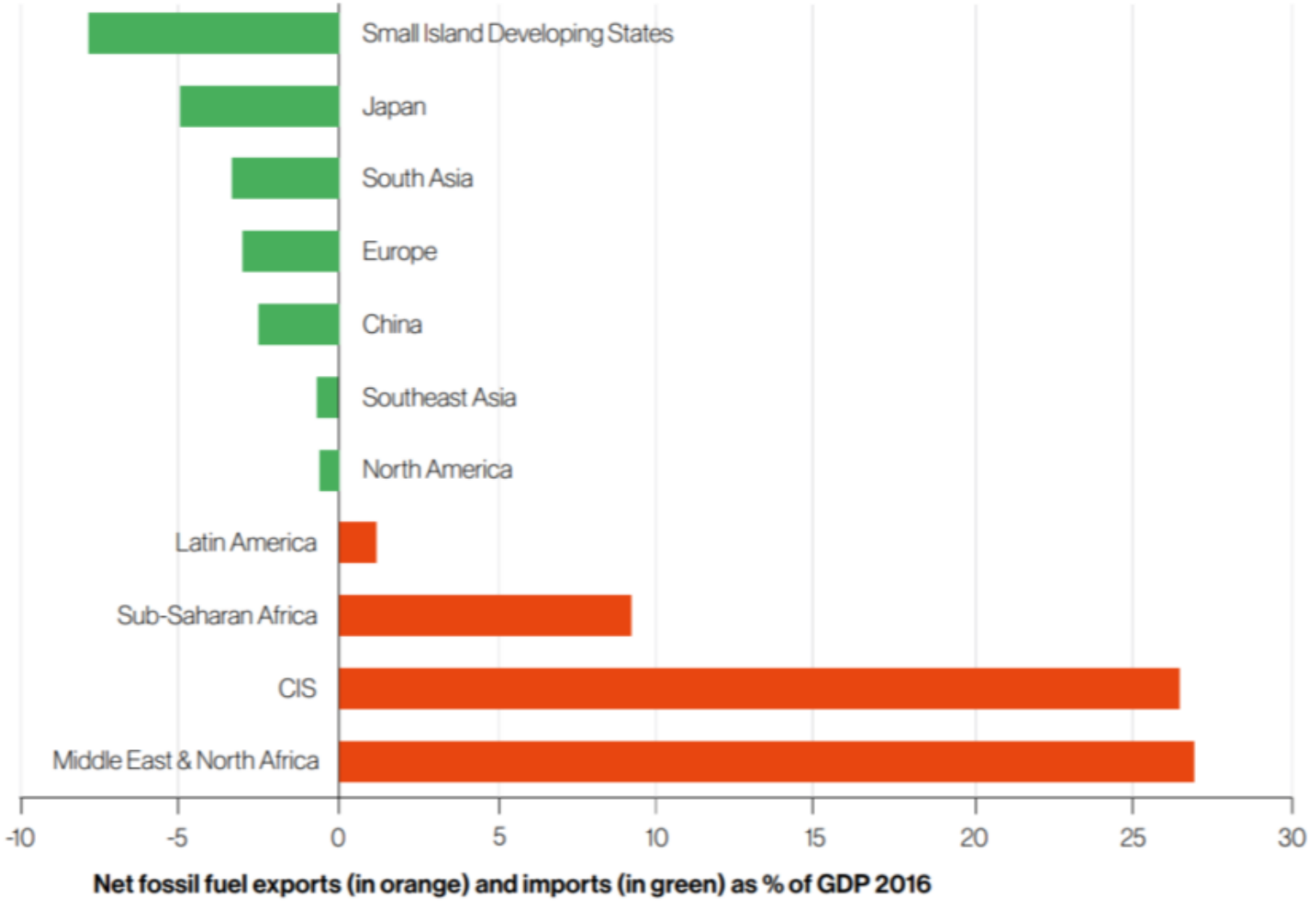
The political economy of the energy transition

Jan Osička

Energy transition

- Who will benefit and who will lose? ((International) Political Economy)
- What will be power & influence effects? (IR)
- What will be the security consequences? (Security studies)

