Deep Dive Analysis:
Tracking SDG7: The Energy Progress Report 2023

SDG7 Data: 2010 - 2021

PERSPECTIVE 2023

Purpose of this document

The purpose of this document is to:

- Highlight the progress made towards achieving SDG 7
- Highlight specific areas where there are challenges
- Help organizations prioritize where to focus and what to focus on

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Snapshot: SDG7 tracking report data 2010 – the latest available data (2020 / 2021)

SDG7	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Goal 7.1.1: Universal Electricity Access, million of people without access	1,141	1,081	1,063	1,022	999	958	882	829	772	757	742	**675**
Goal 7.1.2: Universal Access to Clean Fuels & Technologies for Cooking, million of people without access	2,977	2,939	2,878	2,812	2,742	2,666	2,613	2,557	2,497	2,432	2,363	**2,288**
Goal 7.2A: Increase Share of Renewable Energy, % share energy consumption from renewables	16.0%	16.0%	16.3%	16.5%	16.7%	16.7%	16.9%	17.1%	17.3%	17.8%	**19.1%**	--
Goal 7.2B: Increase Share of Renewable Energy, % share energy consumption from **modern renewables**	8.7%	8.8%	9.2%	9.7%	9.8%	10.0%	10.4%	10.6%	11.1%	11.5%	**12.5%**	--
Goal 7.3: Double Rate of Energy Efficiency, % Improvement, yearly rate of improvement of global primary energy intensity	-	2.2%	1.8%	1.7%	1.9%	3.1%	2.2%	1.4%	1.0%	1.7%	**0.4%**	--

SOURCES: World Bank / ESMAP Tracking SDG7 Database, 2023 and Tracking SDG7 Report 2023

SEforALL key messages – *Tracking SDG7: The Energy Progress Report 2022*

Electricity access is growing, but the progress is uneven – Africa needs strong actions

- The number of unelectrified people was reduced from 1.14 billion in 2010 to 675 million in 2021.
- Asia was the major driver of this decline as the deficit shrank from 516 million in 2010 to 69 million in 2021, while Africa only saw only marginal reduction of unelectrified population from 591 million to 586 million during the same period with rapidly increasing population.
- 2021 saw the strongest annual improvement (9.0 percentage point) since 2010 but it was mainly made in Asia. Africa needs accelerating efforts and activities.
- Differences in rural and urban electrification persist and should be factored into tailored country strategies to achieve universal access by 2030.

Lack of clean cooking access will persist in a massive scale if the current pace of progress continues

- 2.3 billion people in 2021 - approximately a third of the world's population - are still unable to cook cleanly and safely.
- Considering expected population growth, the annual increase in the number of people gaining access to clean cooking in both Asia and Africa needs to be significantly accelerated. Sub-Saharan African countries require much stronger and focused actions.
- Countries with large population without electricity and clean cooking access overlap. Electric cooking could be an option for solving both access challenges.

Every renewable energy potential should be pursued in both electrification and clean cooking and usage in industry, transport and building

- Slow pace of renewable energy uptake has been observed and not been changed in both renewable energy in general (renewable share in total final energy consumption 16.0% in 2010 to 19.1% in 2020) and modern renewables (8.7% in 2010 to 12.5% in 2020). While we should continue accelerating renewable electricity, the increase of renewables in heat and transport fuel energy consumptions, which are much larger than electricity consumption, is necessary with the uptake of modern renewables in industry, building and the transport sectors.

Energy efficiency improvement has slowed down

- A continuing decline in the pace of progress on energy efficiency since 2015 has not been changed, which makes the annual average improvement rate between 2010 and 2020 only 1.8%, far from the originally targeted 2.6%. The 2020 annual improvement rate was mere 0.4%. This has made achieving SDG 7.3 target very difficult.
- Both Africa and Asia have higher energy intensity than the world average and require stronger focus for improvement while economic development in these regions are expected to continue. Focus on countries in the top 20 energy consuming countries with higher energy intensity and/or low improvement rate will be effective as well.

Executive summary

Based on the current trends, we are not on track to achieve SDG 7.1.1 by 2030

- We are not on track to achieve universal electricity access by 2030, with approximately 660 to 674 million people expected to remain unelectrified in 2030 based on a projection with the current trend and stated policy package scenario.
- The efforts to electrify countries with large unelectrified populations, low electrification rates, and/or without significant progress in the past few years need to be strengthened. Additionally, countries with the smaller number of unelectrified populations but low electrification rates also need immediate actions based on sound strategies to leave no one behind. As Asia is moving toward higher electrification rates, the strongest policy and investment focus need to be on Sub-Saharan Africa.

Based on the current trends, we are not on track to achieve SDG 7.1.2 by 2030

- Projections show that we are not on track to achieve universal access to clean fuels and technologies for cooking by 2030, with approximately 1.8 and 1.9 billion people expected to remain without clean cooking access based on current trends
- Countries with large populations without access, such as India, China, Nigeria, Bangladesh, Pakistan and Ethiopia, should be a priority for stronger actions, while countries with low access rates with very weak improvement, many in Africa, should also need a strong momentum to start and accelerate the progress.

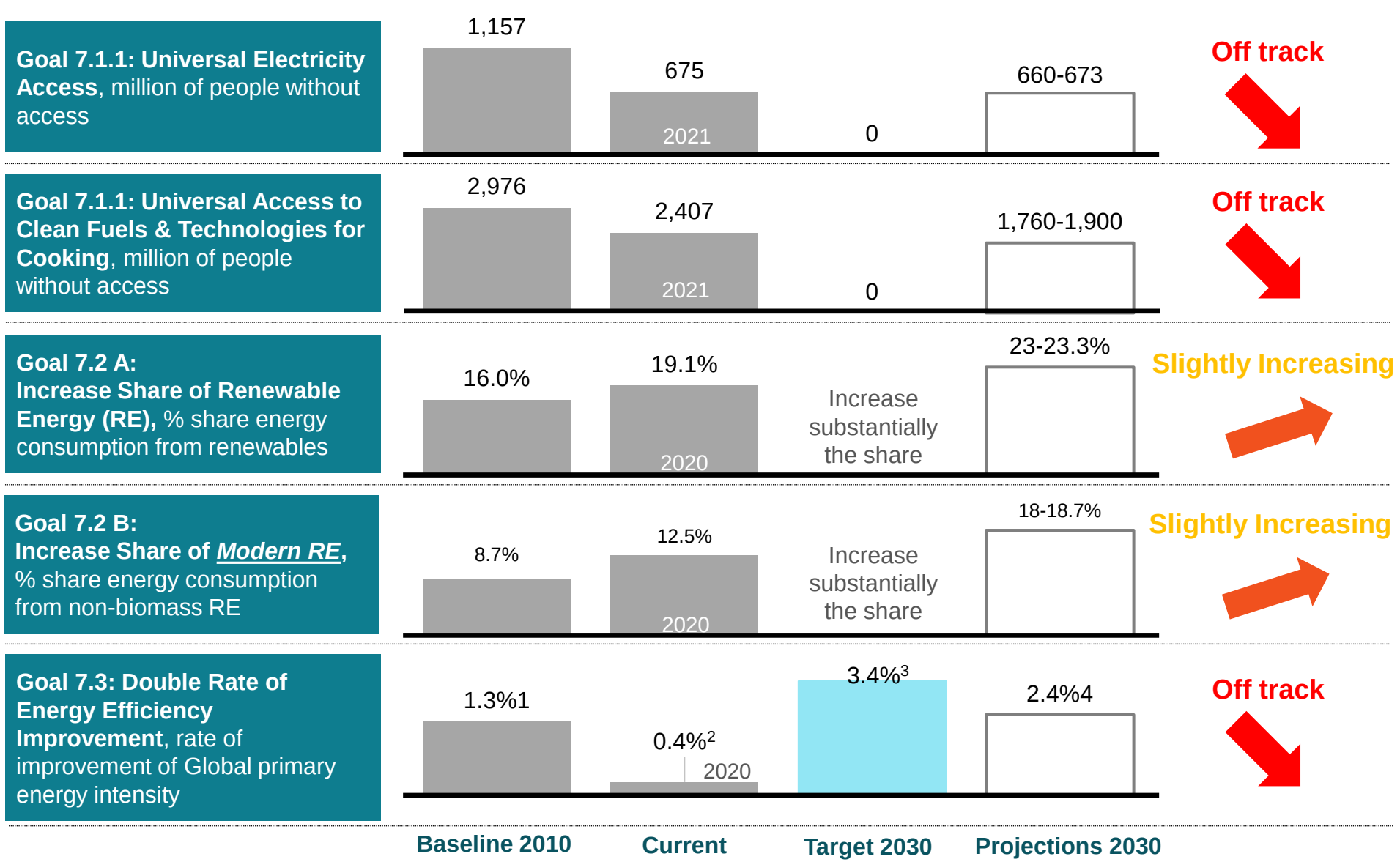
Based on the current trends, we expect to see only moderate gains in the share of renewables and that of modern renewable in the energy mix by 2030.

- Projections show an increase in the share of renewables, including traditional biomass, in energy consumption to around 23% by 2030.
- Africa has the highest share of renewables at 57.1%, with only 8.4% of modern renewables. Africa has the lowest improvement rate (0.6 percentage point) of renewable share in TFEC since 2010. Populations without electricity and clean cooking access in the region should be connected with clean and modern renewable energy.

Based on recent data, an energy intensity improvement rate of at least 3.4 percent per year from now through to 2030 will be necessary to achieve SDG 7.3

- With the continuous slowdown in the rate of improvement of energy intensity continues, efforts to reach SDG 7.3 is increasing every year.
- To ensure we get on track, all end-use sectors (industry, transport and building) need to become more energy efficient. As the economic structures are quite diverse from one country to another, in-depth data and analysis of sector specific energy intensity is critical to create sound strategies for each country.

We are lagging behind in providing access to both electricity and clean cooking, and much more needs to be done for increasing efficiency and renewable energy consumption



- While Asia made a significant progress, Africa is very much lagging behind in electricity access provision (7.1.1)
- The challenges in access to clean cooking (7.1.2) remain enormous.
- While the overall share of renewable energy has been increasing, more efforts are needed to increase modern renewable in both Asia and Africa and in heat and transport sectors in general (7.2)
- Achieving the energy efficiency goal is elusive with an energy intensity improvement rate of at least 3.4 percent per year from now through to 2030, further increased from the originally required 2.6 percent (7.3)

1: Baseline for Goal 7.3: Double Rate of Energy Efficiency Improvement is the value for the years 2006-2010 2: annual rate of improvement from 2019 to 2020
3 Yearly rate of energy efficiency improvement required to meet 2030 Target 2021-2030 4: 2030 projection by the IEA Stated Policies Scenario (STEPS)

SOURCES: World Bank / ESMAP; 2023 Tracking SDG7, IEA 2022 World Energy Outlook, SEforALL analysis

Contents

SDG 7.1.1 Electrification Access

Since 2010, the number of unelectrified people has been reduced from 1,141 million to 675 million in 2021. As Asia has made significant progress, Africa is becoming the sole region with the majority (87%) of unelectrified population.

- 80% of the unconnected people live in just 24 countries (20 of them in Africa and the remaining 4 in Asia).
- 96% of the global improvement since 2010 has been driven by gains in Asia, particularly in India and Bangladesh (62% and 14% gains, respectively).
- Africa's gain in electricity access rate has been 14 percentage points, from 44% to 58%, since 2010. However, with significant population growth, the unelectrified population has resulted in only 5 million people reduction. With the Asia' significant advancement, stronger focus and actions are required in Africa

Looking forward, based on the current trends, we are not on track to achieve SDG 7.1.1 by 2030

- A current trend projection and the IEA's scenario analysis show that we are **not on track** to achieve universal electricity access by 2030, as 660-674 million people are expected to remain unelectrified in 2030
- We need much stronger and tailor-made actions and investments, particularly in Africa.
  - Countries can be categorized as leave-no-one-behind ones, strong focus/ high impact ones, and more and accelerating-focus needed ones. Within each category, tailor-made solutions which match each country's conditions are needed to achieve universal access.
    - Regardless the improvement rates since 2010 and the size of unelectrified populations, all countries with total access rates below 50-60% need more and accelerating efforts.
    - Even countries with relatively high rate of access (above 60-65%) still require continuous tailor-made efforts for both urban and rural populations to cross the goal line by 2030.
  - Differences in the rural and urban electrification rates persist both in Asia and Africa, indicating that different approaches are needed to close the gap in each region.
    - Asian countries typically have close to 100% urban electrification rates and high rural electrification rates, except DPR Korea. Last mile rural electrification is the key for these countries.
    - Sub-Saharan Africa has 81% urban electrification rate, but rural electrification rates of just over 29%, increased by only 1 percentage point in a year. A combination strategy of last mile push in urban areas and stronger rollout of large-scale rural electrification is necessary for many countries.

Methodology

Description

Data Source

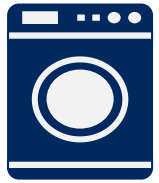
- The following data was gathered from WORLD BANK / ESMAP's Tracking SDG 7 database (download link)
  - Total electricity access rate and population without access to electricity per country
  - Urban electricity access rate and population in urban areas without access to electricity per country
  - Rural electricity access rate and population in rural areas without access to electricity per country
  - Renewable capacity per capita per country and region
- The following data was gathered from WORLD BANK open data source
  - Total population per country between 2010-2021.
  - Total population estimates per country from 2022 to 2030.

Projections

- Straight line extrapolation projections were made via the following process
  - The rate of change of the number of people without access to electricity (Compound Annual Growth Rate, CAGR) between 2018 and 2021 was calculated for each individual country. For countries with missing or unreliable data, available data between 2010 and 2021 was used to calculate CAGR.
  - Each country's 2021 population without access to electricity was projected forwards to 2030 (by 9 years) by adding the calculated average change to the 2021 population 10 times.
  - 0 was set as a minimum to prevent the unconnected population from being negative
  - The projected data was then summed up according to each country's regional classification
- IEA stated policy scenario was taken from the IEA's World Energy Outlook 2022 report.

Definition of electricity access

Electricity access is defined as a household being connected to an electricity supply at Tier 1 and above

	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
						
Minimum hours available per day	<4 hours	4 hours	4 hours	8 hours	16 hours	23 hours
Minimum power	<3 Watts	3 Watts	50 Watts	200 Watts	800 Watts	2,000 Watts
Minimum daily power capacity	<12 Wh	12 Wh	200 Wh	1,000 Wh	3,425 Wh	8,219 Wh

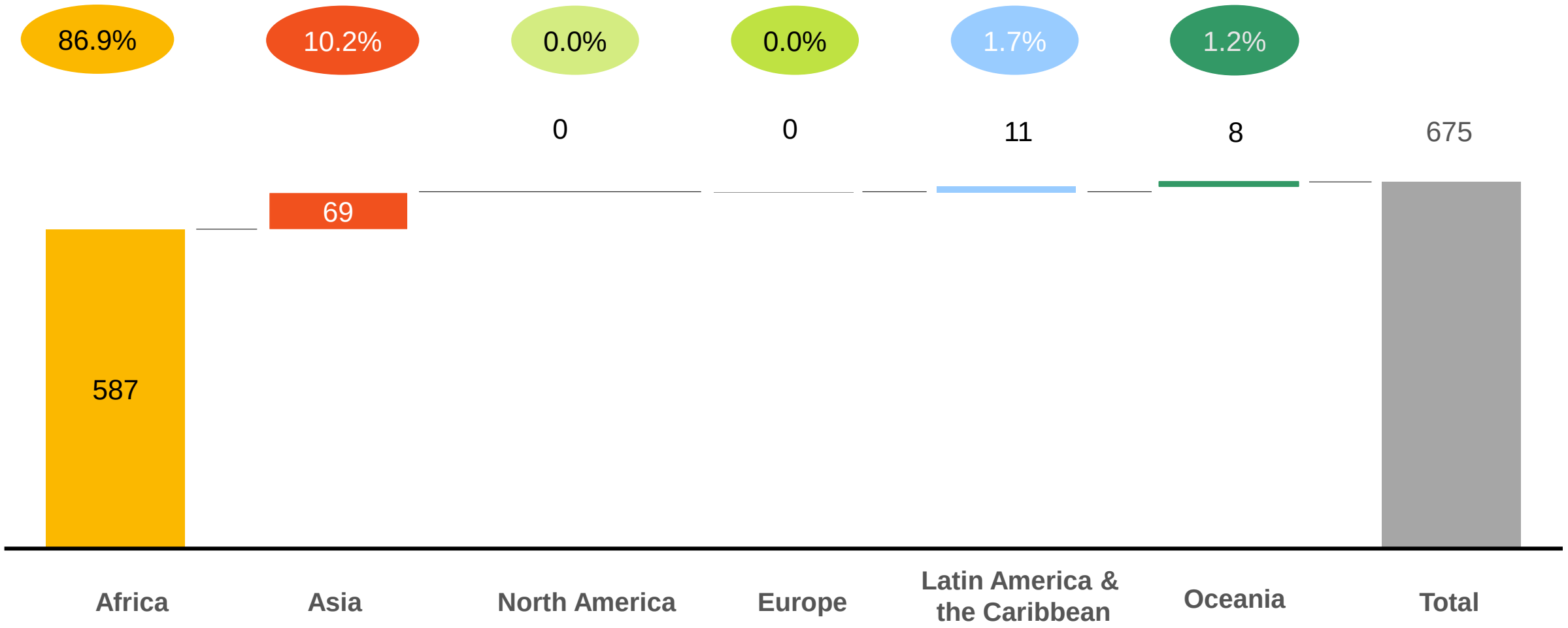
Electricity access

- The numbers presented above are only to supply the absolute minimum of each stage to each household.
- **The Modern Energy Minimum advocates universal electricity consumption of at least 1,000 kWh** (of which approx. 300 kWh at the residential level)**,** if we aspire for all people to reach an income of at least USD 2,500 per capita per year (or about USD 6.85 per day, midpoint for lower-middle income status), based on historical data.
- Meanwhile, this historical data does not include the **impacts of energy efficiency improvement,** which can make the same income level correlate to much less electricity consumption in the future. Hence, this should be considered as an indicative historical number, not an absolute minimum. What really matters is **energy service contents** enabled by a certain consumption level and **their impacts on people's lives.**

SOURCE: Beyond Connections: Energy Access Redefined, ESMAP, 2015; ENERGY FOR GROWTH HUB (2021) The Modern Energy Minimum: The case for a new global electricity consumption threshold

There are ~675 million people in the world without access to electricity as of 2021

Population without electricity access[1], millions, 2021

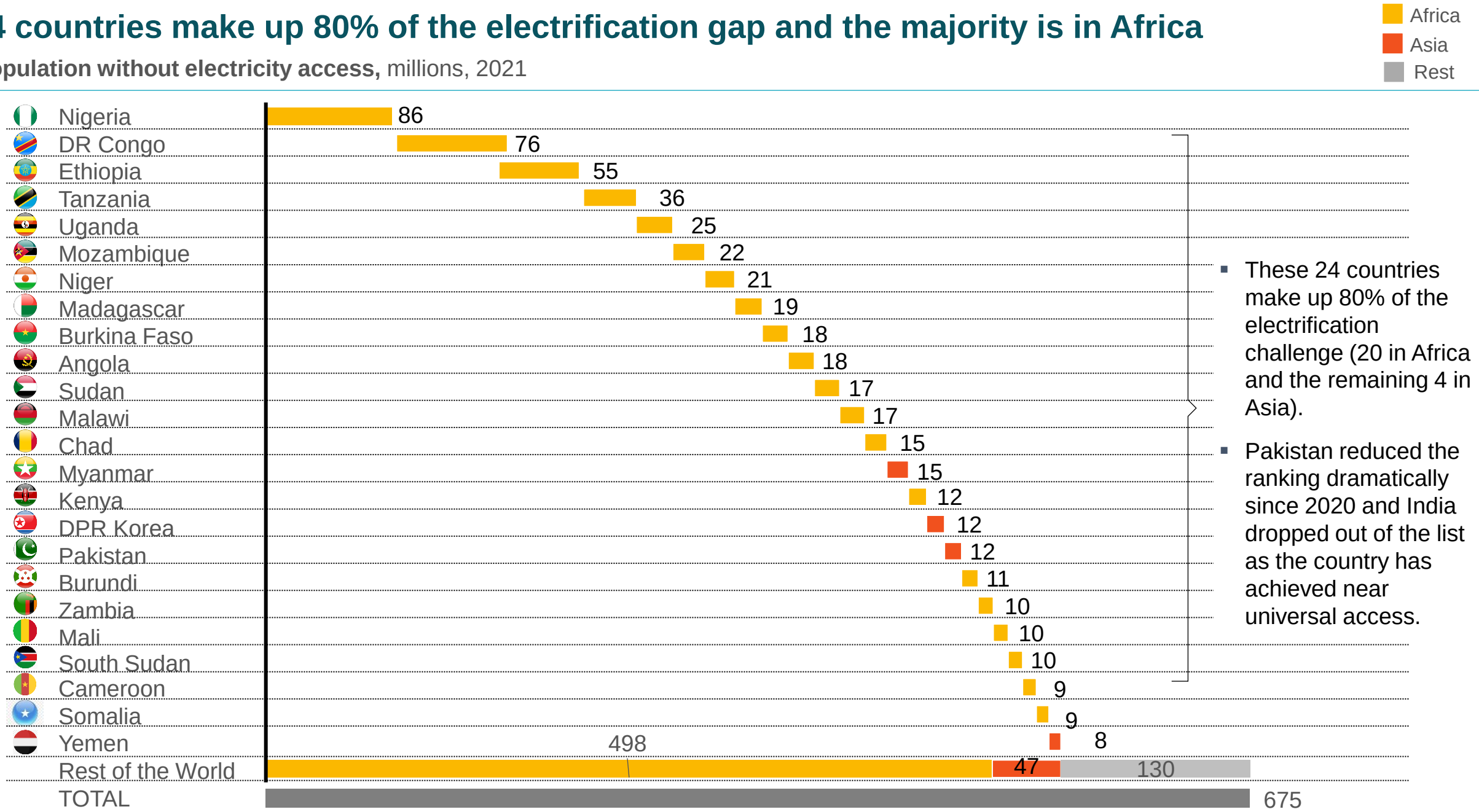


1 Electricity access is defined as a household being connected to an electricity supply at Tier 1 and above

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

24 countries make up 80% of the electrification gap and the majority is in Africa

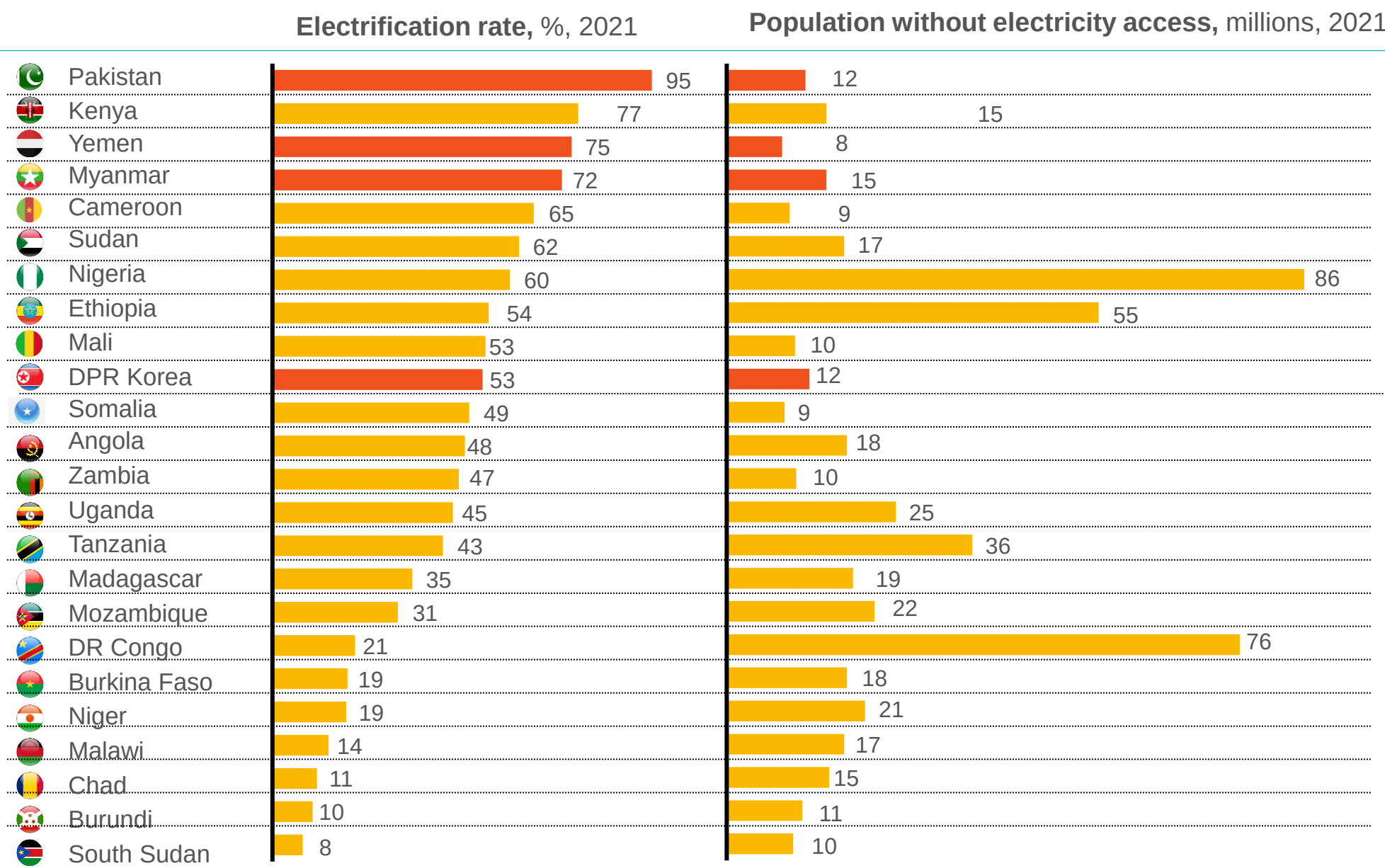
Population without electricity access, millions, 2021



- These 24 countries make up 80% of the electrification challenge (20 in Africa and the remaining 4 in Asia).
- Pakistan reduced the ranking dramatically since 2020 and India dropped out of the list as the country has achieved near universal access.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Asian countries have higher electrification rates than African countries



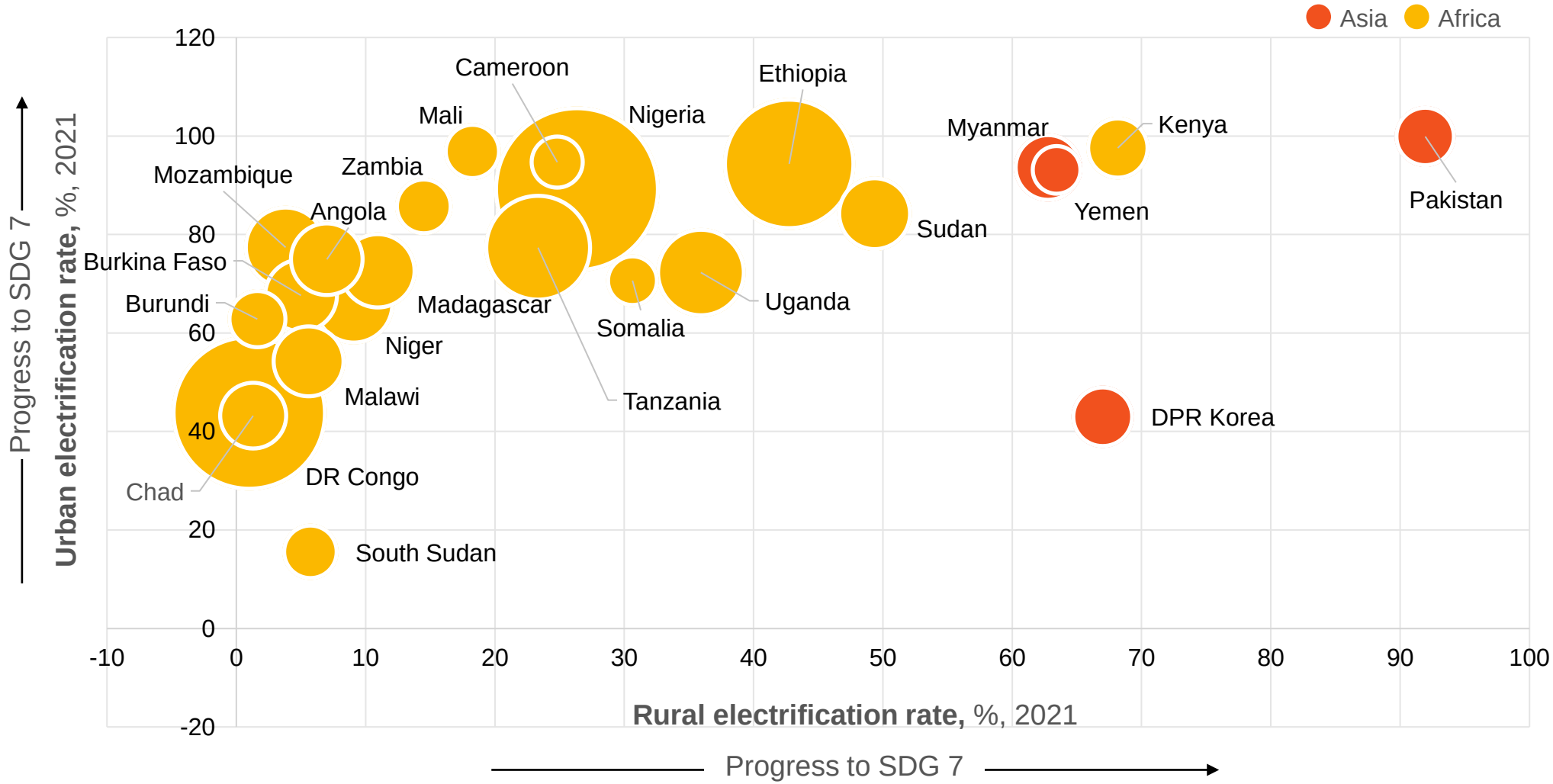
- The access rates of Somalia and Niger slightly decreased.
- In 14 out of 19 African countries in the top 24, >50% of the population is unelectrified. Nigeria has the largest unelectrified population, followed by DR Congo.
- Asia has significantly higher electrification rates, and the recent progress reduced unelectrified population greatly. India and Bangladesh are no longer on the list and the unelectrified population in Pakistan decreased from 54 million to 12 million in one year.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Both Asia and Africa needs strong rural push, while most African countries also needs urban electrification progress including last-mile schemes.

