

# Addressing Africa's energy deficit

Climate change,  
renewables, and gas

## 2 Addressing Africa's energy deficit: gas, renewables, and climate change

Africa is the continent with the lowest rates of energy access globally, so it faces the unique challenge of needing to develop its energy infrastructure amid a global climate crisis it did little to cause. Addressing this energy deficit requires the mobilisation of a wide range of resources, including the continent's vast renewable resources, as well as natural gas, the least polluting fossil fuel.

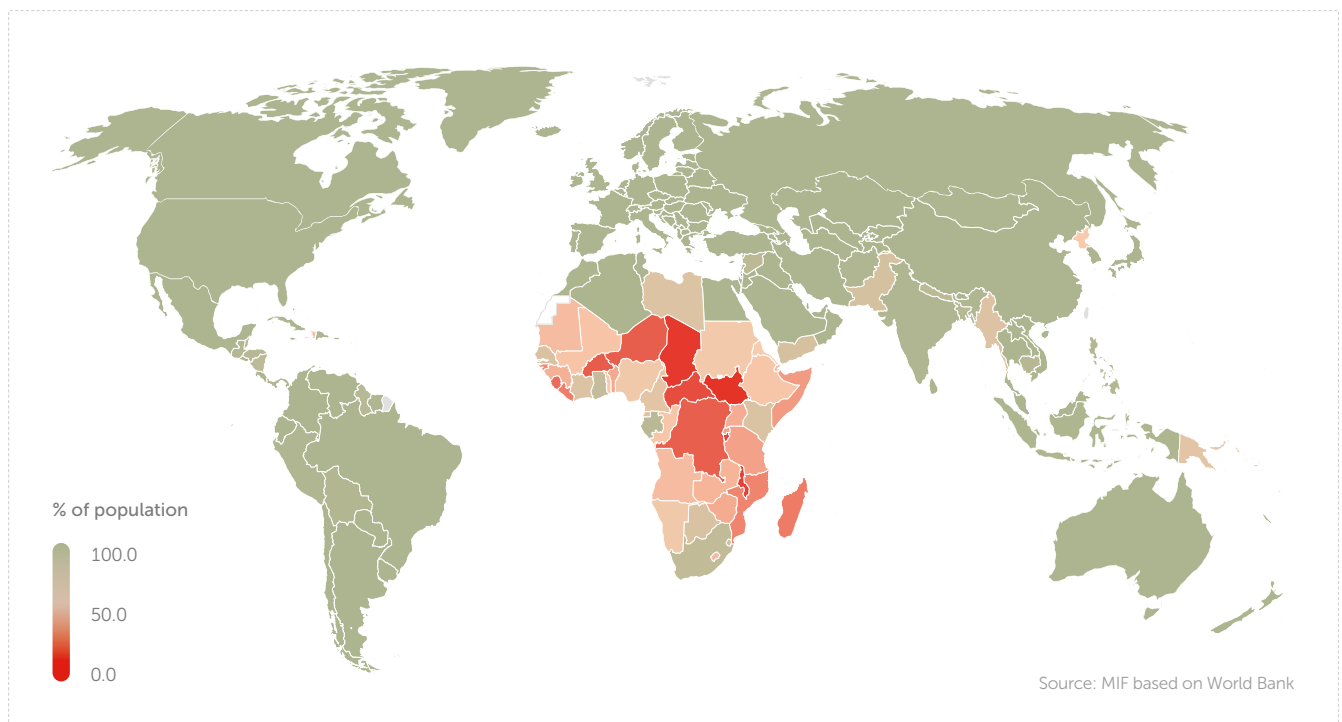
However, climate pledges made by rich countries on renewable investments have failed to materialise, while simultaneously, debates in global policy forums and decisions taken by policymakers in the global North have placed obstacles in the way of the critical gas investments Africa requires.

The World Bank has stemmed financing for fossil fuels, while at the UN Climate Change Conference in Glasgow (COP26), 39 countries and development agencies also pledged to stop direct international public financing of fossil fuel projects. At the same time, many countries in the North continue to expand fossil fuel use at home, triggering a backlash from many African governments and organisations, levying accusations that Africa is being expected to carbon finance the global North.

Reliable grids, that do not fluctuate are essential for economic development and delivering public services such as healthcare. But the narrow scope of the global response to climate change, that in practice has not accounted for the world's disparate energy needs and differing responsibilities, are hindering African countries efforts to achieve their development goals.

