THE PATH TOWARDS A SUSTAINABLE ACCESS TO ENERGY FOR ALL IN AFRICA

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Africa faces unique challenges and requires smart solutions to achieve universal access and improve service quality

- **Half of Sub-Saharan African countries have insufficient power supply** (total capacity ~110 GW)
- **Very high electricity costs** due to heavy reliance on diesel/HFO, **tariffs below cost-recovery, high budgetary costs for governments**
- **Limited consumer affordability**, with electricity bill >10% of income of poorest households, unaffordable connection fees
- **Vast geography and low population density**, leading to high grid extension costs in rural areas
- **Very low transmission & distribution network coverage, unreliable grids and high losses** (20% or double the international norm)
- **Rapid population growth** pulling down access rates even as connections increase, and **rapid urbanization make energy poverty to widen**

Reform to address sector policy and utility performance issues with a focus on:

→ Enhanced governance

→ Improved planning & regulatory capacity

→ Stronger financial standing including through a reduction in debt and arrears

→ Better technical performance and collection rate of utilities

Increase generation capacity to meet demand in a **financially and environmentally sustainable** way

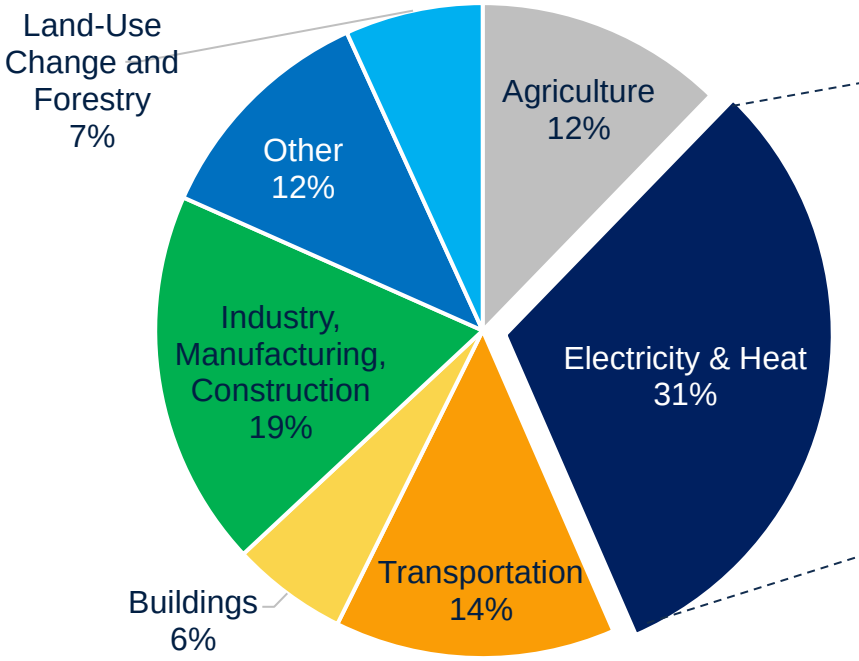
Expand connectivity through grid development, and where relevant, **off-grid solutions**

Where are greenhouse gas emissions coming from?

IDA countries represent just 3% of global power CO2 emissions

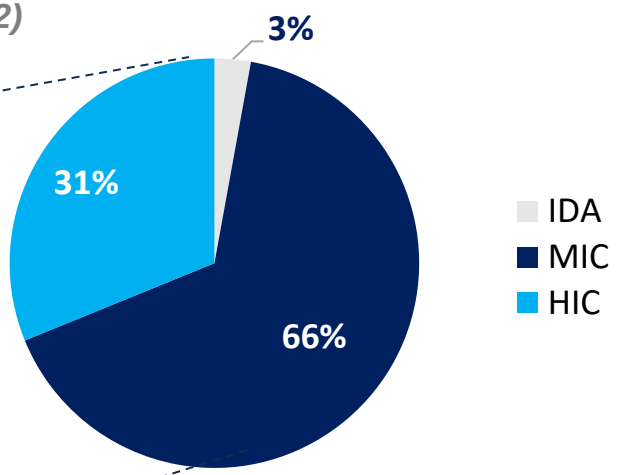
Global greenhouse gas emissions by sector, 2016