Rural vs Urban electrification rates (top 24 countries), 2021

Bubble size = Total unelectrified population in million



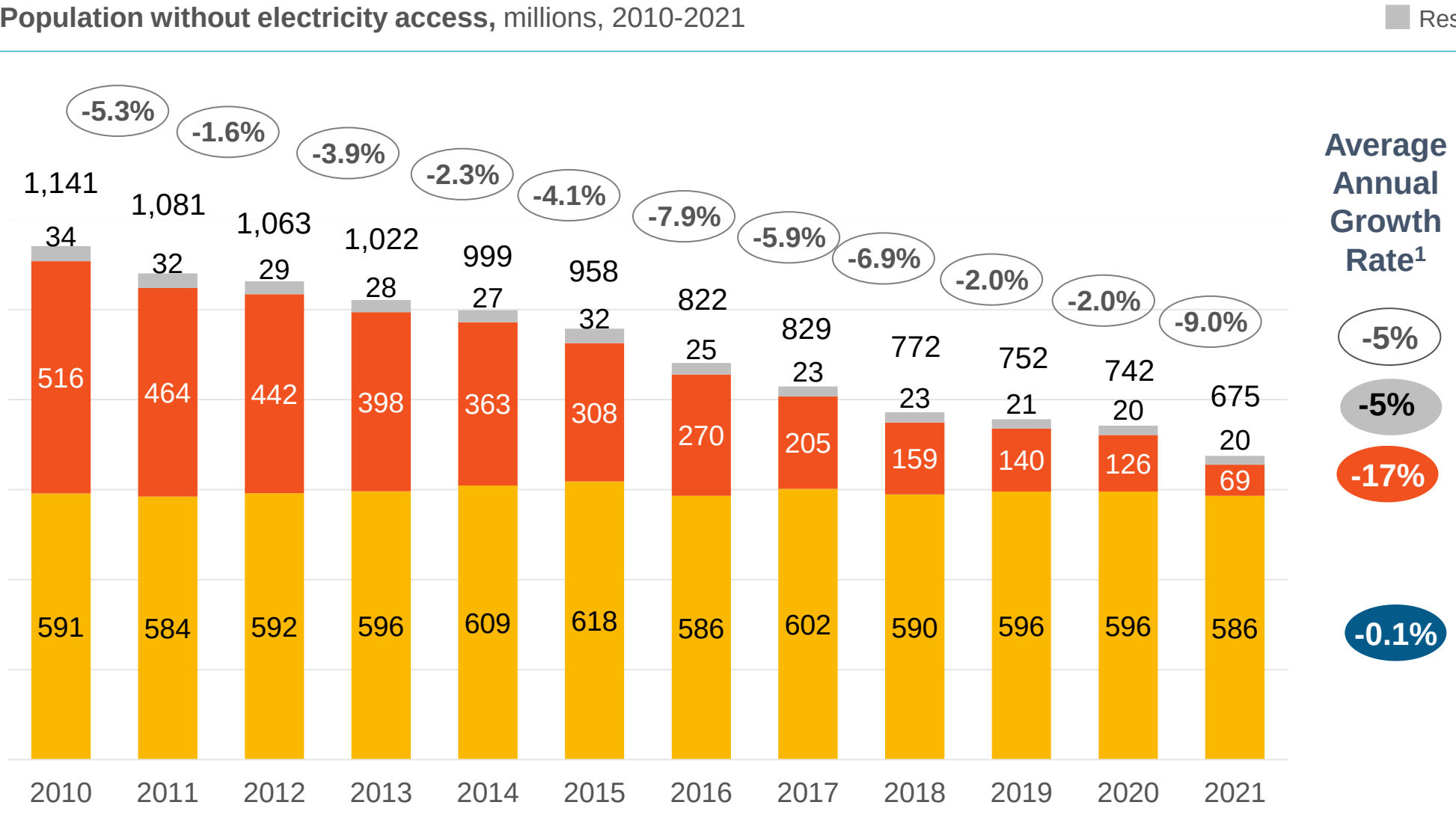
- Asian countries typically have close to 100% urban electrification rates and high rural electrification rates, except DPR Korea. Last mile rural electrification is the key for these countries.
- Sub-Saharan Africa has 81% urban electrification rate, but rural electrification rates of just over 29%. A combination of the last mile push in urban areas and stronger rollout of large-scale rural electrification schemes are required for all countries.

NOTE: Rural access rates of Angola and Burkina Faso for 2020 and both urban and rural rates of DPR Korea were not available from the 2023 database. The rate used for Angola was 2018 rural access rate. The last available Burkina Faso's rural rate was 5% in 2014 and this rate was used in the figure. Both urban and rural access rates used for DPR Korea were the 2020 access rates.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Total number of unelectrified people has declined from 1,141 million in 2010 to ~675 million in 2021. Asia's significant progress contrasts Africa's little progress

Population without electricity access, millions, 2010-2021



Average Annual Growth Rate[1]

-5%

-5%

-17%

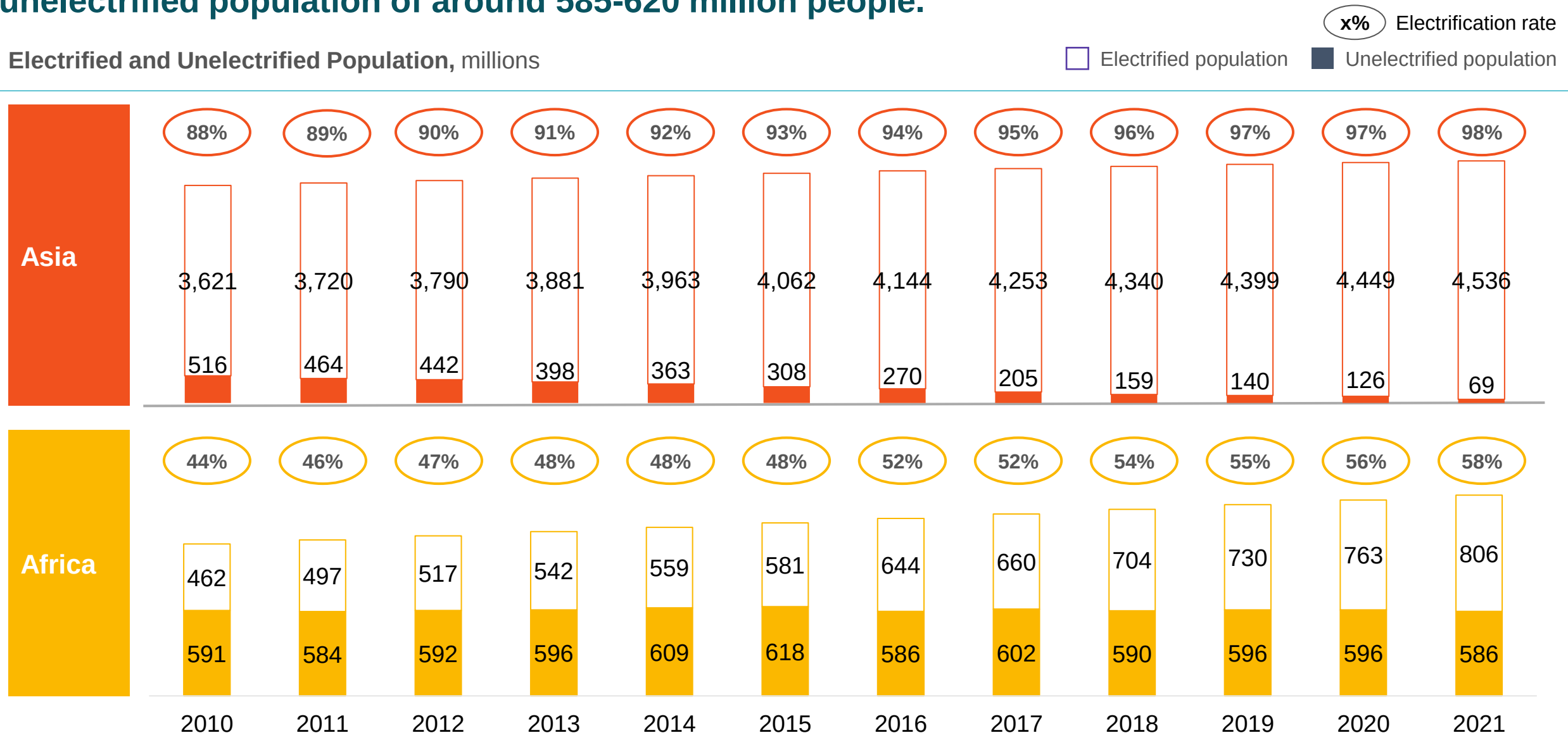
-0.1%

- The number of unelectrified people in the world decreased by ~466 million between 2010 and 2021.
- This was mainly driven by significant gains in Asia.
- 2021 saw the strongest improvement since 2010 which was mainly made in Asia.
- Compared to the Asia's strong progress, Africa saw the minimum progress.
- The pace of annual electrification progress rate slowed down in the last years of the 2010s but significantly increased from 2020 to 2021.

1 2010 – 2021 Compound annual growth rate = the average annual growth rate
2 The World Bank .ESMAP historical data up to 2020 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Africa's electrification rate has not caught up with population growth, resulting in steady unelectrified population of around 585-620 million people.



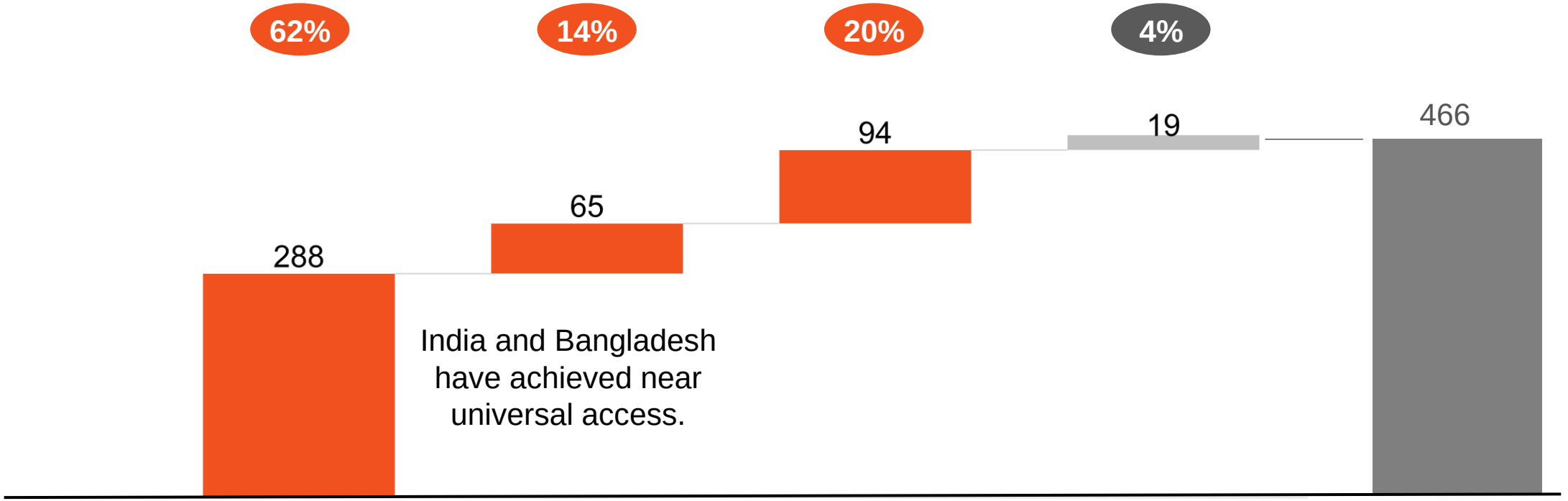
NOTE: The World Bank .ESMAP historical data up to 202 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; World Bank Open Data – Total Population downloaded on June 21nd 2023

India, Bangladesh and the rest of Asia, which account for most of the improvement since 2010, show strong cases for focused efforts to achieve universal access in a decade

Reduction in unelectrified population between 2010 and 2021, millions

x% Share of total reduction



	India	Bangradesh	Rest of Asia	Rest of the World	TOTAL
Access rate change (2010-2021)	76% → 100%	55% → 99%			
Average Annual Improvement Rate (20102021)	-30%	-29%	-8%	-0.3%	

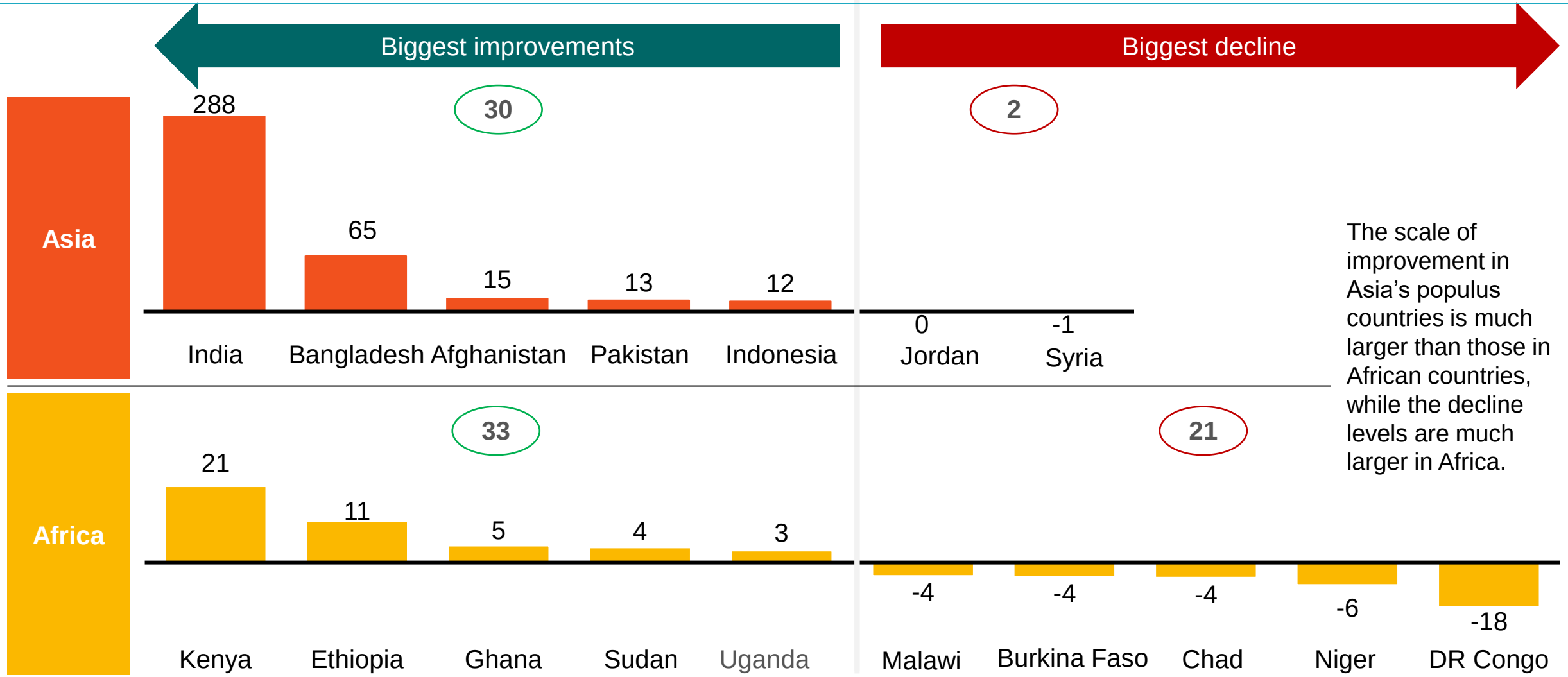
NOTE:
These figures represent the absolute change in the number of unelectrified people between 2010 and 2021 and does not account for changes in the population due to birth rates, human migration etc.
The World Bank .ESMAP historical data up to 2020 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year
DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Success in populous Asian countries with focused efforts could be good examples for African countries with growing population

Reduction in unelectrified population between 2010 and 2021, millions

x Number of countries with improvements

x Number of countries with decline



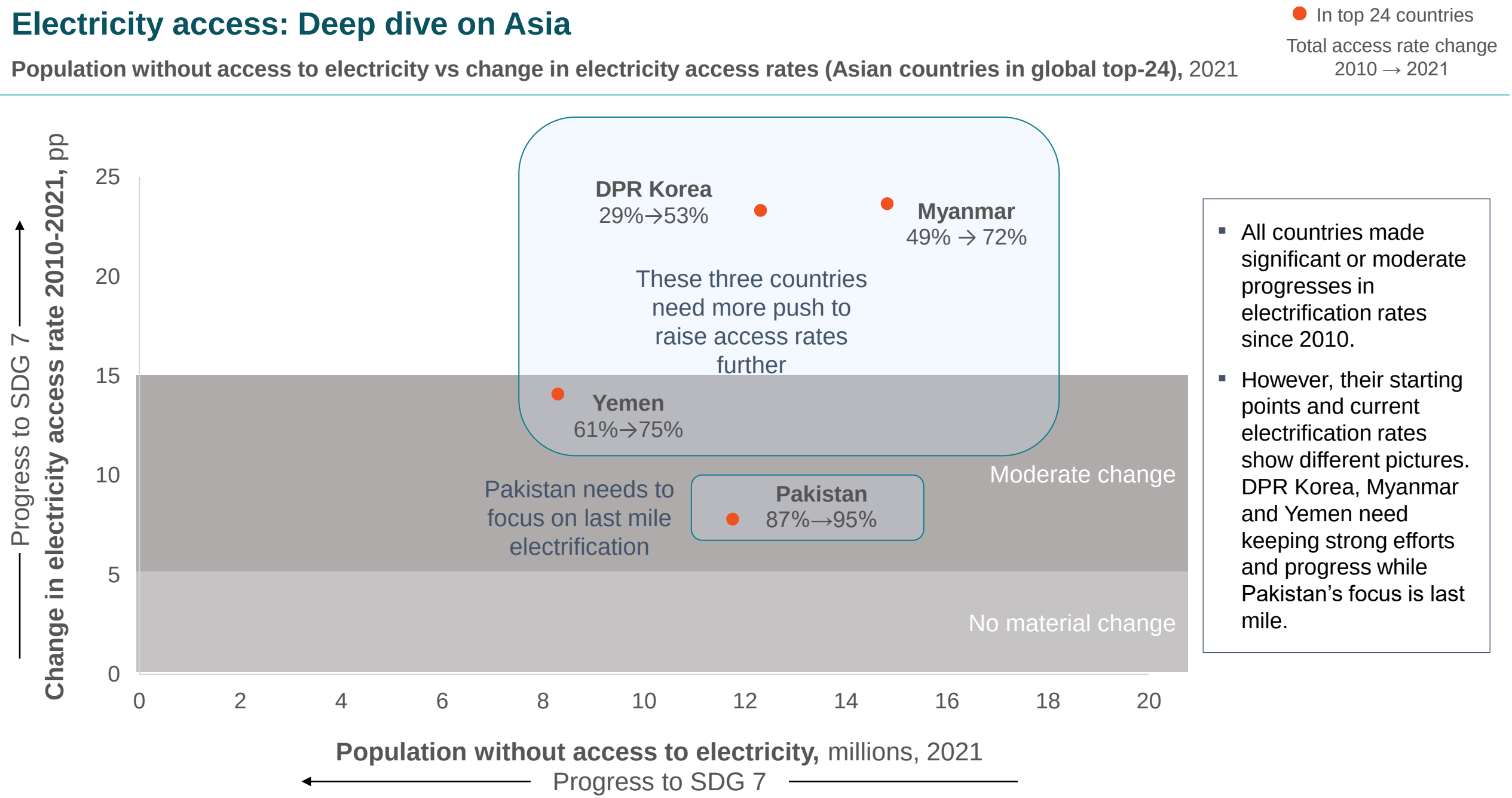
The scale of improvement in Asia's populus countries is much larger than those in African countries, while the decline levels are much larger in Africa.

NOTE: These figures represent the absolute change in the number of unelectrified people between 2010 and 2021 and does not account for changes in the population due to birth rates, human migration etc.
The World Bank .ESMAP historical data up to 2020 was also updated with the 2023 dataset. This creates several inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Electricity access: Deep dive on Asia

Population without access to electricity vs change in electricity access rates (Asian countries in global top-24), 2021

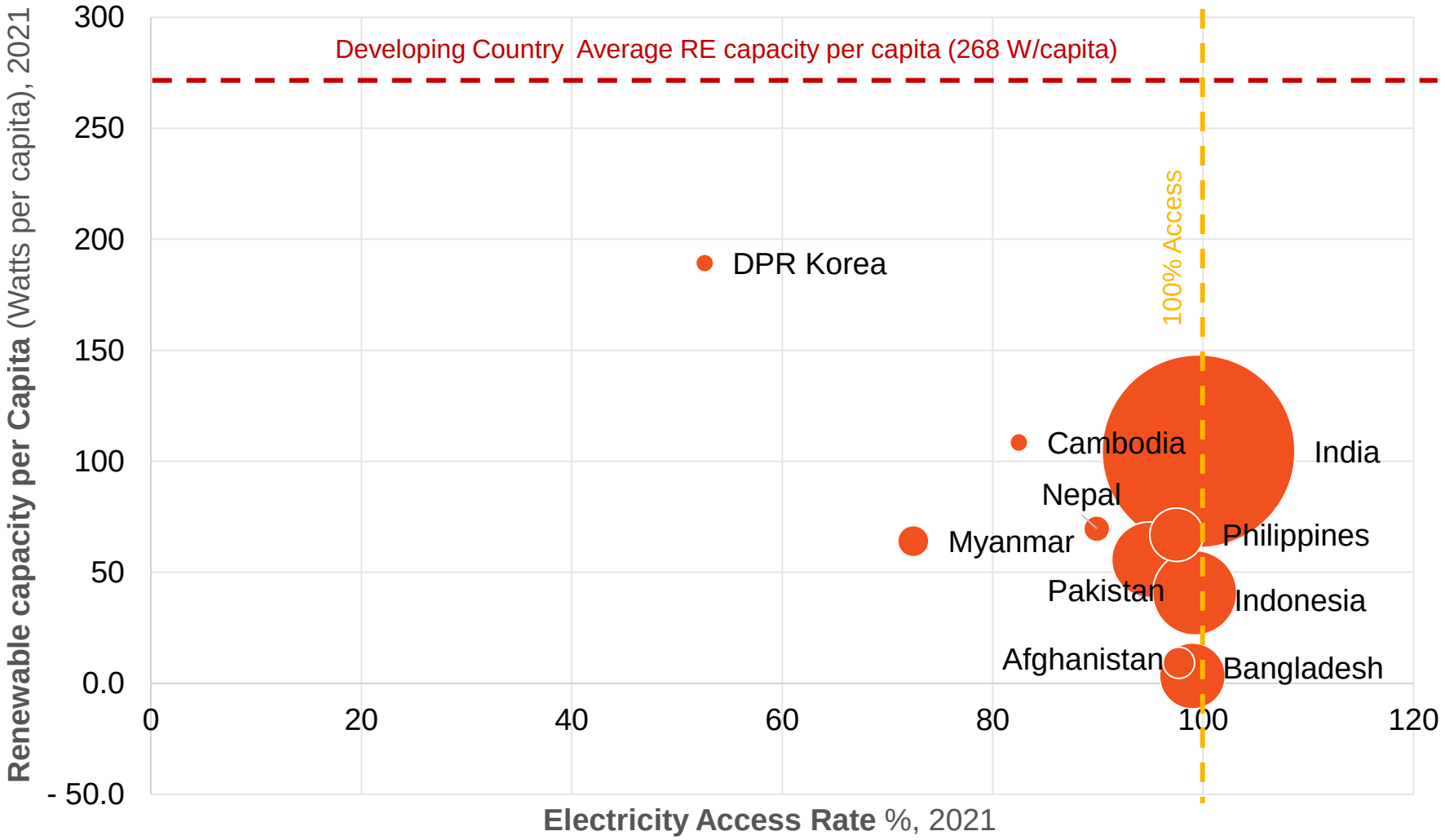


- All countries made significant or moderate progresses in electrification rates since 2010.
- However, their starting points and current electrification rates show different pictures. DPR Korea, Myanmar and Yemen need keeping strong efforts and progress while Pakistan's focus is last mile.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Top 10 countries with electrified population increase since 2010 in Asia have low renewable capacity per capita, indicating opportunity to upgrade modern energy services with renewables

Electrified Population, Electricity Access Rate, and Renewable capacity per capita by country in Asia 2021



Bubble size = Total electrified population in million

- Many Asian countries with the most electrified population increase since 2010 now have near universal access, except Cambodia, Nepal, Myanmar and DPR Korea.
- However, they show much lower renewable capacity per capita than the developing country average (268 W/capita), indicating their newly gained access could be low Tier access such as Tier 1, 2 or lower Tier 3.
- To provide Modern Energy Service with clean energy for all, these Asian countries can turn their focus on increasing supply with renewable energy, creating win-win situation of higher energy consumption with clean energy provision.

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The World Bank .ESMAP historical data up to 2020 was also updated with the 2023 dataset. This creates several inconsistencies with the analysis in the previous year

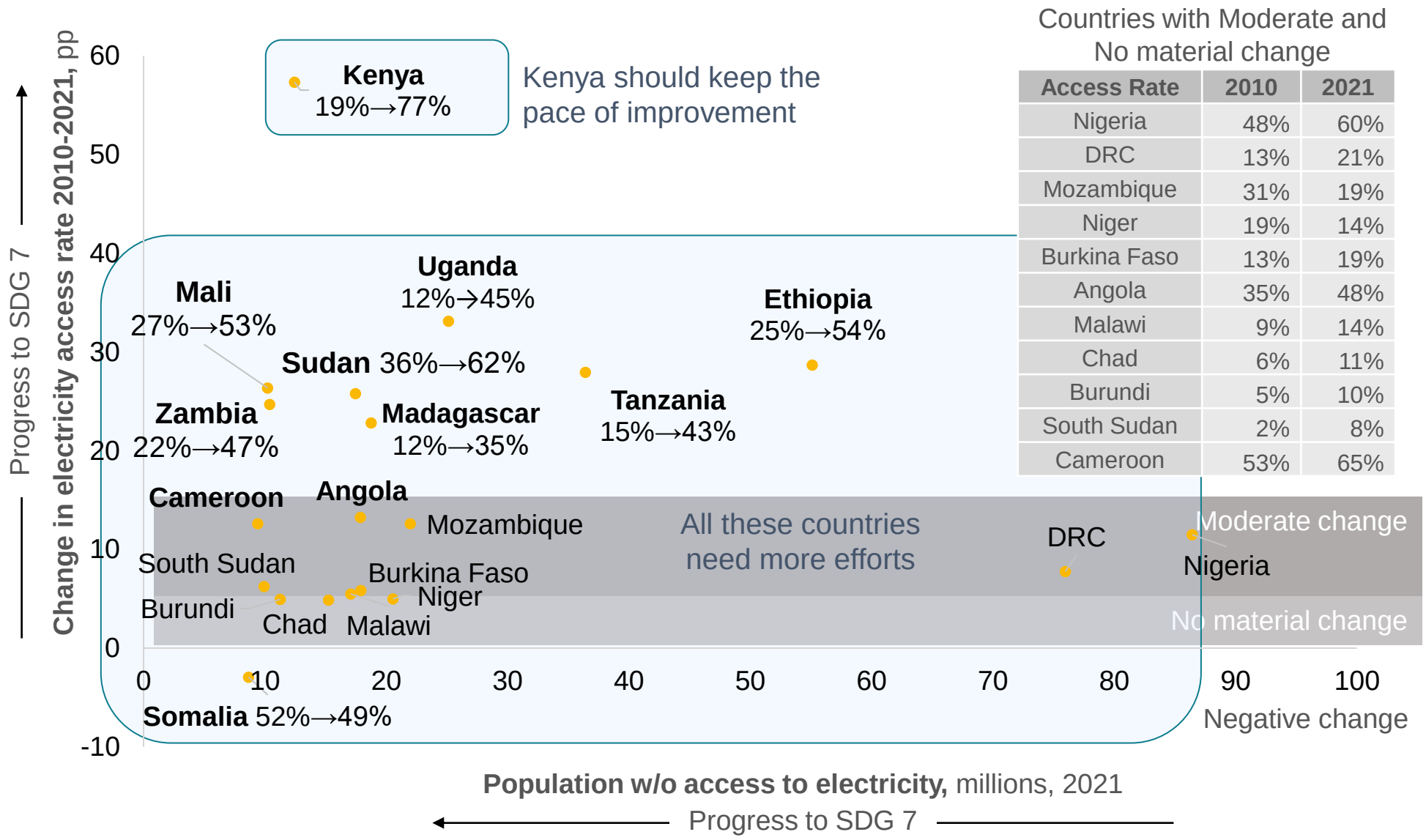
DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Electricity access: Deep dive on Africa

Population without access to electricity vs change in electricity access rates (African countries in global top-24), 2021

● In top 24 countries

Total access rate change 2010 → 2021



Countries with Moderate and No material change

Access Rate	2010	2021
Nigeria	48%	60%
DRC	13%	21%
Mozambique	31%	19%
Niger	19%	14%
Burkina Faso	13%	19%
Angola	35%	48%
Malawi	9%	14%
Chad	6%	11%
Burundi	5%	10%
South Sudan	2%	8%
Cameroon	53%	65%

