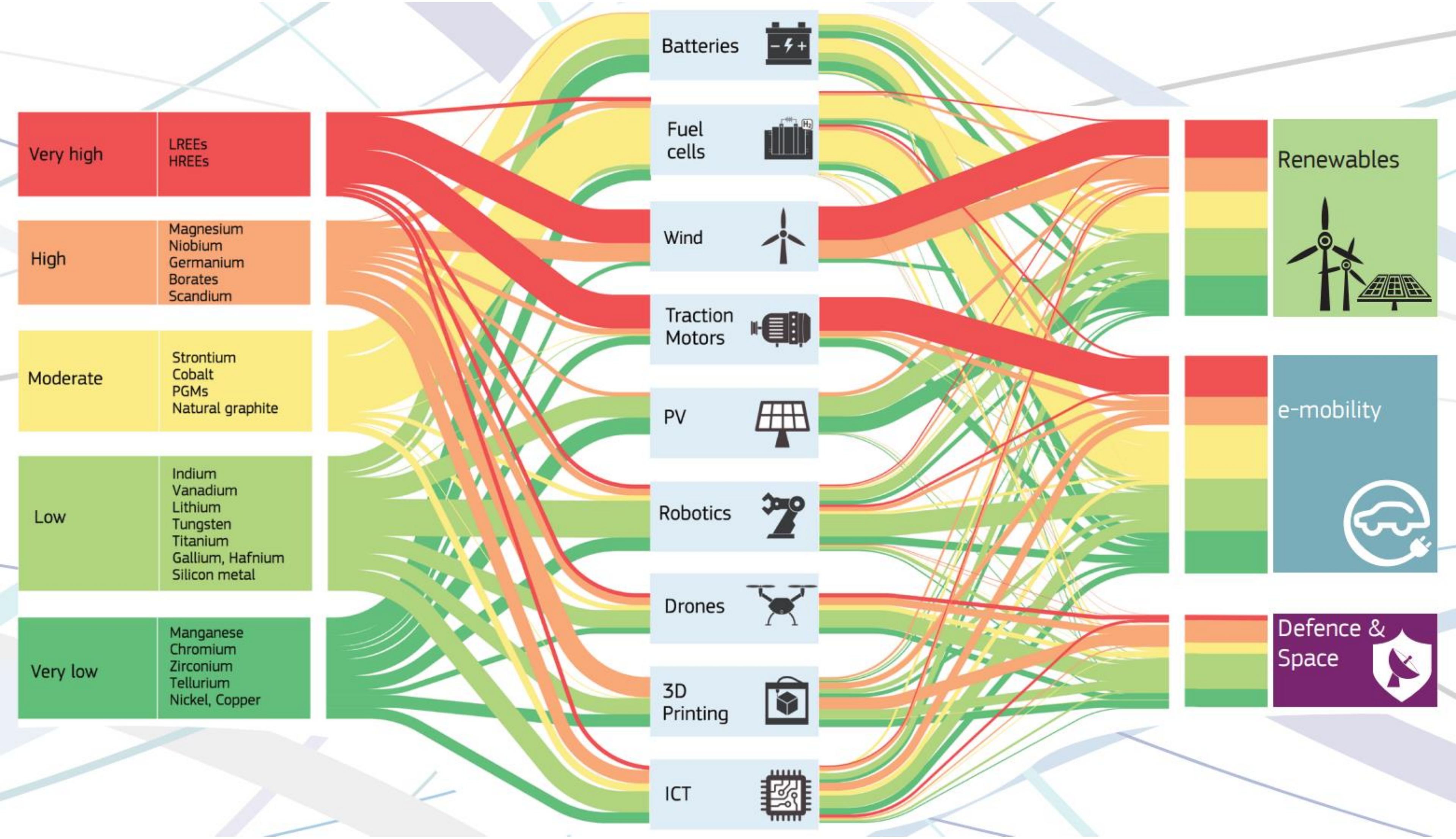
WHAT ARE THE GEOPOLITICAL IMPLICATIONS OF THE ACCELERATING SHIFT TO RENEWABLES AND GREEN ENERGIES?

WHAT IMPACT FOR PORTS AS ENERGY HUBS OF THE FUTURE?

WHAT ARE THE GEOPOLITICAL IMPLICATIONS OF THE ACCELERATING SHIFT TO RENEWABLES? (1)

- **The electrification of transportation in the EU will change Europe's dependencies towards horizon 2030 and beyond. We may start witnessing scarcity and supply problems when it comes to key resources such as nickel, cobalt, copper, silver, scandium, lithium, and rare earth materials.**

- **This has led to calls for a European critical materials (CRM) strategy. For the European Commission, critical raw materials have a high economic value and supply risk. Building on the EU's Raw Materials Initiative, the Commission published a report in which the EU 2020 list of critical raw materials is developed.**


Very high
LREEs
HREEs
High
Magnesium
Niobium
Germanium
Borates
Scandium
Moderate
Strontium
Cobalt
PGMs
Natural graphite
Low
Indium
Vanadium
Lithium
Tungsten
Titanium
Gallium, Hafnium
Silicon metal
Very low
Manganese
Chromium
Zirconium
Tellurium
Nickel, Copper
Batteries
Fuel cells
Wind
Traction Motors
PV
Robotics
Drones
3D Printing
ICT
Renewables
e-mobility
Defence & Space

WHAT ARE THE GEOPOLITICAL IMPLICATIONS OF THE ACCELERATING SHIFT TO RENEWABLES? (2)

- In February 2021 U.S. president Joe Biden signed an executive order that addressed critical materials, essential goods, supply chains, and key technologies for the energy sector.

- Europe could find itself in a world in which the US-China rivalry will affect its own options for developing its continental-wide geopolitical strategy in terms of renewable energy.

- European countries must avoid a scenario in which US and Chinese led-blocs drive renewable energy technologies and standards and redirect relevant natural resources towards their respective economies.

US CHALLENGES: DOMESTIC

INFRASTRUCTURE

The Biden Infrastructure Plan – A $300 Billion Stimulus, A $3 Trillion Ten Year Initiative, Or Both?

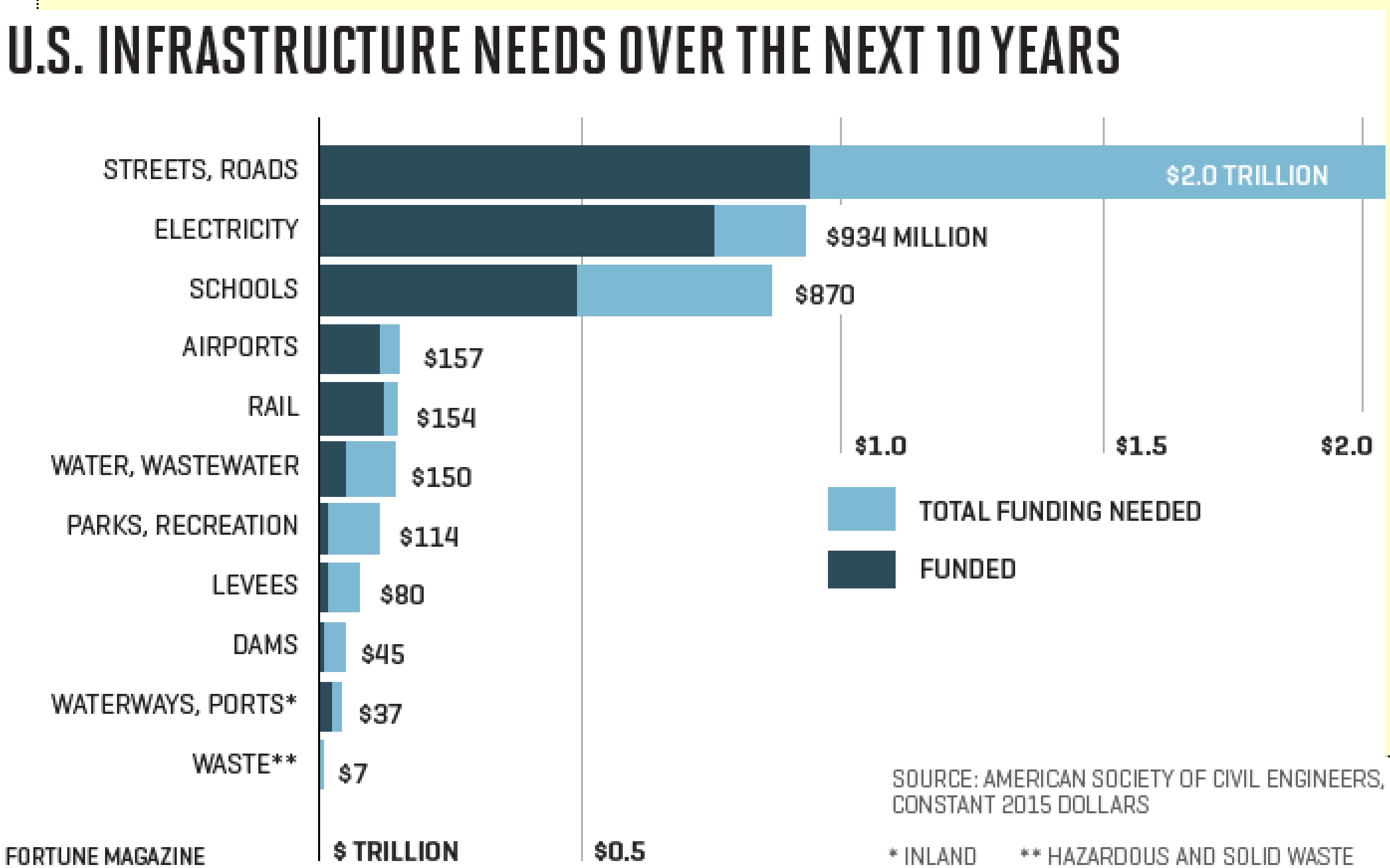
Norman Anderson Contributor

Investing

I write about infrastructure, technology, finance and benefits for all

America's infrastructure is decaying — here's a look at how terrible things have gotten