% (Mt CO2 eq)



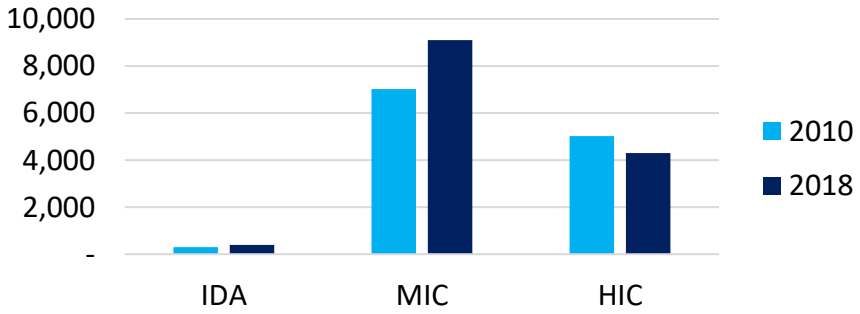
Power sector breakdown by income group, 2018

% (Mt CO2)



Power sector emissions by income group

Mt CO2



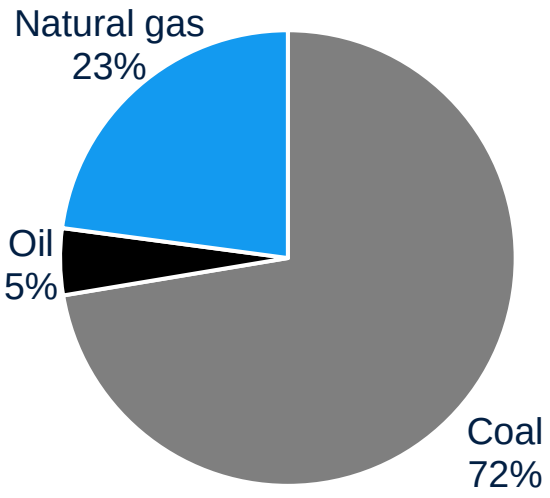
Source: Climate Watch, World Resources Institute and IEA Carbon Tracker.

Coal-fired generation is the key polluter in the power sector

Coal-fired generation represents 72% of power emissions and emits ~2x more CO2 per kWh than gas

