

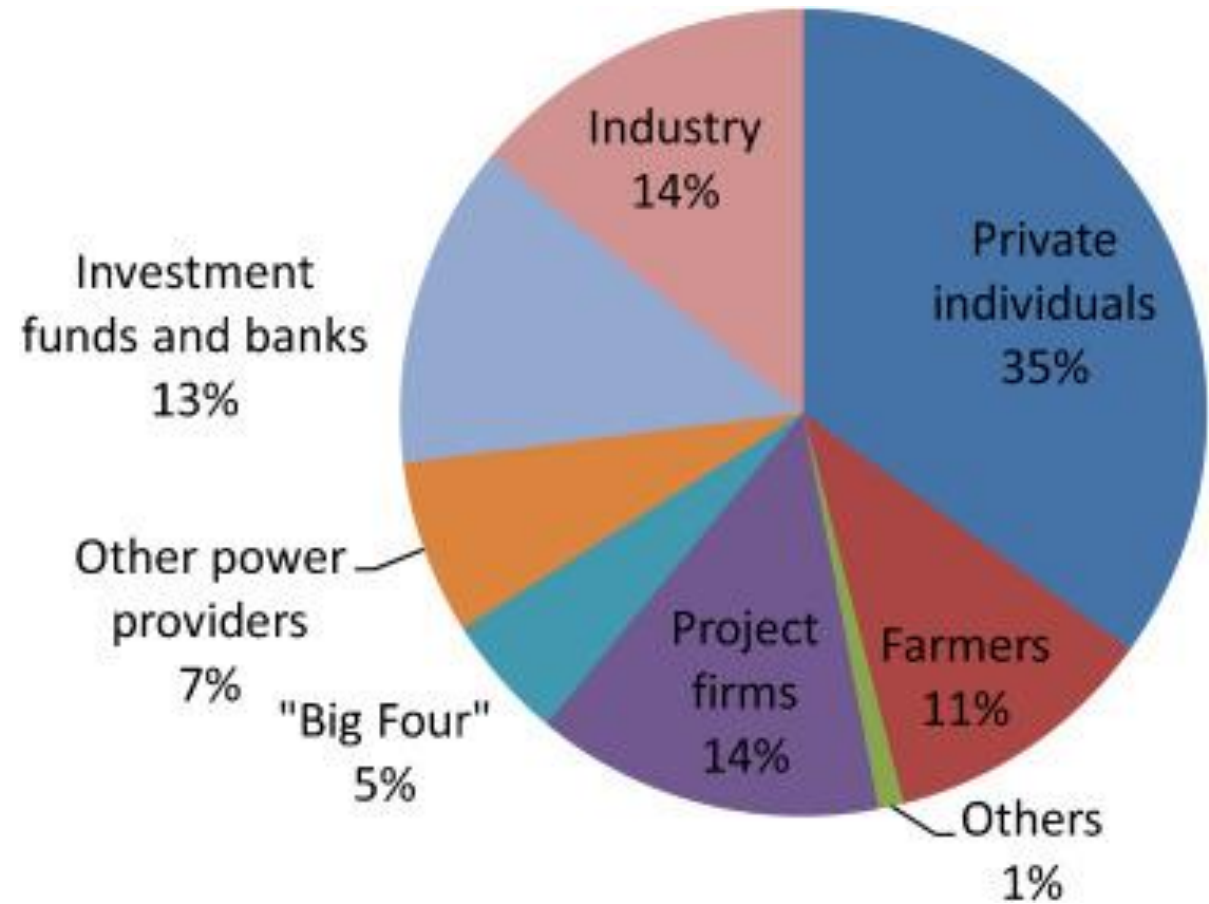
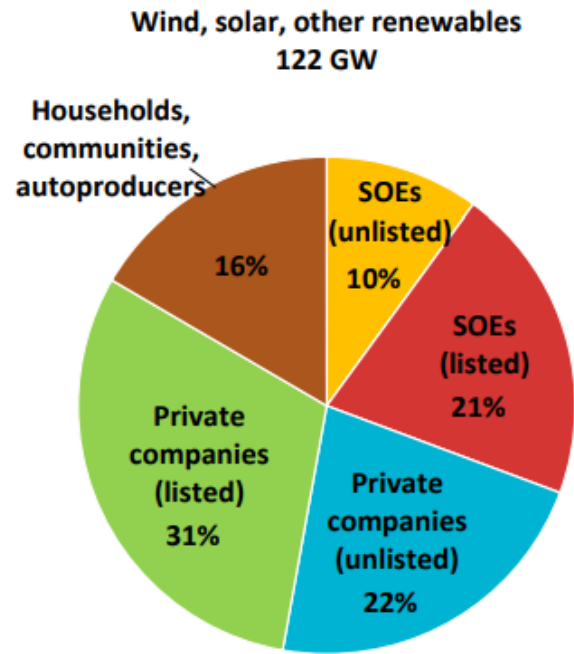
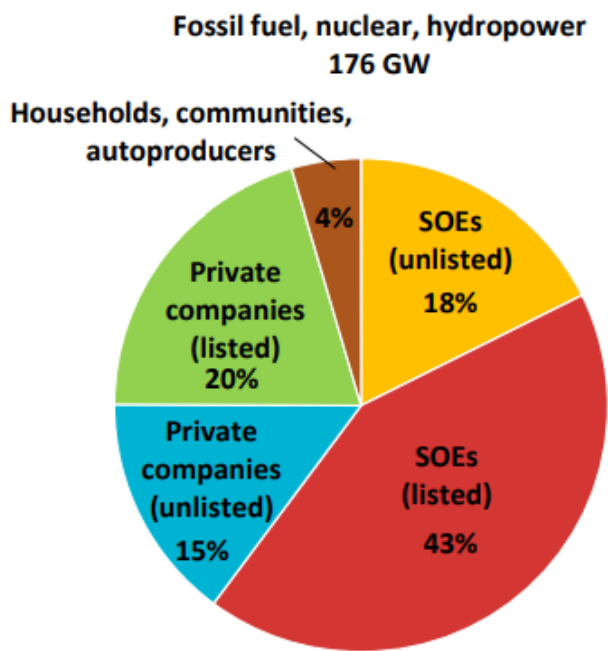
# The political economy of the energy transition

Jan Osička

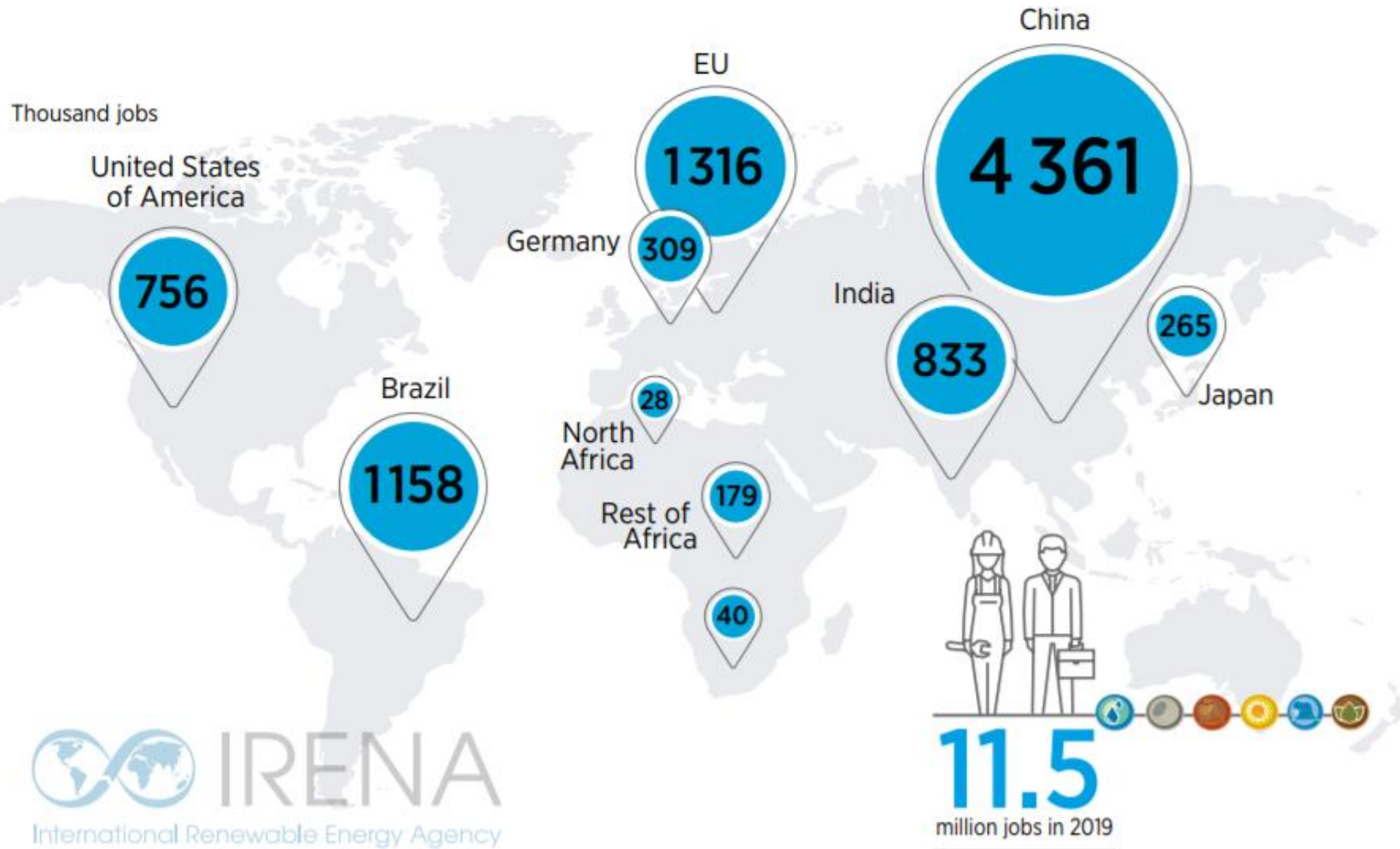
# Democratization of the energy system ownership