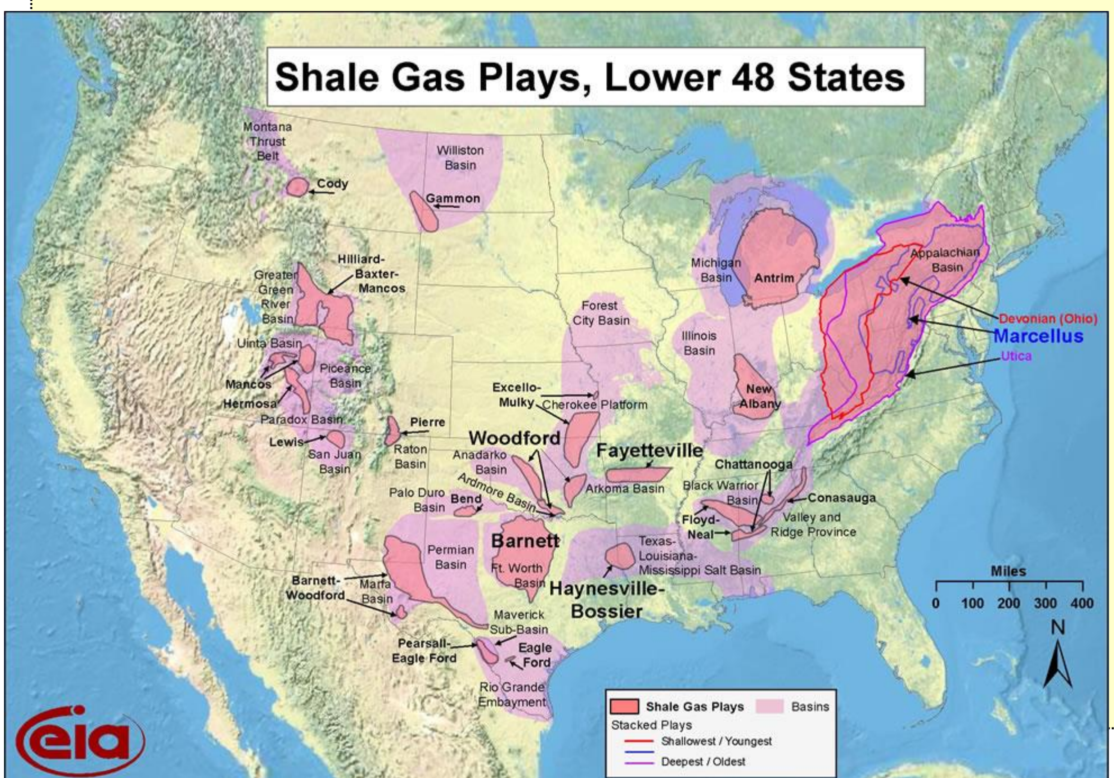
Cadie Thompson, Mark Matousek



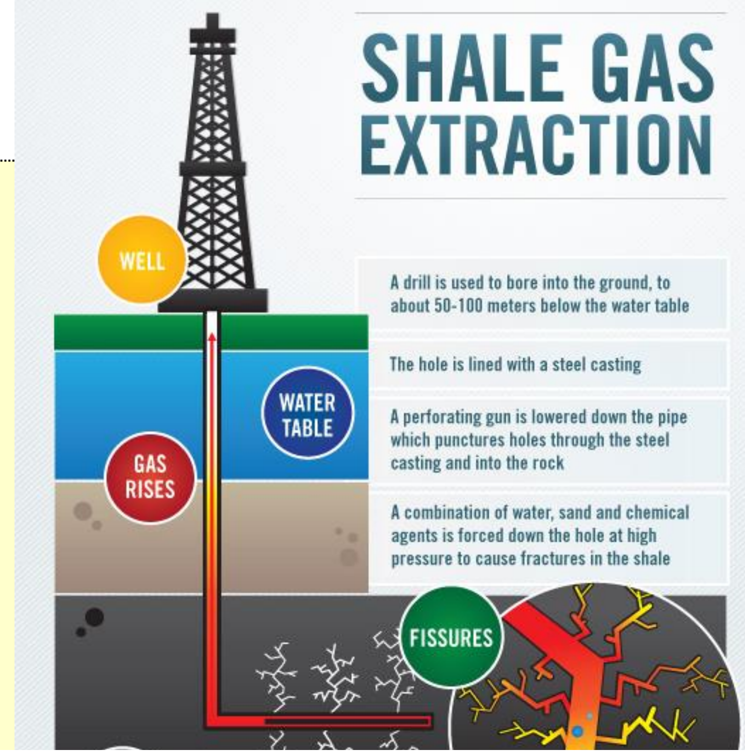
US CHALLENGES: DOMESTIC

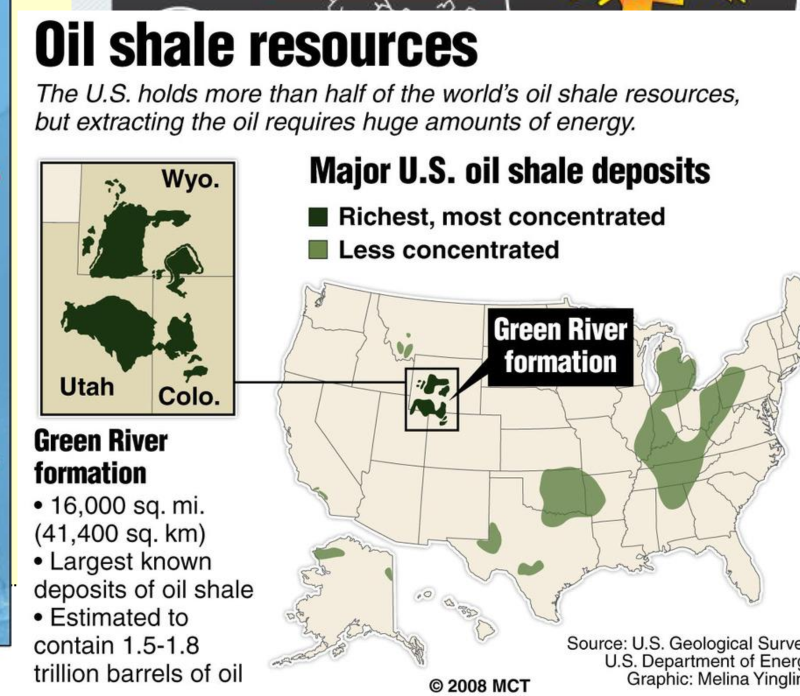
SHALE OIL & -GAS:

an option for EU to diversify away from Russia, but are there enough LNG ships?



Source: Energy Information Administration based on data from various published studies.
Updated: March 10, 2010

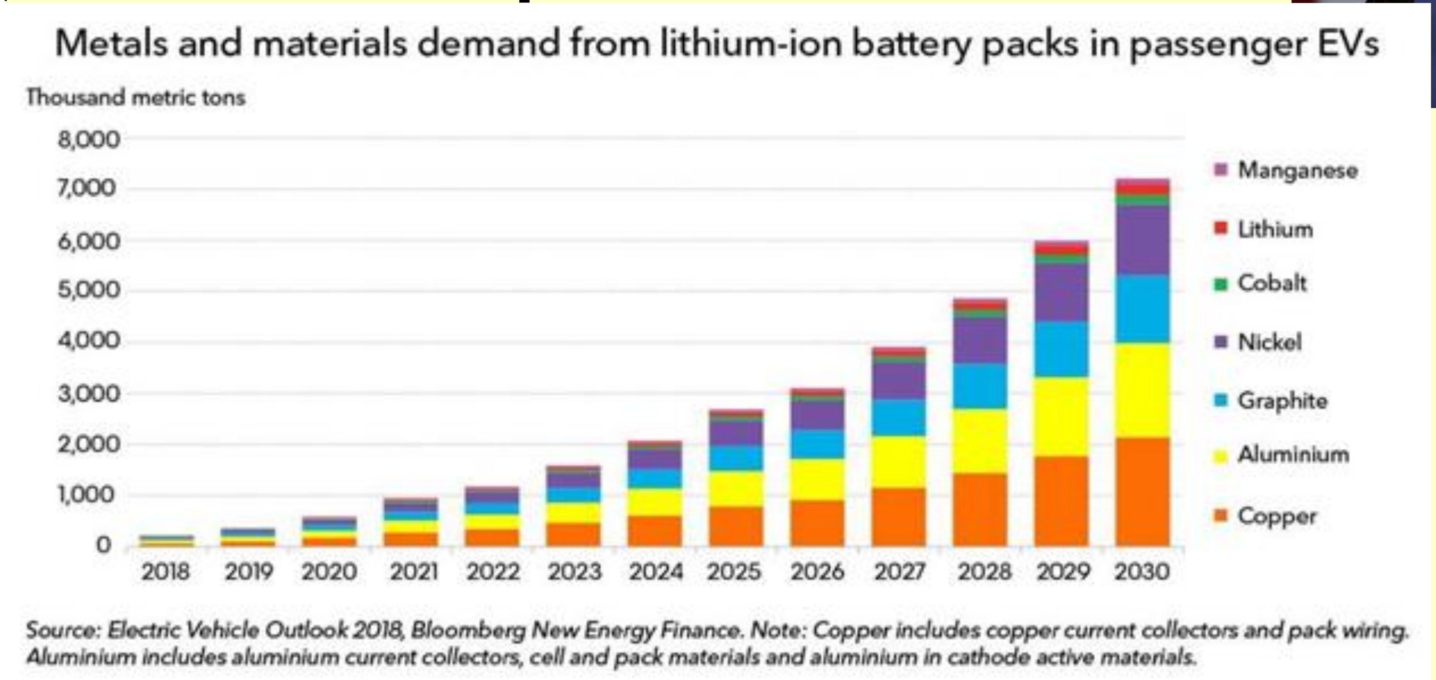




US CHALLENGES: DOMESTIC

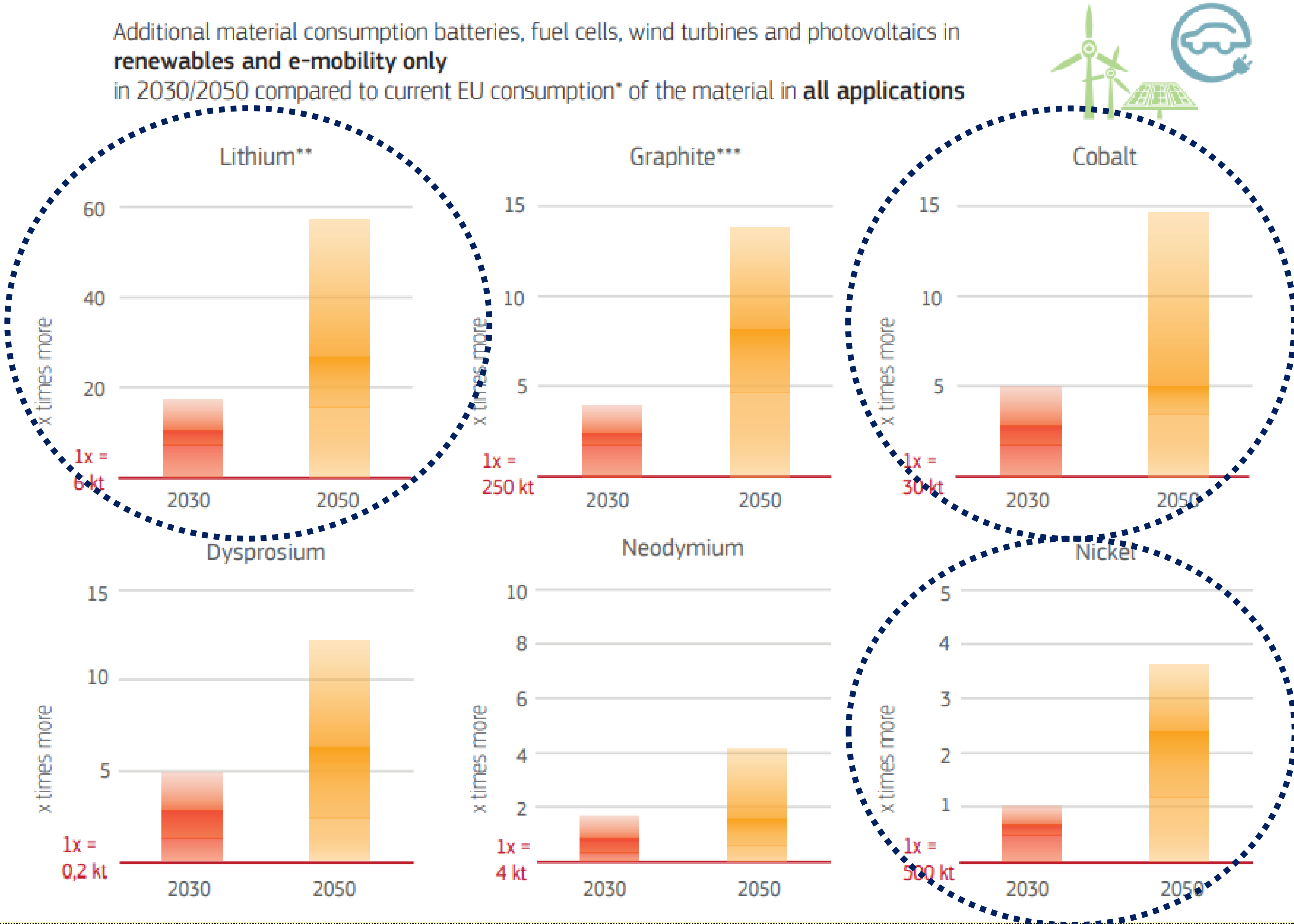
ENERGY TRANSITION:

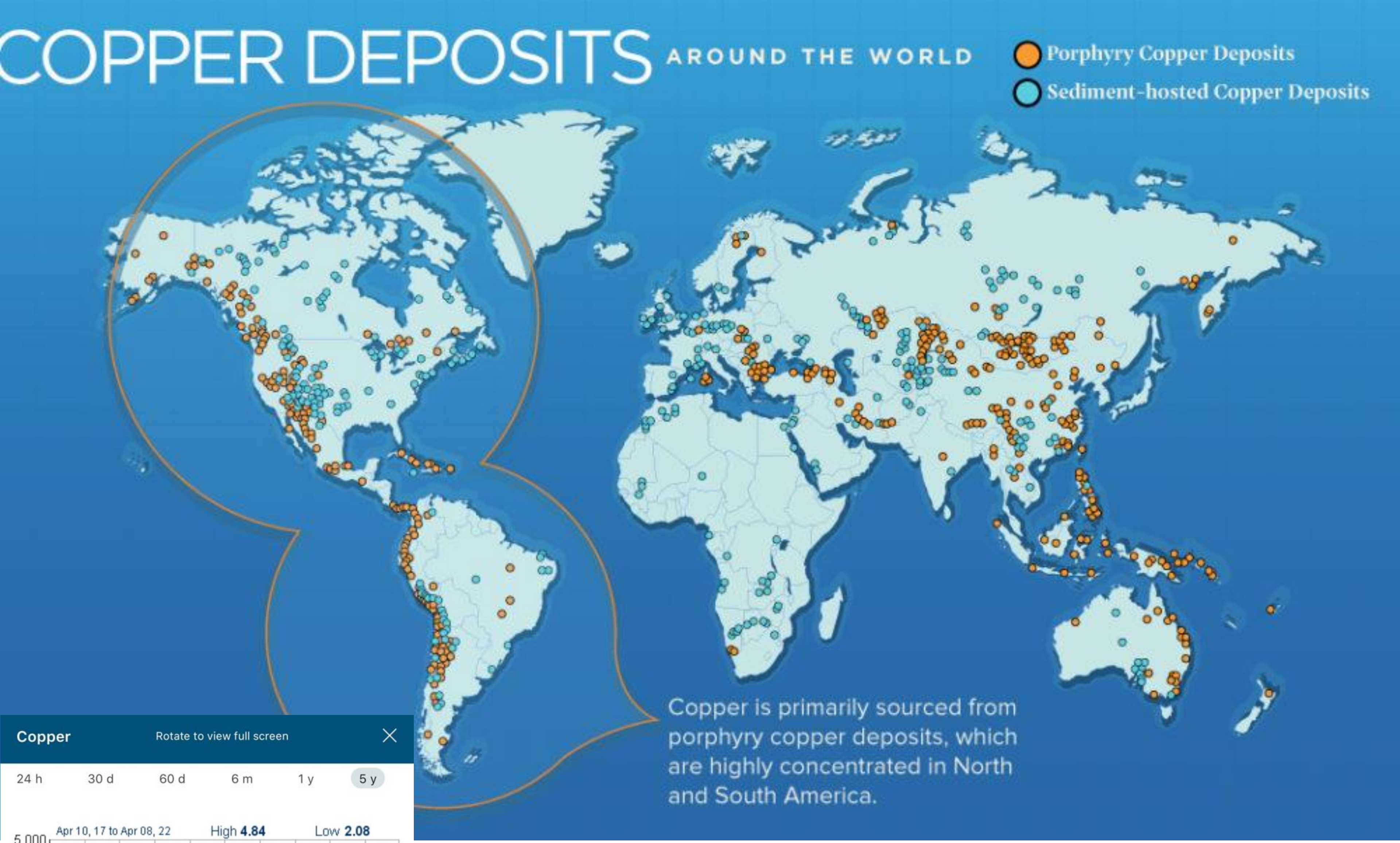
Potential competition US – EU?



Economic transformation requires more attention for basic commodities;
nickel, cobalt,
copper, silver,
Rare earth materials

Figure 1. Combined critical raw materials use in different technologies in the EU in 2030 and 2050





COPPER DEPOSITS
AROUND THE WORLD
Porphyry Copper Deposits
Sediment-hosted Copper Deposits
Copper is primarily sourced from porphyry copper deposits, which are highly concentrated in North and South America.