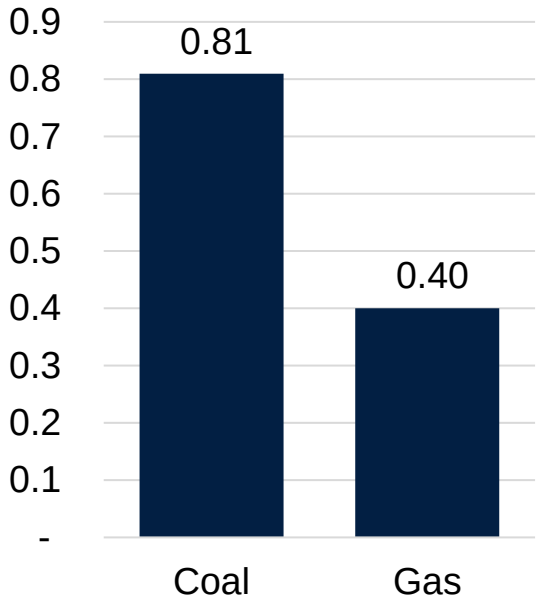
Global power sector emissions

Mt CO2



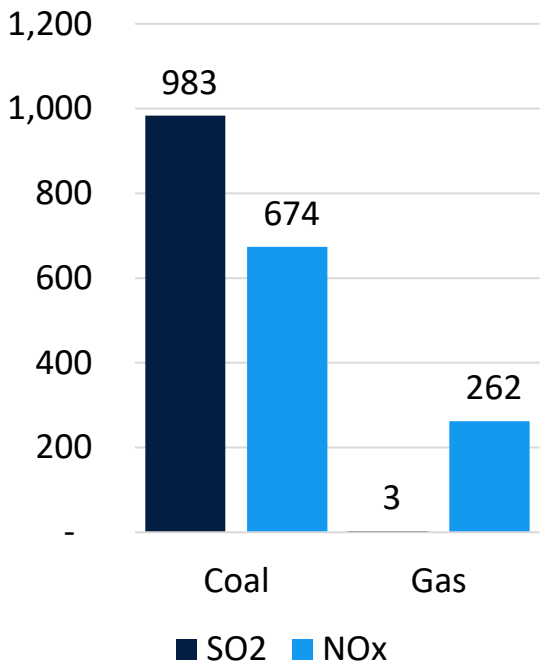
Emissions intensity: coal vs gas

Tons CO2 / MWh



Air pollution intensity: coal vs gas

Grams / MWh



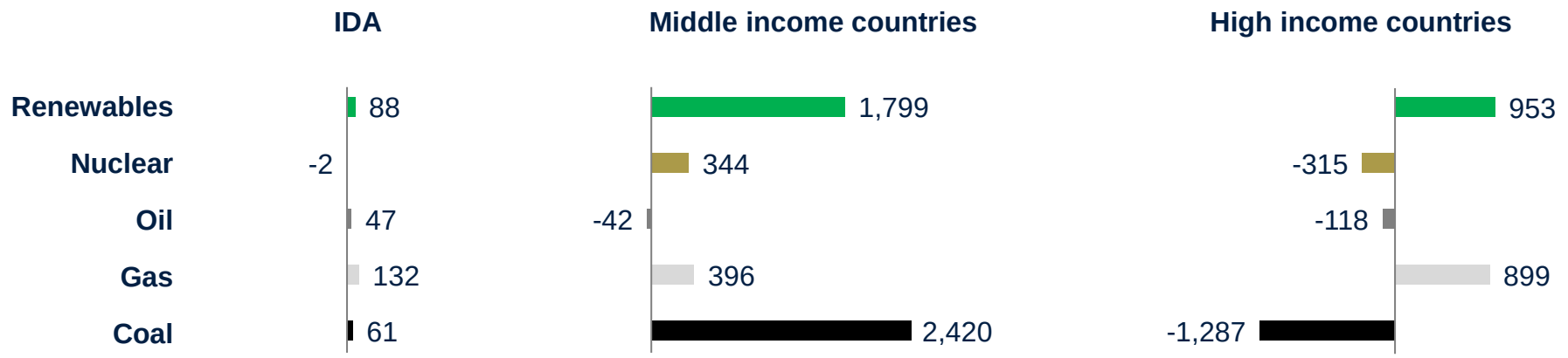
Note: End-consumption emissions intensity based on CO2 intensity of 340 kg/MWh for coal and 200 kg/MWh for gas and assumed efficiency of 42% for coal and 50% for gas-fired plant. Air pollution data calculated based on 2019 US coal and gas plant data. SO2 = sulfur dioxide, NOx = nitrogen oxides.

Source: IEA World Energy Outlook 2020, US EPA.

Evolution of the electricity mix by income group

In IDA countries, the increase in electricity generation over the last decade has been minimal

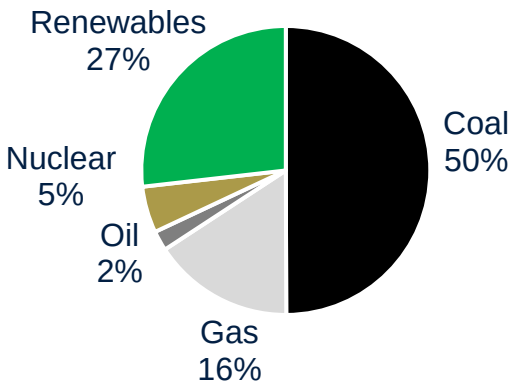
Change in power generation mix, 2010-2019