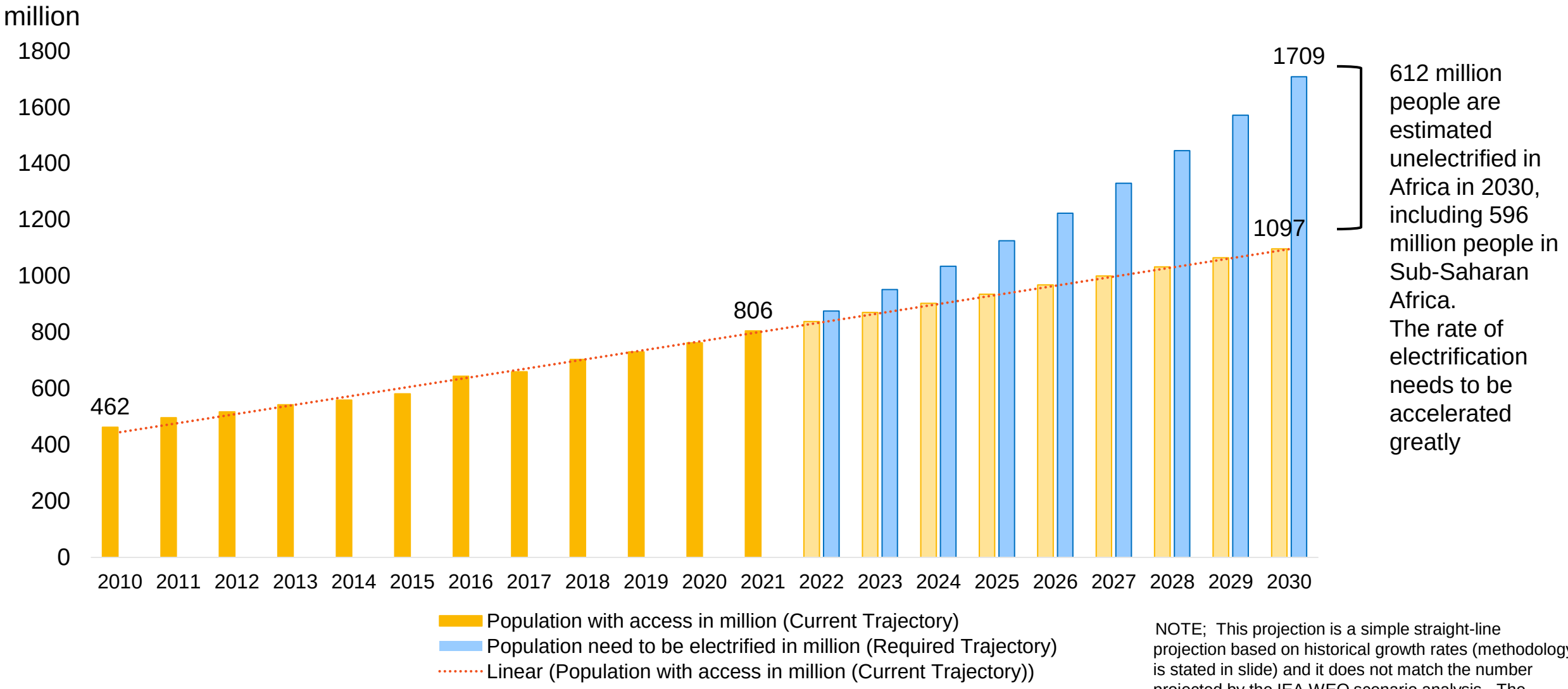
- Only 8 African countries in top 24 list made above 15% improvement since 2010. While Kenya's progress is outstanding, 6 countries still have total access rates below 60%.
- Somalia slipped into negative improvement territory.
- Chad, Burundi and Niger shows no material change, and 7 countries with less than 10% of improvement rates. Countries in the table also show below 50% access rates, except Nigeria and Cameroon.
- All countries need clear, tailor-made strategy and its implementation.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

With the current trajectory, Africa still has 612 million people unelectrified in 2030

Current trend trajectory vs required trajectory to achieve electricity access in Africa

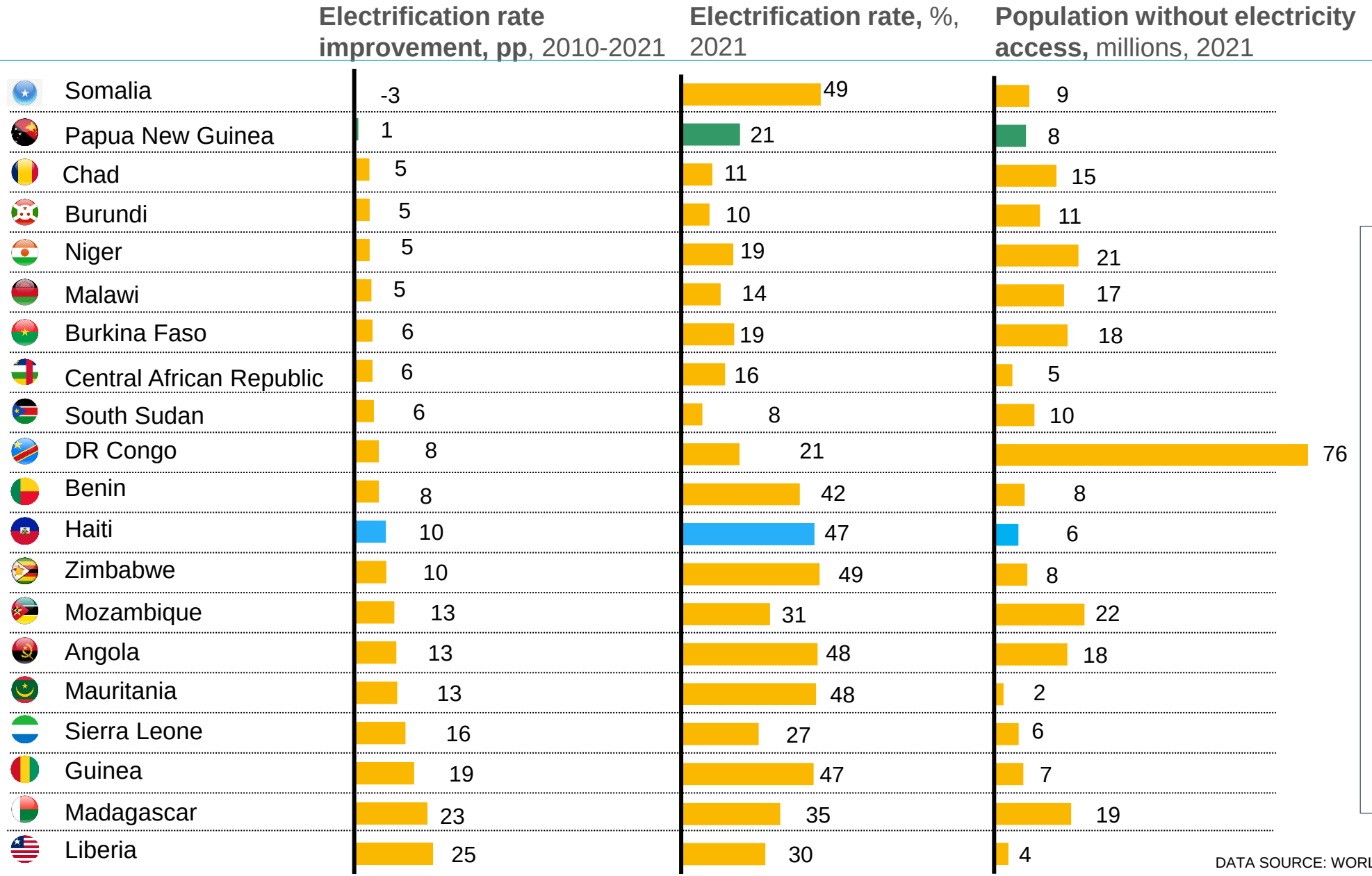
☐ Forecast shown lighter shade



DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; : World Bank Population estimate downloaded on June 22 2023; SEforALL analysis

NOTE; This projection is a simple straight-line projection based on historical growth rates (methodology is stated in slide) and it does not match the number projected by the IEA WEO scenario analysis. The differences are shown on slide 27 and 28.

Countries with slow improvement and low electrification rate require stronger focus, regardless the number of population without electricity access

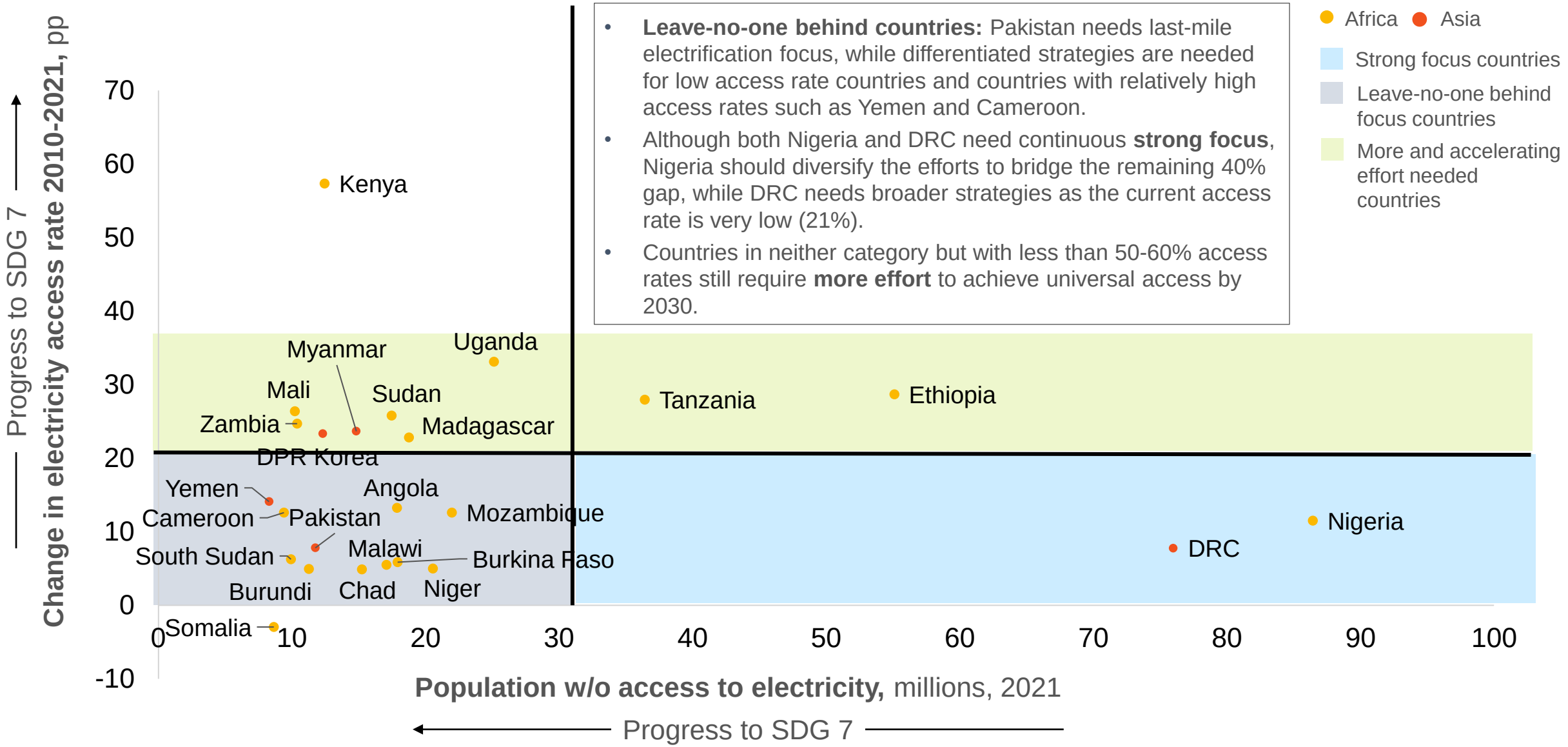


- Top 20 countries with the lowest progress rates and less than 50% of electrification rates are all in Sub-Saharan Africa, except Haiti and Papua New Guinea.
- Of these, 11 countries show less than 10% progress in 11 years. Somalia even decreased the access rate since 2010.
- The progress of these countries will likely remain weak without stronger and renewed support.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Countries with large unelectrified populations have high impact potential, but tailored strategies are needed for all slow progress and low access rate countries

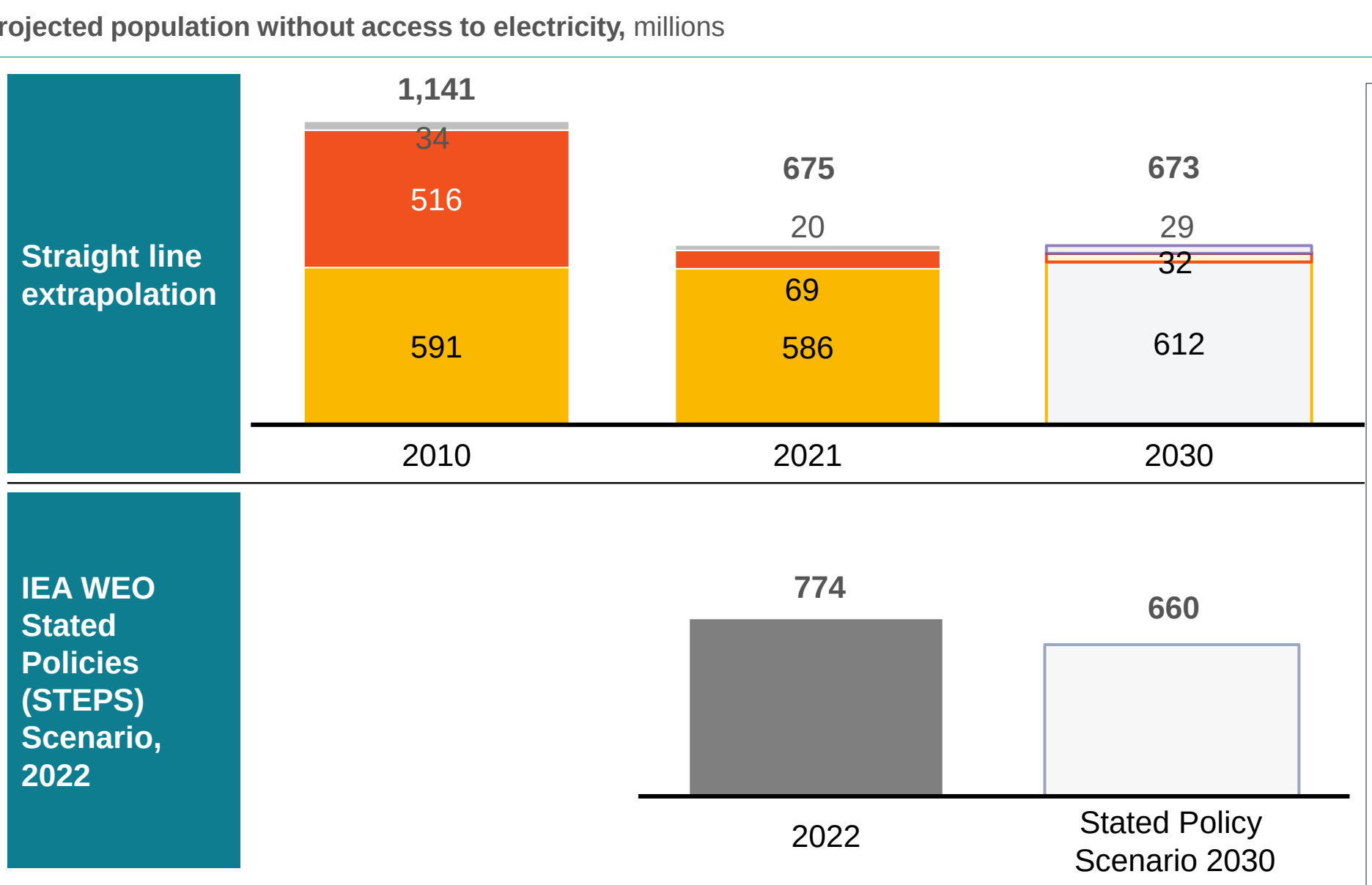
Population without access to electricity vs change in electricity access rates (Top 24 countries), 2021



DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Projections show that we are not on track to reach universal electricity access by 2030

Projected population without access to electricity, millions



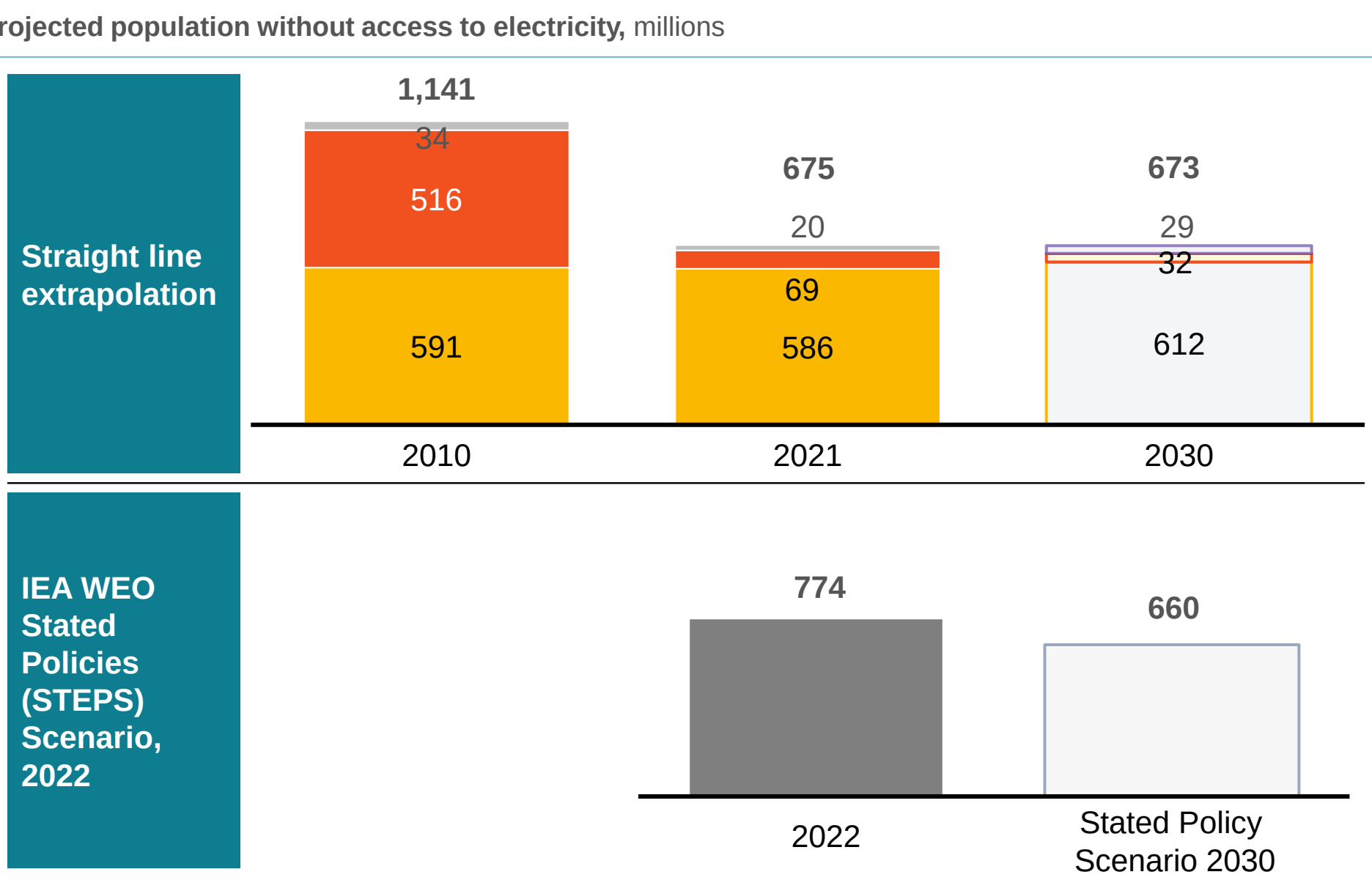
- The straight-line projection with the current trajectory indicates that Africa will increase unelectrified population by 2030, offsetting the gains in Asia.
- According to the IEA, the number of people without electricity access is projected to reach 660 million by 2030 (about 560 million in sub-Saharan Africa and 70 million in developing Asia), up by around 6 percentage points from 2021.
- Reaching universal access to electricity by 2030 require almost 110 million people to gain access every year from 2022, and over 30 countries in sub-Saharan Africa to connect more than 5% of their population every year.

NOTE: The World Bank .ESMAP historical data up to 2019 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; IEA World Energy Outlook 2022; Tracking SDG7 Progress Report 2023

Projections show that we are not on track to reach universal electricity access by 2030

Projected population without access to electricity, millions



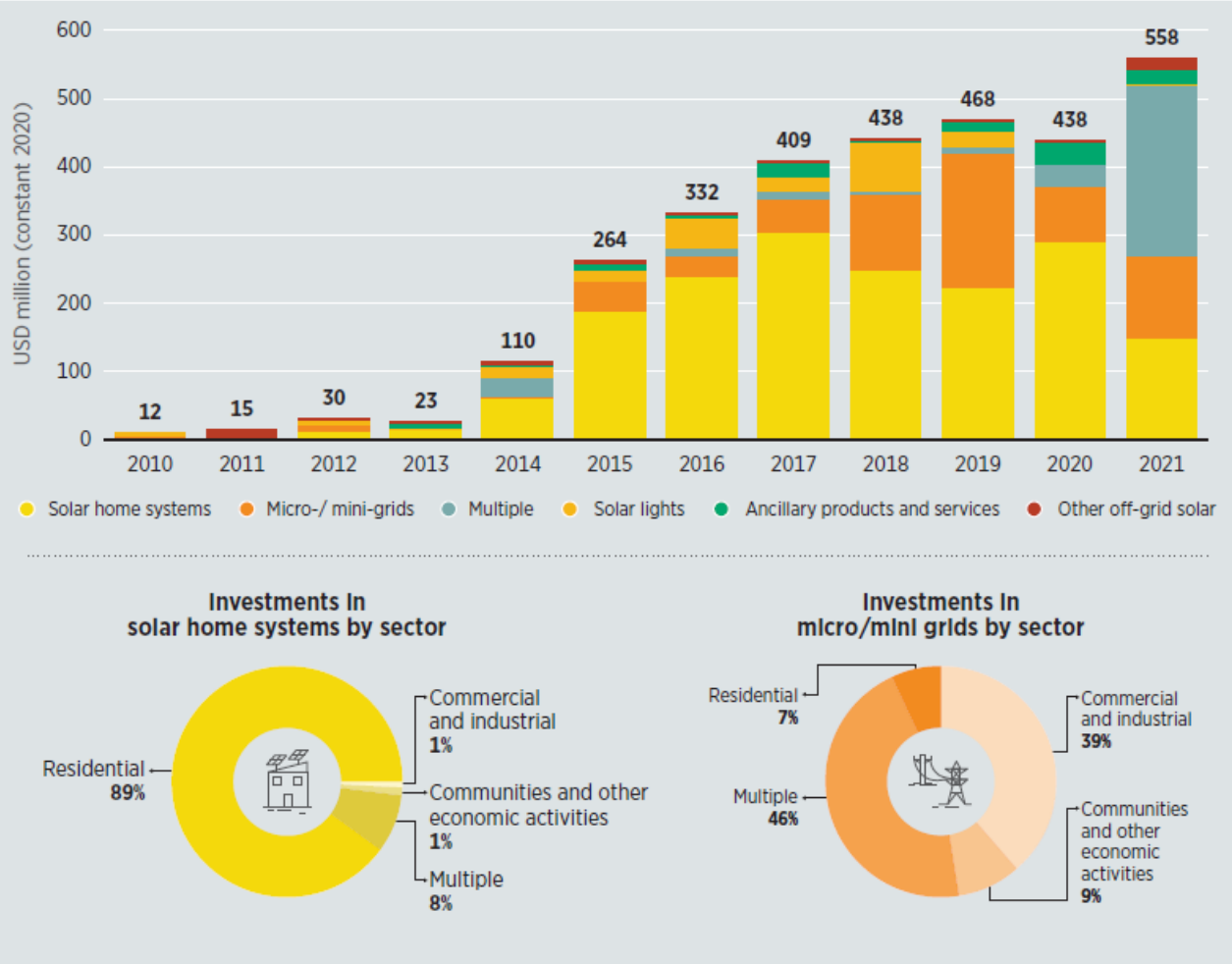
- With the current rates of electrification,
  - 27 additional countries globally will achieve universal access by 2030, including 10 Asian and 2 African countries (lists in appendix)
  - 9 Asian countries would still have unelectrified populations (list in appendix) in 2030
  - 17 African countries will still have significant unelectrified populations of ~10 million or more (list in appendix) in 2030

NOTE: The World Bank .ESMAP historical data up to 2019 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; IEA World Energy Outlook 2022; Tracking SDG7 Progress Report 2023

Tracked investment in the off-grid and mini-grid sector increased significantly in 2021, after suffering substantial setback in 2020.

Figure 3.5 Annual investment in off-grid renewable energy, by off-grid product, and energy use, 2010-2021



Based on: Wood Mackenzie (2022a).

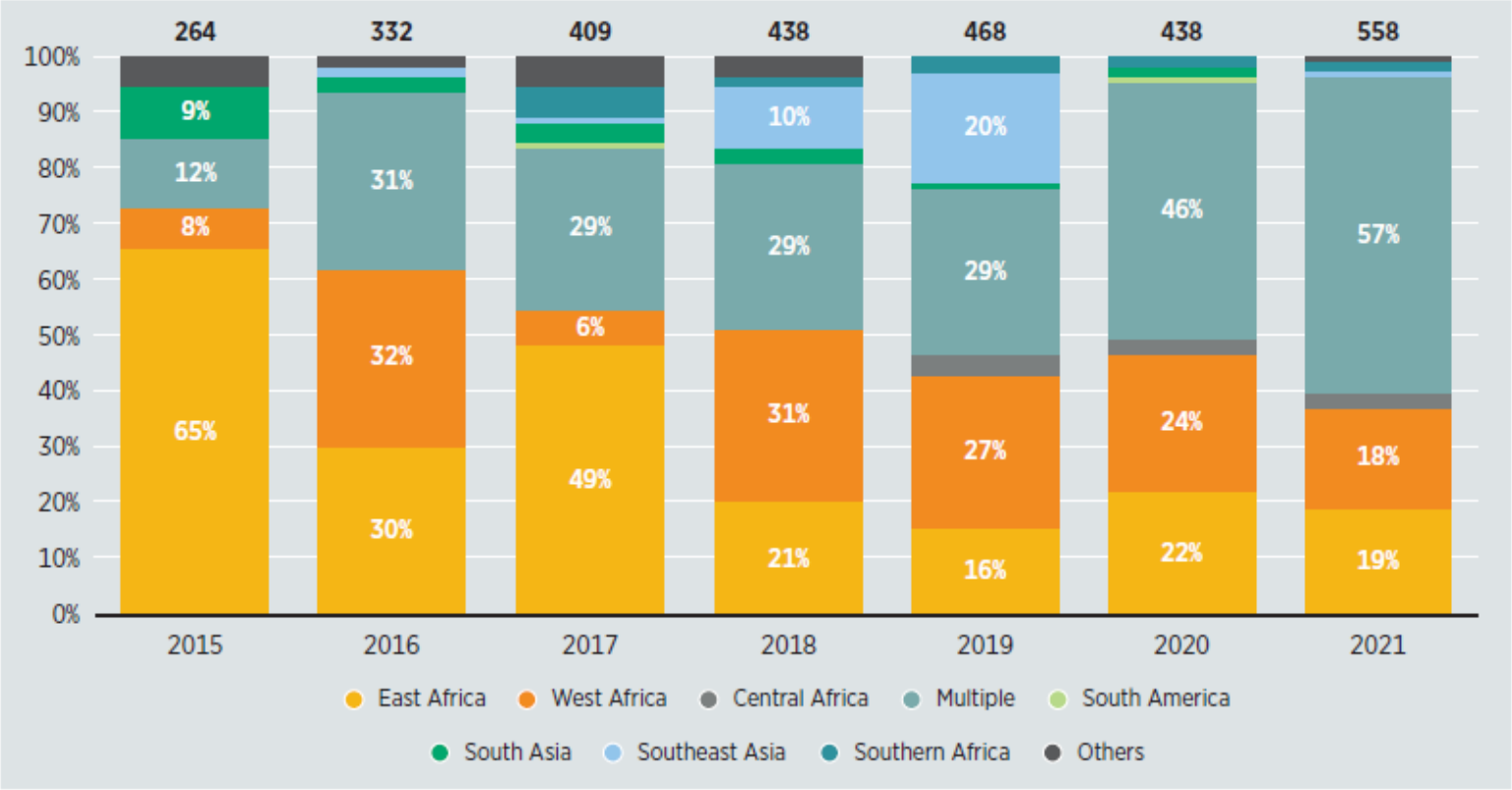
Between 2010 and 2021,

- Solar photovoltaic (PV) products continued to dominate the off-grid space, attracting 92% of overall investments.
- Solar Home Systems received USD 1.74 billion, Almost 90% of investment in SHSs has gone to residential uses.
- Mini-grid investments were USD 648 million. large share of these investments are going to either stand-alone C&I applications (39% of the total) or multiple applications which include C&I customers (46% of the total).
- Solar lights received USD 224 million and multiple application finance amounted USD 343 million.

Source: IRENA and CPI (2023) Global Landscape of Renewable Energy Finance

Sub-Saharan Africa has been the strongest destination of off—grid electrification finance, particularity East Africa and West Africa.

Figure 3.6 Shares of annual investment in off-grid renewables by subregion of destination, 2015-2021



Based on: Wood Mackenzie (2022a).

Source: IRENA and CPI (2023) Global Landscape of Renewable Energy Finance

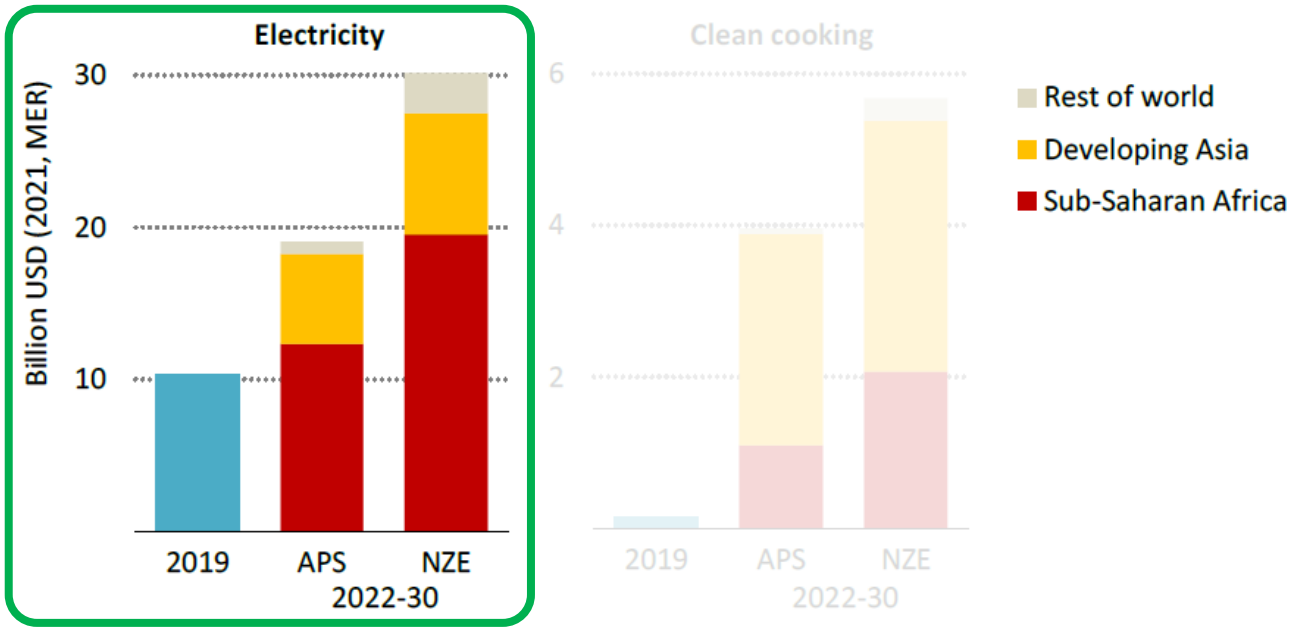
Between 2010 and 2021,

- Off-grid renewables sector attracted more than USD 3 billion in total.
- Sub-Saharan Africa attracted at least USD 2.2 billion (equivalent to 71%) of the overall off-grid renewable investments. Particularly, East Africa (USD 952 million) and West Africa (USD 621 million) show strong investment trends.
- In terms of instruments, the amount of debt finance was USD 1.4 billion, while equity amounted USD 1.5 billion.

