PROGRESS TOWARD

SUSTAINABLE ENERGY

Global Tracking Framework 2015

Coordinators:

WORLD BANK GROUP

International Energy Agency

ESMAP
Energy Sector Management Assistance Program

Partners:

ENERGIA
INTERNATIONAL NETWORK ON GENDER AND SUSTAINABLE ENERGY

FAO
FIAT PANIS

GLOBAL ALLIANCE FOR CLEAN COOKSTOVES

Global Water Partnership

IIASA

ipeec
International Partnership for Energy Efficiency Co-operation

IRENA
International Renewable Energy Agency

REN21
Renewable Energy Policy Network for the 21st Century

PRACTICAL ACTION
Technology challenging poverty

SIWI

UNDESA

UNDP

UN-Energy

UNITED NATIONS FOUNDATION

UNEP

UNEP RISØ CENTRE
ENERGY, CLIMATE AND SUSTAINABLE DEVELOPMENT

UNIDO

United Nations Statistics Division

UN WOMEN

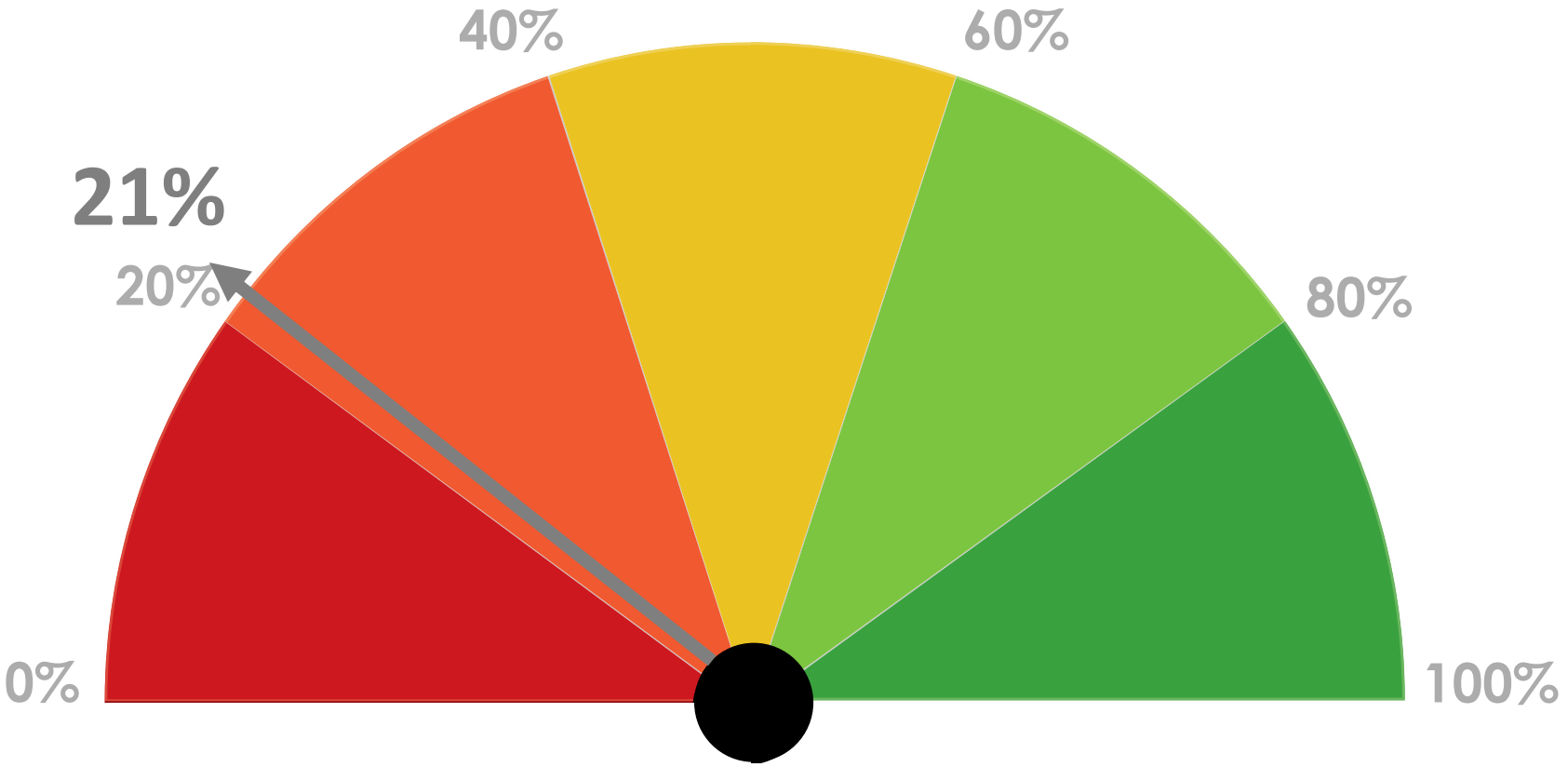
WORLD ENERGY COUNCIL
CONSEIL MONDIAL DE L'ÉNERGIE
For sustainable energy.

World Health Organization

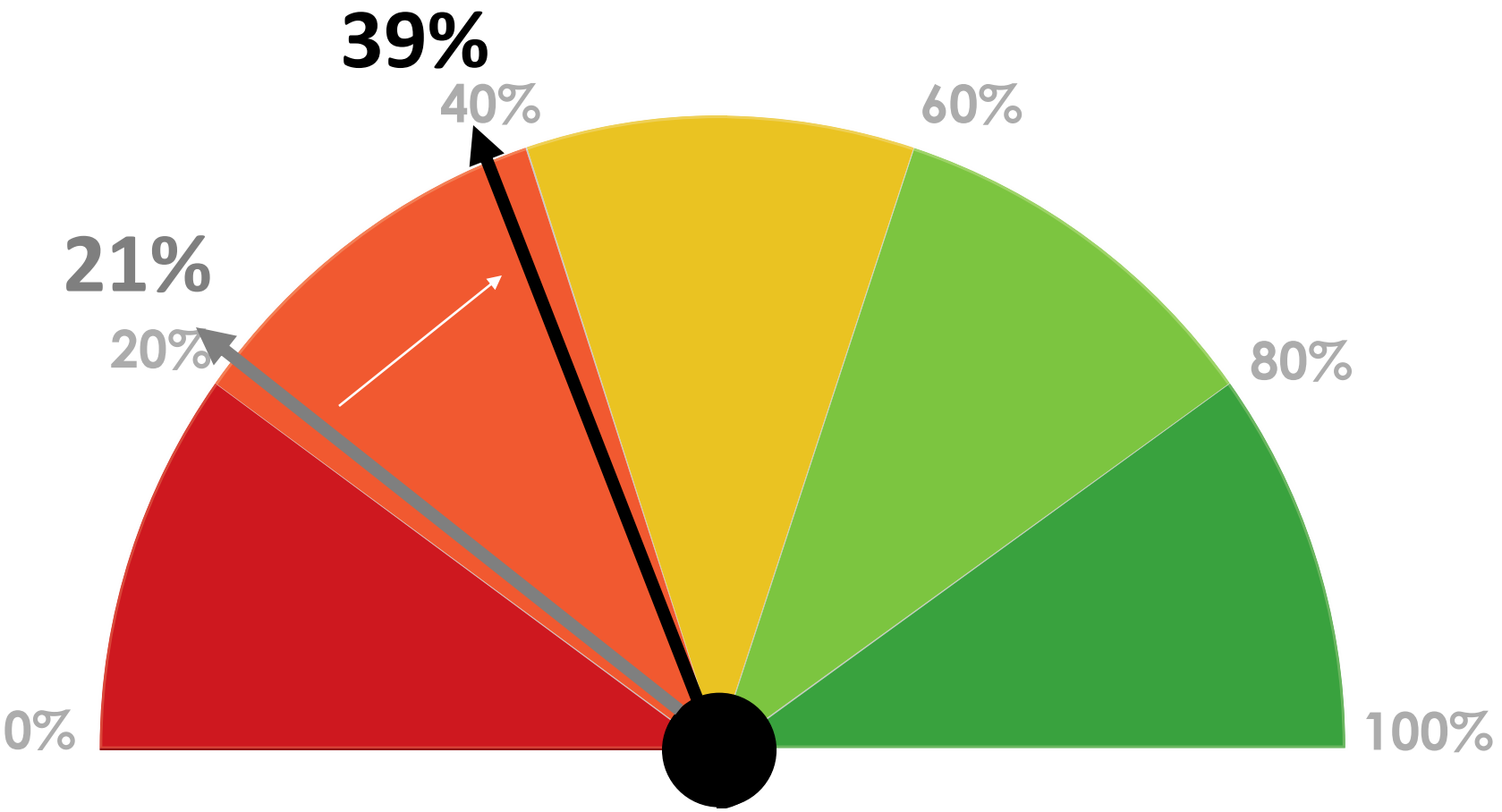
Global Tracking Framework 2015 Results for Africa

Despite some acceleration, Africa still not moving fast enough to end energy poverty by 2030

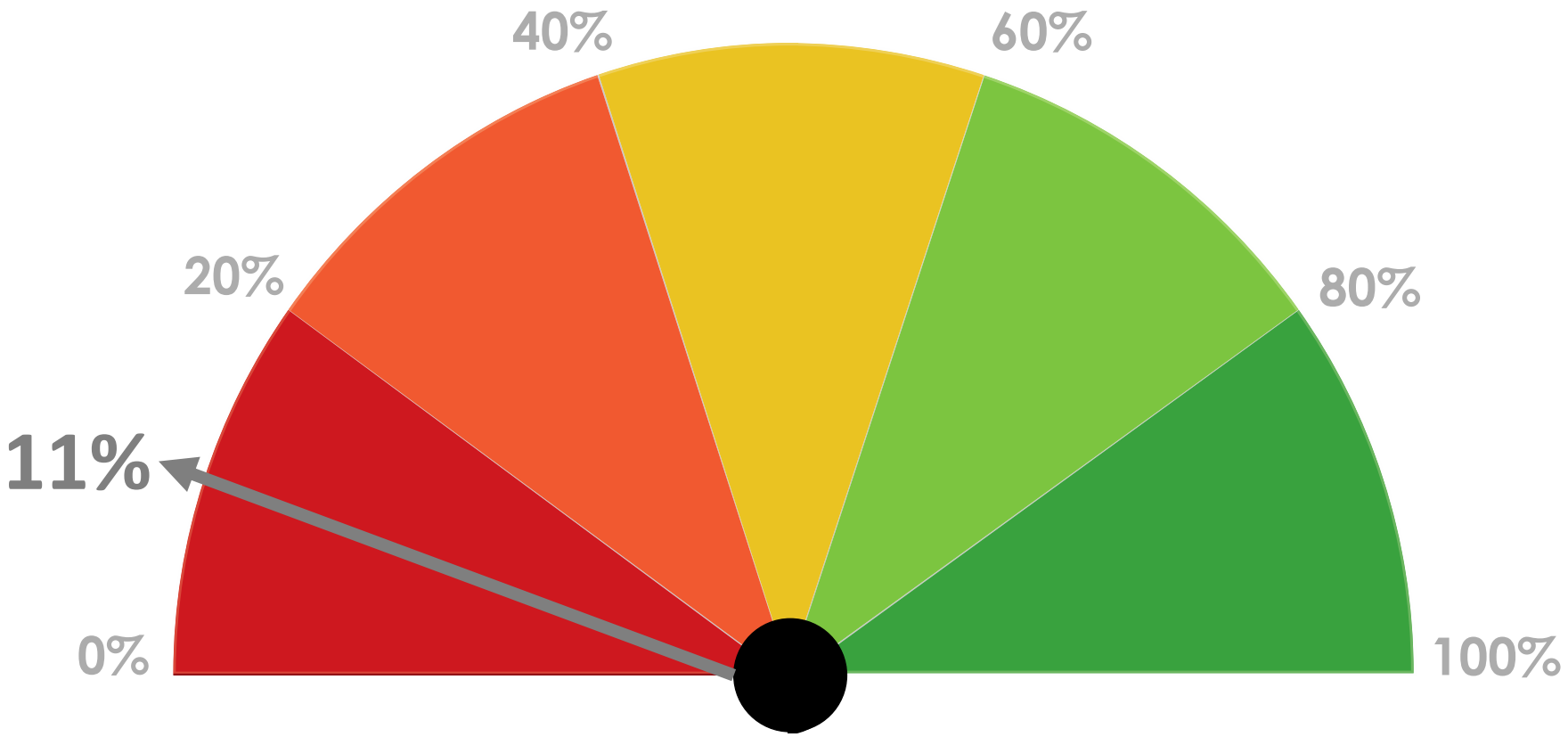
Pace of electrification doubled in recent years, but needs to double again to meet SDG7



Pace of electrification doubled in recent years, but needs to more than double again to meet SDG7



Minimal progress on access to non-solid fuels, and moving even more slowly than in the past



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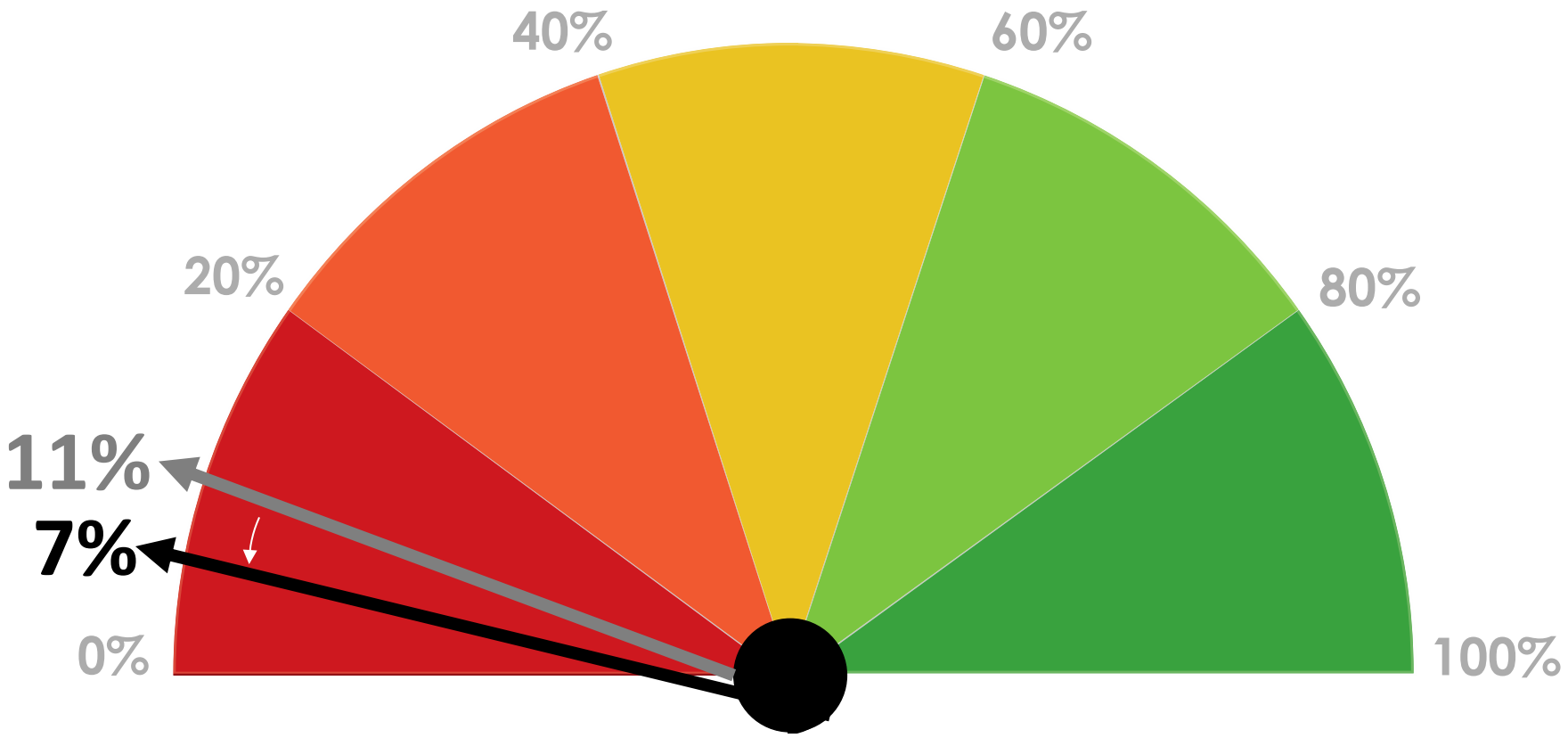
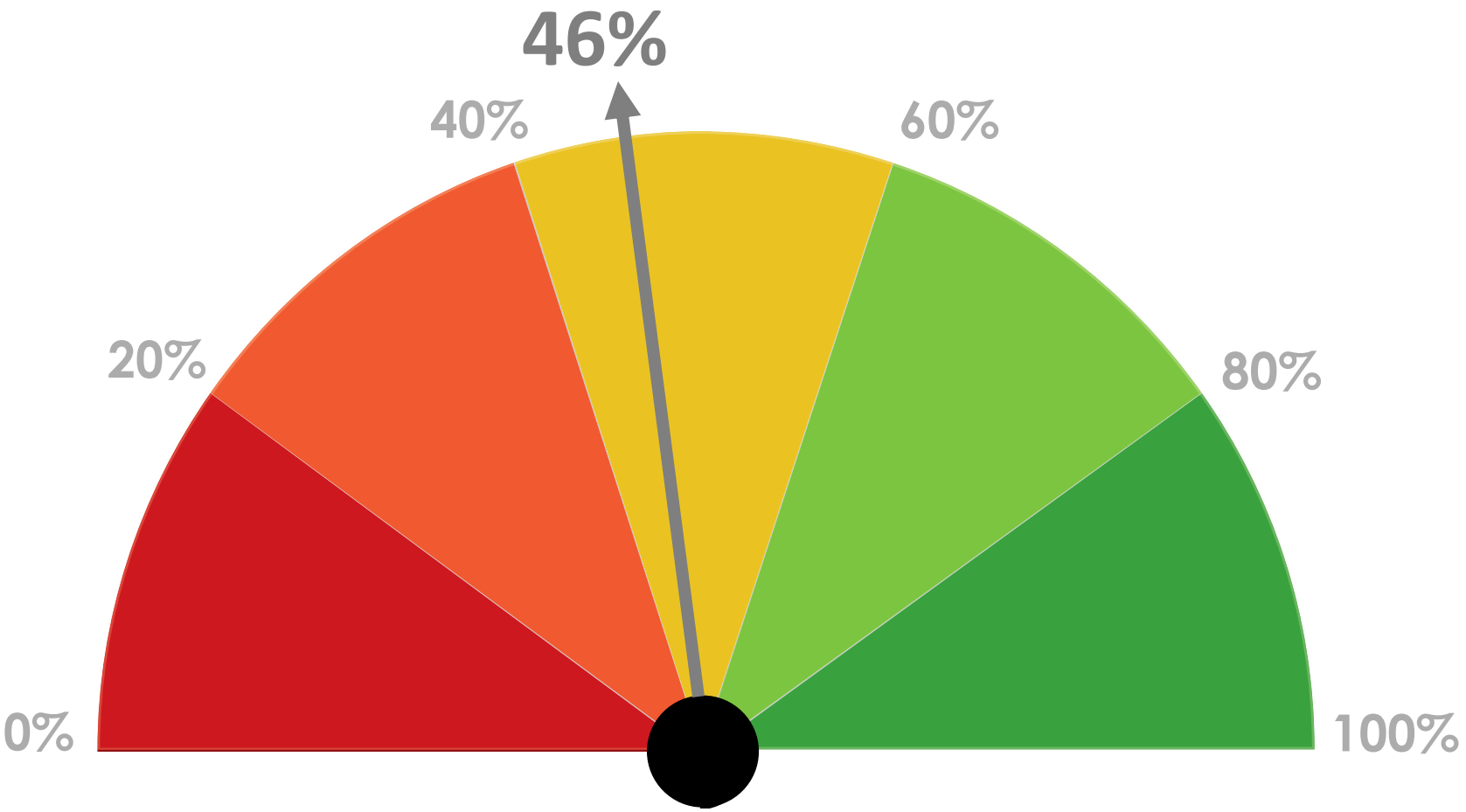


Africa's progress on energy efficiency is about half of what the global target envisages



