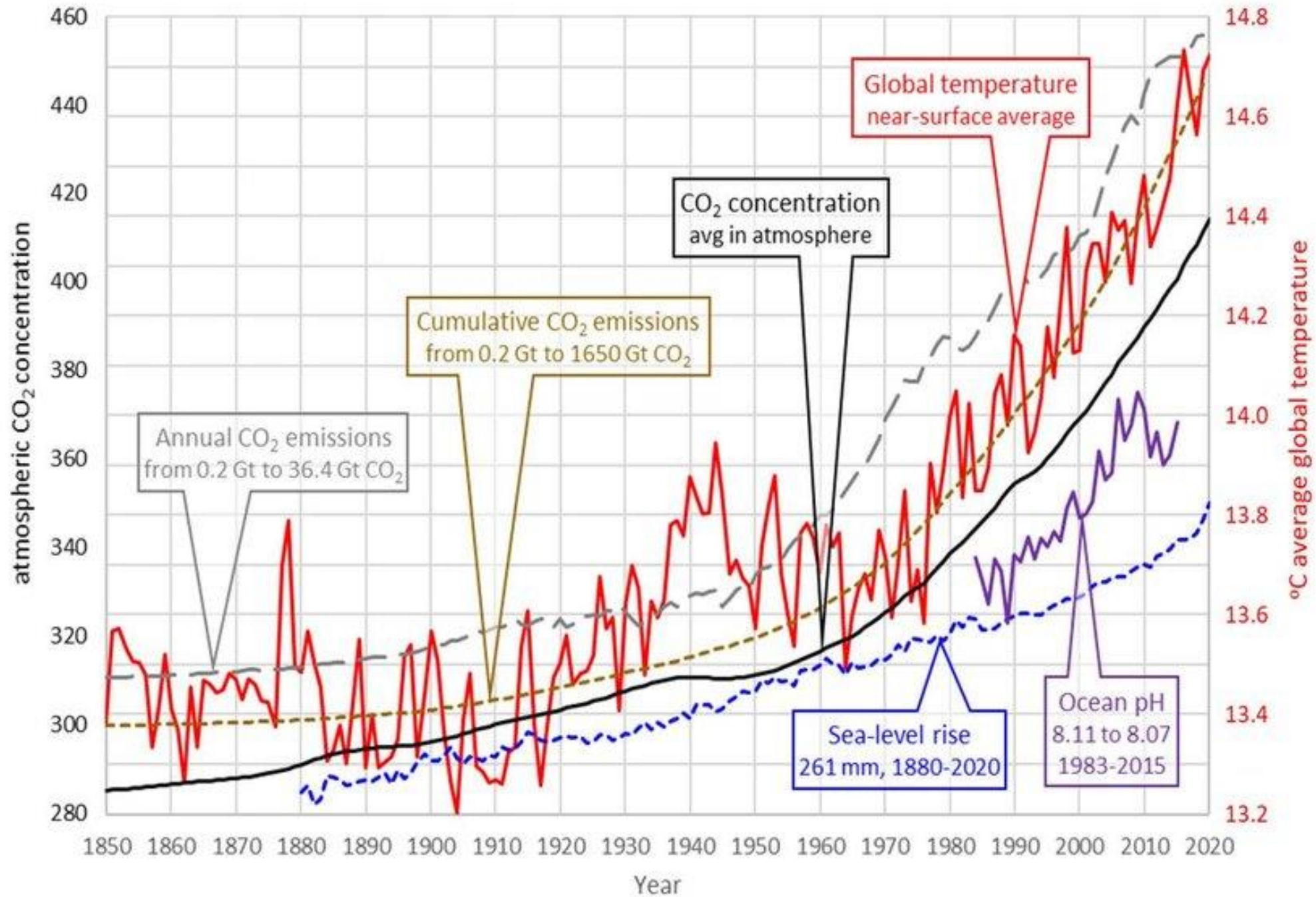


Climate justice and sub-Saharan Africa

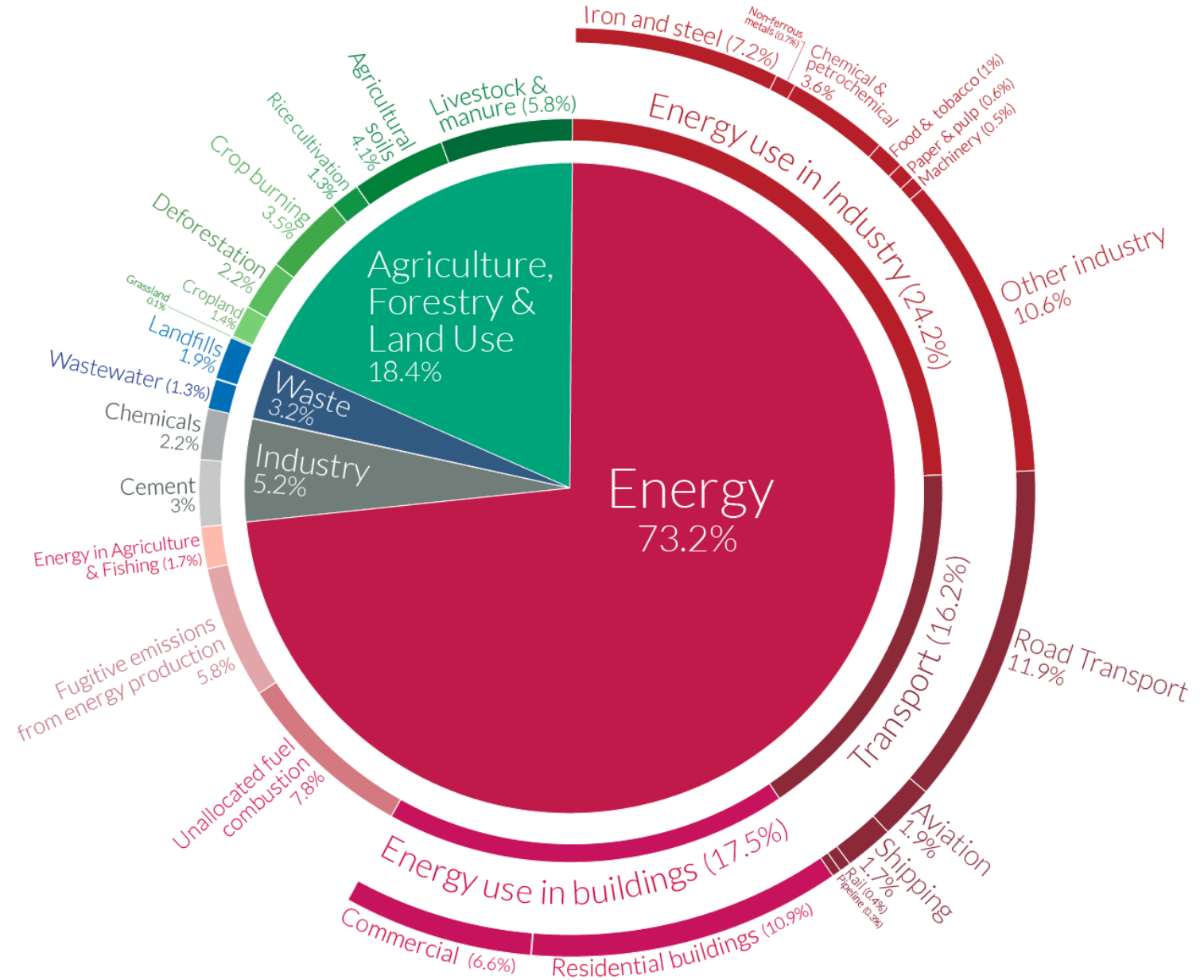
Filip Černoch
cernoch@mail.muni.cz



Quirk, D.G.(2021): Greenhouse gas emissions and their effect on global temperatures

