

# Towards a Green New Deal for Africa

Prof Mark Swilling

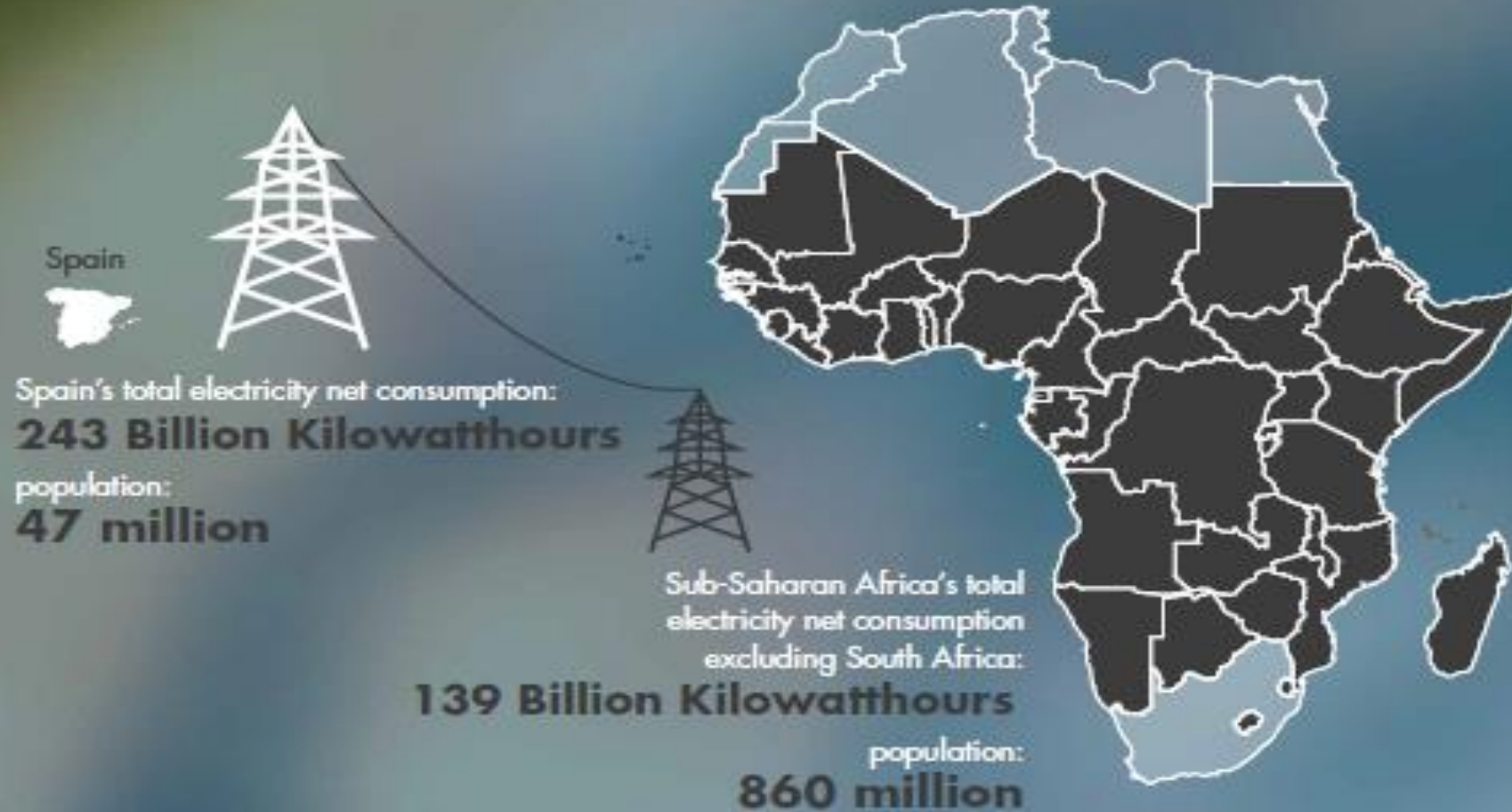
Professor of Sustainable Development: Stellenbosch University

# Key trends

- fastest economic growth over the last decade - ***the 'next frontier'*** for global economic growth and Foreign Direct Investment (FDI)
- ***more than 30%*** of the population still lives in extreme poverty (AfDB 2016)
- ***two in every three*** people (around 621 million people in total) have no access to electricity (APP 2015) – even if energy access improves in % terms, by 2030 600 m could still lack access
- current population of 1 billion - increasing to 2 billion by 2050, largest work force in the world
- urbanisation – from 400 m urbanites in 2010 to 1.2 billion by 2050
- ecological footprint ***increased by 240%*** between 1961 to 2008 while the overall carbon footprint of the region ***increased 8 fold*** during the same period (AfDB & WWF, 2013)

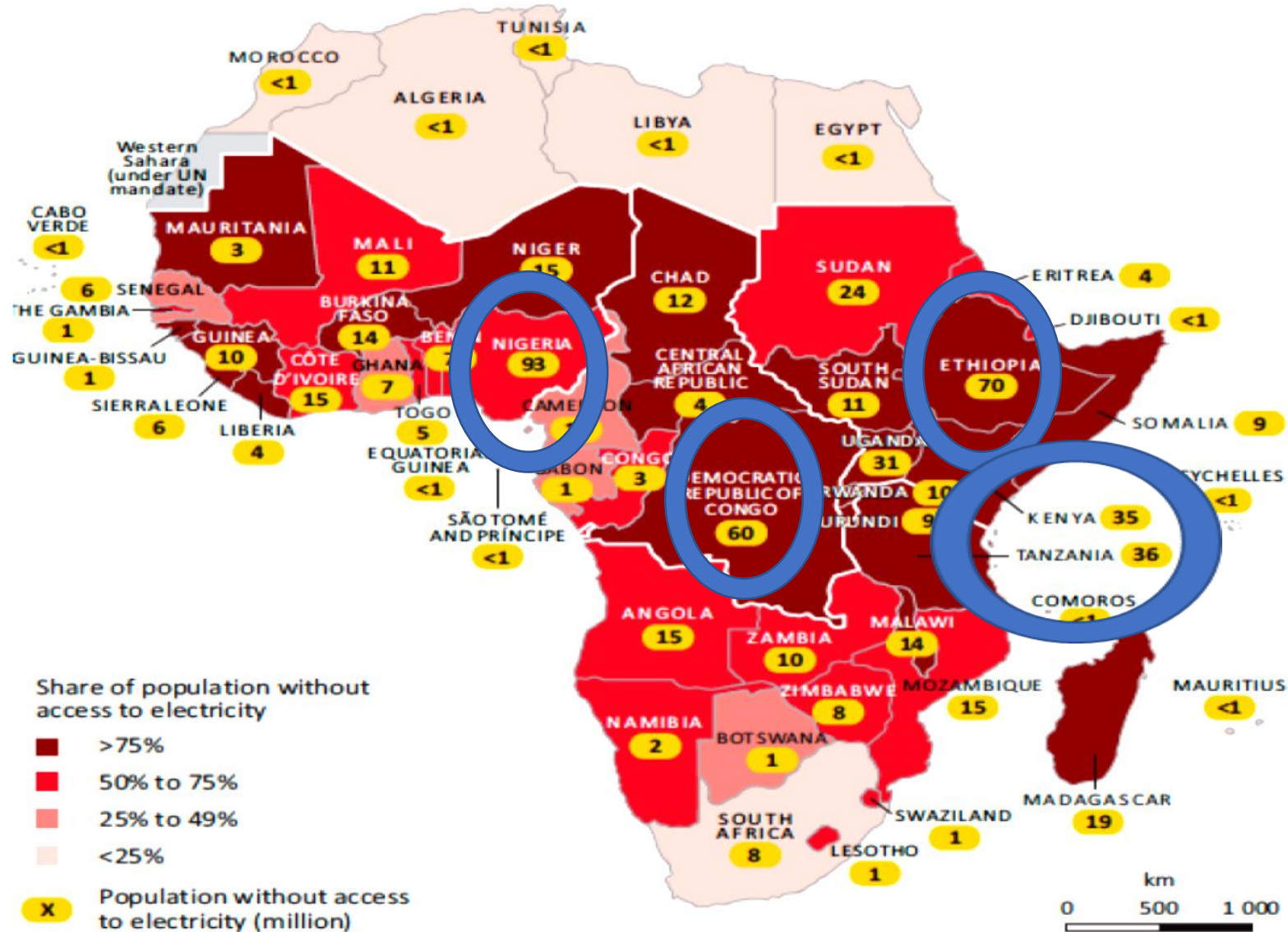
# WORLDS APART

Viewed from Africa, energy use patterns in rich countries represent another universe



What is the best option?  
Cheapest?  
Easiest to manage in grid-constrained environment?  
Least dependent on mega-financing & construction capacity?

## Share of population without access



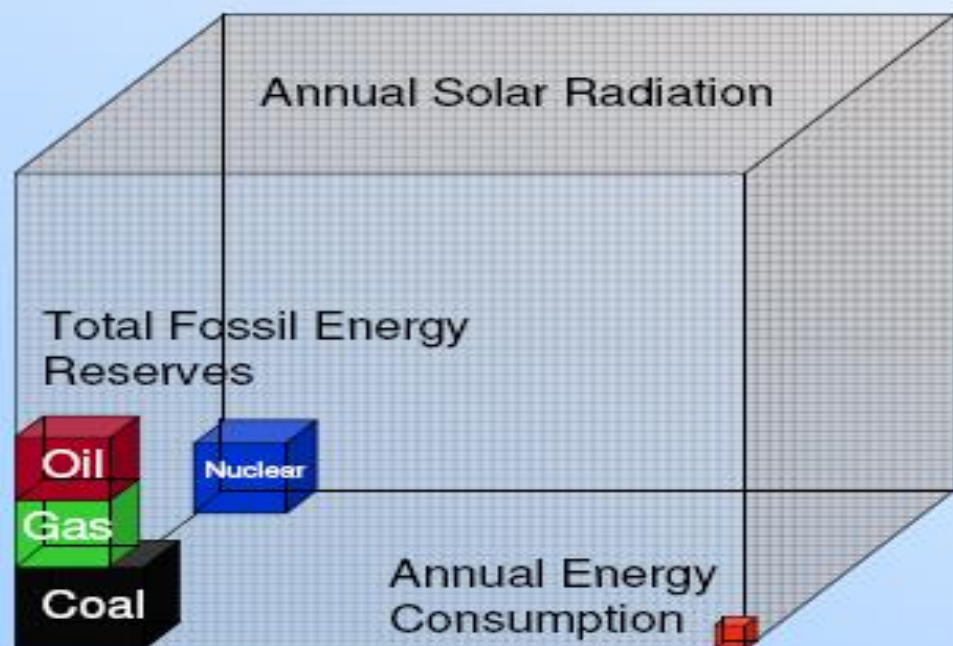
Source: International Energy Agency. Africa Energy Outlook, 2014, Figure 1.6