Average annual investment of USD 30 billion is needed between 2022 and 2030 for universal electricity access

Average annual investment for electricity access under IEA' Net Zero Emissions by 2050 Scenario, 2022-2030

Figure 5.17 ▷ **Annual investments for access to electricity and clean cooking by scenario relative to tracked 2019 investments**



IEA. CC BY 4.0.

Current investment in access to electricity is less than 30% of what is needed to achieve universal access by 2030, while investment in clean cooking lags even further behind

Notes: MER = market exchange rate. Sub-Saharan Africa excludes South Africa.

Sources: IEA analysis; SEforALL and CPI (2021).

- Under the IEA's Net Zero Emissions by 2050 (NZE) Scenario, which achieves universal access in both electricity and clean cooking by 2030, the annual necessary investment for electricity access is **around USD 30 billion.**
  - ✓ Approximately USD 20 billion is needed to be invested in Sub-Saharan Africa.

Source: IEA World Energy Outlook, 2022

Contents

SDG 7.1.2 Clean Cooking Access

There are currently 2.3 billion people without access to clean fuels and technologies for cooking with 52% of them in Asia and 40% in Africa.

- 75% of the people without access live in just 22 countries with 10 of them in Asia and the remaining 11 in Africa.
  - The Asian countries in the top 22 mostly have higher access rates than their African counterparts. However, their large population size leaves a very significant room for improvement
  - Only 4 of the 11 African countries (Nigeria, Kenya, Ghana and Comoros) that are part of the top 75% challenge countries have access rates over 10%
- Russia has decreased access rate significantly (from 96% to 73%) since 2010 with a huge access deficit of 73 million people.

The number of people without access has only slightly improved from 3.0 billion in 2010 to 2.3 billion in 2021. The global average reduction rate of the population without clean cooking access since 2010 is just 2.4%

- Asia's progress is stronger than other regions with annual improvement rate of 5.0% since 2010. The population without access has declined from 2.1 billion to 1.2 billion.
- Meanwhile, the number of population without clean cooking access in Africa has increased by 150 million (from ~770 million to ~920 million) since 2010, with annual average growth rate of 1.6%

Looking forward, based on the current trends, we are not on track to achieve SDG 7.1.2 by 2030

- A current trend projection and the IEA's scenario analysis show that we are **not on track** to achieve universal access to clean fuels and technologies for cooking by 2030, as between 1.8 and 1.9 billion people expected to remain without clean cooking access
- Countries with still large populations without access, such as India, China, Nigeria, Bangladesh, Pakistan and Ethiopia, should be a priority for stronger actions. Countries with very low access rates, regardless population size, and countries with low improvement rates should be also a focused countries to create a strong momentum to accelerate the rate of improvement.
- Much larger public finance is necessary along with strategic planning, financial / fiscal incentives, and strong political will to remove barriers and create the good enabling environment for faster and larger-scale clean cooking roll-outs
- Countries with large population without electricity and clean cooking access overlap. Electric cooking could be an option for solving both access challenges.

Methodology

Description

Data Source

- The following data was gathered from WORLD BANK / ESMAP's Tracking SDG 7 database (download link)
  - Total access rate to clean cooking per country
- The following data was gathered from WORLD BANK open data source
  - Total population per country between 2010-2021
  - Total population estimates per country from 2022 to 2030

Projections

- Interpolation calculations between 2010 and 2021 were made via the following process
  - Each country's number of people without access to clean cooking was calculated with Total access rate to clean cooking per country and total population data per country in each year between 2010 and 2020.
  - For countries which lack the data of total access rate to clean cooking in years 2011, 2012, 2013, 2014, 2016, 2017, 2018, 2019, and 2020, the rate of change of the number of people without access to clean cooking (Compound Annual Growth Rate, CAGR) between 2010 and 2015 and between 2015 and 2021 were calculated for each individual country
  - Each country's number of people without access to clean cooking in 2010 was projected forward for each year between 2010 and 2014 using the 2010-2015 calculated CAGR as the growth rate, and the same method was used for between 2015 and 2019 using the 2015-2020 CAGR and the number of people without access to clean cooking in 2021
  - The calculated data was then summed up according to each country's regional classification
- Straight line extrapolation projections toward 2030 were made via the following process
  - The average change made between 2015 and 2021 was calculated for Africa, Asia and the World
  - Each region's 2021 population without access to clean cooking was projected forwards to 2030 (by 9 years) by adding the calculated average change to the 2020 population 9 times
  - 0 was set as a minimum to prevent the unconnected population from being negative
  - Africa and Asia regions' projected population are subtracted from the World projection to obtain the remaining region's projection.
- IEA stated policy scenario was taken from the IEA's World Energy Outlook 2022 report

Definition of clean cooking access

Clean cooking access is defined as a household using clean fuels or improved technologies for cooking as defined by the WHO[1]

Clean fuels for cooking

Clean fuels recommended by WHO[1] are

- LPG
- Ethanol
- Biogas
- Solar cookers
- Electricity

Improved technologies for cooking

Emissions rates for improved technologies are defined by the WHO[1] and should be less than

- 0.23mg/min (unvented) and 0.8mg/min (vented) of $PM_{2.5}$[2]
- 0.16g/min (unvented) and 0.59g.min (vented) of CO

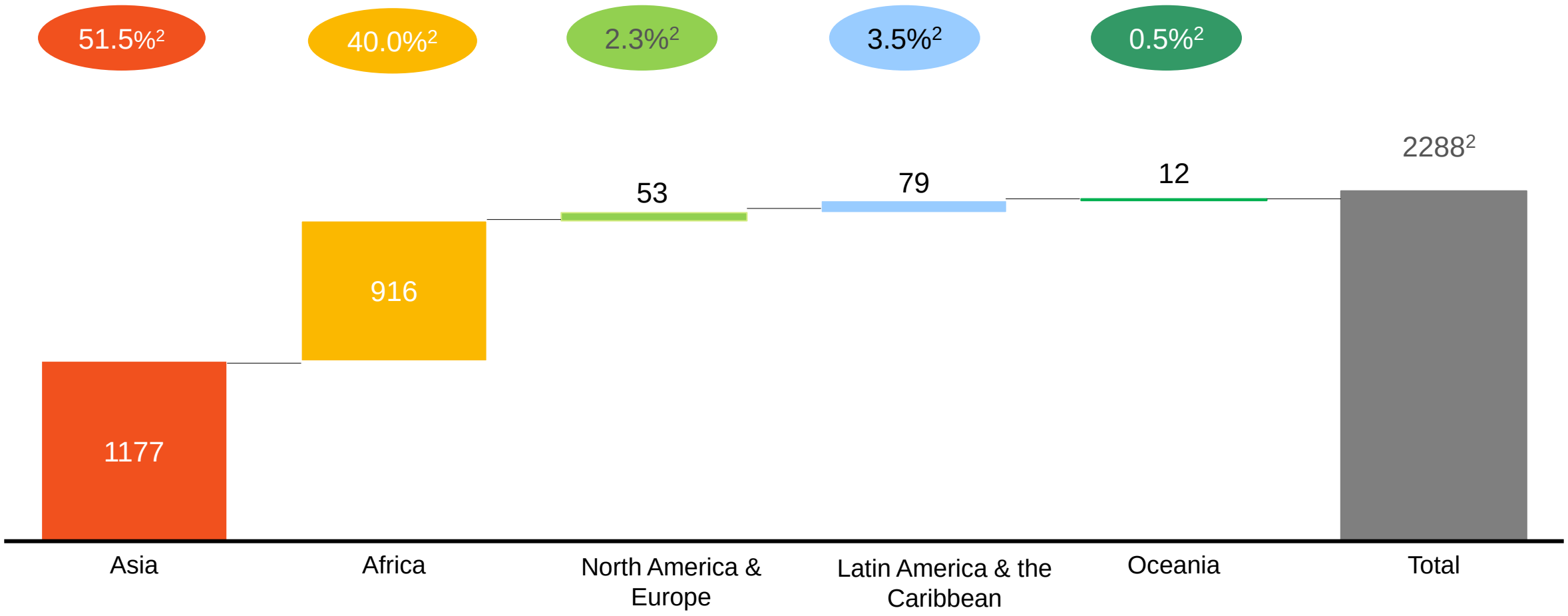
1 In the Normative guidance World Health Organization guidelines for indoor air quality: household fuel combustion
2 Atmospheric Particulate Matter with diameter less than 2.5 micrometers

SOURCE: Beyond Connections: Energy Access Redefined, ESMAP, 2015; WHO Guidelines for Indoor Air Quality, 2014

There are ~2.3 billion people in the world without access to clean fuels and technologies for cooking

Population without access to clean fuels and technologies for cooking[1], millions, 2021

(x) % of total



NOTES: 1 Clean cooking access is defined as a household using clean fuels or improved technologies for cooking as defined by the WHO

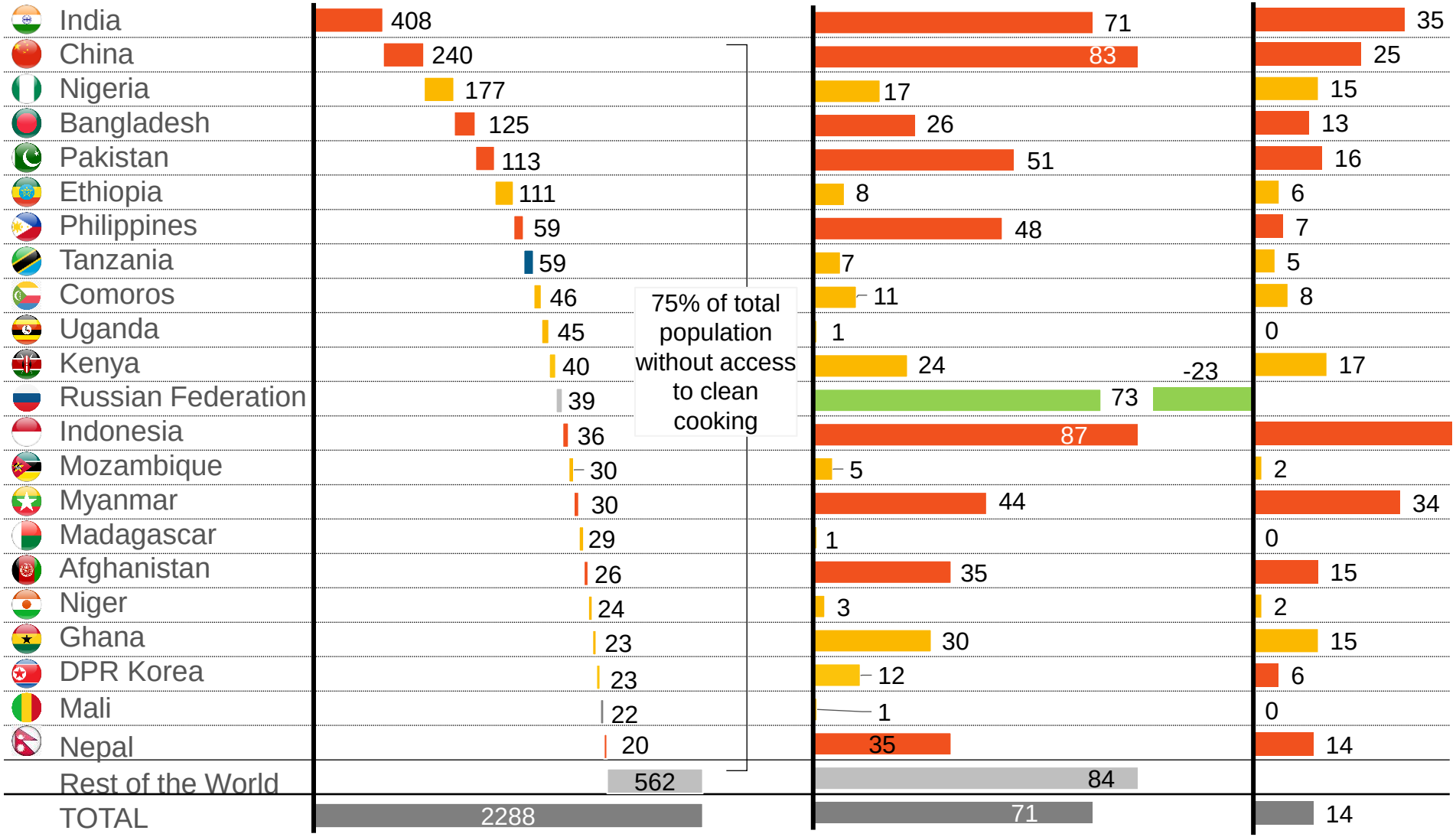
2 Due to lack of access rate data for various countries in the 2023 dataset as well as the possible total population data disparity, there is 51 million difference between the population reported by the 2023 Tracking SDG7 report on total world population without clean cooking access (2.3 billion people) in 2021 and the calculated population number by using the 2023 Tracking SDG7 dataset and the World Bank Total Population dataset updated on May 10, 2023. This analysis uses the total World Population without Clean Cooking Access from the 2023 Tracking SDG7 report, while the calculated population numbers are used for each country and each region. This creates the sum of the shares does not add up to 100% (it is 97.8% in total)

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023 and World Bank Total Population data 2023

22 countries that make up 75% of the access to clean cooking challenge are in Africa, Asia, and include Russia, which reduced access rate significantly since 2010

Africa Asia N. America & Europe

Population without access to clean cooking, millions, 2021 **Access rate,** %, 2021 **Access rate improvement, pp** %, 2010-2021

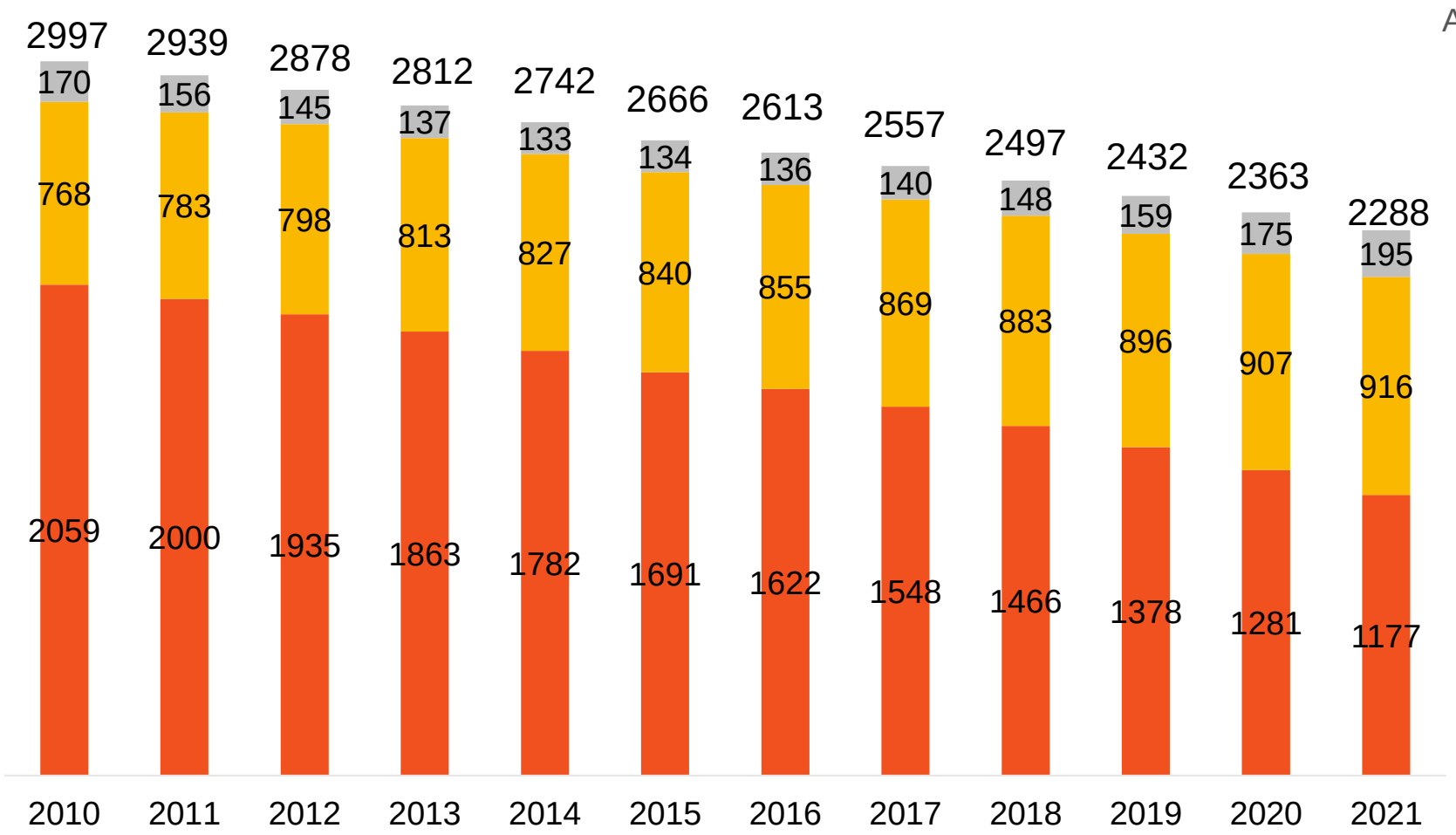


- 22 countries account for 75% of the clean cooking access gap with 10 in Asia and 11 in Africa.
  - **Russia has decreased access rate significantly (from 96% to 73%) in 11 years.**
  - 7 out of 11 African countries have access rates less than 10%
  - Although the Asian countries have higher access rates than their African counterparts, they still need significant improvements.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023 and World Bank Total Population data 2023

The number of people without access to clean fuels and technologies for cooking has declined slightly from 3.0 billion in 2010 to 2.2 billion in 2021

Population without access to clean fuels and technologies for cooking[1], millions, 2021



Average Annual Growth Rate[2]

- 2.4%
+1.2%
+1.6%
- 5.0%

- **Access to clean cooking has only progressed slowly** over the past decade
- While **Asia has shown 43% reduction of access deficit population**, the large population size of the region makes it still the largest population without clean cooking access.
- Meanwhile, the number of people **without access in Africa shows 20% increase since 2010.**

NOTE: The World Bank .ESMAP historical data up to 2020 was and the total population historical data were both updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

1 Some country data unavailable between 2011 and 2020 was interpolated; 2 Compound annual growth rate = the average annual growth rate

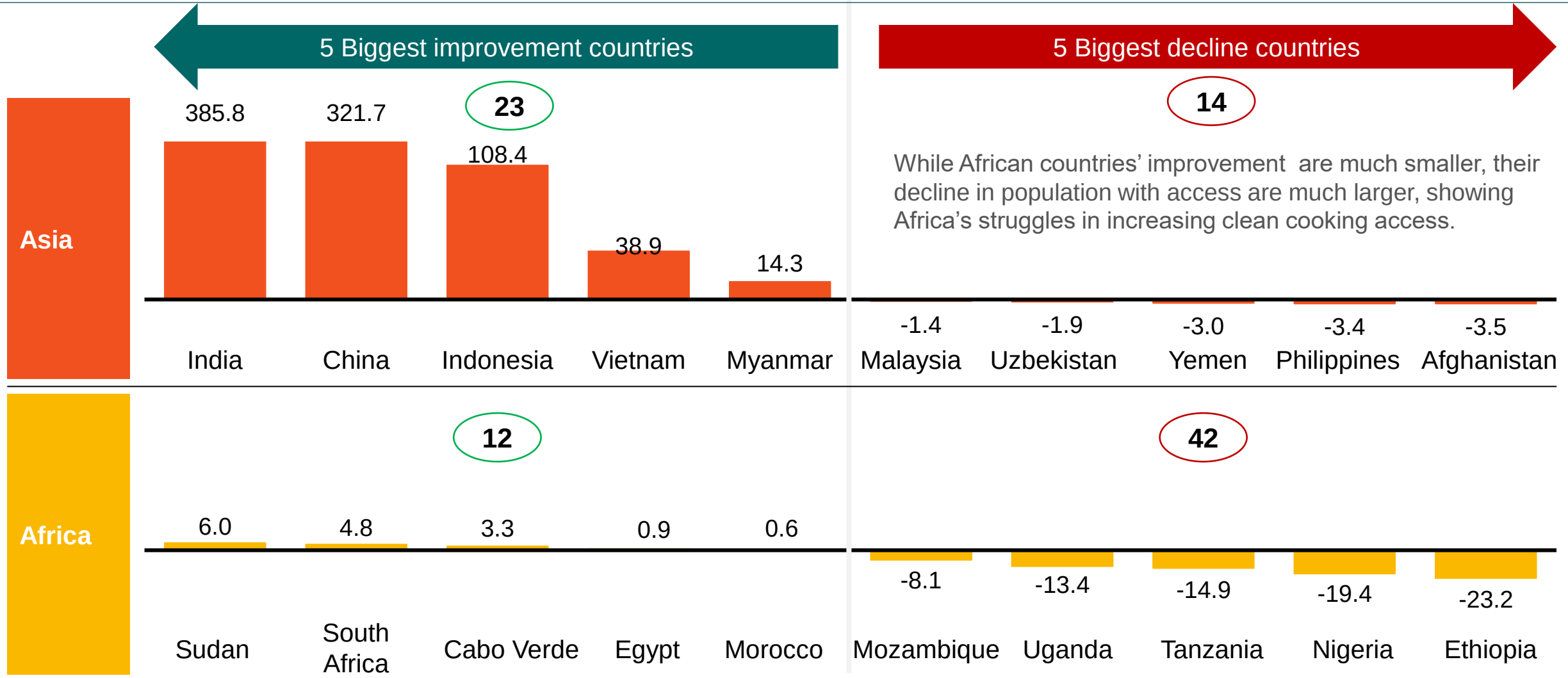
DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023 and World Bank Total Population data 2023

About 80% of African countries (42 out of 54 countries) increased the population without access between 2010 and 2021 while more than 60% of Asian countries reduced access deficit population

Reduction in population without access to clean cooking between 2010 and 2021, millions

x Number of countries with improvements

x Number of countries with decline



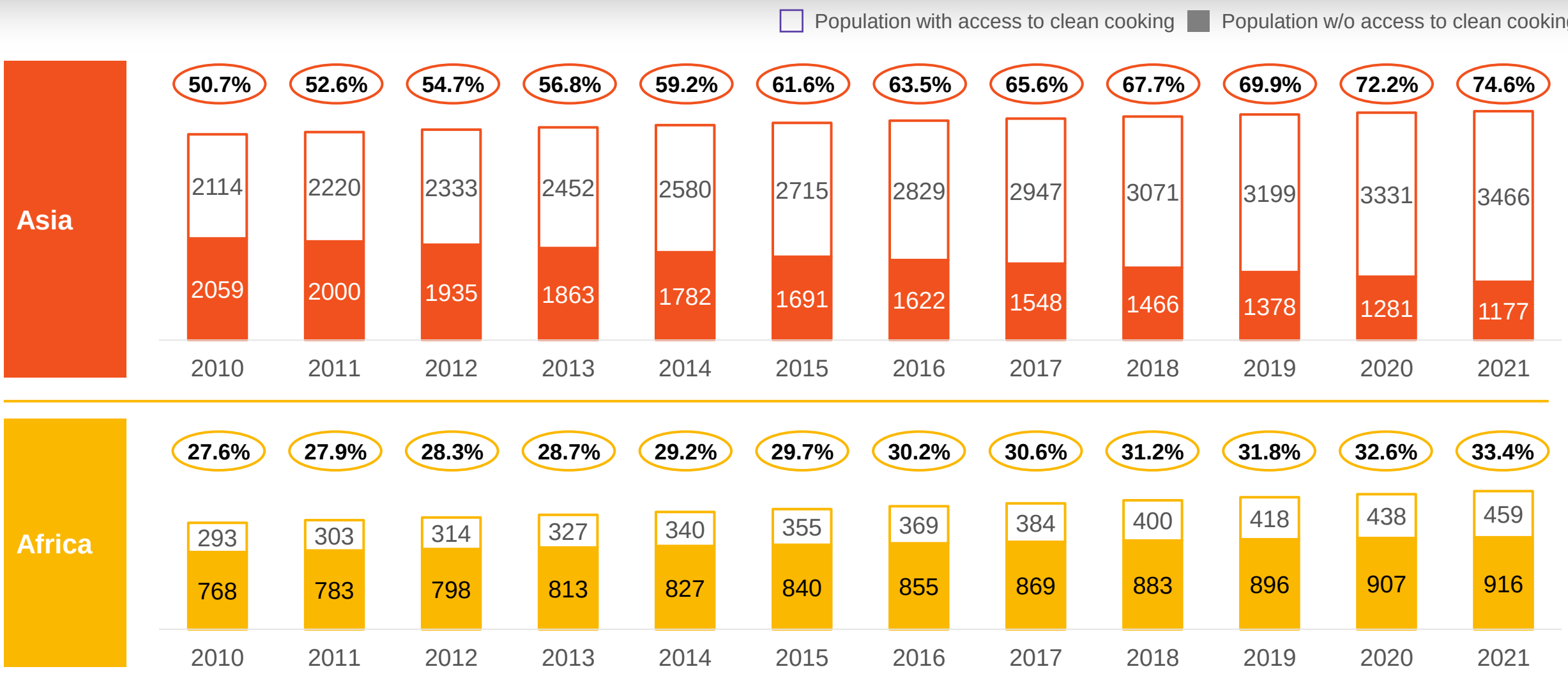
NOTE: These figures represent the absolute change in the number of people without access to clean cooking solutions between 2010 and 2021 and does not account for changes in the population due to birth rates, human migration etc.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023 and World Bank Total Population data 2023

The population growth has outmatched gains access to clean cooking in Africa while Asia has made progress despite population growth

Population, millions

x% Clean cooking access rate

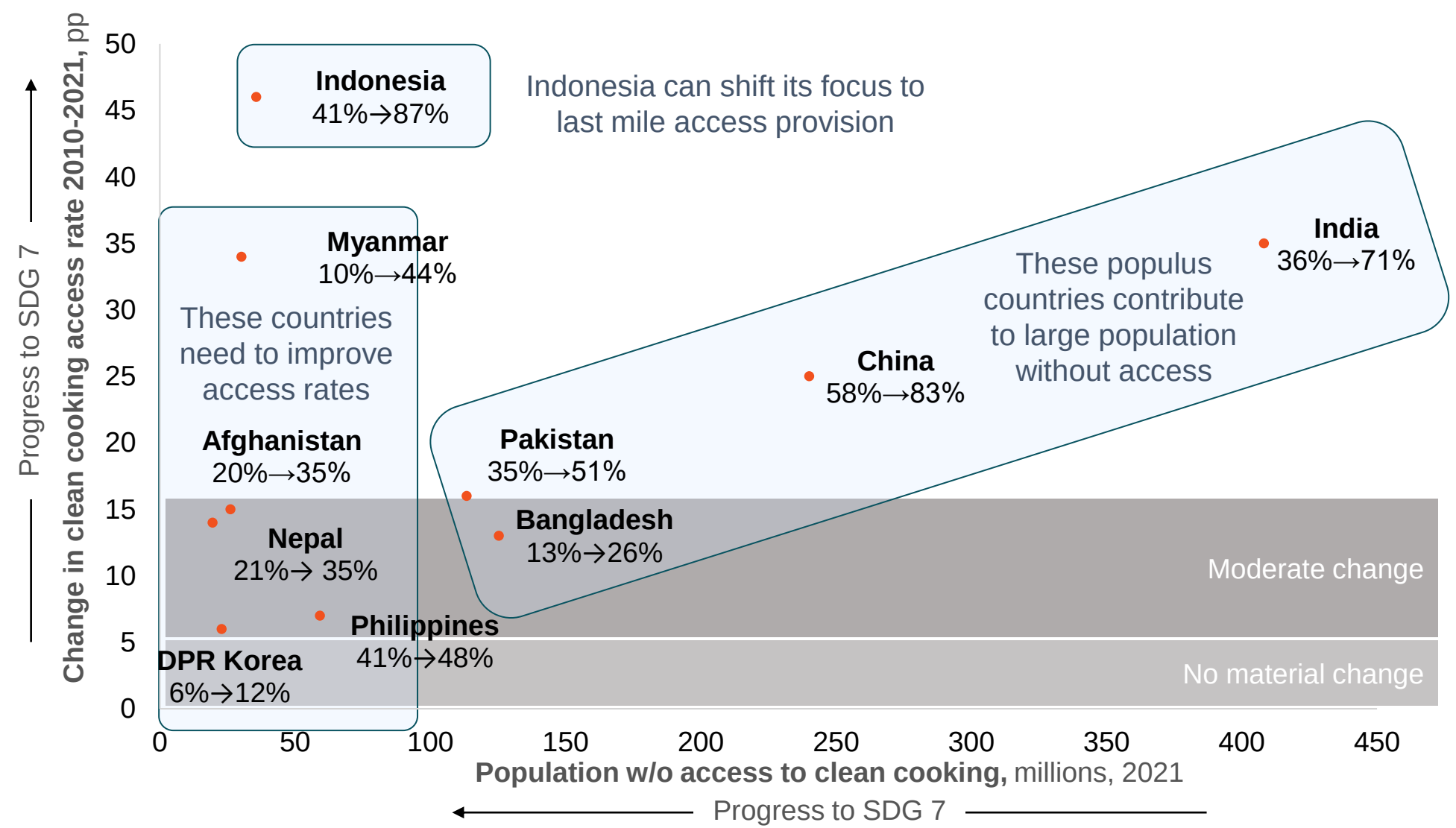


NOTE: The World Bank .ESMAP historical data up to 2020 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023 and World Bank Total Population data 2023

Clean cooking: Deep dive on Asia

Population without access to clean cooking vs change in clean cooking access rates (Asian countries), 2021