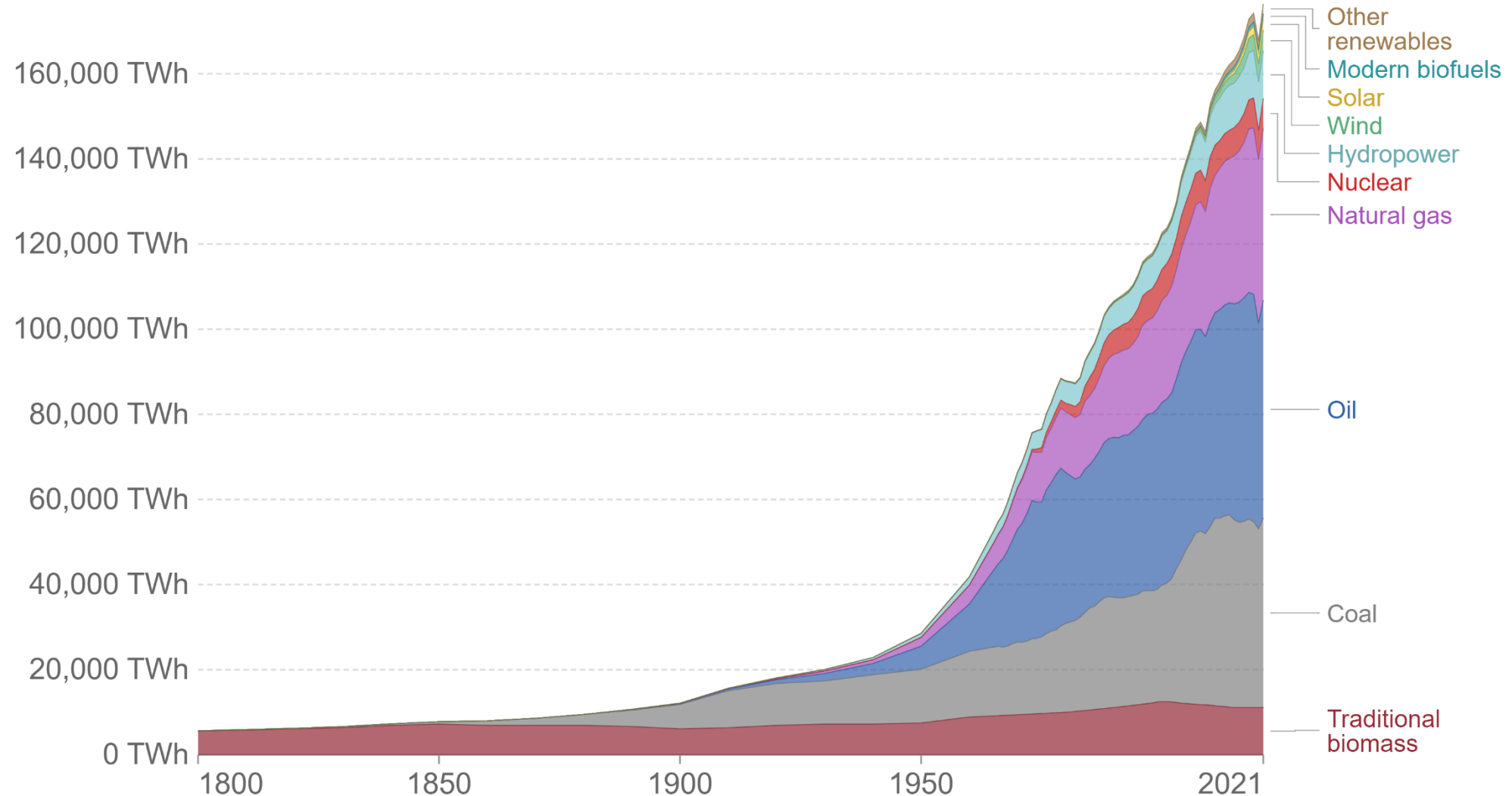
Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂eq.



Global primary energy consumption by source

Primary energy is calculated based on the 'substitution method' which takes account of the inefficiencies in fossil fuel production by converting non-fossil energy into the energy inputs required if they had the same conversion losses as fossil fuels.

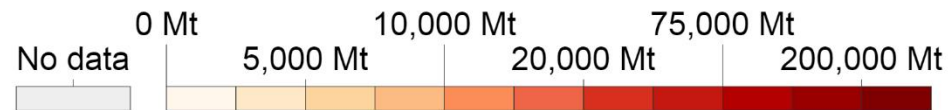
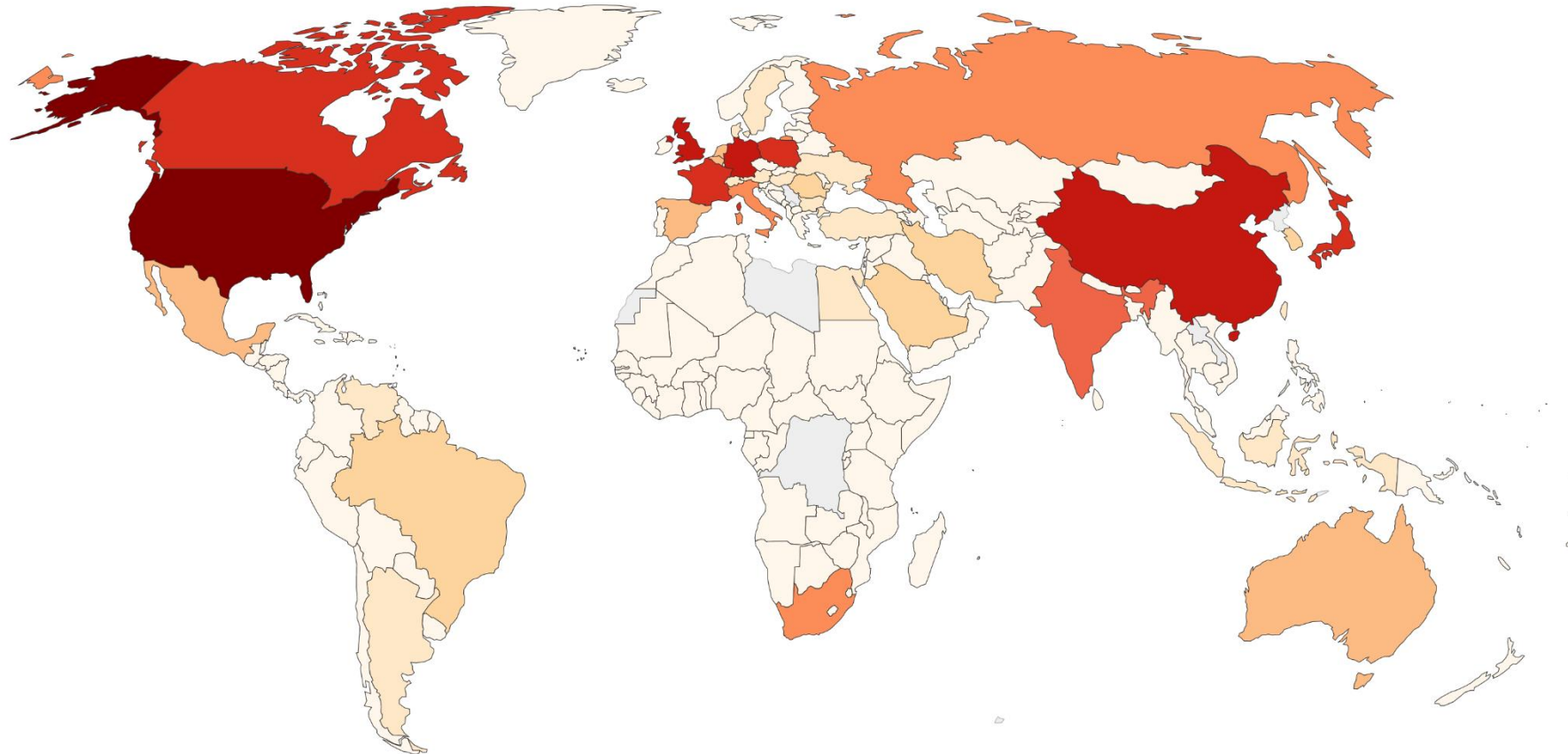


International (UN) climate change regime

- Intergovernmental Panel on Climate Change – 1988.
- Rio Summit on Earth – 1992 (UN conference on environment and development).
 - UNFCCC (UN Framework Convention on Climate Change) - consensus vs. 180 parties.
 - Existence of a generally accepted consensus on the climate change as well as the contribution of human activities to this change.
 - **Common but differentiated responsibility.**
- Kyoto Protocol – approved in 1997, in force 2005.