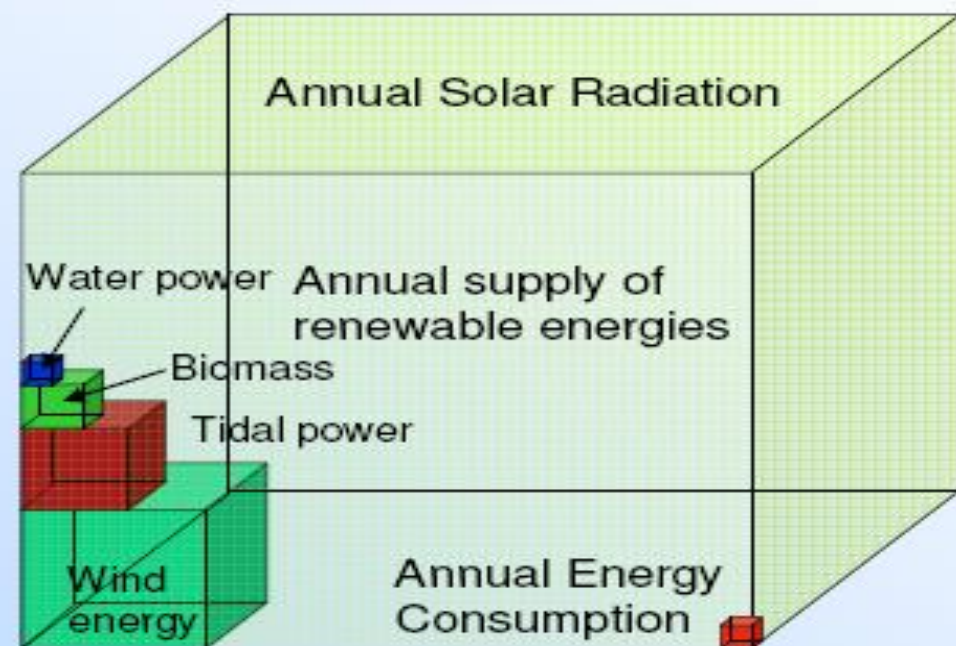
# World energy consumption

.GP solar

## Traditional energy sources

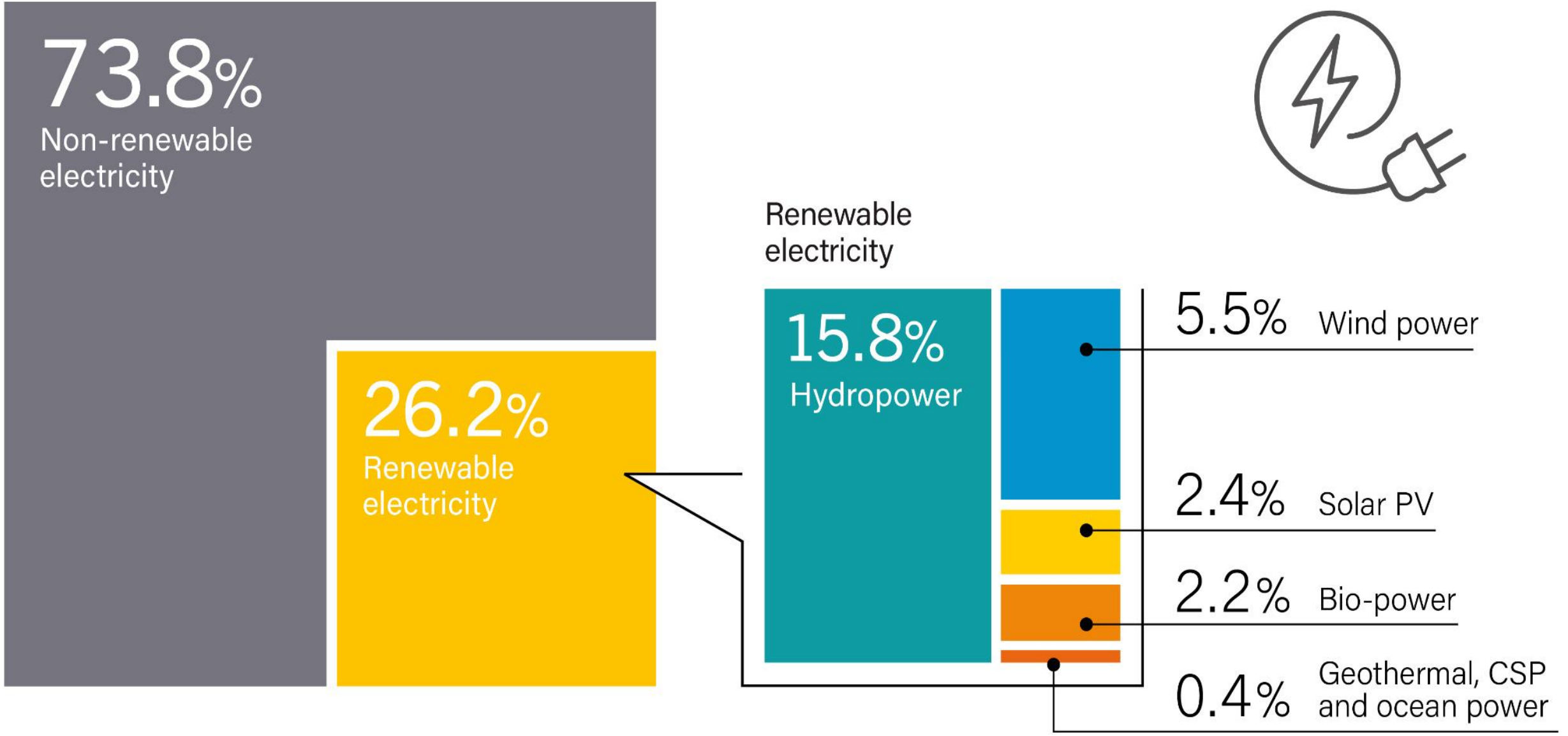


## Renewable energy sources

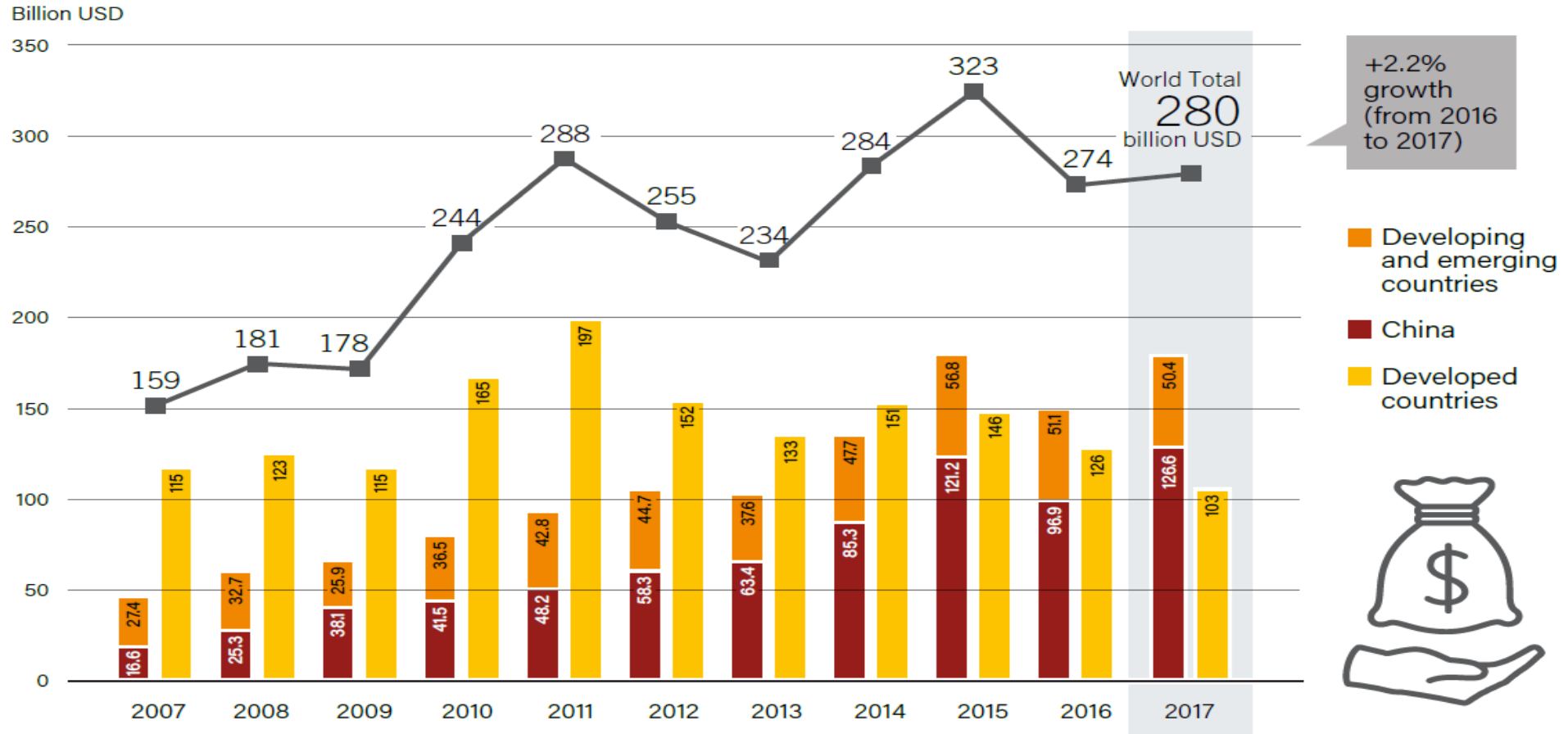


Source: SolMic, Germany

# Estimated Renewable Energy Share of Global Electricity Production, End-2018



**FIGURE 48. Global New Investment in Renewable Power and Fuels in Developed, Emerging and Developing Countries, 2007-2017**