Global change in power generation mix, 2010-2019

	TWh	Share of total change
Renewables	2,840	53%
Nuclear	27	1%
Oil	(114)	(2)%
Gas	1,427	27%
Coal	1,190	22%
Total	**5,370**	

MICs generation mix, 2019

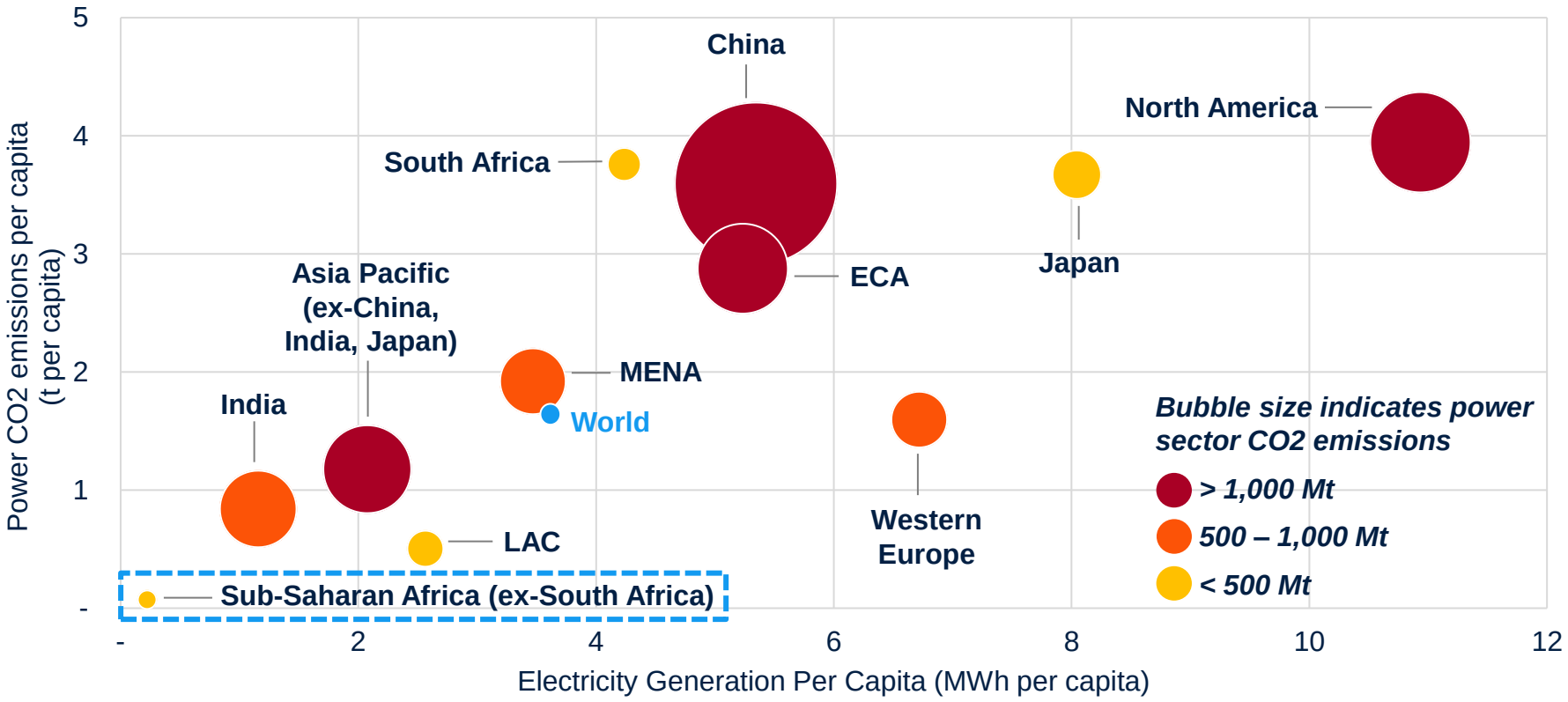


Source: BP Statistical Review of World Energy 2020 and BNEF.