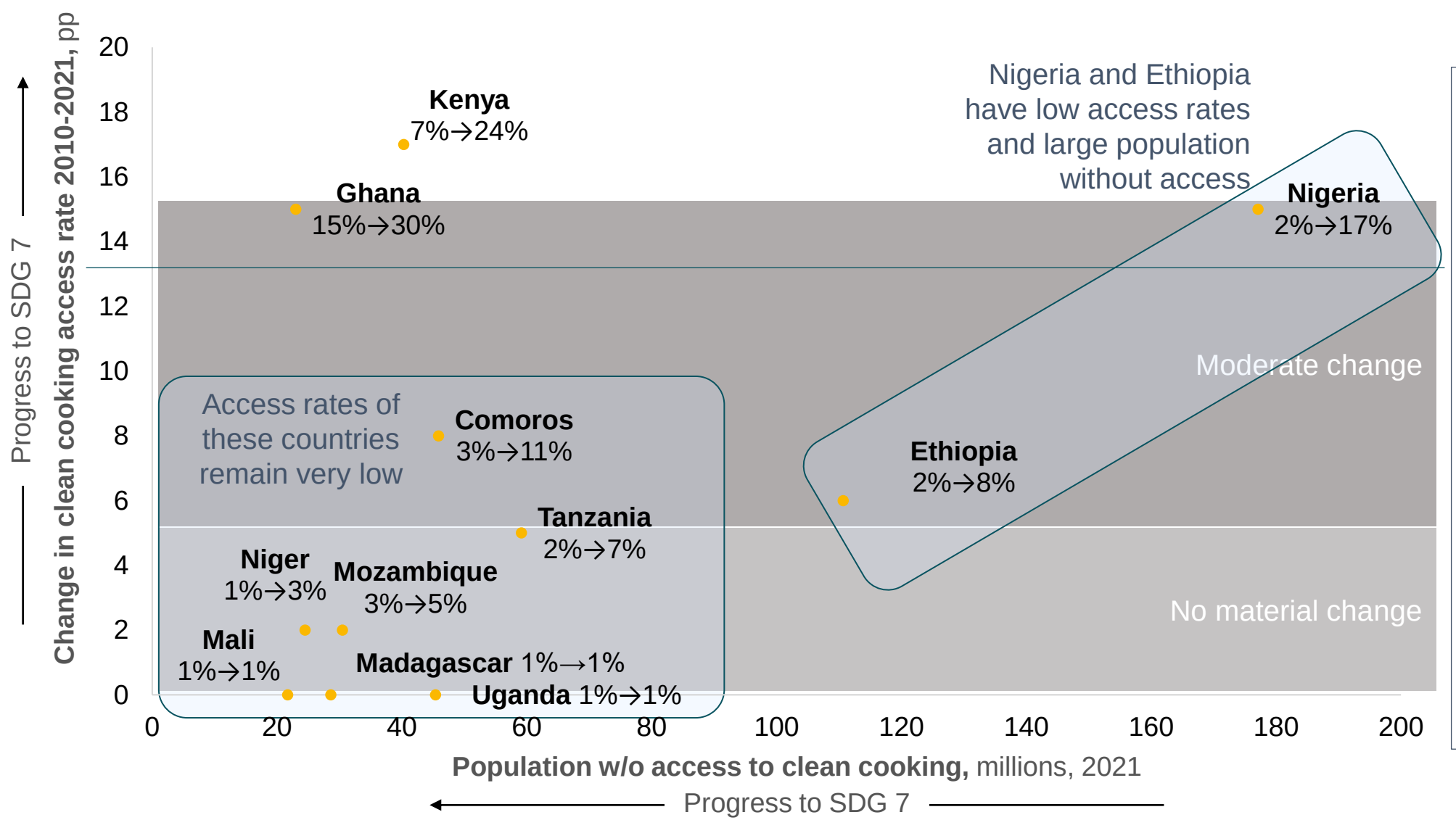


- 6 Asian countries significantly improved their clean cooking access rates (>15pp.) between 2010 and 2021; **India, China, Indonesia, Myanmar, Pakistan and Afghanistan**.
- 4 countries still have significant populations (>100 million) without access to clean cooking; **China, India, Bangladesh and Pakistan.**
- 6 countries (**Myanmar, Afghanistan, Bangladesh, Nepal, Philippines, DPR Korea**), have less than 50% access rates.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023 and World Bank Total Population data 2023

Clean cooking: Deep dive on Africa

Population without access to clean cooking vs change in clean cooking access rates (African countries), 2021

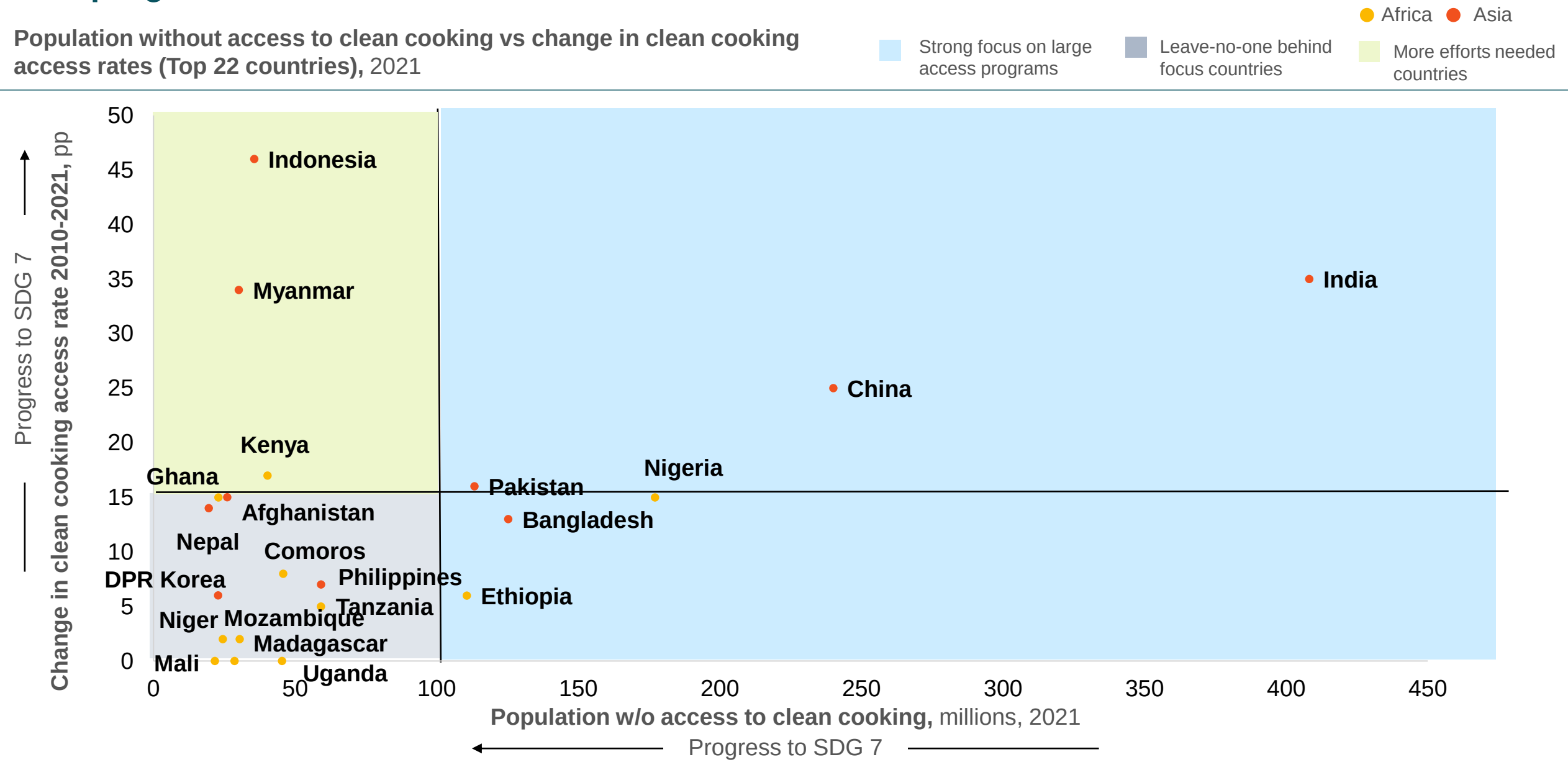


- All top 22 access-deficit African countries have **low access rates.**
- **Kenya** is the only country which improved its clean cooking access rate more than 15p.p. since 2010
- **Uganda, Mali and Madagascar** shows no change in access rates and their access rates are only 1%.
- **Nigeria and Ethiopia** have significant populations (>100 million) without access.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023 and World Bank Total Population data 2023

Strong focus is needed onto both countries with large populations without access and those with slow progress and low access rates

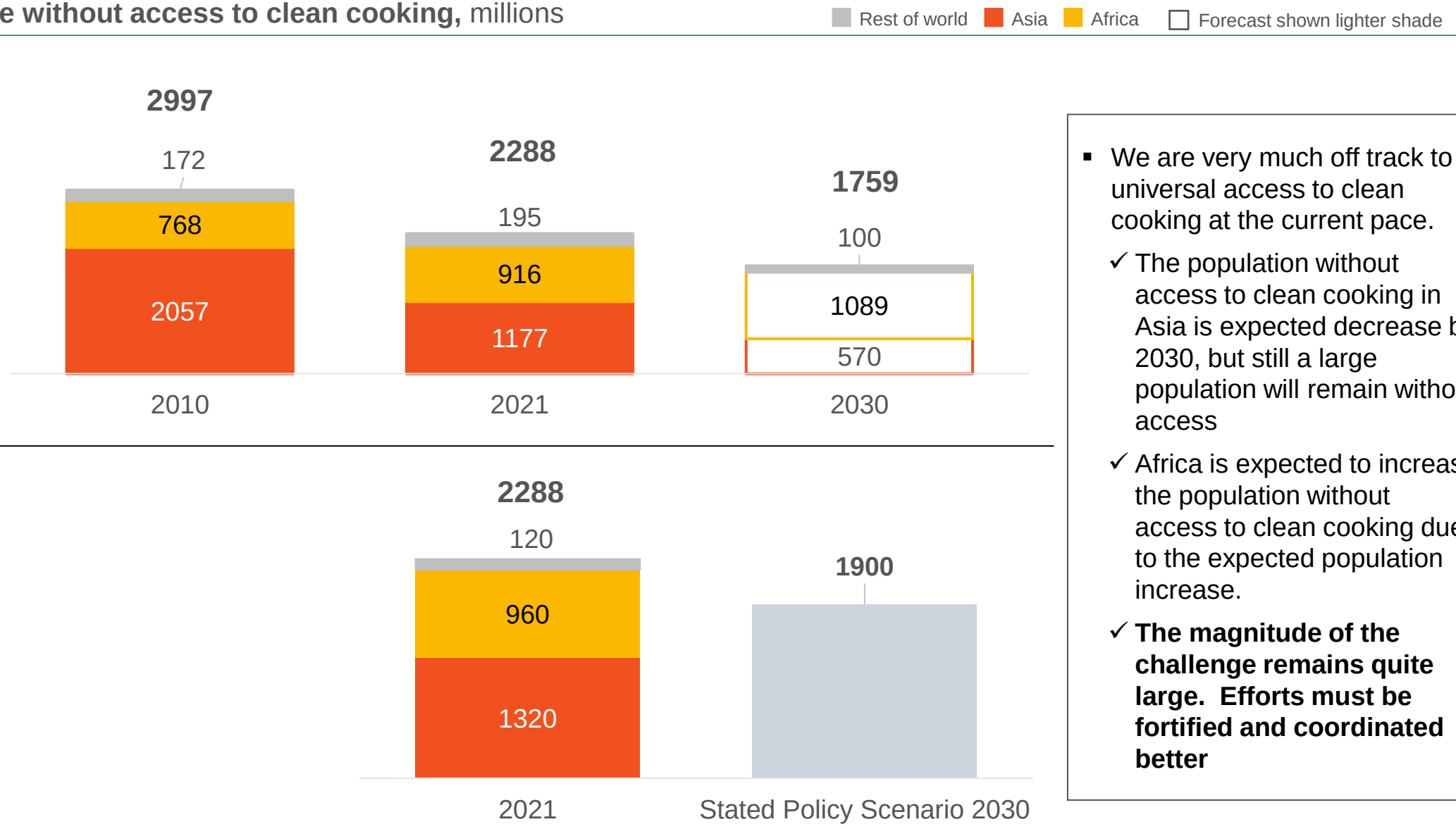
Population without access to clean cooking vs change in clean cooking access rates (Top 22 countries), 2021



DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023 and World Bank Total Population data 2023

Projections show that SDG7.1.2 is off-track for 2030 achievement with large margin

Number of people without access to clean cooking, millions



- We are very much off track to universal access to clean cooking at the current pace.
  - ✓ The population without access to clean cooking in Asia is expected decrease by 2030, but still a large population will remain without access
  - ✓ Africa is expected to increase the population without access to clean cooking due to the expected population increase.
  - ✓ **The magnitude of the challenge remains quite large. Efforts must be fortified and coordinated better**

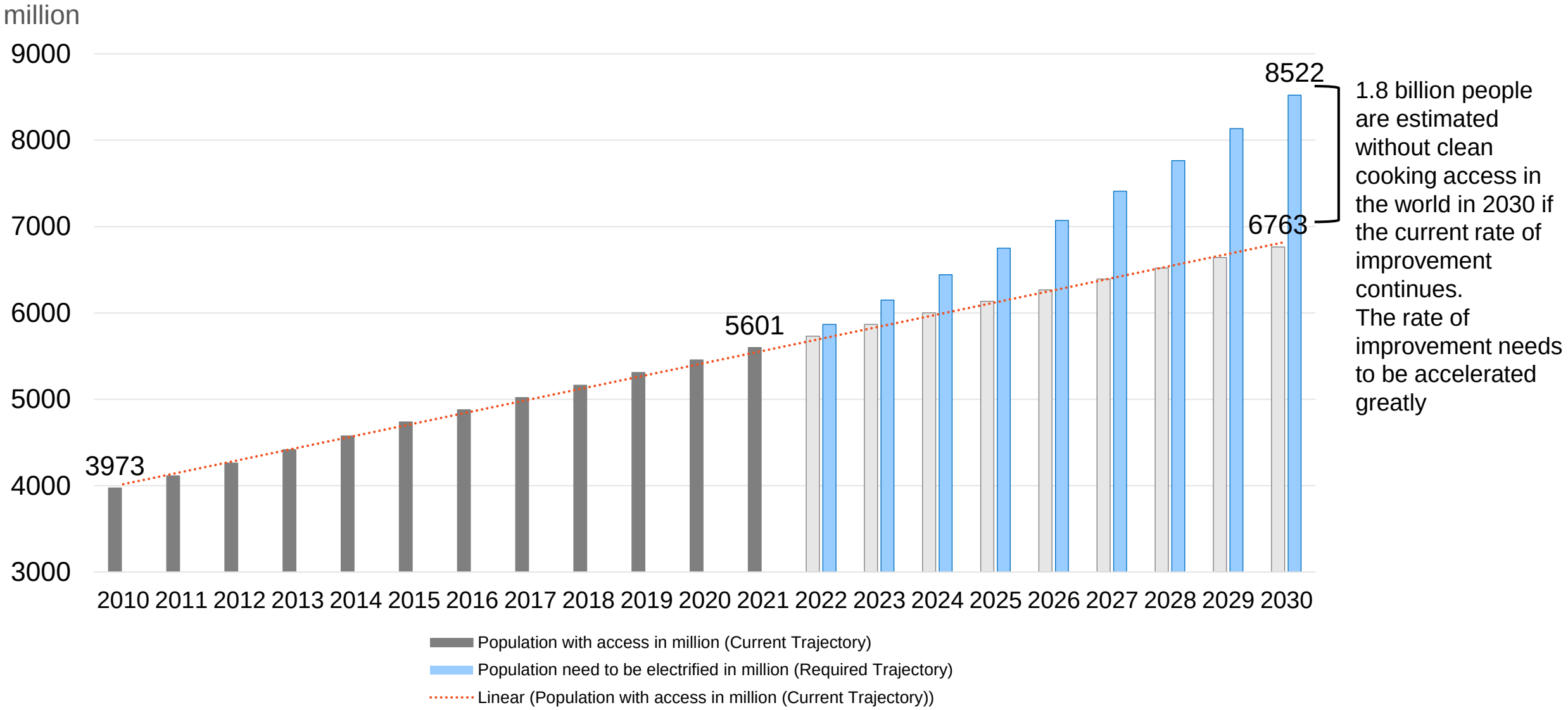
NOTE: The World Bank .ESMAP historical data up to 2020 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; World Bank Total Population data 2023; IEA World Energy Outlook, 2022

Rate of Clean Cooking Access in the World

Current trend trajectory vs required trajectory to achieve clean cooking access

☐ Forecast shown lighter shade



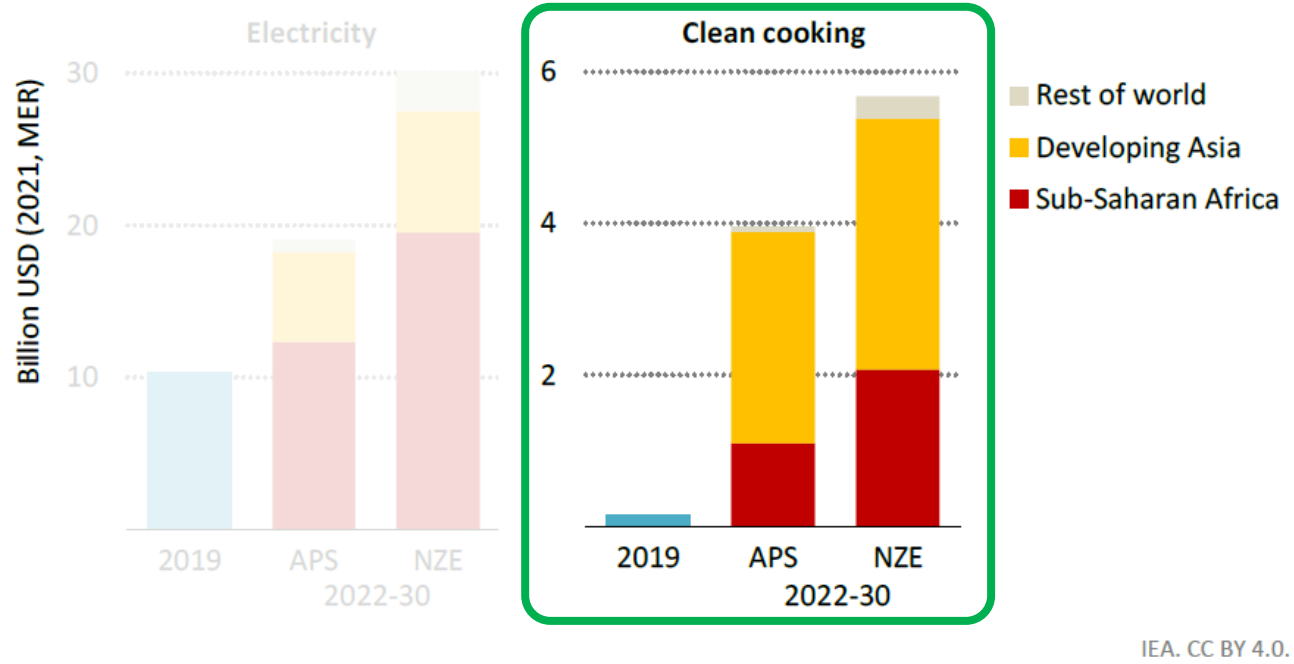
1.8 billion people are estimated without clean cooking access in the world in 2030 if the current rate of improvement continues.
The rate of improvement needs to be accelerated greatly

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; : World Bank Population estimate downloaded on June 22,2023; SEforALL analysis

Average annual investment of USD 6 billion is needed between 2022 and 2030 for universal clean cooking access

Average annual investment for clean cooking access under IEA' Net Zero Emissions by 2050 Scenario, 2022-2030

Figure 5.17 ▷ **Annual investments for access to electricity and clean cooking by scenario relative to tracked 2019 investments**



IEA. CC BY 4.0.

Current investment in access to electricity is less than 30% of what is needed to achieve universal access by 2030, while investment in clean cooking lags even further behind

Notes: MER = market exchange rate. Sub-Saharan Africa excludes South Africa.

Sources: IEA analysis; SEforALL and CPI (2021).

- Under the IEA's Net Zero Emissions by 2050 (NZE) Scenario, which achieves universal access in both electricity and clean cooking by 2030, the annual necessary investment for clean cooking is **around USD 6 billion.**
- The bulk of current investment is concentrated in developing Asia, and investment in Africa represents only around 6% of what is necessary to achieve universal clean cooking access by 2030.

Source: IEA World Energy Outlook, 2022

While significant overlaps are found between lack of electrification and clean cooking, the large difference of population numbers without access between the two show that electricity does not automatically contribute to clean cooking access as a fuel.

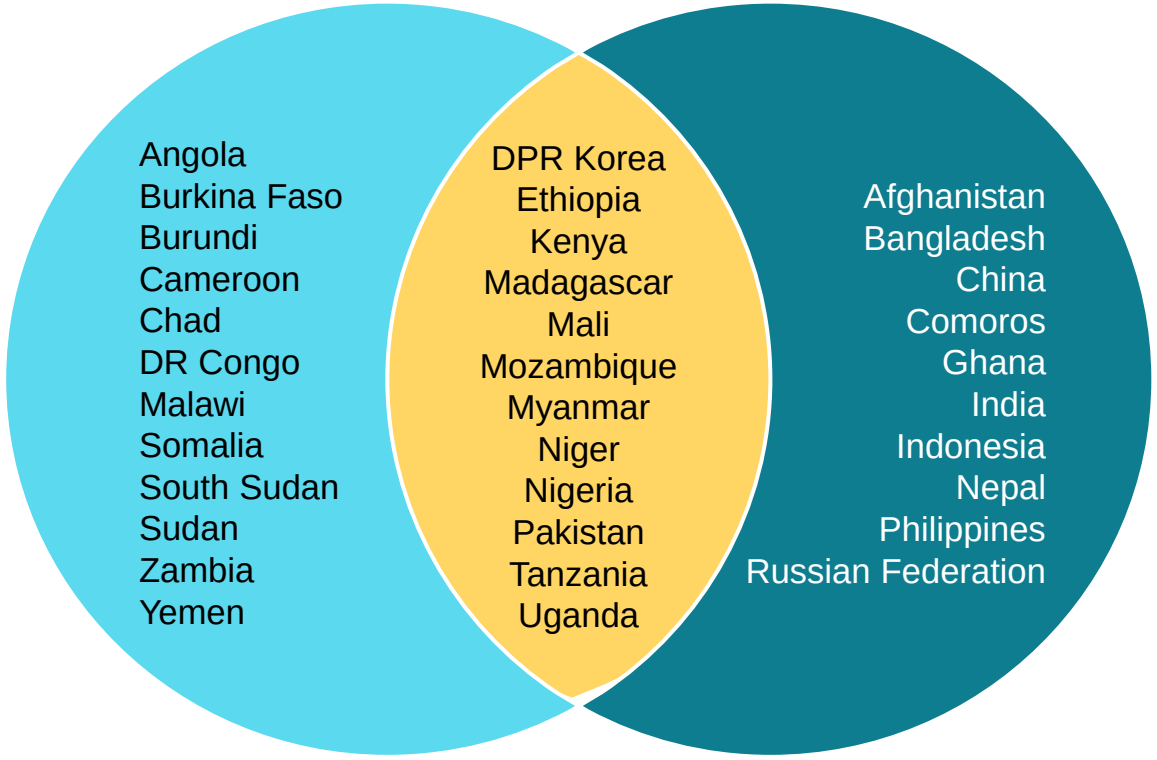
12 countries make up both of the top 80% of electricity access and 75% of clean cooking access challenge

There is a correlation between electrification and access to clean cooking, but the difference in population without access in the two areas are large

~675 million people lack access to electricity with the countries making the top 80% being…

~2.3 billion people lack access to clean cooking with the countries making up the top 75% being…

Country Overlap between Electricity and Clean Cooking Access Challenges



- Clean cooking technologies (such as solar cookers) can be used as an entry product to unelectrified households, and e-cooking solution may create synergy between electrification and clean cooking access.
- In reality, however, e-cooking affordability, cooking traditions, and level of electricity access are some of the factors that contribute to the difference between the 2.3 billion people without access to clean cooking and 675 million without access to electricity.
  - For example, Tier 1 or 2 electricity access does not provide enough power for electric cooking, and efficiency plays an important role. In many parts of the world, electricity is not an affordable clean cooking fuel compared to traditional fuels. Electric cooking stoves could be also expensive and difficult to obtain due to weak local market demand and/or lack of local industry/supply. In addition, many people have strong fuel preferences on their cultural cooking practices.
- To create synergy between electricity and clean cooking accesses through e-cooking, well-coordinated planning, policy and regulations based on the nature of market failures and more funding to multi-benefit projects may be needed.

1 Based on a study of the effects of Tier 2 electrification (low power and ~4 hours of electricity a day) in Kenya, Ethiopia and Bangladesh;

SOURCE: ESMAP Tracking SDG7 Database, 2022; IEA World Energy Outlook 2021

Contents

SDG 7.2 Share of Renewables Energy

The share of renewables, including the use of traditional biomass, in total energy consumption is 19.1% in 2020, while the share of *modern* renewables in total energy consumption is only 12.5%.

- The global share of renewables in its total final energy consumption (TFEC) increased only 3.1 percentage point in 2020 from 16.0% in 2010, while the share of modern renewables also had a very modest increased of 3.8 percentage points from 8.7% in 2010
- Africa has the highest share of renewables at 57.1%, but this only includes 8.4% of modern renewables. Africa has the lowest improvement rate (0.6 percentage points) of renewable share in TFEC since 2010.
- Latin America and the Caribbeans follows Africa with high renewable share in energy consumption with 34.2%. However, the share of modern renewables of the region is 29%. Asia and Oceania have lower share of renewable energy, but modern renewable share are higher than Africa. North America and Europe has the least share of renewables in its TFEC at 14.3% but all are from modern renewables.

After peaking in 2017, international public investment in renewables has been declining

- Although international public financial flows in support of renewable and clean energy peaked in 2017 (around 26 billion USD), totalling 79 billion USD in 5 years, the annual investment has declined every year. The 2021 investment total was 41% of the 2017 amount.
- Solar PV is the only technology which shows significant increase since 2010.
- Regional distribution of the total investment in renewables has been very uneven as advanced economies and China received more than 80% of the total investment.

Looking forward, based on the current trends, we are not on track to achieve SDG 7.1.2 by 2030

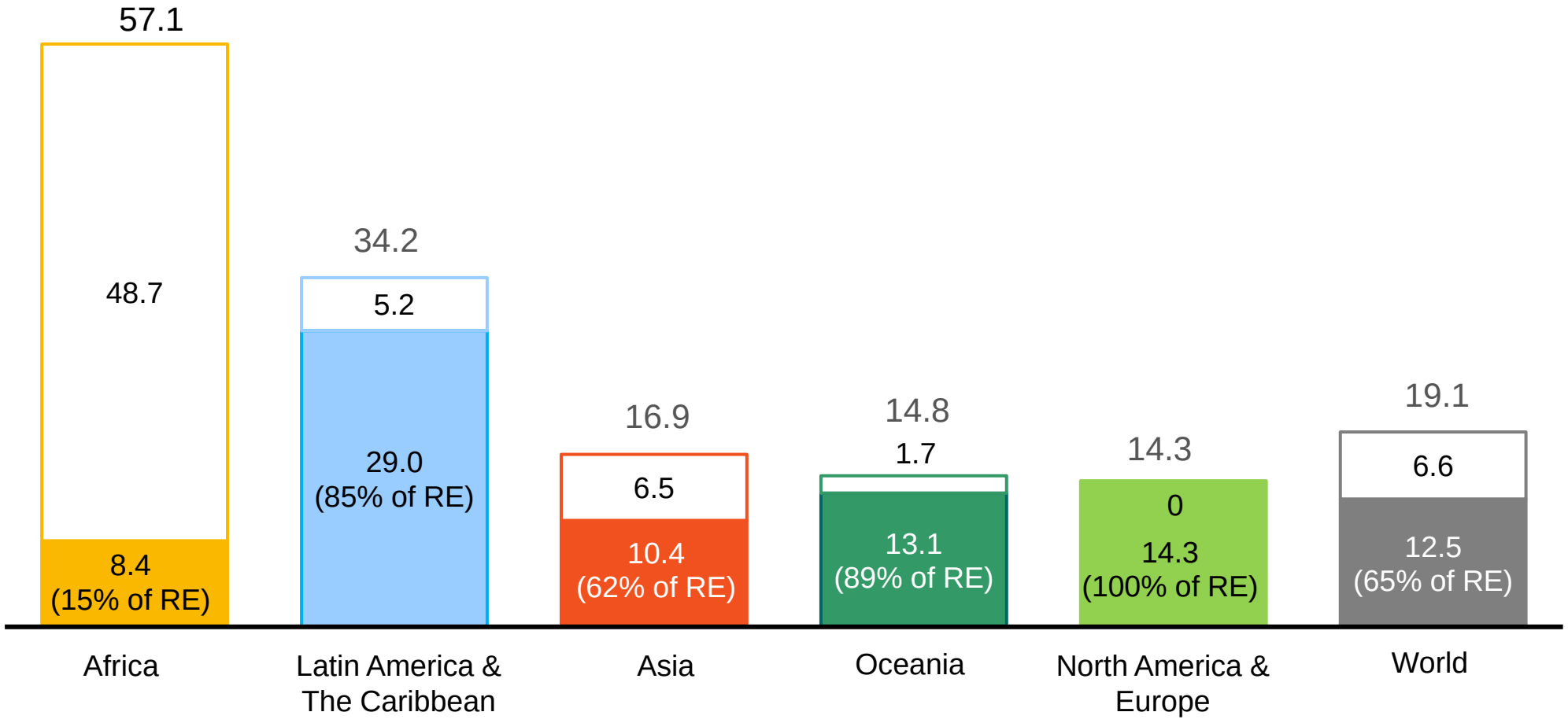
- A current trend projection and the IEA's scenario analysis show that the share of renewables in TFEC will be increasing to around 23% by 2030, which represents weak progress compared to that in 2010 (16.0%), and below the 33-38% needed by 2030 to keep global temperature rise below 1.5 C.
- Modern renewable expansion needs to be accelerated further to reduce the negative impacts of traditional biomass, particularly in Africa, and achieve much stronger progress in SDG7.2.
- Increasing renewable electrification and direct renewable usage – alongside energy efficiency - in transport, industry and building sectors is necessary to accelerate the SGD7.2 progress, while populations without energy access in both electricity and clean cooking should be connected with clean and modern renewable energy.