Ownership of global power generation capacity commissioned in 2015

Ownership of installed RE capacity in Germany (2012)



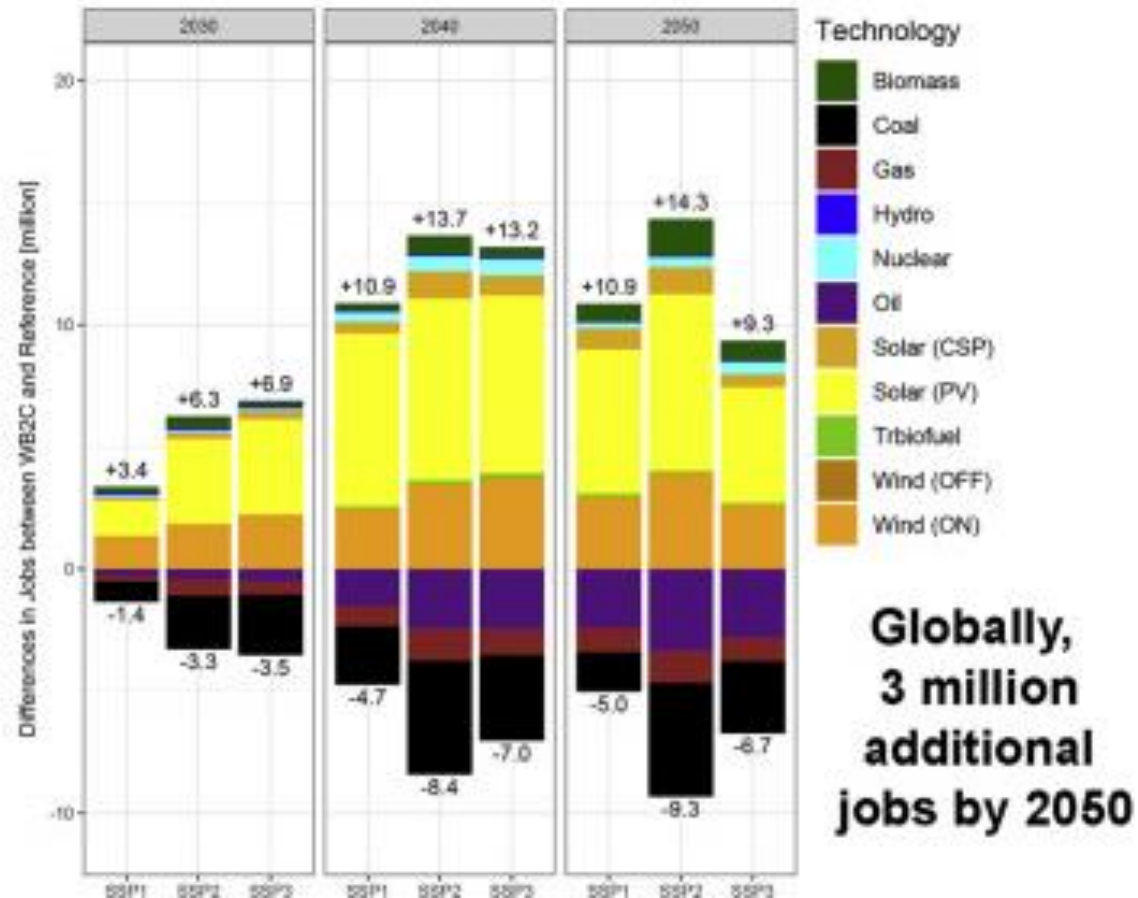
# Changes in employment structure



- 11.5 M jobs in RE as of 2019
- 1 M USD invested (USA)  
=> 7.5 jobs in RES  
=> 2.6 in fossil energy

Sources: [IRENA](#),  
[Garret-Peltier 2017](#)

# Changes in employment structure

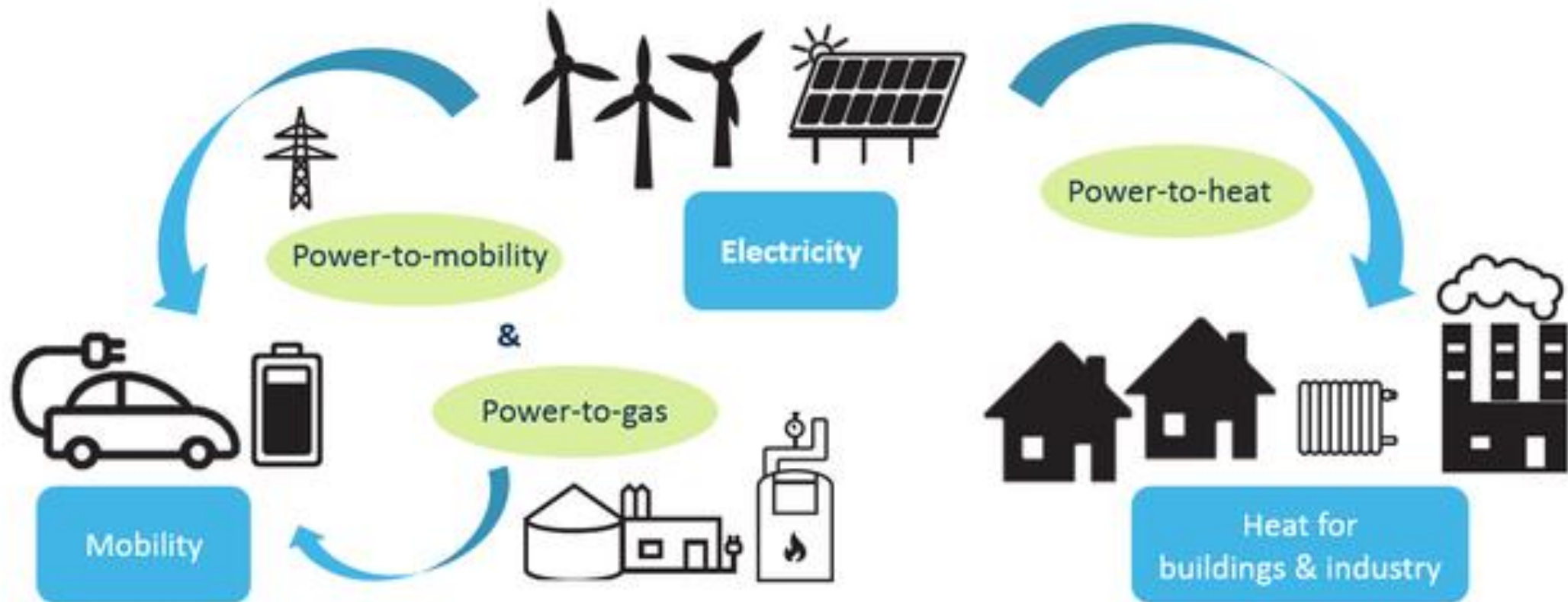


RES jobs additions to outweigh fossil fuels job losses

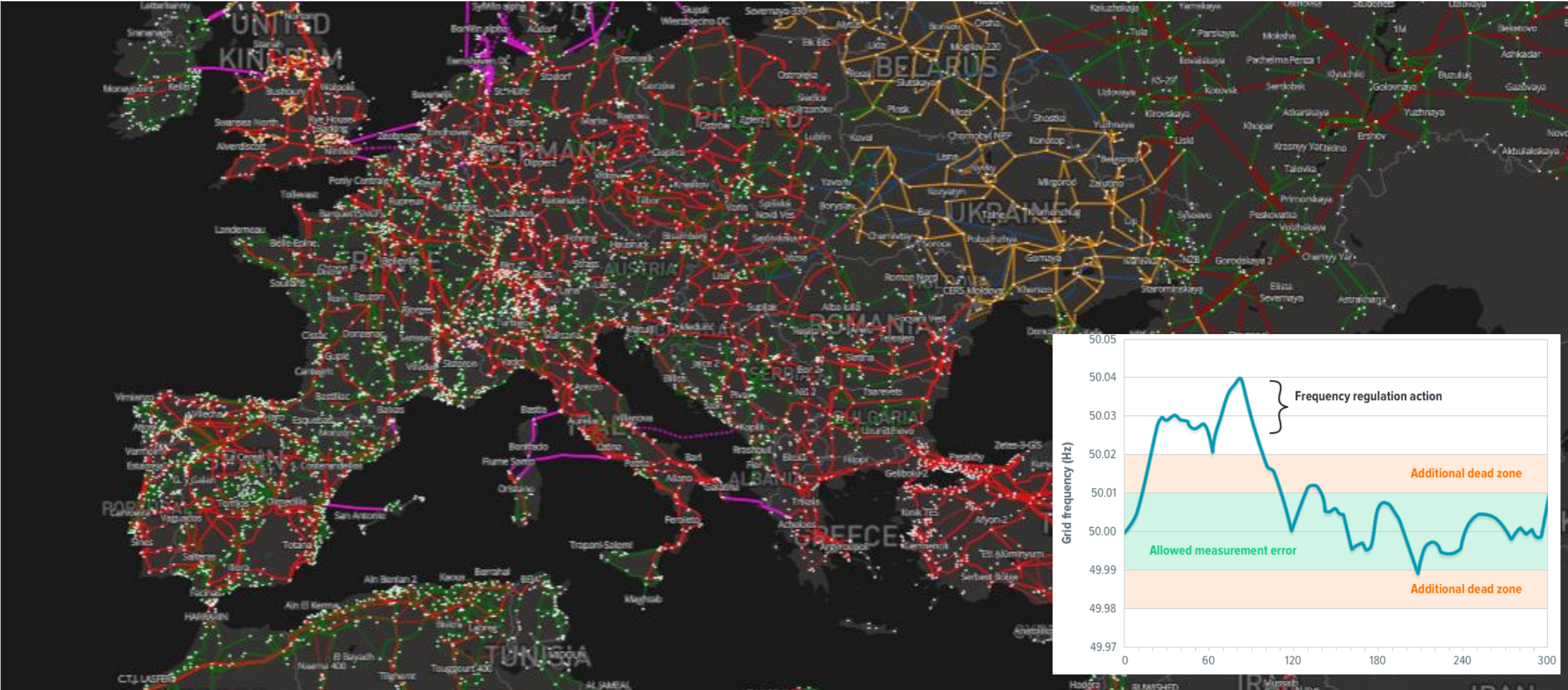
Source: [Pai et al. 2021](#)