Electricity generation and CO2 emissions

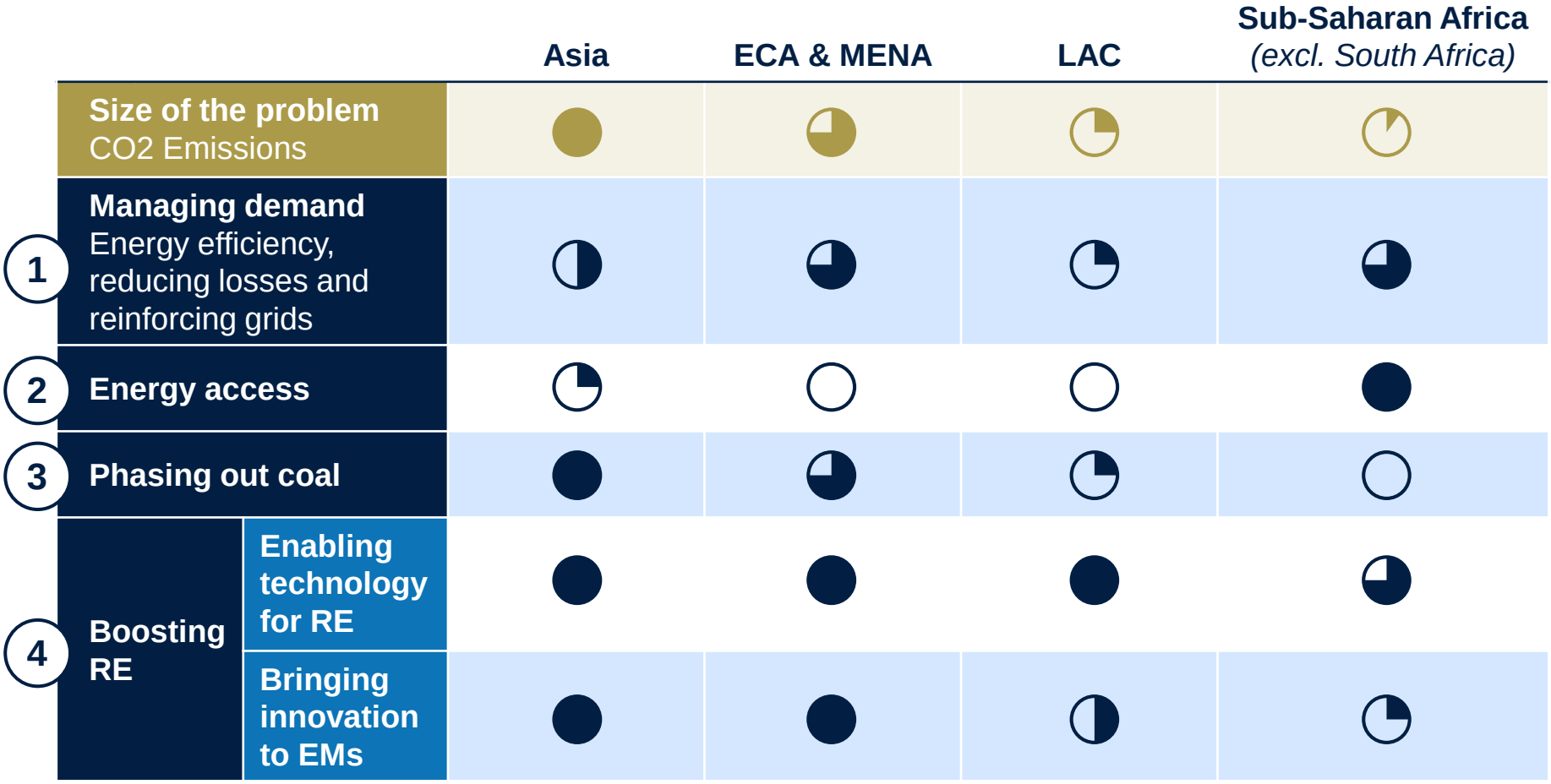
Sub-Saharan Africa (excl. South Africa) accounts for 0.5% of global CO2 emissions from the power sector

Power sector CO2 emissions in relation to population size



Source: IEA World Energy Outlook 2020, IEA Carbon and Energy Tracker 2020.