Regional impact of the transition

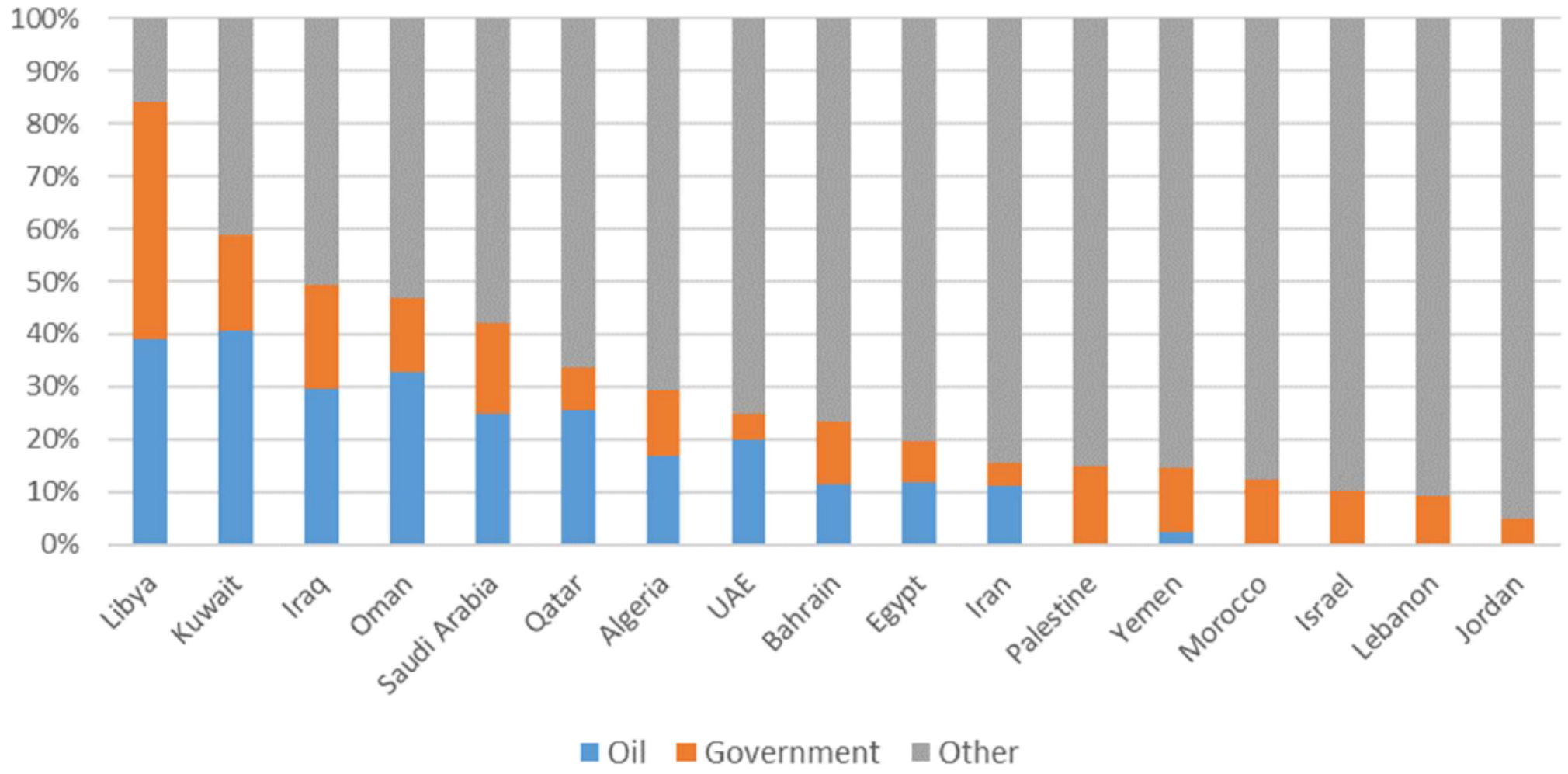


Net fossil fuel exports (in orange) and imports (in green) as % of GDP 2016

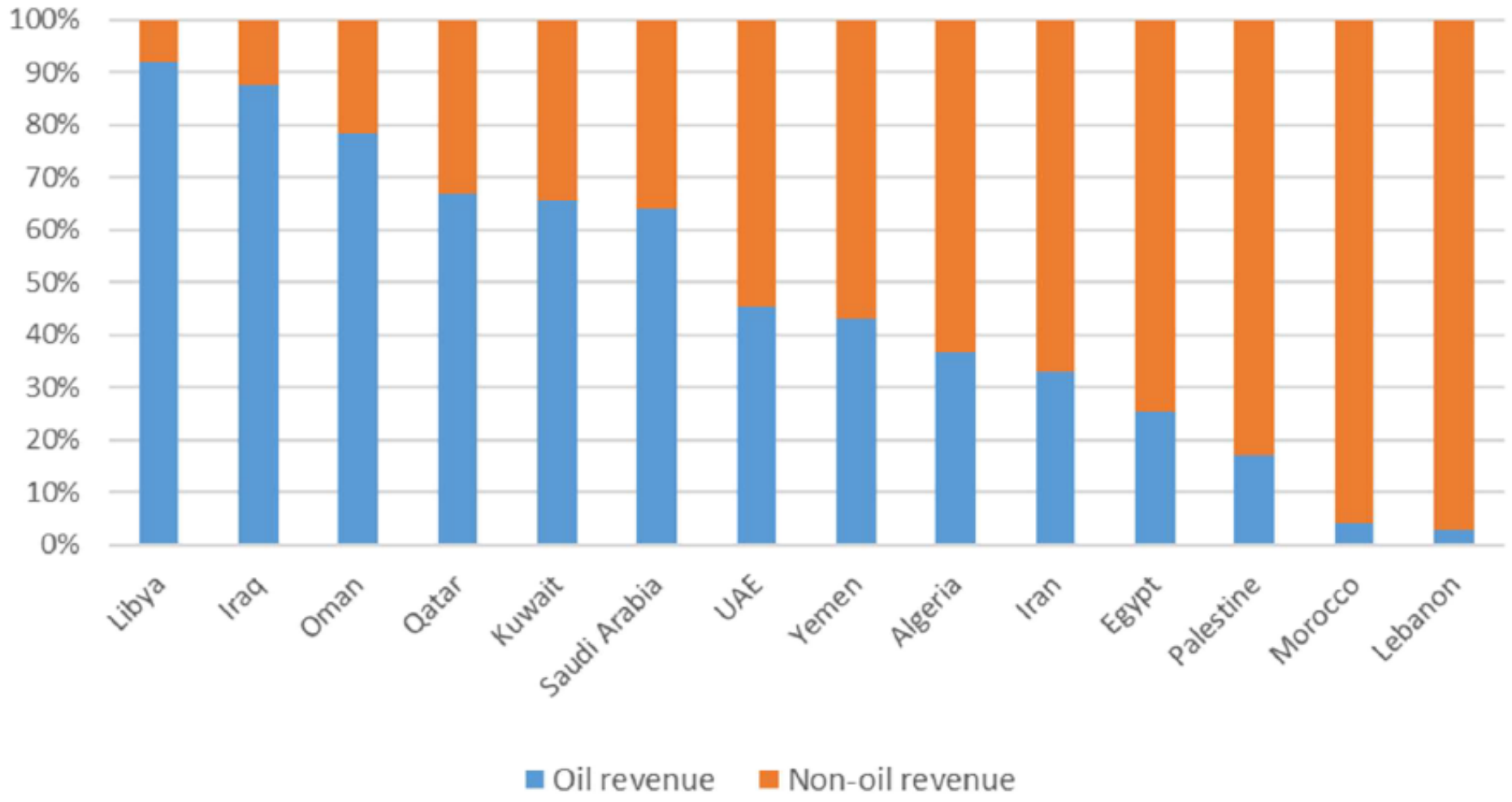
Macroeconomics of the MENA region

- For 5 regional oil exporters (Libya, Kuwait, Iraq, Oman, SA), more than 40% of GDP based on oil and oil-related government activities.
- Four other (Qatar, Algeria, UAE, Bahrain) varies between 20-40%.
- Main sources of manufacturing value-added are refinery, chemical and mining/extractive industries, construction.
- In some MENA countries oil is the primary source of fiscal revenues. Non-oil fiscal revenues, however, often also relate to oil industry (Qatar – practically all investment income and the bulk of corporate income tax from Qatar Petroleum).
- Oil makes more than 50% of total exports from MENA oil exporting countries. Limited economic diversification.

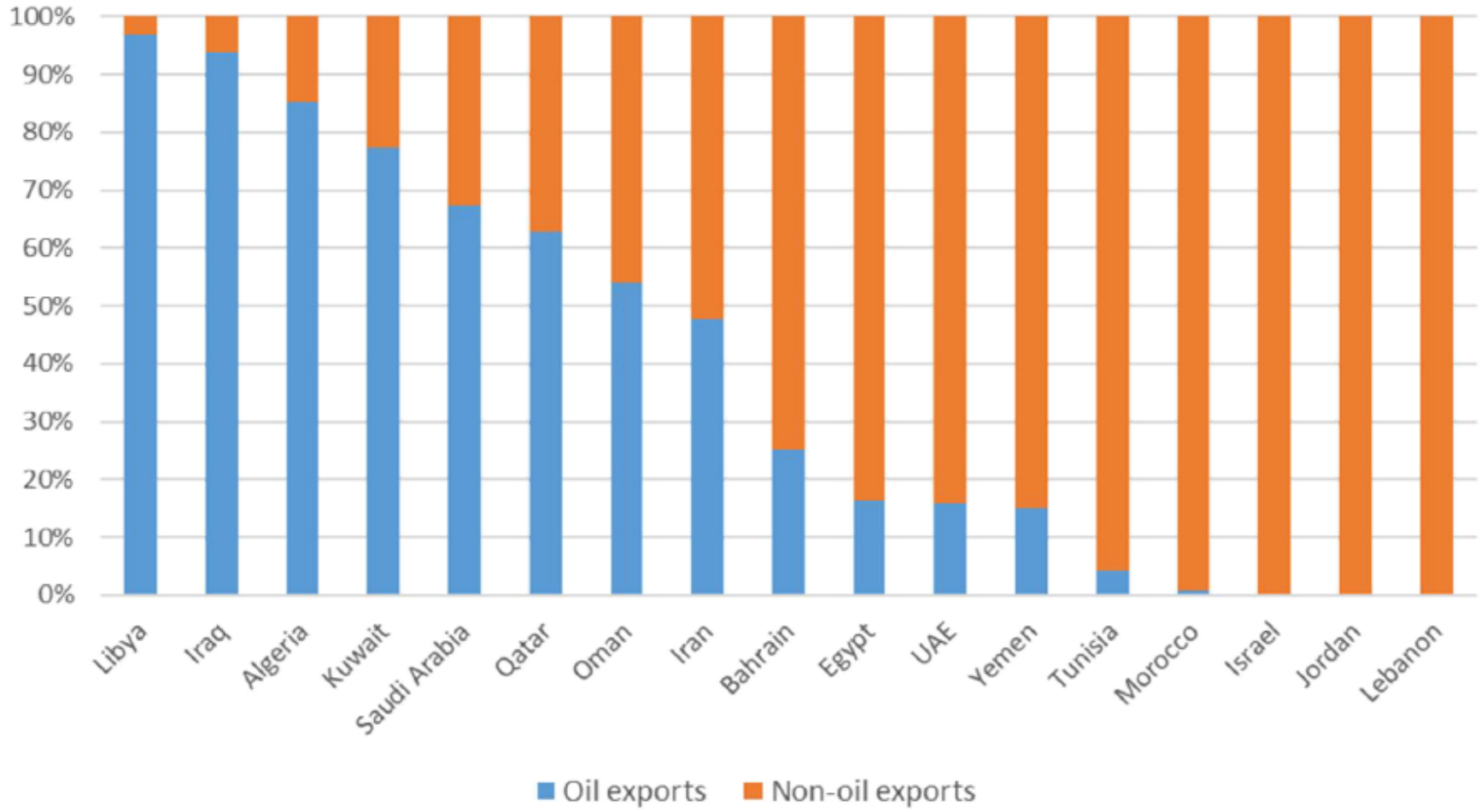
GDP composition of MENA countries, 2016



Oil and non-oil fiscal revenue in selected MENA countries, 2016 (% of general government revenue)