# Electrify everything = increase complexity

**Sector coupling** – an integrated energy system based on renewable electricity



# New security challenges



# Blackouts, cyber attacks

## Recent blackouts

- India 2012: 700 million people affected
- India 2001: 230 million
- Indonesia 2005: 120 million
- Brazil 1999: 97 million
- Brazil and Paraguay 2009: 67 million
- Italy 2003: 57 million
- USA and Canada 2003: 50 million

## May 7, 2021 Colonial Pipeline attack

- Billing operations affected
- 75 BTC ( 4.4 M USD) requested
- Ransom paid
- 64 BTC (2.3 M USD) later recovered by the FBI
  
- 99 corporations infected
- 47% paid the ransom
- Avg ransom 1.9 M USD

# Will new energy materials breed new Saudi Arabias?

**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

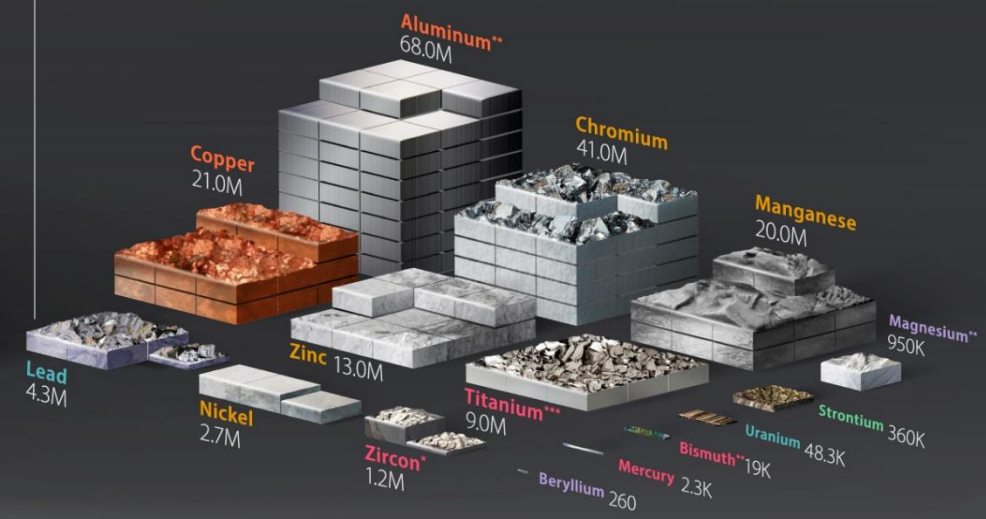


## LARGEST END-USE

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

## INDUSTRIAL METALS

181,579,892 tonnes

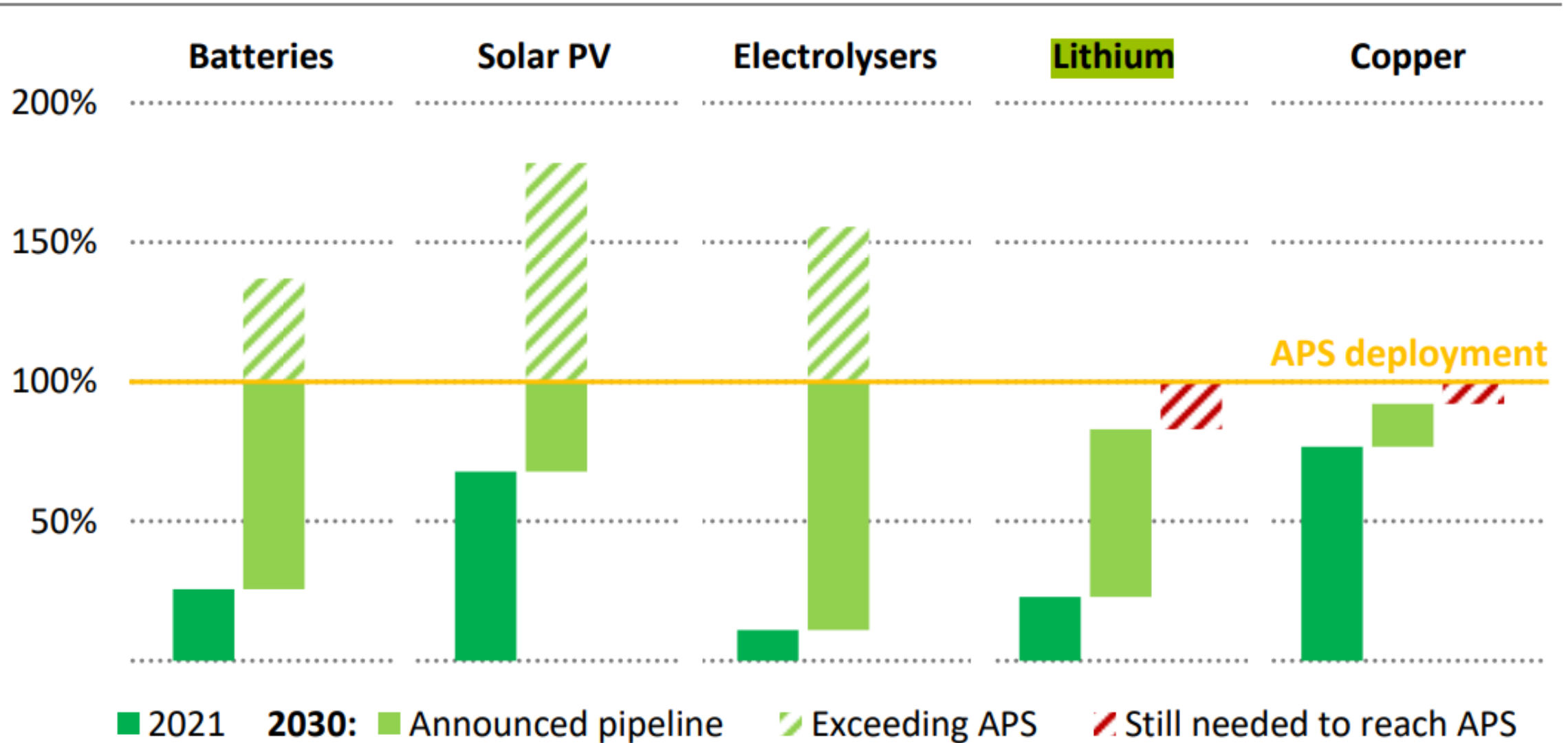


## TECHNOLOGY AND PRECIOUS METALS

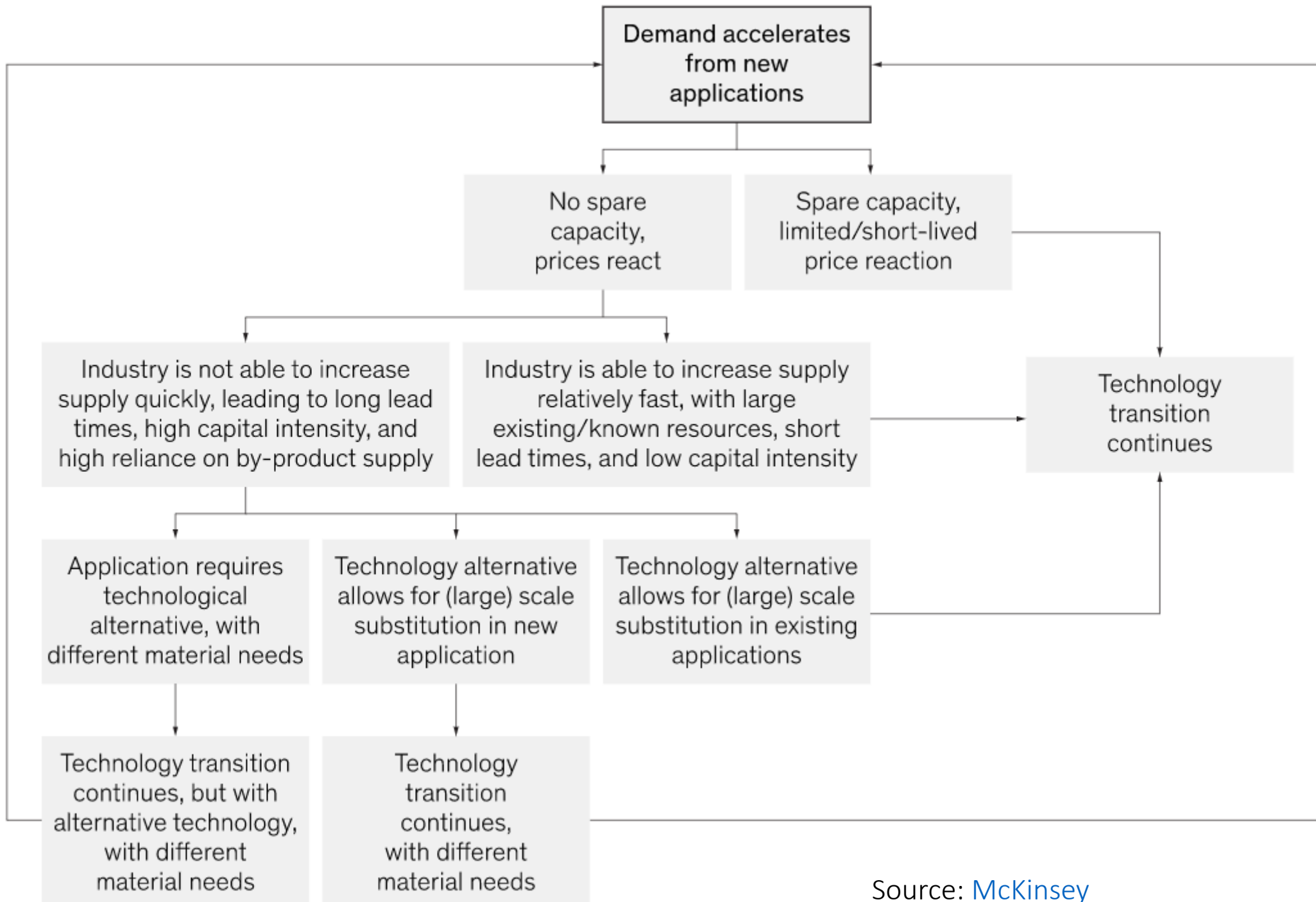
1,474,889 tonnes



**Figure 1.25** ▸ Announced manufacturing capacity for selected energy technologies relative to deployment in the APS, 2021 and 2030

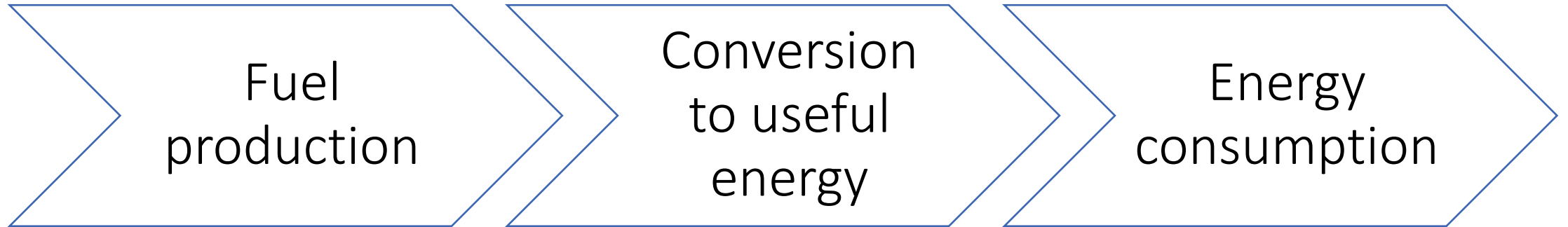


Material shortages: prices and substitution

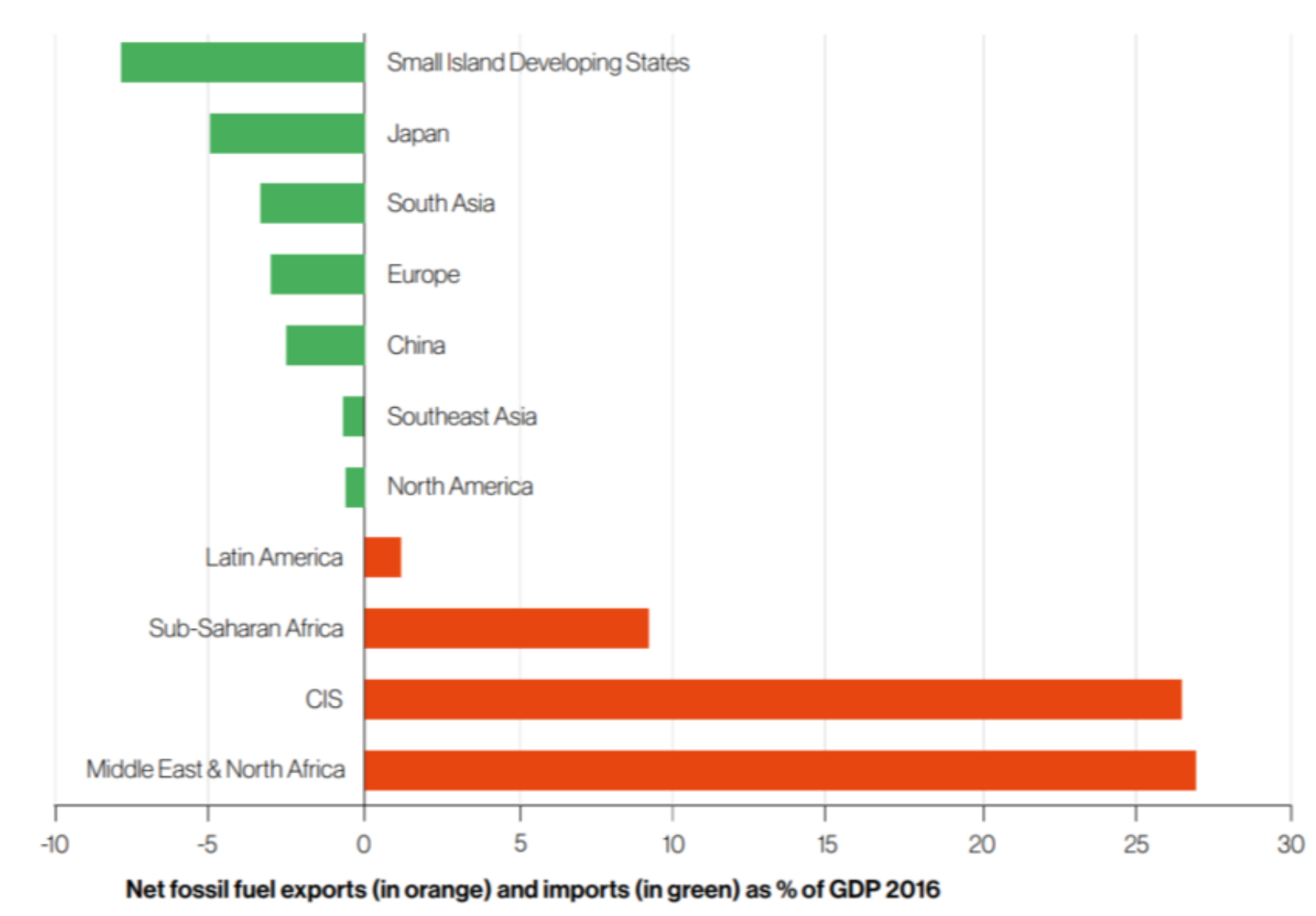


Source: [McKinsey](#)