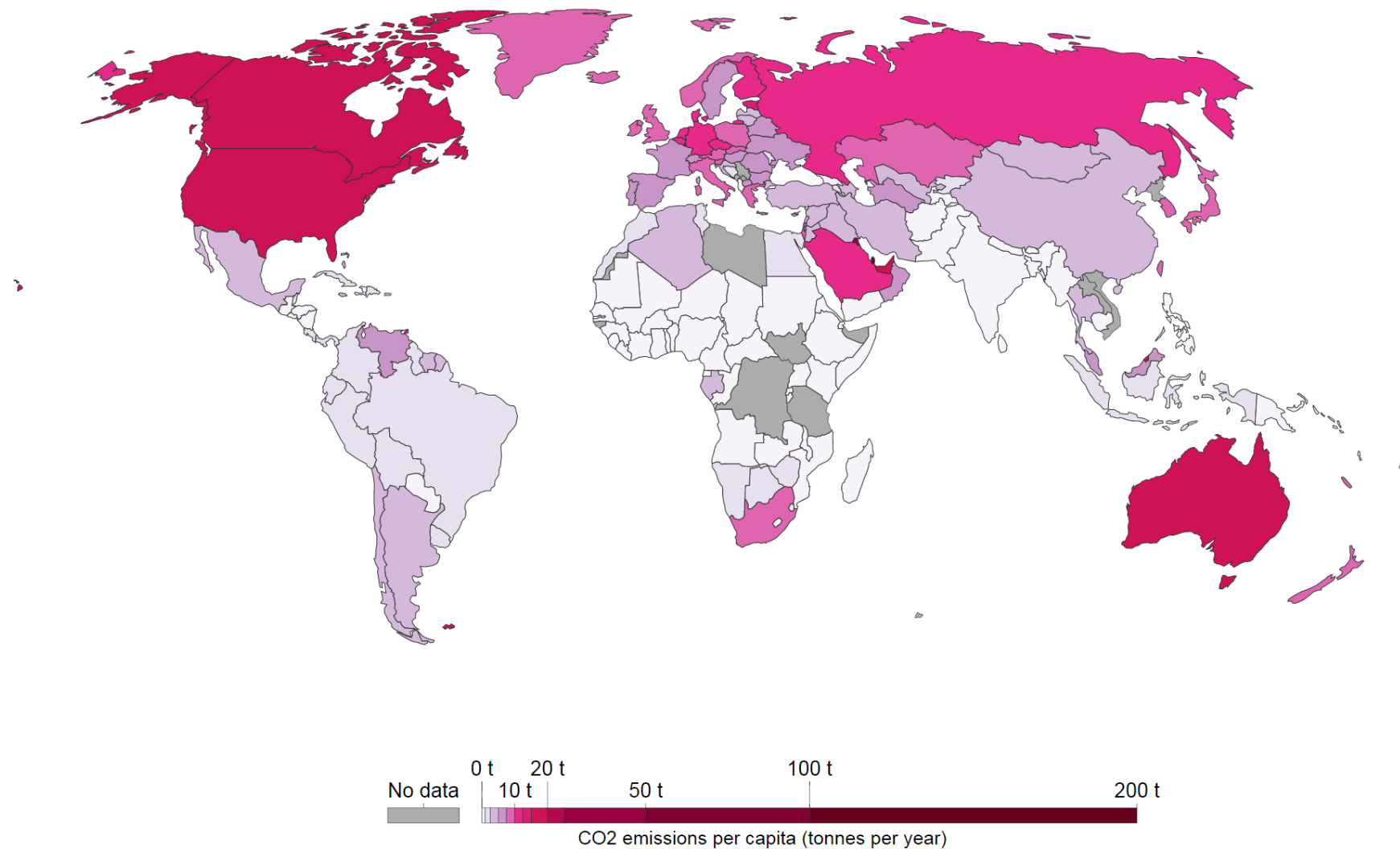
Cumulative CO₂ emissions, 1997

Cumulative carbon dioxide (CO₂) emissions represents the total sum of CO₂ emissions since 1751, and is measured in million tonnes.



CO₂ emissions per capita, 1997

Average carbon dioxide (CO₂) emissions per capita measured in tonnes per year



Kyoto Protocol

- 4 GHG (carbon dioxide, methane, nitrous oxide, sulphur hexafluoride) + hydrofluorocarbons and perfluorocarbons.
- Reducing of GHG emissions by 5,2 % for the first commitment period of 2008-2012. (4,2 % after USA left). Base year 1990.
- Reduction of emissions from fossil fuel combustion; reduction of emissions in other sectors (land-use or direct industrial emissions); flexible mechanisms – Emission trading, CDM, JI.
- Annex I. countries (37 industrialized countries + EU15), Non-annex I. parties.
- First binding international treaty on climate change mitigation, with enforceable (to some extent) targets and schedule, channeling investments into low-carbon technologies.

THE MAIN CLIMATE SUMMITS (AND THEIR ACHIEVEMENTS)