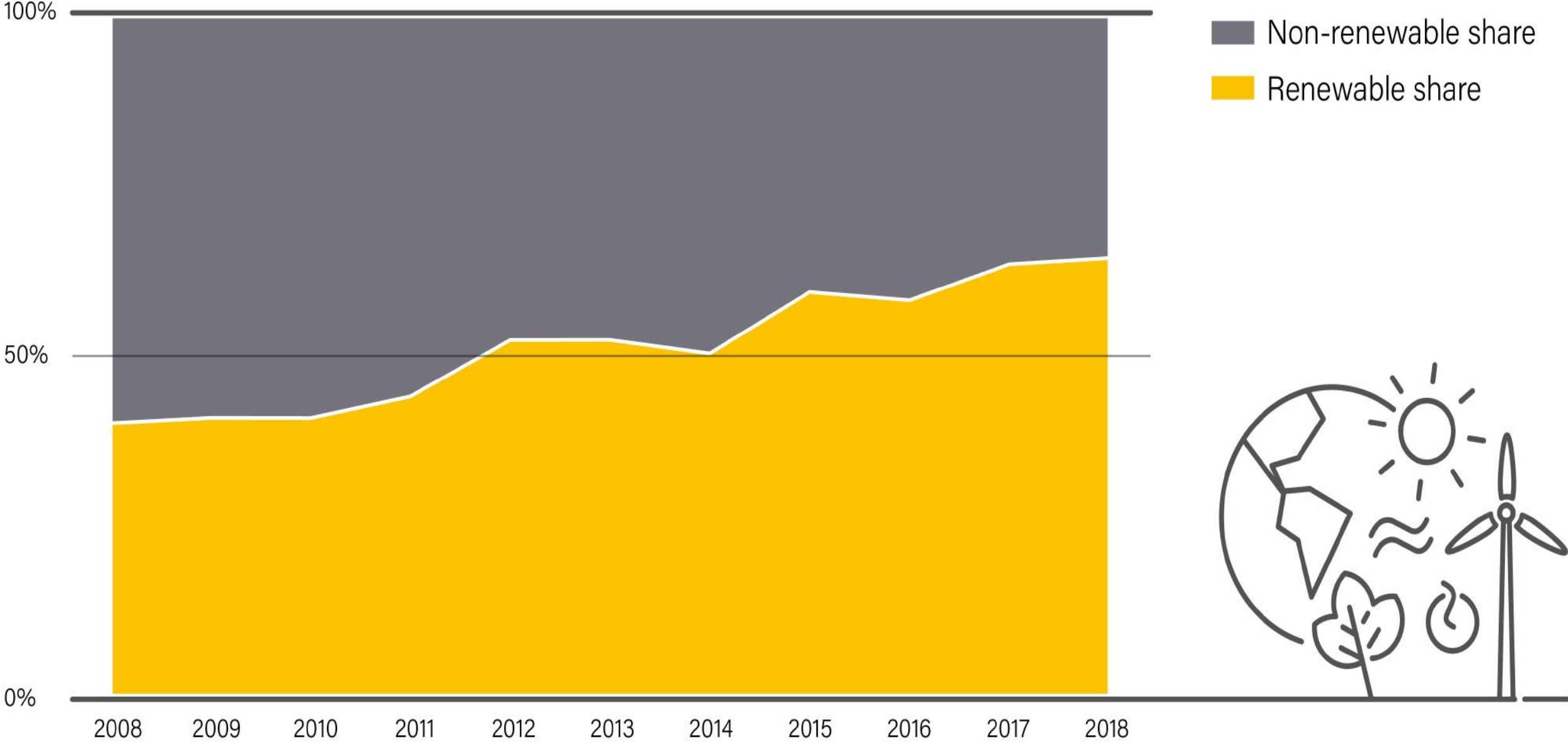
Note: Figure does not include investment in hydropower projects larger than 50 MW. Investment totals have been rounded to nearest billion and are in current USD.

## Prices:

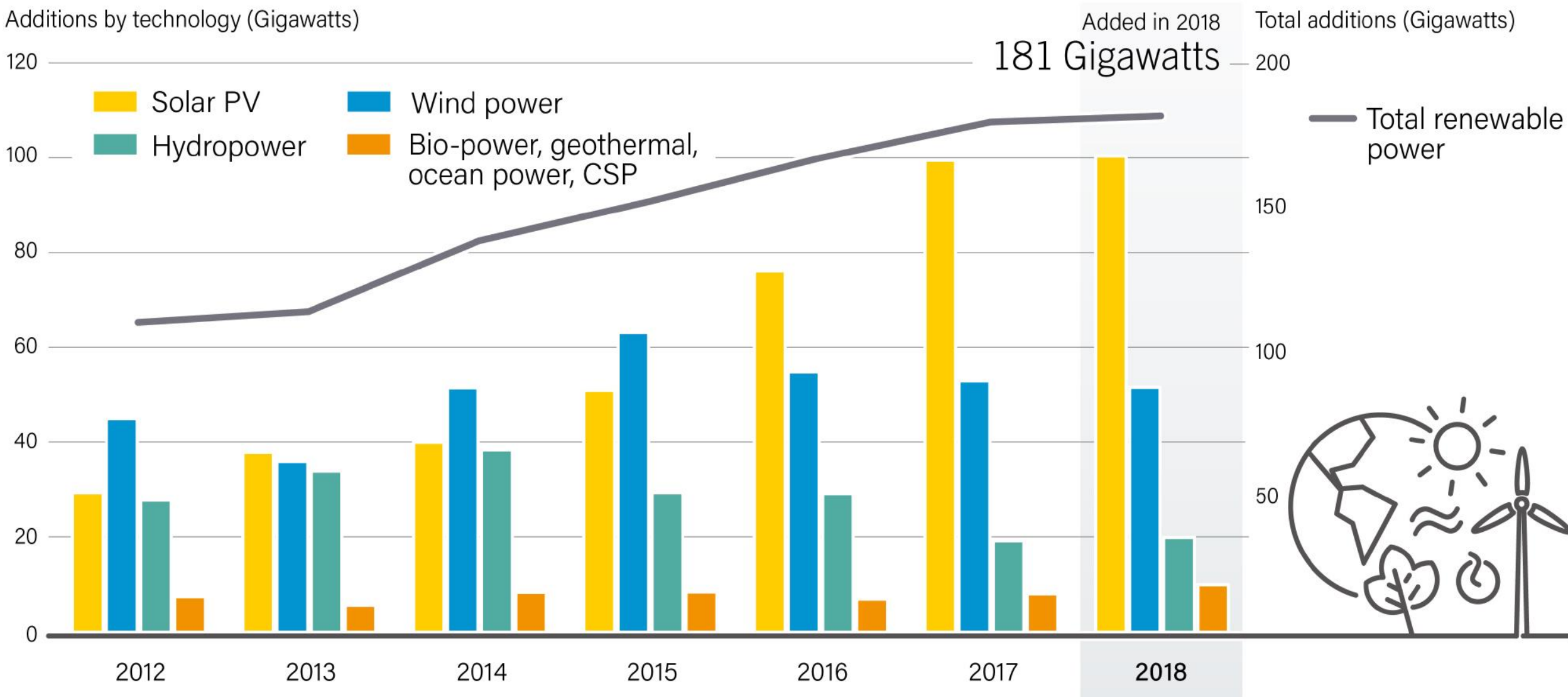
- \$0.10/kWh over the life cycle on average (with onshore wind power now down to \$0.03-0.04/kWh and solar pv at \$0.03/kWh)
- Fossil fuels - \$0.05/kWh to over \$0.15/kWh



# Share of Renewables in Net Annual Additions of Power Generating Capacity, 2008-2018



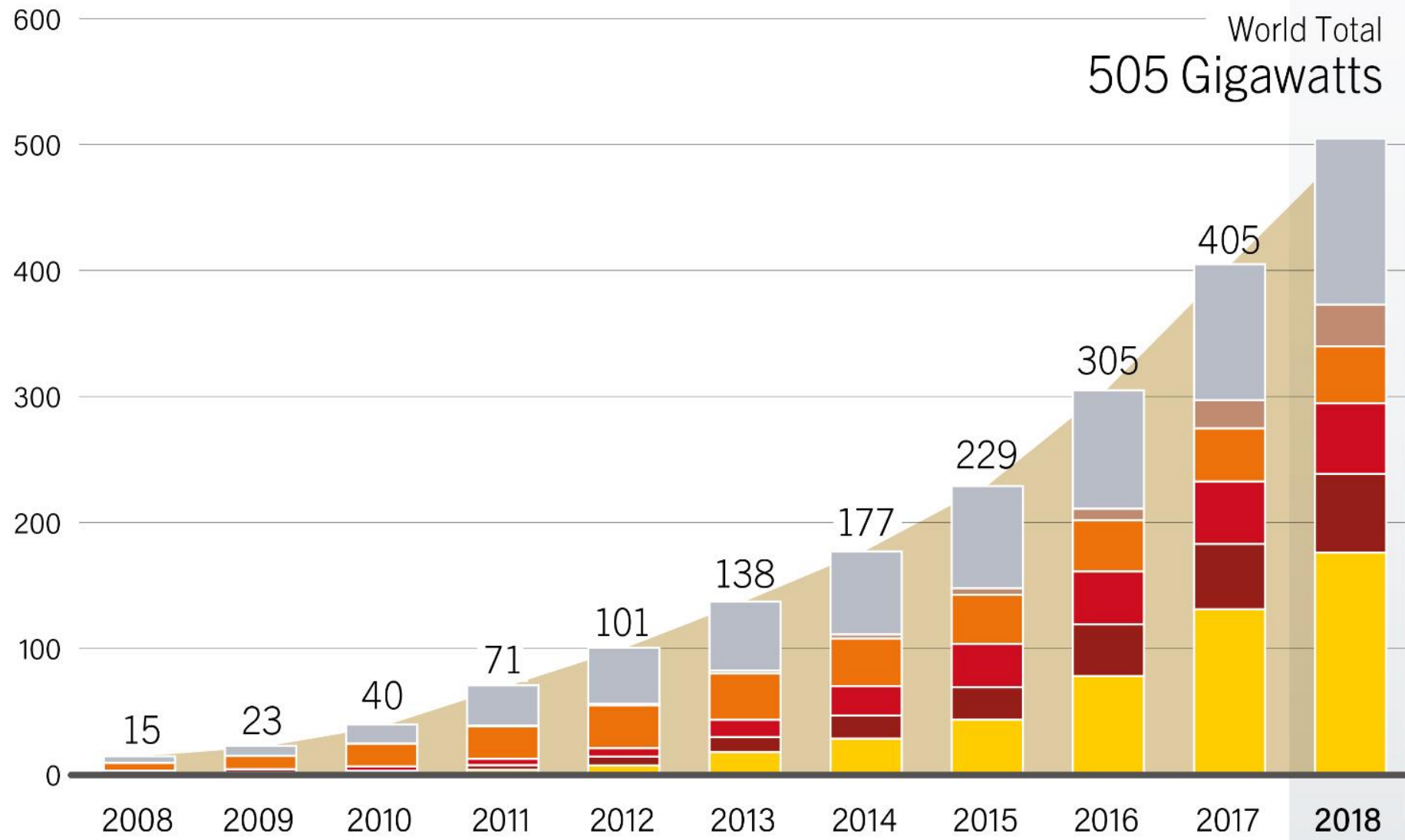
# Annual Additions of Renewable Power Capacity, by Technology and Total, 2012-2018