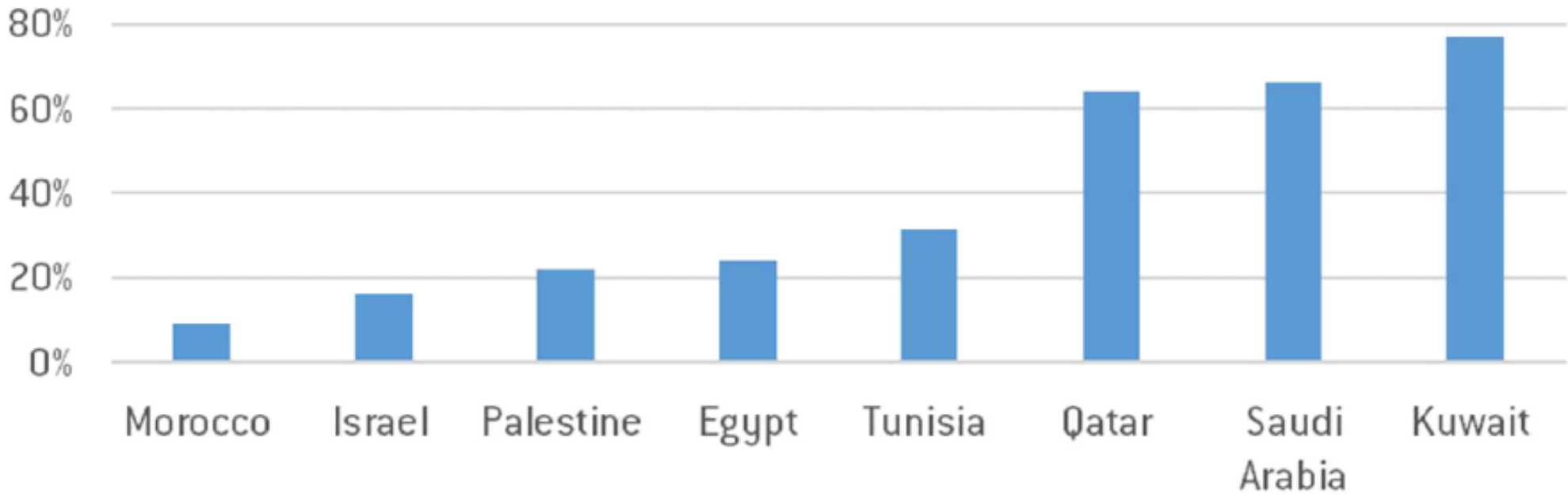


Oil and non-oil exports in MENA countries, 2016



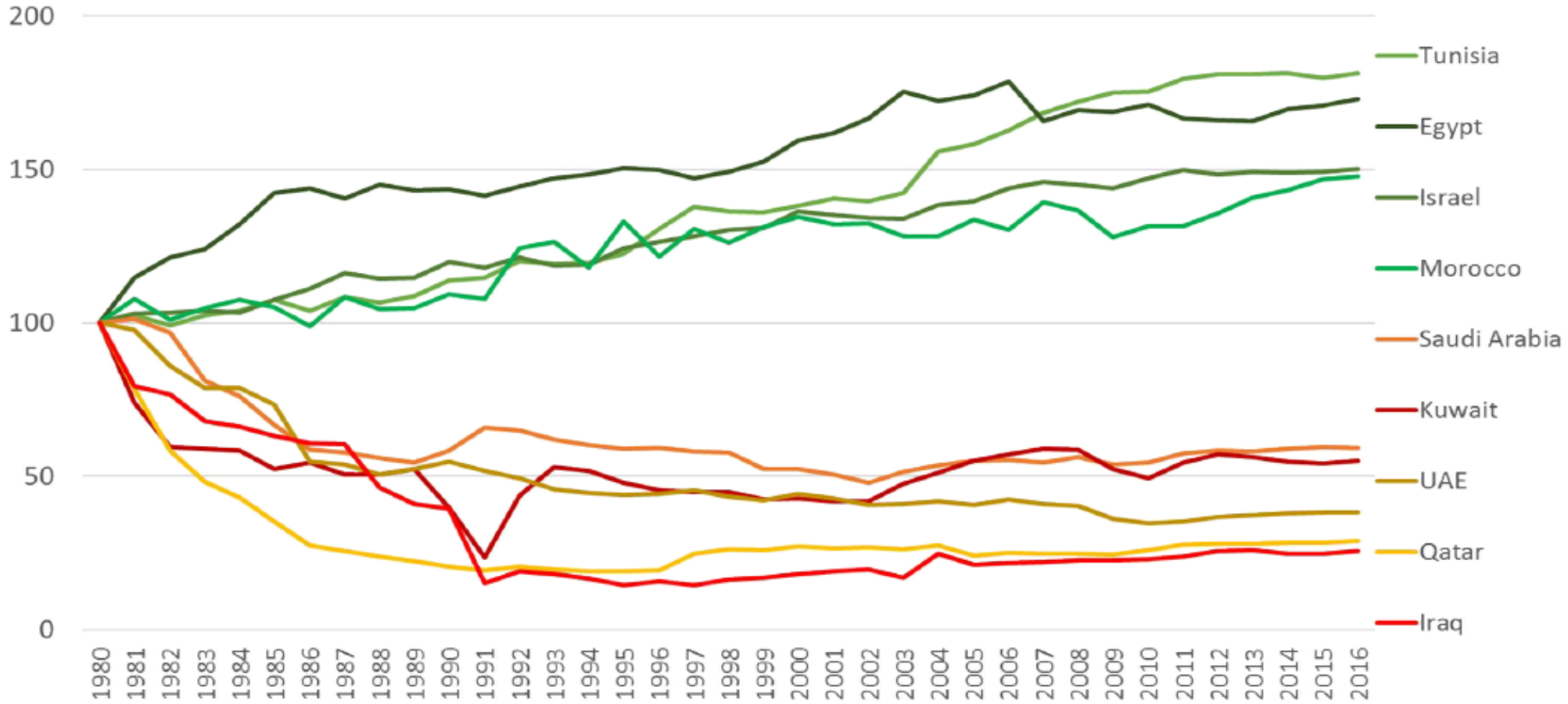
Note: Low shares of oil in exports from the UAE and Bahrain are because non-oil exports include a large share of re-exports.

Public sector employment in selected MENA countries (% of total employment of nationals)

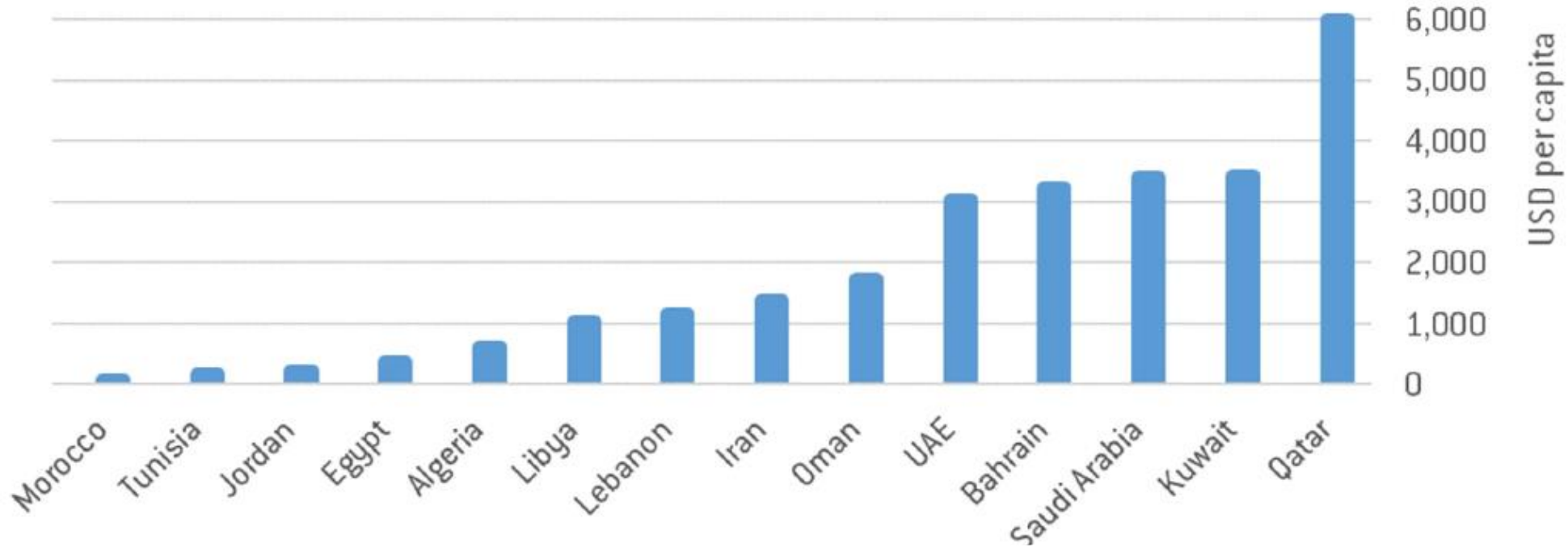


High shares of public employment in usually protected jobs with high wages contributes to low labour productivity of MENA oil-exporting countries. Emphasized by imported cheap non-national labour (since 80s), reducing productivity also in private sector. That prevents its development to internationally competitive form.

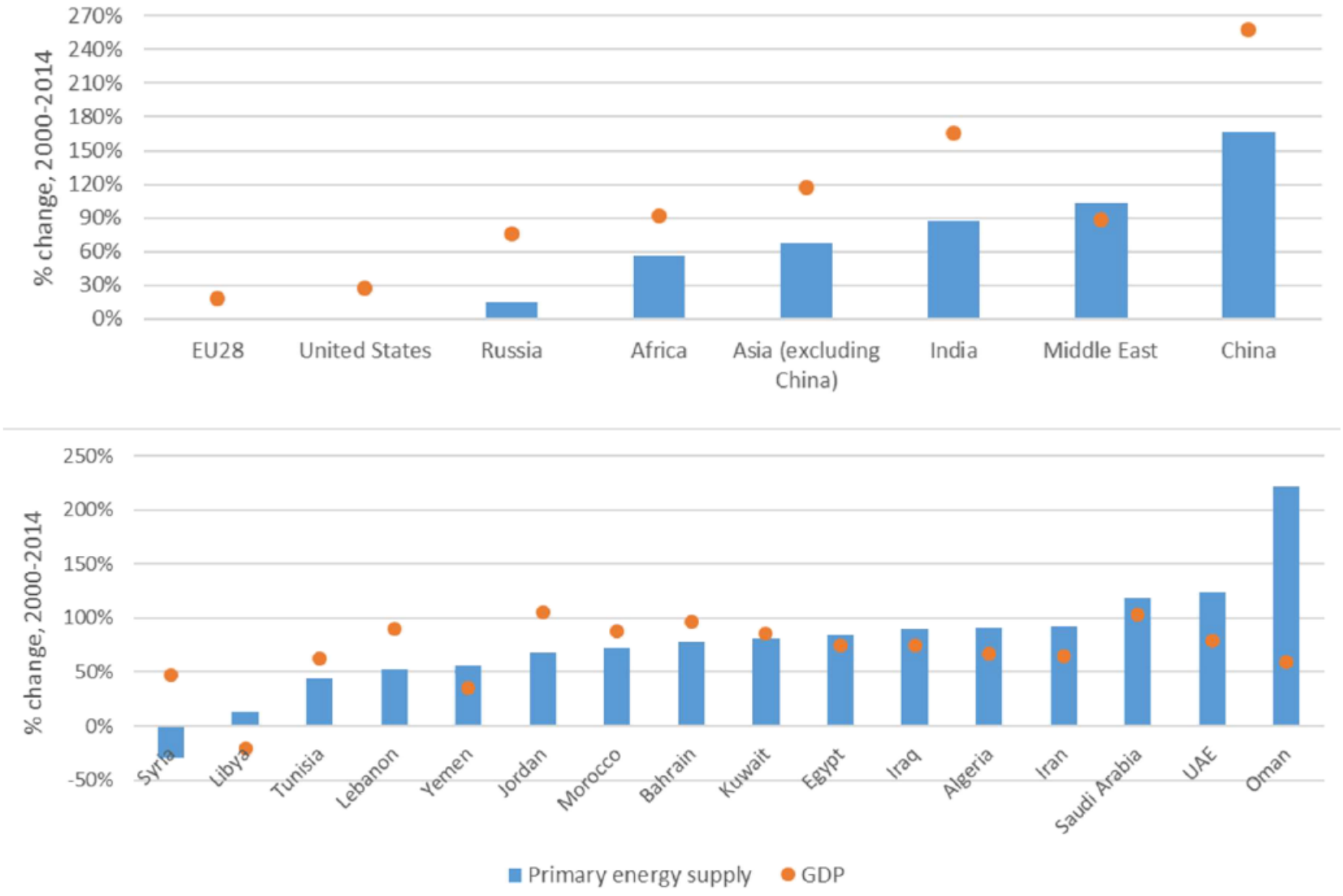
Labour productivity in selected oil-importing and oil-exporting MENA countries