2021

COP26 - GLASGOW

Glasgow Climate
Pact adopted



2019

COP25 - CHILE

Held in Madrid



2018

COP24 - KATOWICE

Katowice Rulebook
Rules of the Paris Agreement



2017

COP23 - FIJI

Held in Bonn



2013

COP19 - VARSOVIA

International
Warsaw
Mechanism



2014

COP20 - LIMA

Contributions for a
global agreement



2015

COP21 - PARIS

Paris
Agreement



2016

COP22 - MARRAKECH

Marrakech Partnership
The Paris Agreement
comes into effect



2012

COP18 - DOHA

Doha Amendment:
21st Stage of the
Kyoto Protocol



2011

COP17 - DURBAN

Durban
Platform



2010

COP16 - CANCÚN

Cancún
agreements



1992

UNFCCC

The United Nations Framework
Convention on Climate Change



1997

COP3 - KIOTO

Kyoto Protocol:
Emissions reduction



2007

COP13 - BALI

Bali Road
Map



2009

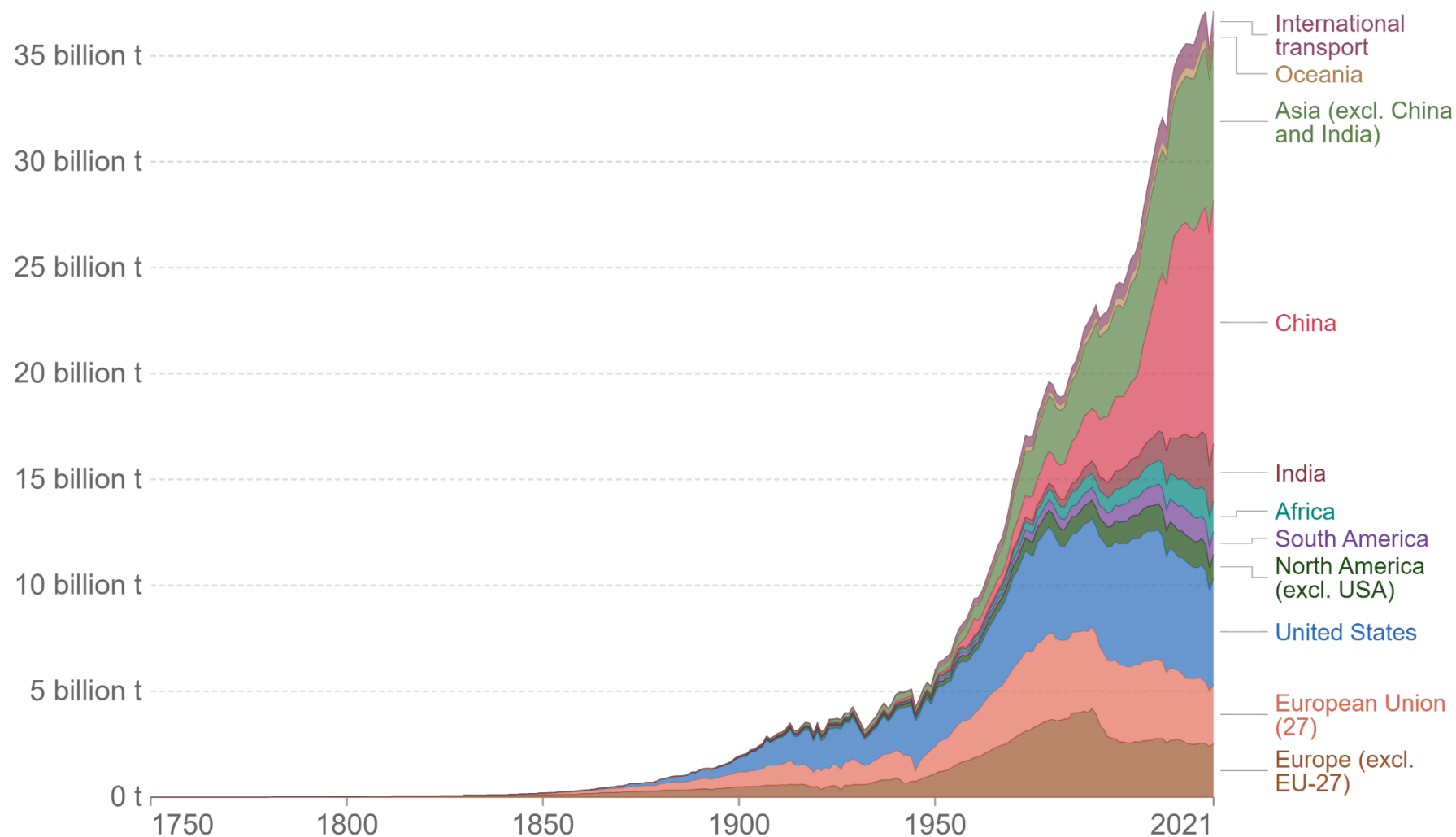
COP15 - COPENHAGEN

Copenhagen Agreement:
Long-term financing, 2° C challenge

Iberdrola (n.d.): Climate
Negotiations: 25 year of
searching for consensus
on the fight against
climate change.

Annual CO₂ emissions by world region

This measures fossil fuel and industry emissions¹. Land use change is not included.



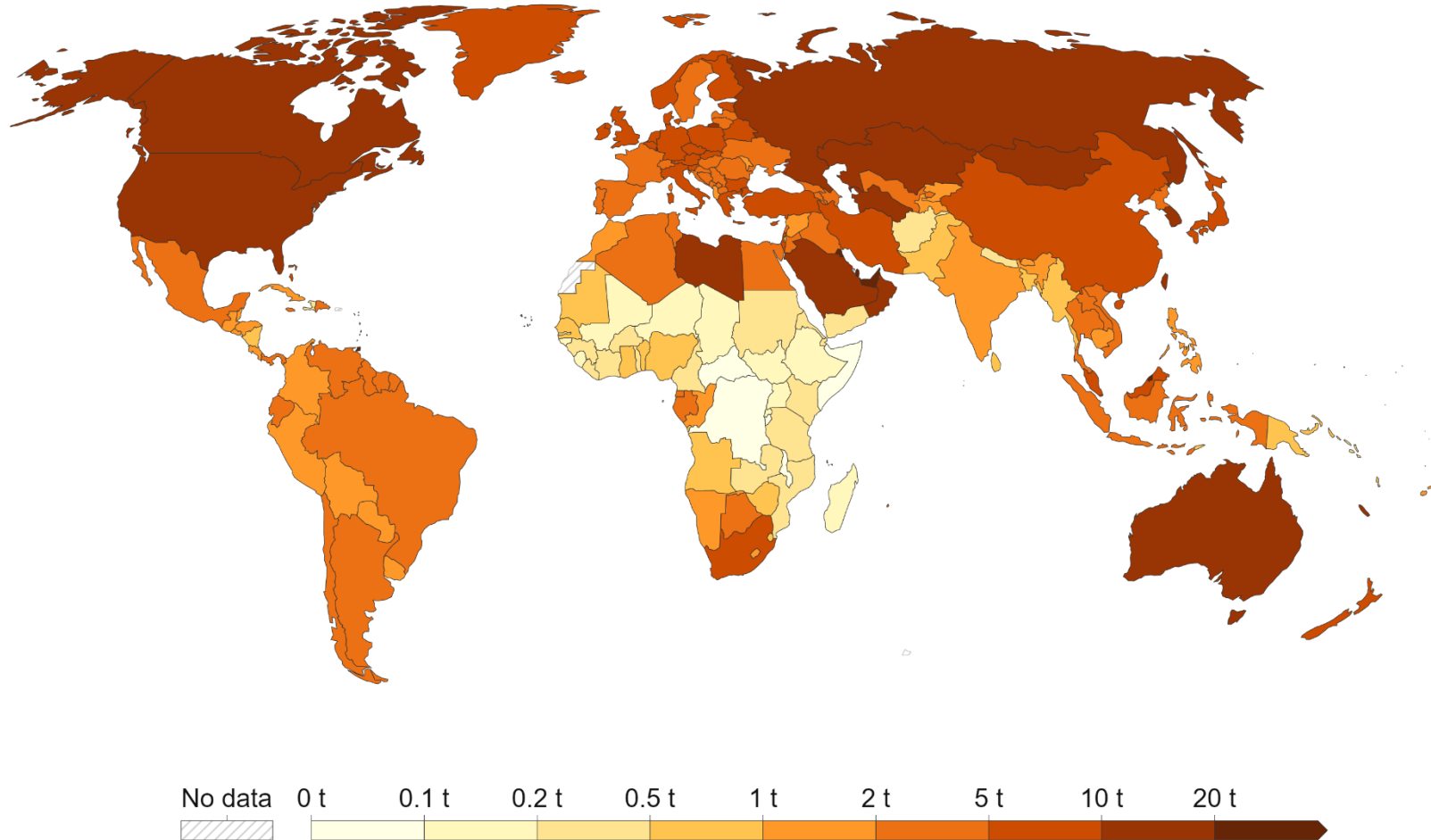
Source: Global Carbon Budget (2022)

OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO₂) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO₂ 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.

Per capita CO₂ emissions, 2021

Carbon dioxide (CO₂) emissions from fossil fuels and industry¹. Land use change is not included.



Source: Global Carbon Budget (2022); 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 (CO₂) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO₂ 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.

Role of the developing countries

- How should developing countries and regions approach decarbonization?
- Is it fair to expect them to take an untested and potentially more expensive low-carbon path? And at the same time, is it possible not to ask this of them when for example sub-Saharan Africa is projected to represent 40% of the world's population by the end of century?
- Is it feasible, both technically and politically? Considering that the same climate change will dramatically increase their expenses?