# Value distribution in the supply chains



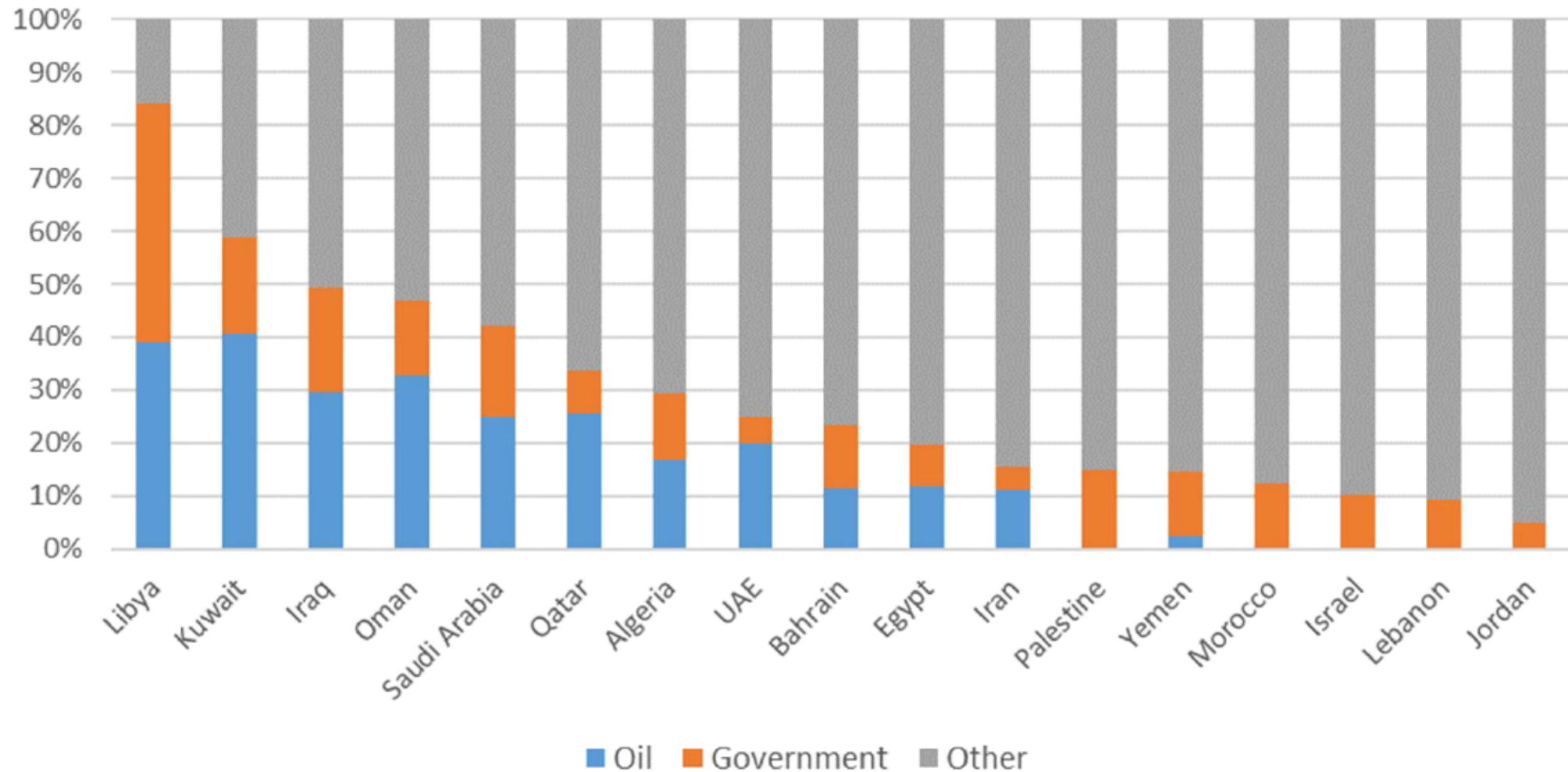
# Regional impact of the transition



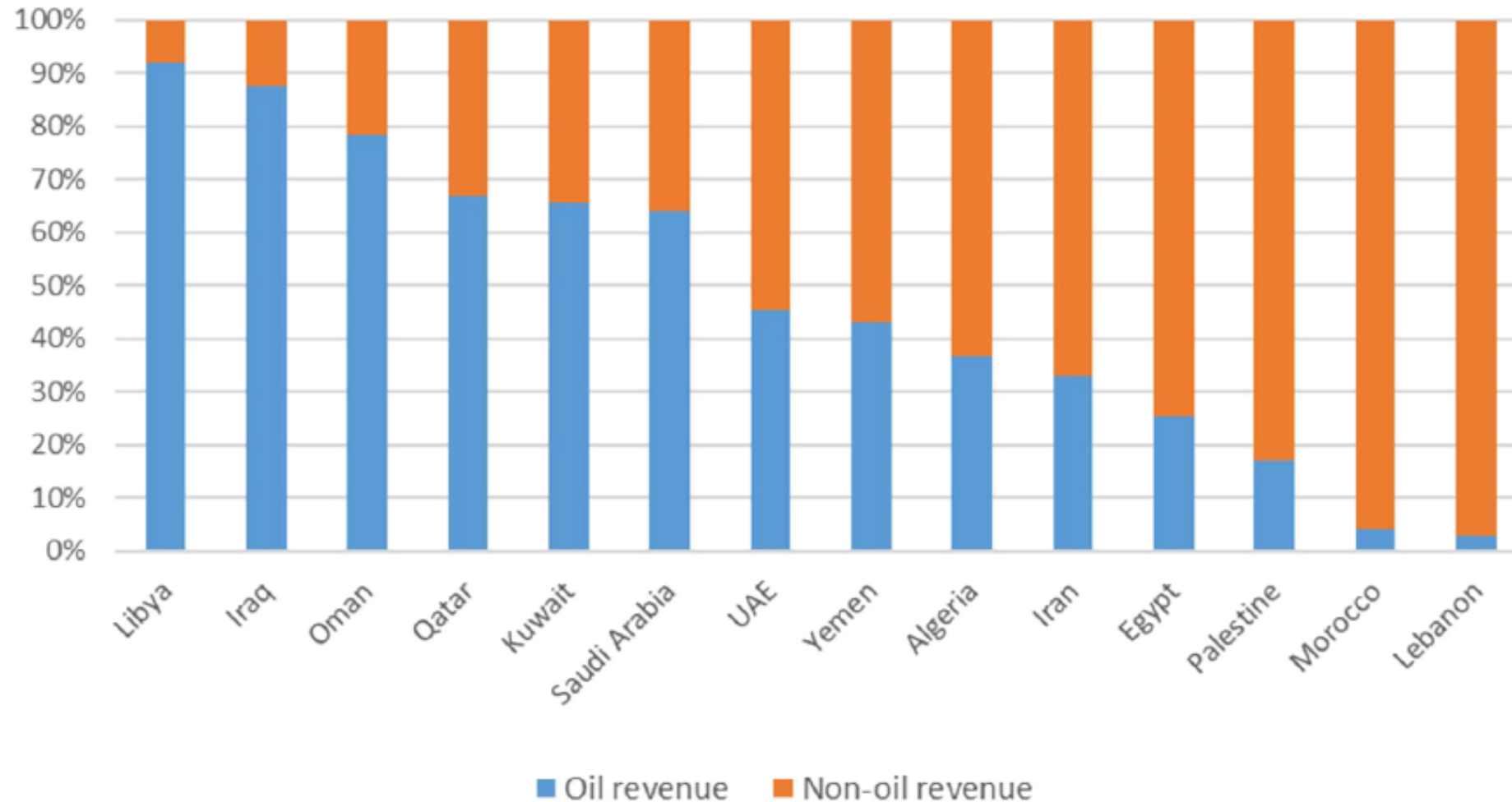
# Macroeconomics of the MENA region

- 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

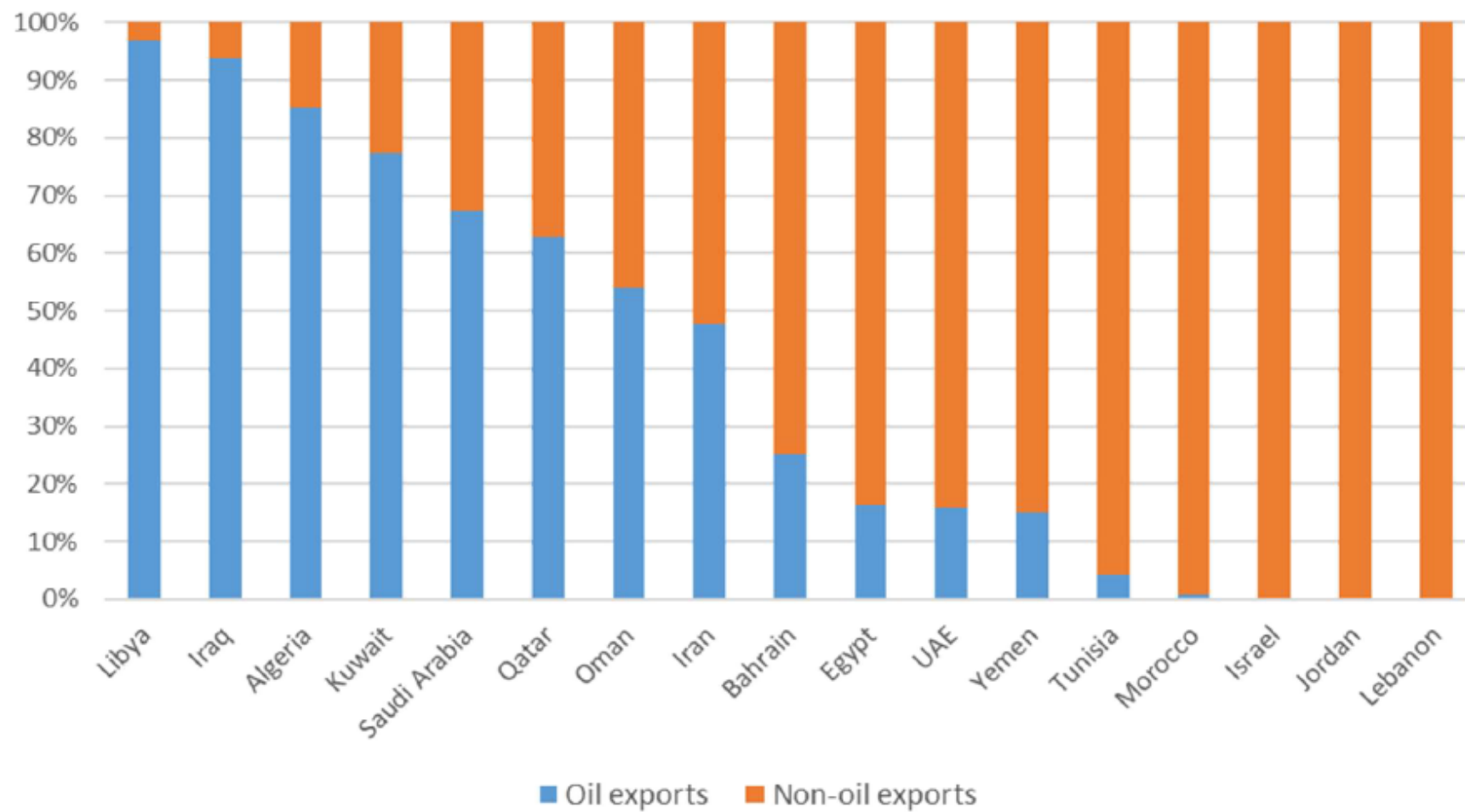


# Oil and non-oil fiscal revenue in selected MENA countries, 2016 (% of general government revenue)



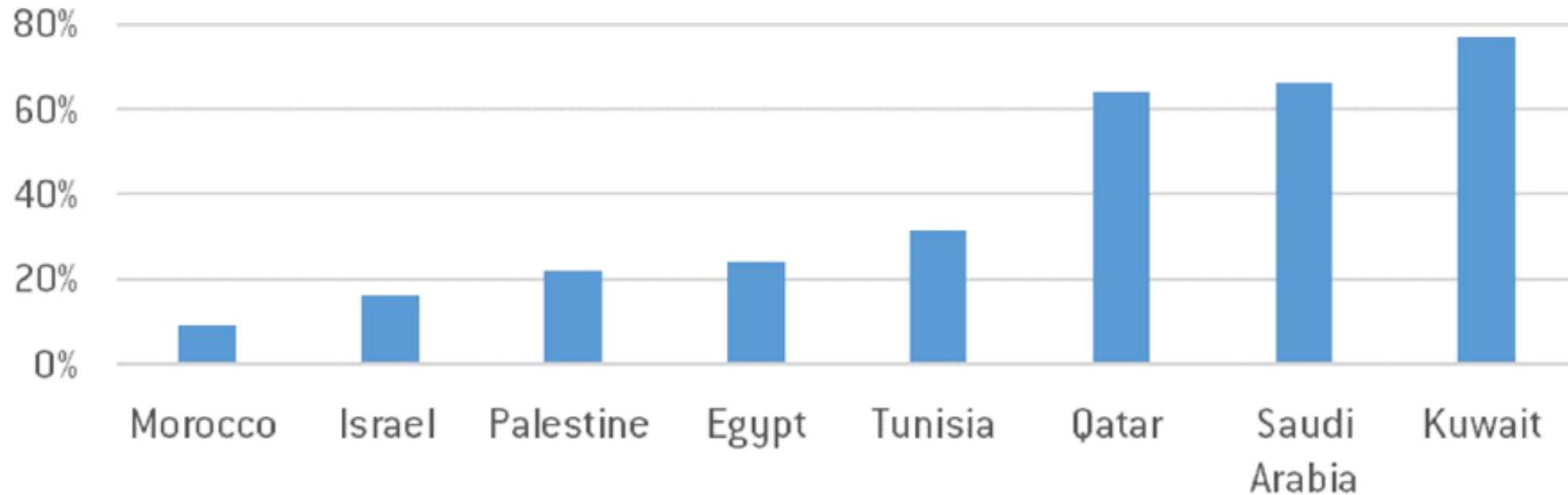


# Oil and non-oil exports in MENA countries, 2016



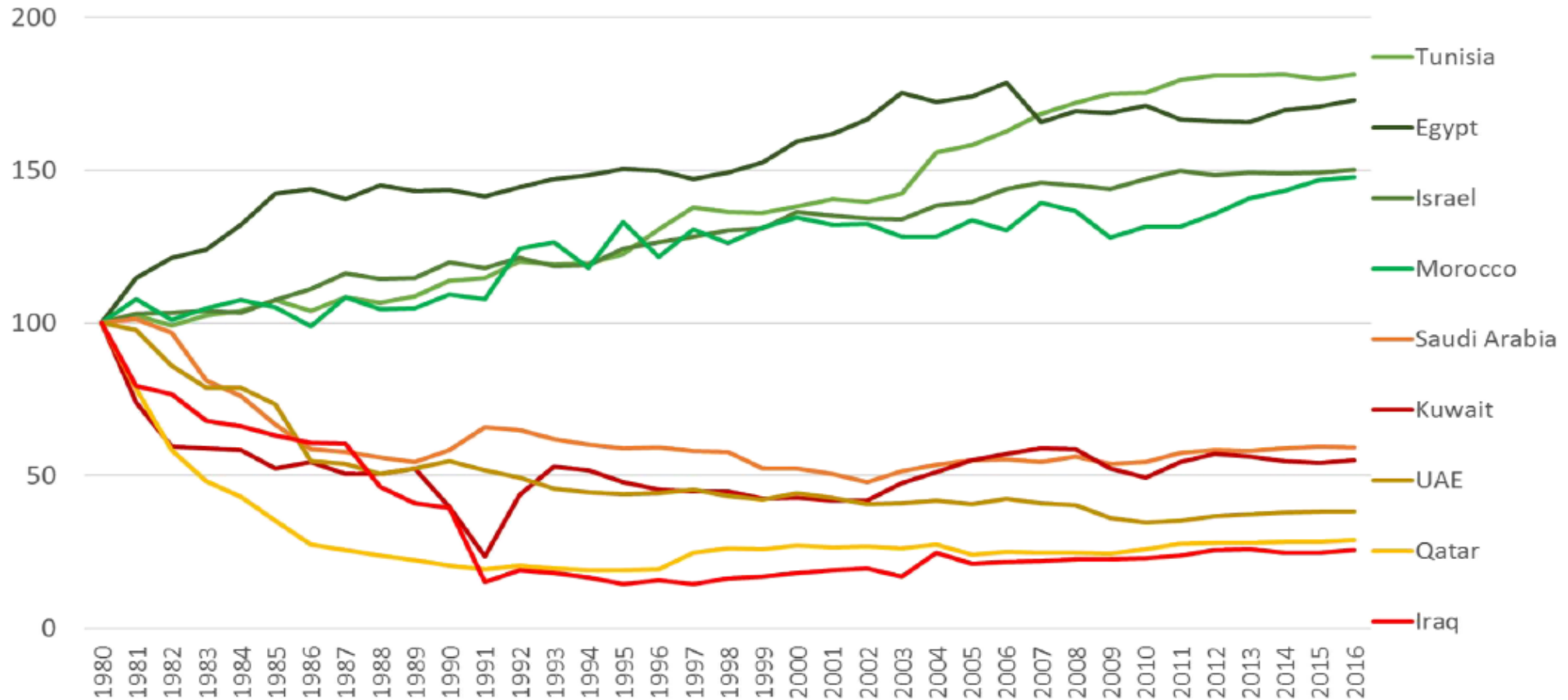