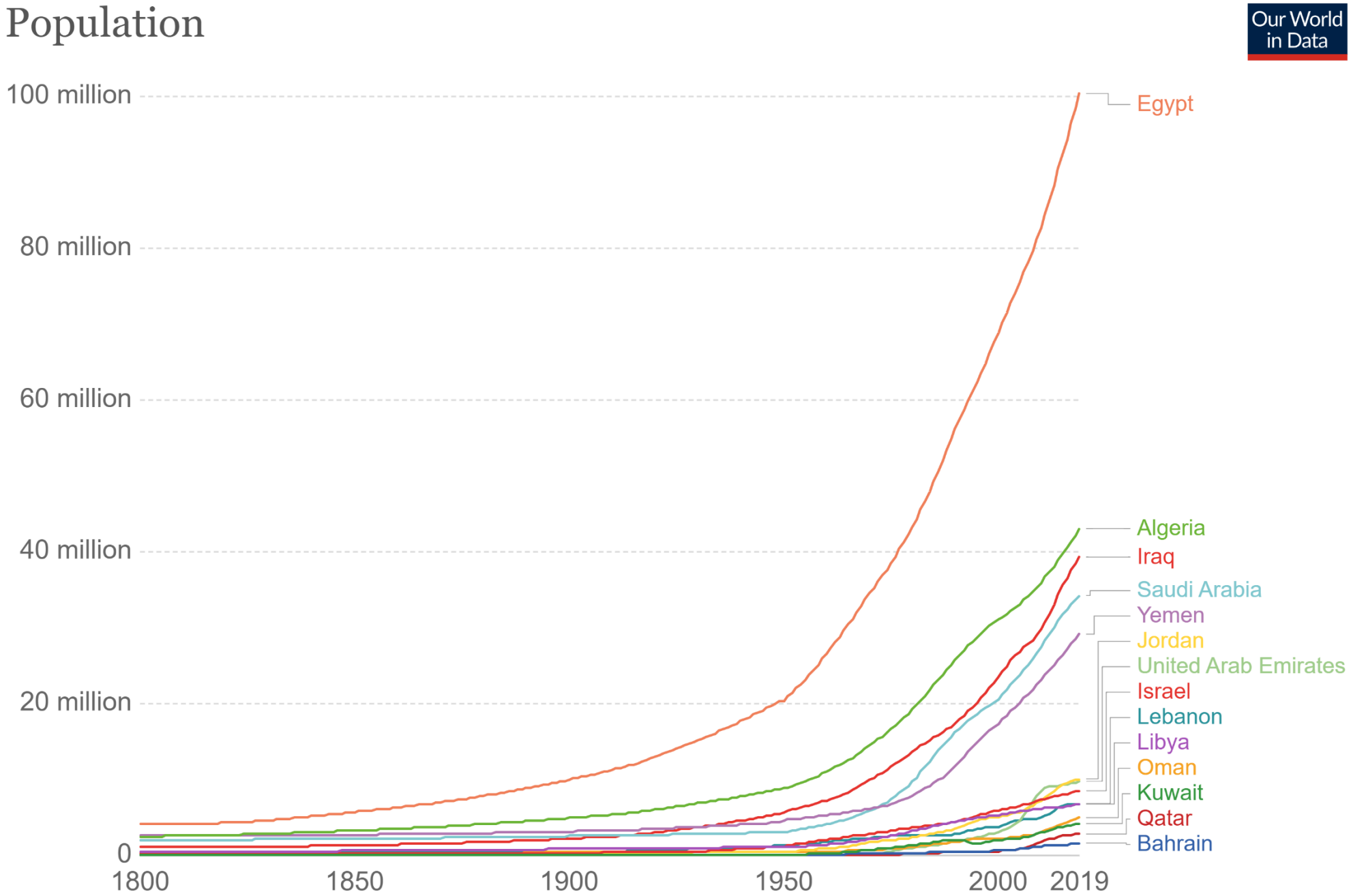
Post tax energy subsidies in selected MENA countries, 2015