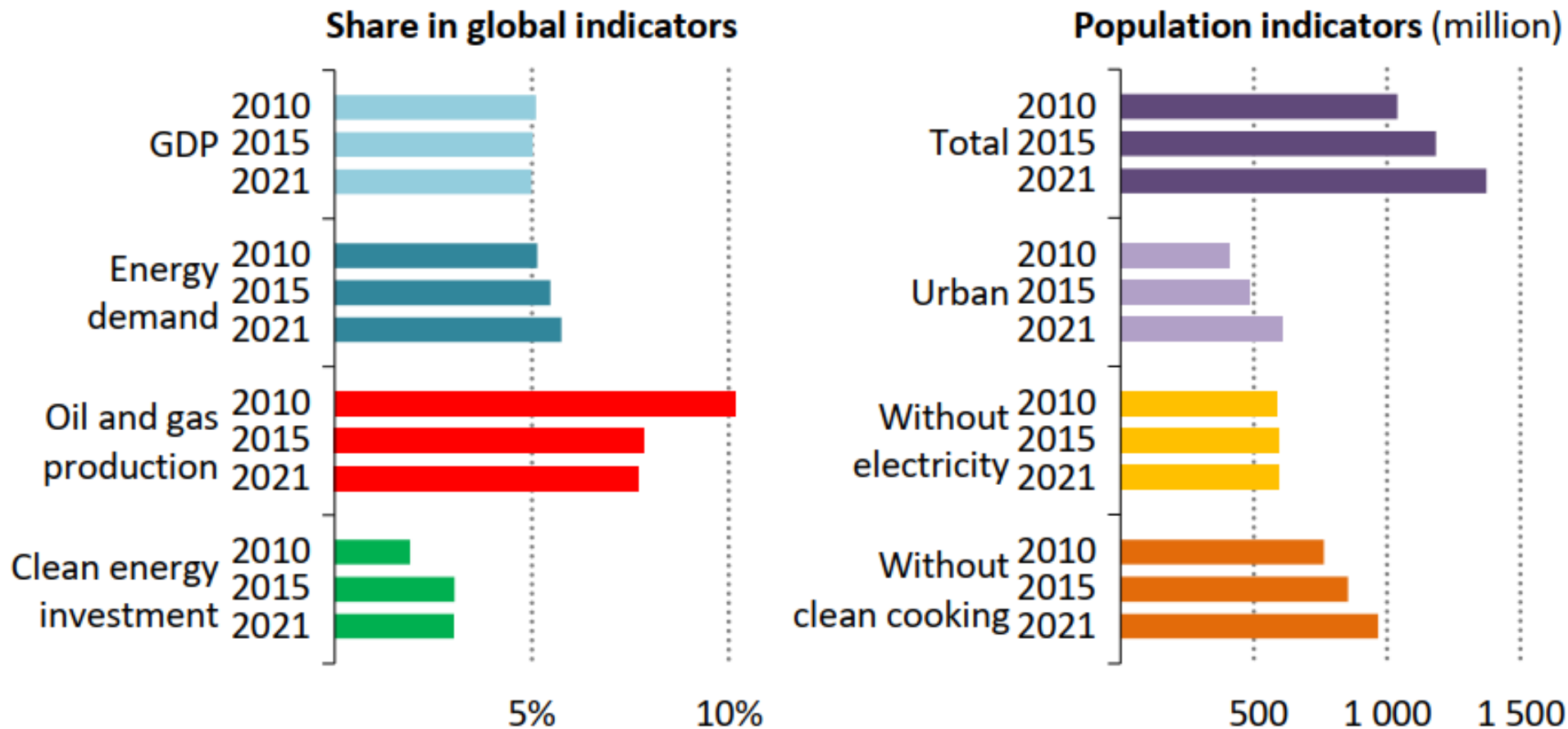
Sub-Saharan Africa



Sub-Saharan Africa – energy context

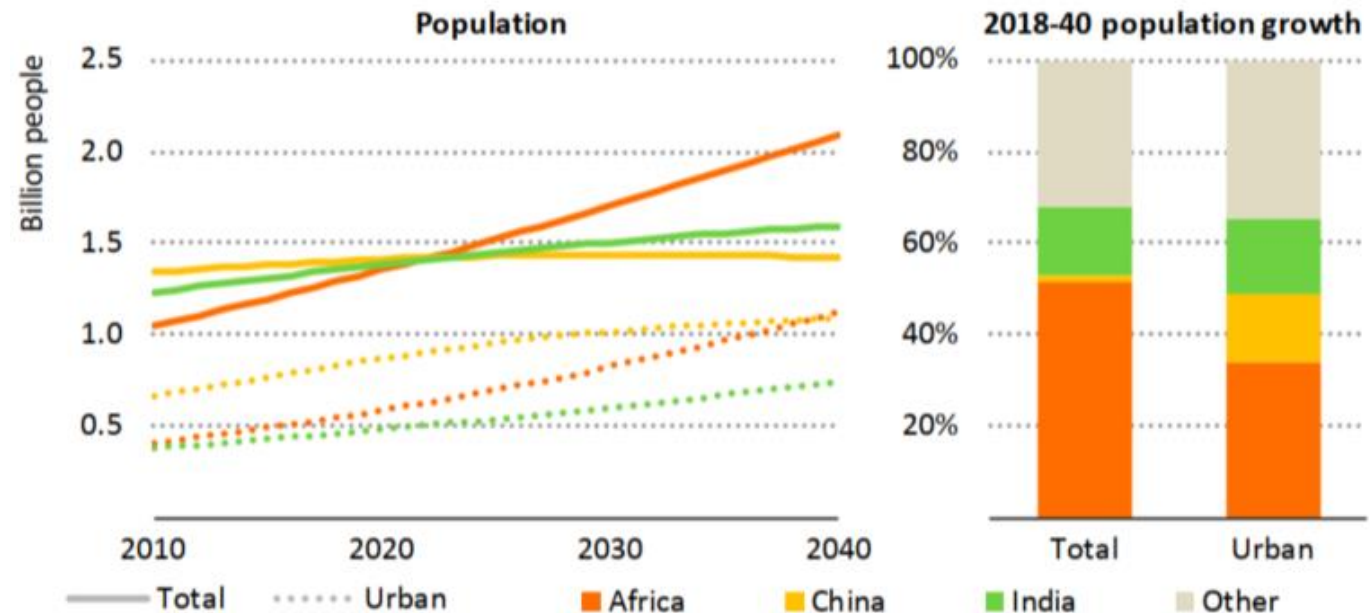
- Region rich with resources (both fossil and renewables) but poor with energy - accounts for 6% of global energy demand (3% of electricity), having 18% of the world's population. Over the past 30 years power generation per capita plateaued.
- Solid biomass (fuelwood, straw, charcoal, dried animal and human waste) accounts for about 70% of final energy use in the region (80% with SA excluded).

Africa's share in selected global energy and economic indicators and key population indicators, 2010-2021



1) Growing population

- Rapid population growth: 180 million in 1950; 1.3 billion in 2018, 2.2 billion in 2050, and 3.9 billion in 2095.
- Urbanization: by 2030, more than 50% of people will be in cities; by 2050, more than 60%. Around 580 million additional people are expected to reside in cities by 2040.
- Growing working-age population (42% under 15), with nearly 40% living below the poverty line, poses both potential and tension.



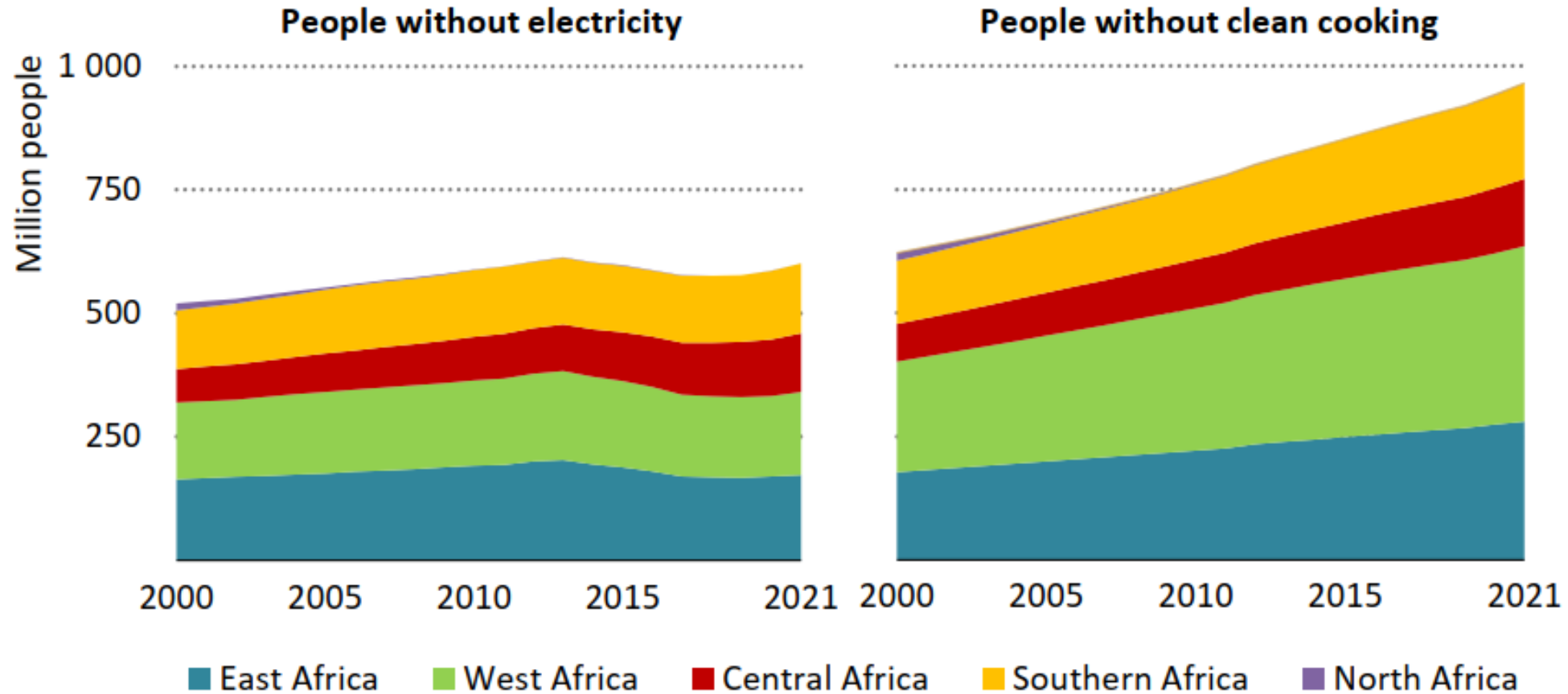
2) Investments and economy

- In 2018, around USD 100 billion, or 5.5% of the global total, was invested in the energy sector.
- Less than 3% of the decade's global clean energy investment.
- The economy is smaller than Germany's.
- 65% are employed in agriculture and mining for export.
- The share of people in poverty is decreasing in percentage but increasing in absolute numbers.
- Governance shortcomings 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.
- Covid and Russian war worsened the situation.
- Renewables play an increasing role, including decentralized and off-grid systems.
- Reliable electricity is vital for economic growth. Prices are high.