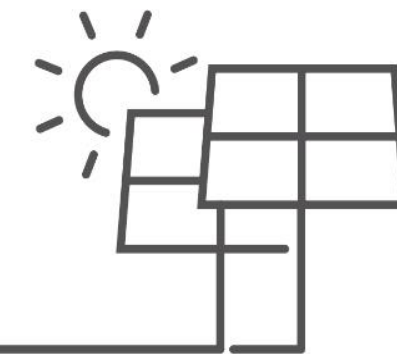
**179 countries with RE targets, 57 with 100% RE target**

# Solar PV Global Capacity, by Country and Region, 2008-2018

Gigawatts



- Rest of World
- India
- Germany
- Japan
- United States
- China



# Jobs in Renewable Energy



**Solar energy**  
solar PV, CSP, solar heating/cooling



**Bioenergy**  
biomass, biofuels, biogas



**Hydropower**  
(large- and small-scale)



**Wind power**



**Geothermal**



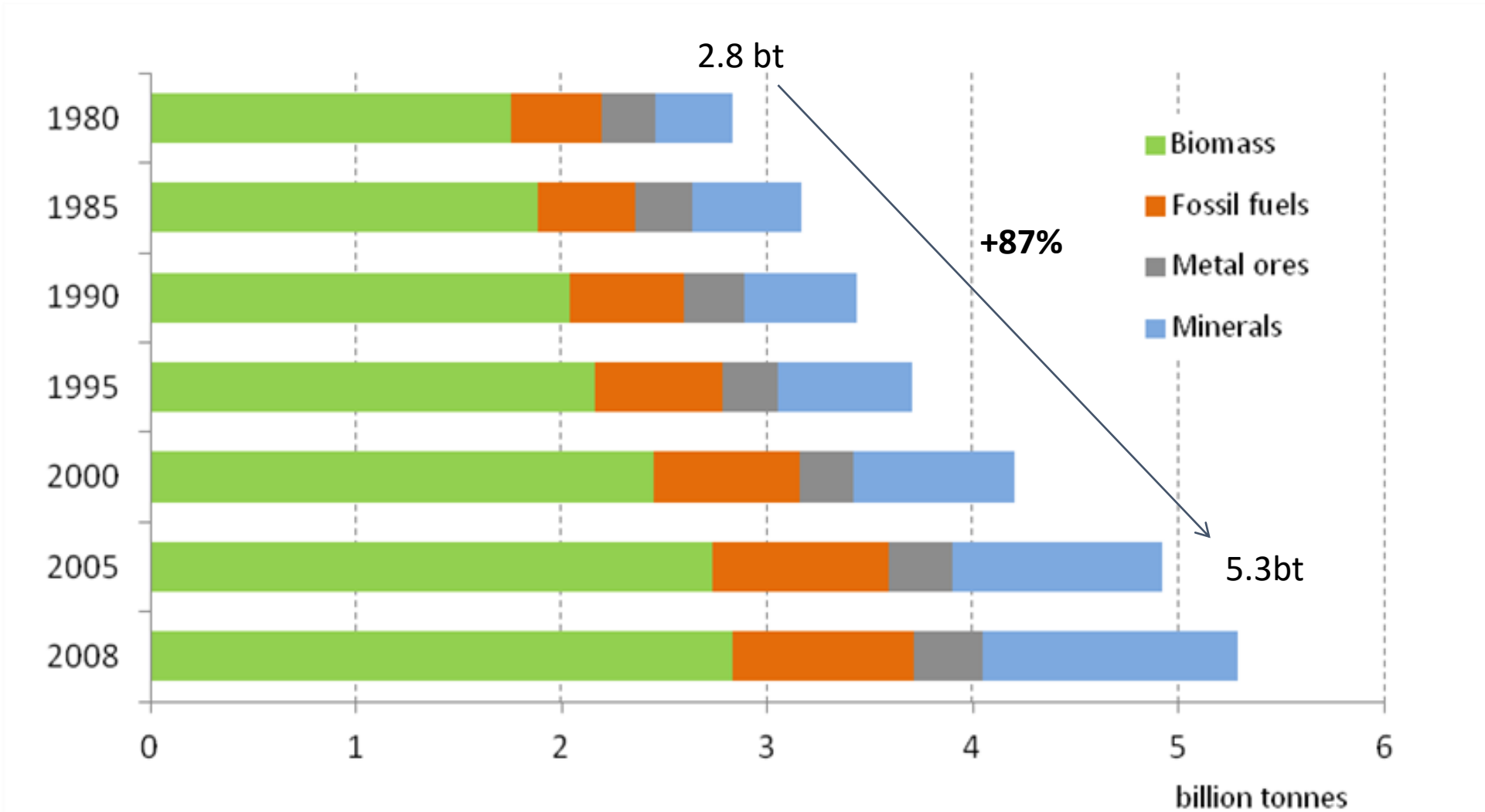
= 50,000 jobs



World Total:  
**11**  
million jobs

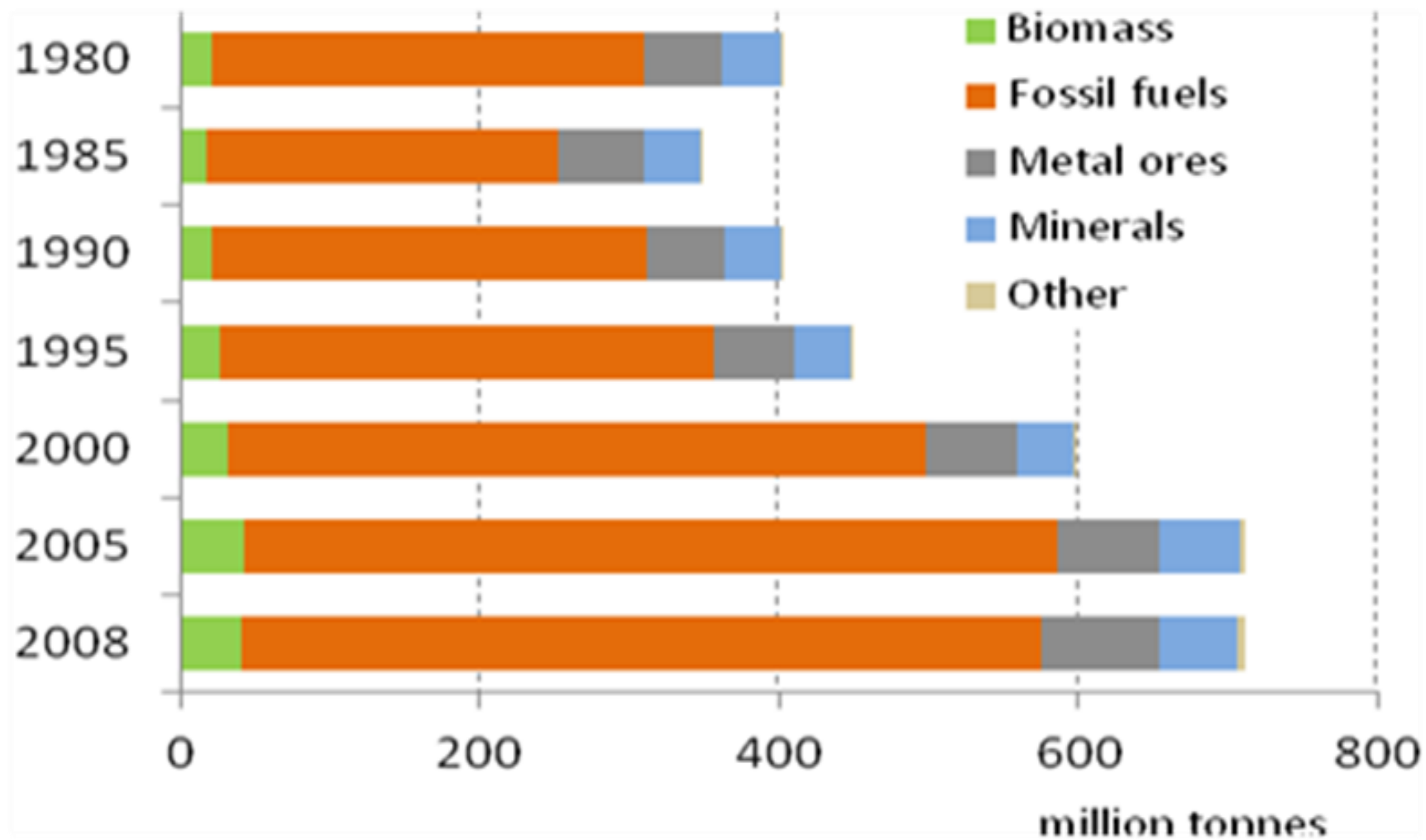


# Domestic Material Extraction in Africa, 1980-2008

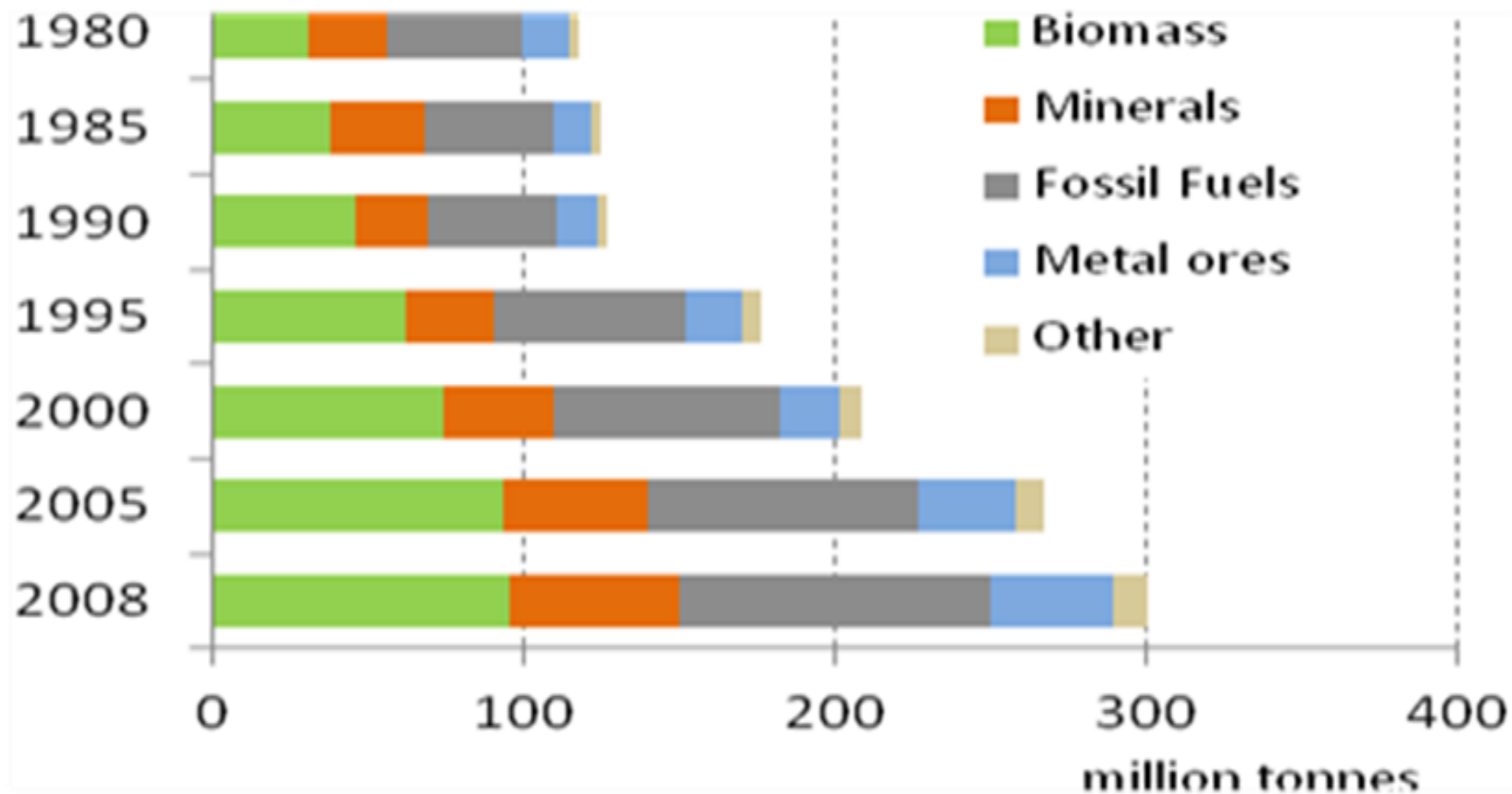




# Africa's physical exports (mt), 1980-2008



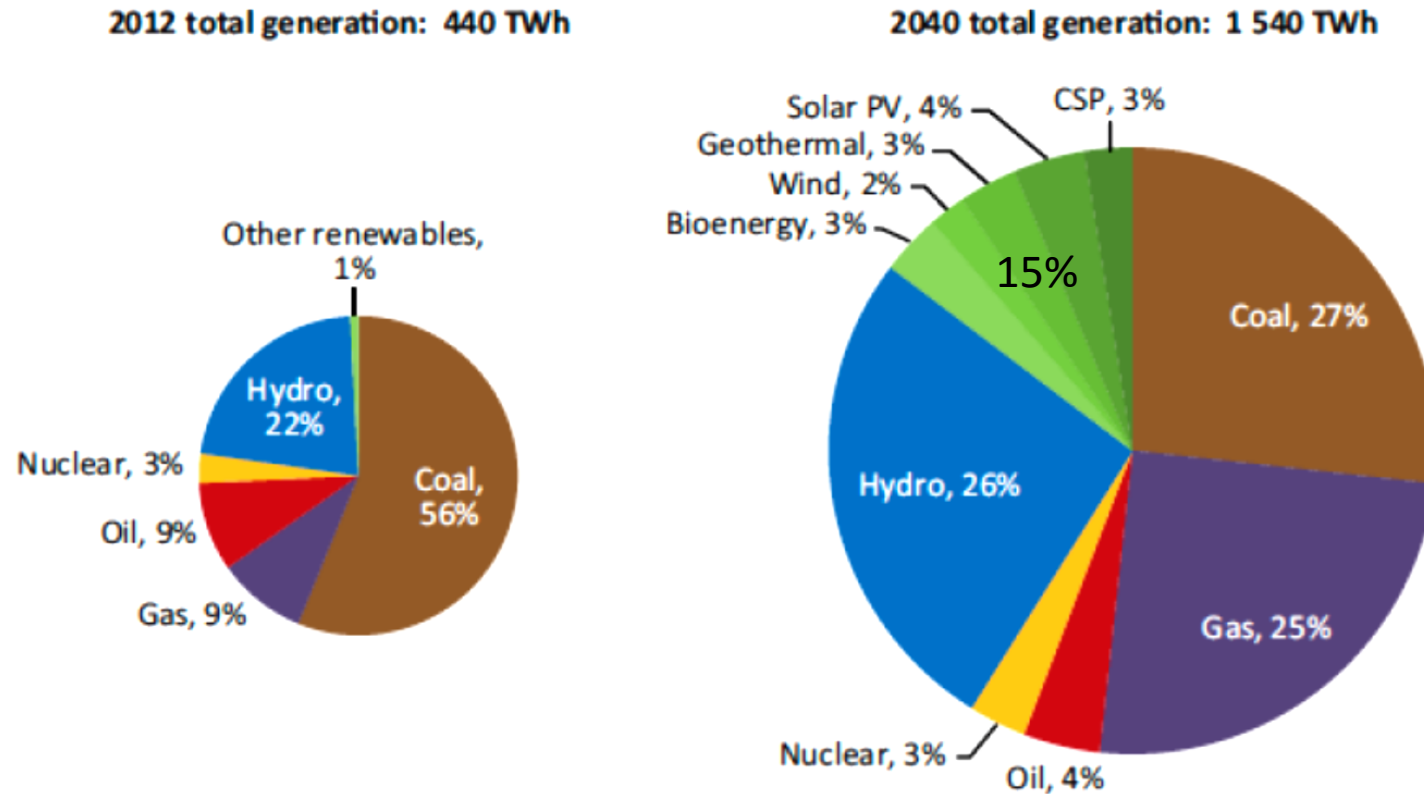
