Climate justice and sub-Saharan Africa

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Per capita CO_2 emissions by region, 2022

Carbon dioxide (CO_2) emissions from fossil fuels and industry[1]. Land-use change is not included.

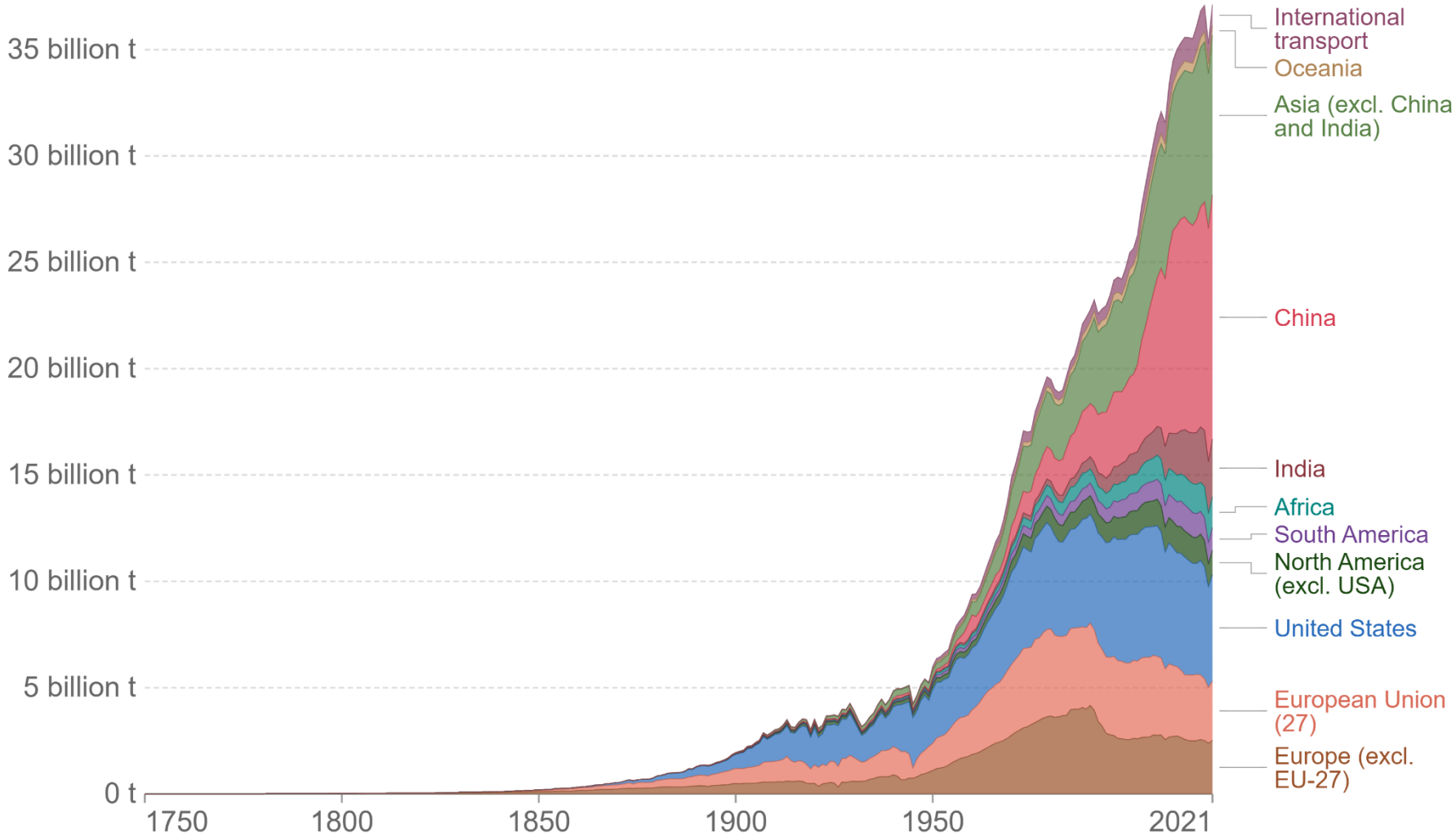
Data source: Global Carbon Budget (2023); Population based on various sources (2023)
OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO_2) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO_2 includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

Annual CO_2 emissions by world region

This measures fossil fuel and industry emissions[1] . Land use change is not included.

Our World in Data



Source: Global Carbon Budget (2022)

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Per capita CO_2 emissions, 2021