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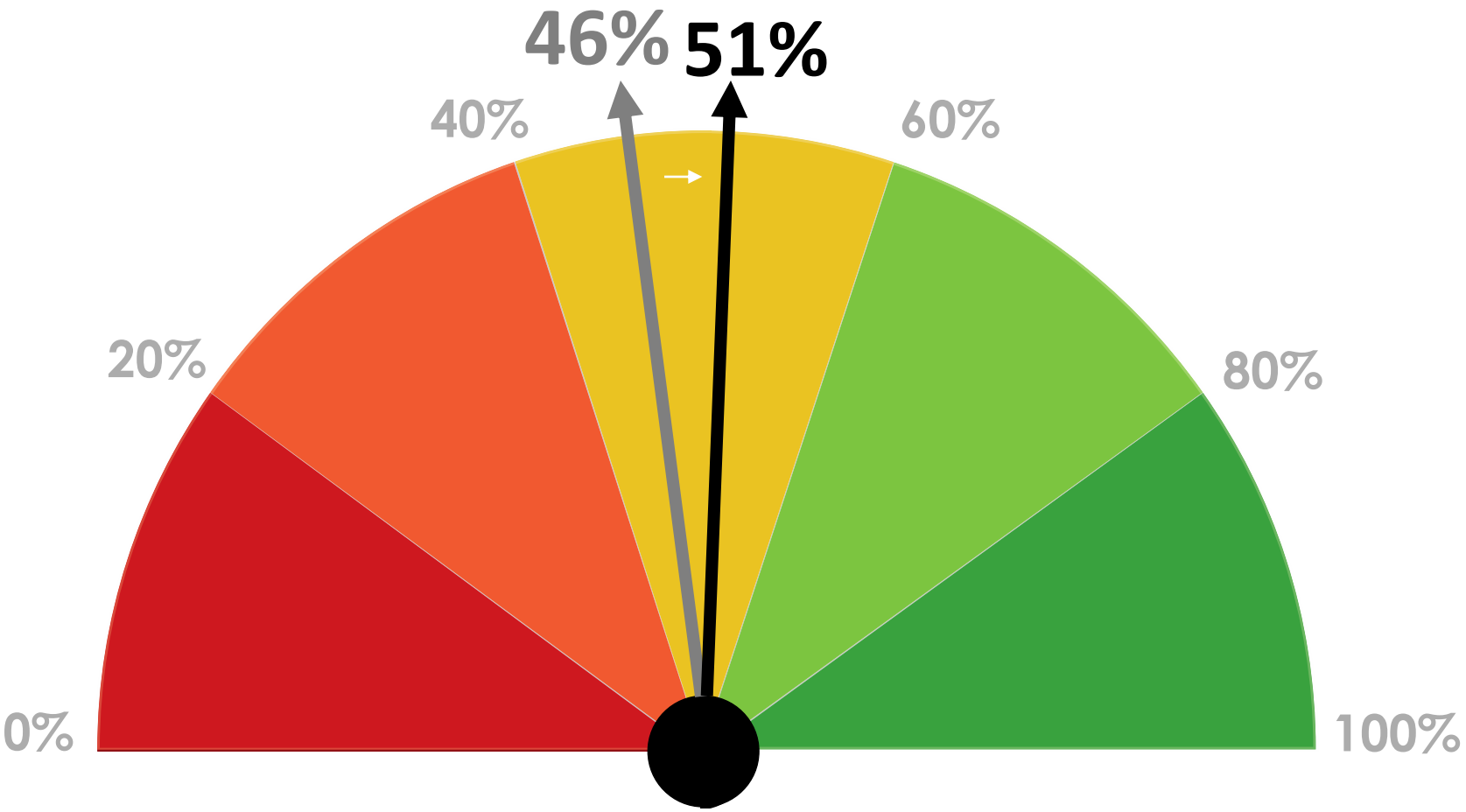
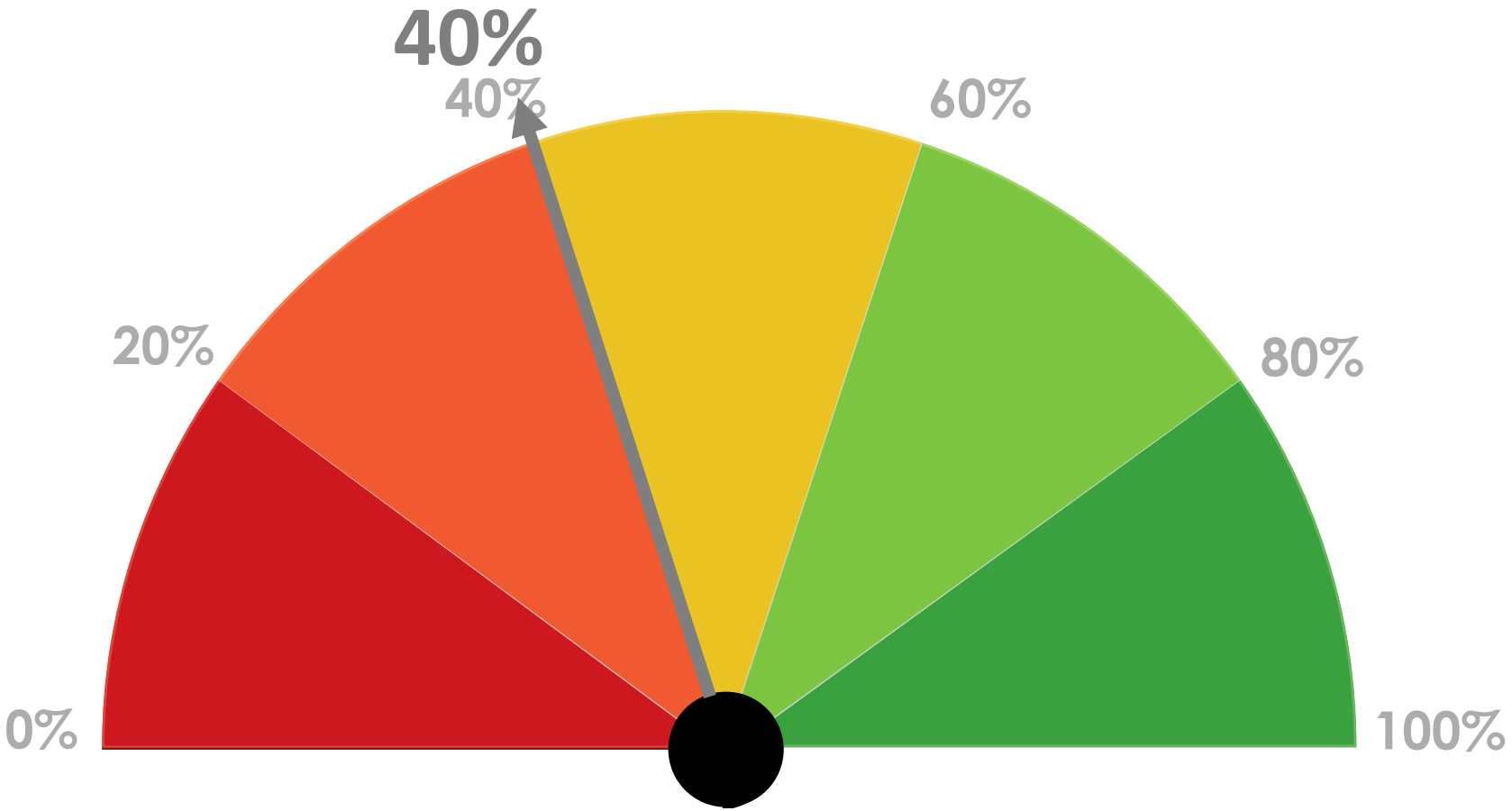


Recent acceleration of modern renewables, consistent with a doubling of the share by 2030



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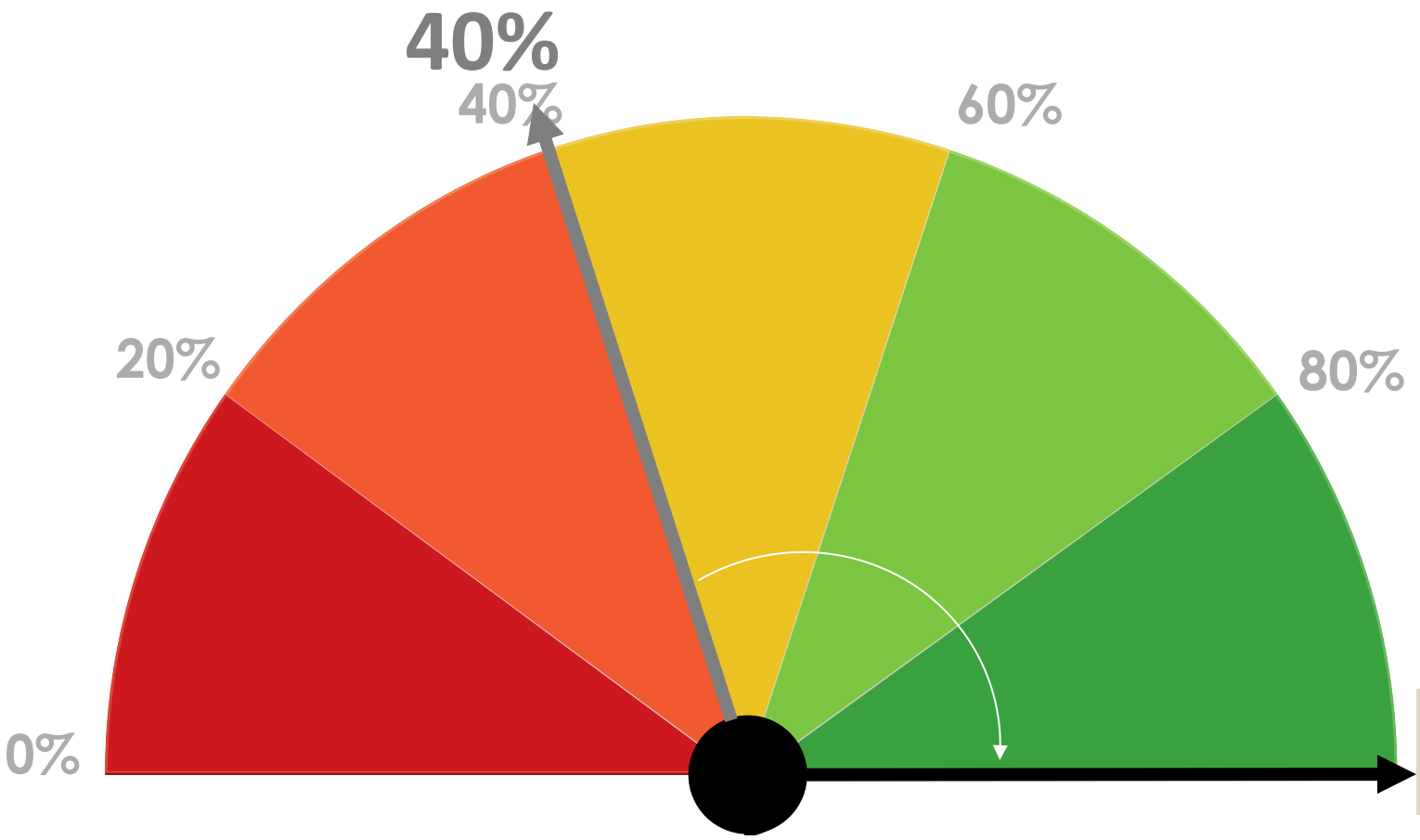
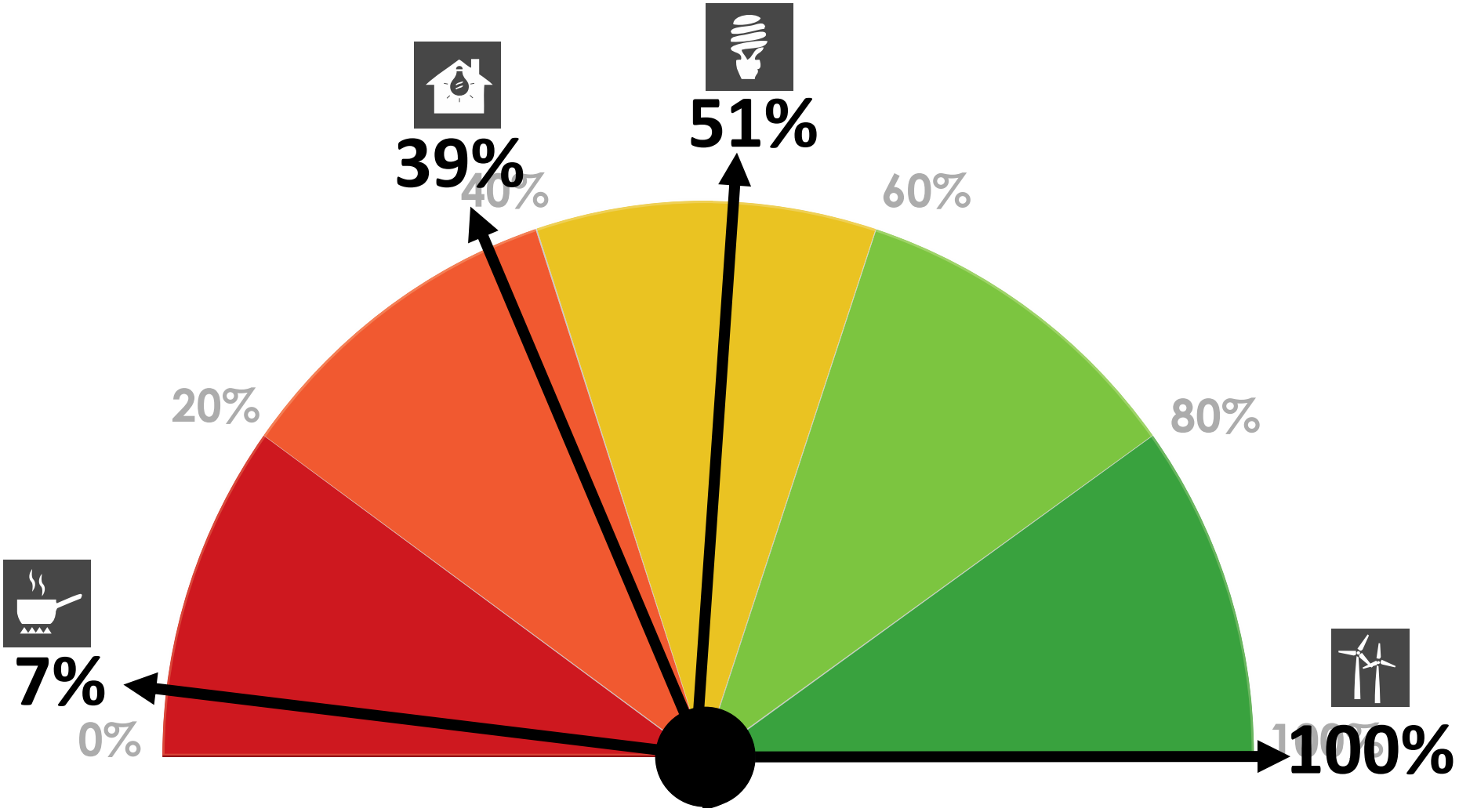
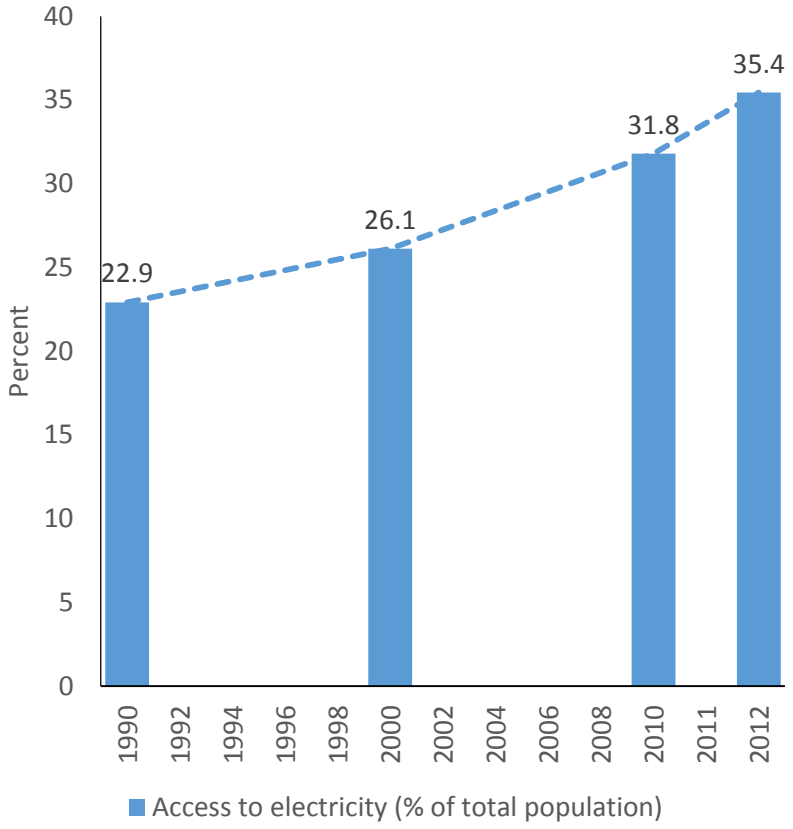


Africa's overall progress: a mixed report card

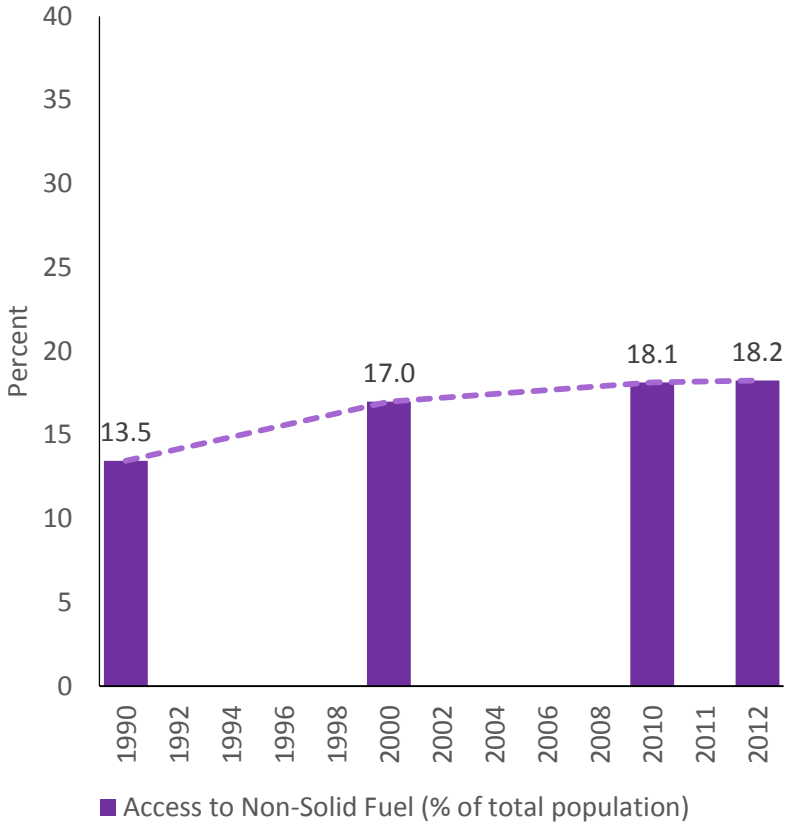


Many African countries are gearing-up on electrification, but challenge to stay ahead of population growth

Notable long term acceleration in electrification rates, and stagnation in progress on non-solid fuels