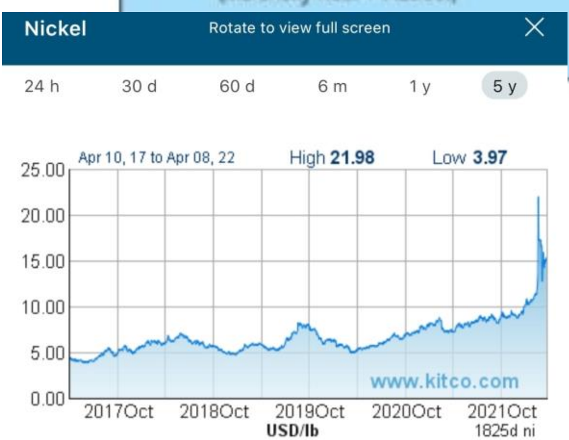
Copper
Rotate to view full screen
24 h
30 d
60 d
6 m
1 y
5 y
Apr 10, 17 to Apr 08, 22
High 4.84
Low 2.08
5.000
4.500
4.000
3.500
3.000
2.500
2.000
1.500
2017Oct
2018Oct
2019Oct
2020Oct
2021Oct
www.kitco.com
USD/lb
1825d cu

COPPER

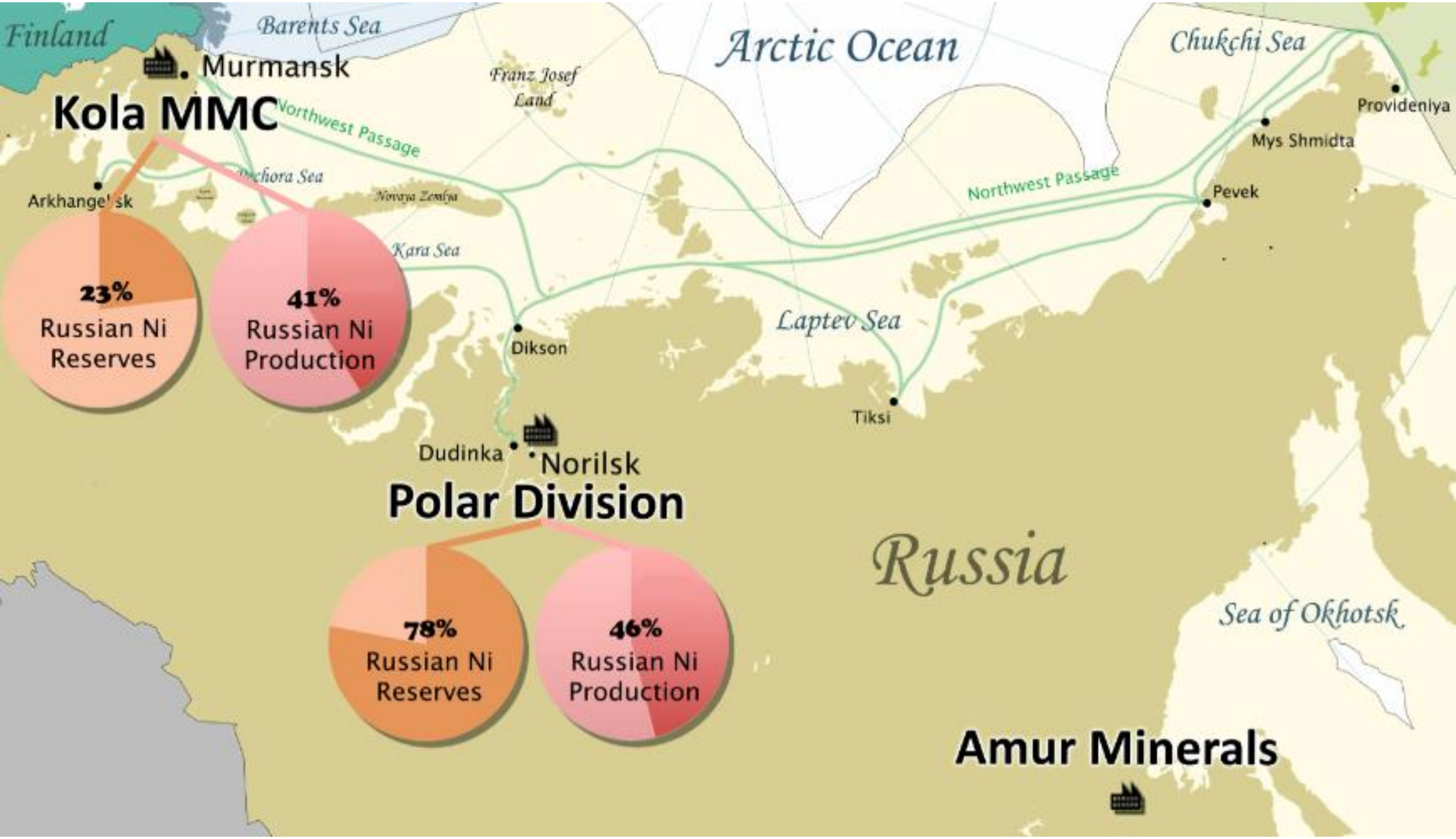
NICKEL

Nickel sulphide deposit
(Global resources of nickel metal)

- *> 10 000 000 t*
- *1 000 000–10 000 000 t*
- *< 1 000 000 t*
- *Associated platinum-group element deposits*
- *Nickel laterite deposit*



Nickel production Russia



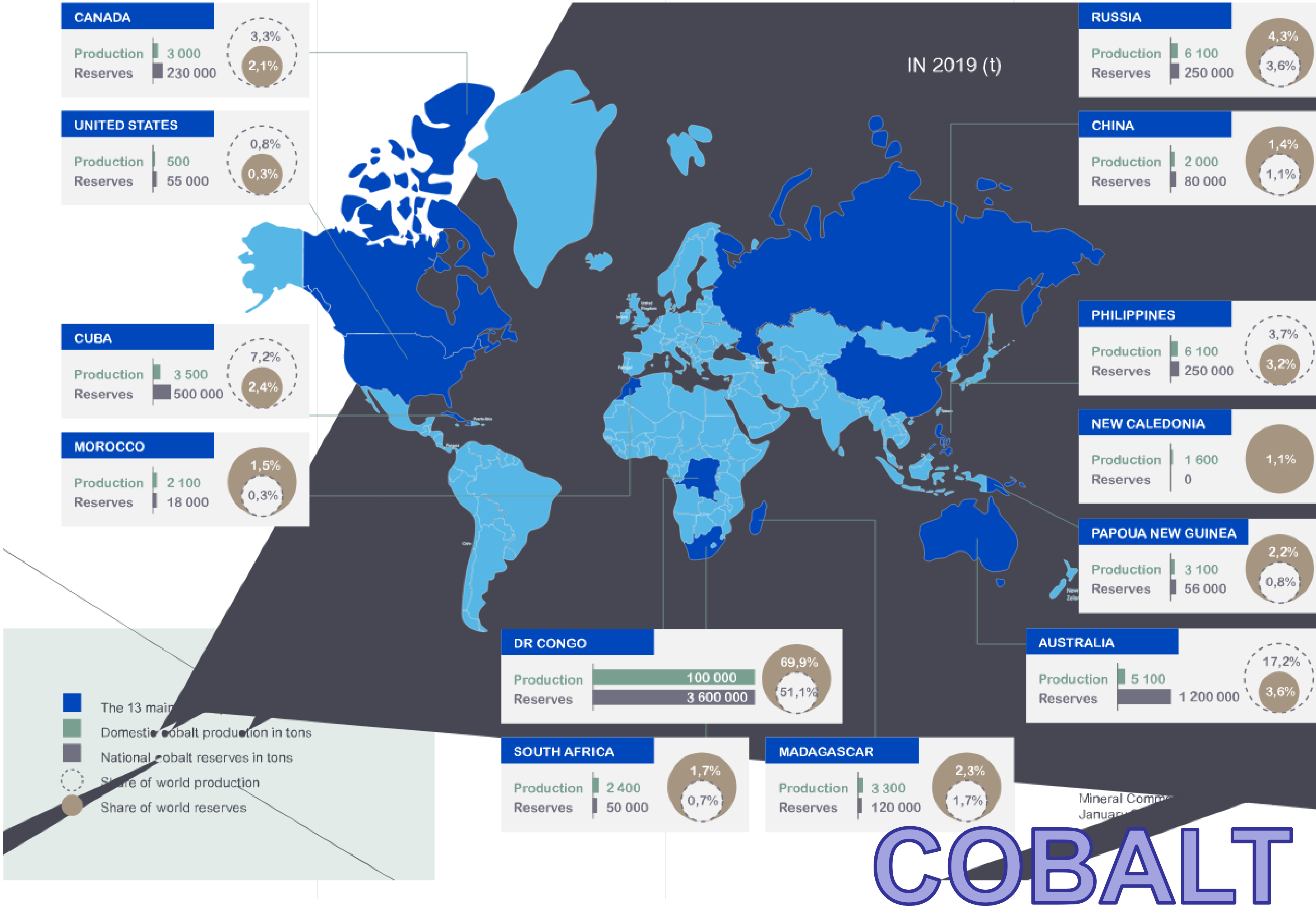
Sustainable mining efforts in Canada:

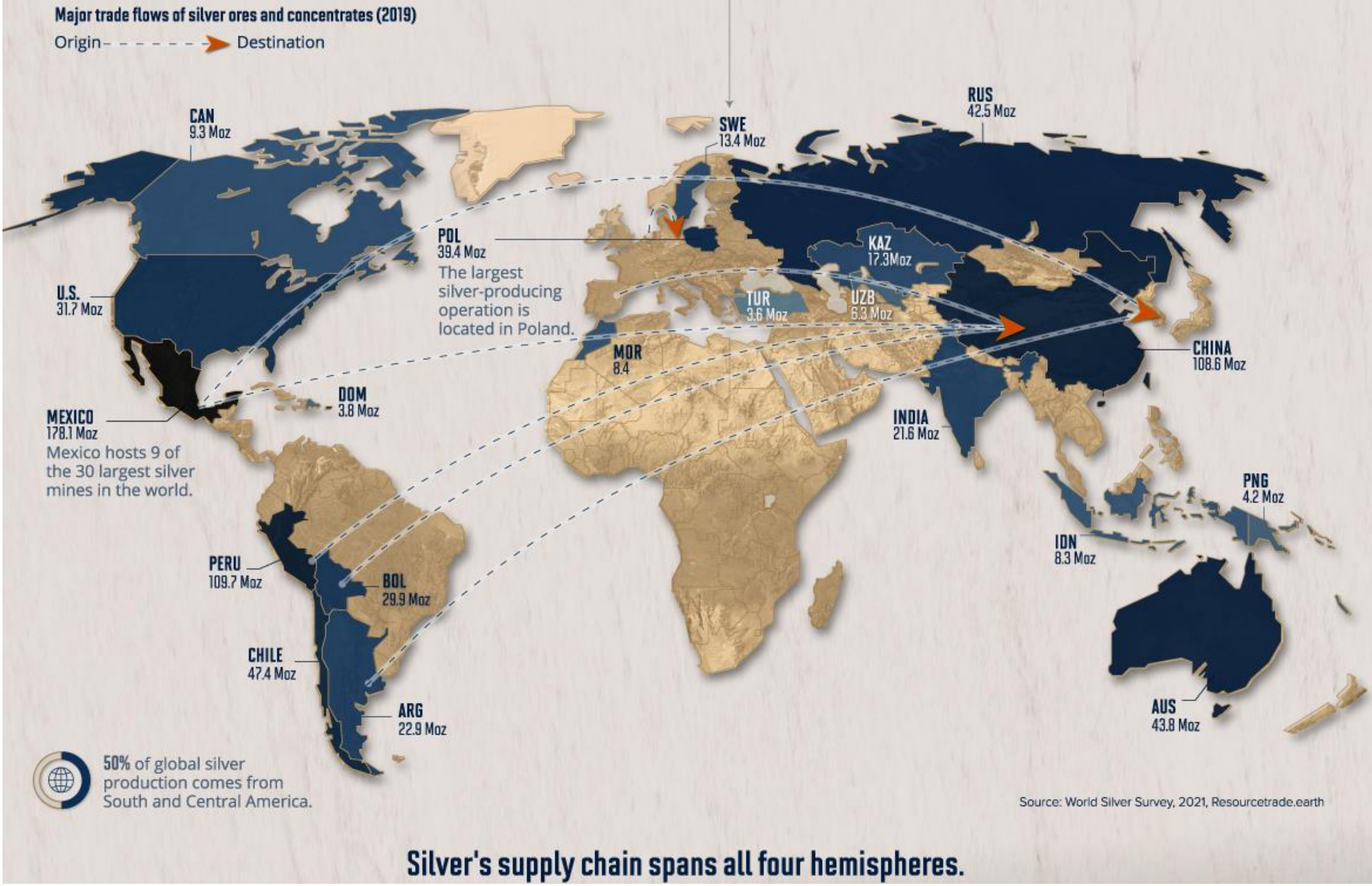
FPX Nickel looks to achieve production from Baptiste project with lowest carbon footprint in nickel industry

Posted by Paul Moore on 12th January 2021

Strategic Partnership EU-Canada?

FPX Nickel Corp has highlighted the potential for its Baptiste project in central British Columbia to produce refined nickel with a significantly lower carbon footprint than other sources of production in the global nickel industry. These findings are based on the project's recent Preliminary Economic Assessment (PEA), which outlined the development of a conventional processing facility powered by low-carbon hydro-electric power for the production of a refined, high-grade (63% nickel) product capable of bypassing smelting and being sold directly to end users.