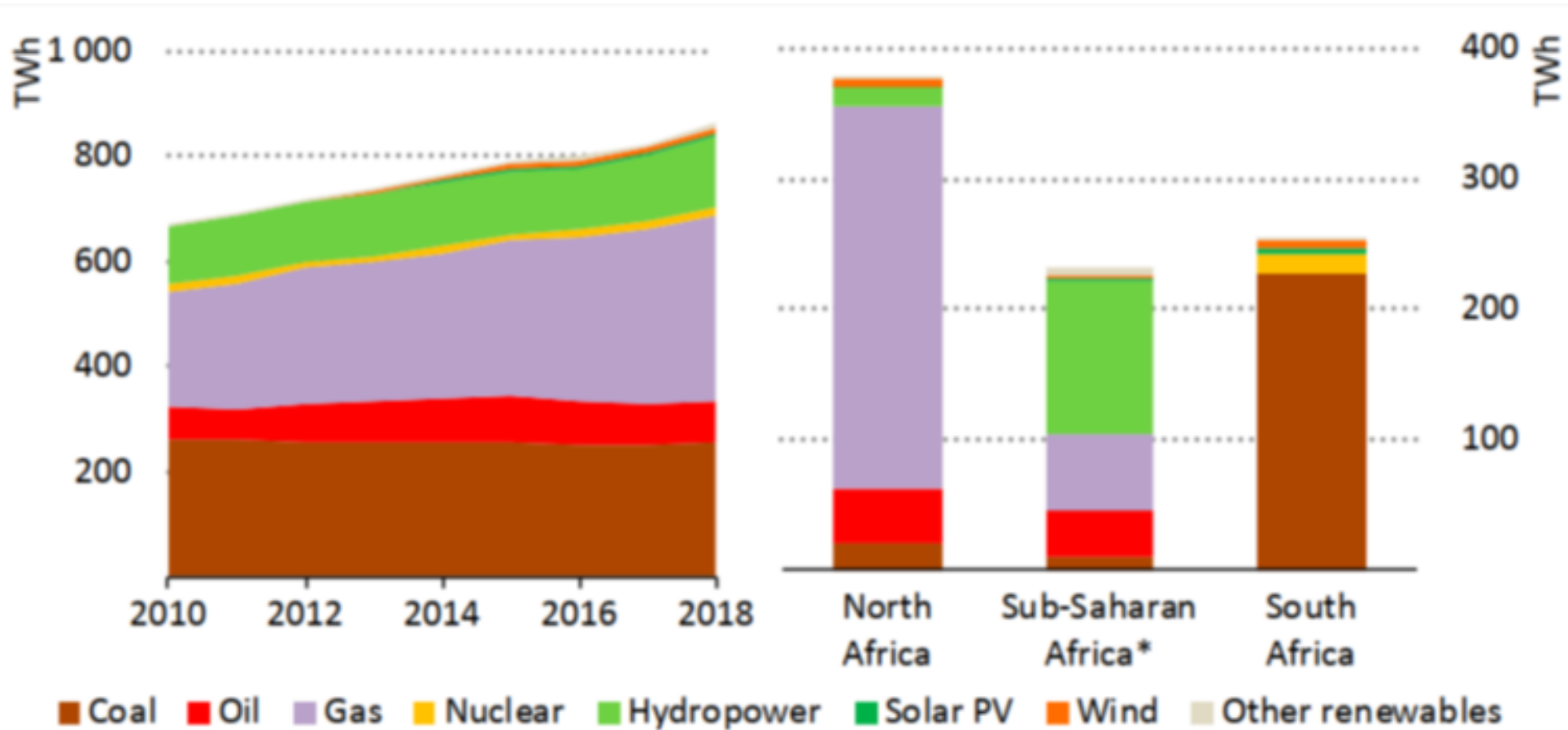
3) Access to electricity



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

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



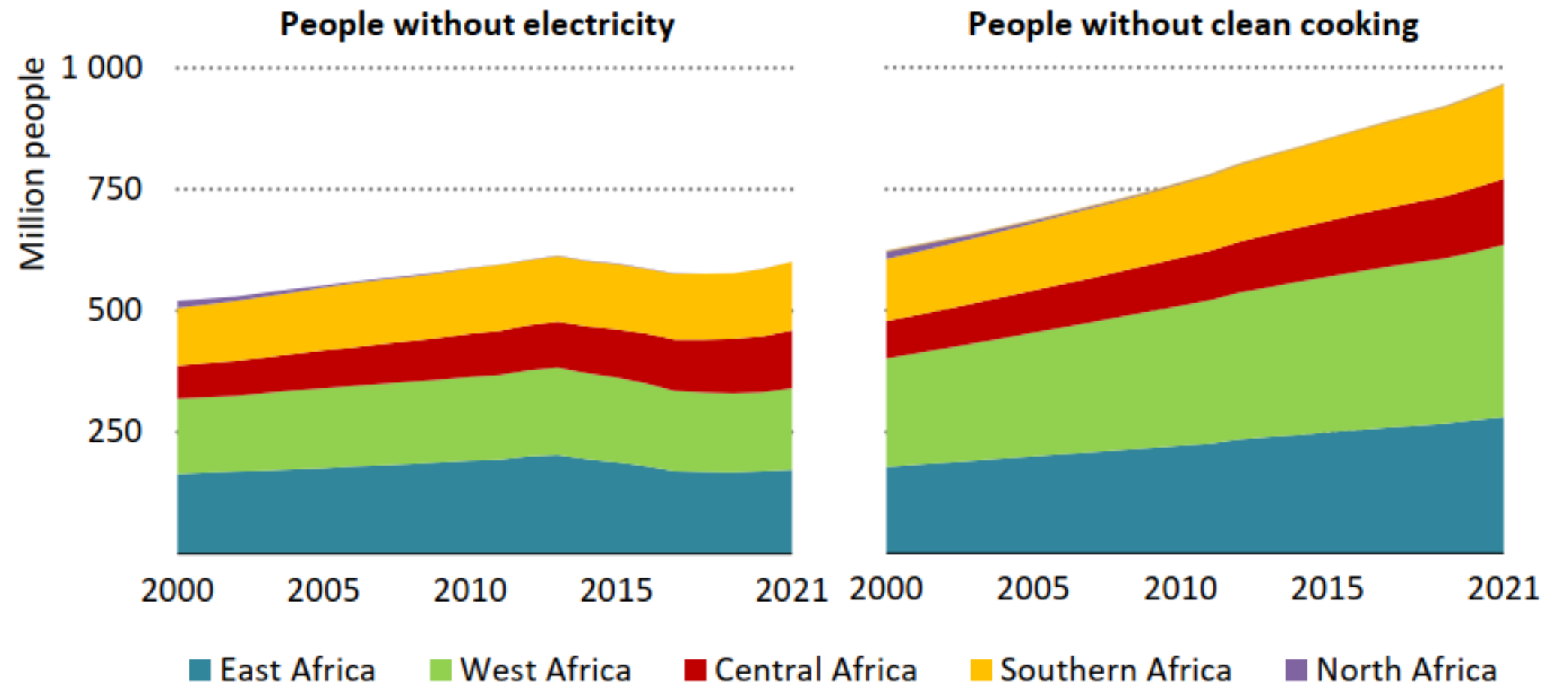
4) Clean cooking

- 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

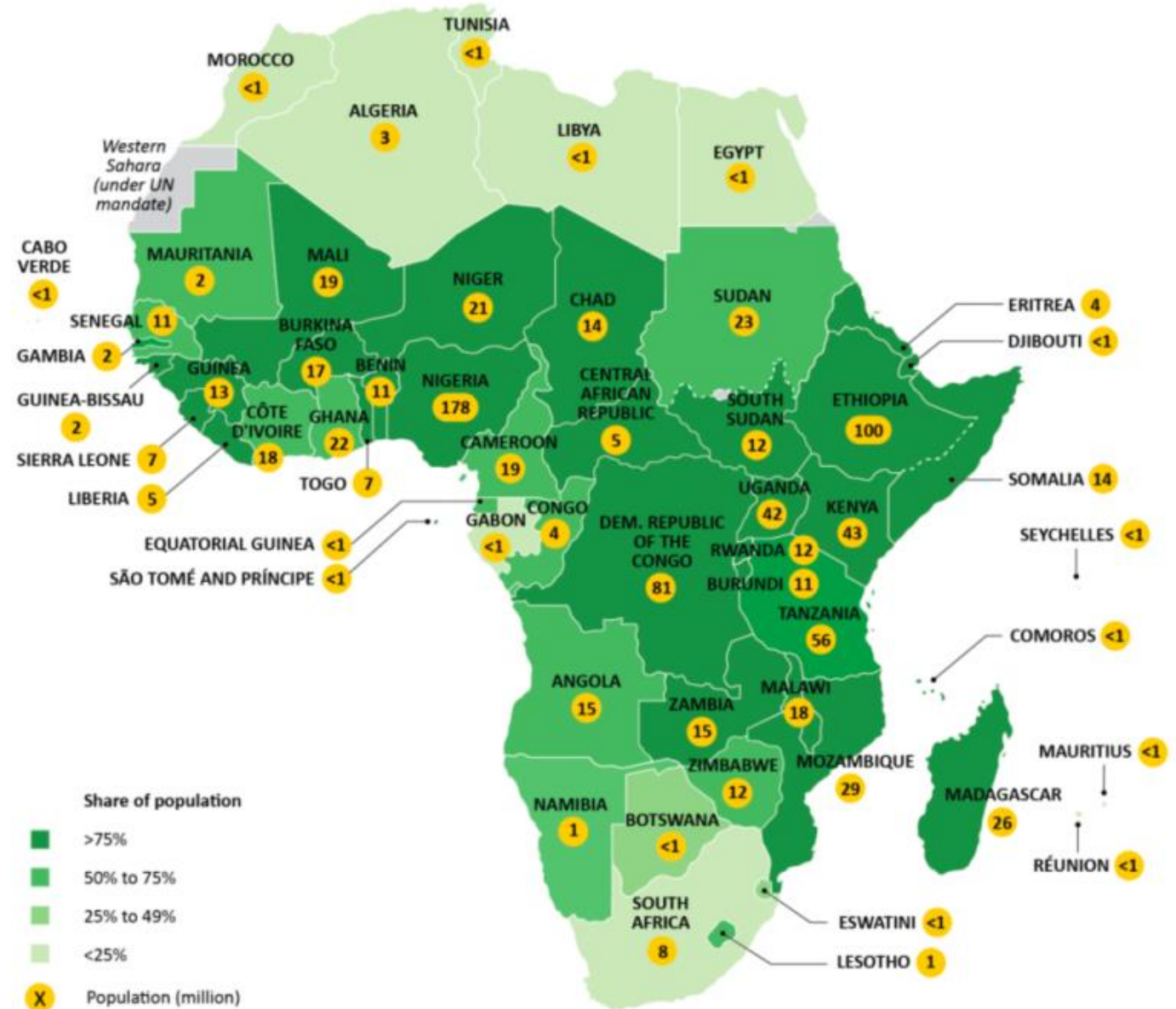
	Investment cost (\$)	Efficiency	Daily hours for cooking	Consumption per household (toe/year)