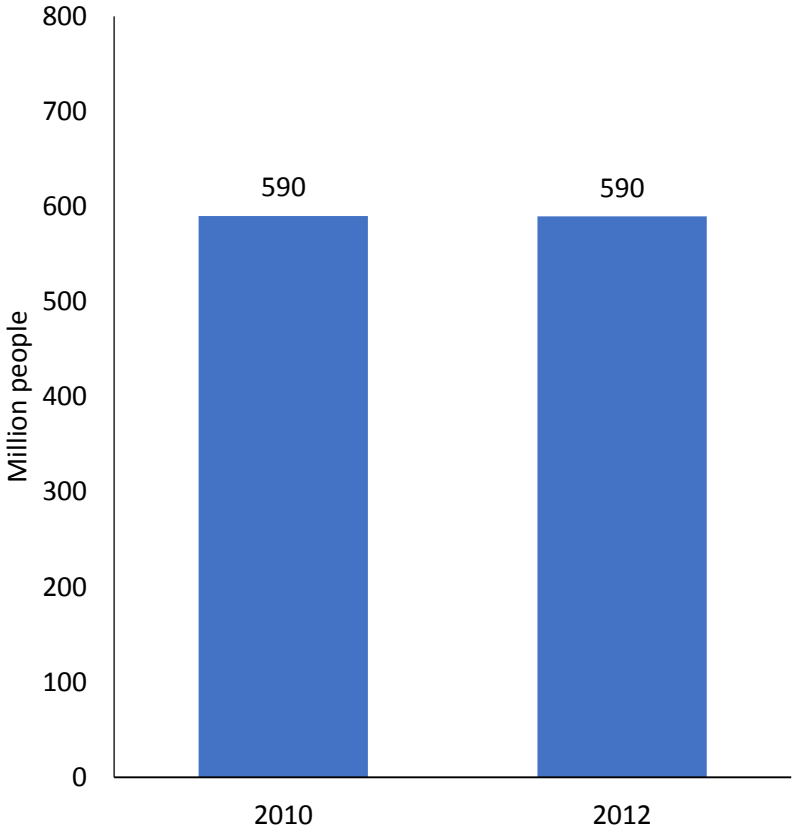


Access to electricity, 1990-2012

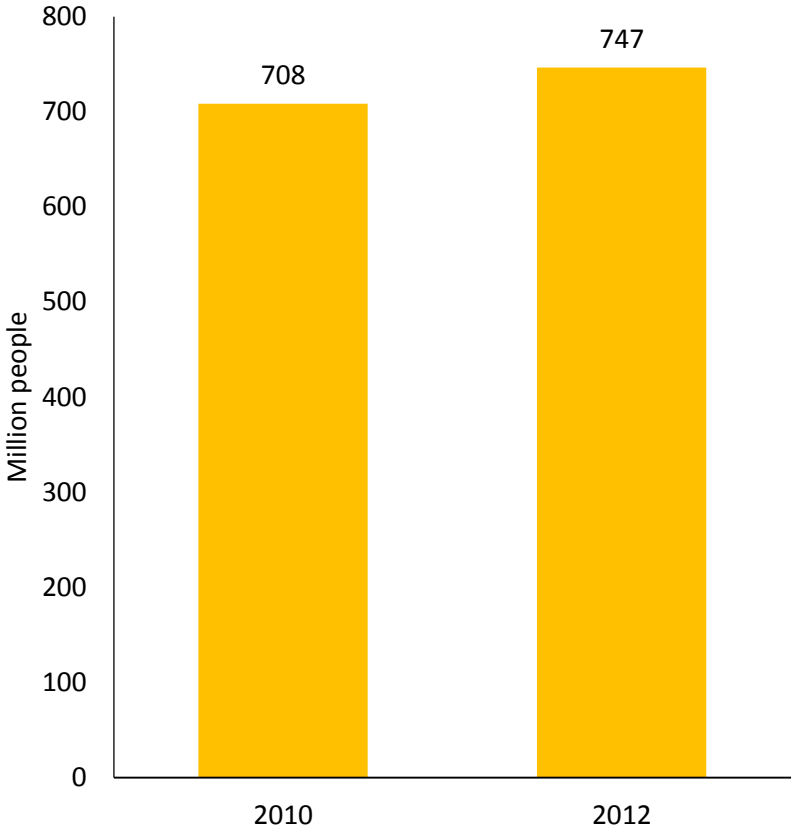


Access to non-solid fuels, 1990-2012

Absolute number of people without access constant for electricity (at 590m), growing for non-solid fuels (to 747m)

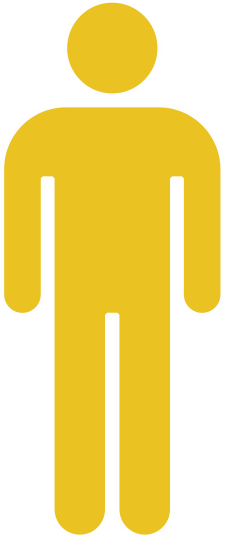


Electricity access deficit (millions of people)

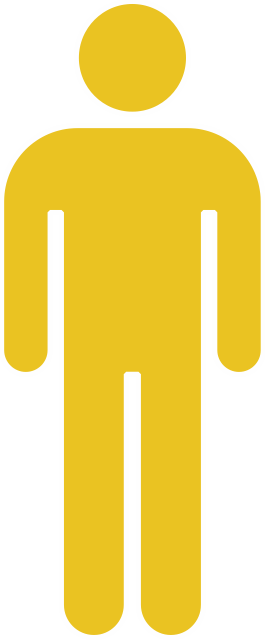


Non-solid fuel access deficit (millions of people)

For the first time, African pace of electrification just kept up with population growth; not so for non-solid fuels

24 million	24 million	5 million
		
Average annual increase in electrified population 2010-2012	Average annual population increase 2010-2012	Average annual increase in population with access to non-solid fuels 2010-2012

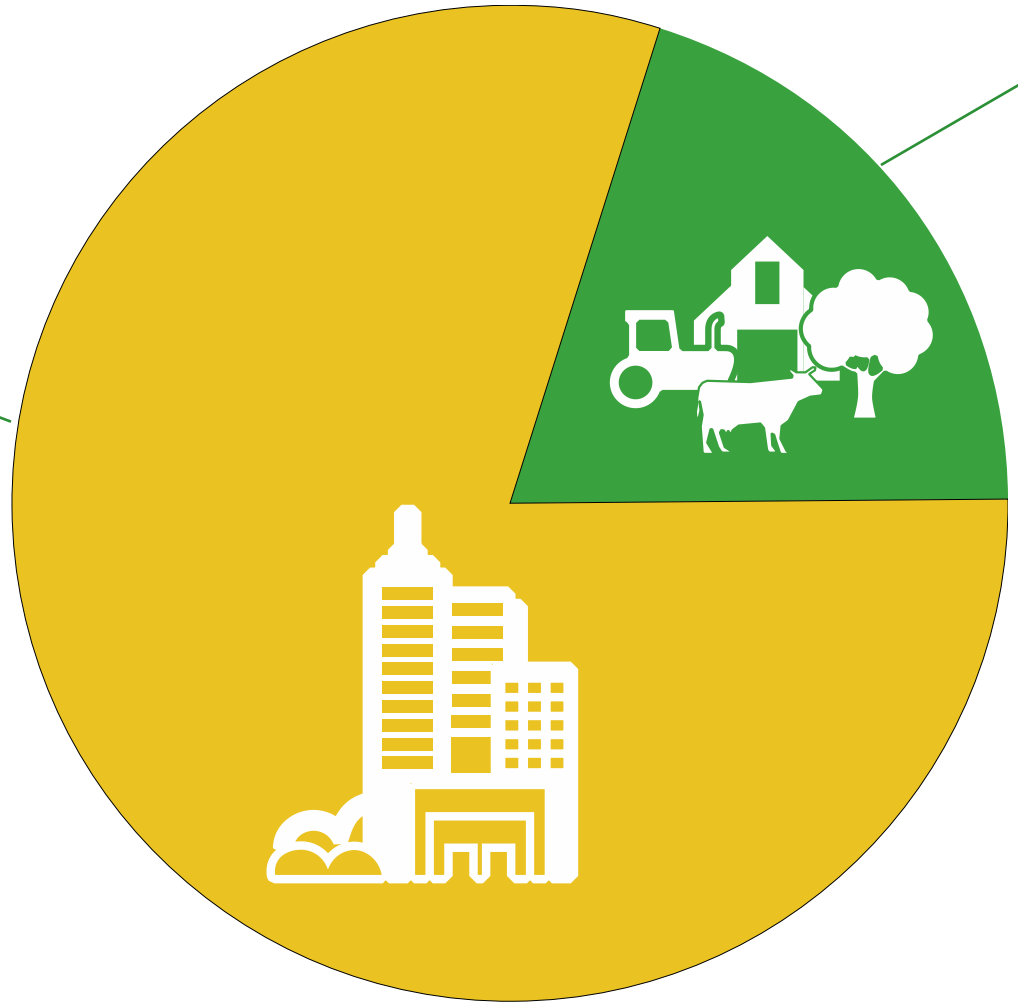
In South Asia, pace of electrification already almost four times faster than population expansion

38 million	11 million	11 million
		
Average annual increase in electrified population 2010-2012	Average annual population increase 2010-2012	Average annual increase in population with access to non-solid fuels 2010-2012

To stay ahead of population and meet SDG7 target 60-70 million Africans will need to gain access each year

24 million	24 million	5 million
		
Average annual increase in electrified population 2010-2012	Average annual population increase 2010-2012	Average annual increase in population with access to non-solid fuels 2010-2012
62 million	**29 million**	**71 million**

Four times as many people gained energy access in urban than rural areas over 2010-2012



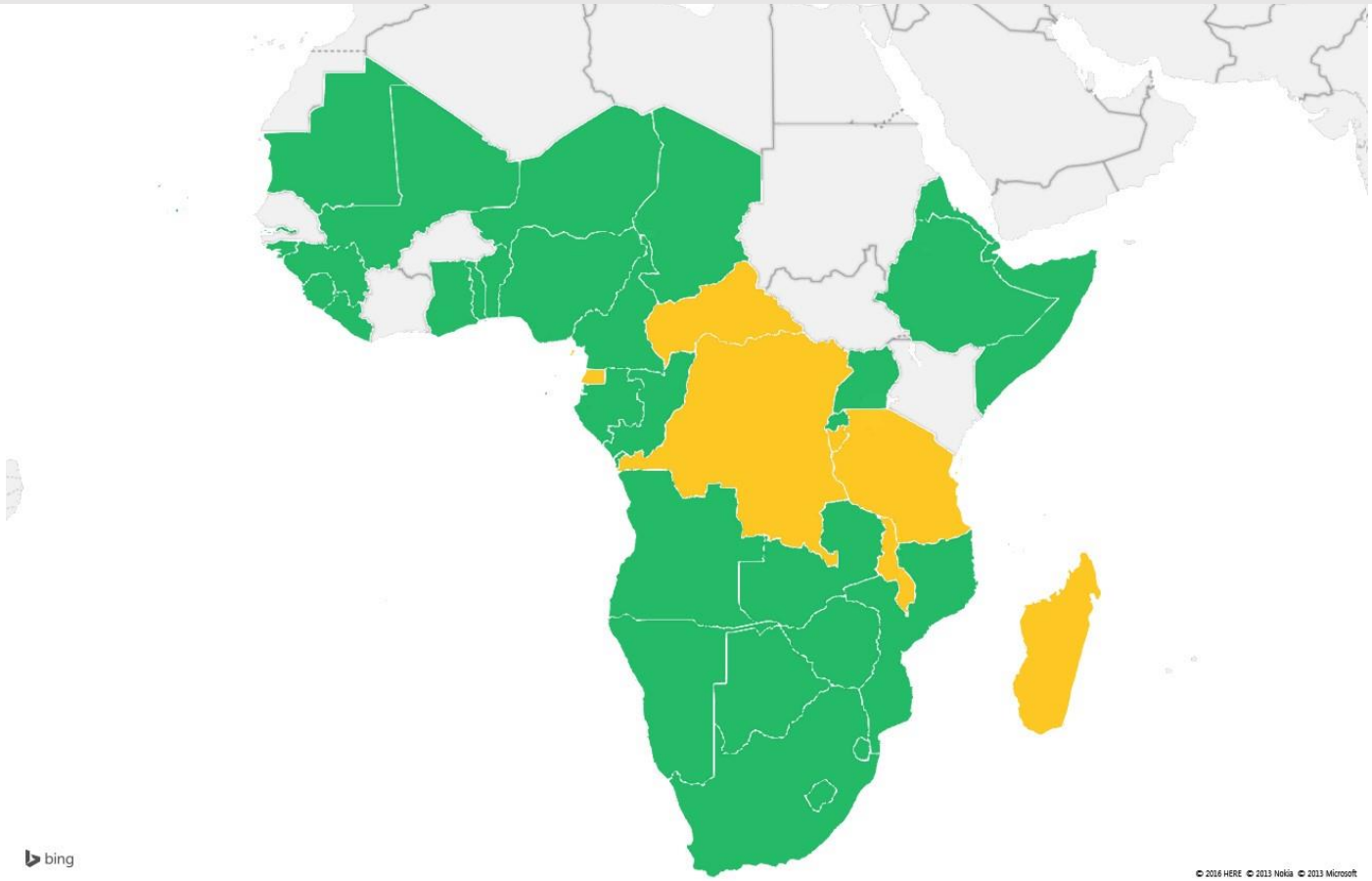
Most African countries making good progress on electrification

Electrification rate did not increase between 2010-2012

Electrification rate increased by less than 2 percentage points 2010-2012

Electrification rate increased by at least 2 percentage points 2010-2012

Most African countries making steady progress on electrification



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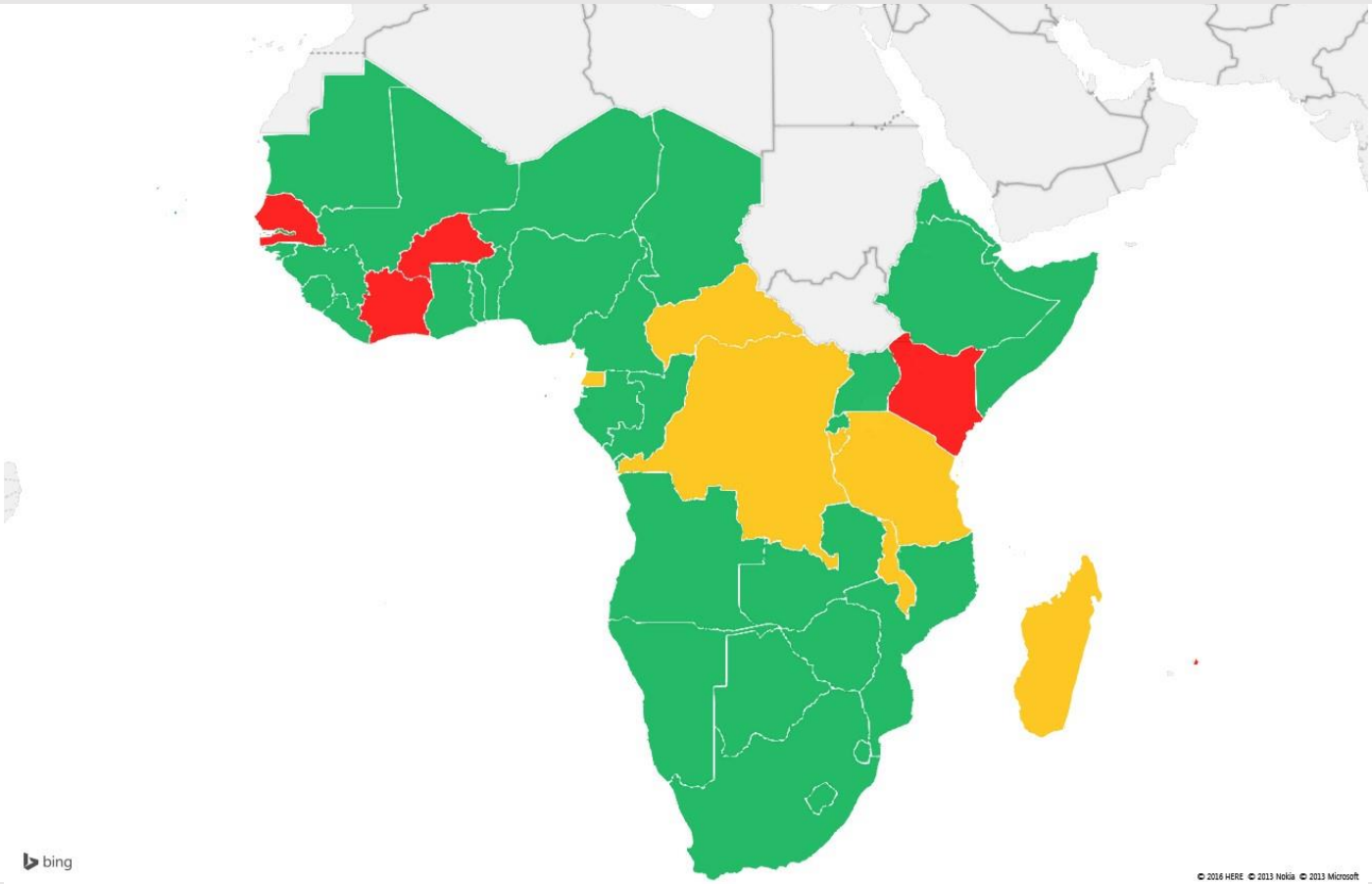

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Progress on access to non-solid fuels lackluster across the board

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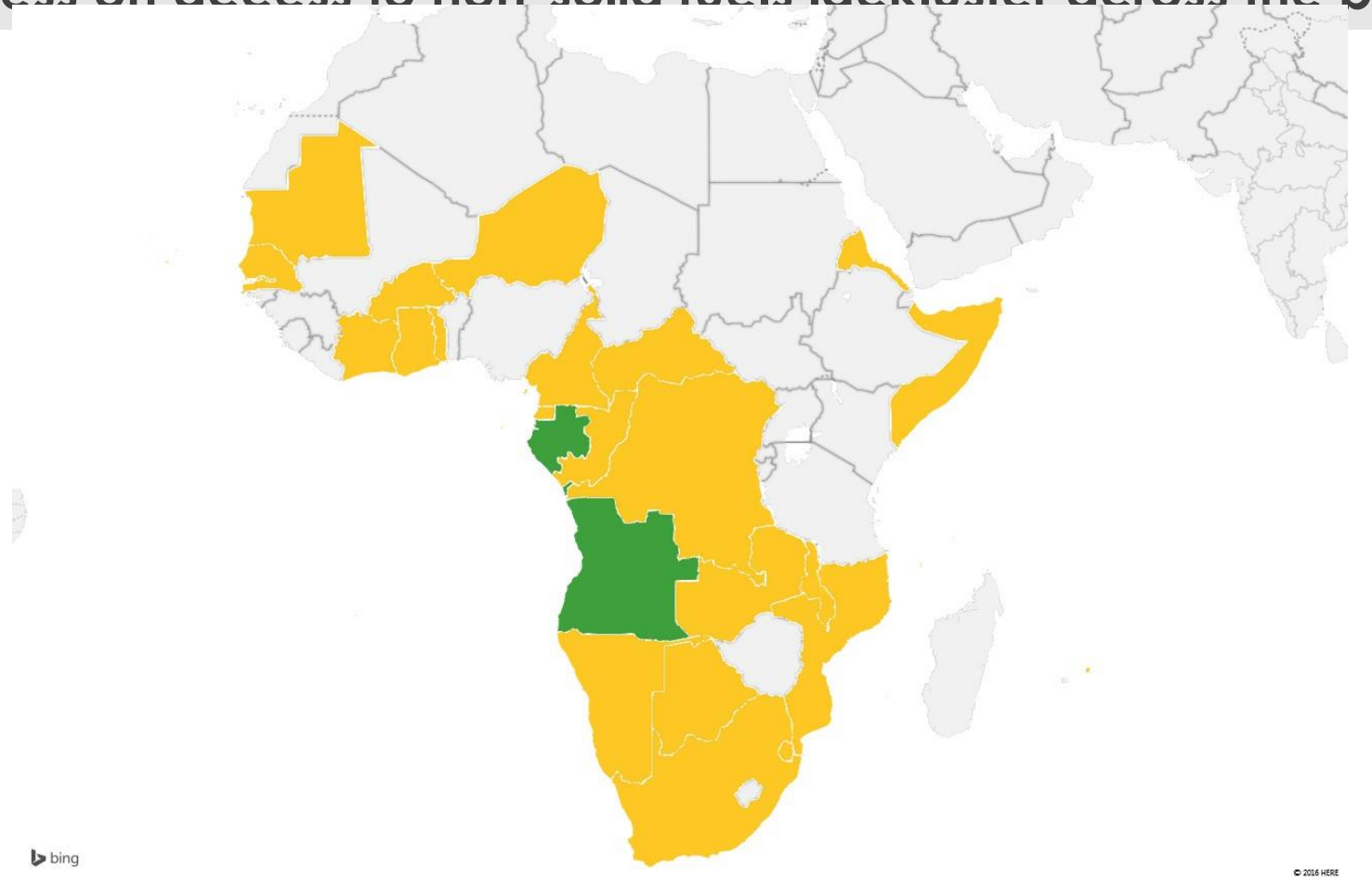