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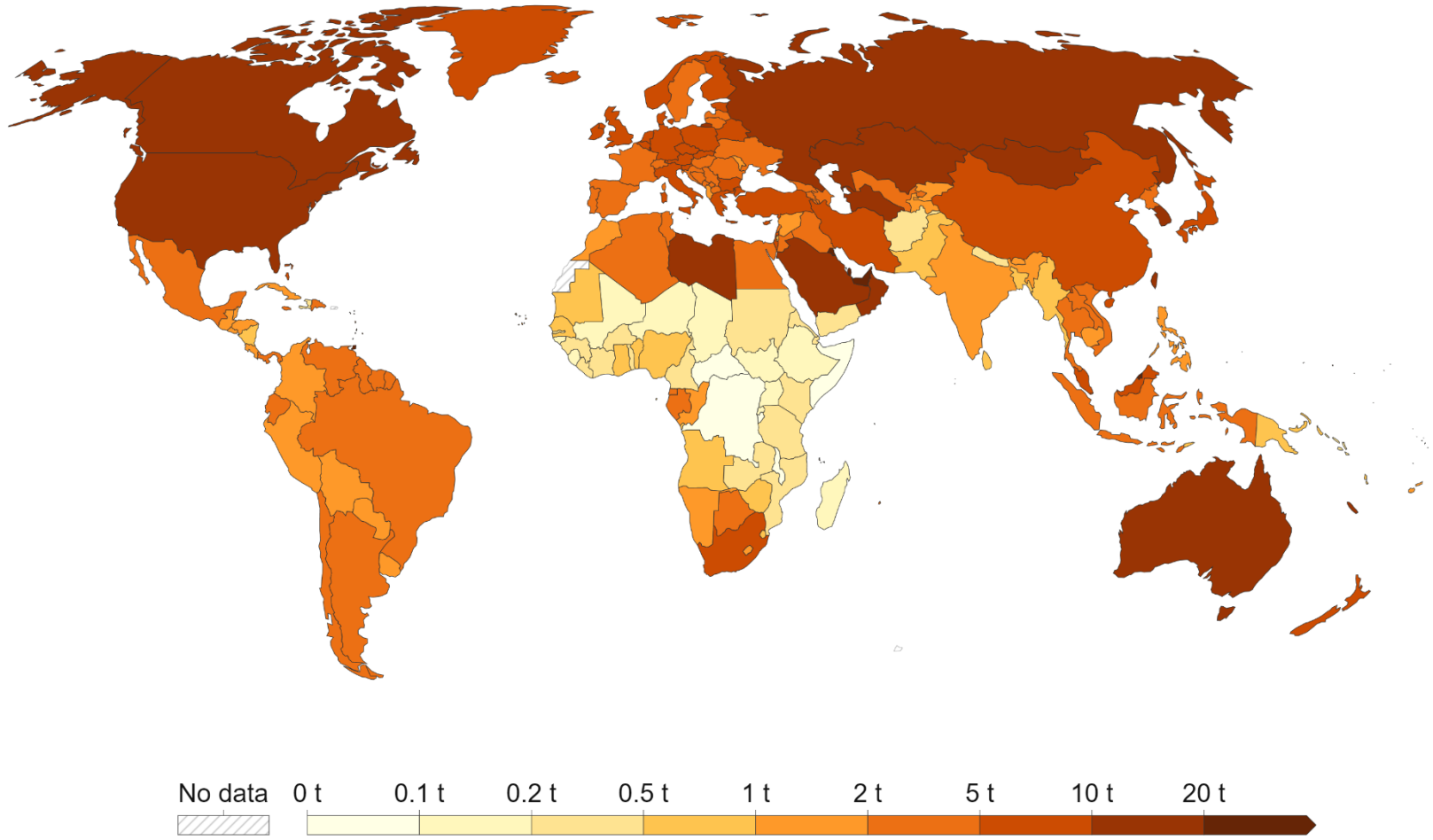

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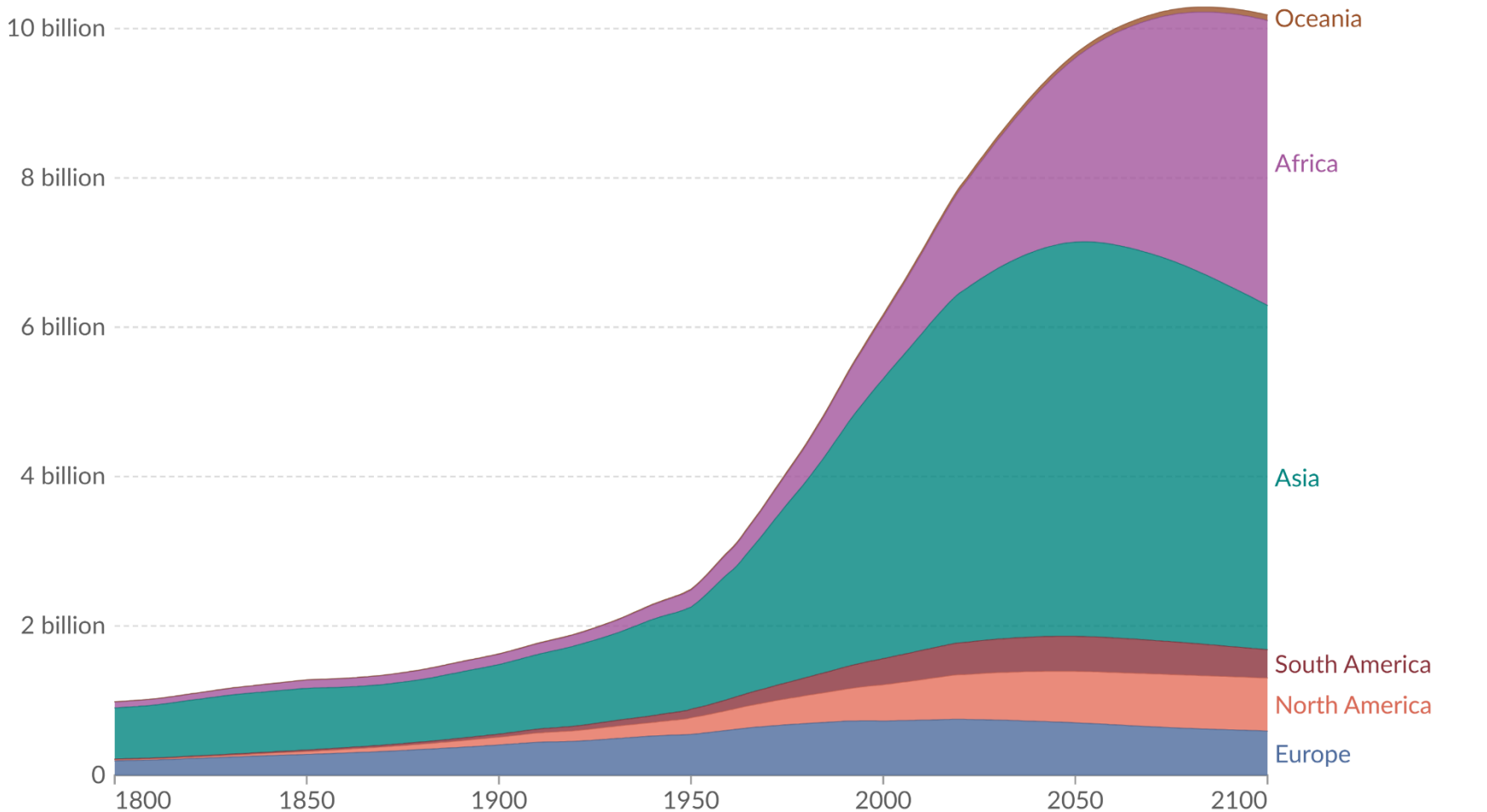
Population by world region

Historic estimates with future projections based on the UN medium scenario[1].



Data source: HYDE (2023); Gapminder (2022); UN WPP (2024)
Note: Historical country data is shown based on today's geographical borders.