Traditional cookstoves				
Charcoal	3 - 6	20%	2 - 4	0.5 - 1.9
Fuelwood, straw	0 - 2	11%	2 - 4	1.0 - 3.7
Alternative cookstoves				
Kerosene	30	45%	1 - 3	0.1 - 0.2
LPG	60	55%	1 - 3	0.08 - 0.15
Electricity	300	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



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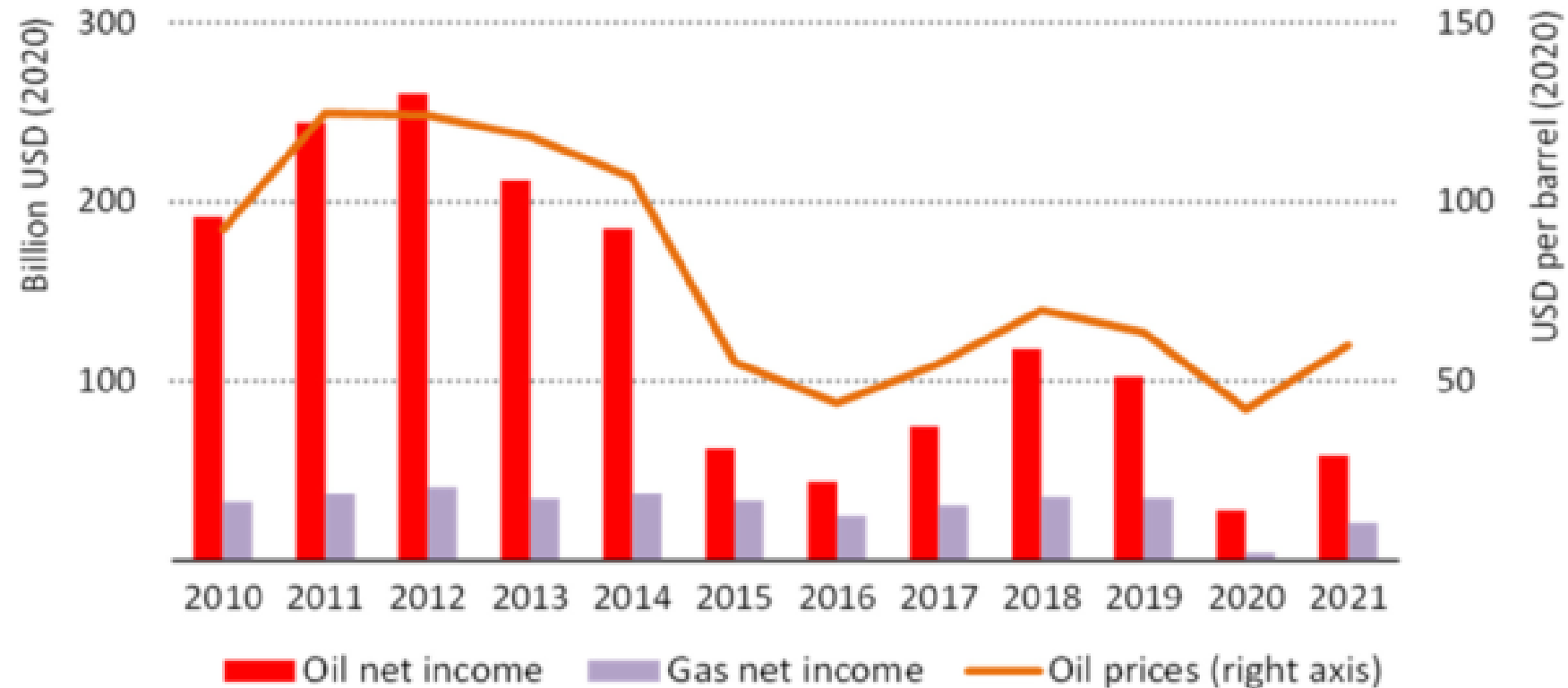
4) Population without access to clean cooking, 2018