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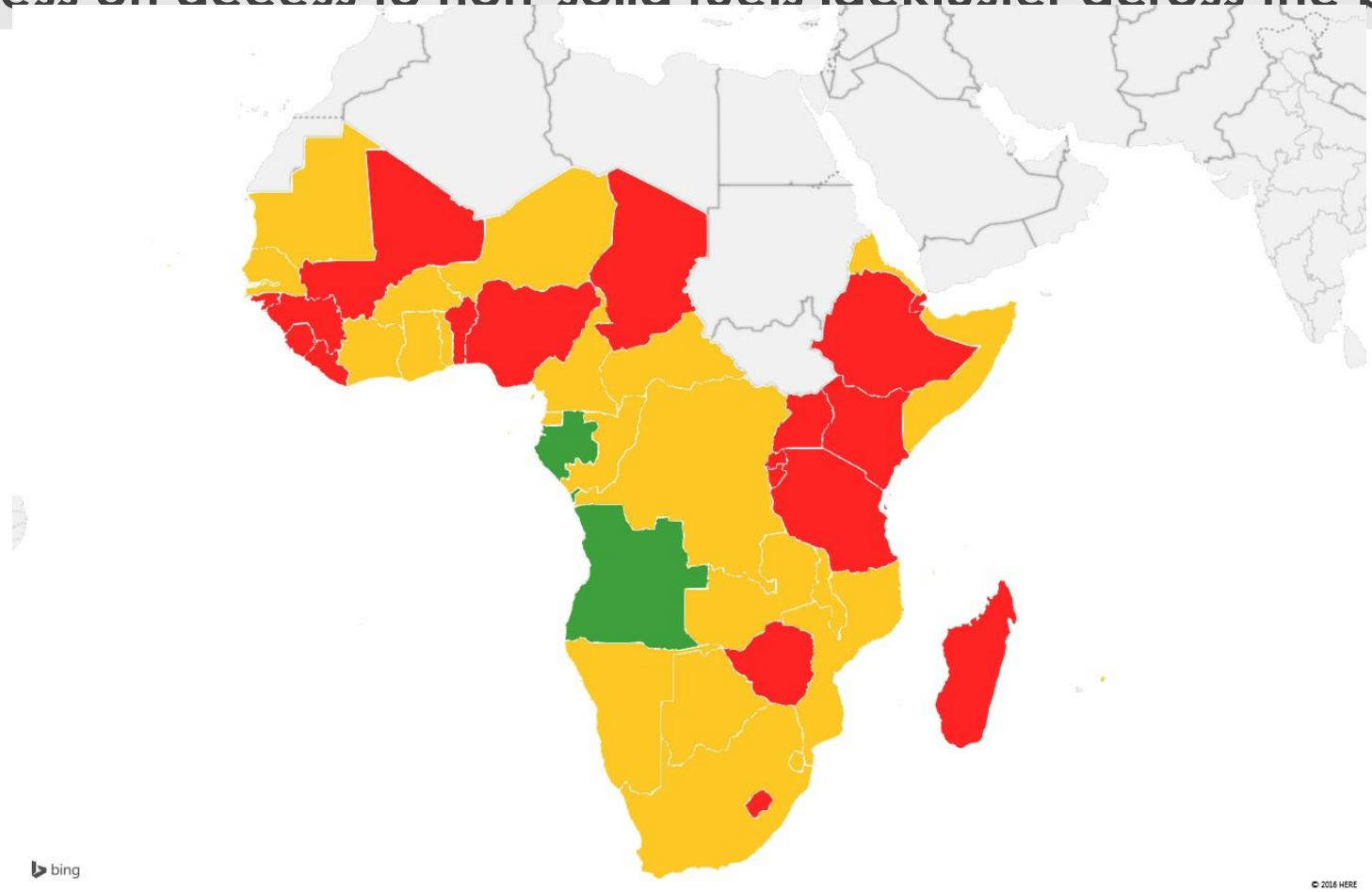

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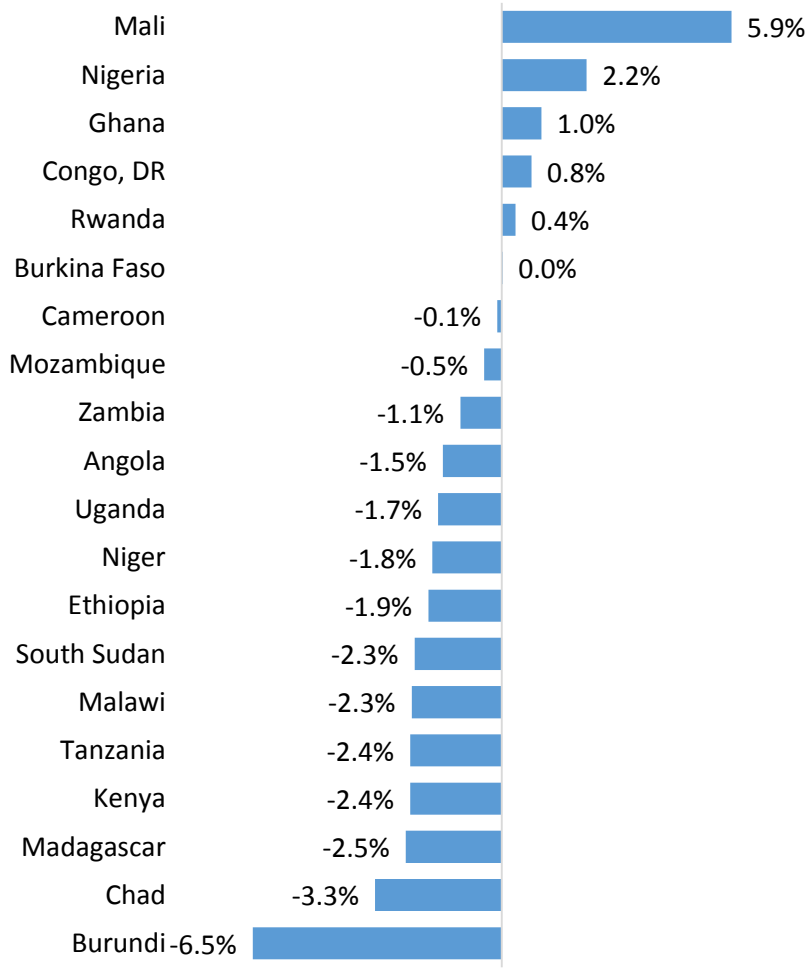
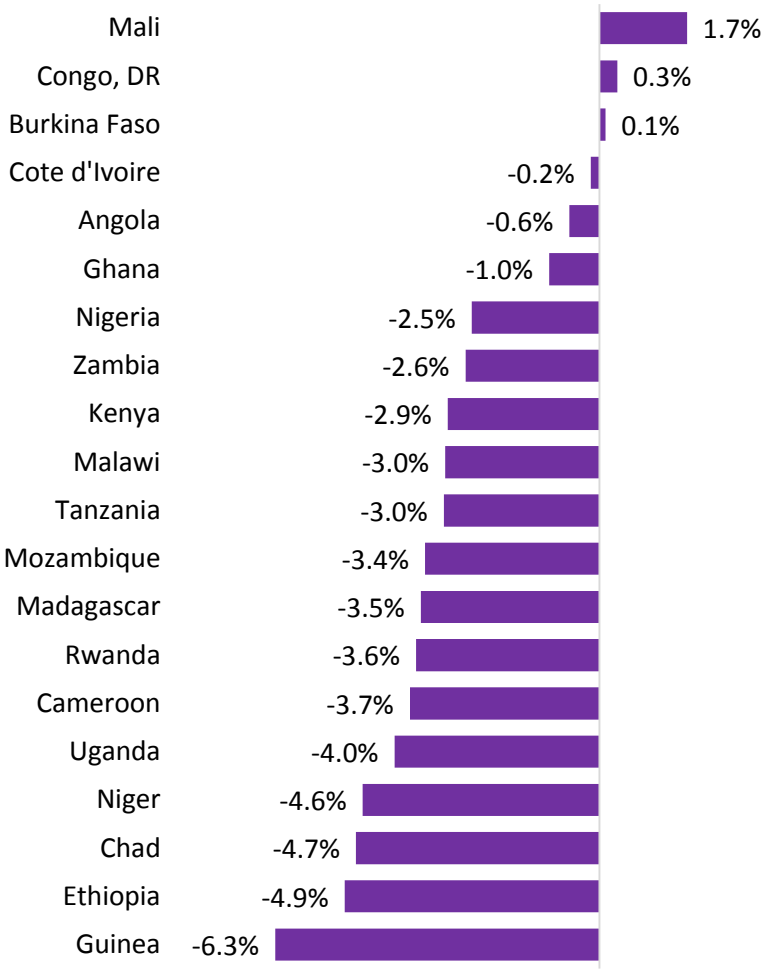
Despite strong efforts only a handful of countries are accelerating energy access faster than population

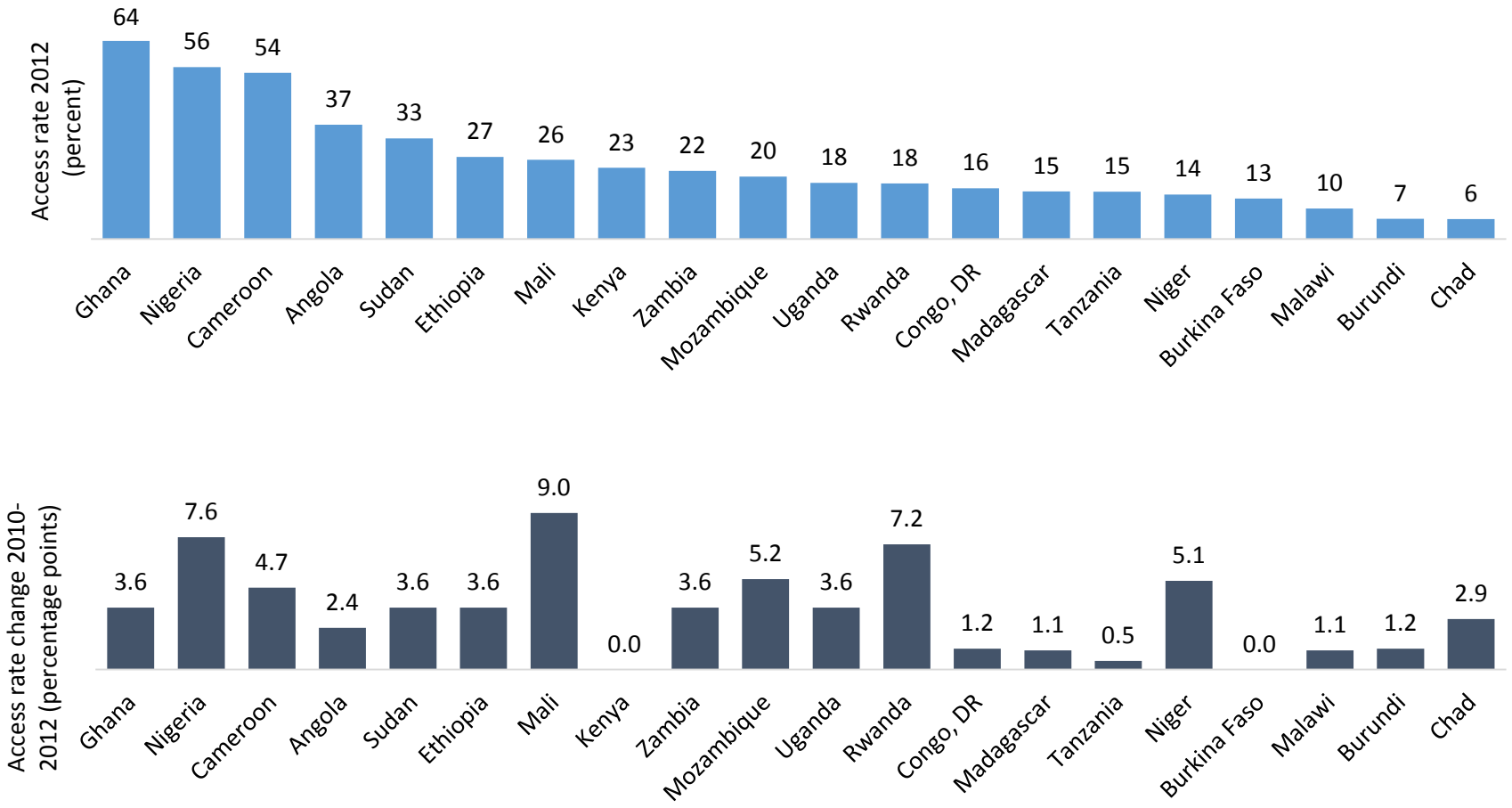




Access to electricity net growth rate, 2010-2012

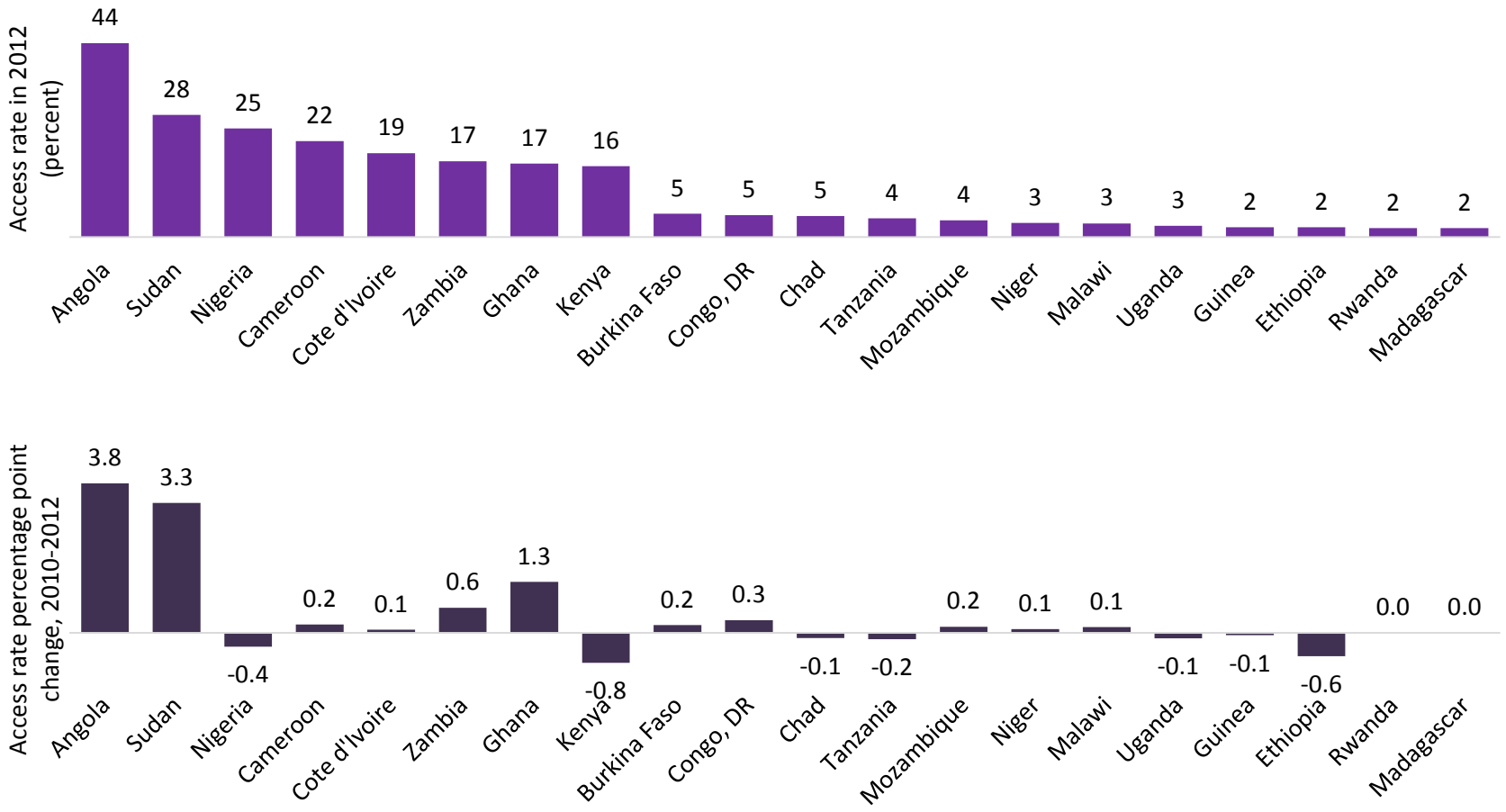
Access to non-solid fuels net growth rate, 2010-2012

Among top 20 electricity access deficit countries, show slow expansion in countries with lowest electrification



Electricity access rate in 2012 (top)
and access rate percentage point change, 2010-2012 (bottom)

Among top 20 non-solid fuel access deficit countries, fastest expansion among those with highest access



Non-solid fuel access rate in 2012 (top)
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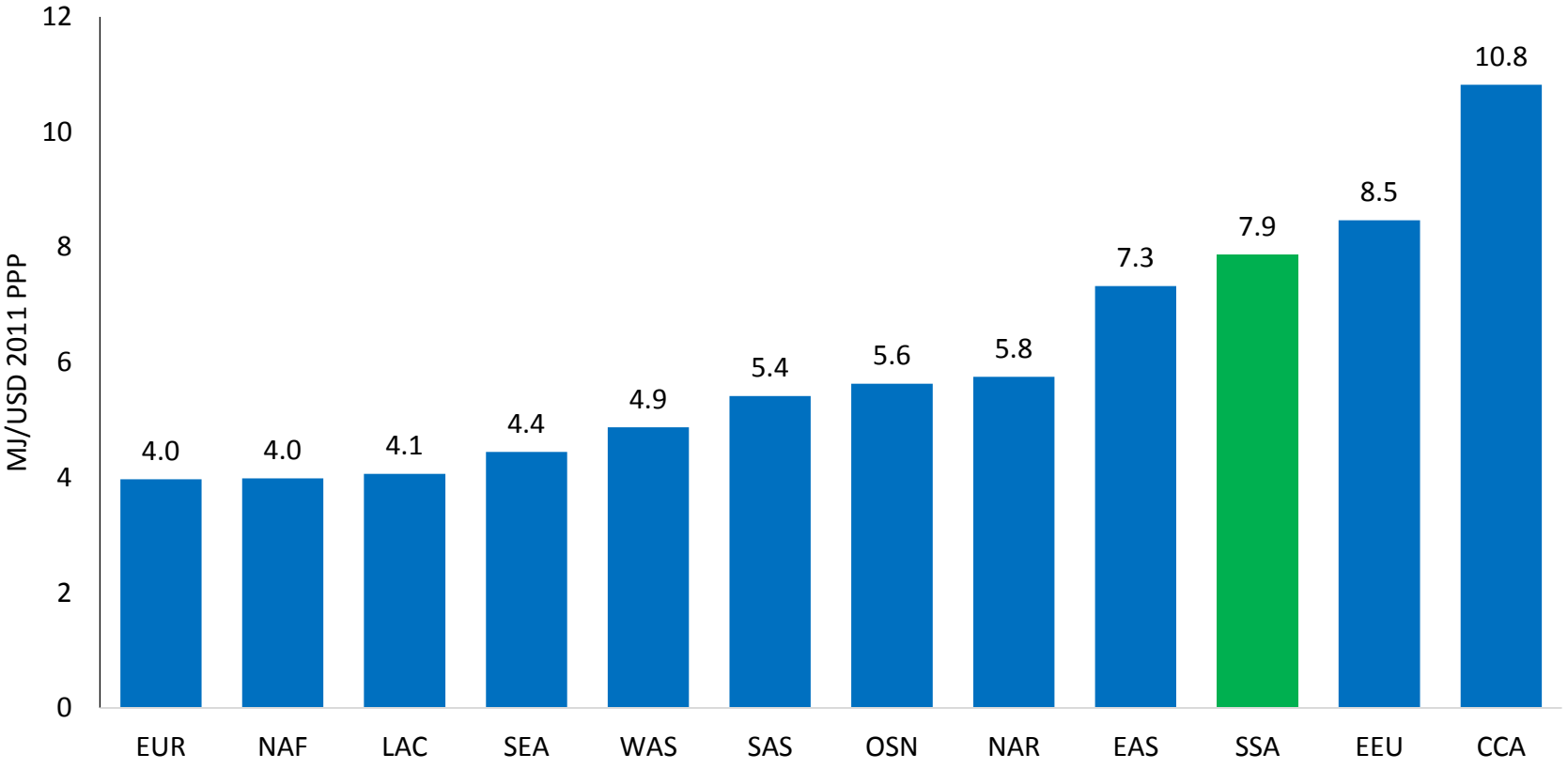
African economies are surprisingly energy intensive, some progress driven mainly by transport and by South Africa