OurWorldinData.org/population-growth | CC BY

1. UN projection scenarios: The UN's World Population Prospects provides a range of projected scenarios of population change. These rely on different assumptions in fertility, mortality and/or migration patterns to explore different demographic futures. Read more: Definition of Projection Scenarios (UN)

Role of the developing countries

- How should developing countries approach decarbonization? Is it fair to expect them to pursue an untested and still costly low-carbon path?
- Yet, can we avoid asking this, given that sub-Saharan Africa alone may represent 40% of the global population by century's end?
- Is decarbonization technically and politically feasible, especially as climate change is set to significantly raise its costs?

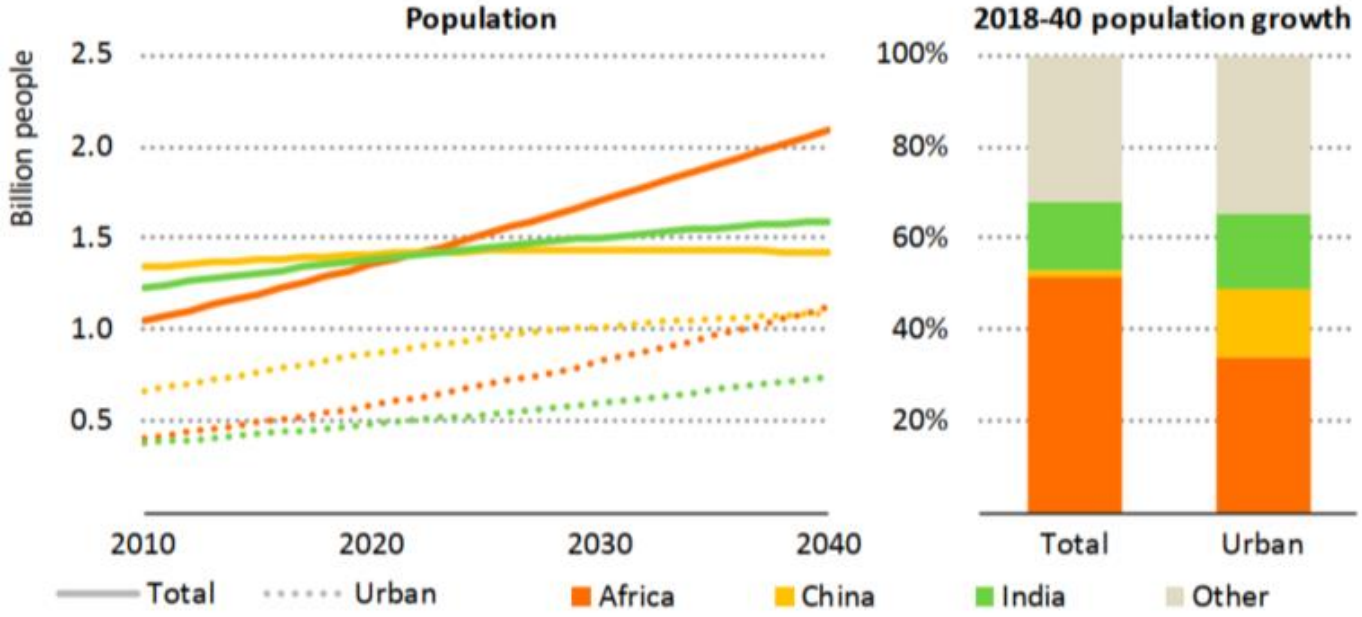
Sub-Saharan Africa

Sub-Saharan Africa – energy context

- This resource-rich but energy-poor region, with 18% of the world's population, accounts for just 6% of global energy demand (3% for electricity).
- Per capita power generation has stagnated over 30 years.
- Solid biomass—fuelwood, straw, charcoal, and waste—comprises 70% of final energy use, reaching 80% without South Africa.

1) Growing population

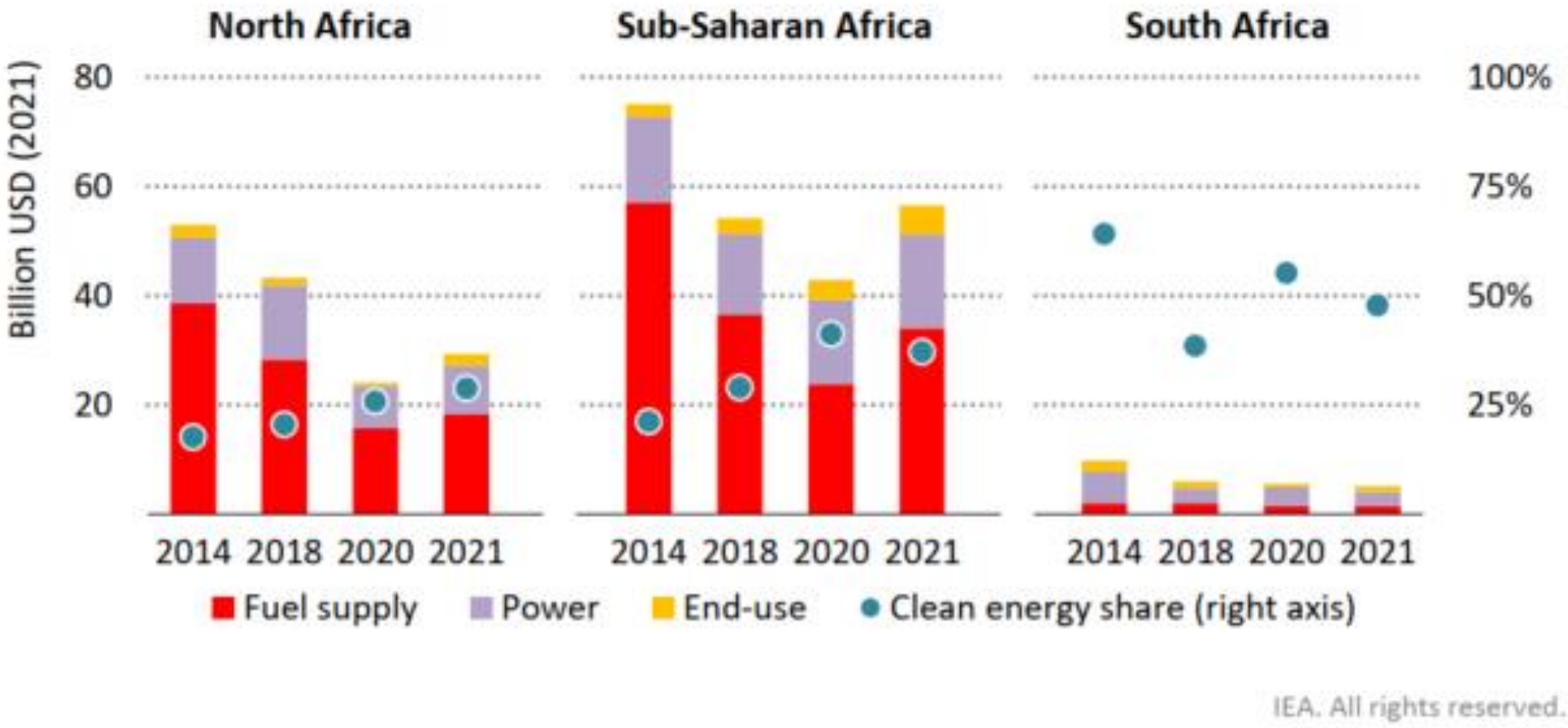
- Rapid population growth: from 180 million in 1950 to 1.3 billion in 2018, projected at 2.2 billion by 2050 and 3.9 billion by 2095.
- A large working-age population (42% under 15), with nearly 40% below the poverty line, presents both opportunities and challenges.
- Urbanization: over 50% in cities by 2030, and more than 60% by 2050, with an additional 580 million expected in urban areas by 2040.