IN 2019 (t)
CANADA
Production 3 000
Reserves 230 000
3,3%
2,1%
UNITED STATES
Production 500
Reserves 55 000
0,8%
0,3%
CUBA
Production 3 500
Reserves 500 000
7,2%
2,4%
MOROCCO
Production 2 100
Reserves 18 000
1,5%
0,3%
RUSSIA
Production 6 100
Reserves 250 000
4,3%
3,6%
CHINA
Production 2 000
Reserves 80 000
1,4%
1,1%
PHILIPPINES
Production 6 100
Reserves 250 000
3,7%
3,2%
NEW CALEDONIA
Production 1 600
Reserves 0
1,1%
PAPOUA NEW GUINEA
Production 3 100
Reserves 56 000
2,2%
0,8%
AUSTRALIA
Production 5 100
Reserves 1 200 000
17,2%
3,6%
DR CONGO
Production 100 000
Reserves 3 600 000
69,9%
51,1%
SOUTH AFRICA
Production 2 400
Reserves 50 000
1,7%
0,7%
MADAGASCAR
Production 3 300
Reserves 120 000
2,3%
1,7%
Domestic cobalt production in tons
National cobalt reserves in tons
Share of world reserves
COBALT

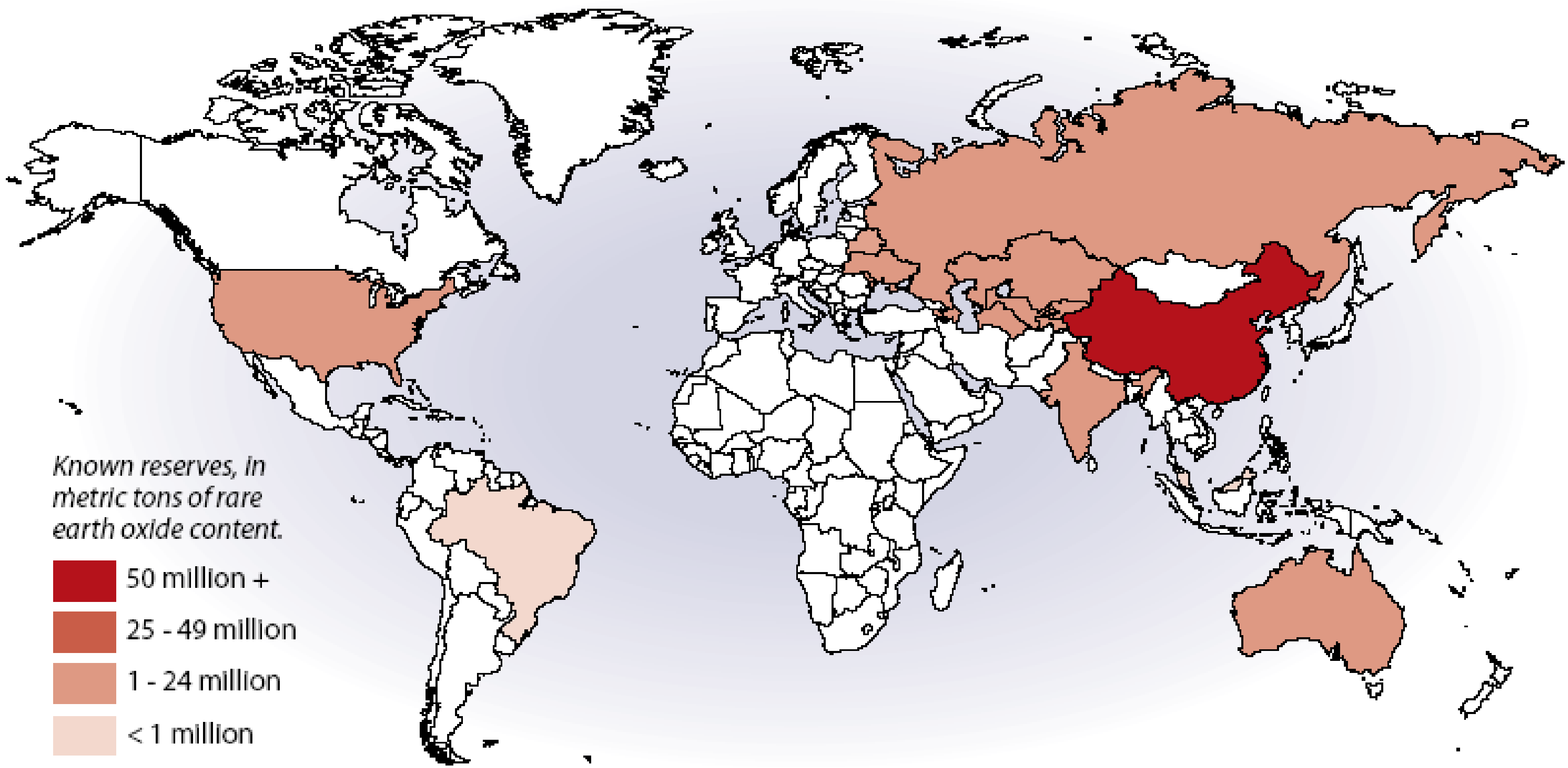

Major trade flows of silver ores and concentrates (2019)
Origin Destination
CAN
9.3 Moz
SWE
13.4 Moz
RUS
42.5 Moz
POL
39.4 Moz
The largest silver-producing operation is located in Poland.
KAZ
17.3Moz
U.S.
31.7 Moz
TUR
3.6 Moz
UZB
6.3 Moz
MOR
8.4
CHINA
108.6 Moz
DOM
3.8 Moz
MEXICO
178.1 Moz
Mexico hosts 9 of the 30 largest silver mines in the world.
INDIA
21.6 Moz
PNG
4.2 Moz
IDN
8.3 Moz
PERU
109.7 Moz
BOL
29.9 Moz
CHILE
47.4 Moz
ARG
22.9 Moz
AUS
43.8 Moz
50% of global silver production comes from South and Central America.
Source: World Silver Survey, 2021, Resourcetrade.earth
Silver's supply chain spans all four hemispheres.

SILVER

Map of silver-producing countries: The map above shows the top ten silver-producing countries in the world for calendar year 2013. Data from the USGS Mineral Commodity Summary.

SILVER

KNOWN RESERVES OF RARE EARTH MINERALS



Source: USGS Mineral Commodity Summary 2011

Known reserves worldwide totaled 110 million metric tons as of January 2011. The Commonwealth of Independent States combined hold 19 million metric tons. Additionally, other countries hold a combined 22 million in known reserves.

RARE EARTHS

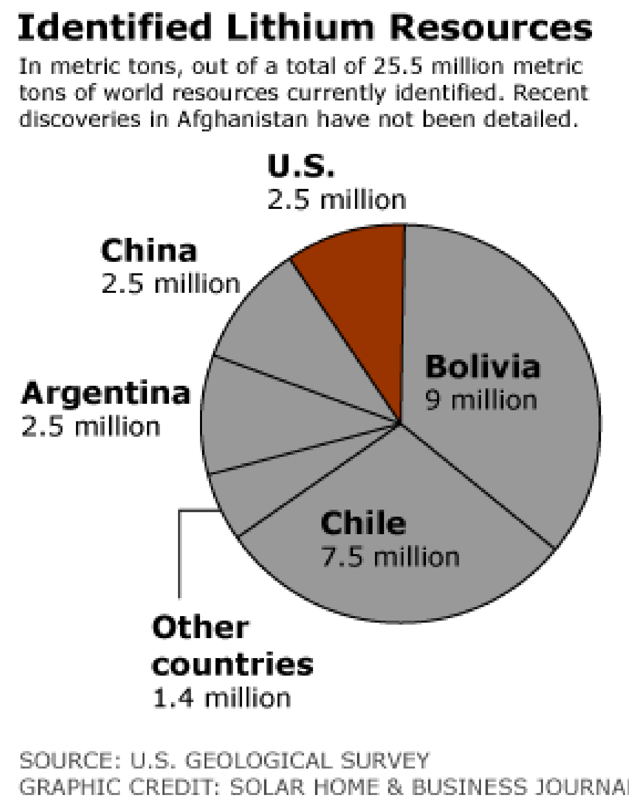
IMPORT SOURCES OF RARE EARTH MINERALS

Source: USGS Mineral Commodity Summary 2011

Other countries produced 2 percent of supplies to the United States.

RARE EARTHS

ELECTRIC CARS, BATTERIES AND LITHIUM SUPPLIES: GEOPOLITICS!



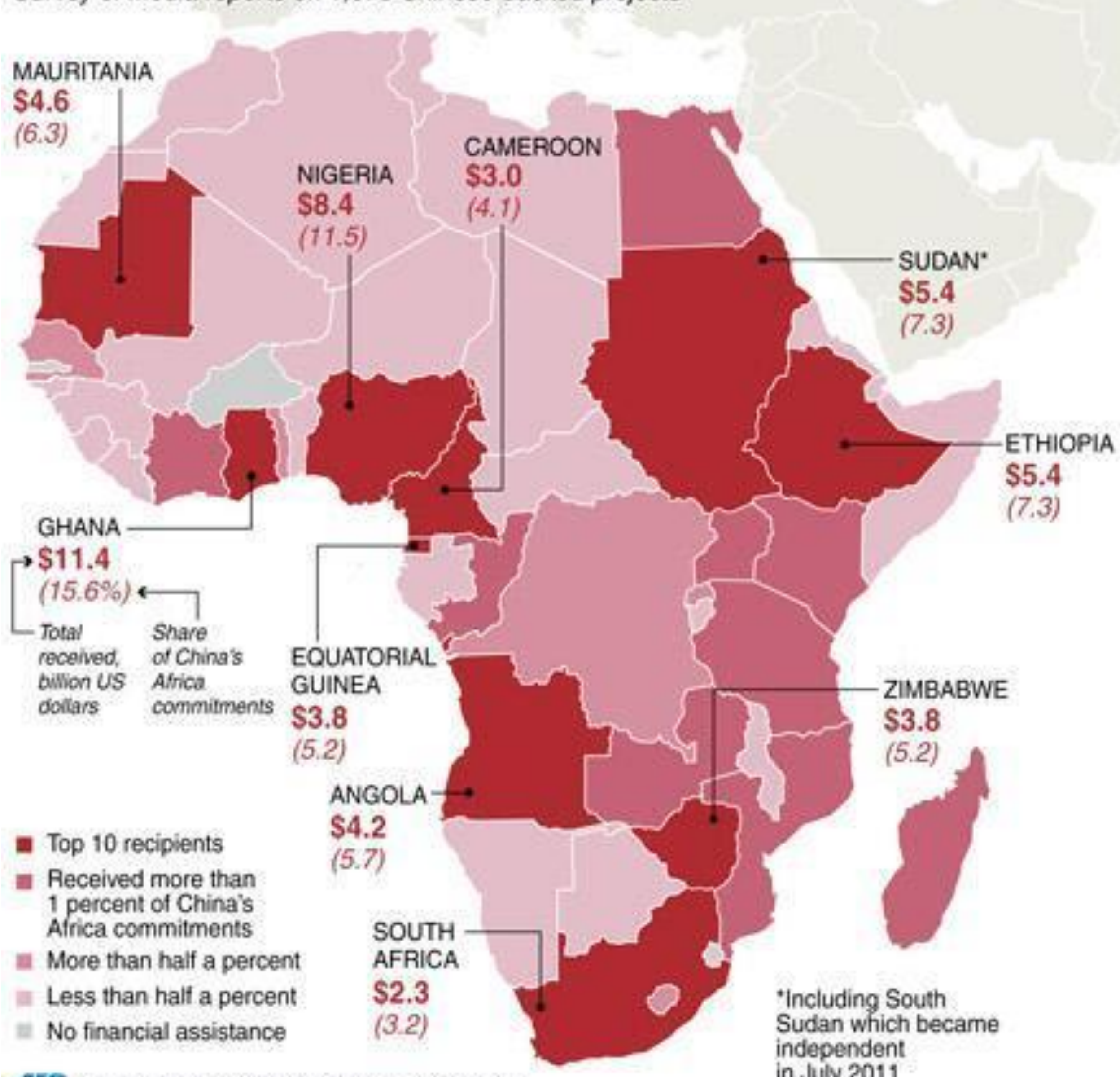
LITHIUM

China assistance to Africa

During the last decade, China has been investing heavily in African natural resources, developing mines, oil wells and running related construction companies