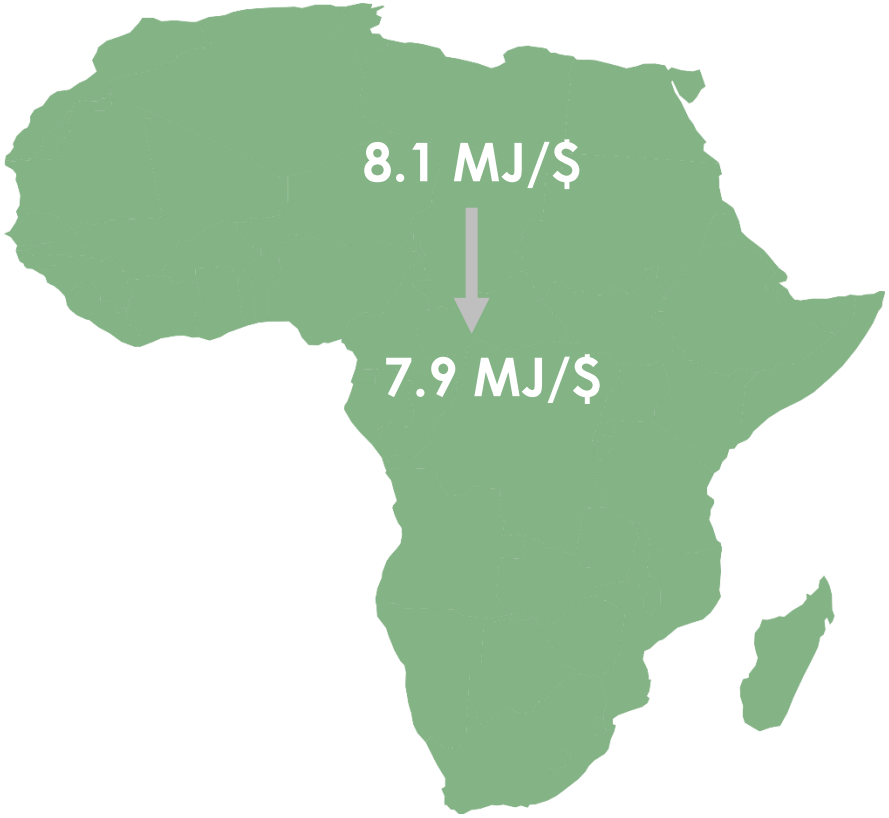
Africa shows high levels of energy intensity, compared to most other regions



Energy intensity by region, 2012

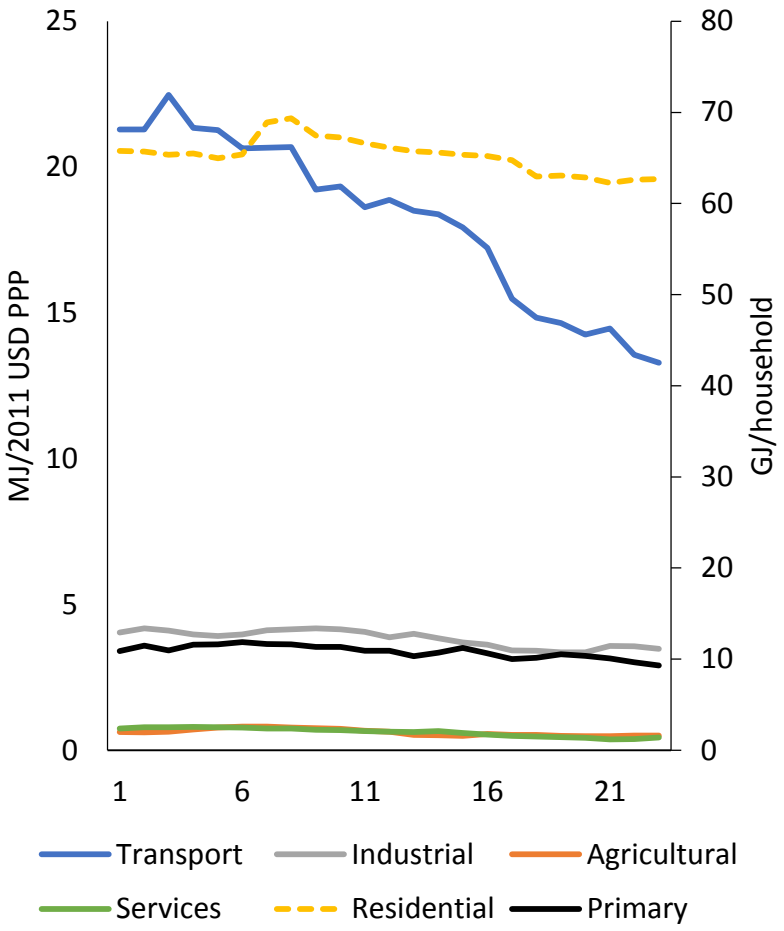
Africa most energy intensive continent after Eastern Europe and CIS, but making meaningful improvements

Primary Energy intensity reduction 2010-2012

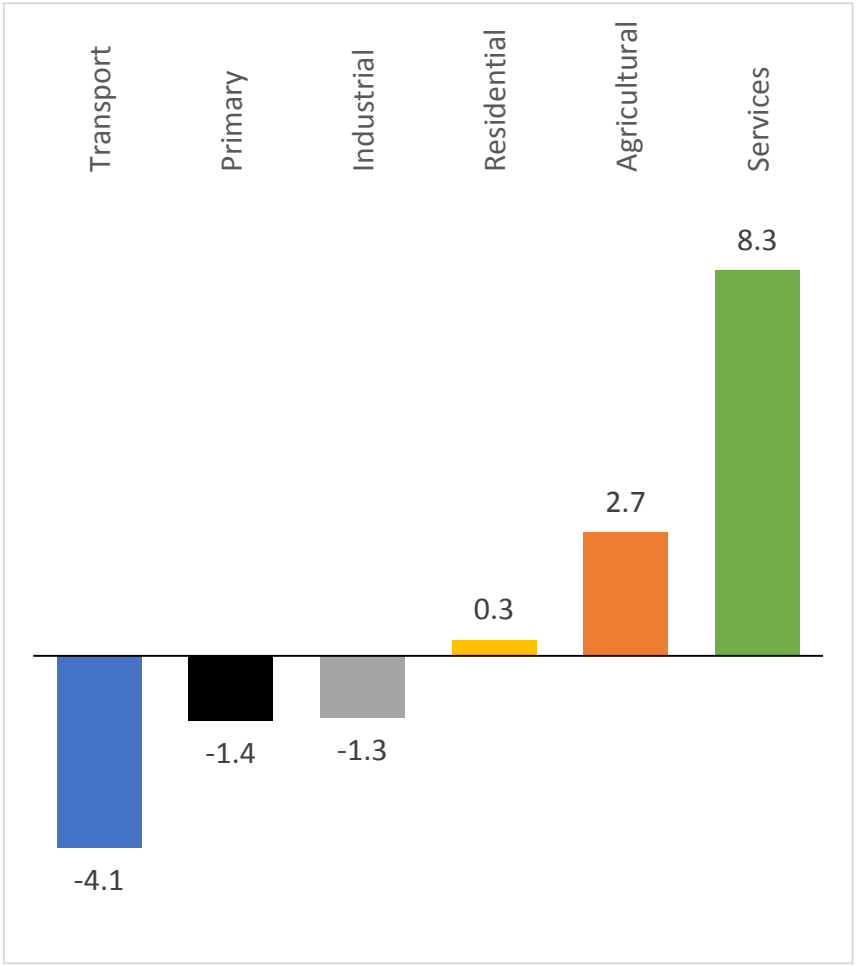


Energy savings 2010-2012

Africa's energy intensity is decreasing at -1.4% per year, driven entirely by improvements in transport and industry



Energy intensity, 1990-2012



CAGR of energy intensity, 2010-2012

One third of countries making rapid progress on efficiency

Compound annual growth rate of energy intensity did not improve between 2010-2012

Compound annual growth rate of energy intensity improved by less than 2.6% per annum in 2010-2012

Compound annual growth rate of energy intensity improved by at least 2.6% per annum in 2010-2012

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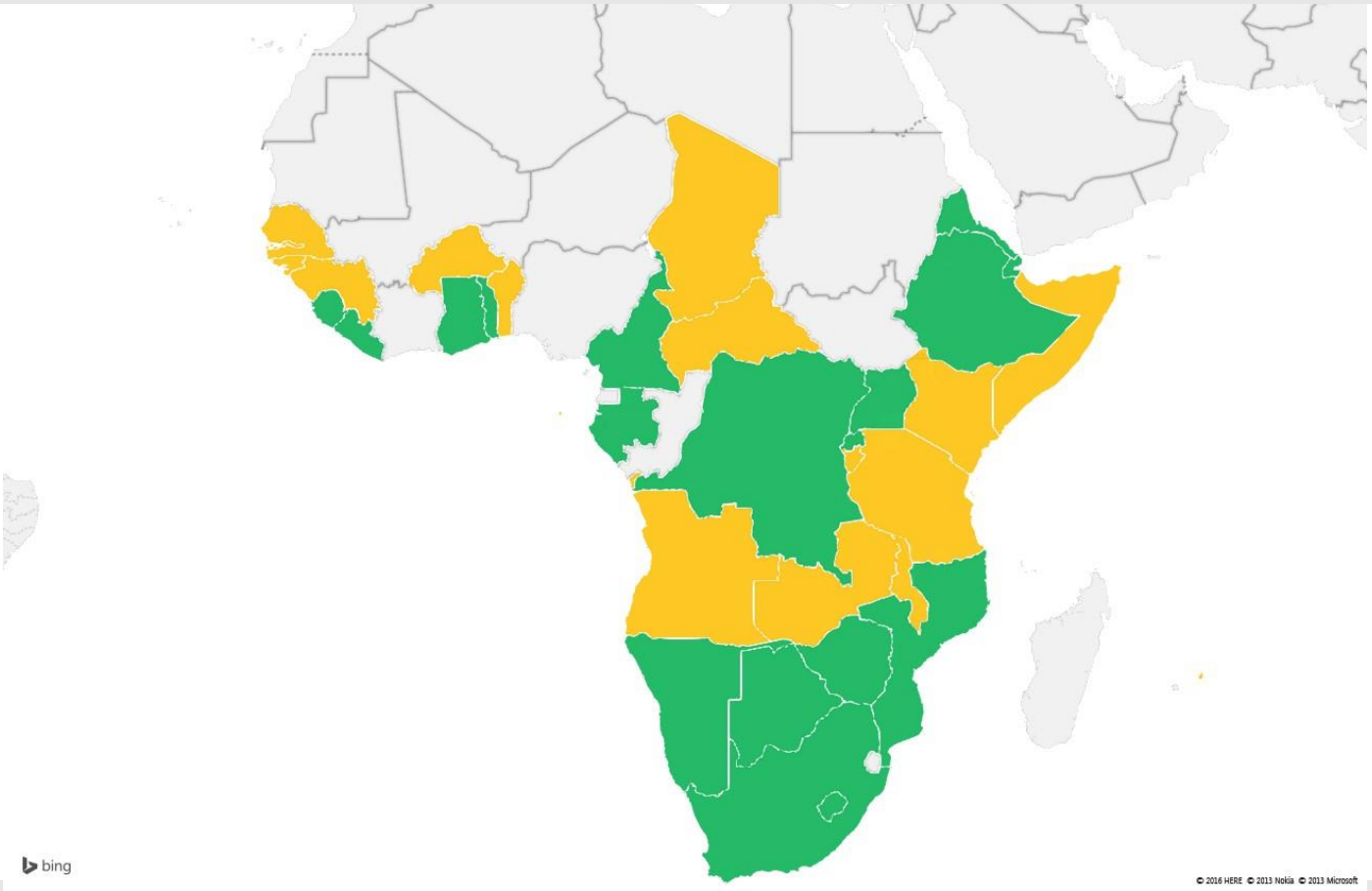

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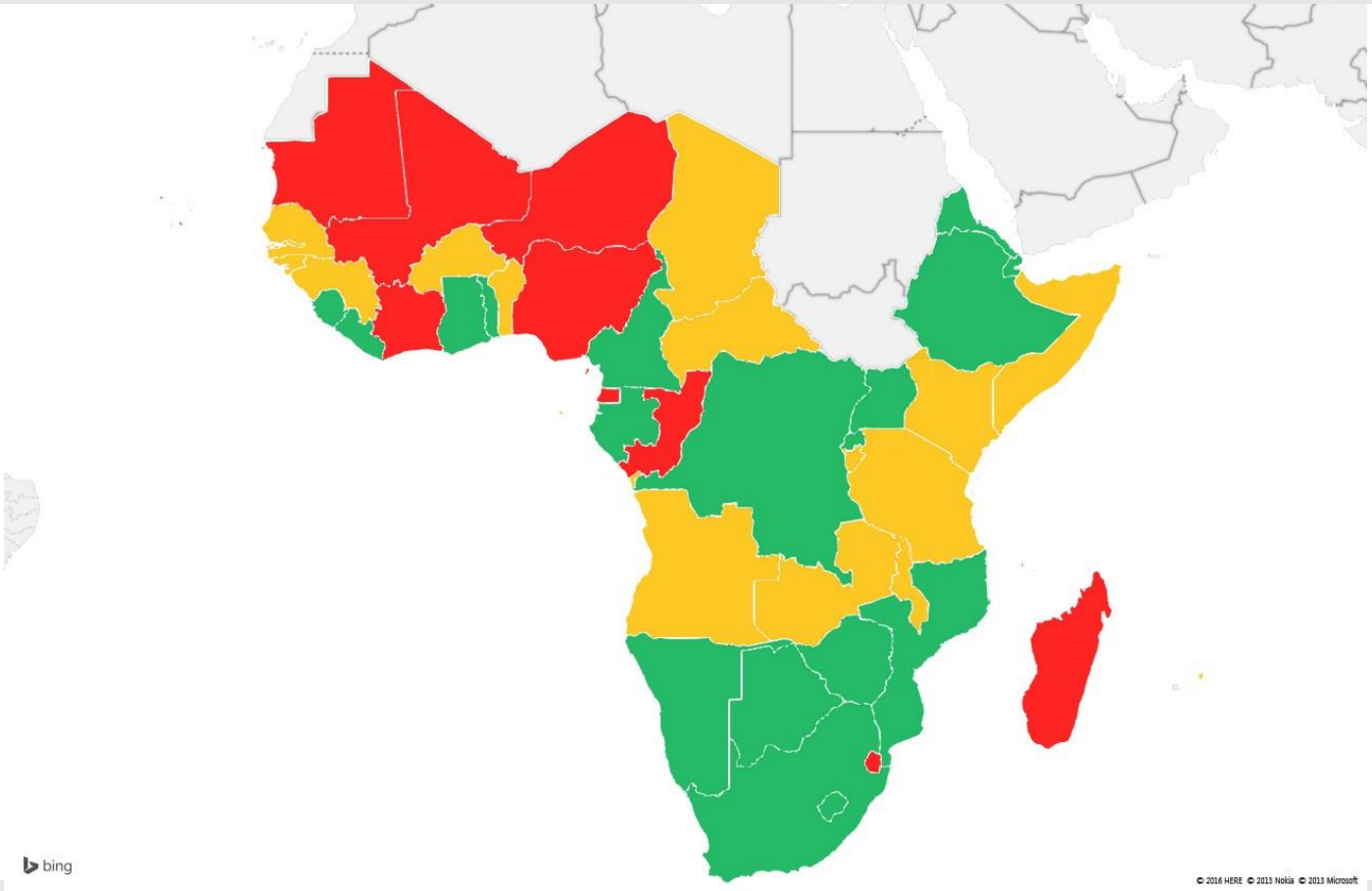

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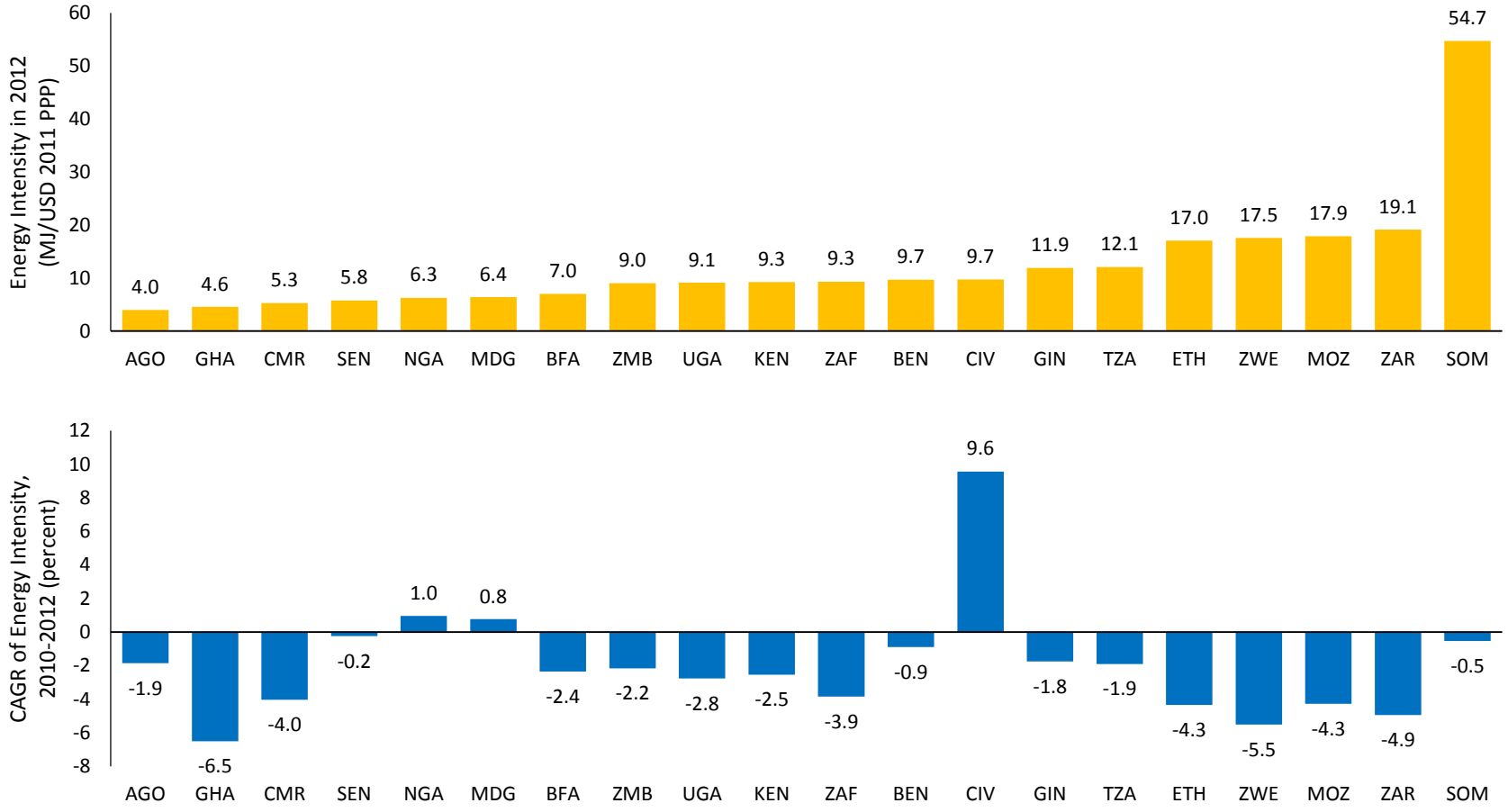
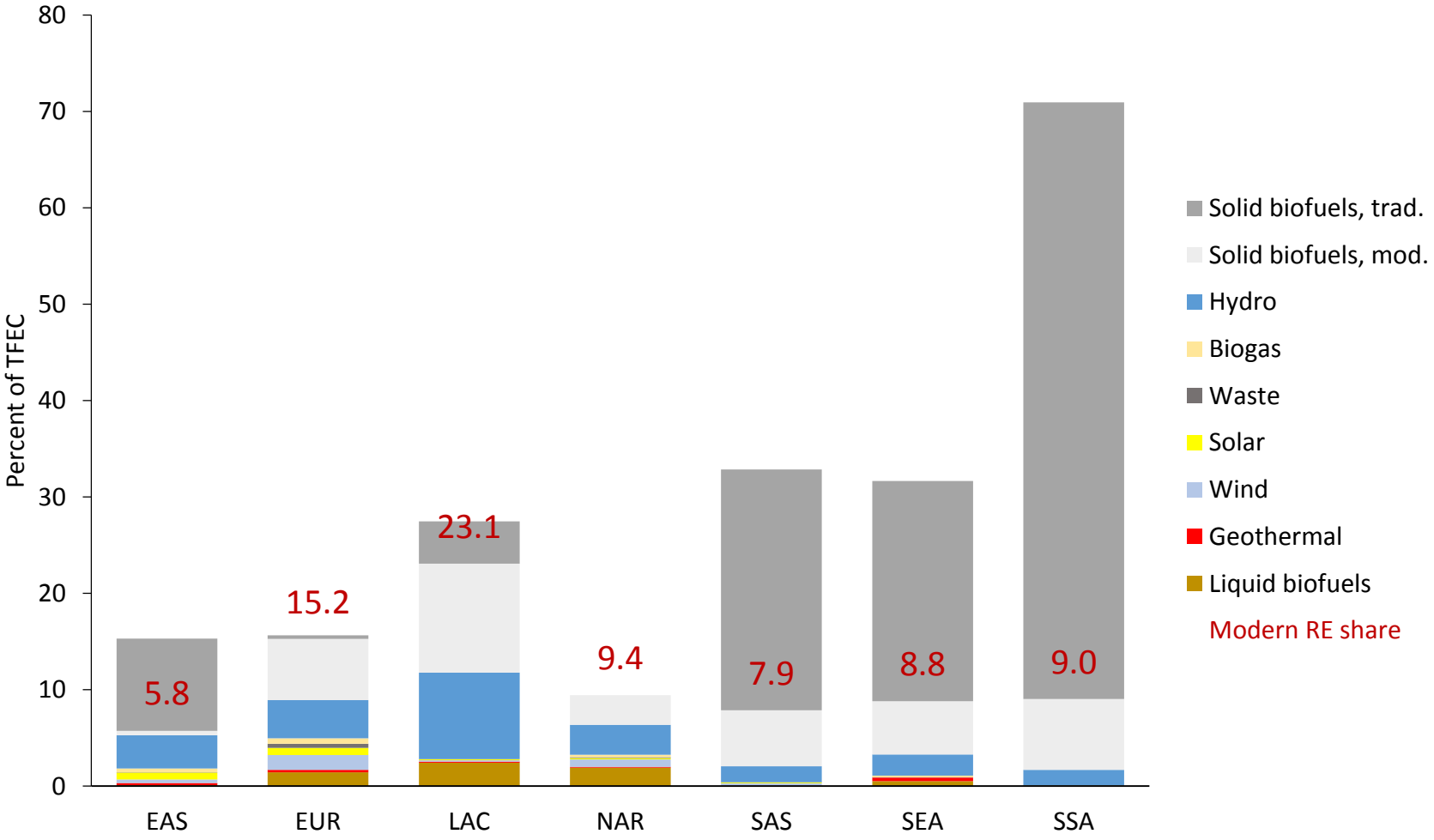
Among 20 top energy consumers, 8 exceeded SE4ALL energy intensity change target of -2.6% per year