Methodology

	Description
Data Source	▪ The following data was gathered from WORLD BANK / ESMAP's Tracking SDG 7 database (download link) with data available between 2000 and 2020The total share of renewables in total final energy consumption in the world between 2010 and 2019 – The total share of renewables in total final energy consumption per country and per region between 2010 and 2020 – The share of modern renewables in total final energy consumption per country and per region between 2010 and 2020 – The total energy consumption per country in 2010 and 2020
Projections	▪ Straight line extrapolation projections were made via the following process – The rate of change of the share of renewables in final energy consumption (Compound Annual Growth Rate, CAGR) between 2010 and 2020 was calculated at a global level – The share of renewables in energy mix was projected forward to 2030 (by 10 years) using the calculated CAGR as the growth rate

Today, the share of renewables in the energy consumption is 19.1%, 12.5% of which is modern renewables

Share of renewables in energy consumption by region, %, 2020

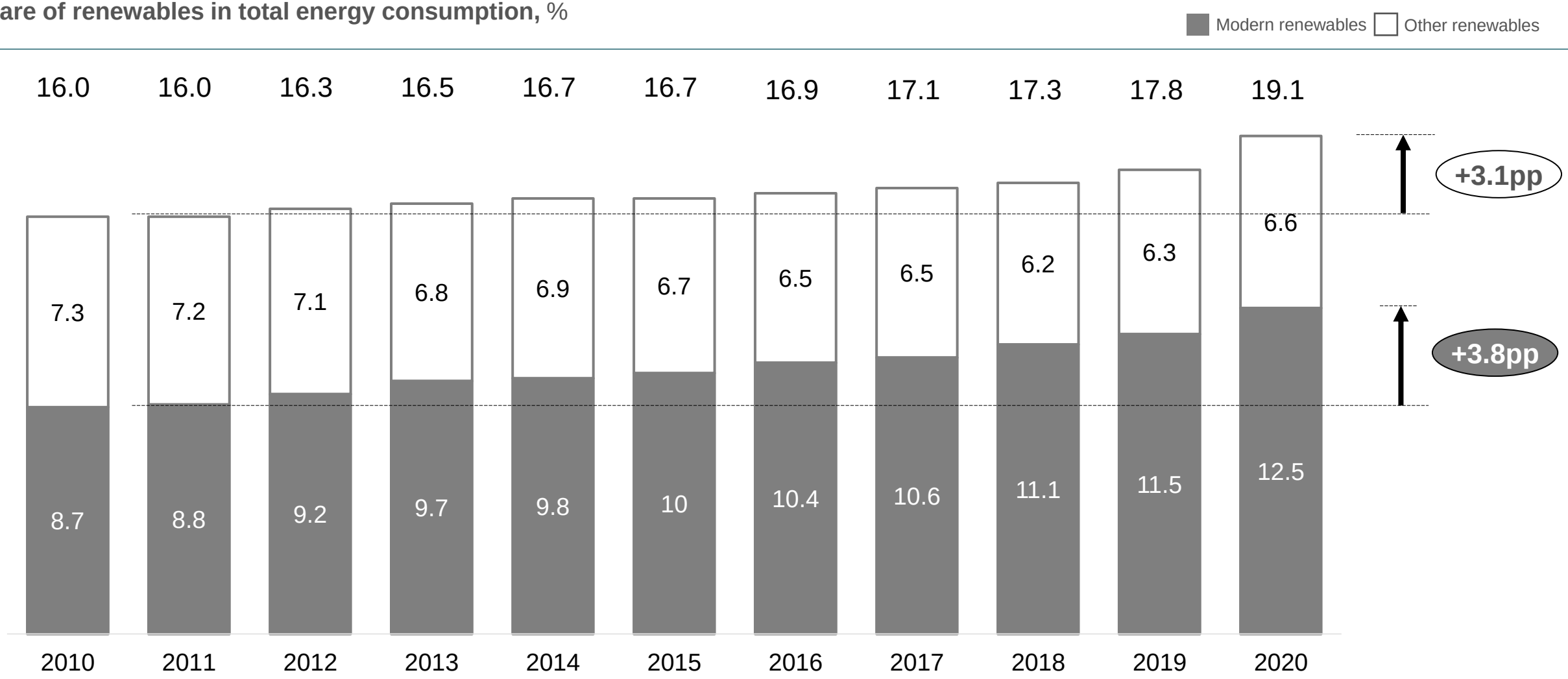


- The world has only 12.5% of modern renewables (excl. traditional biomass) in its TFEC (Total Final Energy Consumption), increased 1% from 2019.
- Africa and Latin America & the Caribbean have higher % of renewables in TFEC. However, 86% of Africa's share is traditional biomass usage.
- Latin America and Caribbean, Oceania and North America and Europe have high share of modern renewables within renewable shares in TFEC.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

The share of renewables and share of modern renewables in total energy consumption increased to 3.8pp and 3.1pp respectively in 2010-20, with the largest annual push in 2019-20.

Share of renewables in total energy consumption, %

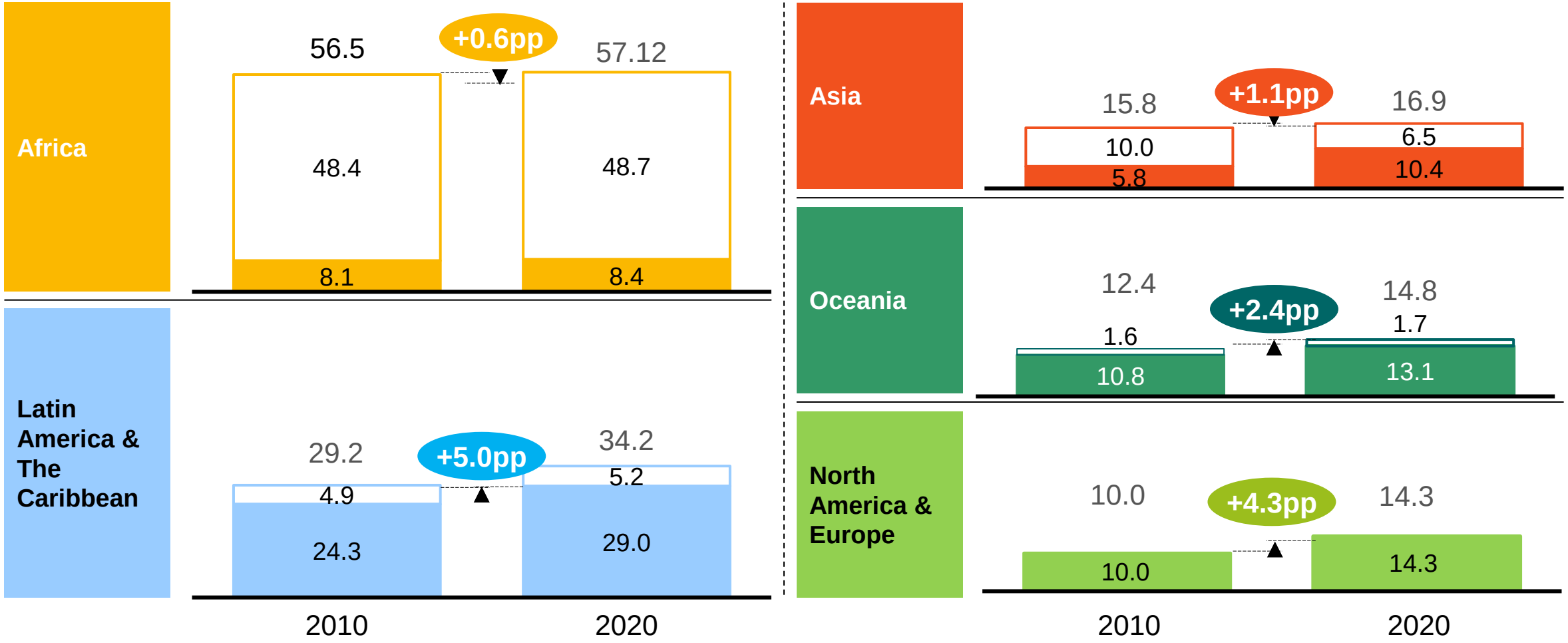


NOTE: The historical data up to 2019 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

While North America & Europe and Latin America & the Caribbean show advancement, progress in Asia, Oceania and Africa remains VERY slow.

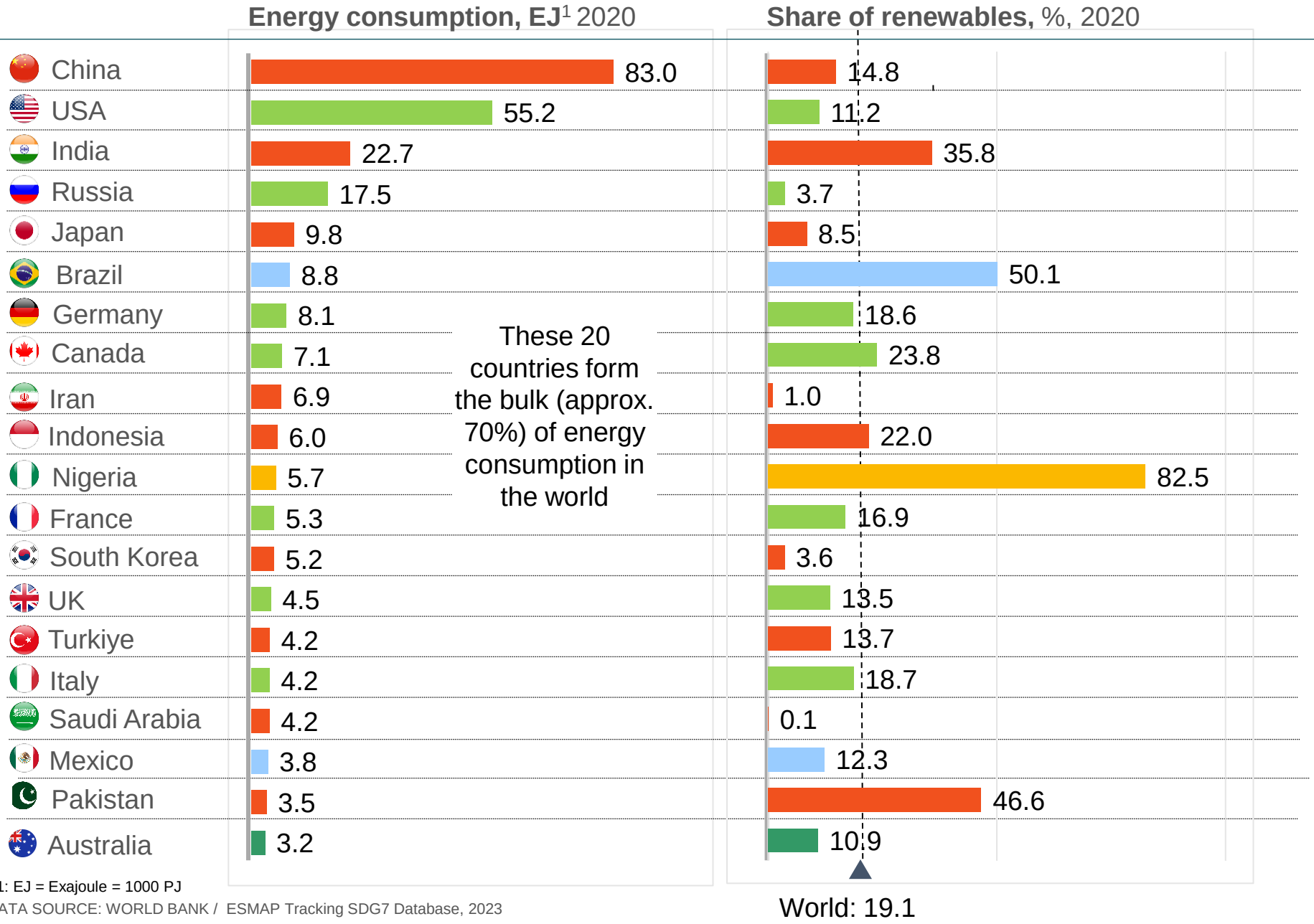
Share of renewables in energy consumption by region, %, 2010, 2020



NOTE: The historical data up to 2019 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Only 18% of energy consumption of the top 20 energy consuming countries are from renewables



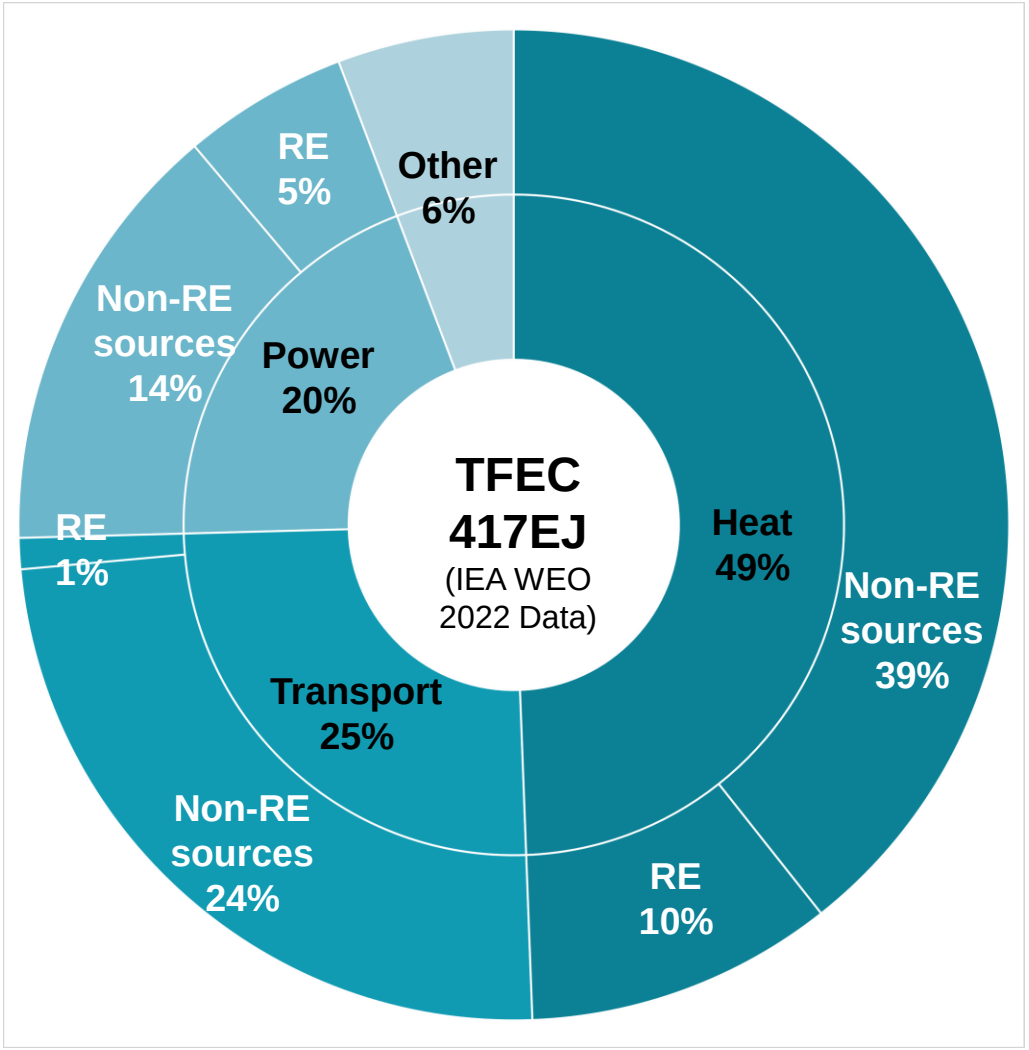
- Only 6 countries out of the top 20 energy consuming countries have higher share of renewables in their energy TFEC than the world average. This is worsened from last year.
- Only 47.3 EJ (17.6%) in 278.3 EJ TFEC of top 20 countries come from renewables.
- To substantially increase RE share in TFEC, fortifying efforts in all sectors in these top 20 High-Impact Countries are most effective.

1: EJ = Exajoule = 1000 PJ

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Increasing significant renewables share requires strong actions in Heat and Transport

Share of renewables in world final energy consumption by sector, 2020 %



	Average Annual Growth Rate 2010-2020
TFEC	0.73%
RE in Heat	0.82%
RE in Transport	5.06%
RE in Electricity Consumption	6.20%

(Tracking SDG7 Dataset)

- Power sector showed strong advancement of renewable during the past decade, but it only consumes 17% of total energy.
- Transport sector also shows good advancement rate but the share of renewable itself is extremely low as it only constitutes approximately 1% of TFEC
- Heat consumes more than a half of total energy consumption, but both the annual growth rate and overall share of renewable heat consumption are less than 1%.
- Increasing renewable uptakes in Transport sector as well as Heating and Cooling in Building and Industry sectors is critical.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2022 and ; IEA World Energy Outlook, 2022

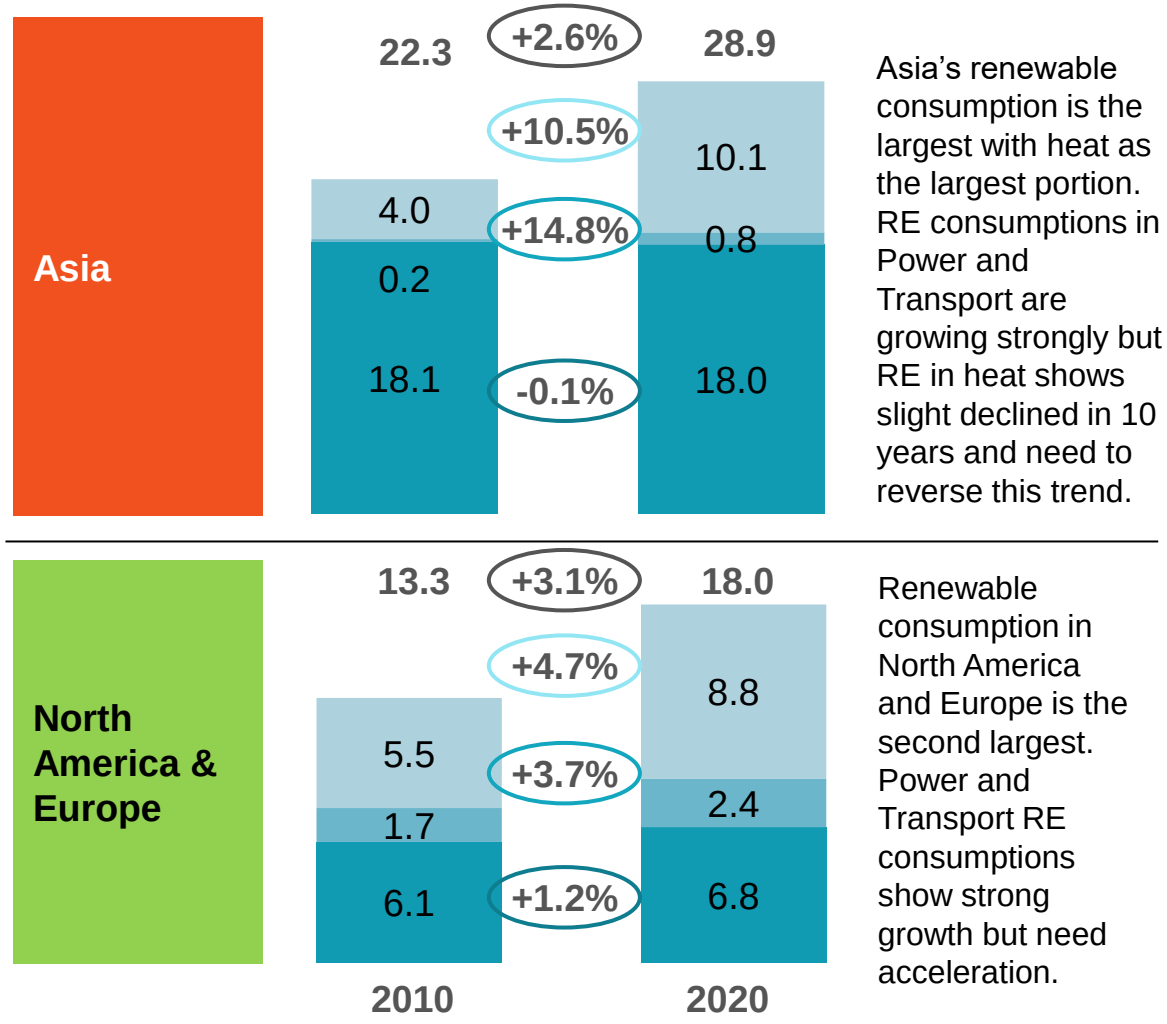
All regions show very low renewable consumption levels in transport and slow renewable progress in heat sector

Renewables total, heat, transport and electricity final energy consumption by region, EJ, 2010, 2020

Heat Transport Power

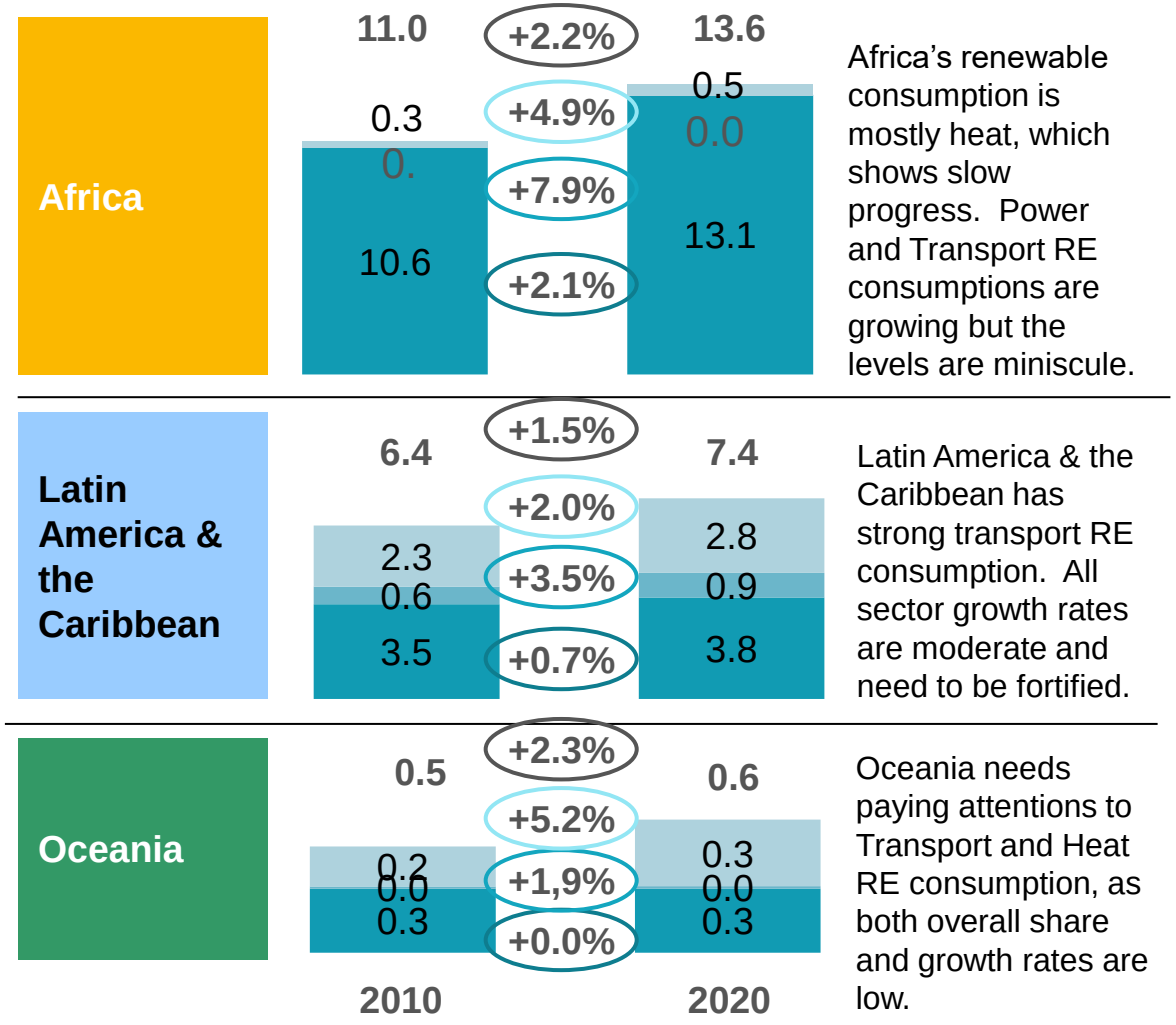
Annual average growth rate

Dark grey numbers on top of each bar are total RE consumption



Asia's renewable consumption is the largest with heat as the largest portion. RE consumptions in Power and Transport are growing strongly but RE in heat shows slight declined in 10 years and need to reverse this trend.

Renewable consumption in North America and Europe is the second largest. Power and Transport RE consumptions show strong growth but need acceleration.



Africa's renewable consumption is mostly heat, which shows slow progress. Power and Transport RE consumptions are growing but the levels are miniscule.

Latin America & the Caribbean has strong transport RE consumption. All sector growth rates are moderate and need to be fortified.

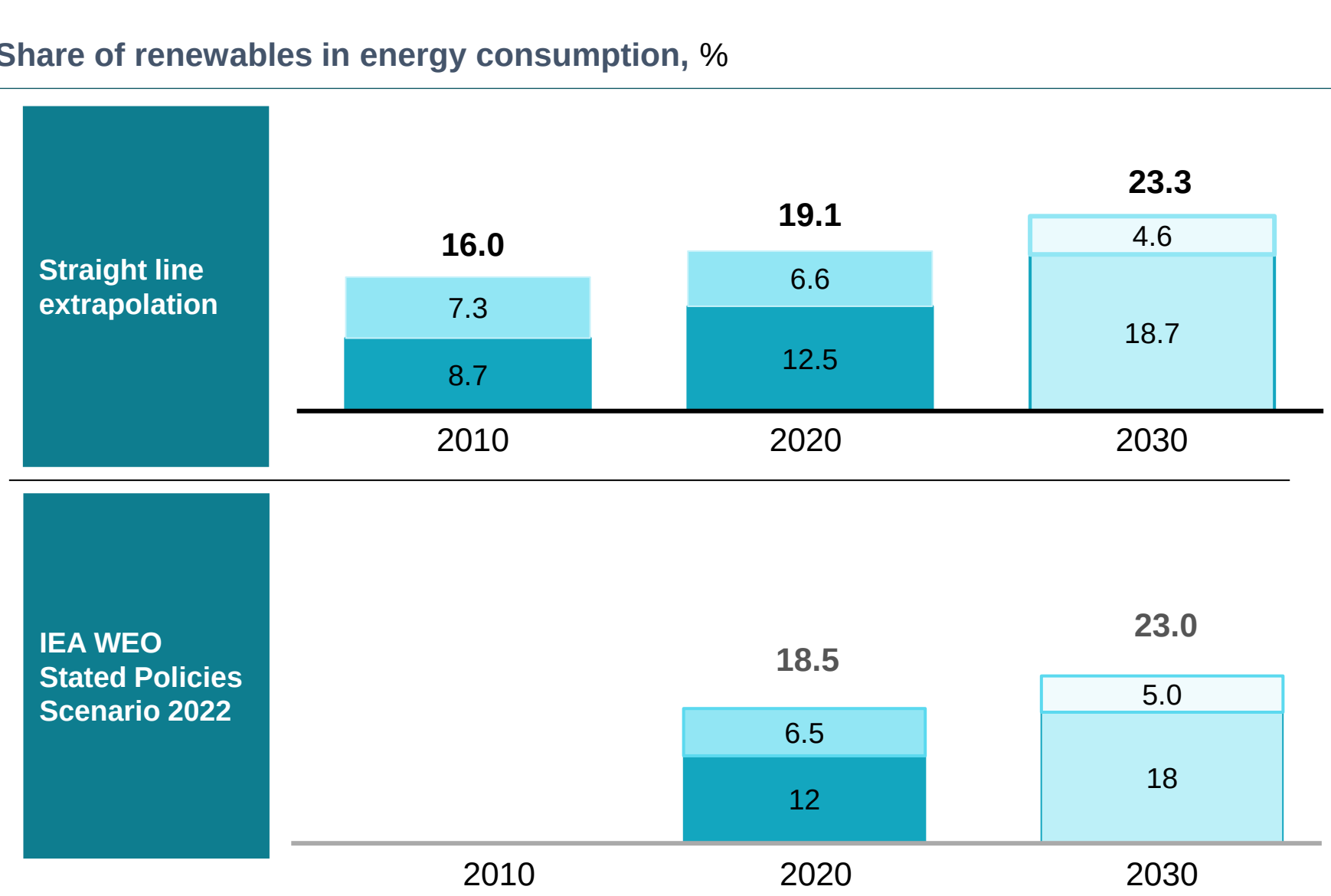
Oceania needs paying attentions to Transport and Heat RE consumption, as both overall share and growth rates are low.