Top recipients of Chinese finance to Africa 2000-2011

Survey of media reports on 1,673 Chinese-backed projects



AFP Source: Aid/Data/Center for Global Development

Billion-dollar projects

Ghana, 2010
Concessionary loan
$5.49 billion

Nigeria, 2006
Infrastructure in exchange for preferential oil right bidding
5.38

Mauritania, 2006
Oil exploration, sewage systems, iron mine, road
4.04

Ghana, 2009
Loan for oil and road projects
3.0

Equatorial Guinea, 2006
Oil-backed loan
2.69

Ethiopia, 2009
Loan for dam construction
2.25

South Africa, 2011
Financial cooperation agreement
2.25

Angola, 2004
National Rehabilitation Project
1.51

Madagascar, 2008
Hydroelectric construction
1.42

Sudan, 2007
Railway construction
1.38

Angola, 2009
Agriculture development
1.20

Zimbabwe, 2004
Powerplant construction
1.01

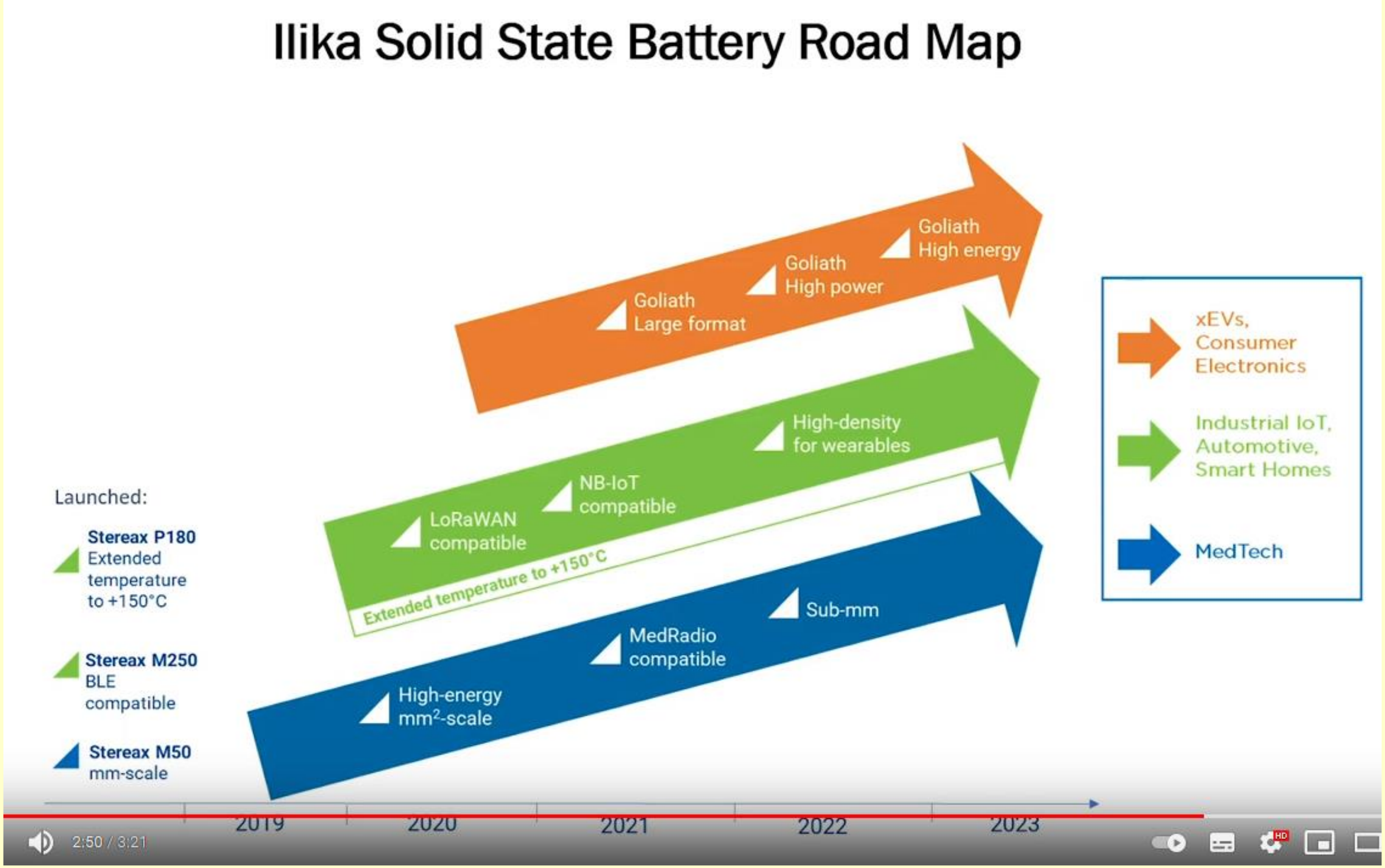
umicore

materials for a better life

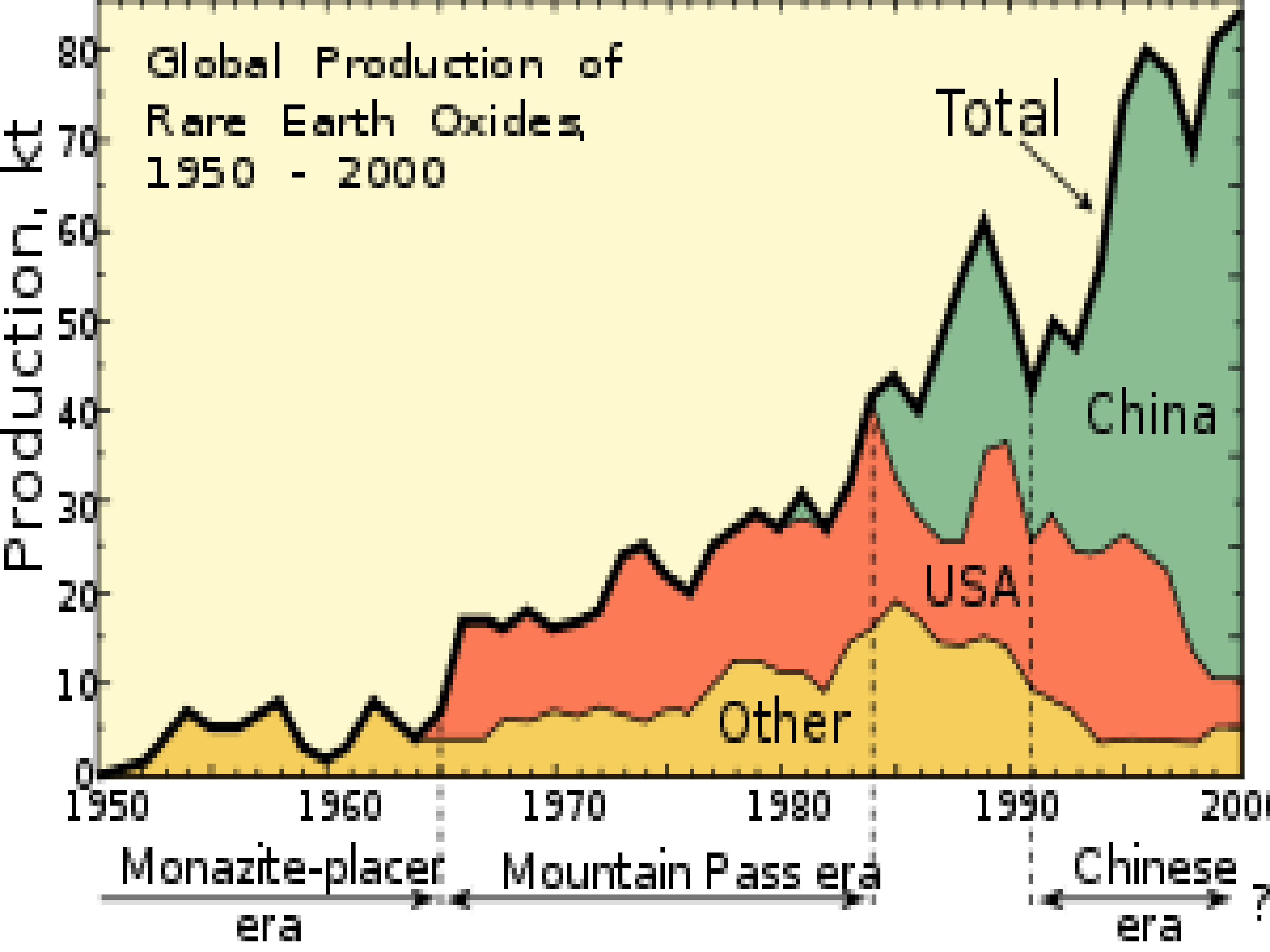
Umicore at a glance

Co Cobalt	Ni Nickel	Cu Copper	Zn Zinc	Ga Gallium	Ge Germanium				
As Arsenic	Se Selenium	S Sulfur	Ru Ruthenium	Rh Rhodium	Pd Palladium	Ag Silver	In Indium	Sn Tin	Sb Antimony
Te Tellurium	Ir Iridium	Pt Platinum	Au Gold	Pb Lead	Bi Bismuth	La Lanthanum	Ce Cerium	Pr Praseodymium	Nd Neodymium

Example UK:
ilika sold state batteries



Example Canada: Electra Battery RG

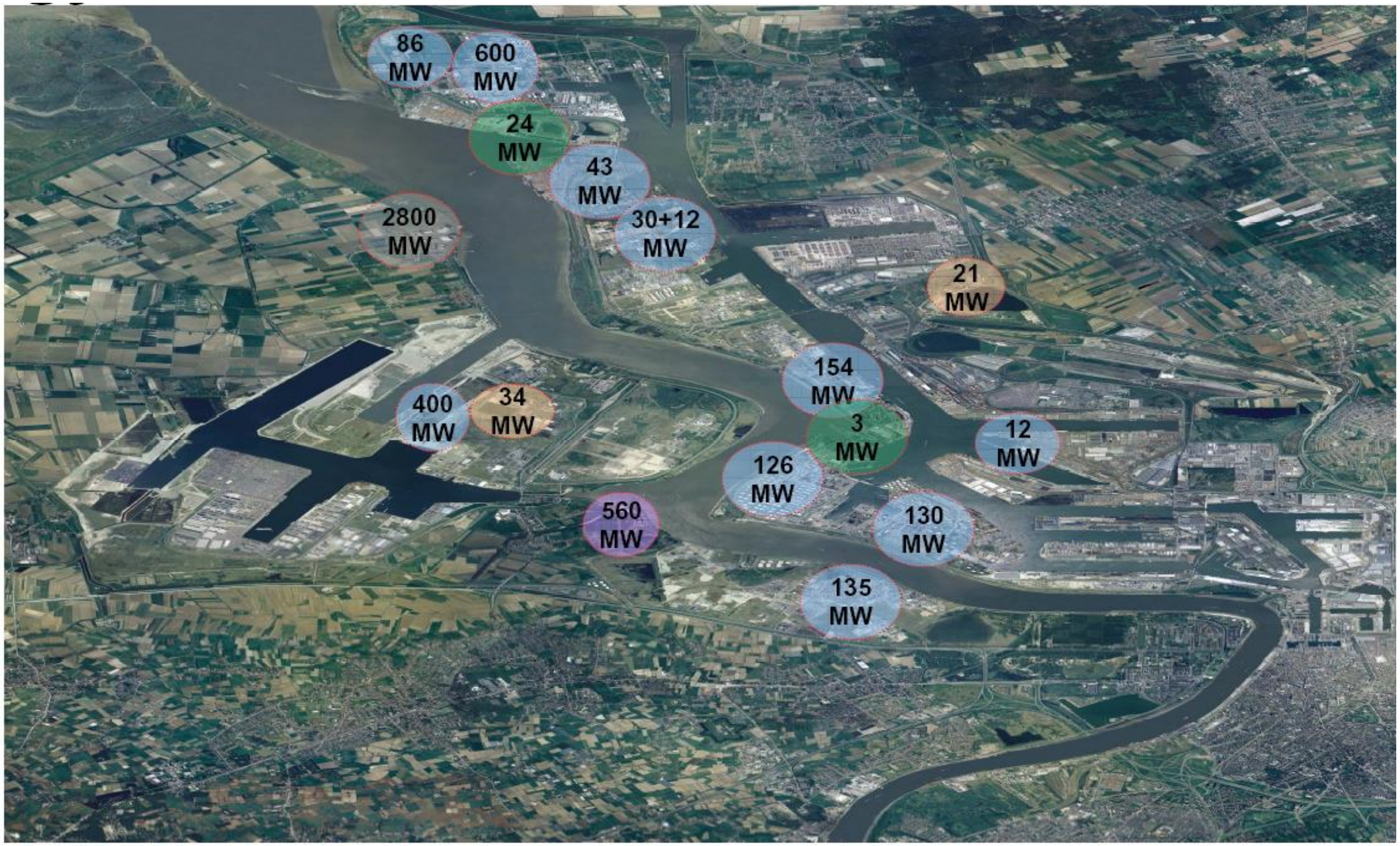


Global Production of
Rare Earth Oxides
1950 - 2000
Production, kt
0
10
20
30
40
50
60
70
80
Total
China
USA
Other
1950
1960
1970
1980
1990
2000
Monazite-placer
era
Mountain Pass era
Chinese
era
?

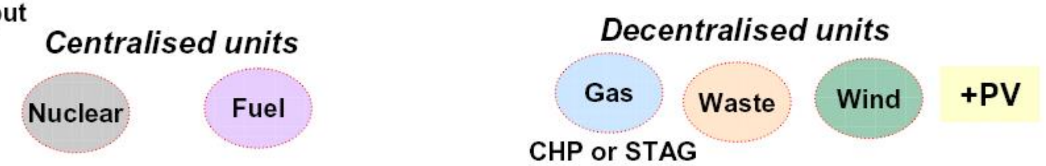
Hot Rocks
Prices for select rare-earth elements at the end of last year and earlier this week.
Price in dollars per kilogram*
4Q 2010
March 21, 2011
Rare-earth oxide
0
200
400
600
$800
Terbium
Europium
Dysprosium
Neodymium
Praseodymium
Lanthanum
Cerium
Samarium
*Average annual price in China for a standard 99% purity of each element.
Sources: Lynas; Agence France-Presse/Getty Images (photo)

As China's own consumption of rare earths grows, and the world remains dependent, will China not advance its own interests?

HARBOURS AS ENERGY HUBS IN ENERGY TRANSITION



All data in MW electrical output



Port of Antwerp

Active EU energy diversification strategies will be needed

HARBOURS AS KEY PLACES FOR INNOVATION

Port of Valencia:
using hydrogen technologies to reduce the environmental impact of its terminal machinery operations

HARBOURS AS NODES IN SUSTAINABLE TRANSPORT

HARBOURS AND PORT SECURITY IN A COMPLEX WORLD

- Physical security
- Cyber protection
- Critical infrastructure
- Screening
  foreign direct investment

Geopolitics becomes more central

HARBOURS AND SANCTIONS IN A WORLD OF STRUGGLE

Challenges in a complex geopolitical environment

HARBOURS:	**POLICY-MAKERS:**
- Long term planning	- Reaction to changes
- Regulatory stability	- Regulatory adaptation
- Keep options open	- Making policy choices
- Flexibility	- Decision-making slow

Energy transition in an age of geopolitical change. Ports as energy hubs of the future.

David Criekemans

3.

WHAT FORESEEABLE CONSEQUENCES OF GLOBAL ENERGY TRANSITION ON OIL AND GAS PRODUCERS?