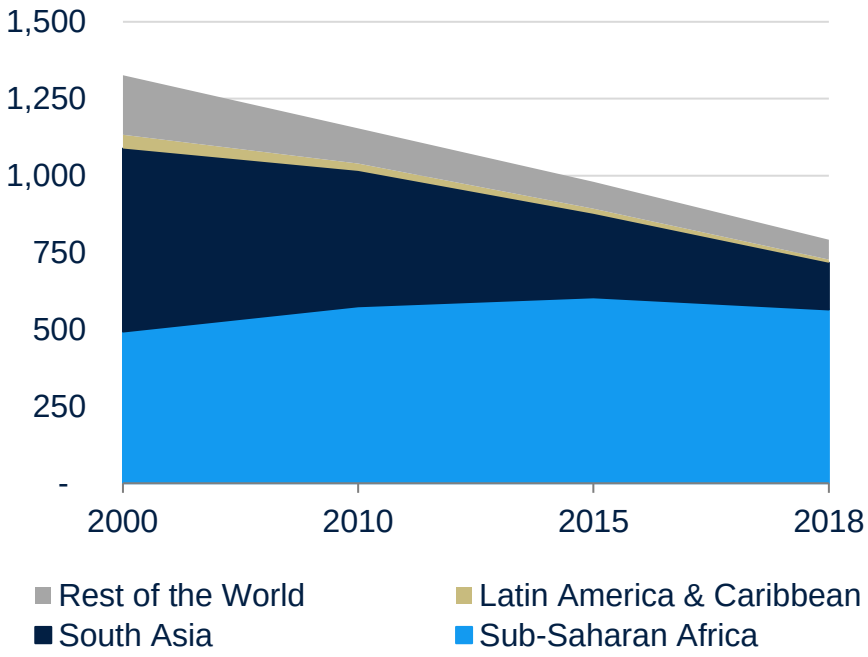
One solution does not fit all – different regions face different challenges



Energy access remains the priority in Africa: leapfrogging will not get us there and the effect on power sector emissions will be marginal

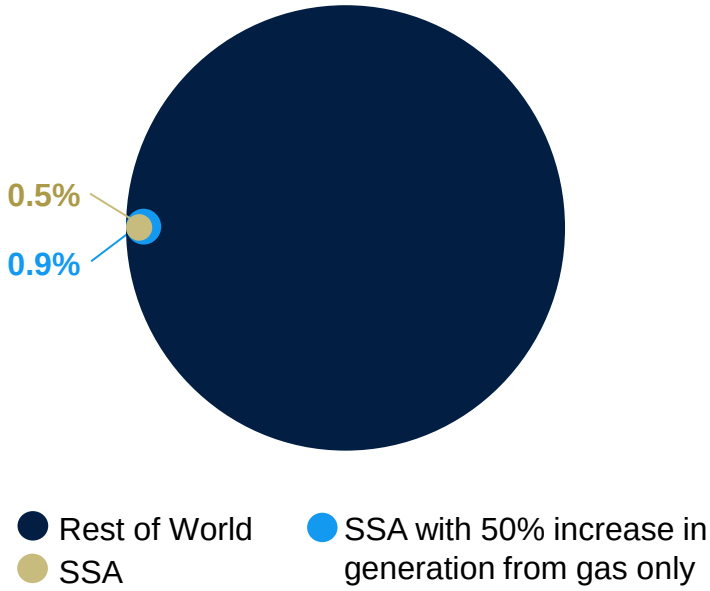
Evolution of access to electricity by region