2) Investments and economy

- In 2018, USD 100 billion (5.5% of global total) was invested in energy, with under 3% of global total in clean energy.
- The region's economy is smaller than Germany's, with 65% employed in agriculture and mining exports.
- Poverty rates are decreasing proportionally but rising in absolute numbers.
- Low-quality institutions limit foreign investment.

2) Investments and economy

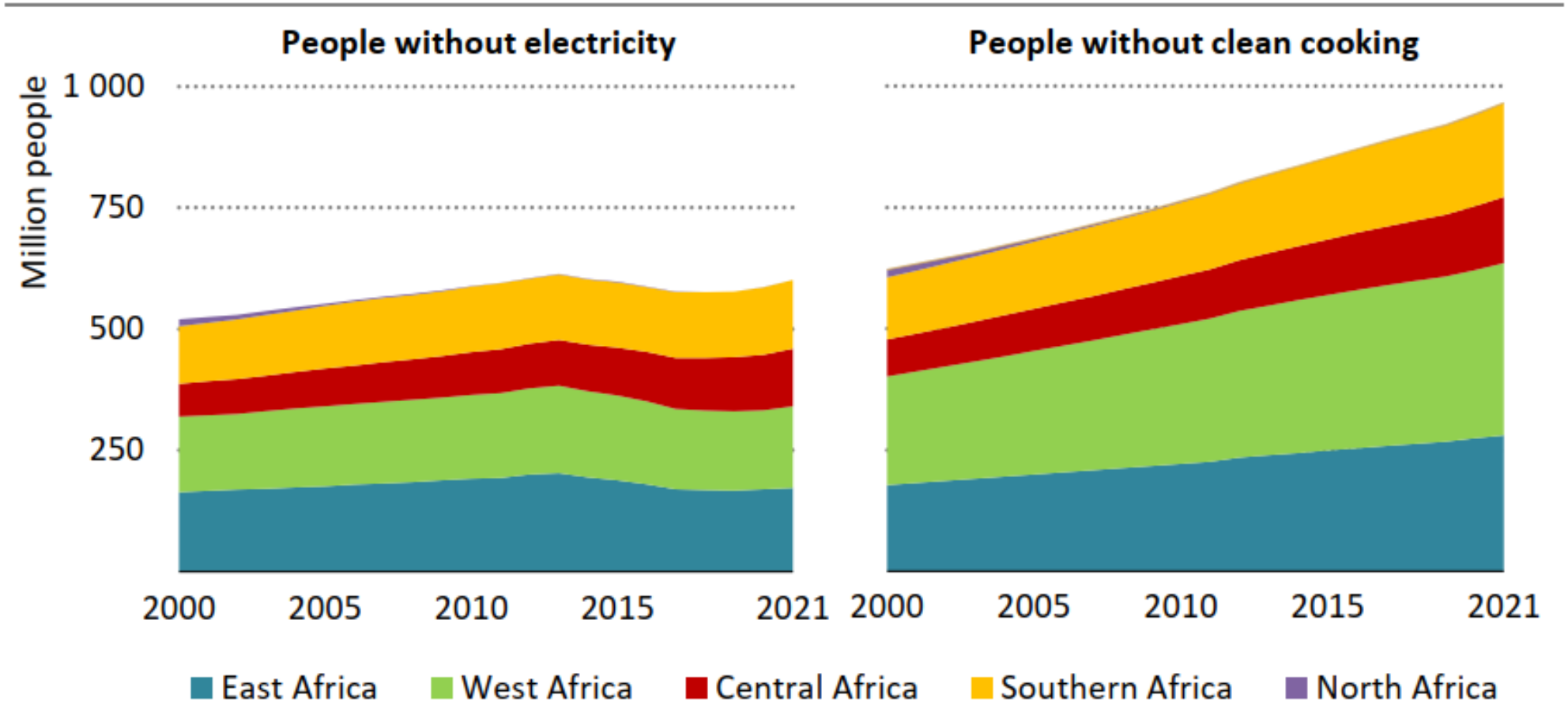


- Governance shortomings preventing foreign investments – low-quality institutions.