Top 20 energy users primary energy intensity in 2012 (top) and energy intensity CAGR 2010-2012 (bottom)

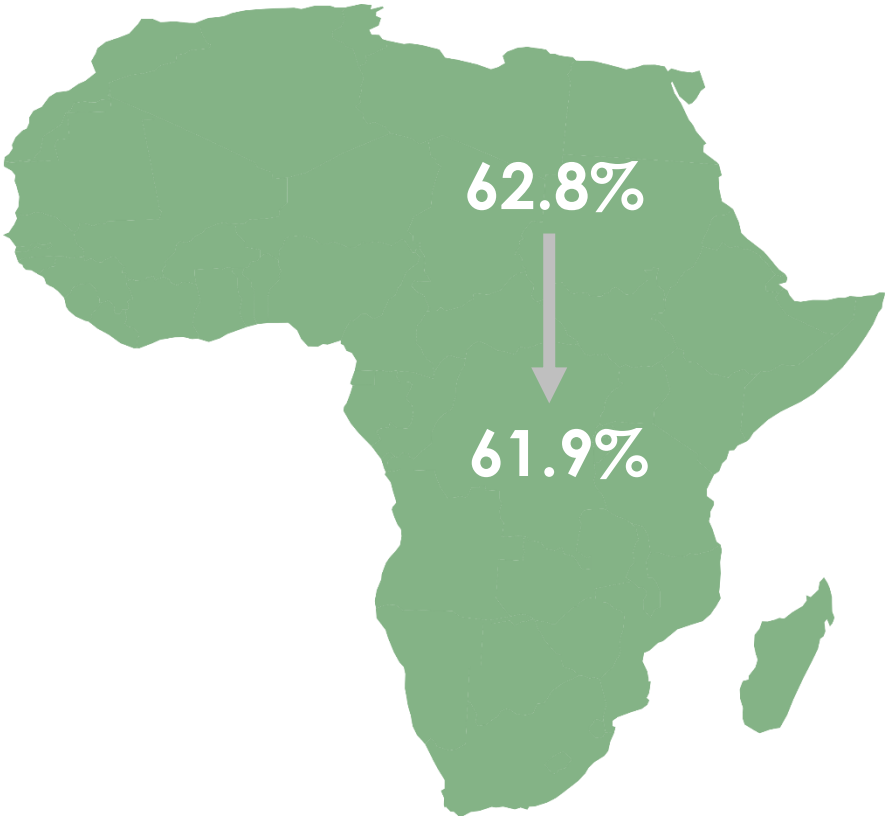
Africa world's most renewable continent, due to biomass and hydro, current shift from traditional to modern renewable energy

Africa's energy consumption is 70% renewables, and 9% modern renewables comparing favorably with Asia



Traditional biomass consumption decreased 0.46 EJ 2010-2012, equivalent to Angola's annual energy consumption

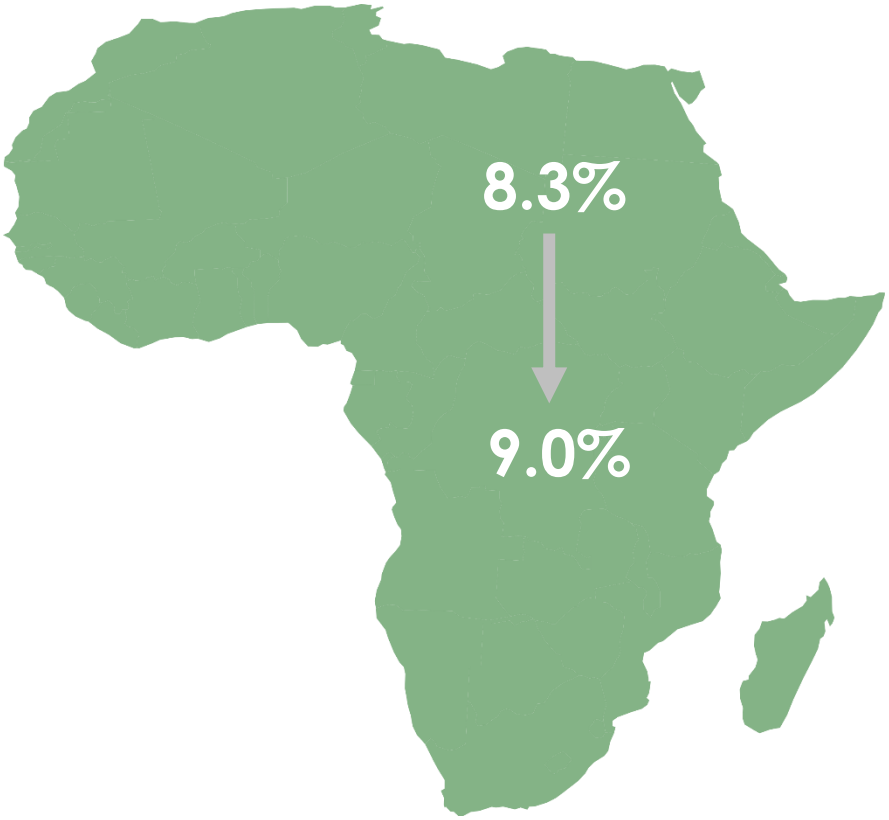
Traditional RE share decrease 2010-2012



Annual traditional RE consumption decrease, 2010-2012

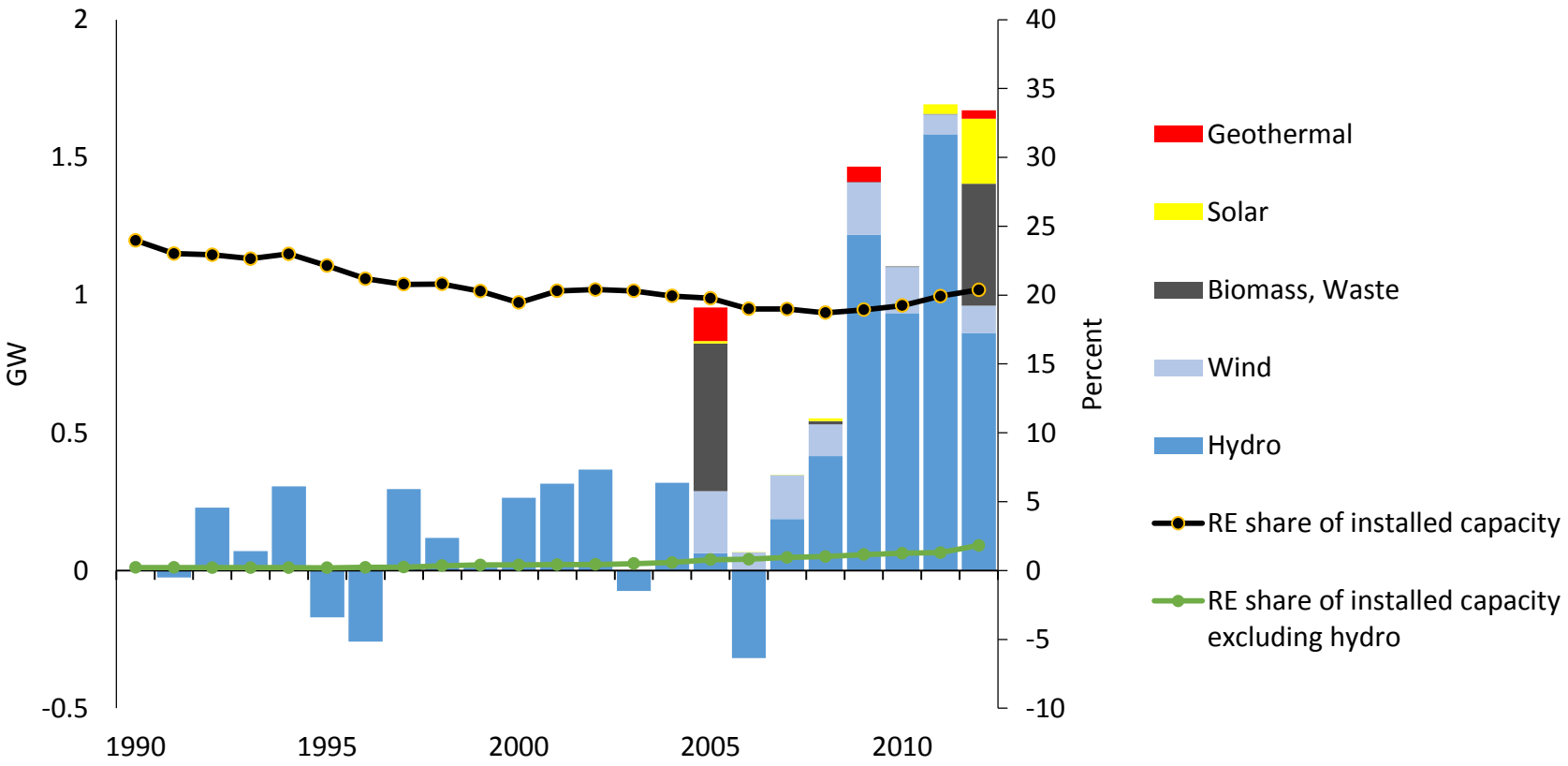
Modern renewable energy consumption increased 0.19 EJ 2010-2012, more than Benin's annual consumption

Modern RE share increase 2010-2012



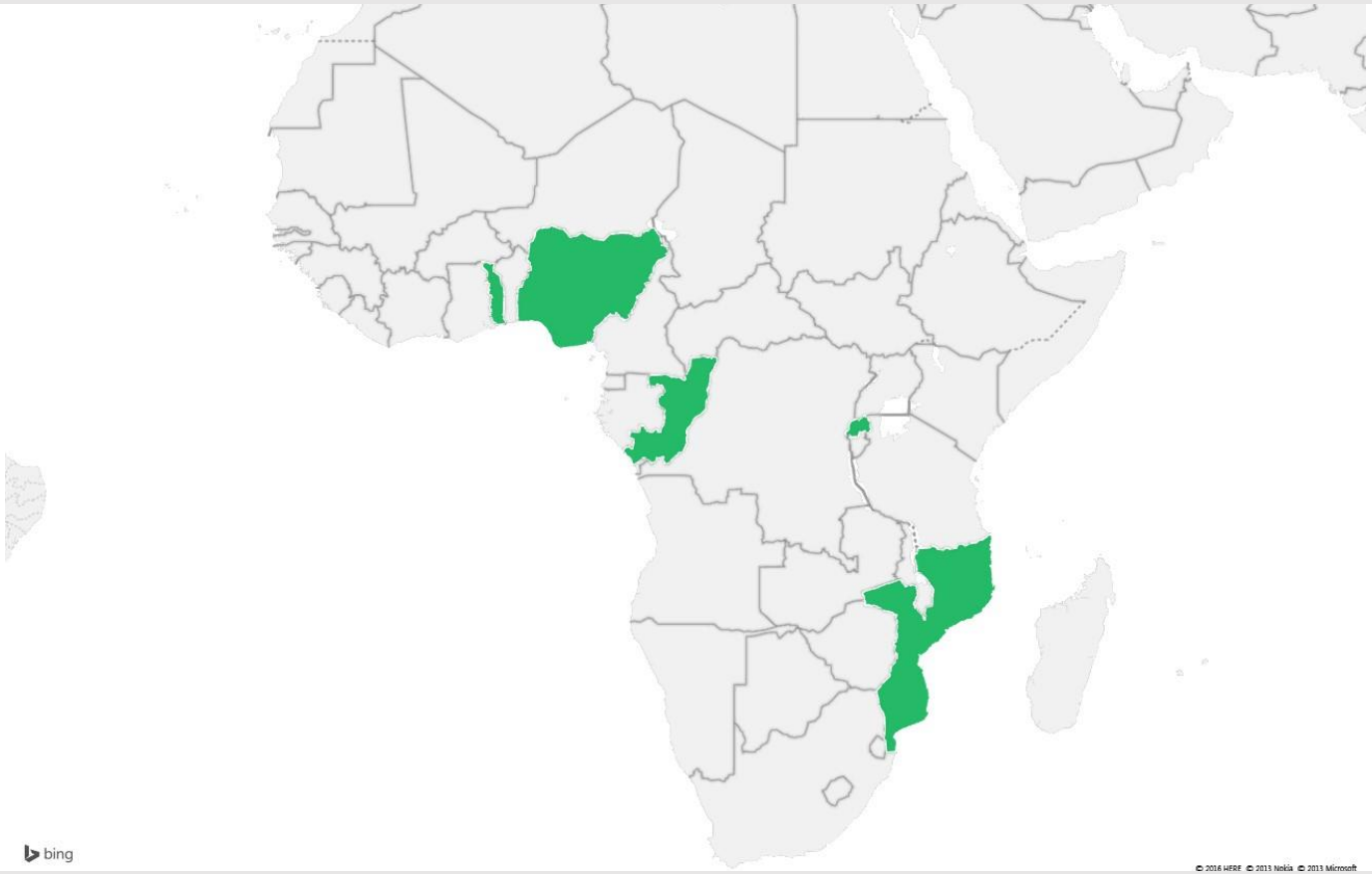
Annual modern RE consumption increase, 2010-2012

Modern renewable energy, mainly hydro-power, provide 20% of Africa's electricity



Renewable capacity change (left) and renewables share of capacity (right), 1990-2012

Few countries rapidly increasing modern renewable share



Share of modern renewable energy in total final energy consumption did not improve between 2010-2012

Share of modern renewable energy in total final energy consumption improved by less than 1 percentage point 2010-2012

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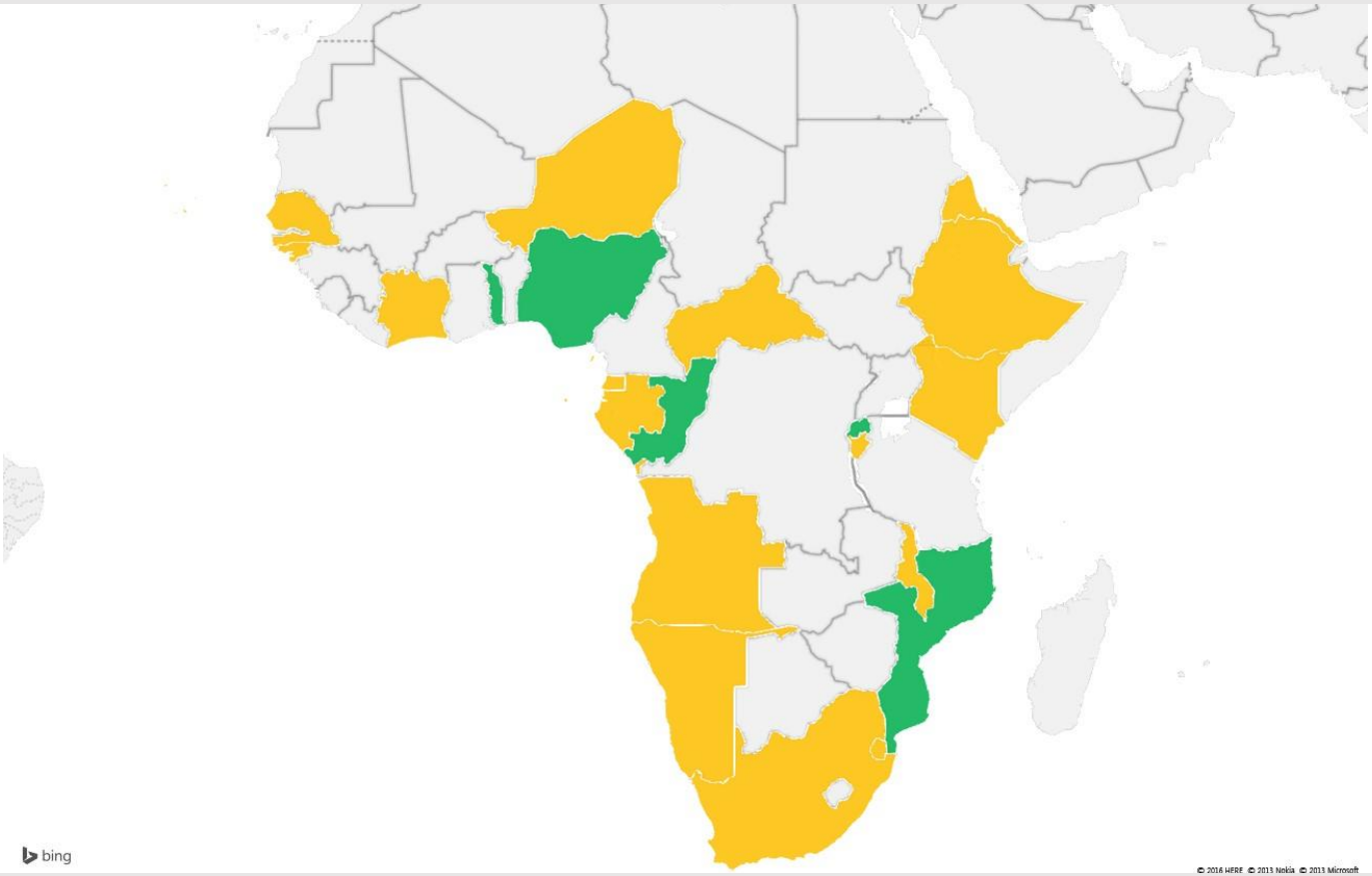
Few countries rapidly increasing modern renewable share