Note: Low shares of oil in exports from the UAE and Bahrain are because non-oil exports include a large share of re-exports.

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

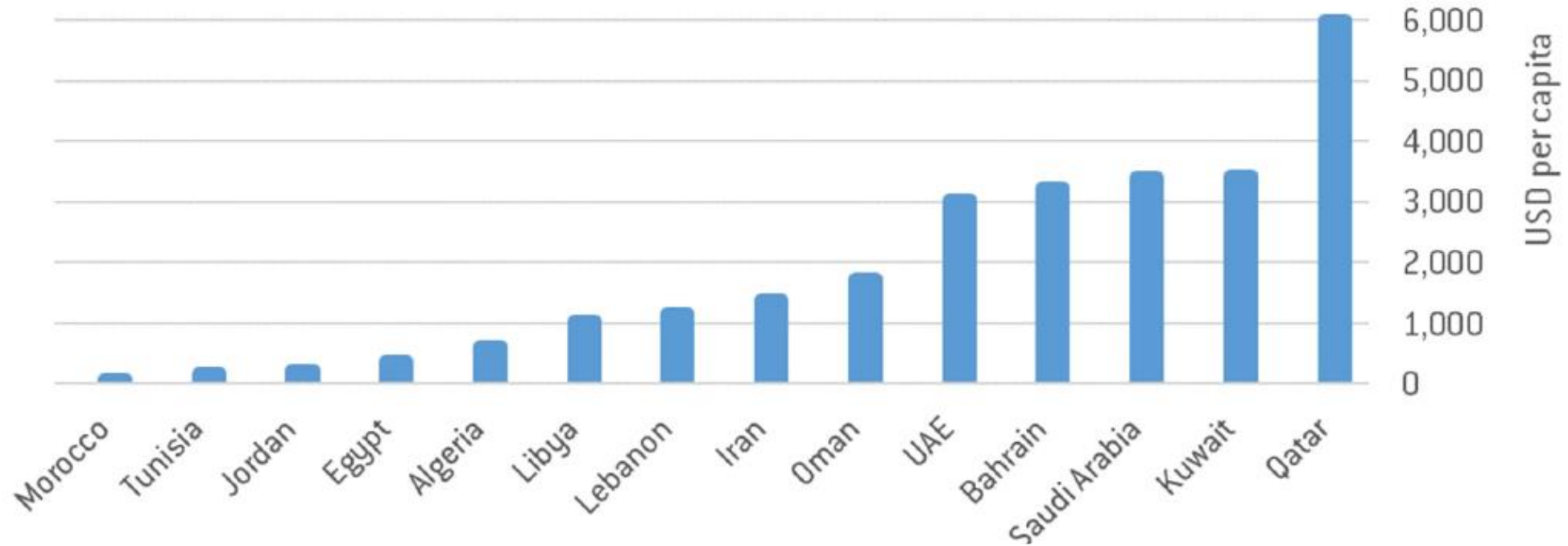


High shares of public employment in usually protected jobs with high wages contributes to low labour productivity of MENA oil-exporting countries. Emphasized by imported cheap non-national labour (since 80s), reducing productivity also in private sector. That prevents its development to internationally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