NOTE: The historical data up to 2019 was also updated with the 2023 dataset.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Projections show that we could see moderate gains to 2030

Share of renewables in energy consumption, %

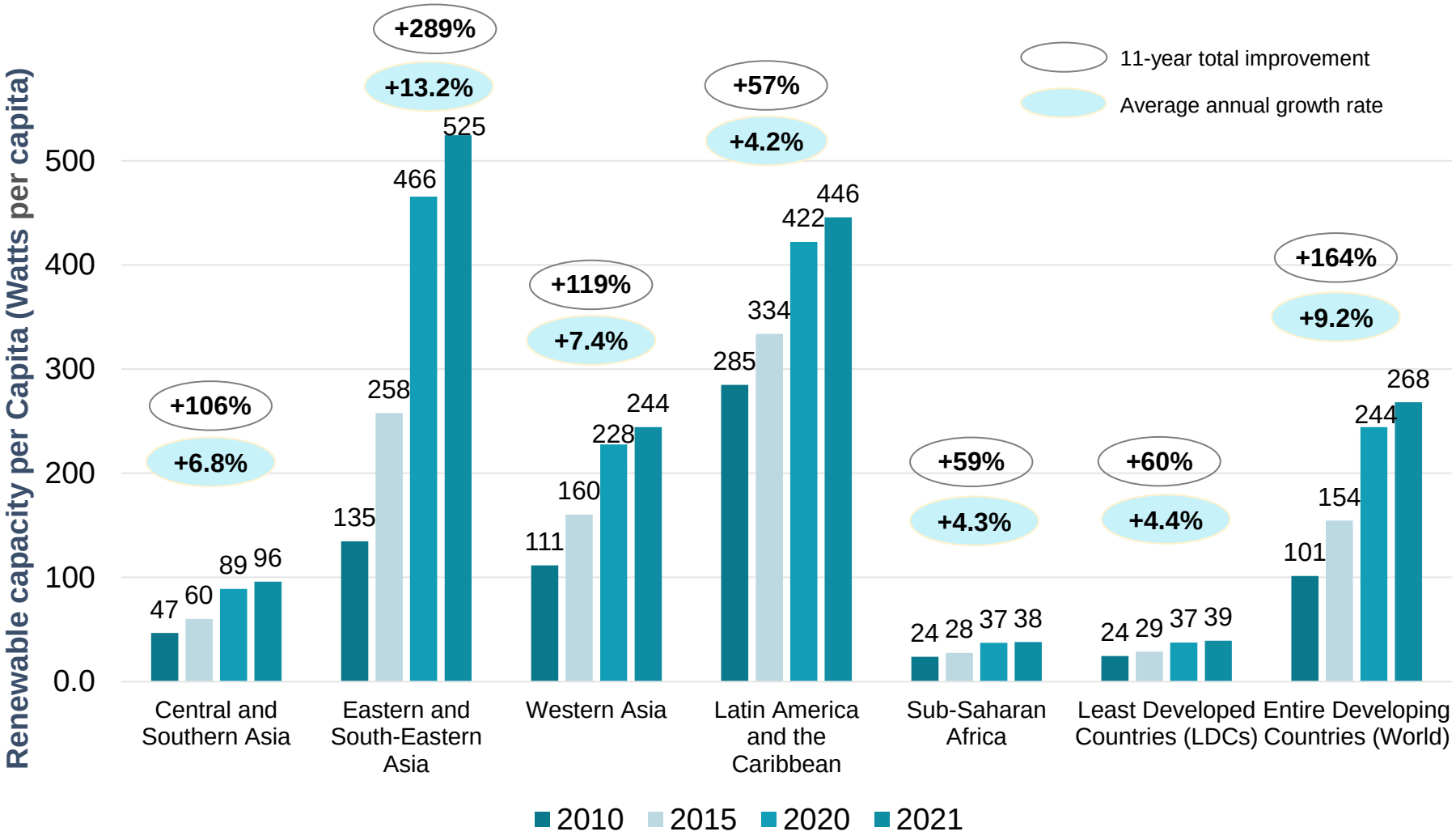


- There is no quantitative target for SDG 7.2, but the IEA estimates that a 33-38% share of renewables in TFEC in needed by 2050 to keep global warming below 1.5 C.
- While progress has been made towards improved share in renewables in energy consumption since 2010, the straight-line projection indicates only moderate increase is expected by 2030 with the current pace of improvement.
- It is necessary to ensure most of the unelectrified population to be connected to electricity via clean renewable energy and expand both direct renewable and renewable electricity use in industry, building and transport sector, in order to accelerate SDG7.2

NOTE: The historical data up to 2019 were also updated with the 2023 dataset. This creates inconsistencies with the analysis from the previous year.
SOURCE: World Bank/ESMAP Tracking SDG7 Database, 2023 and Tracking SDG7 Progress Report 2023

Sub-Saharan Africa's renewable capacity per capita are quite low, while Asia and Latin America and the Caribbean have advanced strongly since 2010

Renewable capacity per capita in Developing Countries by Region, Watts per capita

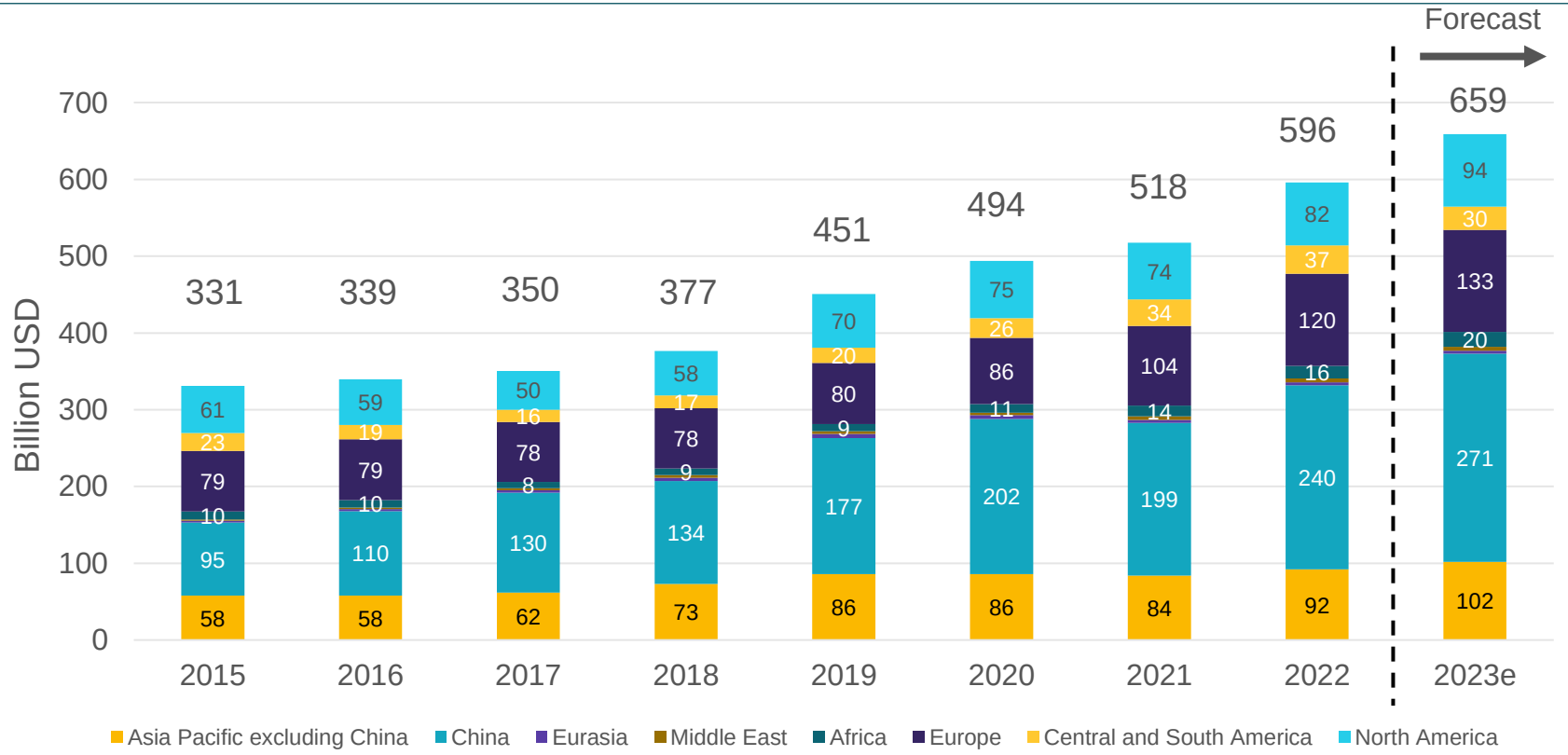


DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

- Renewable power generating capacity per capita in Sub-Saharan Africa and LDCs (many in SSA) have been much smaller than in Asia, corresponding the slow pace of electrification of the region. Meanwhile all Asian regions made strong progress since 2010.
- Eastern and South-Eastern Asia and Latin America and the Caribbean show much high capacity per capita than the developing country average (268 W/capita).
- Central and Southern Asia's low capacity per capita, despite strong electrification progress in India, Bangladesh and Pakistan, suggests low Tier electrification in those populus countries (India: 105 W/capita, Bangladesh: 3.4 W/capita & Pakistan 56W/capita in 2021)

Global investment in renewable power and fuels reached USD 659 billion USD in 2021, but the distribution is very uneven

Renewable Power Investment, Billion USD 2015-2021



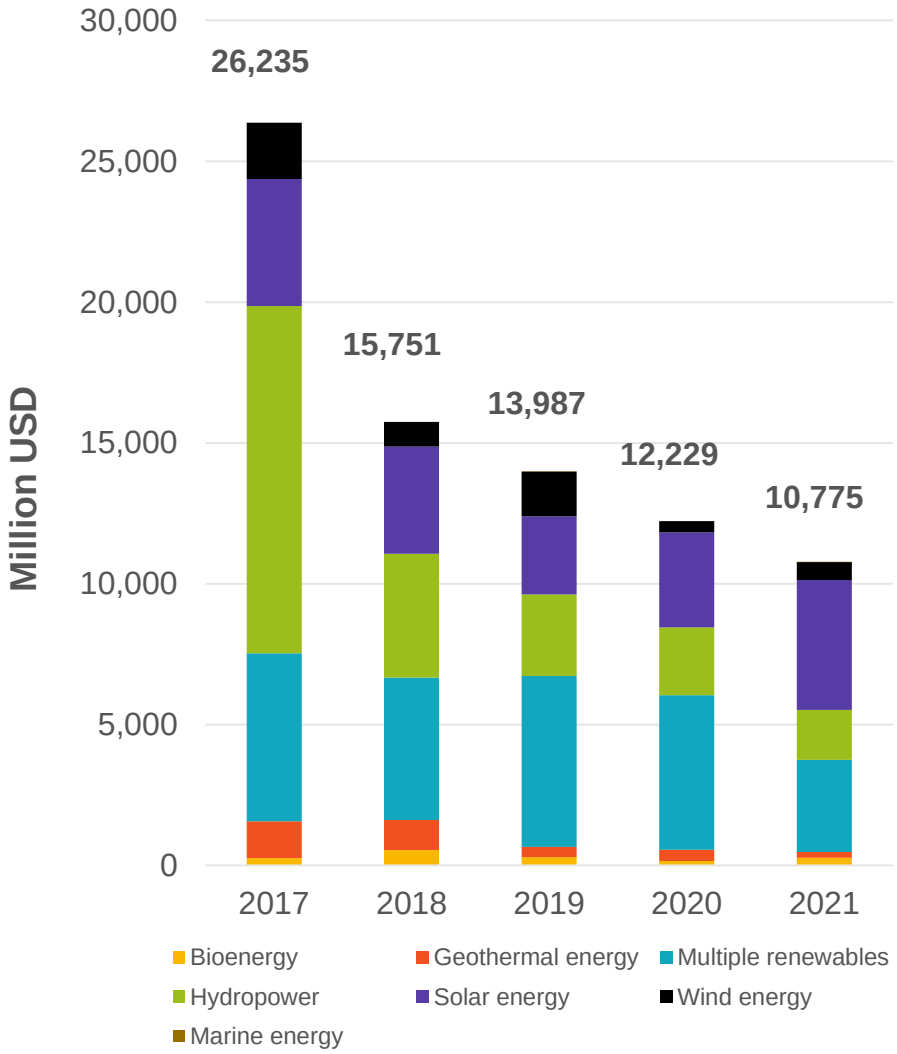
Renewable Power Investment, 2022

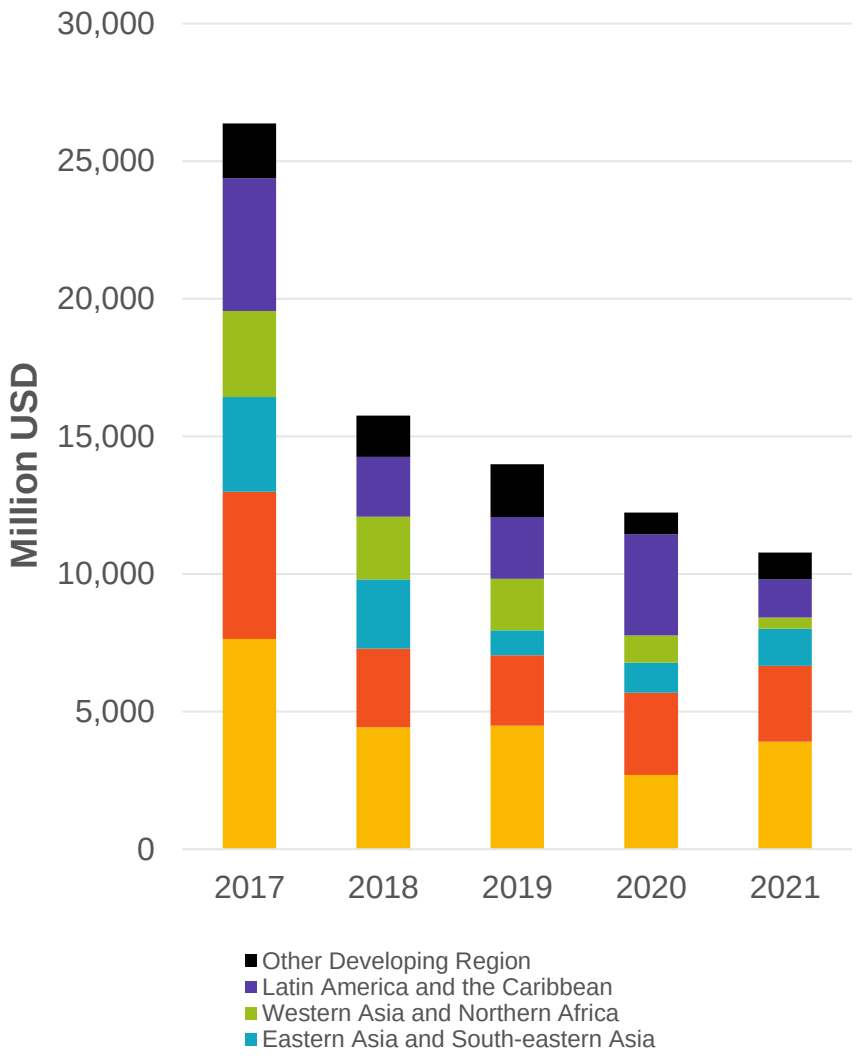
- The global investment in renewable power have reached close to USD 600 billion in 2022 and expected to reach USD 660 billion in 2023.
- The investments have been quite uneven among geographies.
- Advanced economies (42%) and China (40%) accounted more than 80% of total investment in 2022. China alone had more than twice of investment of the entire EMDE. China (USD 240 billion) was followed by Europe (USD 120 billion), North America (USD 82 billion), Asia Pacific without China (USD 102 billion) and Africa (USD 20 billion) in 2022.
- China also accounted for 37% of the total investment made between 2015 and 2022, more than any single country or region, followed by Europe (20%).

Data Source: IEA World Energy Investment Datafile 2023

Meanwhile, international public financial flows to support Clean and Renewable Energy Investment in developing countries was USD 11 billion in 2019, the lowest level since 2015

International Public Investment in Renewable and Clean Energy to Developing Countries, 2015-2019



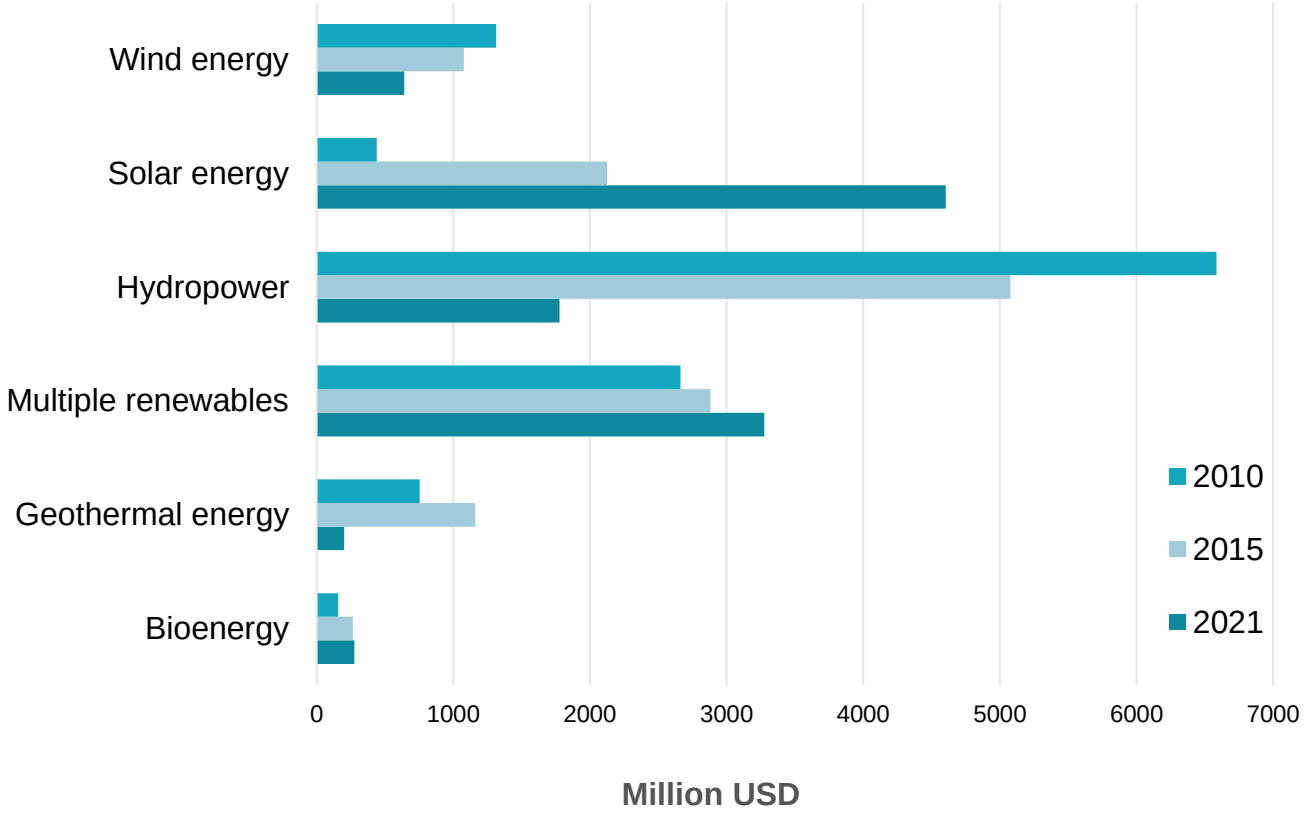


- International public financial flows in support of renewable and clean energy peaked in 2017 (around 26 billion USD), totalling 79 billion USD in 5 years, but the trend shows significant decline since 2017. The 2021 investment total was 41% of the 2017 amount.
- Multiple technology projects received the largest supports for the past 5 years in total (USD 25 billion), followed by Hydropower (USD 24 billion) and solar energy (USD 19 billion), showing shifting trend toward multiple technologies projects.
- Sub-Saharan Africa received the largest amount in total (USD 23 billion USD) between 2018 and 2021, followed by Central and Southern Asia (USD 17 billion) and Latin America and the Caribbeans (USD 14 billion).

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Investments in solar technologies have dramatically increased since 2010 despite the falling cost in developing countries. Where local resource availability permits, diversification of energy sources should be considered more during clean energy transition

International Public Investment in Renewable and Clean Energy in Developing Countries, 2010, 2015 and 2021



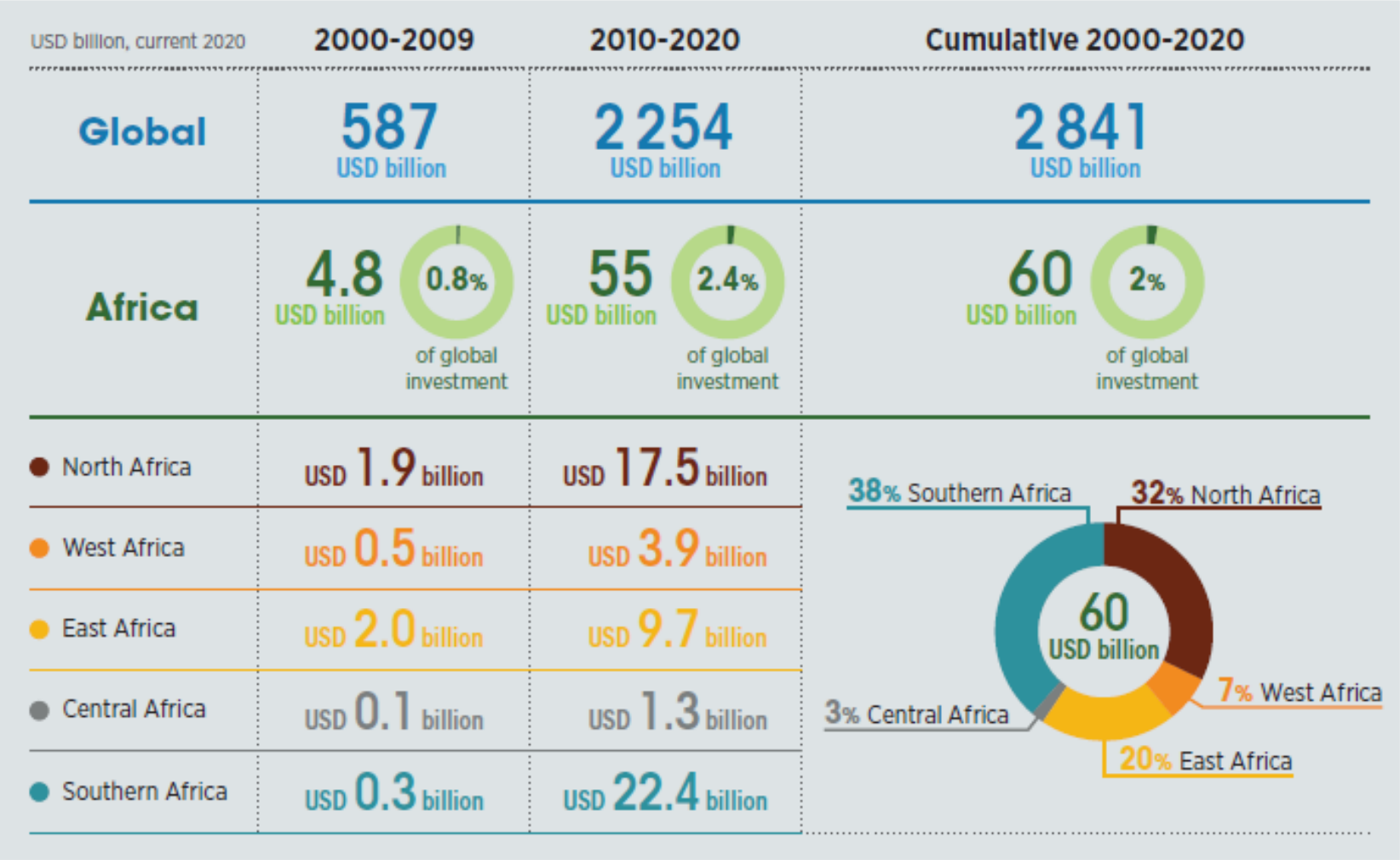
	Change relative to 2010	Change relative to 2015
Wind energy	**-51%**	**-40%**
Solar energy	**946%**	**117%**
Hydropower	**-73%**	**-65%**
Multiple renewables	**23%**	**14%**
Geothermal energy	**-73%**	**-83%**
Bioenergy	**77%**	**4%**

- Solar's 2021 investment reached almost 10-hold increase, despite the dramatically decreased cost, while the total amount of wind investment has been declining.
- Hydropower investments have been greatly reduced since 2010, showing the shifting preference of technology.
- While many single-resource technologies show decreased or slowed-down trends, multiple technology project investment is increasing steady.
- Wherever resource endorsement permits, diversifying energy resources could bring energy security benefits and system resiliency.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Global investment in renewable power and fuels reached USD 365.8 billion USD in 2021

Figure 2.12 Cumulative renewable energy investment in Africa and globally, 2000-2020



- Only 2% (equivalent to USD 60 billion) of the USD 2.8 trillion invested in renewable energy globally between 2000 and 2020, excluding large hydropower, went to Africa.

✓ Sub-Saharan Africa received 75% of the total investment within Africa. But it was less than USD 41 billion cumulatively during 2000-2020 – that is, less than 1.5% of the amount invested globally during that period. Investments in the region dropped considerably in 2021, to one-quarter of what they were in 2020 (from USD 4 billion to less than USD 1 billion).

✓ Within Africa, 75% of the investments made between 2010 and 2020 went to just four countries: South Africa, Morocco, Egypt and Kenya.

Source: IRENA and CPI (2023) Global Landscape of Renewable Energy Finance

Contents

SDG 7.3 Energy Intensity

Globally it currently takes 4.6 MJ (megajoules) of energy to generate USD 1 of economic activity in 2020

- Africa is the least efficient region with 5.4 MJ/USD GDP, followed by Asia with 5.0 MJ/USD GDP. Both regions have higher energy intensity than the world average and the progresses are slow.
- Latin America & the Caribbean is least energy intensive region with 3.3 MJ/USD GDP, followed by North America and Europe (4.1 MJ/USD GDP) and Oceania (4.3 MJ/USD GDP). Three regions' energy intensities have not been improved since 2019.
- Of top 20 most energy consuming countries:
  - Two-third have lower energy intensity than the top 20 peer average.
  - 12 are more efficient than the world average, with the United Kingdom, Italy and Turkey leading the way.
  - 17 countries have improved their energy intensity since 2015.

  Focus on countries in these top 20 energy consuming countries with higher energy intensity and/or low improvement rate will be effective.

Looking back, we see that the global energy intensity has decreased from 5.5 MJ/USD GDP in 2010 to 4.6 MJ/USD GDP in 2020, corresponding to an average rate of improvement of 1.8%

- This is a higher pace of improvement compared to the 1.2% in 1990-2010. However, the rates of improvement have significantly slowed down in the recent years, with the lowest 0.4% annual improvement rate from 2019 to 2020 since 2010 and remain well below SDG 7.3 targets. Initial estimates suggest as return to faster progress (2%) in 2022.

Looking forward, we will need an energy intensity improvement rate of at least 3.4 percent per year through 2030 to achieve SDG 7.3, and even higher (4%) to achieve Net-Zero by 2050

- Due to the slowdown in the rate of improvement of energy intensity since 2015, reaching SDG 7.3 will require much higher improvement rate than the originally rate of 2.6 percent. The IEA's scenario analysis show that we are not on track and 3.4% of annual improvement rate is necessary between 2021 and 2030 to achieve SDG7.3
- To ensure we get on track, all end-use sectors (industry, transport and building) need to be incentivized to be more energy efficient. As the economic structures are quite diverse from one country to another, in-depth analysis of sector specific energy intensity data is warranted to create sound strategies for each country

Methodology

Description

Data Source

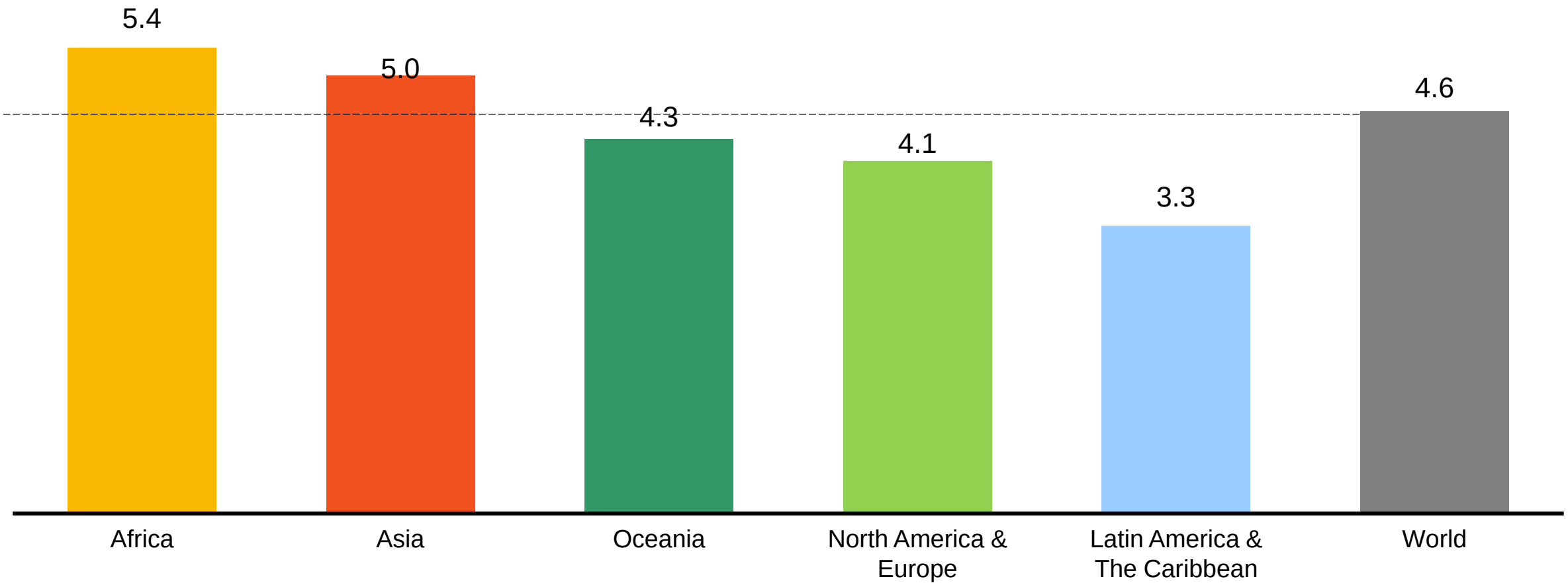
- The following data was gathered from WORLD BANK / ESMAP's Tracking SDG 7 database (download link) with data available between 2010 and 2020
  - Energy intensity per country (Energy intensity level of primary energy (megajoules per constant 2017 purchasing power parity GDP)
  - Total Final Energy Consumption per Country (PJ)
  - Total Energy Supply per Country (ktoe)
  - GDP per Country (billion USD 2017 prices and PPPs)
  - Total Energy Intensity per Region
- The following data was gathered from the IEA's World Energy Outlook 2022 report and its dataset
  - Sources and uses of energy for consumption in 2021 for the World

Projections

- The straight-line extrapolation projection was made via the following process
  - The rate of change of the energy intensity of GDP (Compound Annual Growth Rate, CAGR) between 2010 and 2020 was calculated at a global level
  - The energy intensity of GDP was projected forward to 2030 (by 10 years) using the calculated CAGR as the growth rate
- IEA stated policies scenario was taken from the IEA's World Energy Outlook 2022 report

Today, it takes 4.6 MJ of energy to generate USD 1 of economic activity. Regional Energy Intensities have not largely improved since 2019, except slight improvement in Africa