### Africa's pressing and inescapable need to expand its energy supply

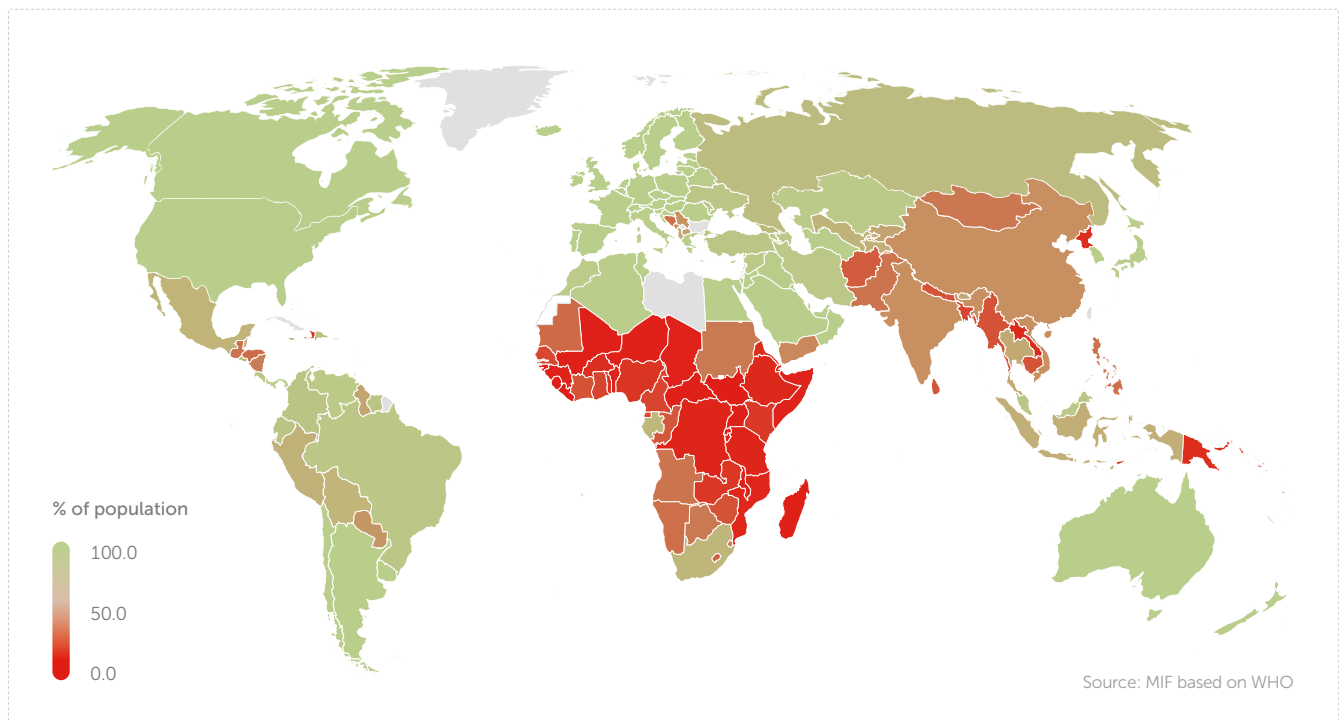
#### World countries: access to electricity (2019)



Just over half (55.7%) of the 1.3 billion people living in Africa have access to electricity, leaving over 600 million on the continent with no access to electricity, equivalent to almost twice the total population of the US, and 1.3 that of the European Union (EU). Electricity is also expensive, with the average electricity costs of running a modern fridge in Africa 2.6% of average annual income, more than five times the global average rate. Outages also make supply unreliable. Over a quarter of those connected to the grid only have access half of the time or less. Estimates suggest electric shortages cost the continent about two to four percent of gross domestic product (GDP) a year.

Just over half (55.7%) of Africa's population has access to electricity, as opposed to over 90% for the rest of the world