3) Electricity access

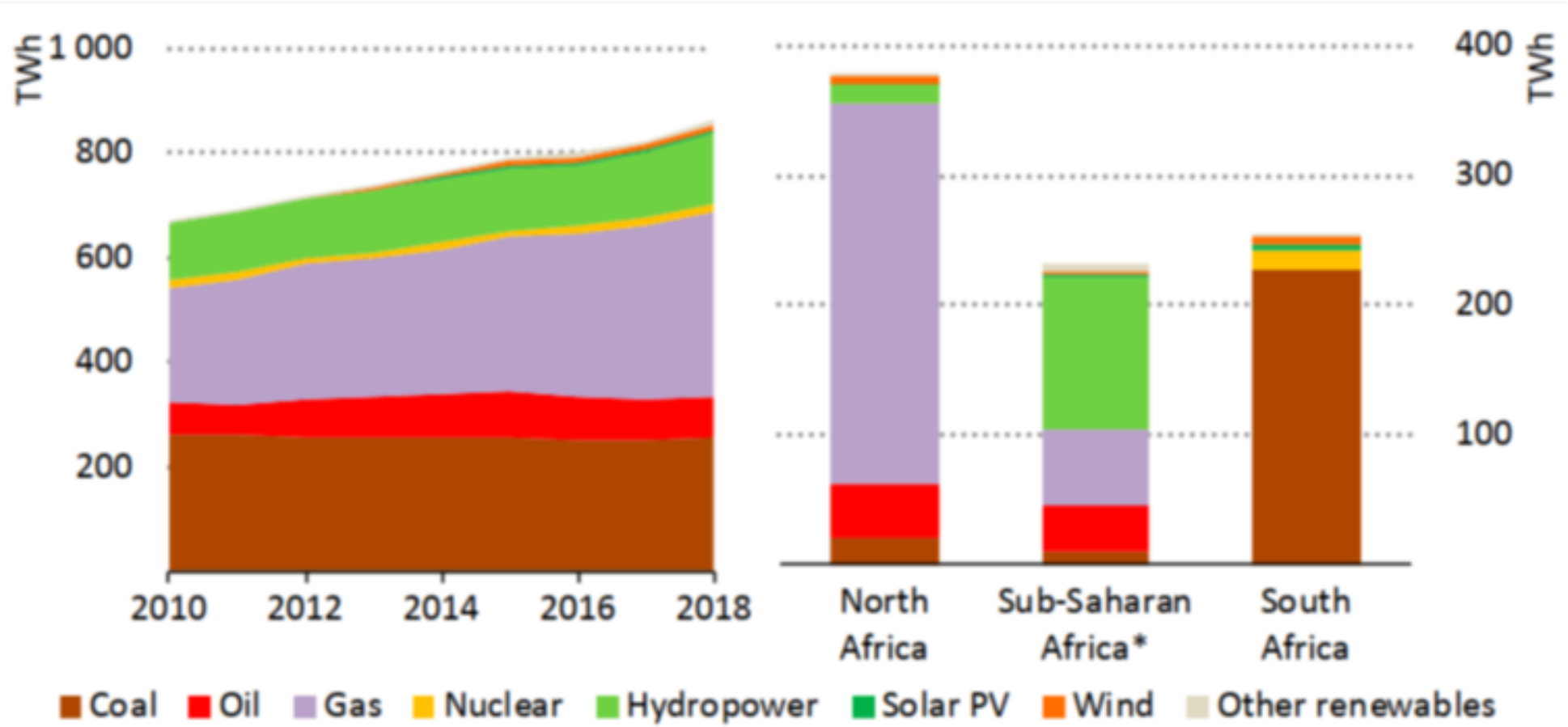
- In 2021, 43% of Africa (around 600 million) lacked electricity, with 590 million in Sub-Saharan Africa.
- Prices are high.
- Covid and Russian war worsened the situation.
- Renewables, including off-grid systems, are increasingly important.
- Reliable electricity is vital for economic growth.

3) Access to electricity



57% of people without electricity, mainly in rural areas.

3) Africa, electricity generation by fuel, 2010 - 2018



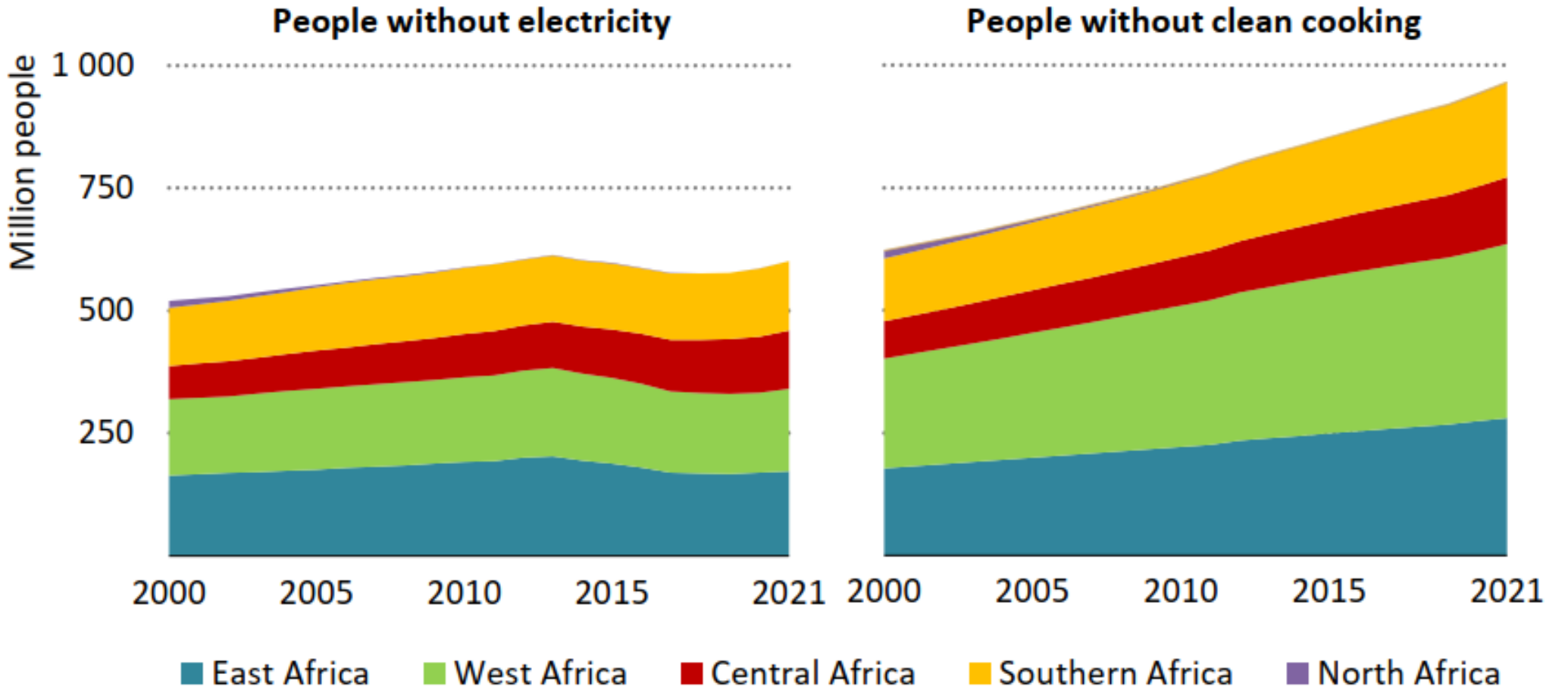
4) Clean cooking

- In 2021, over 970 million lacked clean cooking, with population growth surpassing access efforts.
- Again, Covid and Russian war worsened this.
- Clean cooking offers health, environmental, and economic benefits for women.
- Household air pollution leads to 500,000 premature deaths per year.
- 6% still use kerosene, deforestation for charcoal. LPG usage is increasing.