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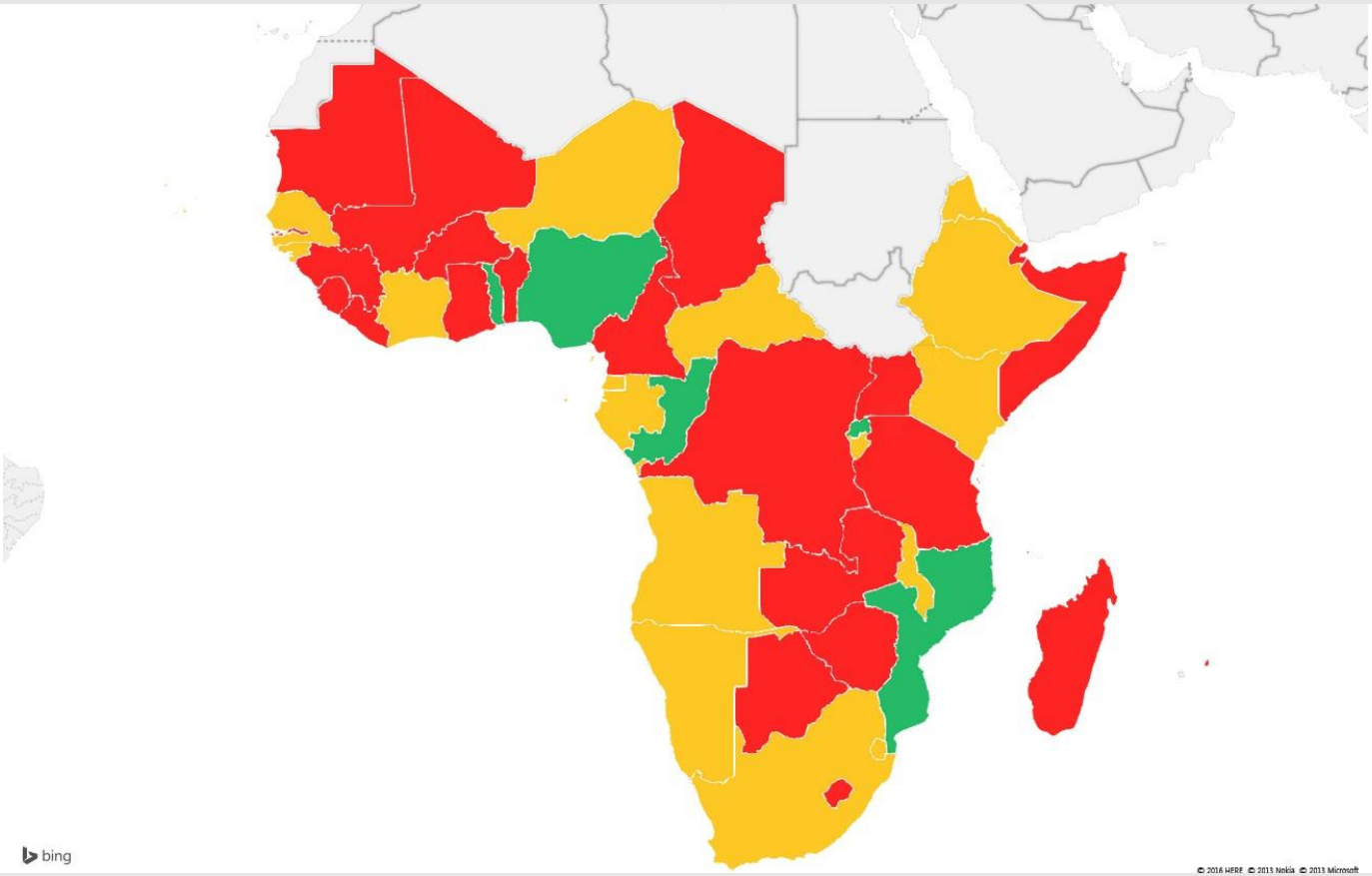

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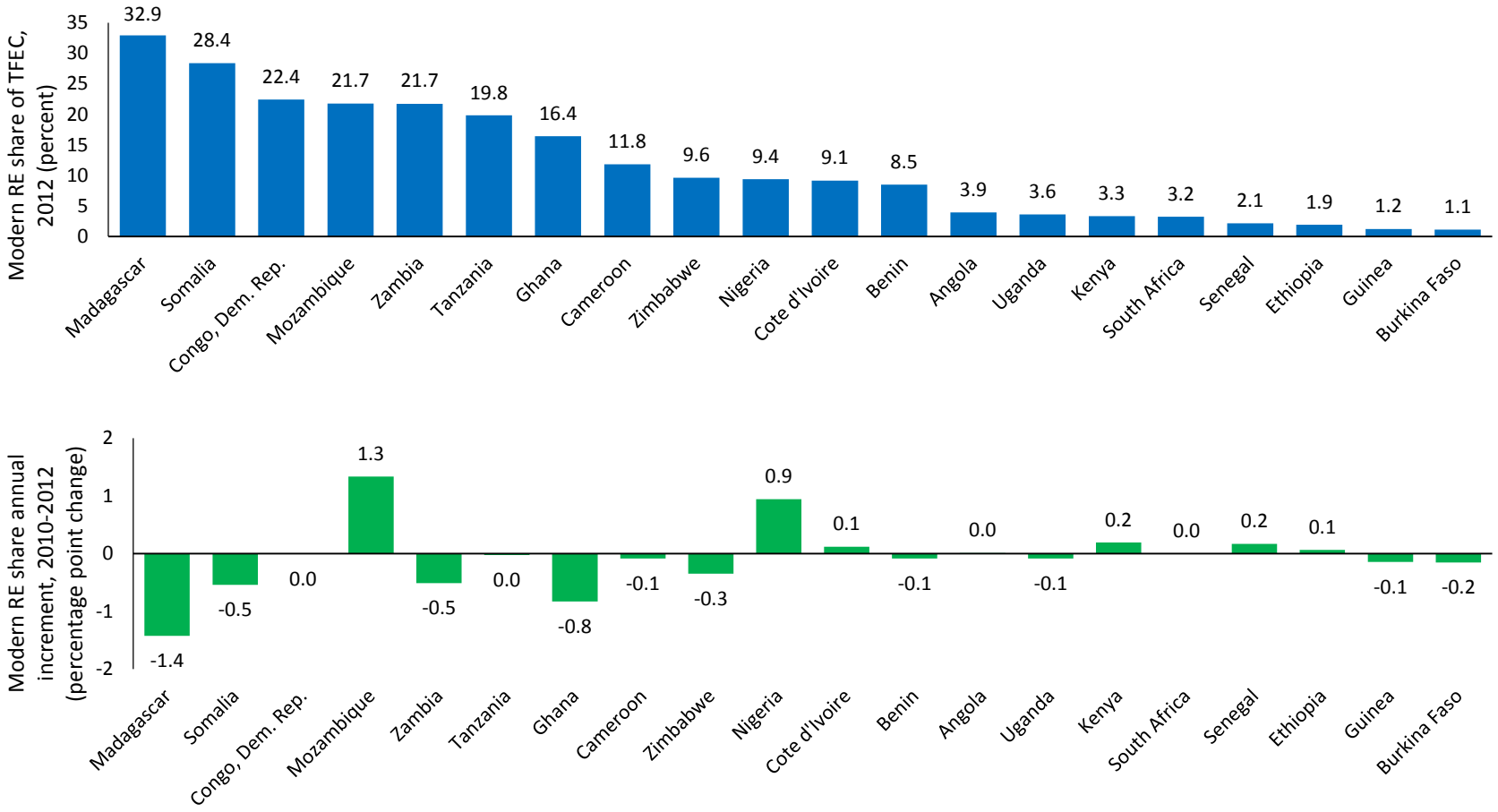
Among top 20 energy consumers, 8 expanded their modern renewable energy share between 2010-2012



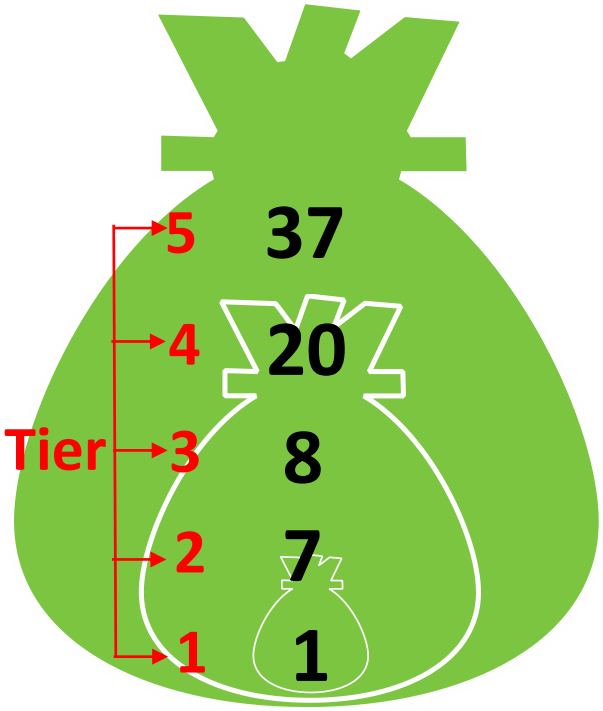
Top 20 energy consumers modern renewable energy share in 2012 (top)

and modern renewable energy share annual percentage point change, 2010-2012

Annual investment needs range from $49-85 billion

Annual investment needs very much depend on the level of ambition for energy access

Electricity access



Providing at minimum universal Tier I/III/V electricity access to Sub-Saharan Africa's population

Source: results from AIM model

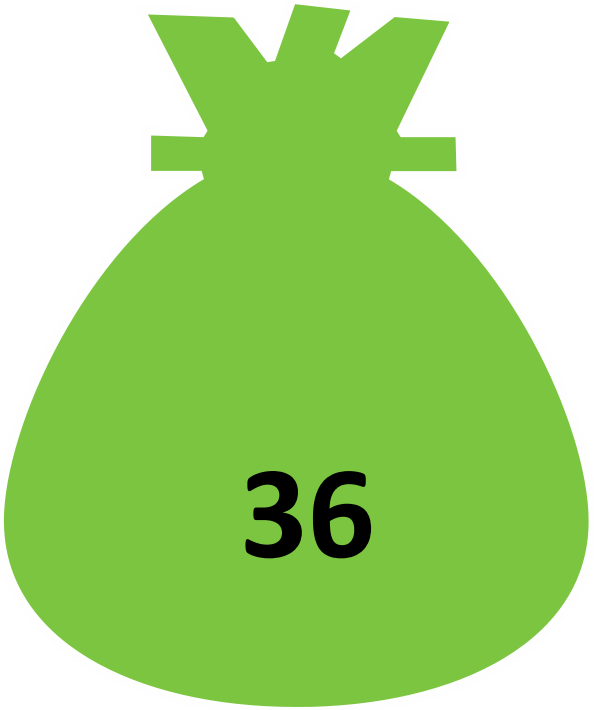
Energy efficiency

$Billion/year

Significantly reducing energy intensity in Africa

Source: WEO 450

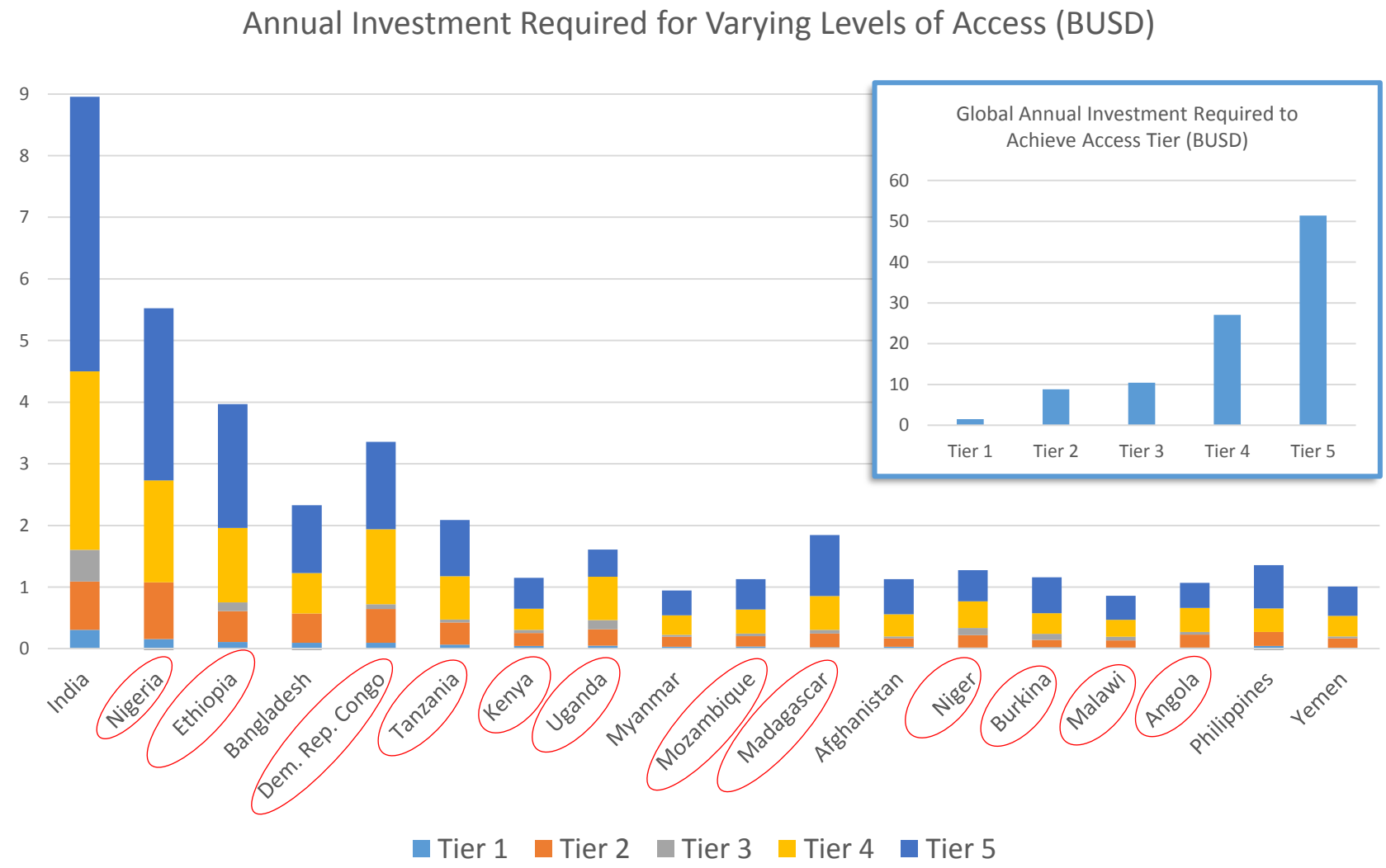
Renewable energy



Doubling Africa's share of RE in TFEC

Source: IRENA REmap

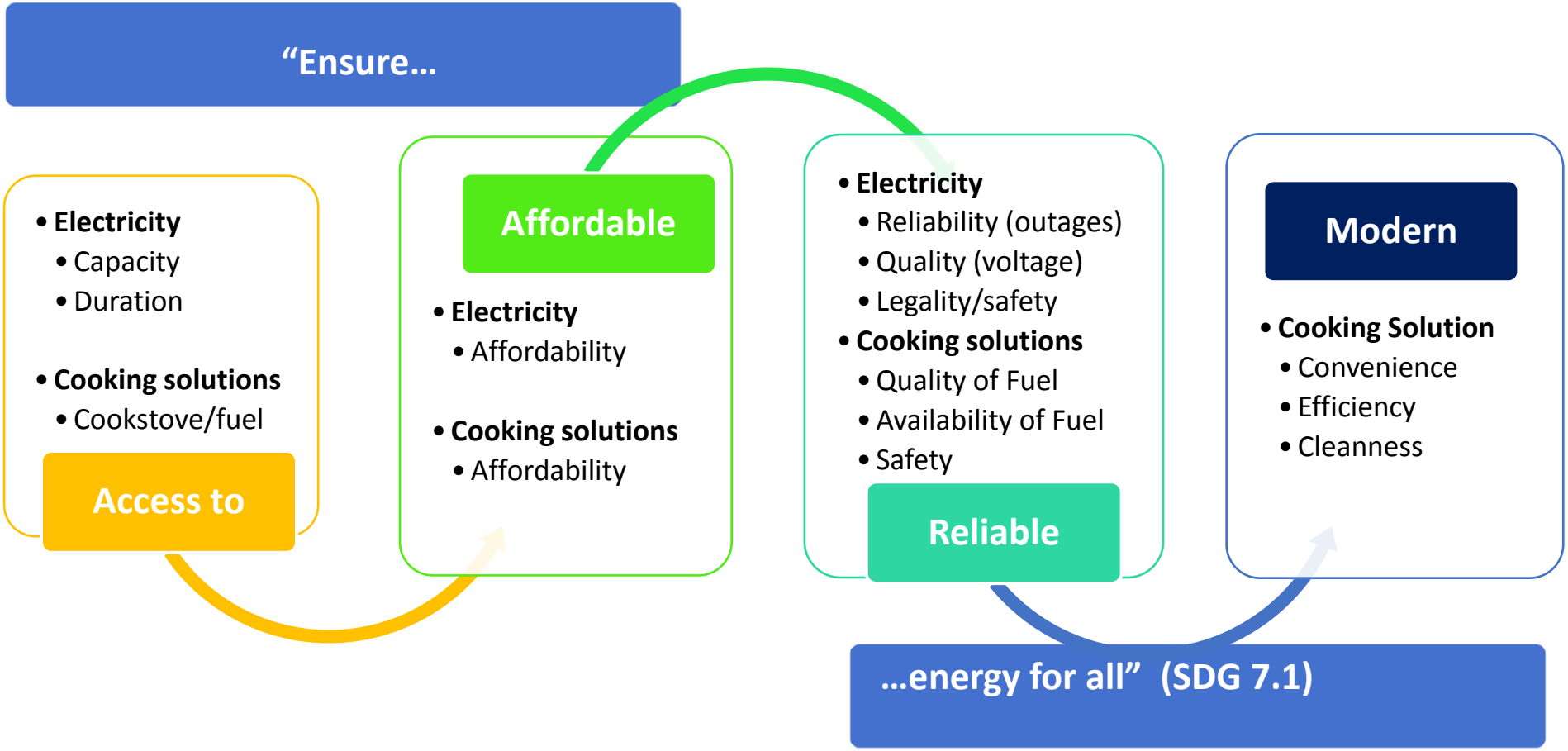
AIM can help policy makers define what they mean by universal access



How can we improve our ability to monitor SDGs?

ENERGY ACCESS

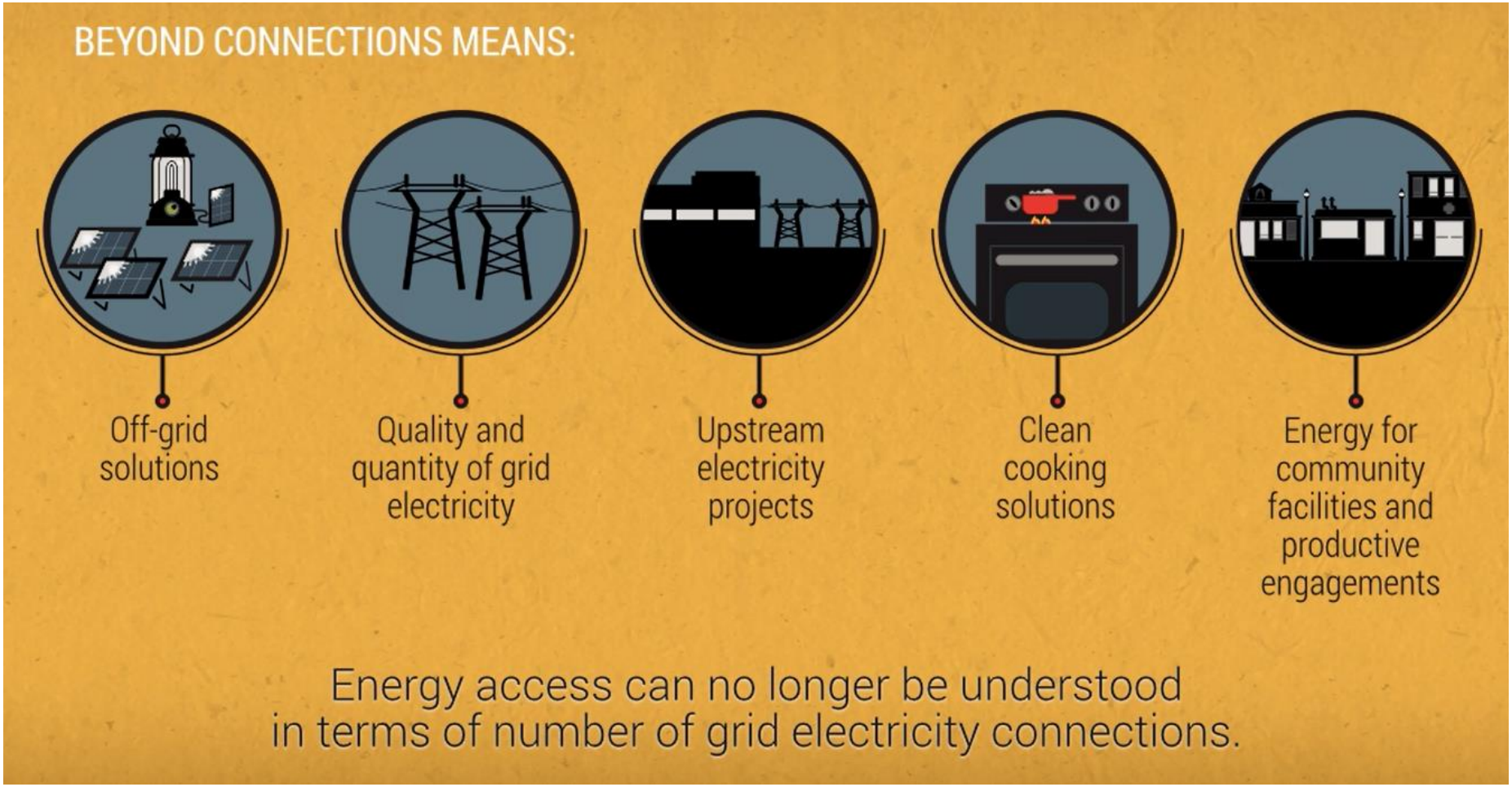
SDG7 explicitly emphasizes multi-dimensional attributes of energy access: "affordable, reliable, modern"