#### World countries: access to clean cooking fuel (2019)

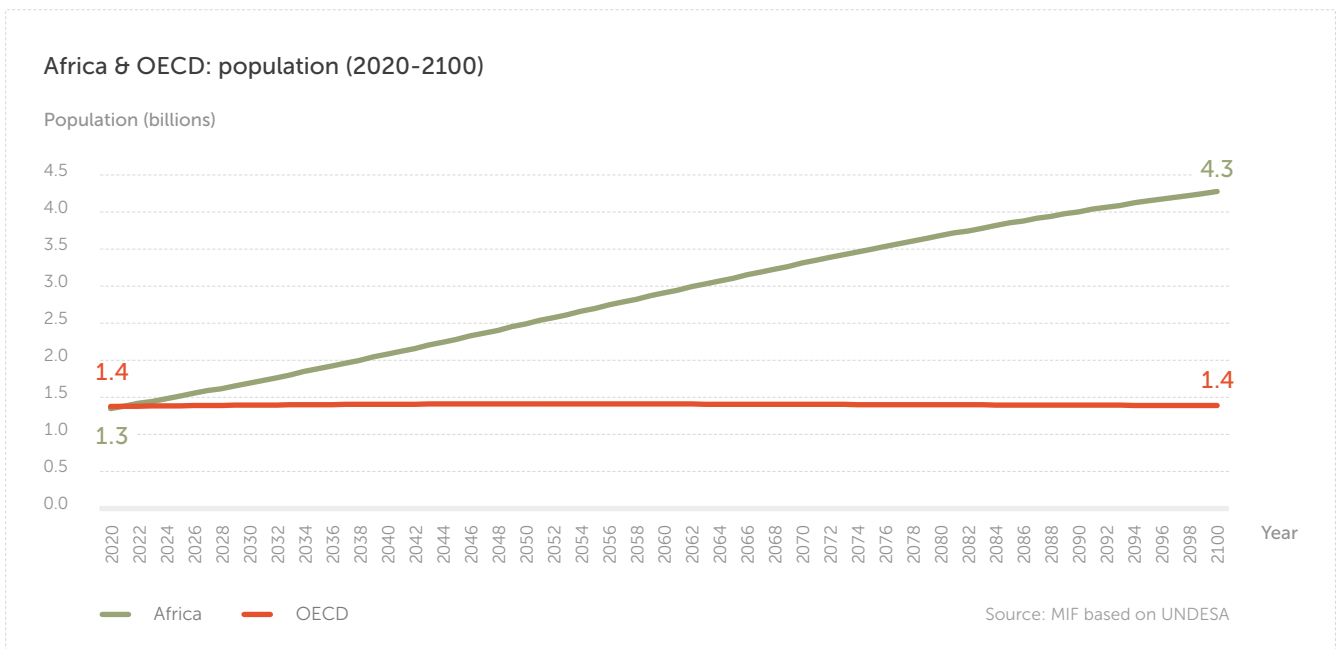


Africa also has the lowest access to clean cooking of any region globally, at less than one in three people. In total, over 930 million in Africa lack access to clean cooking fuels. This is more than Europe's entire population and three times that of the US. Concerningly, Africa is also the only region in which the number of people using unclean cooking fuels is on the rise, having increased by almost 50% since 2000.

Africa's growing energy demand is inescapable, given demographic trends and development plans. Africa's population is projected to almost double by 2050 and increase three-fold by 2100. This will mean even more people needing energy to cook their meals, light their homes, travel, power business and create jobs. Large infrastructural projects such as Agenda 2063's African Integrated High-Speed Rail Network and the Programme for Infrastructure Development in Africa's Trans-African Highway Network are already underway, translating into increased energy needs.

In 41 out of 53 African countries, most of the population lacks access to clean cooking

There are almost 490,000 premature deaths per year due to polluting cooking fuels in sub-Saharan Africa



In industrialised countries where populations are stagnating or declining, and energy consumption and access levels are already high, there is little need to expand the energy supply, leaving governments the policy space to focus on a low-carbon transition. In Africa, **the need to expand the energy supply is pressing and inescapable**. Without rapid progress, the continent will not realise the Sustainable Development Goals (SDGs) or Agenda 2063.

### Renewables represent a key component of addressing the energy gap

The potential of renewable electricity in Africa is undoubtedly vast, and African governments have already recognised the role they can play in addressing the continent's energy deficit. **Between 2010 and 2019, African governments more than tripled public investment in renewables**, up to \$47.0 billion from \$13.4 billion the previous decade.

Renewable projects are underway such as the African Development Bank's 'Desert to Power Initiative', a solar project which by 2030 should increase existing capacity of the eleven countries in the Sahel region by almost 40% and bring electricity access to 90 million people for the first time. DR Congo's Grand Inga Dam could produce up to 40,000 MW of electricity when completed, twice the power generation capacity of the world's current largest dam, China's Three Gorges.