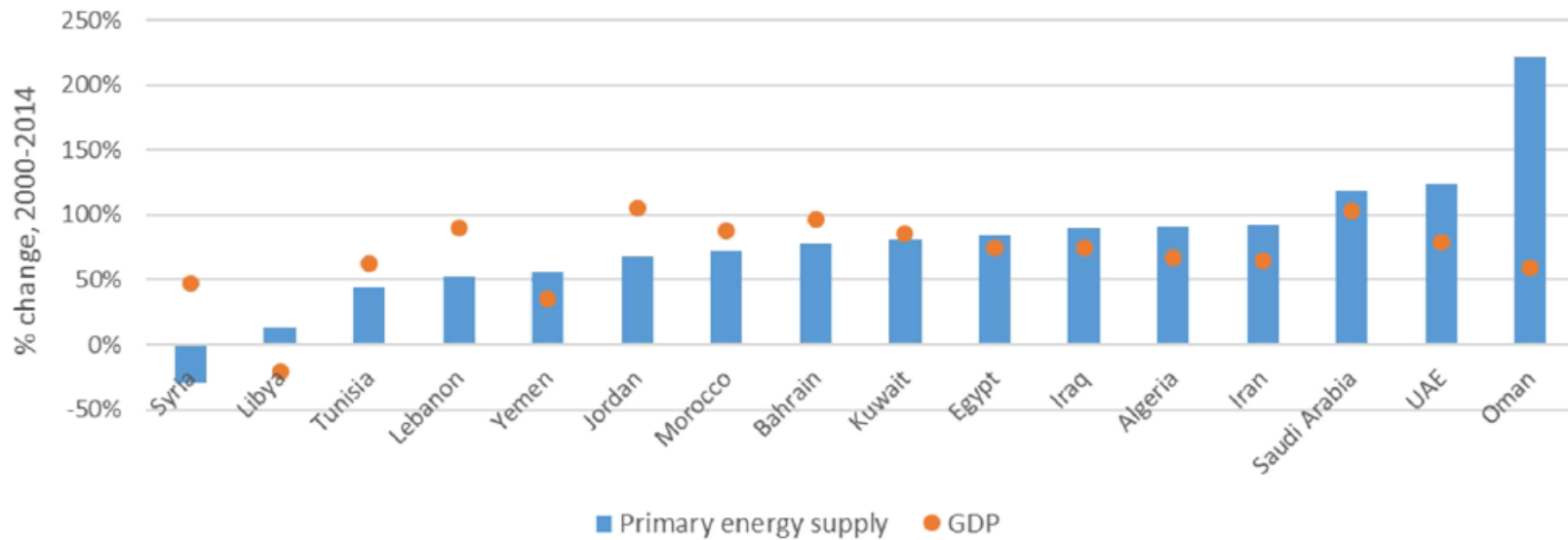
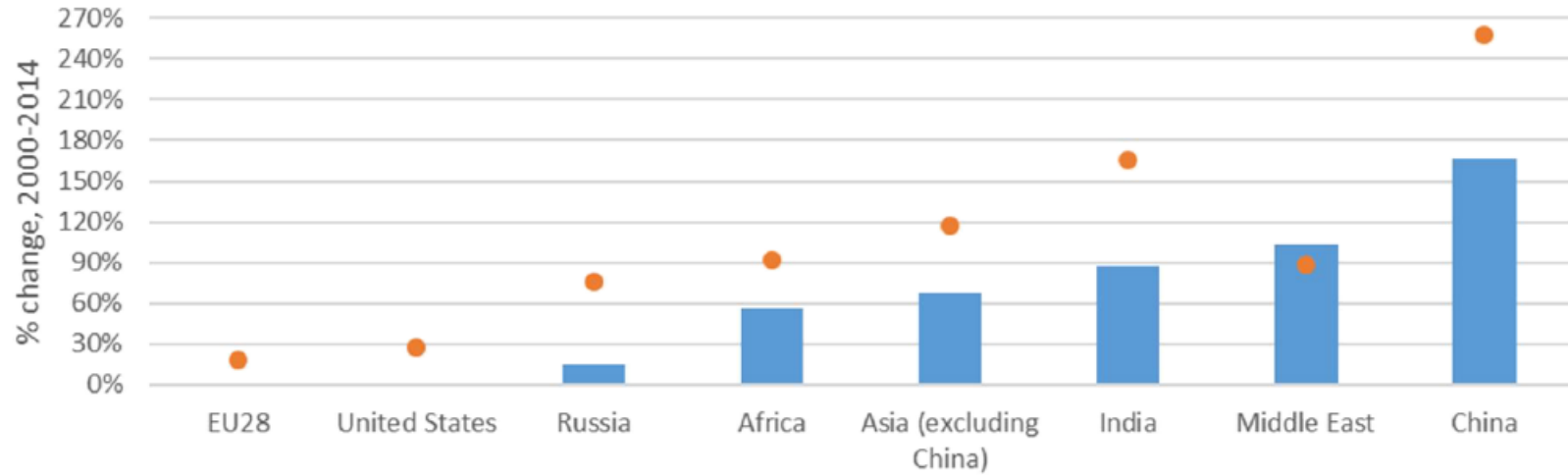
# Labour productivity in selected oil-importing and oil-exporting MENA countries



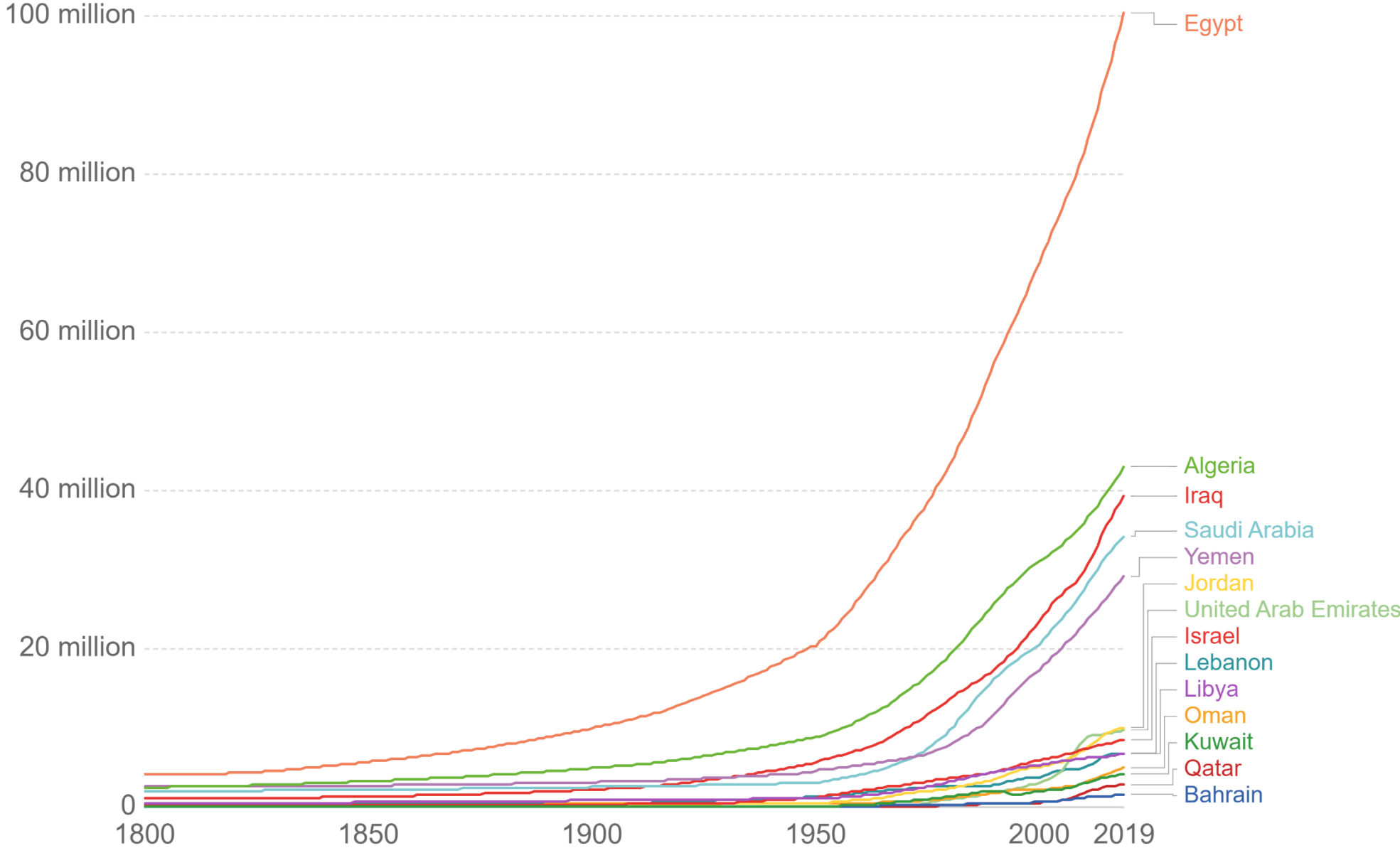
# Post tax energy subsidies in selected MENA countries, 2015