# Africa's physical imports (mt), 1980-2008



# Africa as net resource exporter

- Africa is a net exporter of non-renewable resources & net importer of biomass (renewables)
- Non-renewables: export 500 mt of fossil fuels, import 100 mt (mainly refined fuels)
- Biomass: export 14.5 mt, import 95.8mt (mainly cereals followed by biomass-products - mainly vegetable fats and oils, timber and sugar crops)

## Electricity generation by fuel in sub-Saharan Africa in the New Economic Policies Scenario, 2012 and 2040



Source: International Energy Agency (2014) African Energy Outlook: World Energy Outlook Special Report Figure 2.6

# Estimates of total energy investment needed:

- International Energy Agency – *Energy For All*: \$389 billion (2010-2030)
- McKinsey (2015): \$490 billion (2010-2040)

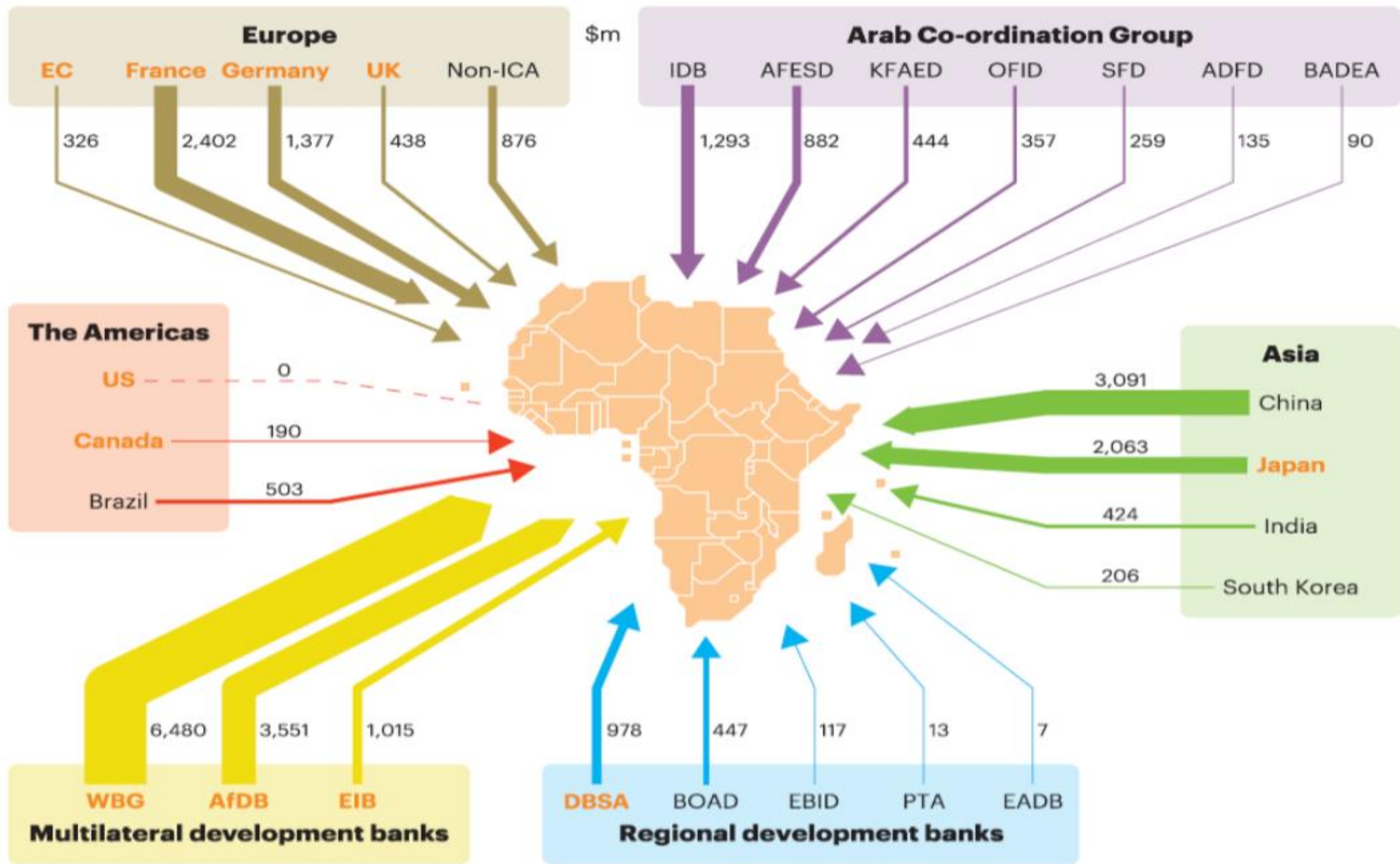
.....assumes an energy mix, but relative low proportion for RE