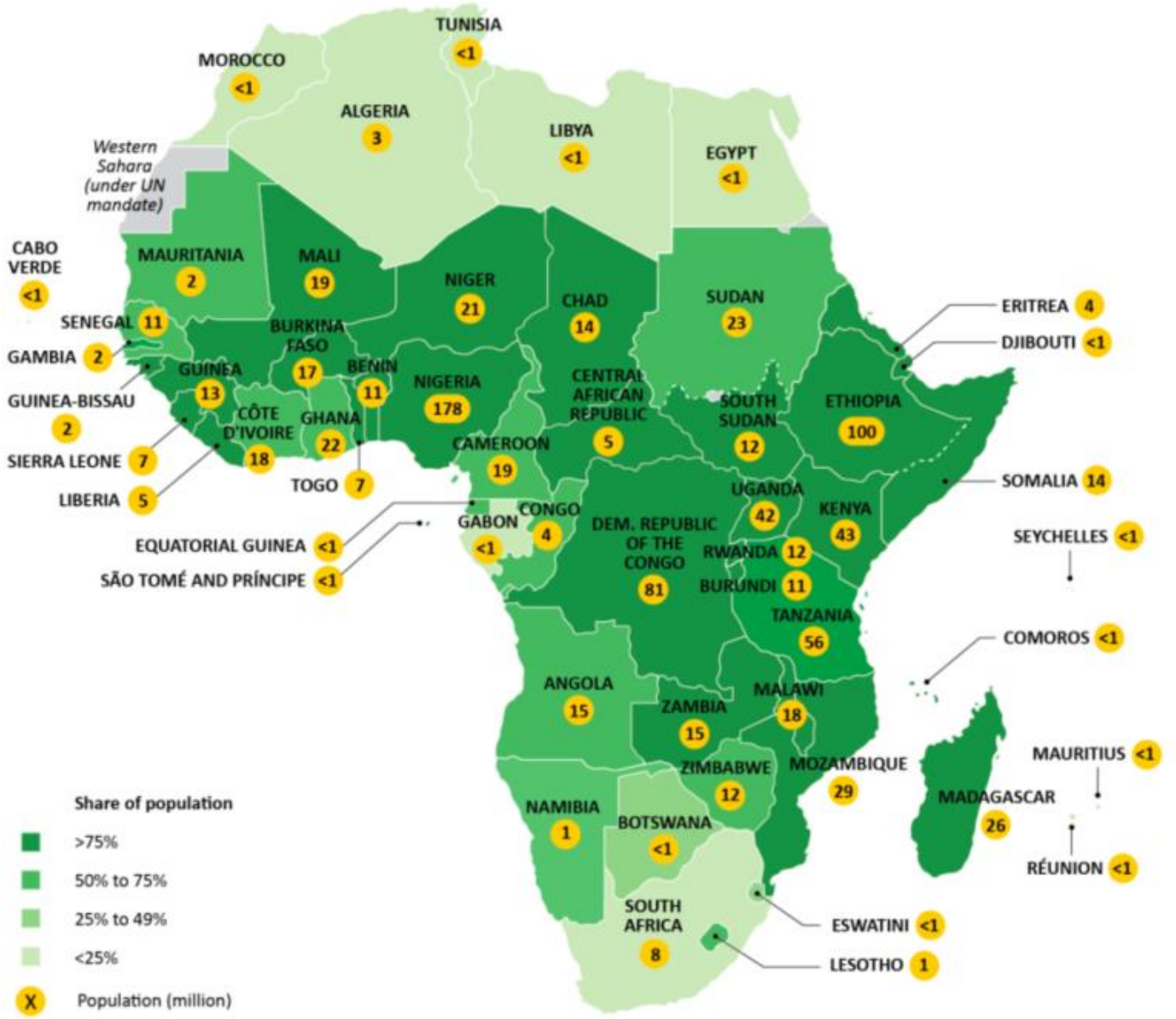
4) Biomass in cooking

	Investment cost ($)	Efficiency	Daily hours for cooking	Consumption per household (toe/year)
Traditional cookstoves				
Charcoal	3 - 6	20%	2 - 4	0.5 - 1.9
Fuelwood, straw	0 - 2	11%	2 - 4	1.0 - 3.7
Alternative cookstoves				
Kerosene	30	45%	1 - 3	0.1 - 0.2
LPG	60	55%	1 - 3	0.08 - 0.15
Electricity	300	75%	1.2 - 2.4	0.07 - 0.13
Biogas digester	600 - 1 500	65%	1 - 3	0.07 - 0.14
Improved cookstoves:				
Charcoal	14	26%	1.5 - 3	0.4 - 1.5
Fuelwood	15	25%	1.9 - 3.8	0.5 - 1.6