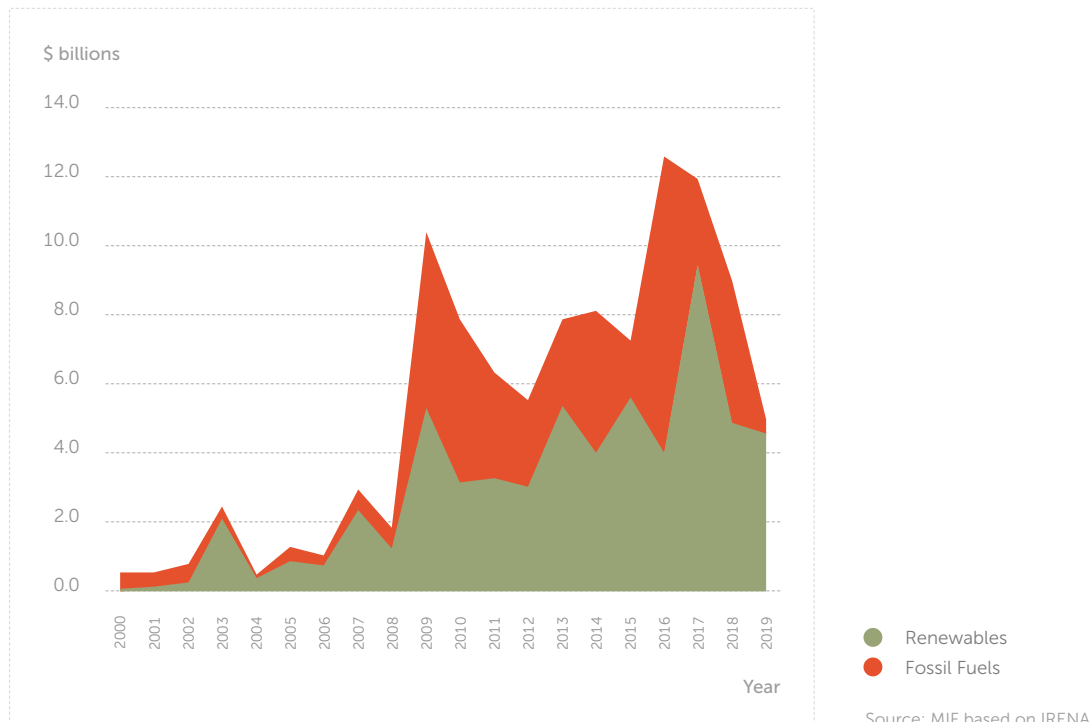
Many African countries are looking to lead in new renewable technologies. The recently opened Noor-Ouarzazate complex in Morocco is the world's largest concentrated solar power plant, while almost one quarter of the electricity generated through off-grid solar globally in 2019 was generated in Africa.

There is also substantial potential that remains untapped. Five of the ten countries at the global level with the potential to generate the most energy per solar panel are in Africa, while full mobilisation of technical wind potential would increase electricity capacity more than 30-fold in Chad, Mauritania, Niger and Mali. But **realising such potential will require climate pledges from wealthier countries to be realised** and for an increase in the meagre 5% of climate finance sub-Saharan Africa of the total received not in the OECD.

**5 of the 10 countries with the greatest solar potential are in Africa: Namibia (1<sup>st</sup>), Egypt (4<sup>th</sup>), Lesotho (8<sup>th</sup>), Libya (9<sup>th</sup>), Botswana (10<sup>th</sup>)**

**Almost one quarter of the electricity generated through off-grid solar globally in 2019 was generated in Africa.**

## African governments: public investment in electricity generation (2000-2019)



### But renewables alone cannot deliver the reliable energy required for economic development and public services

Renewables alone cannot deliver the reliable low-cost electricity supply the continent requires to industrialise and deliver reliable public services such as health and education. **Renewable resources vary greatly between countries and a 'one size fits all' approach to energy does not reflect these differences.** A country like Ethiopia, endowed with vast hydro and geothermal resources, has much greater potential to utilise green technologies in the short-term, and create a reliable stable power base, compared to a country such as Nigeria, which is heavily dependent on oil and gas.

Intermittency is also an issue. **On cloudy days solar panels don't operate at full capacity, while they don't produce any energy at night. On still days, wind power can be reduced to a fraction of capacity.** Europe's largest wind producers, Britain, Germany, and Denmark harnessed just 14% of installed capacity during the third quarter of 2021. **Low or zero-emissions back-up capacity for periods with low sun or wind such as batteries, hydrogen or carbon capture are still a decade away from being available at scale, so much of the gap from intermittent renewables has to be filled by a backup energy source, such as diesel or natural gas.**

On top of that, renewable hydroelectric power is **highly susceptible to the adverse impacts of climate change.** Reduced rainfall would see the volume of water flowing through rivers decline, while increased temperatures could see increased evaporation in reservoirs, causing power to fluctuate.