+

IMPACT ON REGIONAL AND GLOBAL SECURITY

WHAT FORESEEABLE CONSEQUENCES OF GLOBAL ENERGY TRANSITION ON OIL AND GAS PRODUCERS? (1)

- **Crises in the business models of traditional oil producers such as in the Middle East, which could produce domestic societal instability.**

- **Countries like Saudi Arabia are already trying to diversify their respective business models.**

- **Decarbonization may put the social contract in particular oil regimes under pressure.**

WHAT FORESEEABLE CONSEQUENCES OF GLOBAL ENERGY TRANSITION ON OIL AND GAS PRODUCERS? (2)

- Several geopolitical theatres around Europe may reconfigure as a result of decarbonisation and energy transition.

- As a consequence, some such as Leonard et al., propose to help neighbouring oil and gas-exporting countries manage the repercussions of the European Green Deal. In their opinion, the EU should engage with these countries in order to encourage their economic diversification, including into renewable energy and green hydrogen that could in the future be exported to Europe.

RUSSIA
KAZAKHSTAN
Rostov
Astrakhan
Krasnodar
Groznyy
Black Sea
Caspian Sea
GEORGIA
Tbilisi
AZERBAIJAN
ARMENIA
Baku
Erivan
Erzurum
TURKMENISTAN
TURKEY
Tehran
Latakia
SYRIA
IRAQ
Beirut
Damascus
Baghdad
IRAN
Amman
Jerusalem
JORDAN
Al Jawf
KUWAIT
Al Aqabah
Tabuk
SAUDI ARABIA
BAHRAIN
Persian Gulf
OMAN
Riyadh
QATAR
Gulf of Oman
Red Sea
U. A. E.
Muscat
Sur
Jiddah
Mecca
OMAN
THE OIL CORRIDOR
Oil or gas field
R Refinery

WHAT FORESEEABLE CONSEQUENCES OF GLOBAL ENERGY TRANSITION ON OIL AND GAS PRODUCERS? (3)

- Natural gas will grow in relative importance as a ‘bridge fuel’ towards a renewable energy future.
- On the demand side, a growing number of countries are hence opting for an increased share of natural gas in their national energy mixes.
- Important changes are also taking place on the supply side. Thanks to innovative exploration techniques, novel supplies of natural gas are being discovered. This is prompting new shifts in geopolitical relations, potentially weakening Russia’s position because of added supply and competition.

WHAT FORESEEABLE CONSEQUENCES OF GLOBAL ENERGY TRANSITION ON OIL AND GAS PRODUCERS? (4)

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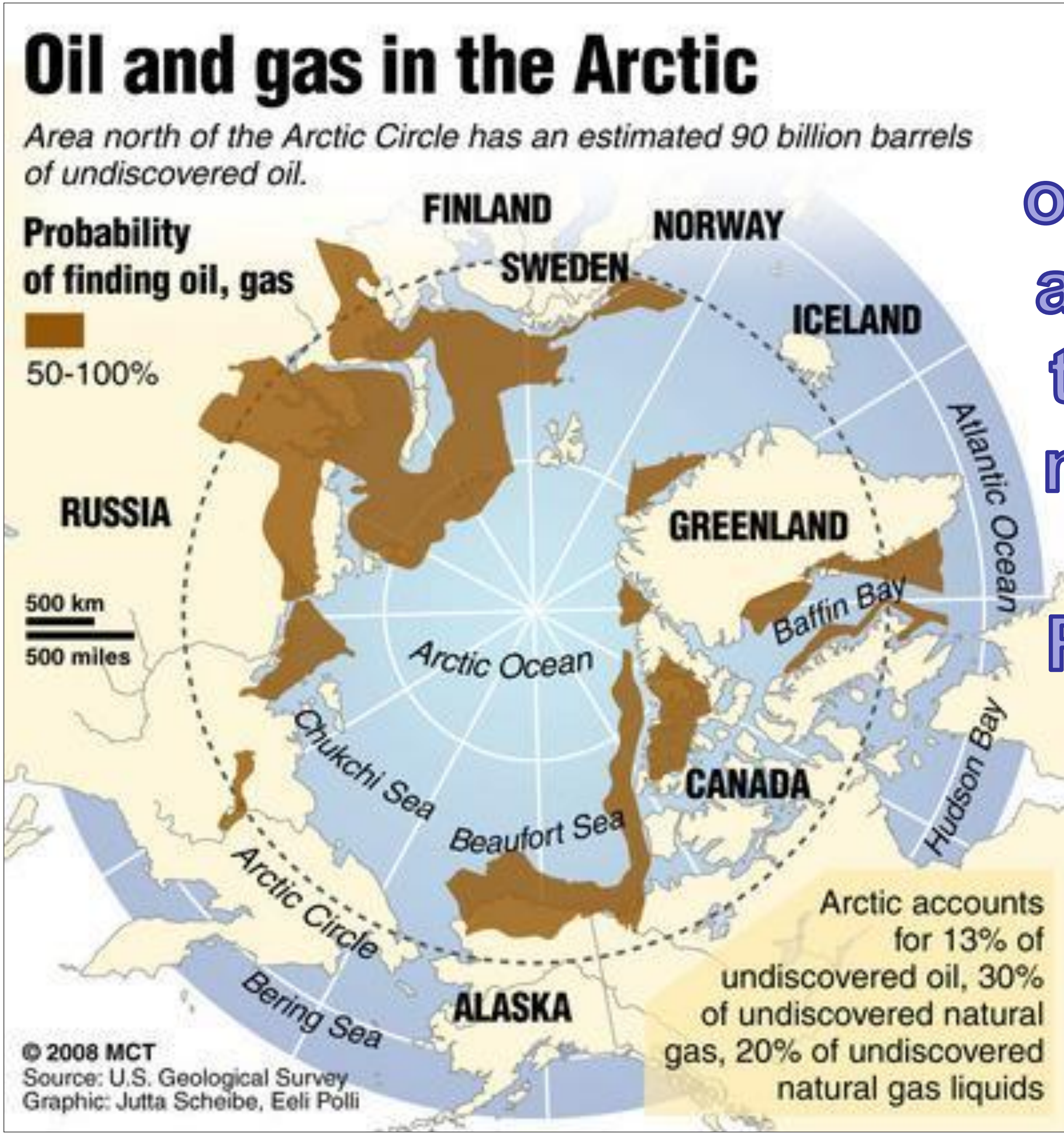
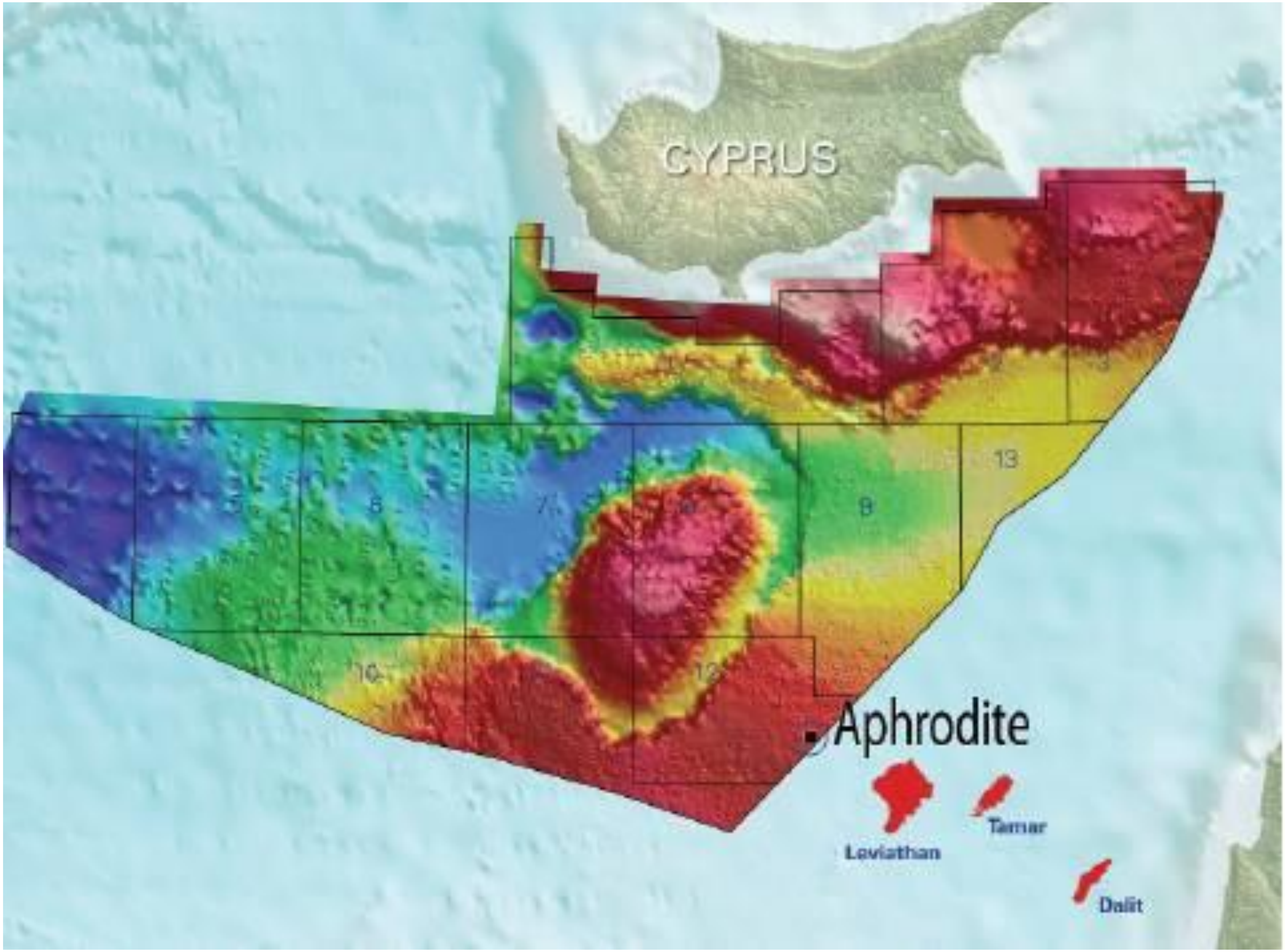


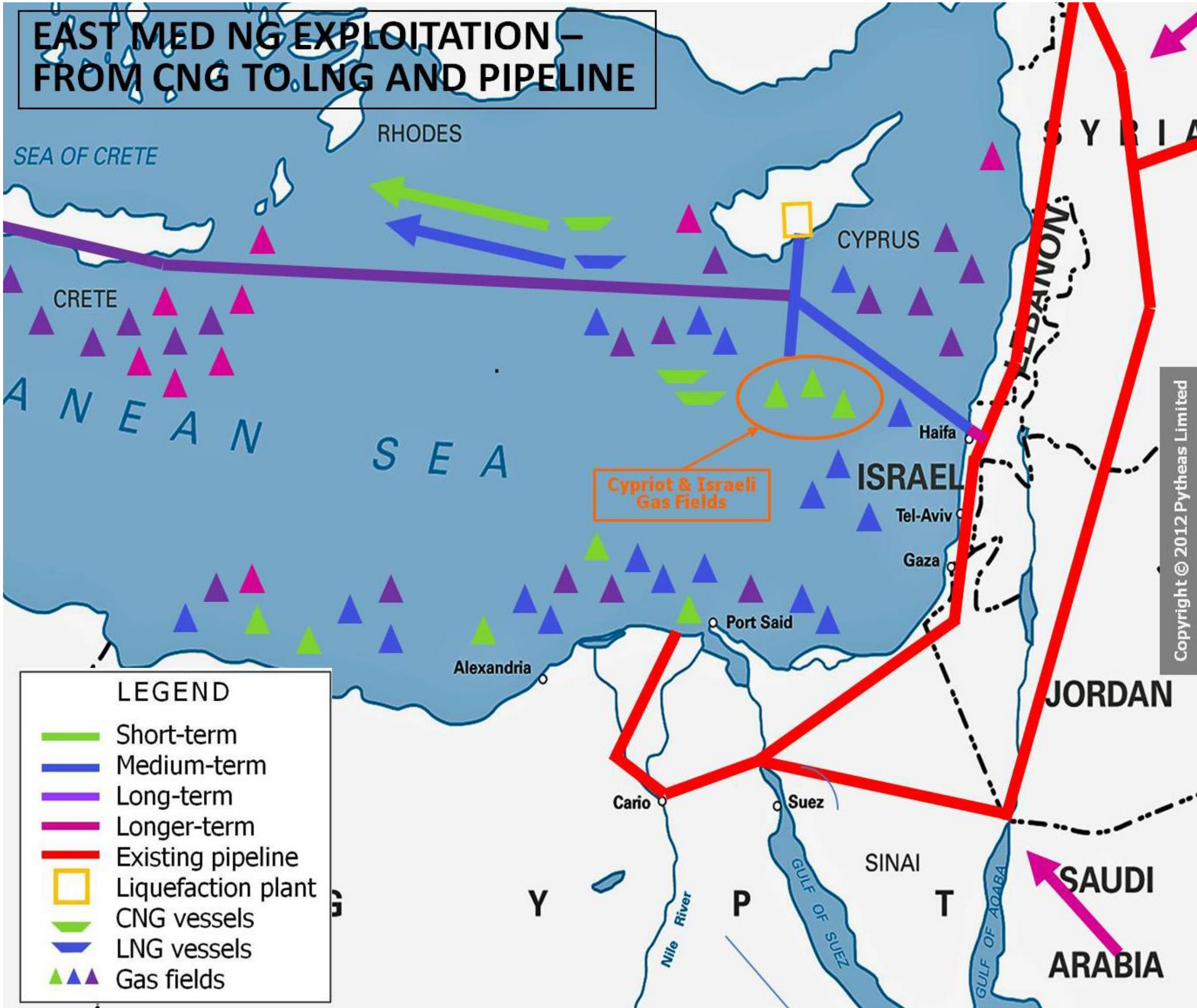
The thawing of the North Pole also is expected to open up new maritime routes to Asia along Russian shores