5) Hydrocarbon resources

- The continent, including North Africa, holds about 450 billion barrels of recoverable oil (7% of the global total, mainly in Nigeria and Angola).
- Natural gas usage is limited (5% in the energy mix), with 100 trillion cubic meters available (13% of the global total), often flared (a third of production). New discoveries in Nigeria, Mozambique, and Tanzania offer potential for increased consumption but require costly infrastructure.
- Estimated coal reserves in the south are 120 billion tons (less than 1% of world reserves), with exploration lacking, especially in South Africa and Mozambique.
- Uranium resources, making up 20% of global reserves, are found 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 and its oil

- Angola surpassing Nigeria as top sub-Saharan oil producer.
- In Nigeria, regulatory uncertainty, militant activity, and oil theft in the Niger Delta hinder production.
- Oil theft, around 150-200 kb/d, along with spills from sabotage, account for about 7-8% of output.
- Nigeria, a rentier state, is the largest economy in the region, but key human development indicators like education and life expectancy are on par with the regional average.
- https://www.youtube.com/watch?v=KagZ76EXU_I

6) Renewable sources

- Development hindered due to financing, weak grids, and policy uncertainties.
- 4 GW of solar PV added (2010-2018).
- Africa has 35 GW of hydro capacity, with 60% of investments (2010-2015) from China.
- Wind capacity is 5.5 GW.
- Bioenergy makes up 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

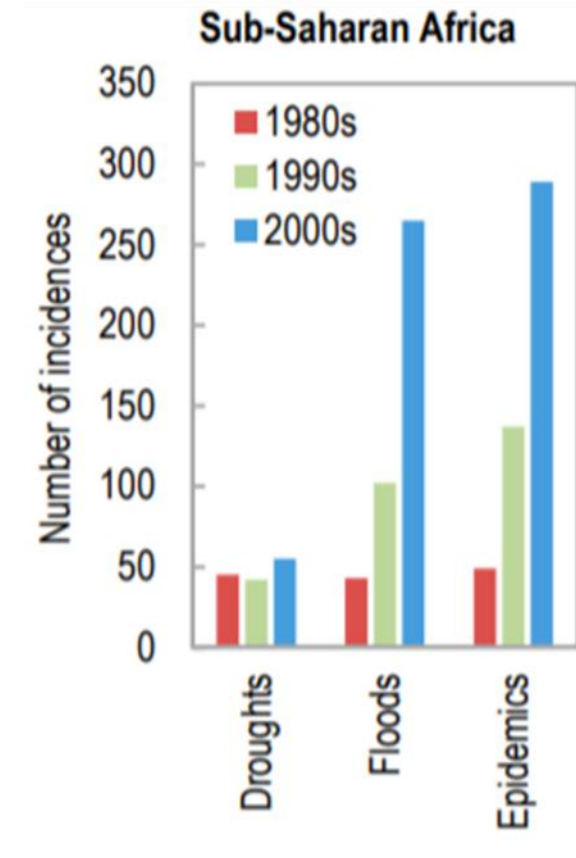
- How should developing countries and regions approach decarbonization?
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- Is it feasible, both technically and politically? Considering that the same climate change will dramatically increase their expenses?

Leapfrogging to...what?

- Energy-intensive manufacturing is a traditional path for economic advancement. Can Africa shift to a service economy without first establishing a strong industrial base, which demands significant energy? This raises questions about technology transfer from more advanced nations.
- Deciding on technologies and systems is crucial: fossil fuels or renewables? Centralized or decentralized energy generation?
- Implementing complex systems requires prior development of technology, education, social norms, legal and financial systems.
- Differentiating between incremental improvements (like solar appliances) and large-scale production is essential.

Some extreme weather events, 2022

- Drought and famine claimed 2,500 lives in Uganda, impacting eight million in Ethiopia.
- Nigeria saw over 600 casualties in its worst floods in a decade.
- Southern African nations, including Madagascar and Mozambique, endured six severe storms, resulting in at least 890 fatalities.
- Tunisia experienced scorching temperatures of 48°C in July, fueling intense wildfires.
- In Chad, floods in August and October affected nearly two million people.
- And these are just a few examples...



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.

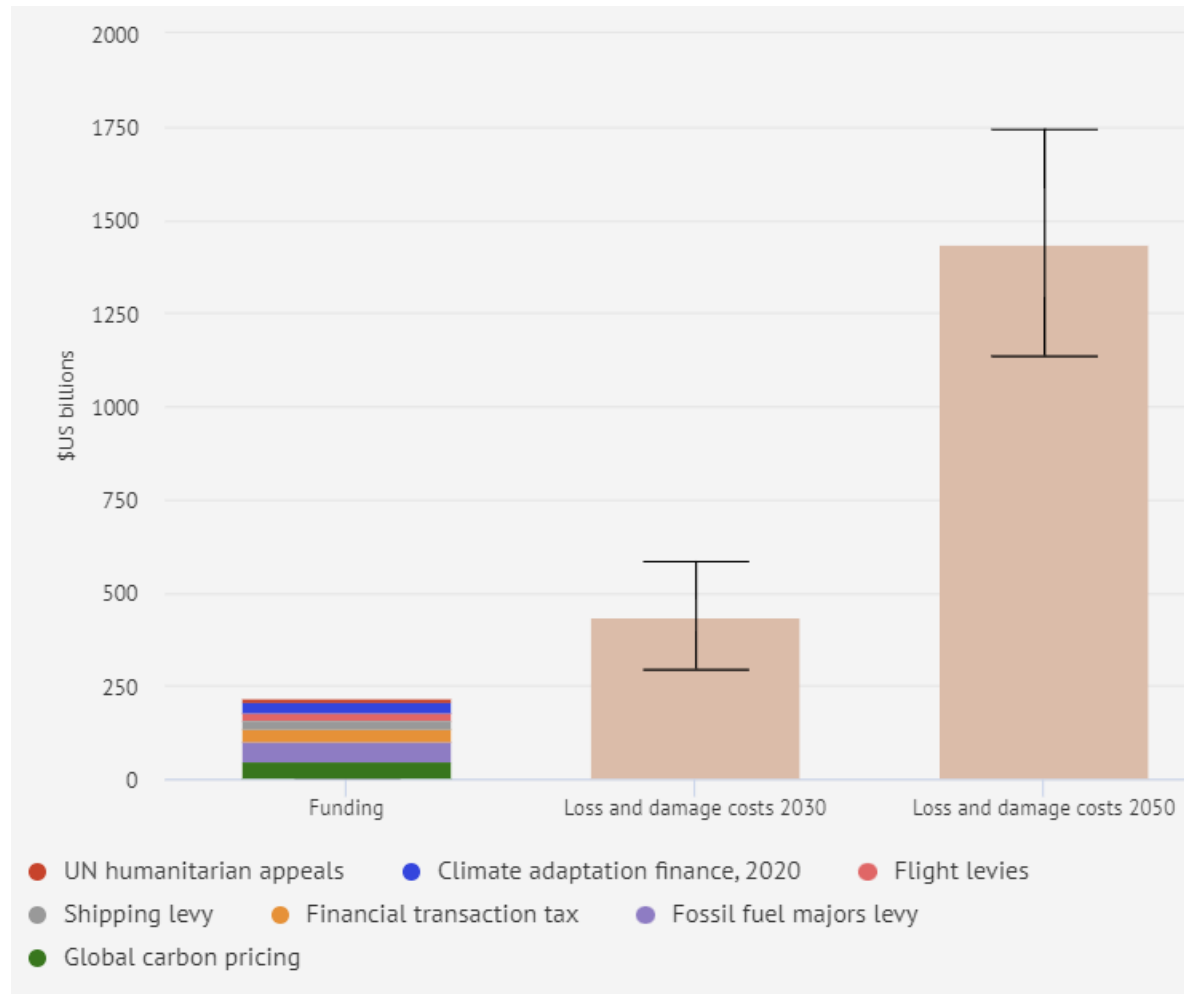
Climate justice issue.

Money and technological transfer from developed countries to Africa.

Sources

- World Population Review (2018): Sub Saharan Africa Population 2018.
- IEA (2014): Africa Energy Outlook.
- IEA (2017): Energy Access Outlook 2017: From Poverty to Prosperity.
- Hafner, M.; Tagliapietra, S.; de Strasser, L.(2017): Energy In Africa: Challenges and Opportunities.
- 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.

Impacts of climate change

- It is usually the poor countries that are hardest hit. Without really contributing to the climate change.
- Who should pay the costs of mitigation, adaptation, and loss and damages?