# Changes in primary energy supply and GDP

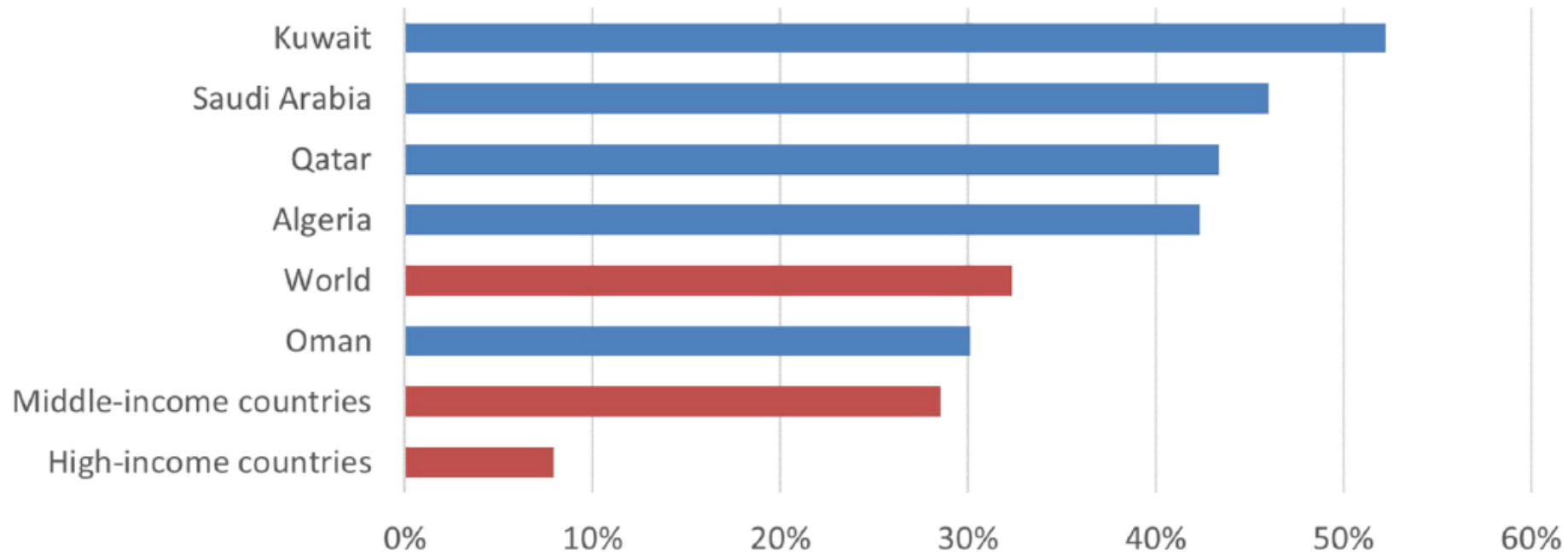


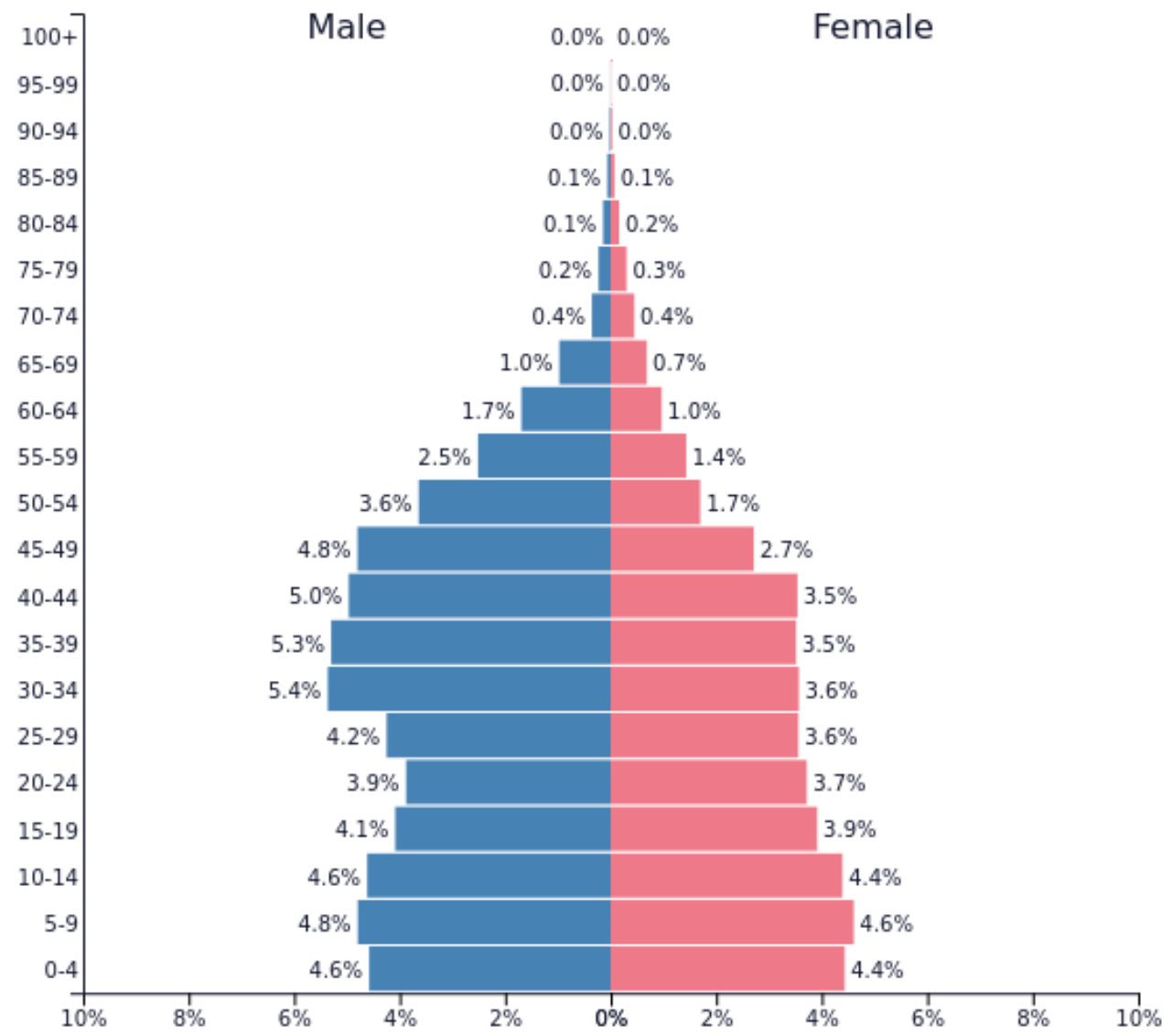
# Population



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

# Expected population growth between 2015-2050







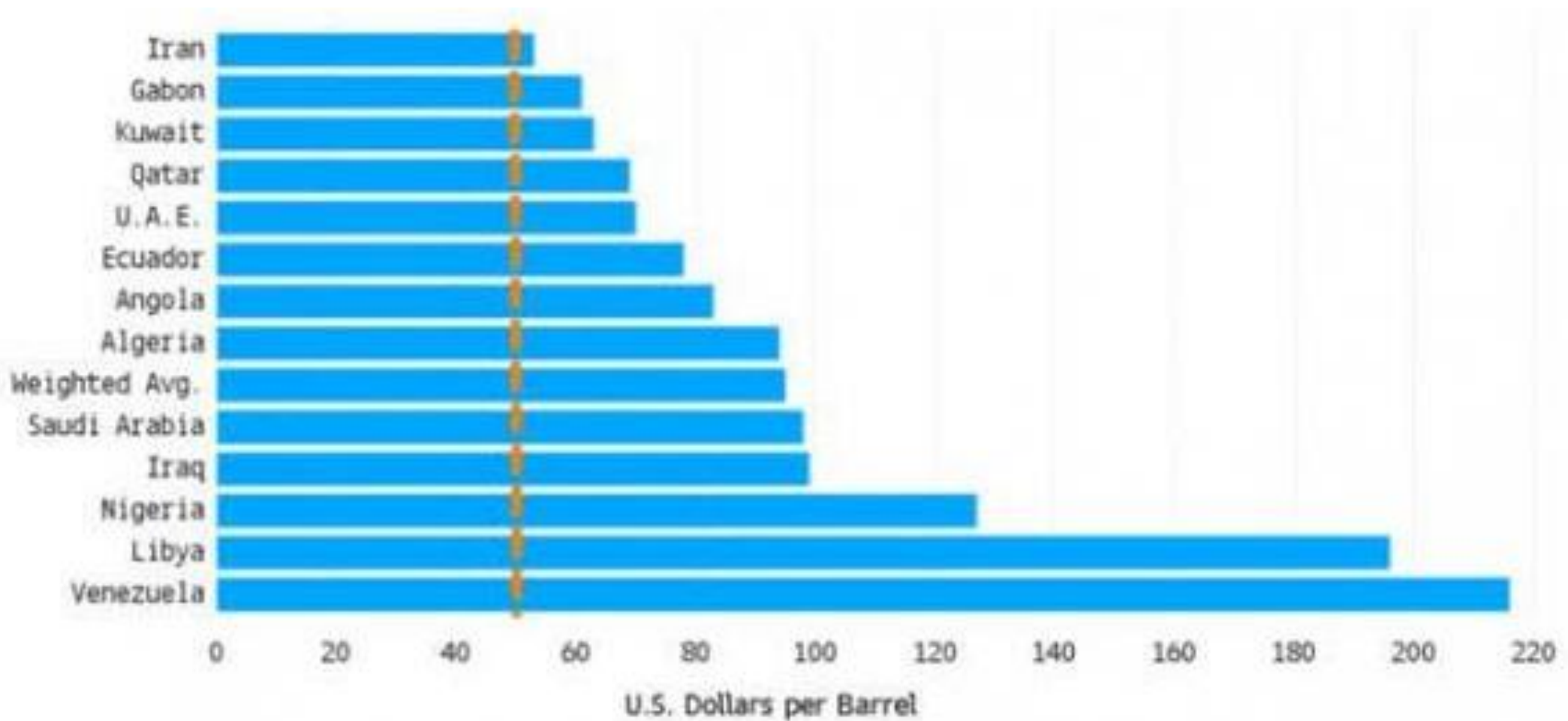
# Saudi reaction to Arab Spring (2011)

- \$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 allocation 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)



Source: IMF, World Bank, RBC Capital Markets  
Note: Indonesia not featured