North Eastern Passage

Natural gas: bridge fuel & the East-Med



Israël, Leviathan, Gazprom & LNG

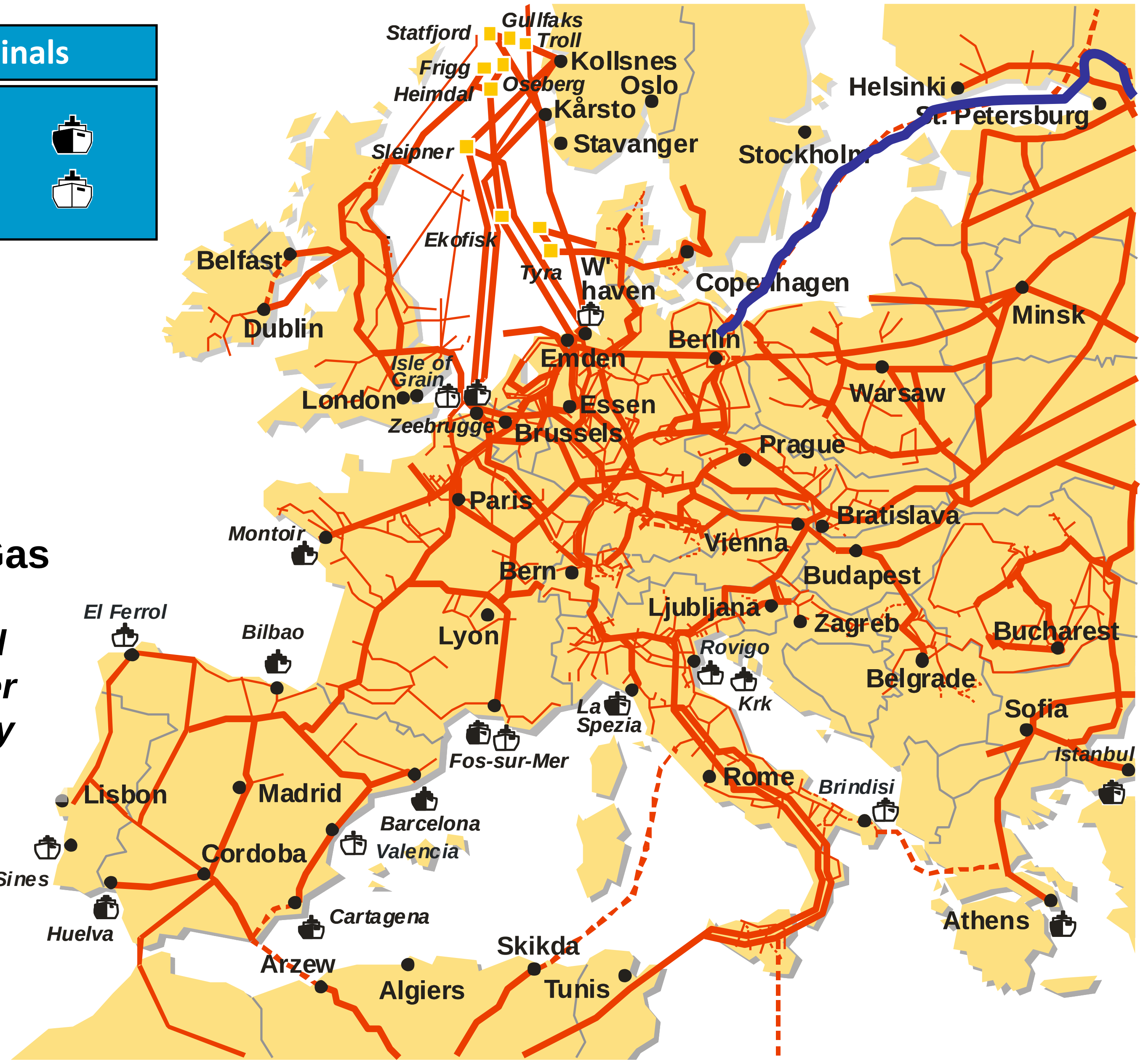


Europe's Gas Grid:
more LNG terminals needed?

pipelines/LNG receiving terminals

existing

planned or under construction



SOURCE:

Mark H. Hayes & David G. Victor - Stanford University

Geopolitics of Natural Gas

A joint study from Stanford PESD & the James A. Baker III Institute for Public Policy of Rice University

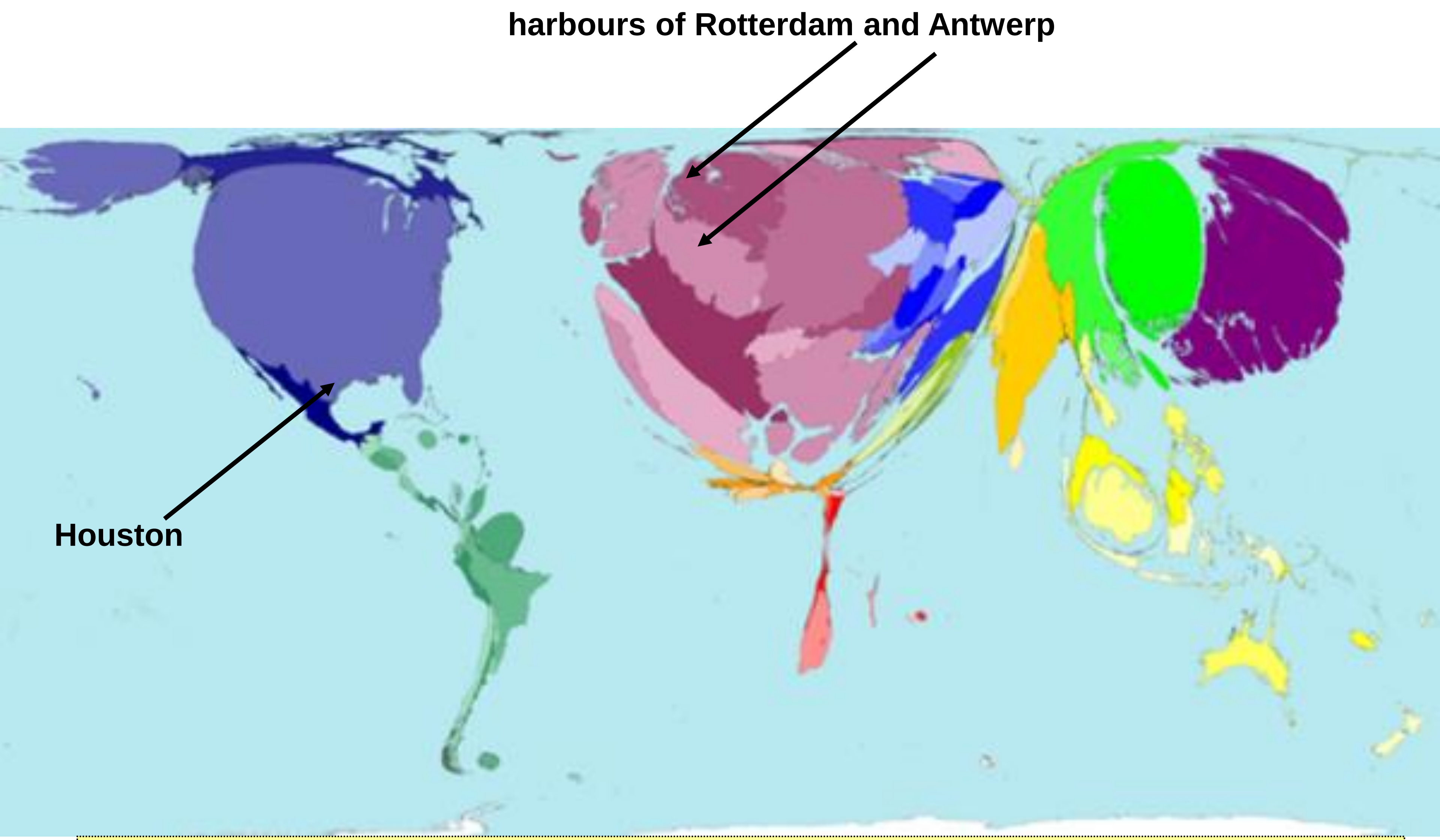
Gas Transmission Europe (2003)

WHAT FORESEEABLE CONSEQUENCES OF GLOBAL ENERGY TRANSITION ON OIL AND GAS PRODUCERS? (5)

- Innovative exploration techniques have uncovered several substantial natural gas fields off the coast of Israel, Cyprus, and Egypt. There are signs of more to come. This has led to geopolitical tensions between Turkey and Greece over their competing claims to natural gas deposits in the Eastern Mediterranean.

- Similarly, often forgotten is that we will completely have to rethink the petro-based chemical industry towards a biobased industry. We may thus currently underestimate the importance of (sustainable) biomass.

GLOBAL OIL TRADE: world map adjusted



SOURCE : http://www.danablankenhorn.com/images/world_fuel_imports_2002_worldmapper.png

Antwerp (BE):

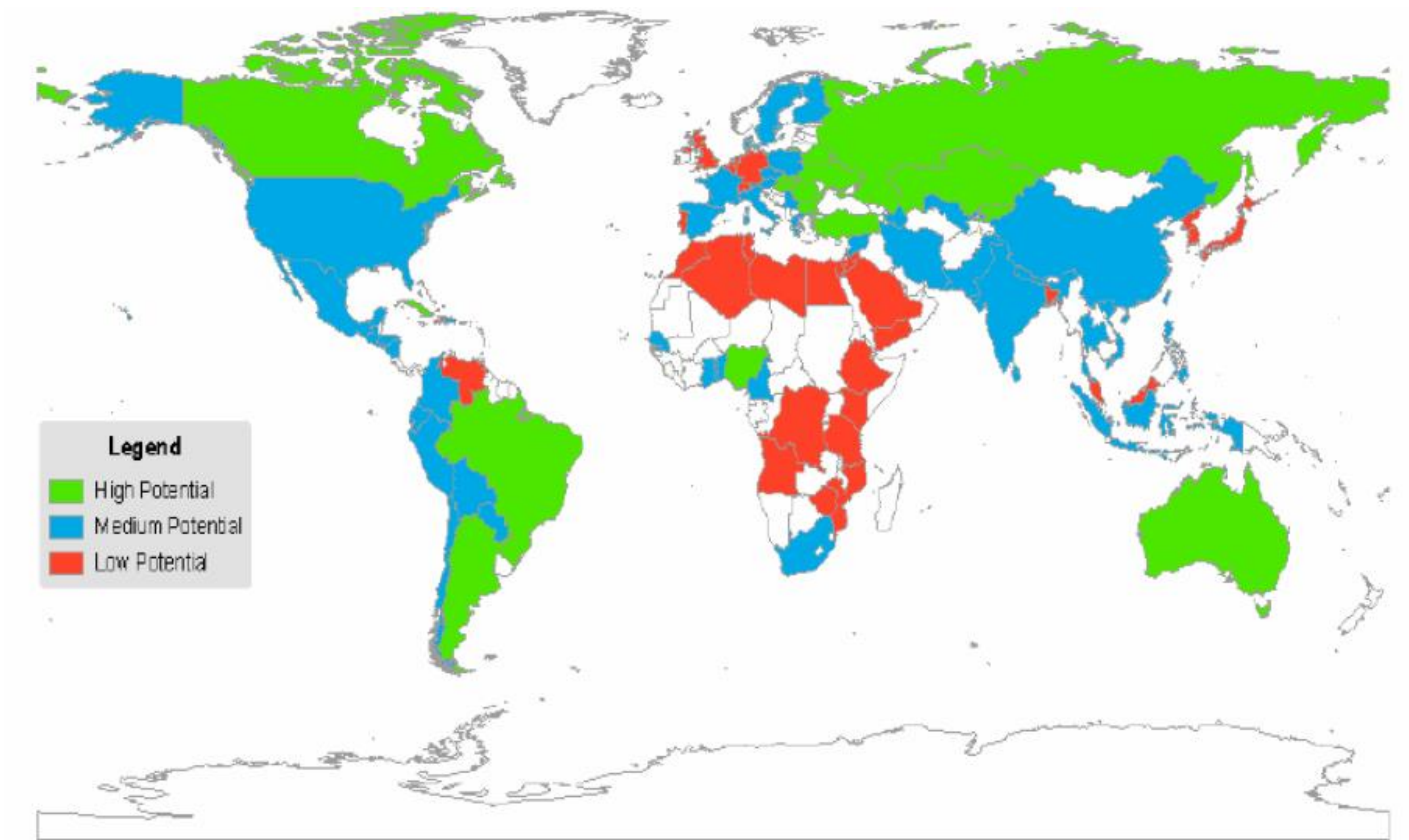
Europe's Largest Petrochemical Cluster

Houston (USA):