Energy intensity by region, MJ/USD 2017 ppp[1], 2020



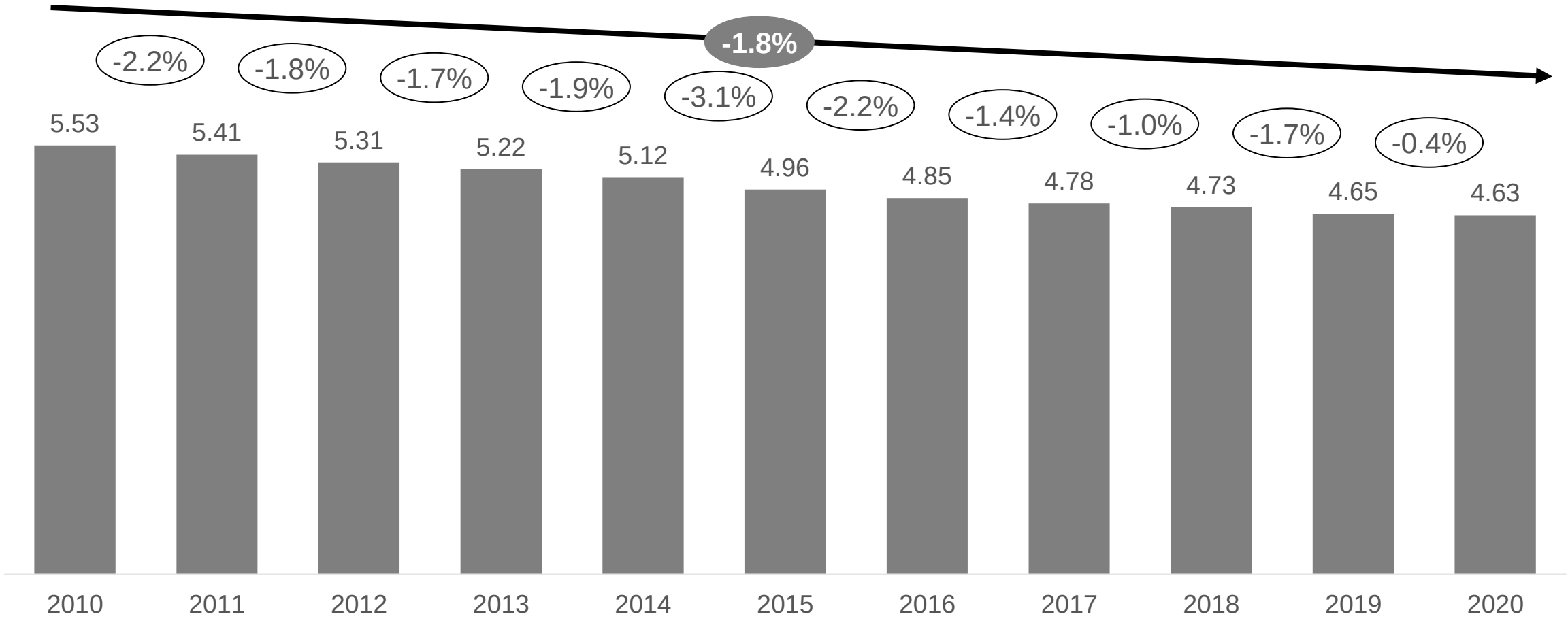
1 Unit is in megajoules per US dollar of GDP at 2017 purchasing power parity

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

There has been a ~0.9 MJ/USD improvement in energy efficiency over the past 10 years. The average annual reduction rate is 1.8% with slower improvement in recent years

Energy intensity, MJ/USD 2017 ppp, 2010-2020

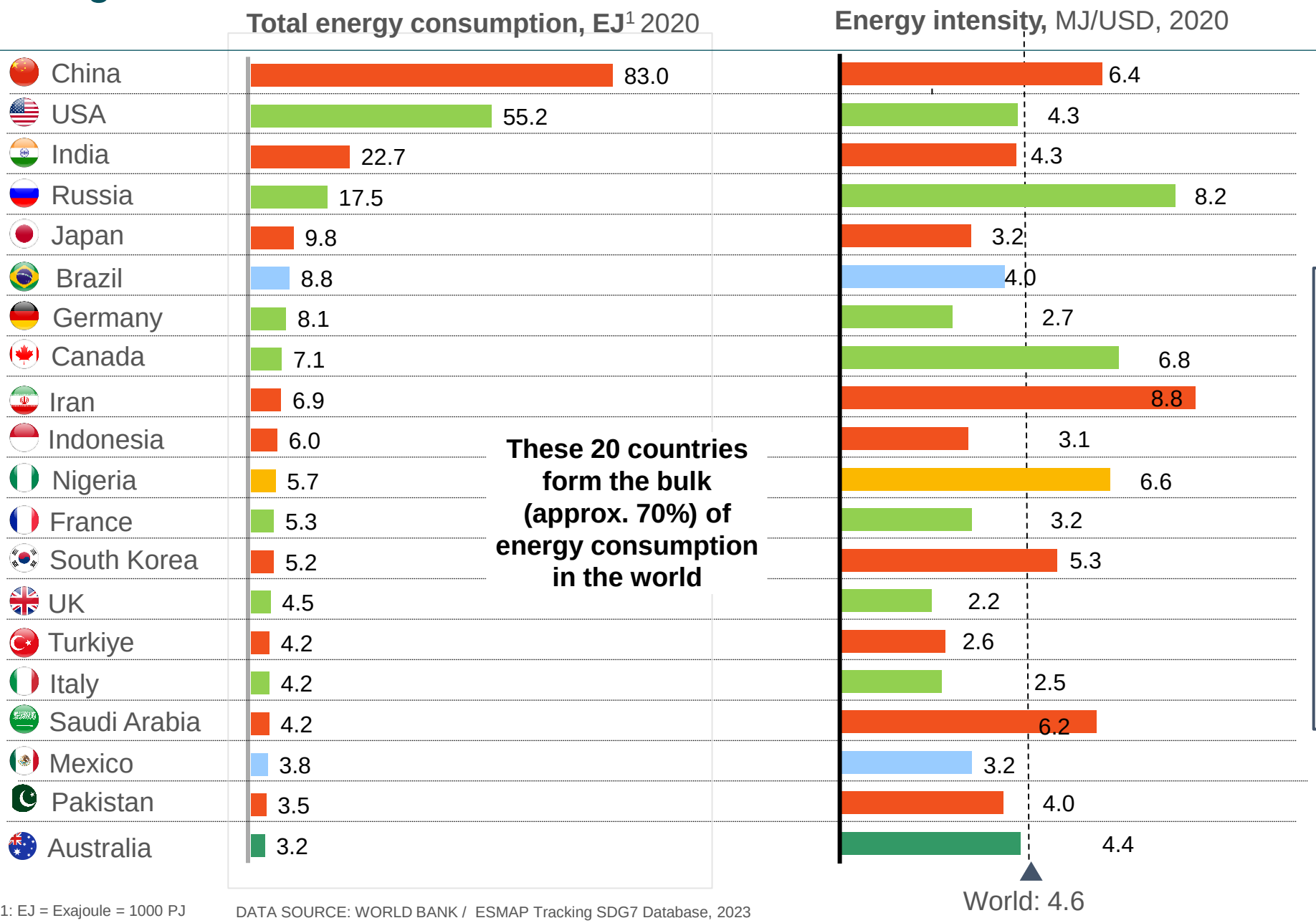
x% 10-year average reduction rate **x%** Annual reduction rate



NOTE: The historical data up to 2019 was also updated with the 2023 dataset. This creates inconsistencies with the analysis in the previous year

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Two Third of top 20 energy consumption countries have energy intensity lower than the world average



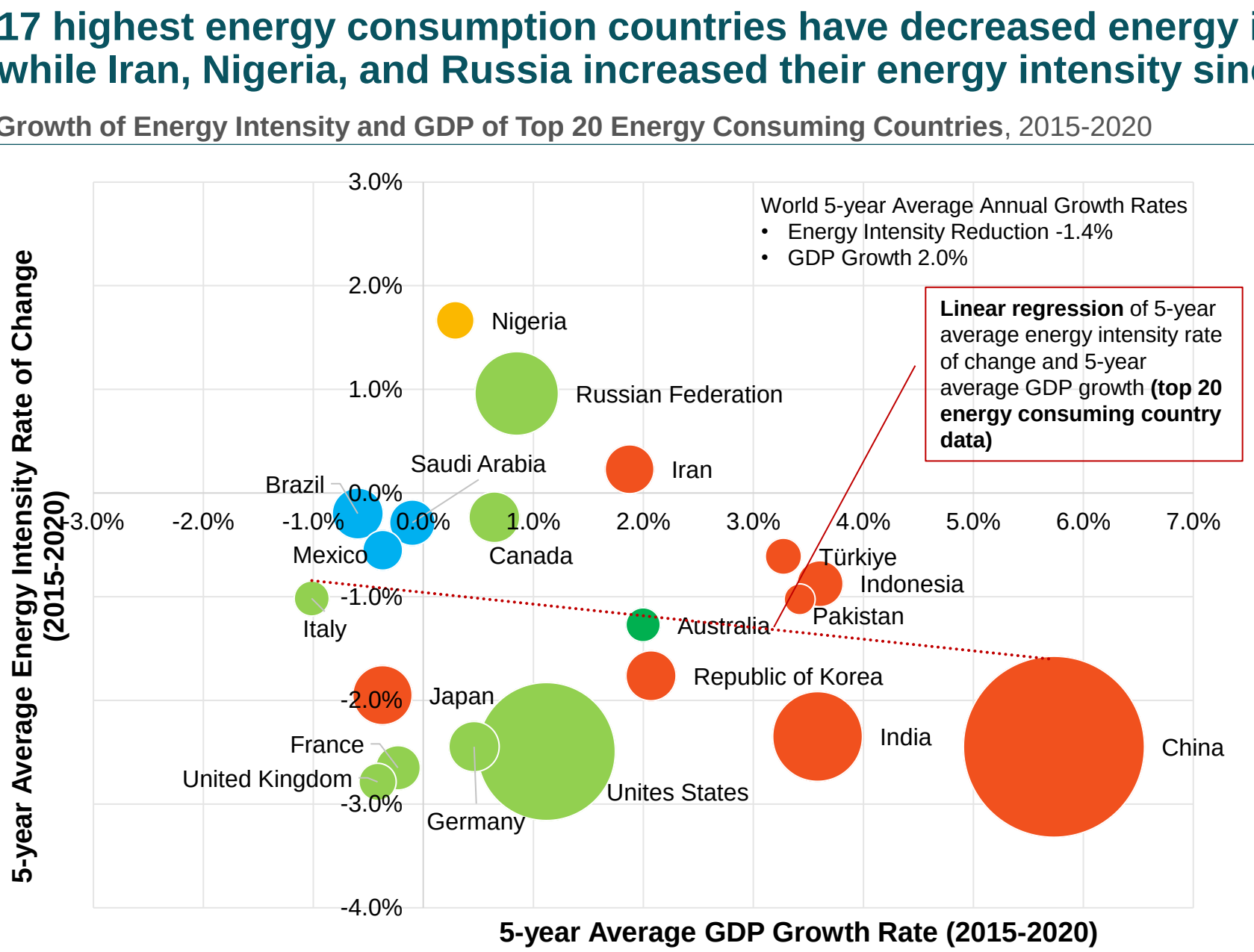
- **Two third of top 20 most energy consuming countries are energy conscientious.**
- Reducing energy intensity of **7 countries (China, Russia, Canada, Iran, Nigeria, Saudi Arabia, South Korea),** which have higher than the world average energy intensity, can accelerate global decarbonization progress greatly.

1: EJ = Exajoule = 1000 PJ

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

17 highest energy consumption countries have decreased energy intensity while Iran, Nigeria, and Russia increased their energy intensity since 2015

Growth of Energy Intensity and GDP of Top 20 Energy Consuming Countries, 2015-2020



- **17 of the top 20 high energy consuming countries have improved their energy intensity** over the last few years.
  - 8 countries have been performing better than the global average based on their 5-year Average Energy Intensity Rate of Improvement.
- Comparison among the top 20 energy consumers shows:
  - **UK, France, Germany, Japan, and United States** have been improving their energy intensity most when taking into account their GDP growth against other top 20 peers.
  - **Nigeria, Russia, and Iran** have been performing very poorly in their energy intensity reduction when taking into account their GDP growth against other top 20 peers. **Turkiye, Canada, Saudi Arabia, Brazil and Mexico** also increased energy intensity.
- **Changes in energy intensity reflect not only changes in energy efficiency, but also in economic structure and activity levels which affect GDP**. Countries with the slowest progress have an opportunity to improve energy efficiency, as well as diversify their economies, for instance away from energy-intensive fossil fuel extraction to more service-oriented economies.

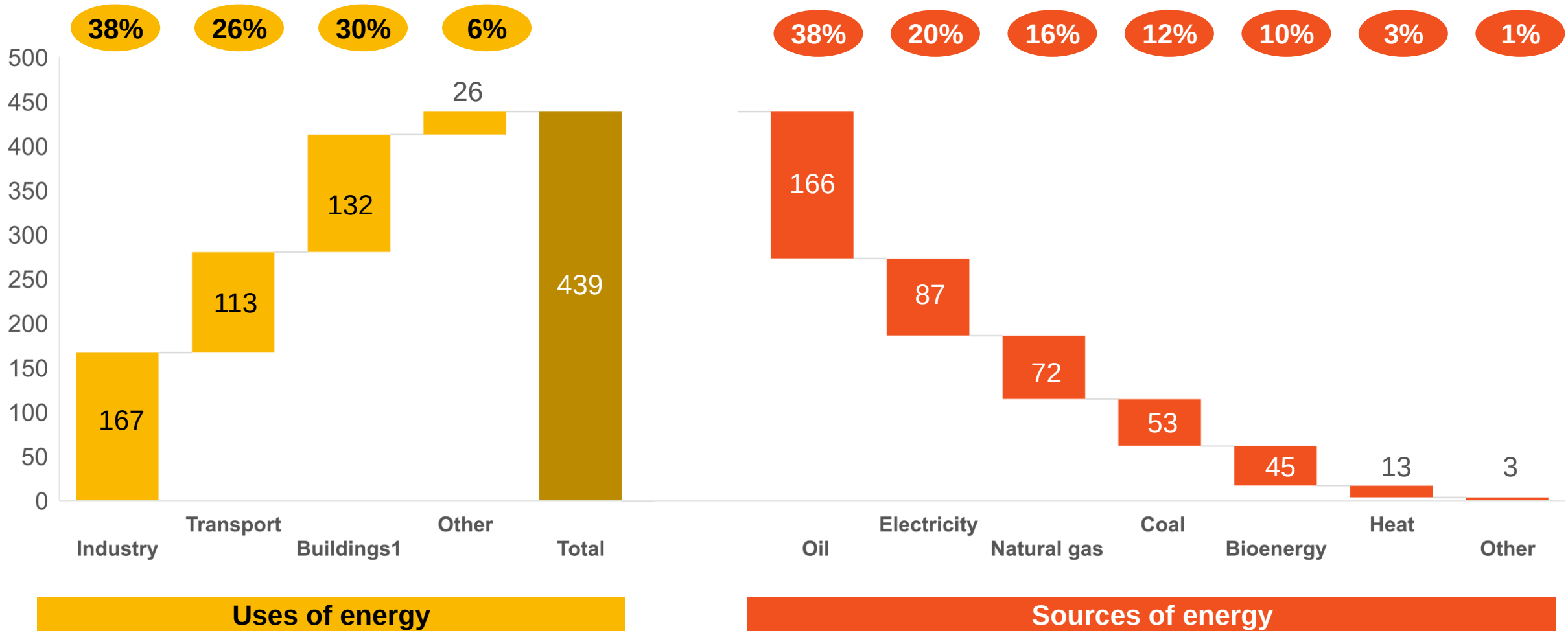
Notes: Energy intensity is defined as total energy supply divided by gross domestic product (GDP). The 2020 data shows Thailand, instead of Pakistan, is in top 20 energy supply countries. However, the comparison here was made for top 20 energy consumption countries.

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023

Energy is mainly used in industry, transport and buildings with oil as the dominant source, followed by electricity

x% Share of total energy consumption

Sources and uses of energy for consumption by sector, EJ, 2021



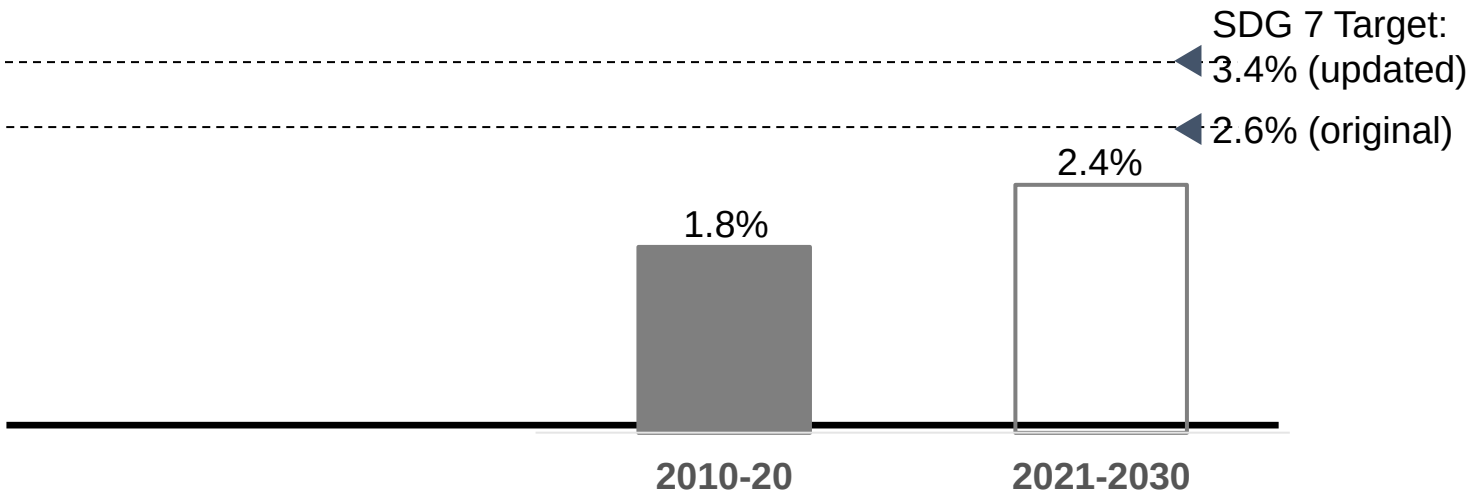
1 Both residential and services.

SOURCE: IEA World Energy Outlook World Dataset, 2022

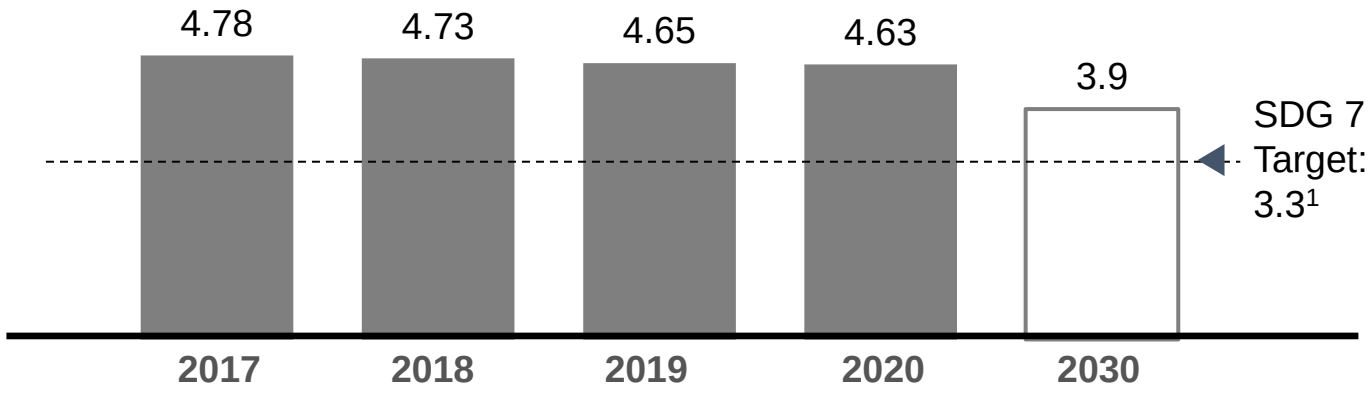
An energy intensity improvement rate of at least 3.4 percent per year through 2030 will be needed to achieve SDG 7.3

Forecast

IEA WEO Stated Policies Scenario, 2022, Annual Primary Energy Intensity Improvement Rates



Energy Intensity, MJ/USD 2017 ppp



- Although recent improvement has been made, slower improvement rate of the late 2010s before the Covid-19 pandemic and the estimated substantial pandemic-related efficiency setbacks in 2020 made 3.4% of annual rate of improvement necessary for the 2020s.
- More aggressive and diverse policy and investments are required to achieve the required improvement rate by 2030, across all sectors and countries.
- High energy consumption economies with high energy intensity or the slowest progress need urgent and focused policy and investments.

1: The target calculated with 2.6% of improvement rate after 2015.

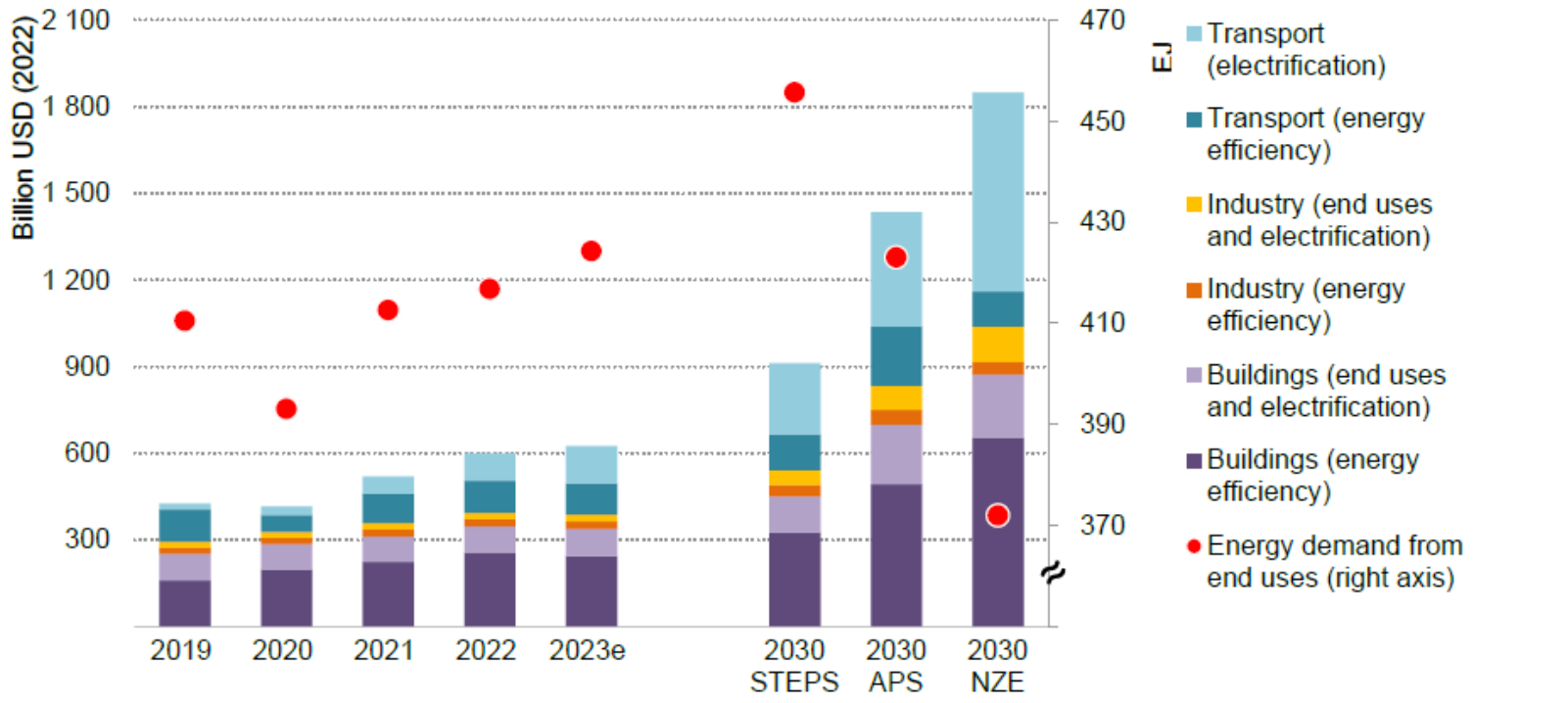
NOTE: The World Bank/ESMAP historical data up to 2019 were also updated with the 2023 dataset. This creates inconsistencies with the analysis from the previous year.

SOURCE: World Bank/ESMAP Tracking SDG7 Database, 2023 and Tracking SDG7 Progress Report 2023

Global investment in energy efficiency has increased to USD 391 billion in 2022, as a part of the total end use sector investments of USD 600 billion.

Global Energy Efficiency Investment, billion USD

Global investment in energy efficiency, electrification and renewables for end uses and energy demand for end uses compared with annual average investment needs in 2030, by scenario



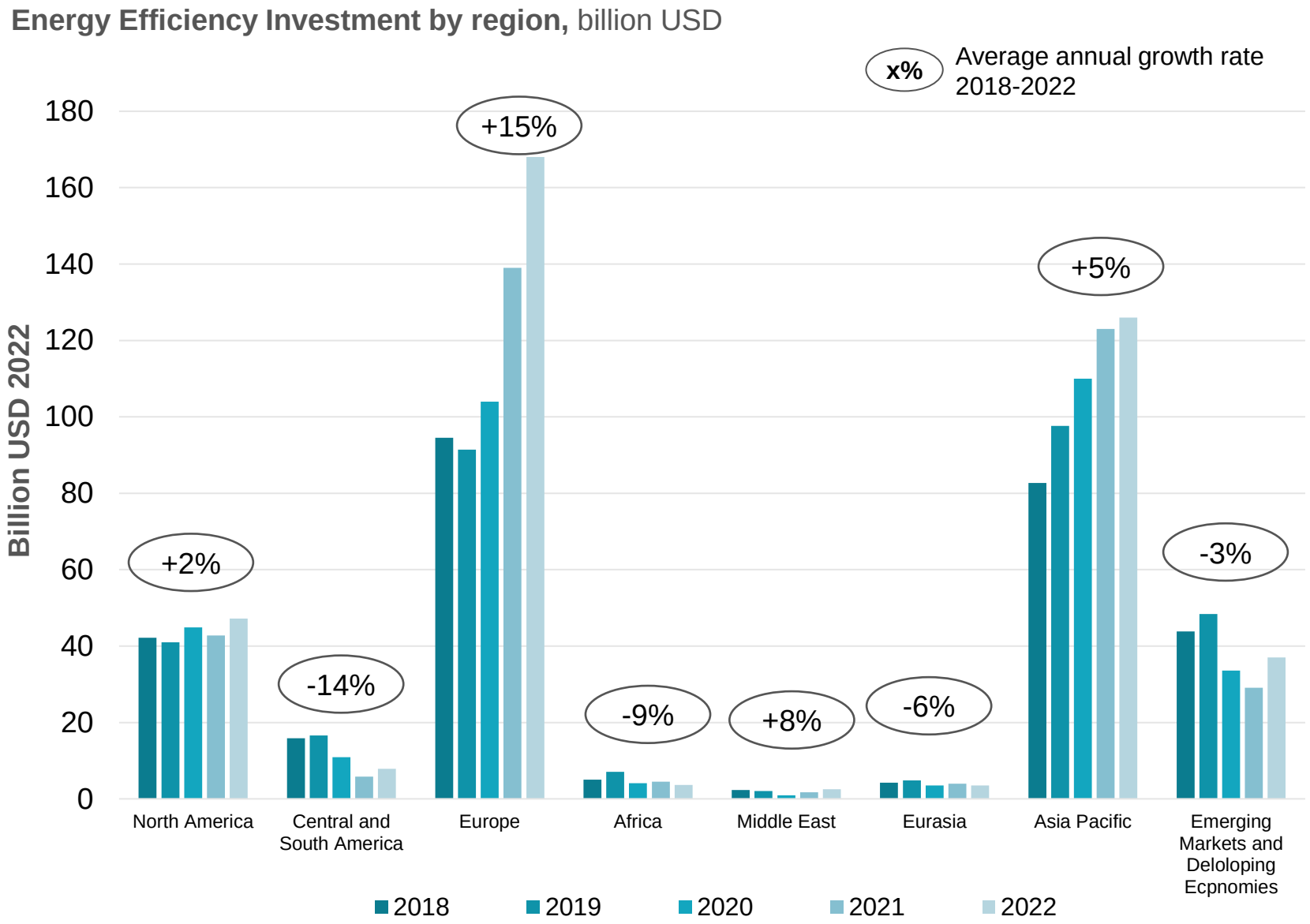
IEA. CC BY 4.0.

Notes: APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario; STEPS = Stated Policies Scenario; includes end-use renewables in the buildings and industrial sectors; 2023e = estimated values for 2023.

Source: IEA World Energy Investment 2023

- Global investment in total end use sector, which include energy efficiency and end use and electrification, grew 11% in 2022, thanks to dynamic growth in electrification of the transport sector.
- Energy efficiency investment alone grew 12% from 2021. An 3% growth in energy efficiency investment was recorded in the industry sector in 2022.
- The IEA cautiones that investment in energy efficiency could face headwinds in 2023 across all sectors but currently anticipate that overall spending will grow modestly by 4% in 2023.
- To achieve Net-Zero by 2050, annual investment in end uses needs to triple by 2030. The investment gap is largest in emerging and developing economies, where a 10x increase is needed.

Europe and Asia Pacific are leading energy efficiency investment, followed by North America



- There is strong regional discrepancy in energy efficiency investment
  - Europe and Asia Pacific have been strongly leading energy efficiency investments.
  - China received more than 50% of investments in Asia Pacific until 2020. But this share is getting lower in 2021 (45%) and 2020 (44%), indicating more investment are made in other countries of the region.
  - Central and South America, Africa, Middle East and Eurasia regions have much weaker investments
  - Two years in row, all regions except Africa and Eurasia saw the increase of investment from 2021 to 2022
  - Emerging Markets and Developing Economies (EMDE) show weaker investment than developed economies.
- The average growth rates (2018-2022) also vary greatly across regions.
  - Europe shows significant growth rate increase with strong investment in 2021 and 2020.
  - Africa, Central America and South America, Eurasia and EMDE as a whole show weak investments in recent years.

Data Source: IEA World Energy Investment Datafile 2023

Appendix

Asia

10 Asian countries will achieve universal access by 2030 with the current rate of improvement, while 9 countries will still have unelectrified populations

Countries expected to achieve universal access by 2030

- Afghanistan
- Bangladesh
- India
- Indonesia
- Jordan
- Kyrgyzstan
- Lao Republic
- Mongolia
- Timor-Leste
- Tajikistan

Countries expected to have unelectrified population by 2030

- Cambodia
- DPR Korea
- Myanmar
- Nepal
- Pakistan
- Philippines
- Syria
- Yemen
- Uzbekistan

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; SEforALL analysis

Africa

While only 2 additional African countries will achieve universal access by 2030 with the current rate of improvement, 48 countries will remain with unelectrified populations and 17 of them will have significant numbers of unelectrified populations (10 million or more)

Countries expected to achieve universal access by 2030

- Algeria
- Cabo Verde

Countries expected to have ~10 million or more unelectrified population by 2030

- Angola
- Burkina Faso
- Burundi
- Chad
- DR Congo
- Ethiopia
- Madagascar
- Malawi
- Mali
- Mozambique
- Niger
- Nigeria
- Somalia
- South Sudan
- Sudan
- Tanzania
- Uganda

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; SEforALL analysis

Rest of the World

15 non-Africa/Asia countries will achieve universal access by 2030 if they continue to deliver at the current levels

Countries currently projected to achieve universal access by 2030

- Belize
- Bolivia
- Bulgaria
- Colombia
- Ecuador
- El Salvador
- Guatemala
- Marshall Islands
- Mexico
- Montenegro
- Paraguay
- Russian Federation
- Suriname
- Tuvalu
- Venezuela

DATA SOURCE: WORLD BANK / ESMAP Tracking SDG7 Database, 2023; SEforALL analysis

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