Changes in primary energy supply and GDP



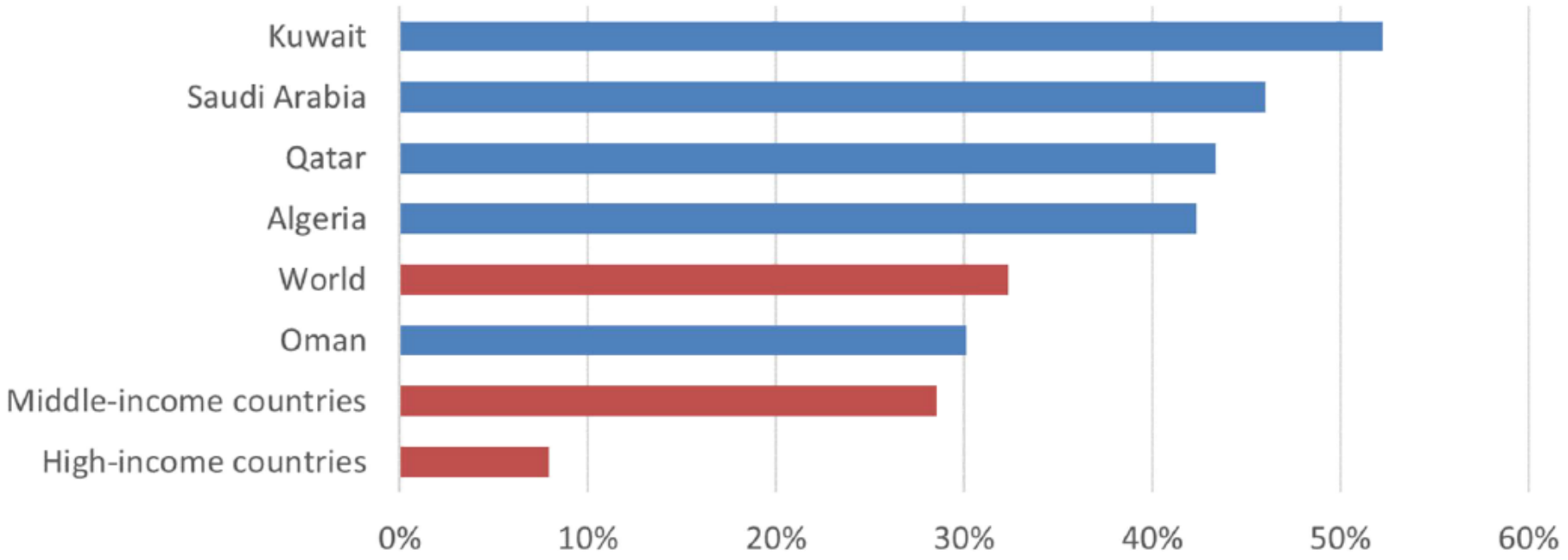
Population

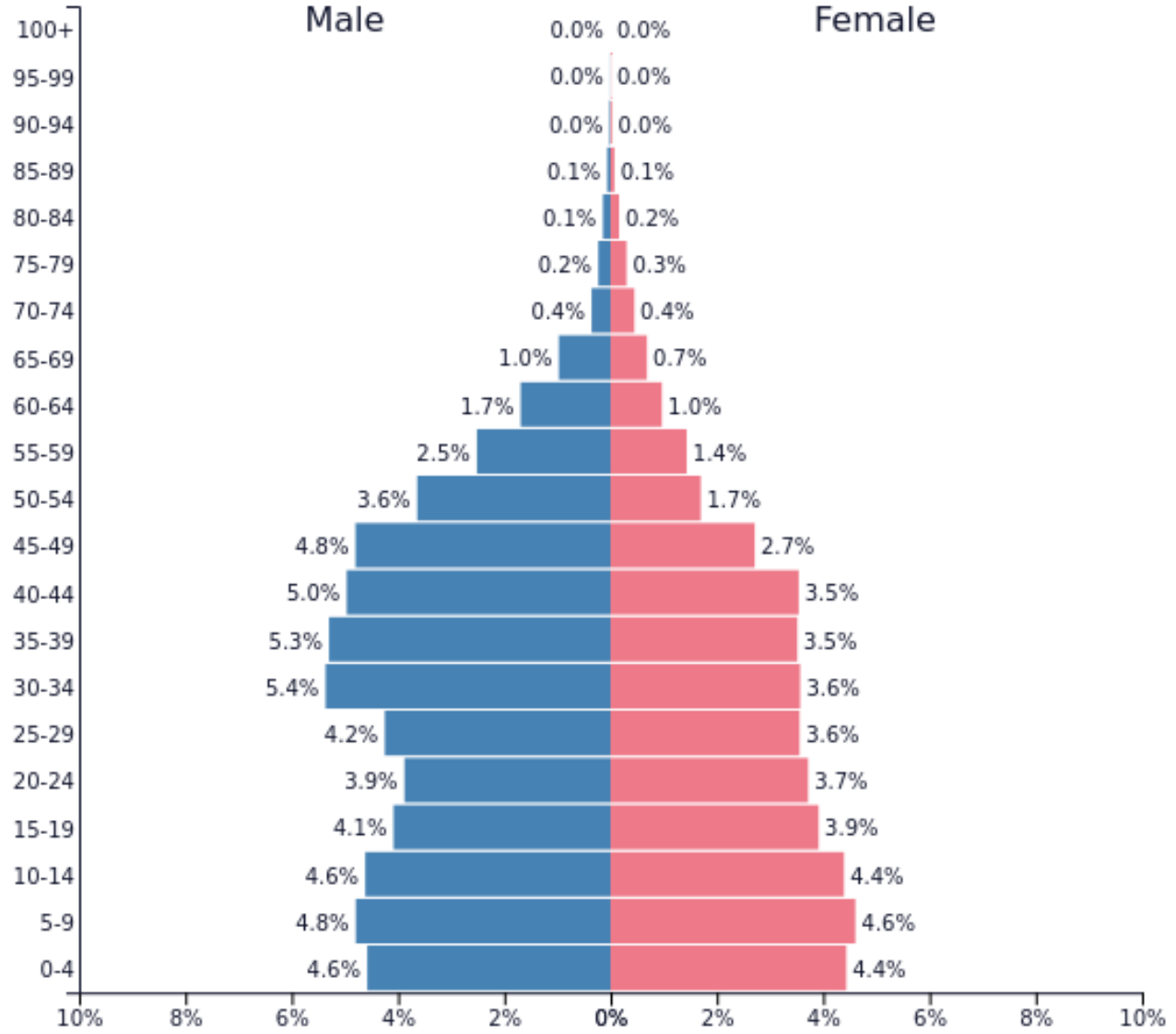


Source: Gapminder; HYDE & UN Population Division (2019)

OurWorldInData.org/world-population-growth • CC BY

Expected population growth between 2015-2050





PopulationPyramid.net

Saudi Arabia - 2019
Population: **33,838,827**

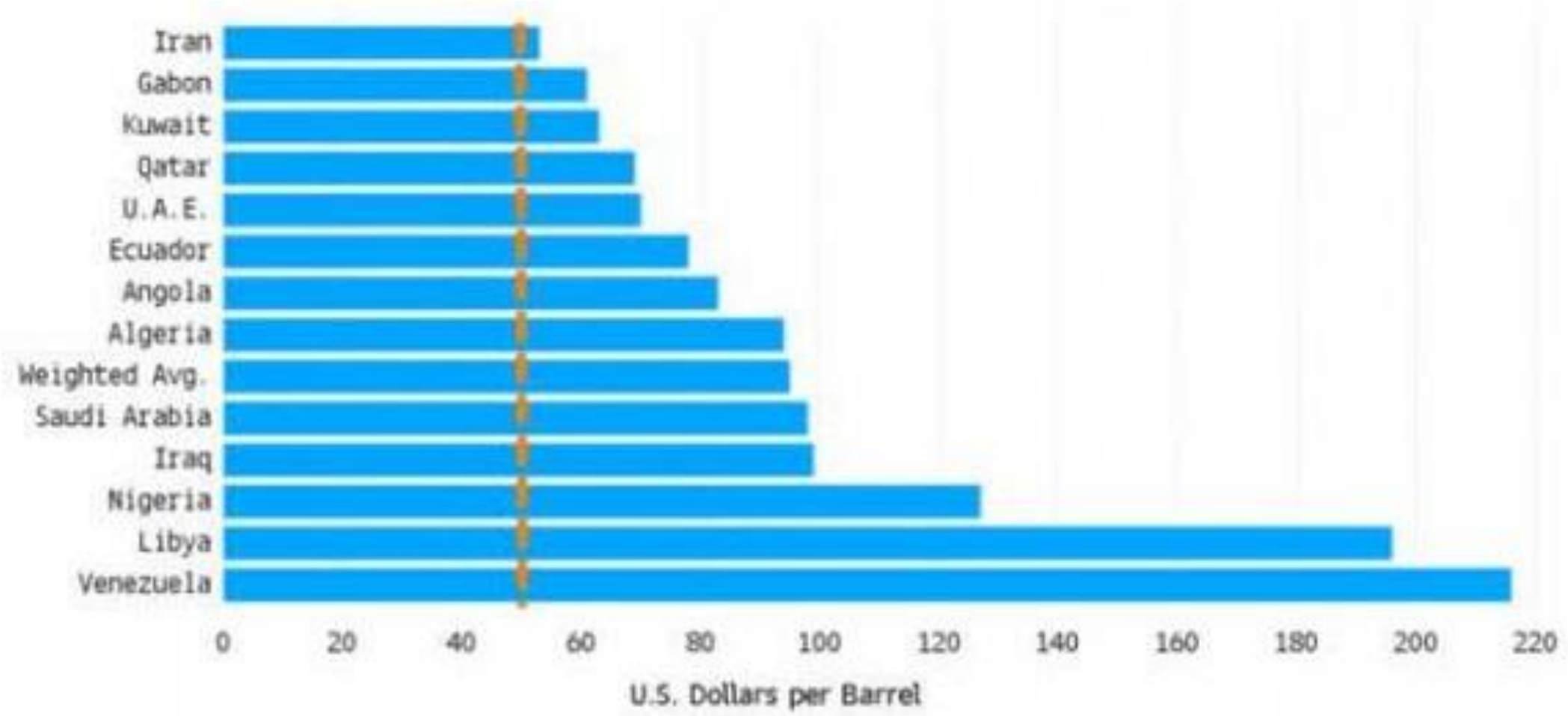
Saudi reaction to Arab Spring (2011)

- $10.6 billion in new funding for housing loans via Real Estate Development Fund.
- $7.9 billion in funding to increase the capital of the Saudi Credit Bank.
- $266 million to enable social insurance to increase the number of family members covered.
- $320 million to expand social services.
- $933 million to help the needy repair their homes and pay utility bills.
- $127 million to support programs for needy students at the Ministry of Education.
- $3,9 billion to support the General Housing Authority.
- A 15% pay increase for state employees.
- A 50% increase in the annual allocations for charitable organizations.
- 27 million annually alocation to project of the National Charitable Fund.

Oil-related sovereign wealth funds

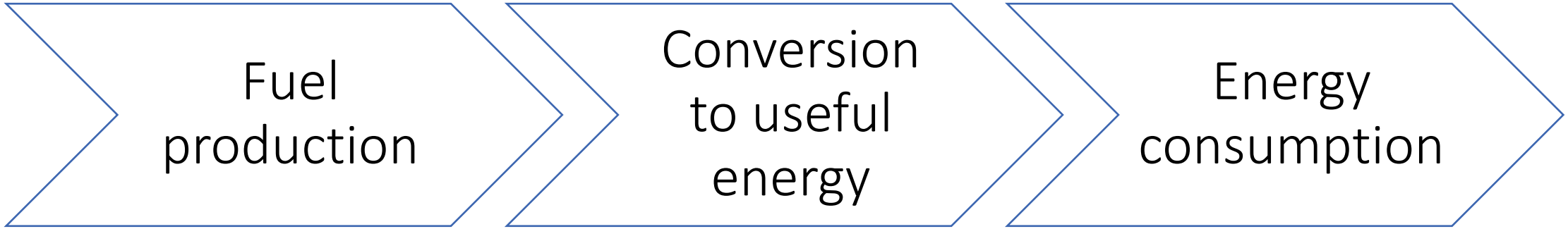
Country	ISO3 code	Region	Value (bn$)	per capita (k$)	% GDP	% Gvt revenue
United Arab Emirates	ARE	Middle-East	1214	134	304%	805%
Saudi Arabia	SAU	Middle-East	792	26	106%	284%
Kuwait	KWT	Middle-East	592	158	362%	527%
Qatar	QAT	Middle-East	256	118	122%	257%
Iran	IRN	Middle-East	62	1	15%	100%
Oman	OMN	Middle-East	40	9	49%	103%
Iraq	IRQ	Middle-East	1	0	0%	1%
Libya	LBY	North Africa	66	11	160%	392%
Algeria	DZA	North Africa	50	1	23%	70%
Angola	AGO	Sub-Saharan Africa	5	0	4%	10%
Nigeria	NGA	Sub-Saharan Africa	1	0	0%	2%
Russia	RUS	Other: CIS	139	1	7%	20%
Kazakhstan	KAZ	Other: CIS	79	5	36%	149%
Azerbaijan	AZE	Other: CIS	37	4	50%	128%
Canada	CAN	Other: Americas	18	0	1%	3%
Mexico	MEX	Other: Americas	6	0	0%	2%
Venezuela	VEN	Other: Americas	1	0	0%	1%
Norway	NOR	Other: Europe	848	165	170%	316%