# of people without access to electricity (millions)



CO2 emissions from the power sector in SSA

Increasing SSA's 2019 electricity generation by 50% using only gas would increase global CO2 emissions by just 0.4%



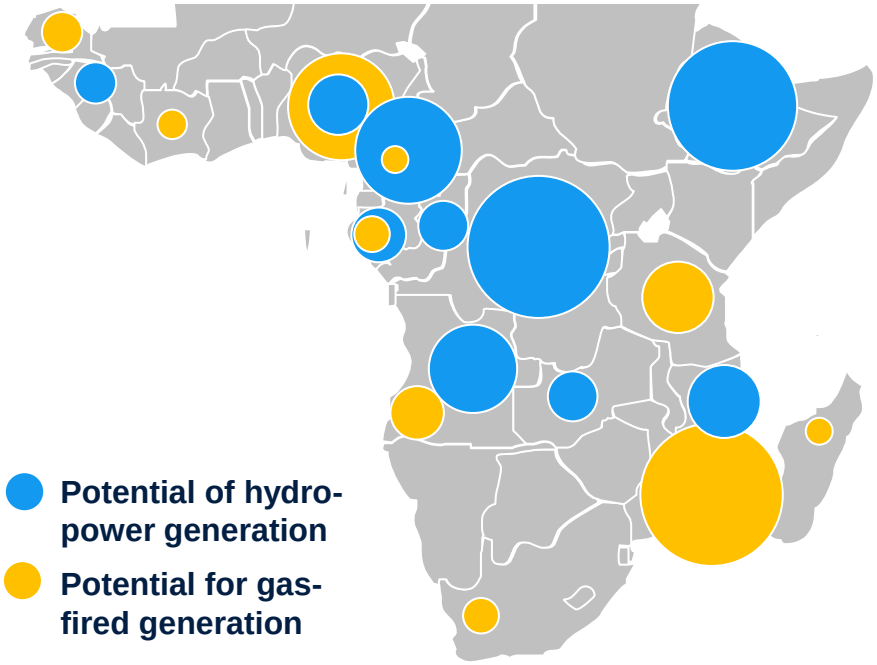
Note: Sub-Saharan Africa refers to SSA excluding South Africa.
Source: World Development Indicators, IEA World Energy Outlook 2020.

Hydropower and gas potential in Sub-Saharan Africa

Top 10 resource-rich countries by technology

	Gas	*EJ*
1	Mozambique	333
2	Nigeria	217
3	Tanzania	92
4	Angola	49
5	Senegal	31
6	South Africa	29
7	Gabon	28
8	Côte d'Ivoire	13
9	Cameroon	12
10	Madagascar	12

	Hydro	*PJ/year*
1	DR Congo	374
2	Ethiopia	353
3	Cameroon	211
4	Angola	129
5	Mozambique	105
6	Nigeria	85
7	Gabon	66
8	Republic of the Congo	43
9	Guinea	42
10	Zambia	40



Source: Shell – Global Energy Resource Database (2020), adjusted for Senegal (Resources of 30Tcf vs. the 10 Tcf reported by Shell).
Note: Hydropower data refers to production potential per year while gas data refers to expected remaining potential. Hydropower potential in peta-joule per year (PJ/year), gas potential in exa-joule (EJ). 1 exa-joule = 1,000 peta-joule.

Key messages

1. In Sub-Saharan Africa, ensuring access to affordable, reliable, sustainable and modern energy for all is essential

2. Electrification expansion will require blending different least-cost business models through grid development and off-grid solutions based on RE, where relevant

3. Clean energy transition will primarily rely on RE, with hydropower and flexible gas generation providing affordable firm capacity and ability to integrate more variable RE

4. Improving the transmission and distribution network is critical to ensure energy access quality, with battery storage progressively having a role to play as costs decrease

5. Reforms to address sector policy and utility performance issues are fundamental to achieve these goals