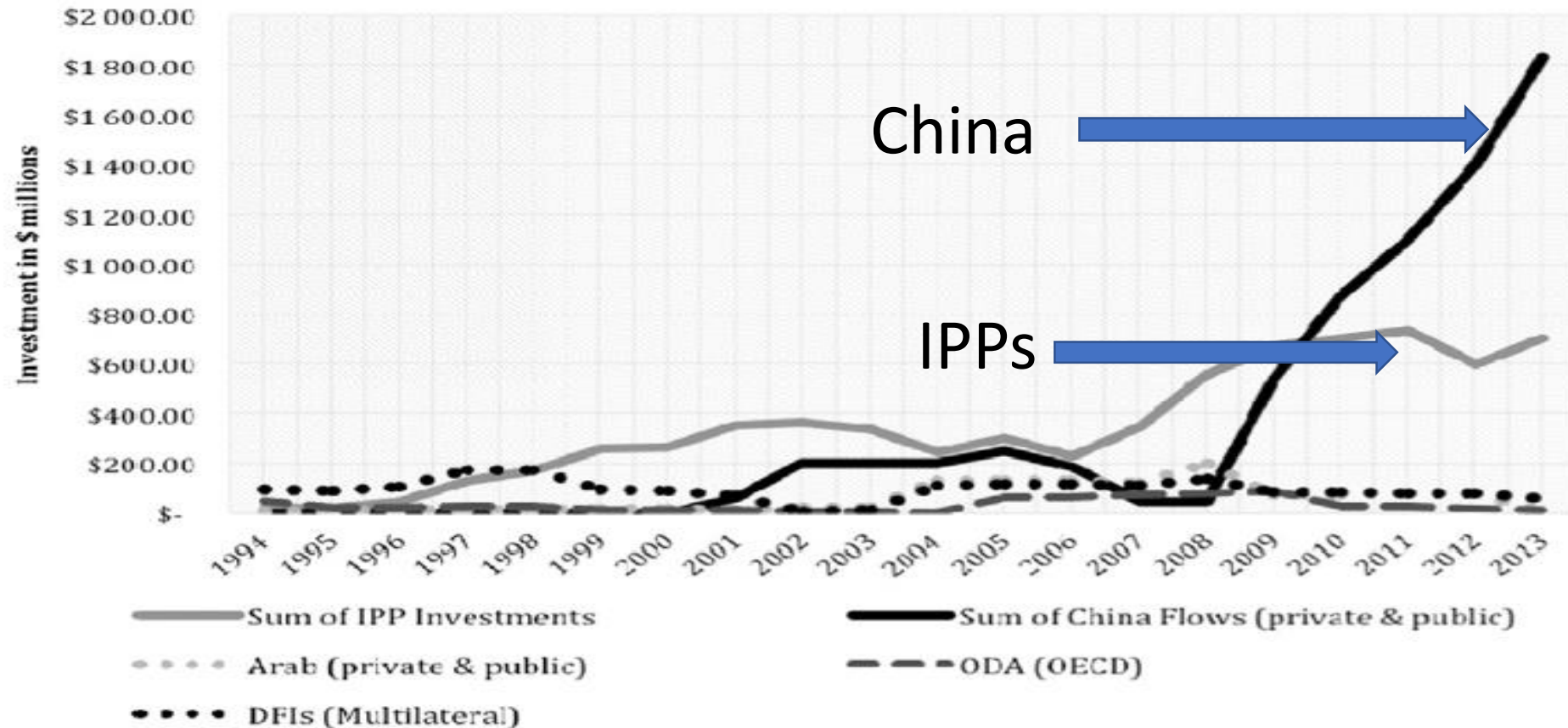
Figure 2.1.14: New Deal on Energy for Africa requirements for universal access by 2025

	FROM CURRENT ENERGY SITUATION IN AFRICA		TO UNIVERSAL ACCESS IN 2025		
Population (m)	1,174	x1.3	1,499		
GDP (US\$bn)	2,175	x1.7	3,742		
Electrification rate (%)	43	x2.3	97		
Households connected (m)	87	x3.63	292		
On-grid	83	x2.6	213		+130m new on-grid connections
Off-grid	4	x20	79		+75m new off-grid connections
Grid capacity (GW)	170	x1.9	332		+160GW of new capacity
Consumption (kWh/capita)	613	x1.5	941		
Households using clean cooking (m)	70	x3.1	220		+150m with clean cooking solutions

Note:  
 This assumes 100% urban electrification and 95% rural electrification.  
 Numbers are out of 234m households in 2015 and 300m households in 2025.

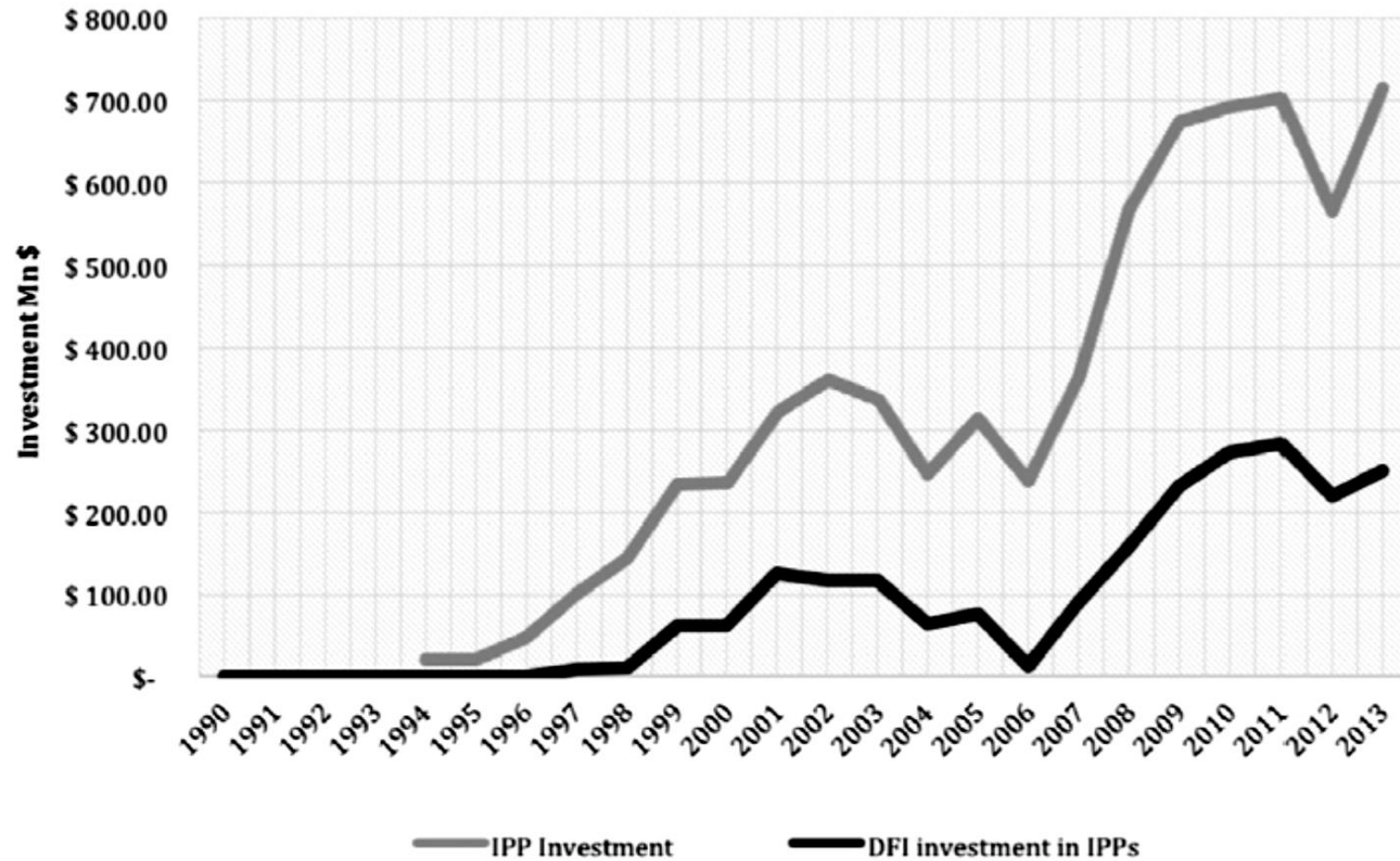


# Investment Trends



**Fig. 1.** Investments in Power Generation, Five-Year Moving Average: Sub-Saharan Africa (Excluding South Africa), 1994 – 2013. Note: DFI = Development Finance Institutions; IPP = Independent Power Project; ODA = Official Development Assistance; OECD = Organization for Economic Co-operation and Development.

(Eberhard et. al., 2017)



**Fig. 7.** Total investment by IPPs and by Development Finance Institutions: Sub-Saharan Africa (Excluding South Africa), 1994 – 2014. Note: DFI = development finance institution; IPP = Independent Power project; (Eberhard et. al., 2017)



# Chinese Investment:

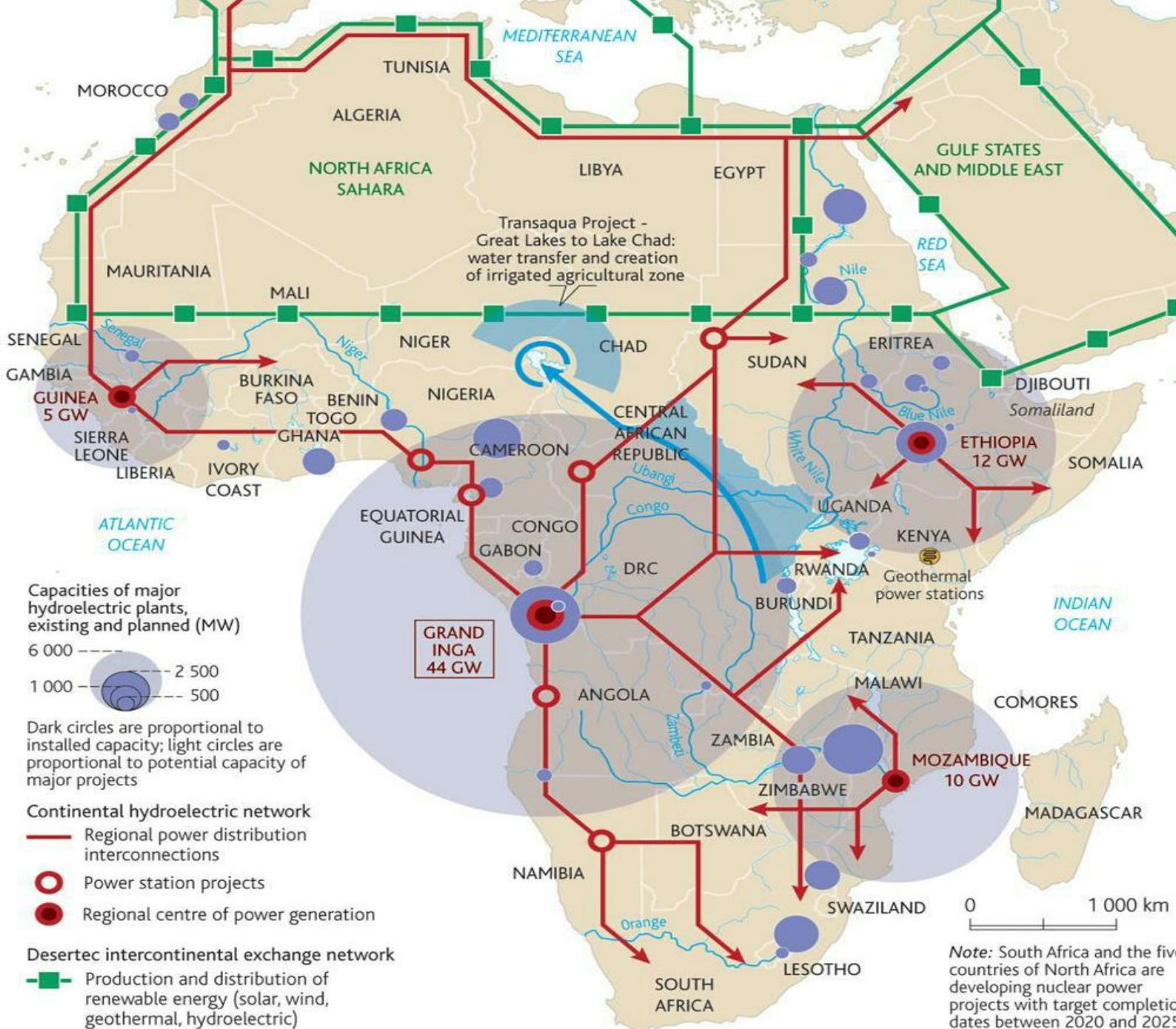
- Chinese: 17 GW of built/to be built energy generation capacity, mostly hydro (49%) for 2010 – 2020 (Eberhard et. al., 2017)
- Difference between Chinese contracts and Chinese funding: in 2014 50% of all infrastructure contracts went to Chinese contractors, but total Chinese investment was 5% of total spend (Eberhard et. al., 2017)