4) Clean cooking



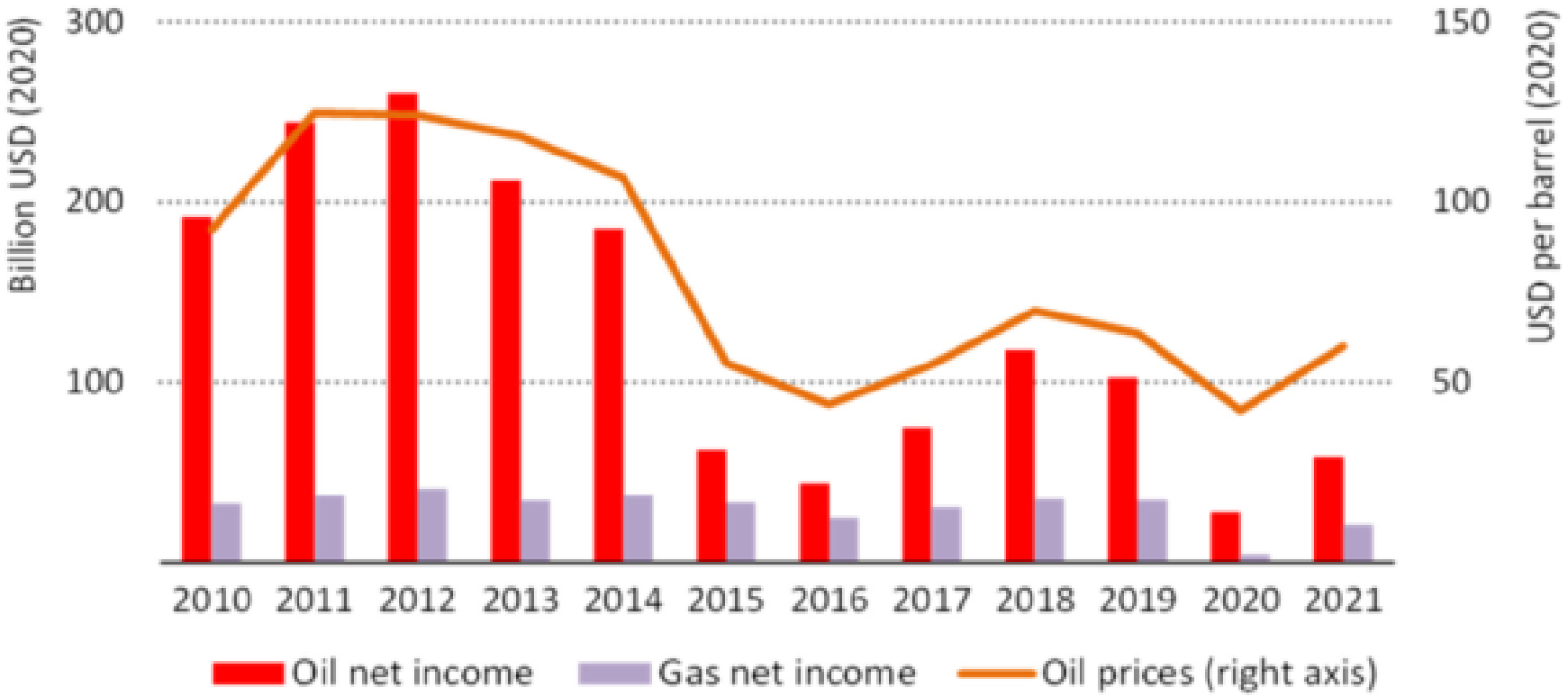
4) Population without access to clean cooking, 2018



5) Hydrocarbon and uranium resources

- Africa, including North Africa, has 450 billion barrels of recoverable oil (7% of global reserves, mainly in Nigeria and Angola).
- Natural gas, about 5% of the energy mix, has 100 trillion cubic meters available (13% globally), with a third flared. New gas finds in Nigeria, Mozambique, and Tanzania offer potential but need costly infrastructure.
- Coal reserves are estimated at 120 billion tons (under 1% globally), mostly in South Africa and Mozambique.
- Uranium resources, 20% of the global total, are concentrated in Namibia, Niger, and South Africa.

5) Oil and gas net income in Africa, 2010 - 2021



- In Sub-Saharan Africa half of total export value derived from fossil fuels.

5) Nigeria´s oil sector

- Angola has surpassed Nigeria as the top oil producer in Sub-Saharan Africa.
- In Nigeria, production is hindered by regulatory uncertainty, militant activity, and oil theft in the Niger Delta.
- Oil theft and sabotage cause losses of 150-200 kb/d, about 7-8% of output.
- Despite being the largest regional economy, Nigeria's human development indicators, like education and life expectancy, align with the regional average.

6) Renewable sources

- Development hindered by financing, weak grids, and policy uncertainties.
- 4 GW of solar PV added between 2010-2018.
- Africa has 35 GW of hydro capacity, with 60% of investments (2010-2015) from China.
- Wind capacity is 5.5 GW.
- Bioenergy accounts for 60% of primary energy use.
- Decentralized and off-grid systems are being explored.

Latest development

- Covid caused a recession in Africa, with a 20% drop in oil income leading to underinvestments, disrupted supply chains, and decreased foreign investments.
- Russia's invasion further spiked energy and food prices for import-dependent nations.

Role of the developing countries

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- Yet, can we avoid asking this, given that sub-Saharan Africa alone may represent 40% of the global population by century's end?
- Is this transition technically and politically feasible, especially as climate change is set to significantly raise their costs?

Can Africa leapfrog to a low carbon economy?

- Energy-intensive manufacturing is a traditional path for economic advancement. Can Africa transition to a service economy without first building a strong industrial base, which requires substantial energy? This raises questions about technology transfer from advanced nations.
- Key decisions include choosing between fossil fuels and renewables, and centralized vs. decentralized energy.
- Implementing complex systems also requires prior development in technology, education, social norms, and legal and financial frameworks.
- Distinguishing incremental improvements (e.g., solar appliances) from large-scale production is essential."

Source: CNN - Solar lamps replace toxic kerosene in poorest countries

Sub-Saharan Africa (and developing countries in general)

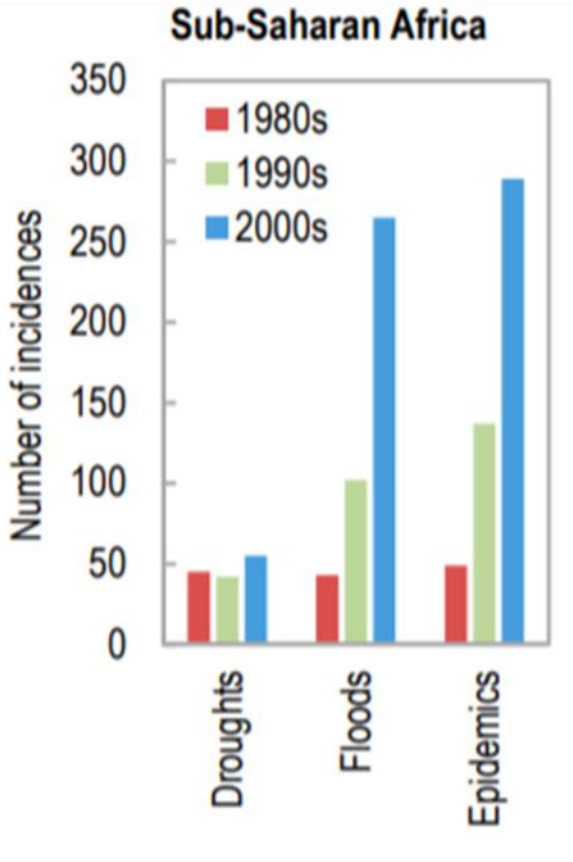
1) don't have the resources, financial and otherwise, for an energy transition,
2) they need to develop economically,
3) and their economic development built on fossil fuels would further worsen the climate as the population grows.
4) Worse, the region is disproportionately affected by climate change.