The fiscal break-even price of oil (2017)



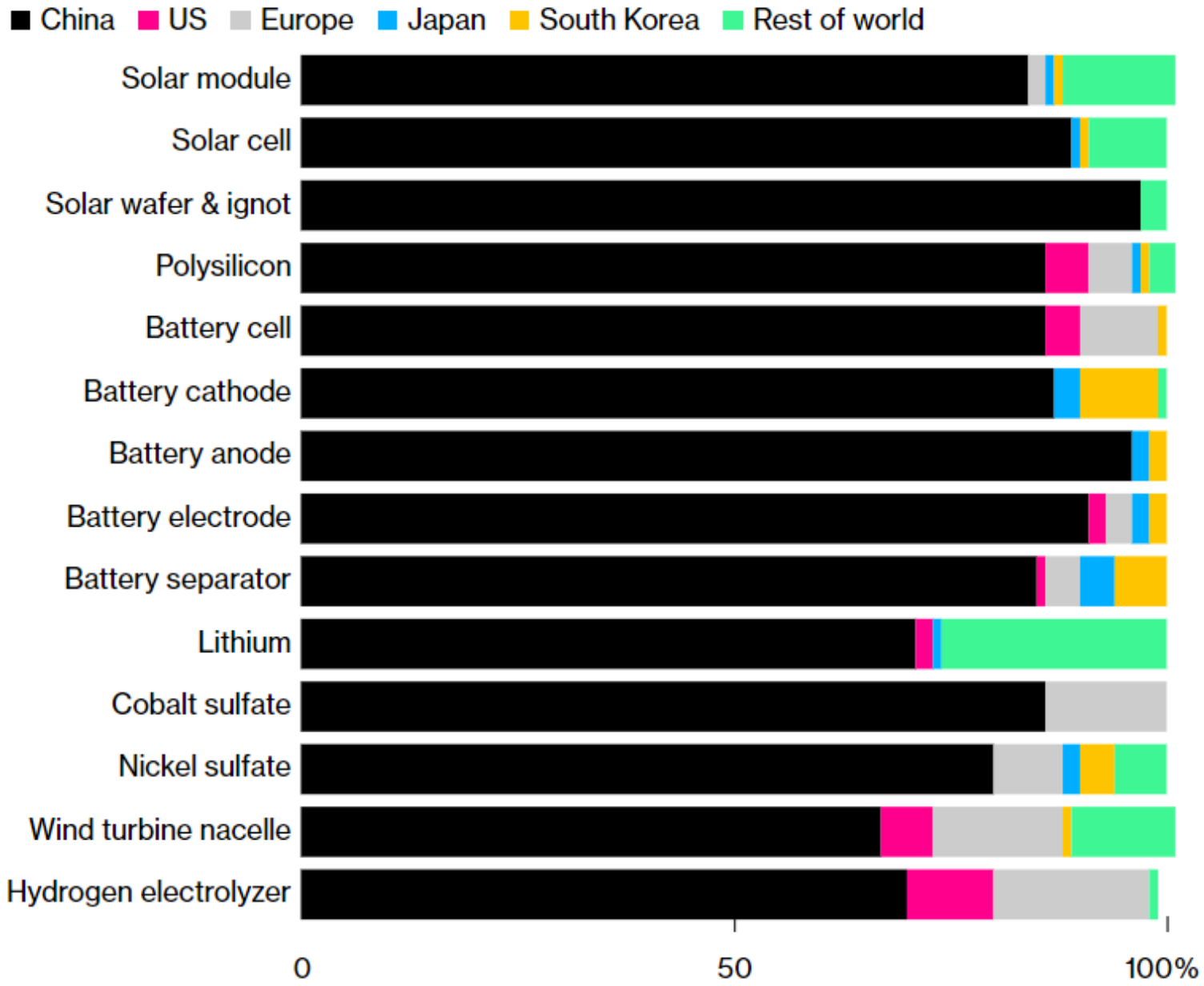
Who will benefit?

Value distribution in the supply chains



China Dominates Clean-Technology Supply Chains

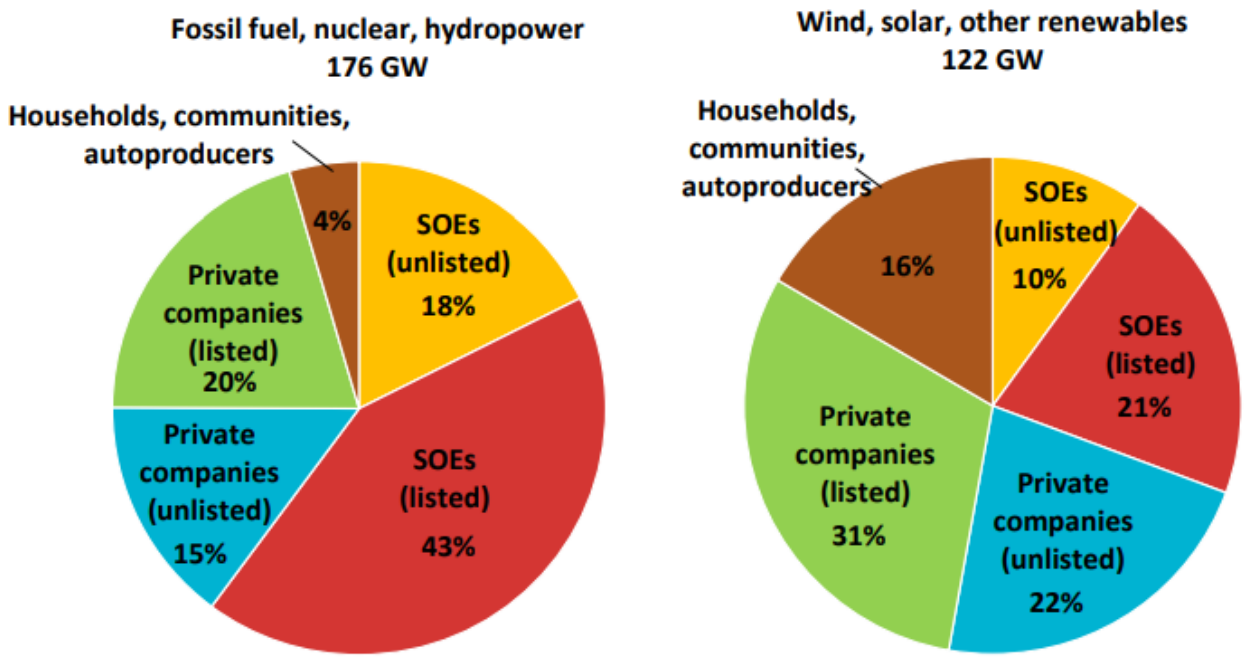
Asian nation's share of global manufacturing capacity is above 80% in 11 segments