World's Largest Petrochemical Cluster

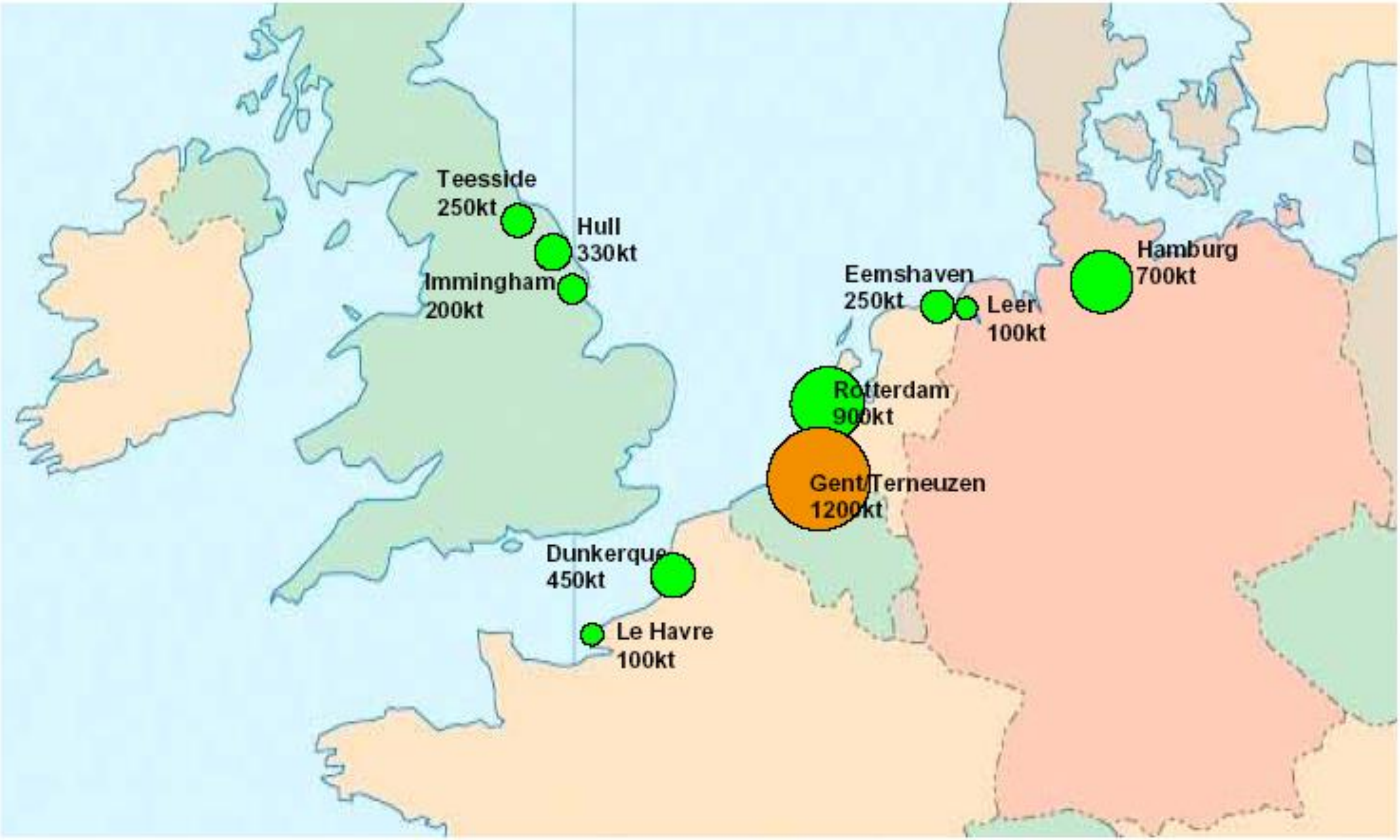
Geopolitics of Renewable Energy

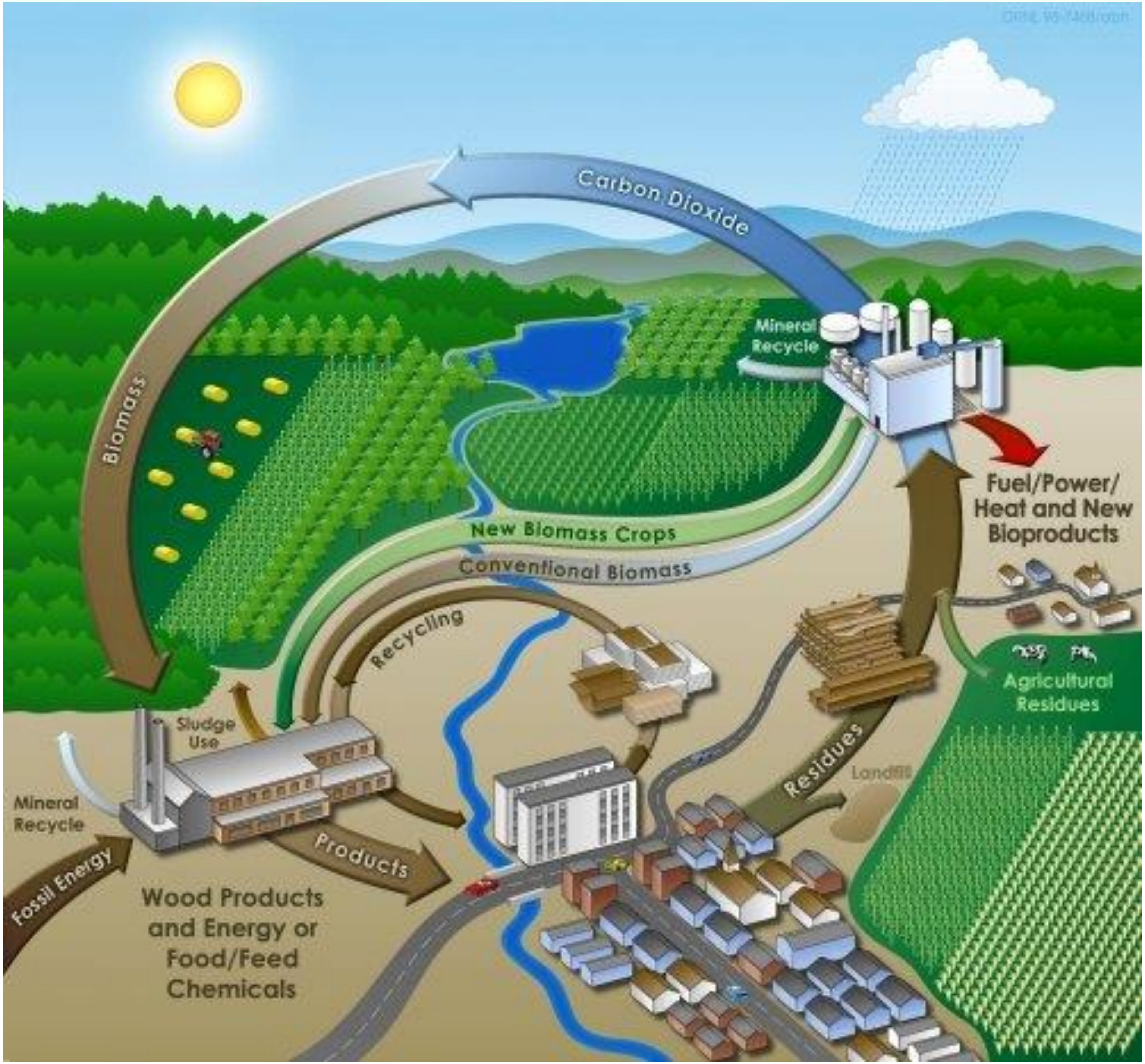
BIOFUELS AND ITS (GEOPOLITICAL) POTENTIAL



Source: IFPRI, 2008

BIOFUEL CLUSTERS IN EUROPE





Carbon Dioxide
Biomass
Mineral Recycle
New Biomass Crops
Conventional Biomass
Recycling
Fuel/Power/ Heat and New Bioproducts
Agricultural Residues
Sludge Use
Mineral Recycle
Residues
Landfill
Products
Fossil Energy
Wood Products and Energy or Food/Feed Chemicals

4.

TOWARDS A RE-GLOBALISATION

FROM THE BOTTOM-UP?

+

EXISTING REGIONAL AND GLOBAL INSTITUTIONS

TOWARDS A RE-GLOBALISATION FROM THE BOTTOM-UP? (1)

- Cf. debate on “strategic autonomy”: in a bottom-up globalisation, the production of essential goods would no longer be carried out exclusively on the basis of cost criteria. Other, more qualitative elements would also be taken into account. A critical materials strategy= needed.

- Sustainability criteria would become more central, and policymakers would aim to strengthen multiplier effects and innovation in their own economies. This, in turn, can also improve the competitive position of our companies.
-
- National security also becomes more central in the design of production and distribution chains, without taking away the benefits of economic globalisation.

TOWARDS A RE-GLOBALISATION FROM THE BOTTOM-UP? (2)

- In time, this could also lead to a political revaluation of local societies. These are now often unable to compete with global production and distribution chains that are primarily organised around marginal costs and economies of scale, resulting in the passing on of ecological costs. Taxation may offer a counterbalance here.

- Renewables can "empower" local populations, but at the same time there are forces at work that may limit the potential of "power to the people". The political question remains; who governs and controls the much needed (power) networks in decentralized renewable energy?

TOWARDS A RE-GLOBALISATION FROM THE BOTTOM-UP? (3)

- **Globalisation from the bottom up makes security in its various dimensions and manifestations much more central. In addition, supply chains may ‘regionalize’ anew**

- **In the form of health to avoid a new pandemic through more proactive multilateral cooperation, but also by making societies more resilient in dealing with other similar (climate) crises that threaten human existence.**

- **To achieve more sustainable globalisation economically and ecologically.**

- **And to achieve socially and societally less inequality within and between countries, and to avert the ongoing race to the bottom.**

TOWARDS A RE-GLOBALISATION FROM THE BOTTOM-UP? (4)

- The neoliberal model, for lack of a better word, cannot or did not provide fundamental answers in times of crisis. Just as the banks had to be rescued very quickly by the nation states during the 2008 banking crisis, so too will only the states and not the market intervene at an unprecedented rate. One of the political consequences is that the relationship between the state and the market may have to be rethought.

- This is also true in the energy domain.

- The already existing geopolitical trends will probably be accelerated; the further *de-Westernisation of the global order* will also raise questions about the place of European countries in this new world full of global risks.

EXISTING REGIONAL AND GLOBAL INSTITUTIONS (5)

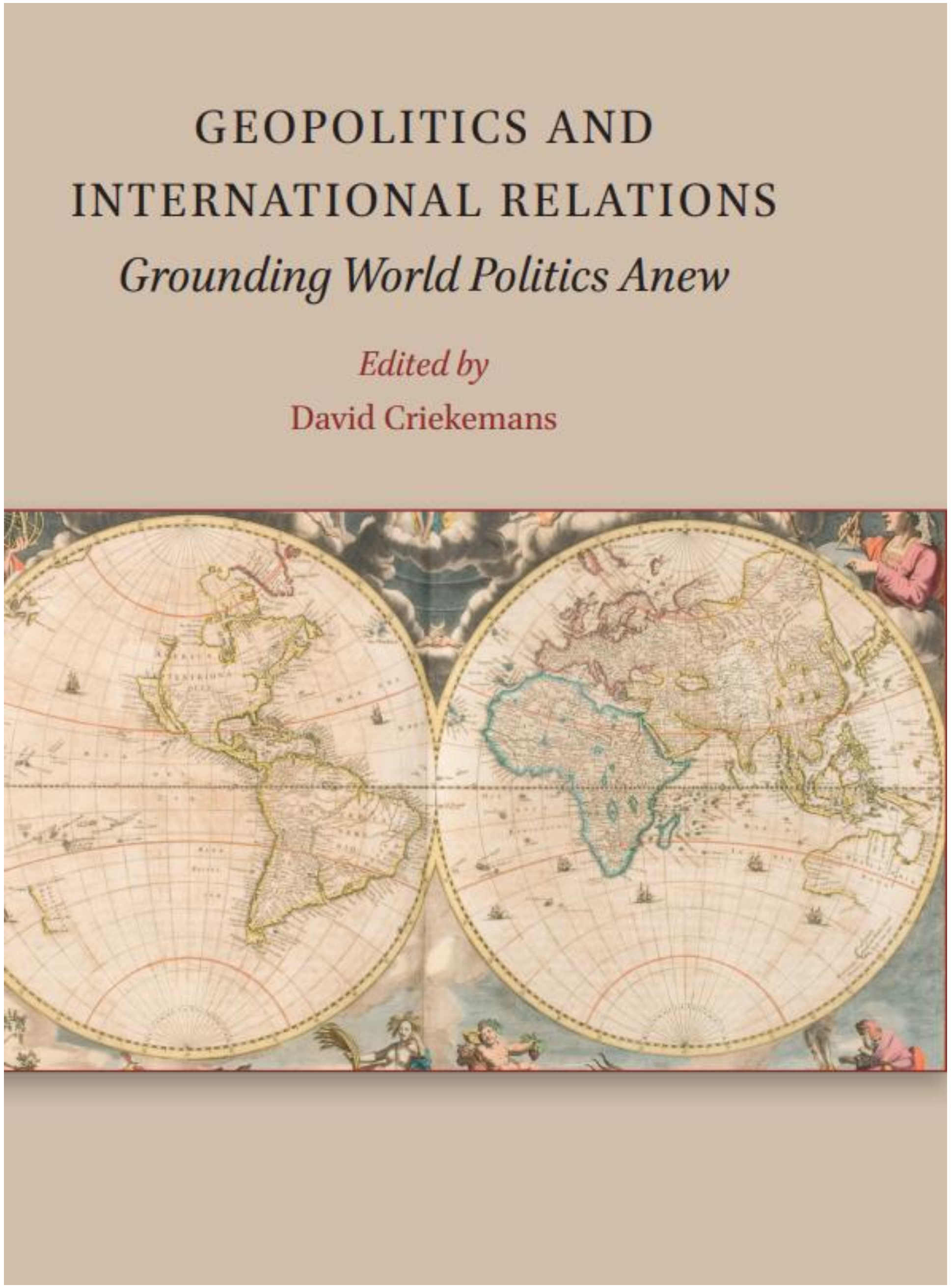
- **More investments are needed to strengthen both regional and global institutions and frameworks of cooperation, so as to create common solutions and mutual trust.**

- **Decarbonization and the energy transition means much more than adapting the EU's energy mix to meet climate challenges. It requires a fundamental rethinking of Europe's geo-economic needs and developing a geopolitical strategy for the longer term. It involves essentially changing our energy dependencies. It entails systematic and coordinated efforts to jointly develop renewable energy technologies. It is a process which needs to be structured and consolidated through a standardization of renewable technologies.**

CONCLUSION

Whilst the demise of the ‘old energy regime’ will create geopolitical fallout, the rise of a new energy regime will need to be guided into a more favourable configuration for Europe’s immediate geo-economic needs and longer-term geopolitical interests.

European harbours can and will play an important role in these processes.



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