Climate (in)justice

- Poor countries, often the hardest hit by climate change, contribute the least to its causes.
- Who should bear the costs of mitigation, adaptation, and addressing loss and damages?

Some extreme weather events, 2022

- Drought and famine claimed 2,500 lives in Uganda and affected eight million in Ethiopia.
- Nigeria experienced over 600 fatalities in its worst floods in a decade.
- Southern African nations, including Madagascar and Mozambique, endured six severe storms, with at least 890 deaths.
- Tunisia saw 48°C temperatures in July, sparking wildfires.
- Floods in Chad impacted nearly two million people.
- And many more.



Africa´s energy transition challenges

„Africa today loses between $7 billion and $15 billion a year to climate change. And if things don't change, it will be $50 billion a year by 2030. Africa doesn't have access to the financing it needs to adapt to climate change and meet nationally determined contributions. By 2030 Africa will need between $1.3 to $1.6 trillion.“ - Akinwumi Adesina, President of the African Development Bank.

Climate justice issue.
Money and technological transfer from developed countries to Africa?

Sources

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- IEA (2014): Africa Energy Outlook.
- IEA (2017): Energy Access Outlook 2017: From Powerty to Prosperity.
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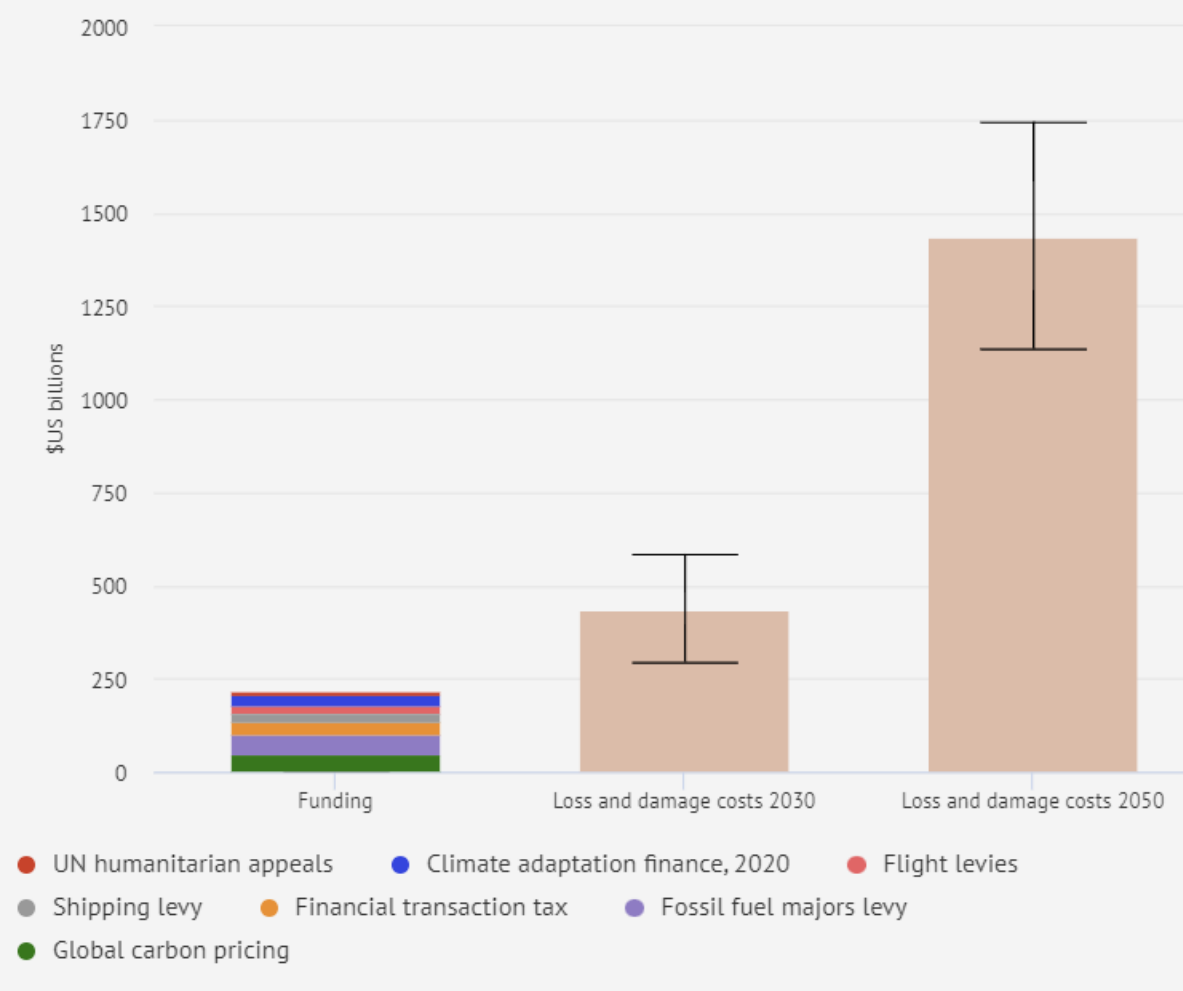
- Oxford Institute for Energy Studies (2018): Electrifying Africa.
- IMF (2019): Regional Economic Outlook: Sub-Saharan Africa.
- CarbonBrief (2022): Analysis: Africa's unreported extreme weather in 2022 and climate change

Existing and planned mitigation and adaptation transfers to Africa



1) 53 countries have submitted Nationally Determined Contribution (NDC) pledges. Among them, 12 nations—representing over 40% of emissions—have committed to net zero emissions goals. Many African NDCs rely on financial support from developed nations, amounting to a staggering USD 1.2 trillion by 2030.