# IPP investments in SSA:

- IPPs started in Cote d'Ivoire in 1994 and Kenya in 1996
- By 2014, 151 projects, \$30 billion, 12 GW of installed capacity – mostly thermal (OCCG), but more recently renewables
- Funders are mainly private and DFIs
- Some state: e.g. Nigerian National Petroleum Corporation, Ugandan Govt, and Kenya Power Staff Pension Fund
- African funders are prominent, e.g. Aba Integrated (Nigeria), Gulf and Triumph (Kenya) and Tororo Buseruke (Uganda)
- Biggest equity partner: Globeleq (Europe)
- DFIs from Norway (Norfund), Netherlands (FMO), Denmark (IFU) and South Africa (DBSA), and IFC.

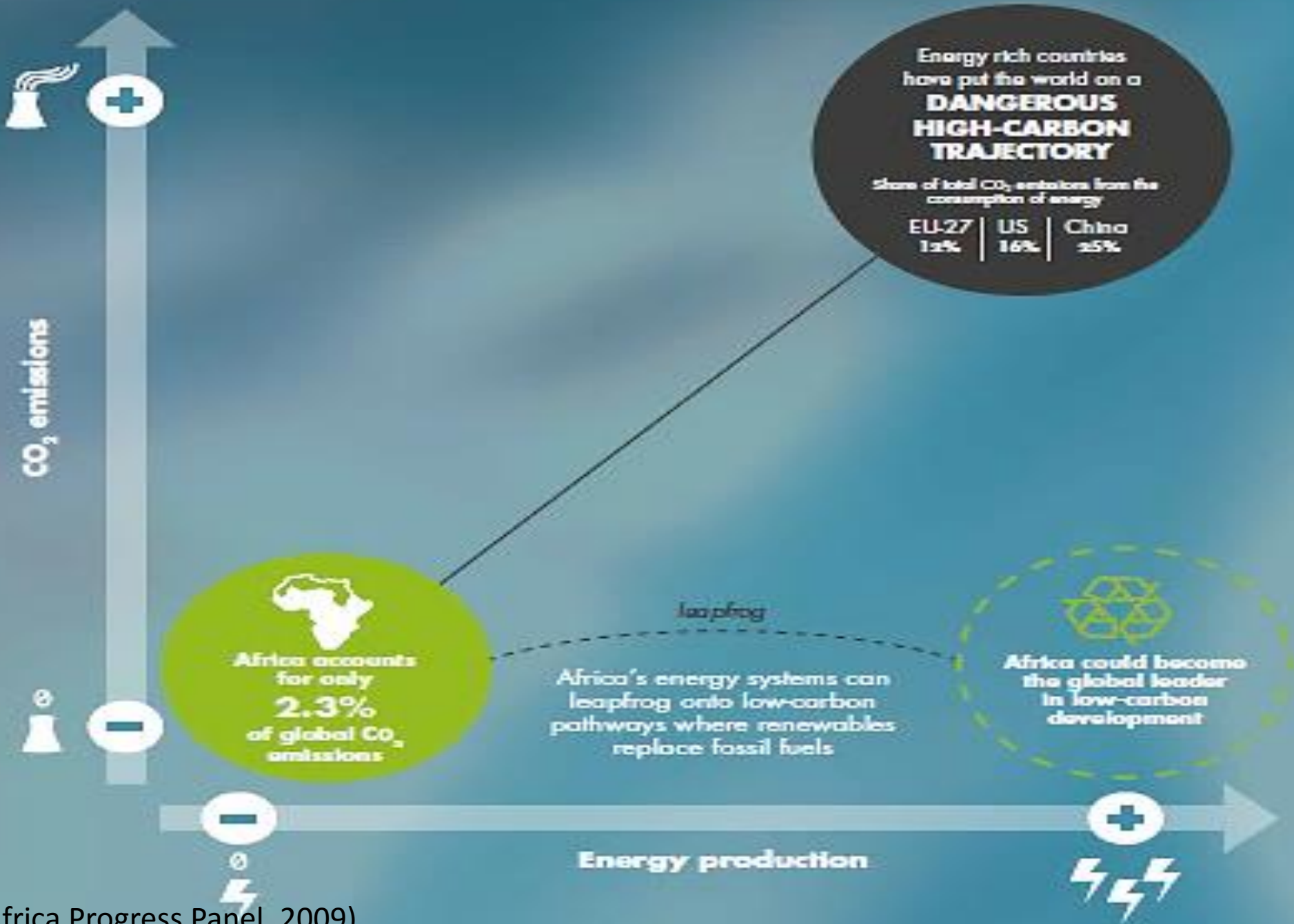
(Eberhard et. al., 2017)





# CHINESE HYDROELECTRIC PROJECTS IN AFRICA





Lowest cost,  
Shortest lead-times, cheapest finance,  
highest impact,  
& potentially most Democratic.

Only way to hit global Paris targets – whole world has an interest in this



# GREENING AFRICA'S INDUSTRIALIZATION



ECONOMIC REPORT ON AFRICA



United Nations  
Economic Commission for Africa

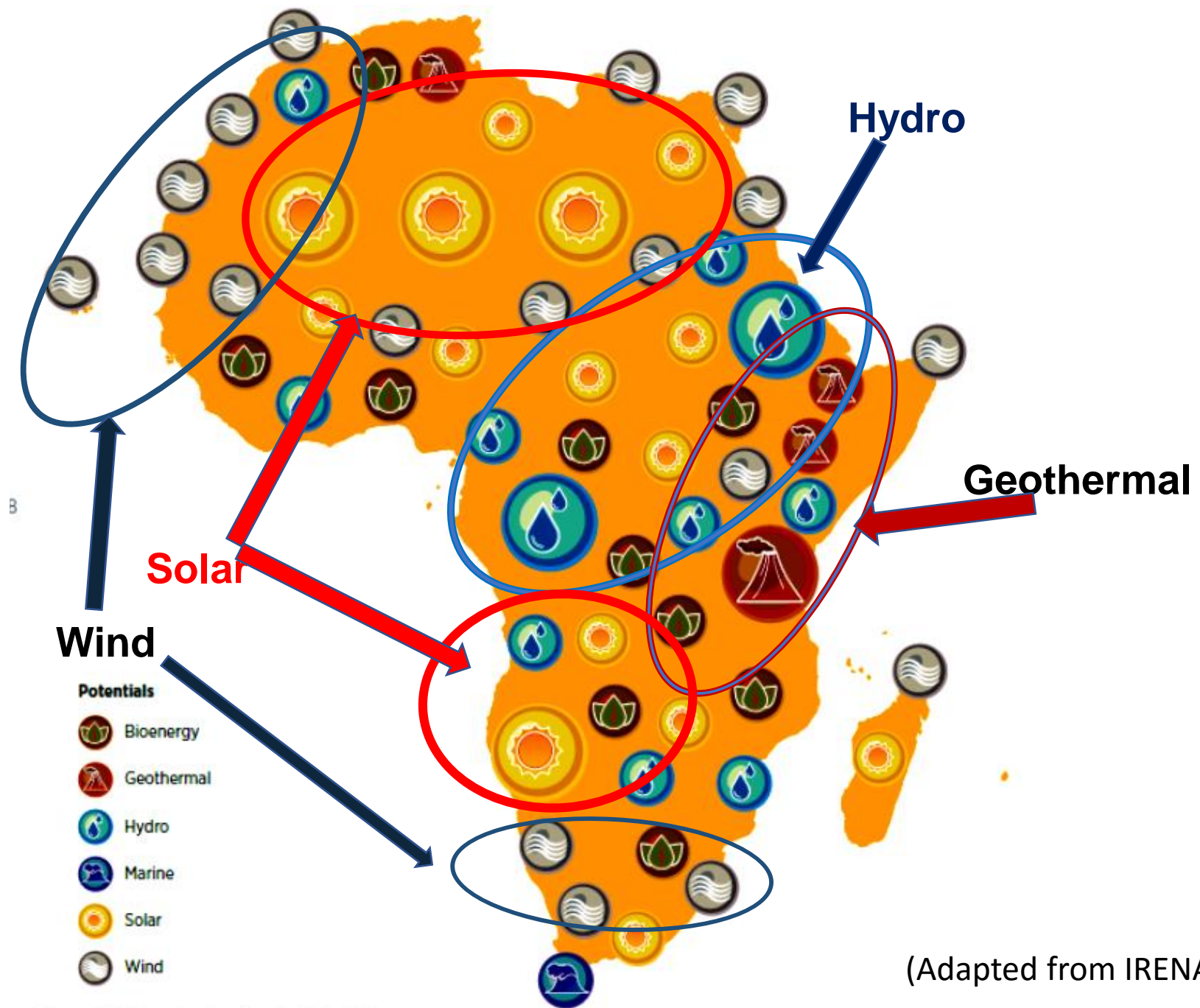
2016





## Analysis of Infrastructure for Renewable Power in Southern Africa





(Adapted from IRENA, 2014)