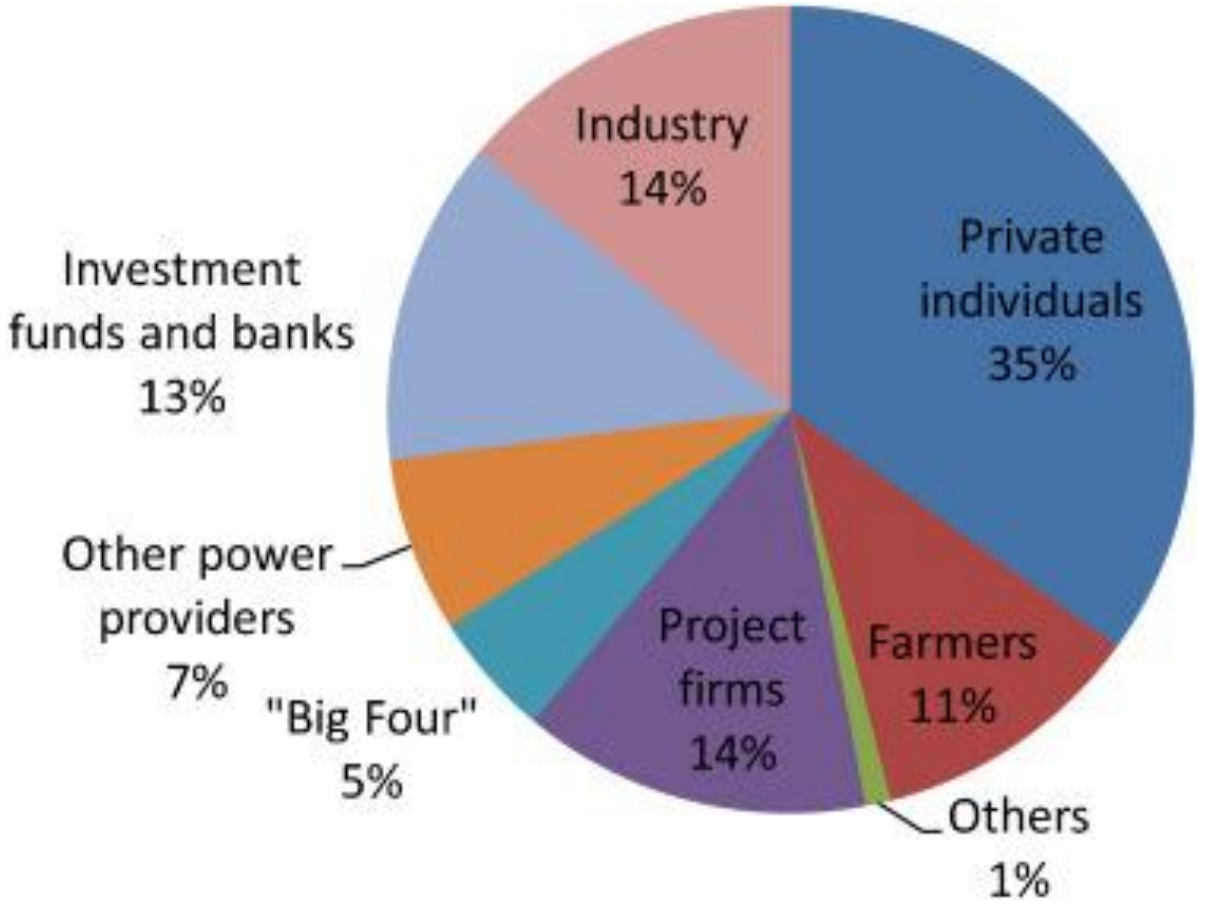
Building the new system

Democratization of the energy system ownership

Ownership of global power generation capacity commissioned in 2015

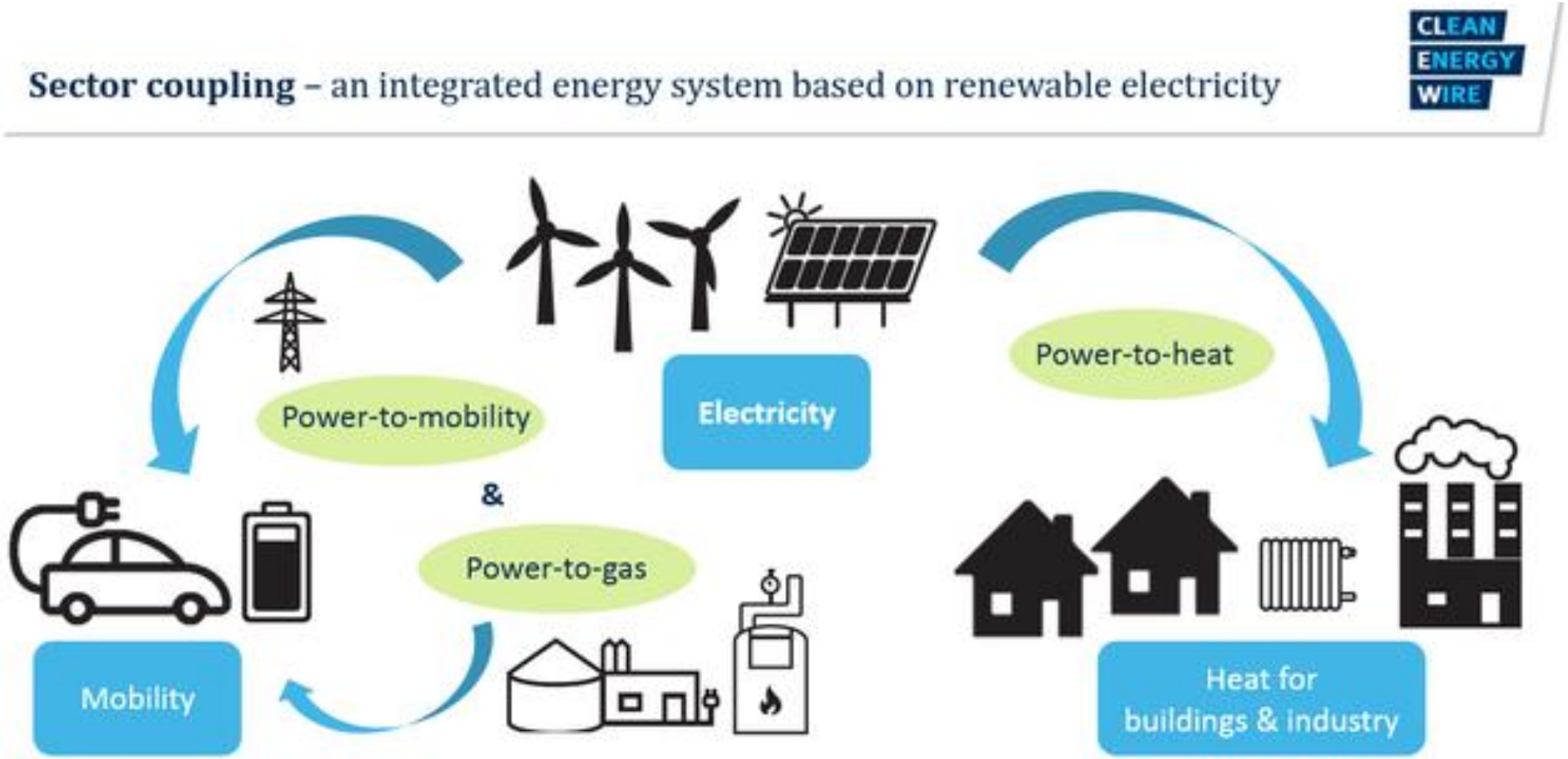


Ownership of installed RE capacity in Germany (2012)