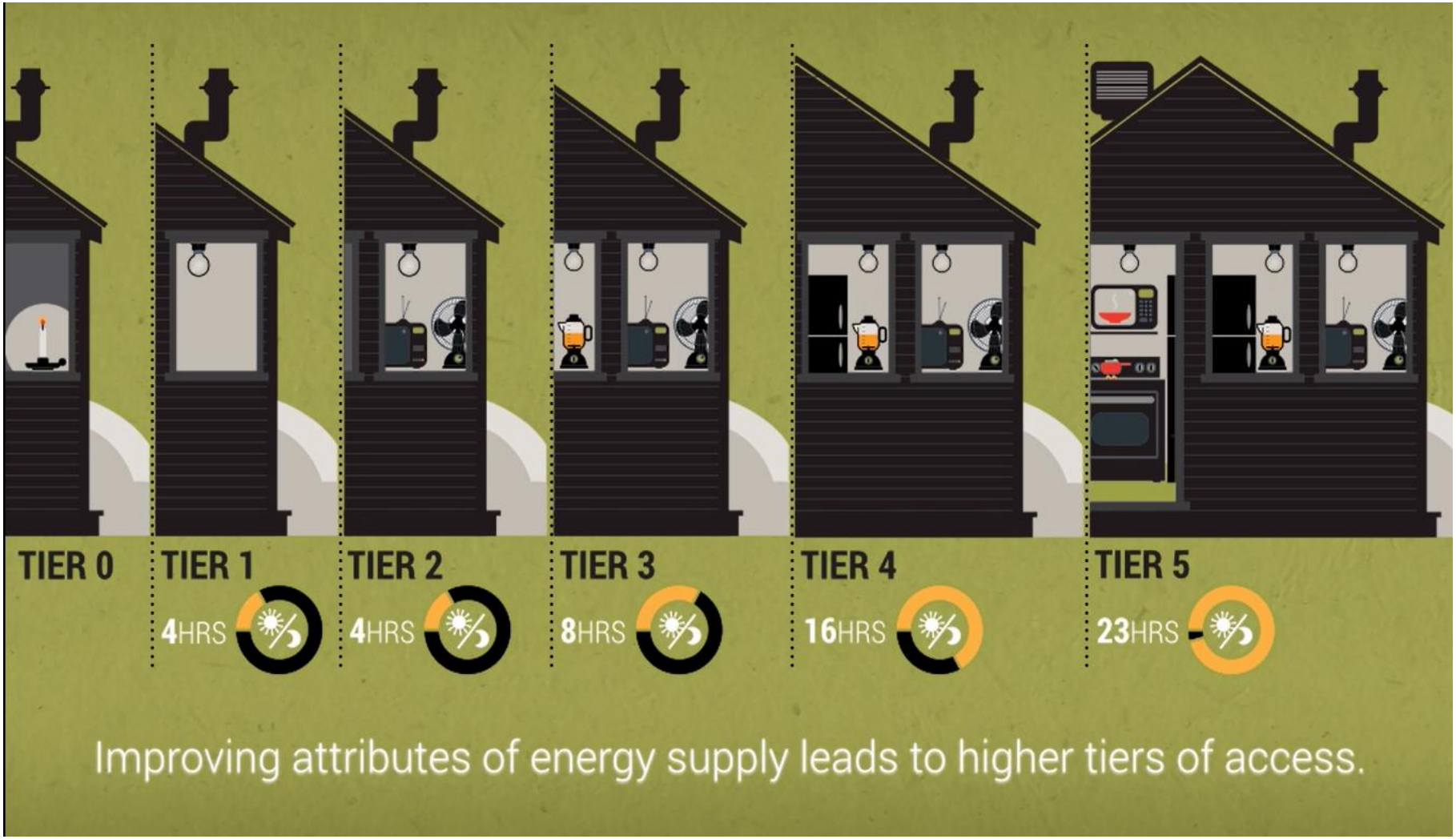
(Legality; Health and Safety)

SUSTAINABLE ENERGY FOR ALL

This highlights the importance of thinking beyond connections to fully understand energy access



Energy access is better defined as a continuum of different service levels

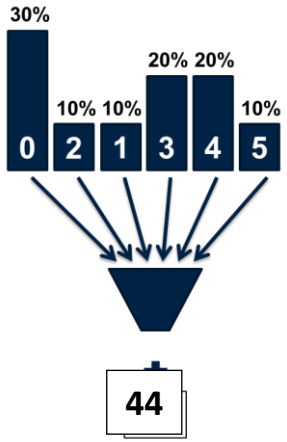


SUSTAINABLE ENERGY FOR ALL

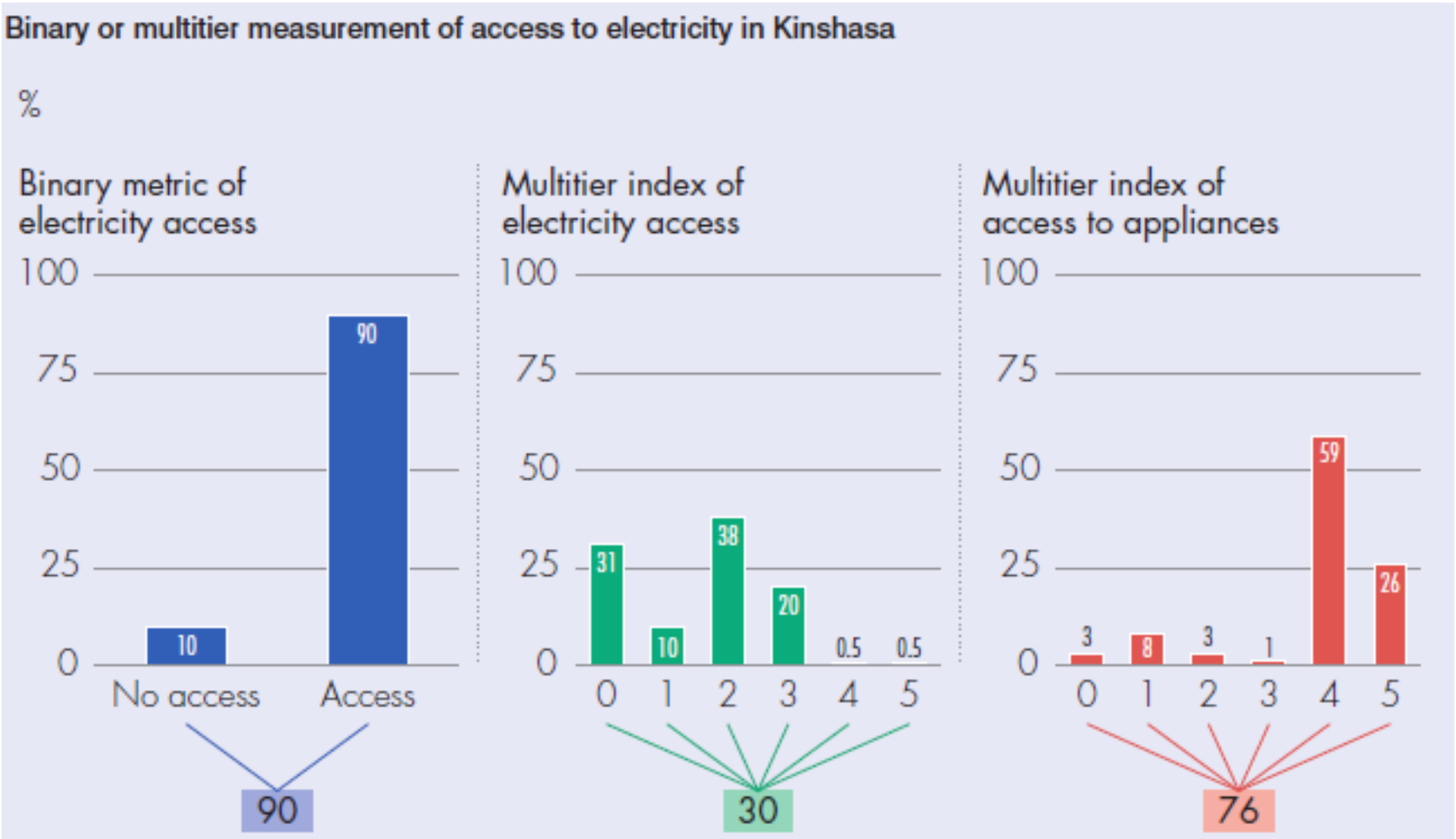
Multi-tier Framework for access to electricity

			Tier-0	Tier-1	Tier-2	Tier-3	Tier-4	Tier-5
Attributes	1. Peak capacity	Power		V. Low Power Min 3 W	Low Power Min 50 W	Medium Power Min 200 W	High power Min 800 W	V.High Power Min 2 kW
		AND Daily capacity		Min 12 Wh	Min 200 Wh	Min 1.0 KWh	Min 3.4 KWh	Min 8.2 KWh
		OR, Services		Lighting of 1000 lmhr/day	Electrical lighting, Air circulation, Television, and Phone charging are possible			
	2. Duration	Hours per day		Min 4 hrs	Min 4 hrs	Min 8 hrs	Min 16 hrs	Min 23 hrs
		Hours per evening		Min 1 hrs	Min 2 hrs	Min 3 hrs	Min 4 hrs	Min 4 hrs
	4. Affordability					Cost of a standard consumption package of 365 kWh per annum is less than 5% of household income		
	3. Reliability						Max 14 disruptions per week	Max 3 disruptions per week of total duration < 2 hours
	5. Legality						Bill is paid to the utility / pre-paid card seller / authorized representative	
	6. Health and Safety						Absence of past accidents and perception of high risk in the future	
	7. Quality						Voltage problems do not affect use of desired appliances	

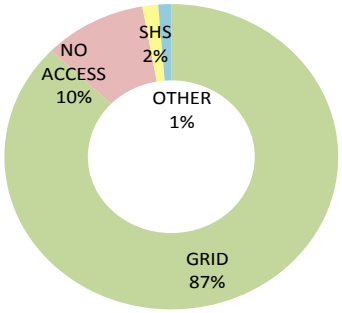
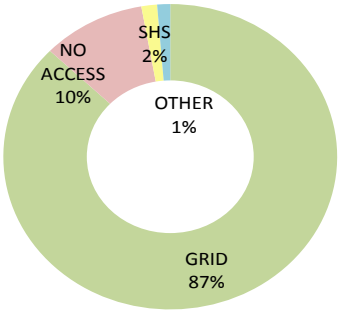
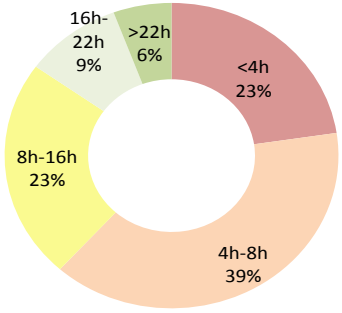
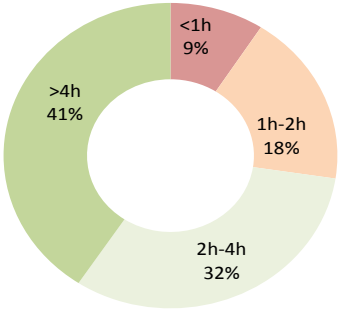
Tier-rating for the household is calculated by applying the lowest of the tier-ratings across all attributes.

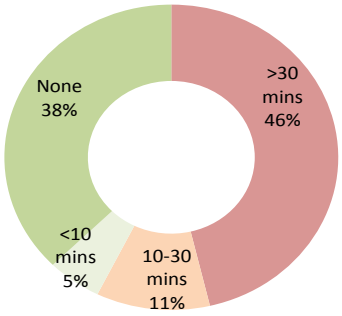
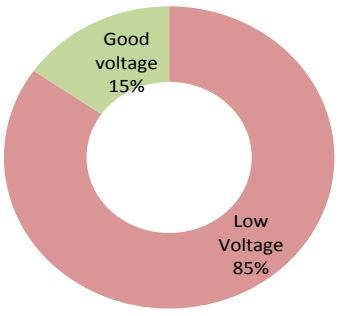
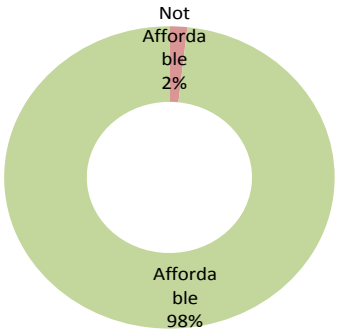
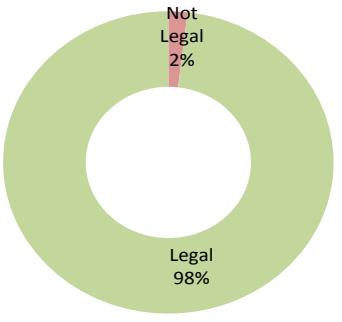


Kinshasa pilot shows multi-tier framework gives a much more nuanced picture of energy access



Conventional measures of energy access fail to capture many important dimensions of service quality

Electricity Source	Capacity	Duration	Duration
Source	Source	24 Hours (hours)	Evening (hours)
			

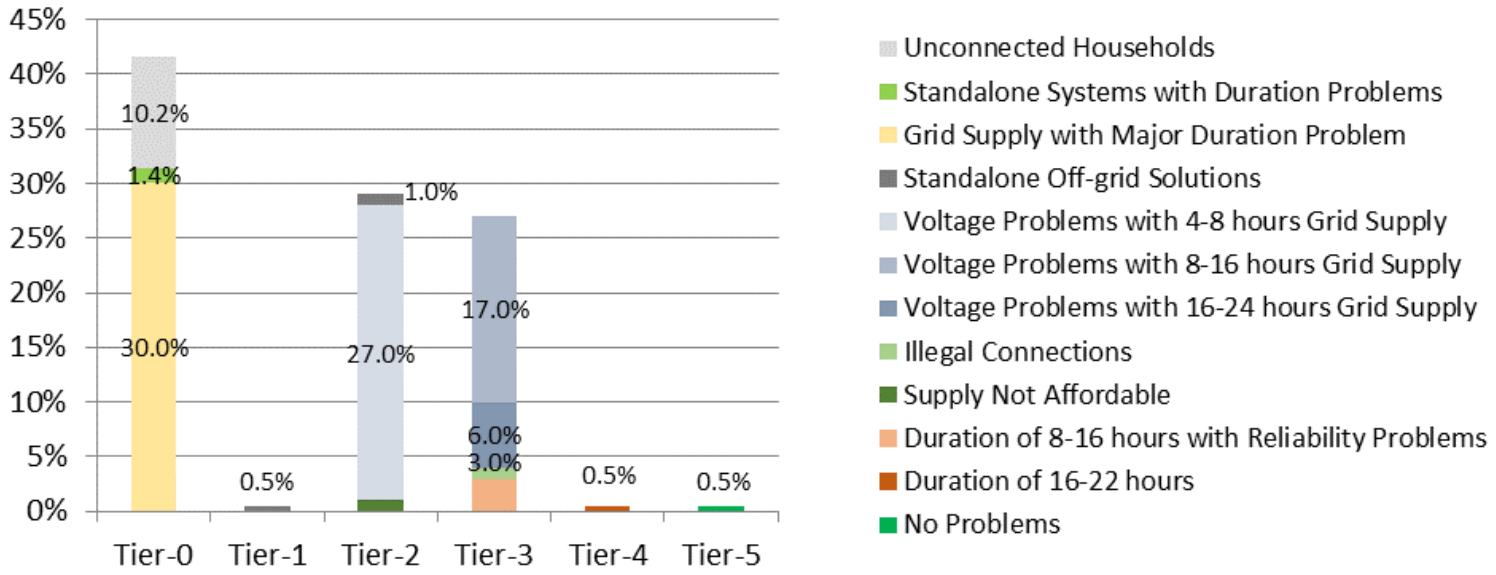
Reliability	Quality	Affordability	Legality
Duration of interruptions (mins)	Low Voltage problems	Index:	Index:
			

Less than 8 hours per day for 62% of the household

Unscheduled interruptions are longer than 30 minutes for more than 57% of the household

Almost 85% of the household experienced low voltage

Multi Tier Framework clarifies which interventions can boost access levels



Gap analysis at Glance:

12.6% households are not connected to electricity grid at all. These households need to be provided electricity connections.

27% households are constrained by less than eight hours of supply per day, and less than 3 hours of supply in the evening.

23% households are affected by voltage problems and are stuck at Tier-3.

Only about 1% households have access to good electricity.

Multi-Tier Framework can be implemented through two different survey based approaches

MTF Energy Global Survey

Estimated time: 45 mins

Nationally statistically representative Rural/Urban

Provides data for multi-tier Supply and Demand information

Implemented by a local survey firm supervised by WB team

Need to collaborate with National Statistical Office

MTF Energy module – integrated in National Surveys*

Estimated time: 15 mins

TA and training available and funded by SREP/ESMAP

Key supply and demand information allowing tier calculation

Additional simplification of monitoring being tested – e.g. use of cell phone surveys

Need to collaborate with National Statistical Office

* Collaboration with the World Bank survey group

SUSTAINABLE ENERGY FOR ALL

First Global Energy Access Survey based on Multi-Tier Framework already underway

Country selection factors

- Highest electricity access deficit
- Highest modern cooking deficit
- Focusing on SREP countries
- Regional balance
- Government's interest

MTF already started: Ethiopia, Kenya, Liberia
MTF in the pipeline: Niger, Nigeria, Rwanda

SUSTAINABLE ENERGY FOR ALL

Multi-Tier Framework for access to clean cooking (1/2)

		Level-0	Level-1	Level-2	Level-3	Level-4	Level-5
1. Indoor Air Quality	$PM_{2.5}$ (µg/m³)		[To be specified by a competent agency such as WHO based on health risks]	[To be specified by a competent agency such as WHO based on health risks]	[To be specified by a competent agency such as WHO based on health risks]	<35 (WHO IT-1)	<10 (WHO Guideline)
	CO (mg/m³)					<7 (WHO Guideline)	<7 (WHO Guideline)
2. Cook-stove Efficiency (Not to be applied if cooking solution is also used for space heating)			Primary solution meets Tier-1 efficiency requirements to be specified by a competent agency consistent with local cooking conditions.	Primary solution meets Tier-2 efficiency requirements to be specified by a competent agency consistent with local cooking conditions.	Primary solution meets Tier-3 efficiency requirements to be specified by a competent agency consistent with local cooking conditions.	Primary solution meets Tier-4 efficiency requirements to be specified by a competent agency consistent with local cooking conditions.	
3. Convenience • Fuel Acquisition and Preparation Time (Hrs / wk)				< 7	< 3	< 1.5	< 0.5
• Stove Preparation Time (Min/meal)				< 15	< 10	< 5	< 2

Framework developed in close discussion with WHO, Berkley Air Monitoring Group and Global Alliance

Framework is conducive to nationally different standards for cook-stoves, as well as development of a framework for DALYs

Multi-Tier Framework for access to clean cooking (2/2)

		Level-0	Level-1	Level-2	Level-3	Level-4	Level-5
3. Safety of Primary	IWA Safety Tiers			Primary solution meets (Provisional) ISO Tier-2	Primary solution meets (Provisional) ISO Tier-3	Primary solution meets (Provisional) ISO Tier-4	
	OR, Past Accidents (Burns and Un-intended fires)					No accidents over the last one year that required professional medical attention.	
4. Affordability						Levelized Cost of Cooking Solution (incld. cook-stove and fuel) <5% of HH Income	
6. Quality of Primary Fuel Variations in heat rate due to fuel quality that affects ease of cooking						No Major Affect	
7. Availability of Primary Fuel						Primary fuel is readily available for at least 80% of the year	Primary fuel is readily available throughout the year

RENEWABLE ENERGY

An agenda for improvement on indicators for sustainability of renewable energy

Major efforts needed to develop measures of sustainability for traditional biomass usage

ENERGY EFFICIENCY

An agenda for improvement on energy efficiency indicators and underlying data

Major efforts needed to improve availability of energy output metrics for major sectors

Transport efficiency	→	Vehicle kilometers?
Buildings efficiency	→	Area in Square meters?
Manufacturing efficiency	→	Physical units of production?

Link to report

https://openknowledge.worldbank.org/handle/10986/22148

Link to data

http://data.worldbank.org/data-catalog/sustainable-energy-for-all