# AREI

Africa Renewable Energy Initiative



Transforming Africa towards a renewable energy powered future with access for all

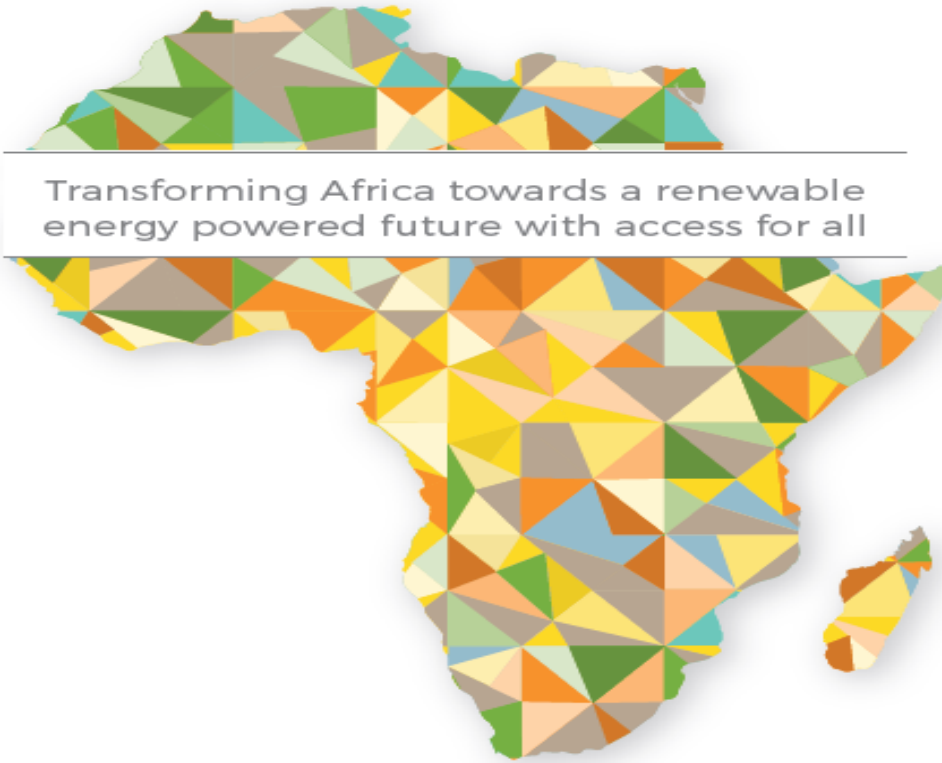
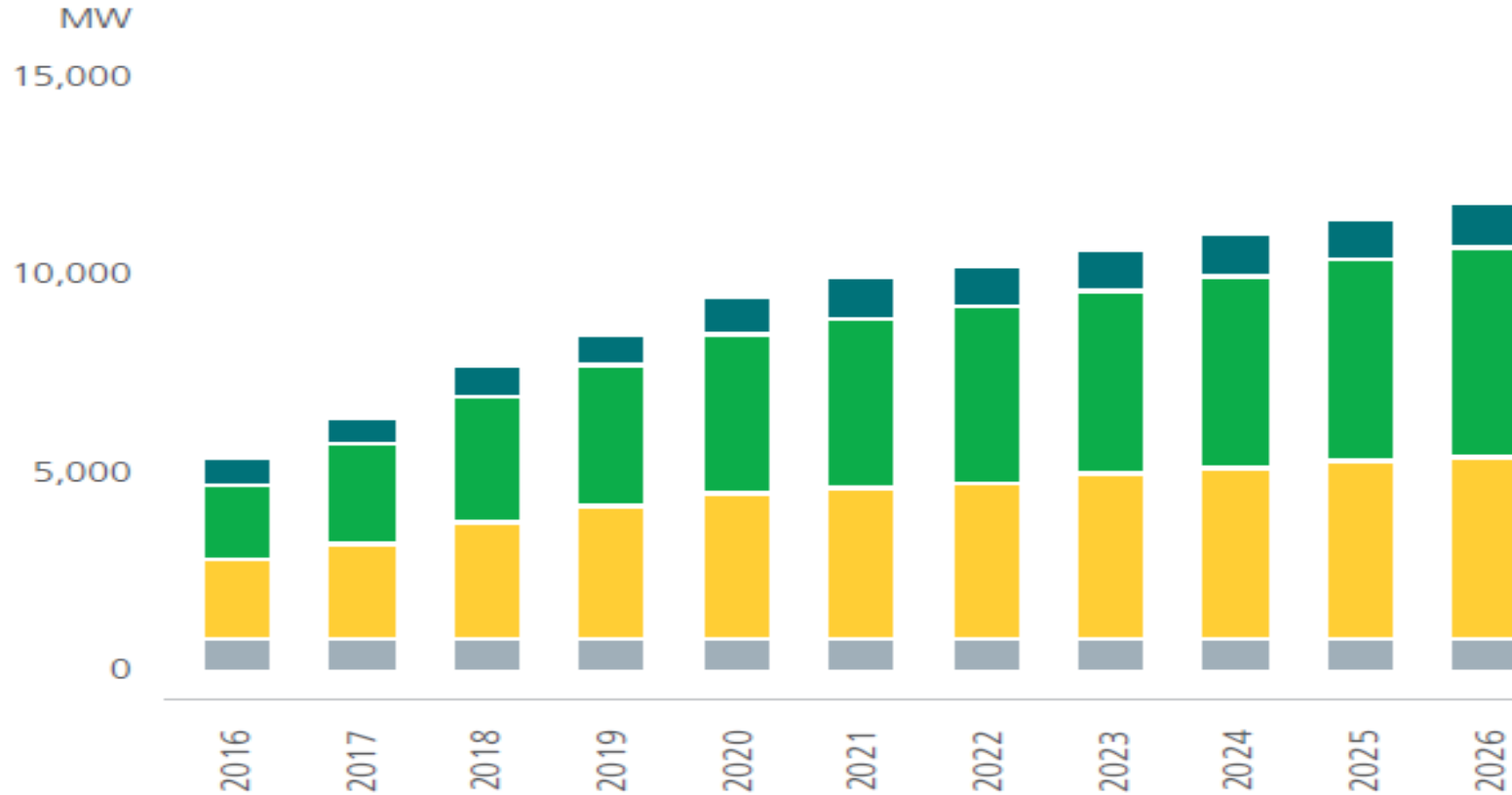


Figure 2.1.11: SSA renewables capacity by technology



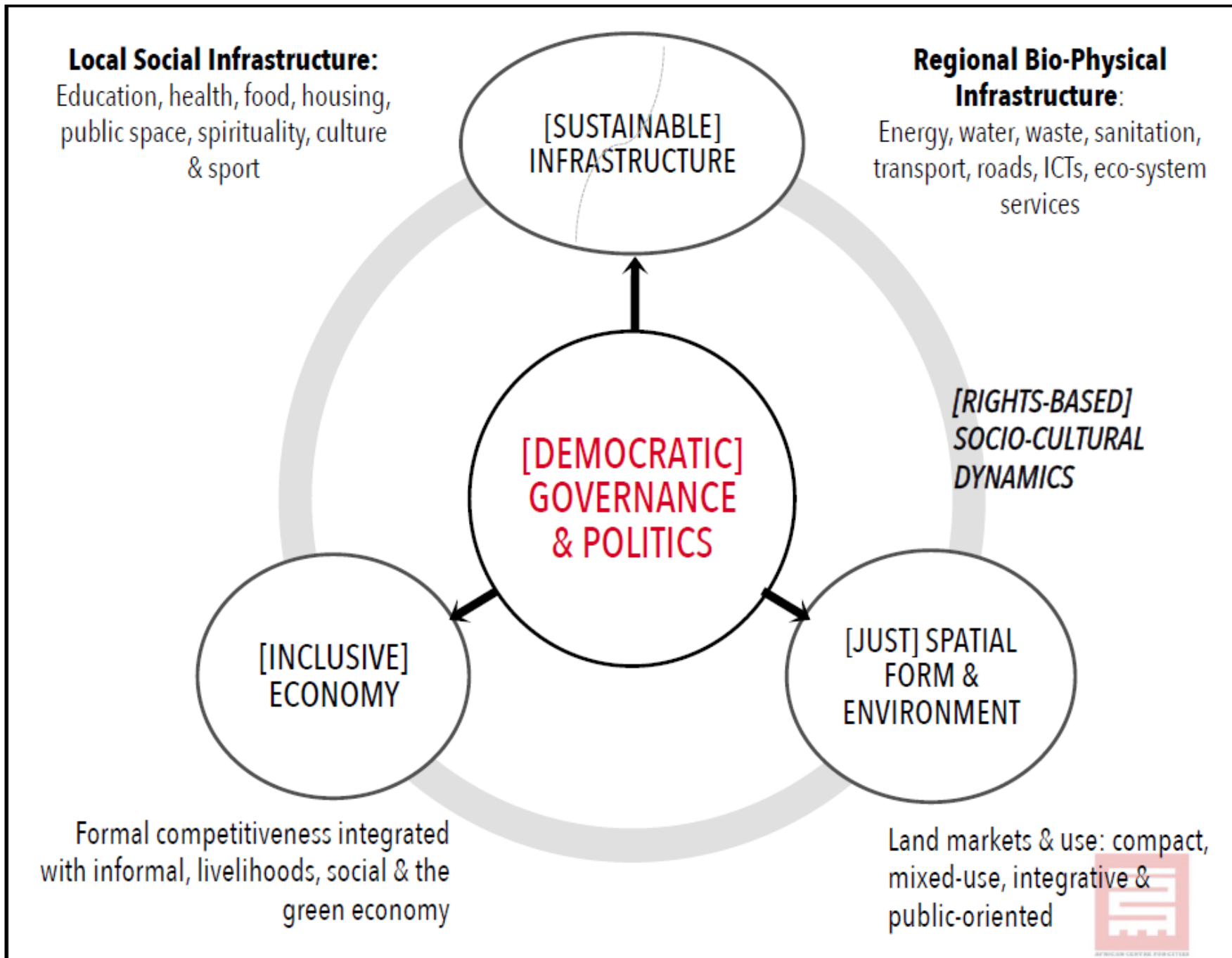
Less than 10% of AfDB target of 160 GW.

Should be at least 40 GW

AREI target is 300 GW by 2030

- Geothermal
- Wind
- Solar
- Biomass

(BMI in Rand Merchant Bank, 2019)



Heterodox macro-economic assumptions:

- Capable states
- Synchronised fiscal & monetary policy, led by fiscal
- Increased debt, but ring-fenced, blended, DFI-oriented
- Energy twinned with IT & environment, not minerals/mining
- Non-equilibrium modeling