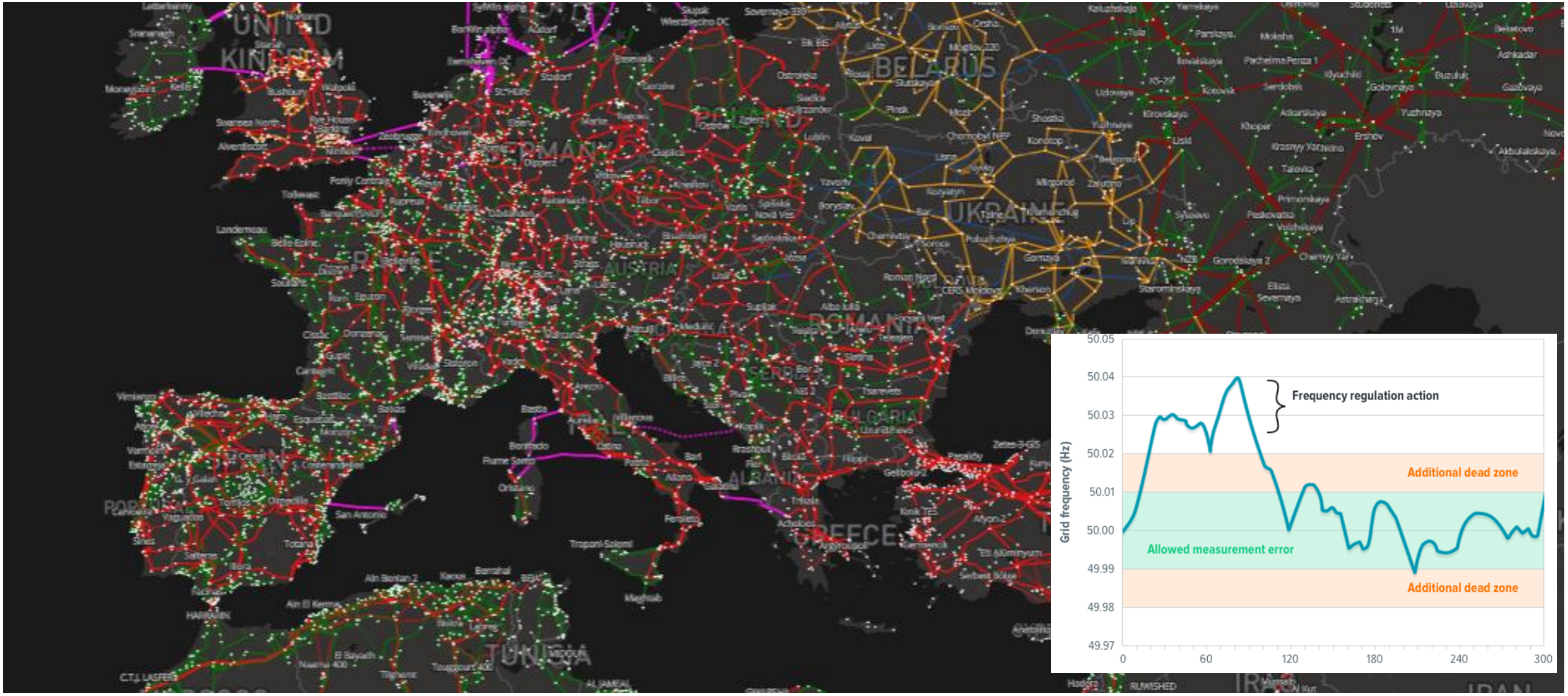


Power, influence, and security implications

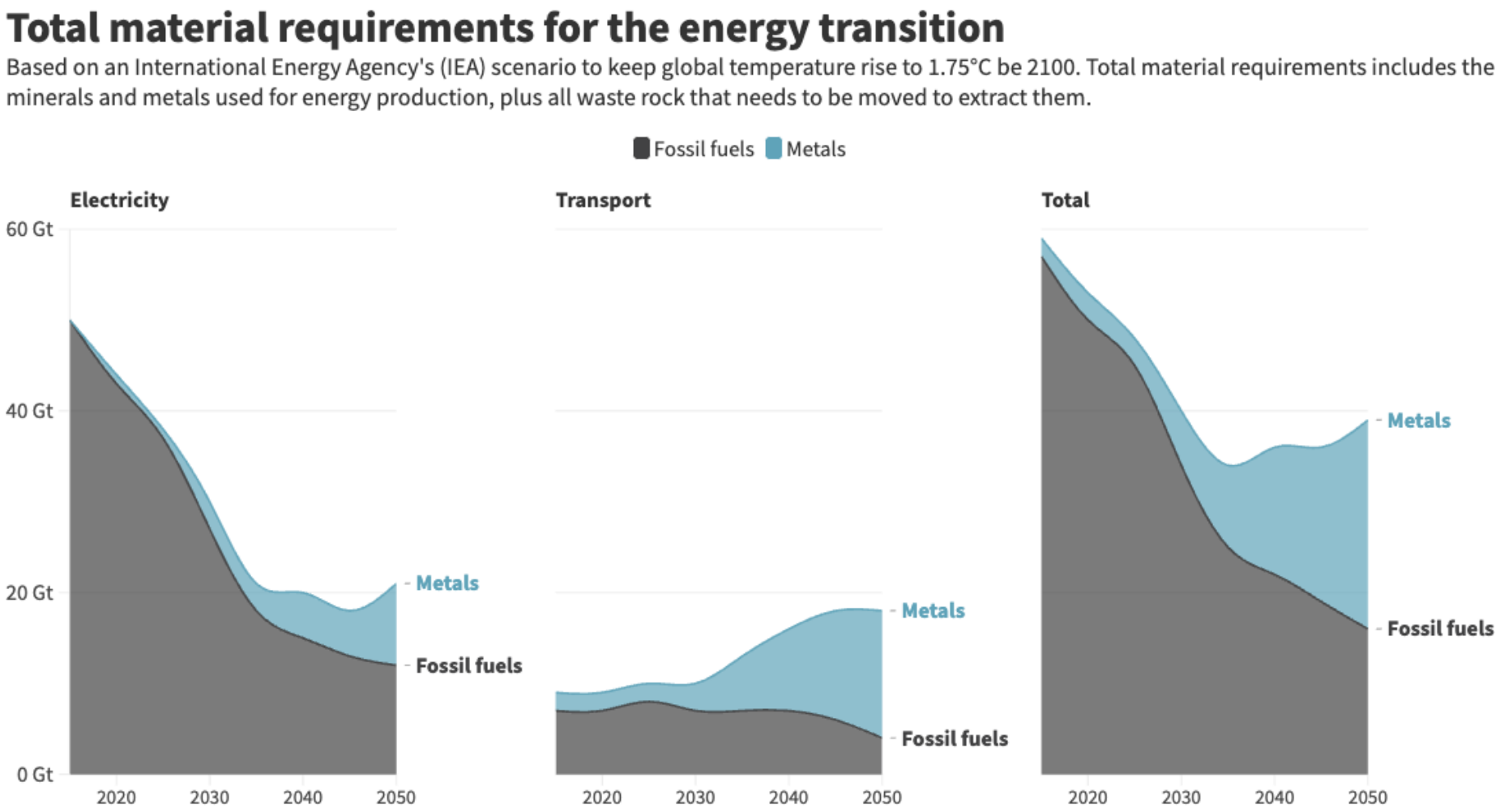
Electrify everything = increase complexity



Fragility and anti-fragility



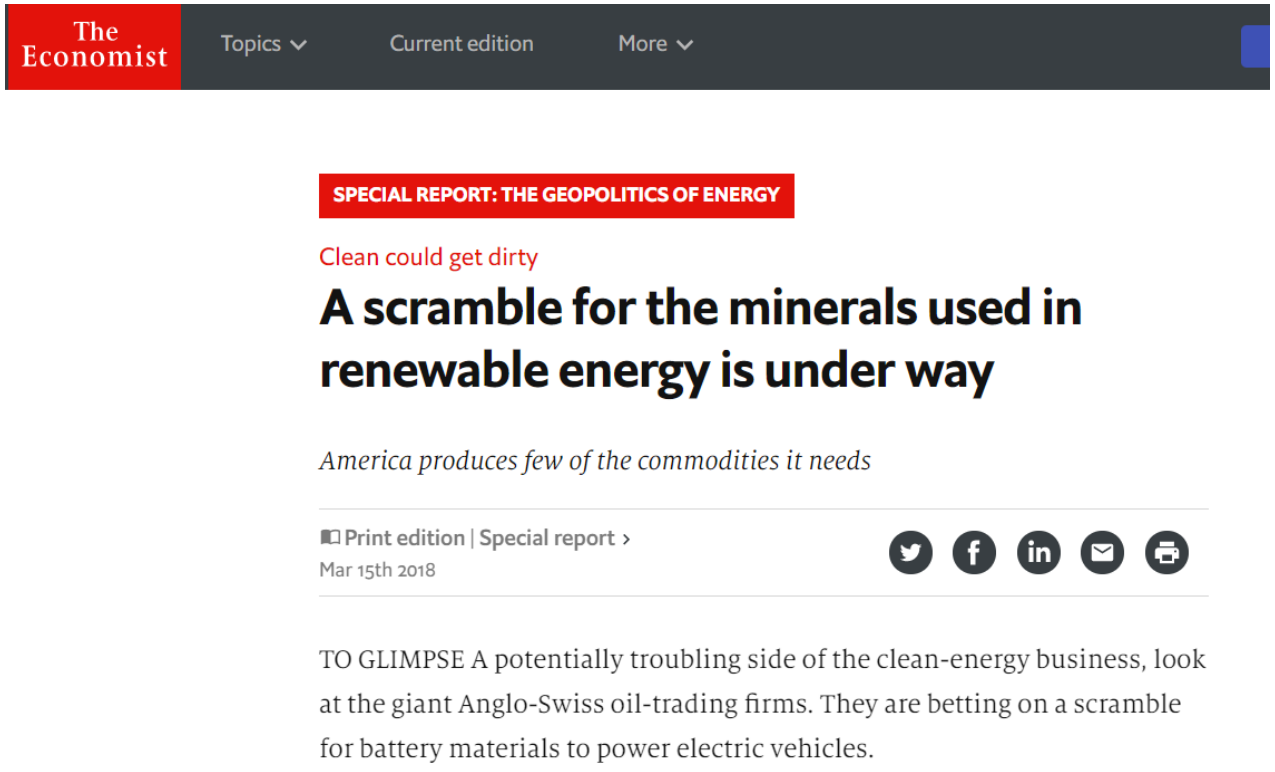
Will we have enough materials to power the transition?



Source: Watari et al. (2021). Sustainable energy transitions require enhanced resource governance.

Sources: [Sustainability by numbers]

Will new energy materials breed new Saudi Arabias?



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SPECIAL REPORT: THE GEOPOLITICS OF ENERGY

Clean could get dirty

A scramble for the minerals used in renewable energy is under way

America produces few of the commodities it needs

Print edition | Special report ›
Mar 15th 2018

TO GLIMPSE A potentially troubling side of the clean-energy business, look at the giant Anglo-Swiss oil-trading firms. They are betting on a scramble for battery materials to power electric vehicles.

- DR Congo produces 60% of the world‘s cobalt
- South Africa controls over 75% of platinum
- China produces 95% of rare earth minerals and controls nearly half of the world‘s lithium
- China halted shipments of rare earths to Japan over fishing dispute in 2010

ALL THE METALS WE MINED
IN 2021

The world produced roughly **2.8 billion tonnes** of metals in 2021.
Here are all the metals we mined, visualized on the same scale.

IRON ORE
2,600,000,000 tonnes*

= 1,000,000 tonnes

Iron Ore*
2.6B

LARGEST END-USE

- Steelmaking
- Construction
- Chemicals
- Alloying Agents
- Energy/Batteries
- Magnets
- Electronics
- Other

INDUSTRIAL METALS
181,579,892 tonnes

Aluminum**
68.0M

Copper
21.0M

Chromium
41.0M

Manganese
20.0M

Magnesium**
950K

Lead
4.3M

Zinc 13.0M

Nickel
2.7M

Titanium***
9.0M

Zircon*
1.2M

Strontium 360K

Uranium 48.3K

Bismuth**19K

Mercury 2.3K

Beryllium 260

TECHNOLOGY AND PRECIOUS METALS
1,474,889 tonnes

Molybdenum
300K

Tin
300K

Rare Earth Oxides
280K

Lithium
106K

Tungsten
79K

Niobium
75K

Silver
24K

Cobalt
170K

Vanadium
110K

Gold
3K

Tantalum
2.1K

Indium**
920

Gallium
430

Platinum Group Metals
380

Cadmium
24K

Rhenium
59

ELEMENTS

Source: *USGS Mineral Commodity Summaries (2022)*

**Ore production does not reflect actual metal production as metals only make up a certain portion of ores.*

***Smelter/refinery production.*

****Represents titanium mineral concentrate production.*

ELEMENTS.VISUALCAPITALIST.COM

Sources: USGS, visual capitalist