Beyond electricity, **fuel is still required for high-energy industries like steel and cement as well as transport.** While some models suggest electric vehicles could account for 40% of African vehicles by 2050, they currently only account for 1% of the total fleet globally and even less in Africa. Transport will need fuel in the meantime.

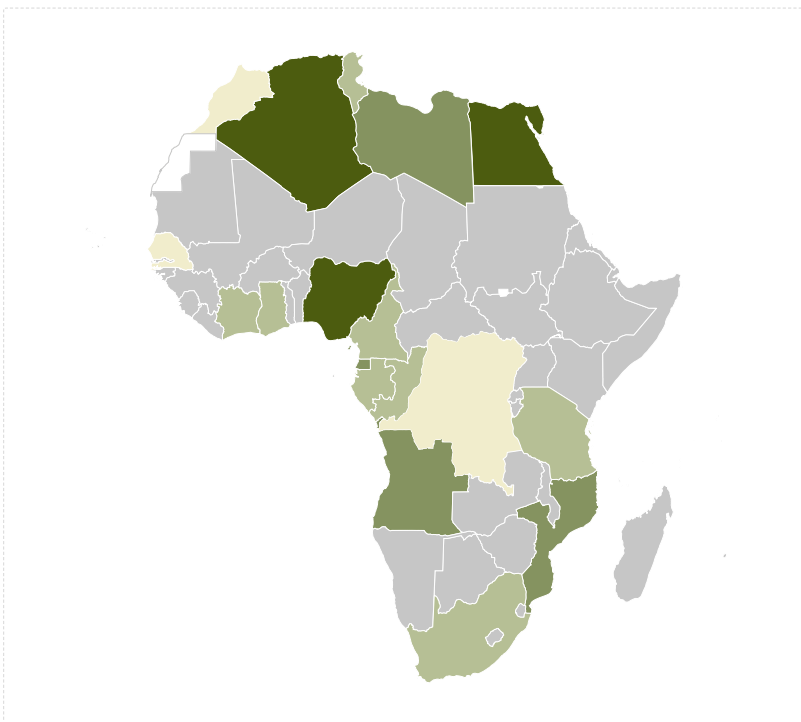
## Gas: a key transitional fuel to achieve the continent's development agendas

To facilitate the widespread energy access urgently required to industrialise and achieve the continent's development goals, the continent cannot afford to turn its back on fossil fuels entirely. **Natural gas, the least polluting fossil fuel, will be key for Africa in the short to medium-term**, acting as a transitional base fuel alongside renewables, providing an input for industry, a source of clean cooking fuel, as well as electricity where renewables are unavailable or intermittent.

Just a small amount of gas can generate a lot of electricity, while gas fired power-plants are typically quicker and less expensive to build than alternatives such as hydropower, geothermal, nuclear, or coal. They can be easily integrated with renewable resources such as solar and wind. Indeed, in the International Energy Agency's (IEA) 'Sustainable Africa Scenario', a plan which details the required direction of Africa's energy landscape by 2030 if both universal access to modern energy services, namely electricity and clean cooking fuel, and the continent's climate pledges are to be simultaneously realised, **gas investments will have to account for half of all fuel supply investment on the continent and 10% of newly installed power capacity up until 2030.**

## Gas is abundant in Africa, but most is exported

African countries: total dry natural gas production (2019)



At 455.2 trillion cubic feet in 2020, Africa's own gas reserves could go a long way to meeting the continent's growing energy demand, while new discoveries are constantly being made. **Africa accounted for 41% of the world's new gas discoveries between 2011-2018.** Mozambique is now known to have 100 trillion cubic feet of natural gas reserves, almost twice the reserves of Norway, the world's 8<sup>th</sup> largest natural gas producer. In Mauritania and Senegal, 450 billion cubic metres of offshore gas has been recently discovered, more than in the entire European Union (EU).

**"Natural gas occupies a special place in the energy world, standing at the nexus of economy and environment. It's abundant, accessible, and affordable... it bridges the gap for those not quite ready to kick the hydrocarbon habit but interested in a more climate-friendly form of fuel"**

NJ Ayuk, Executive Chairman,  
African Energy Chamber



**According to the IEA, gas should account for half of all fuel supply investment and 10% of newly installed power capacity up until 2030 in Africa, if universal access to modern energy services and the continent's climate goals are to be achieved.**

Billions of cubic feet

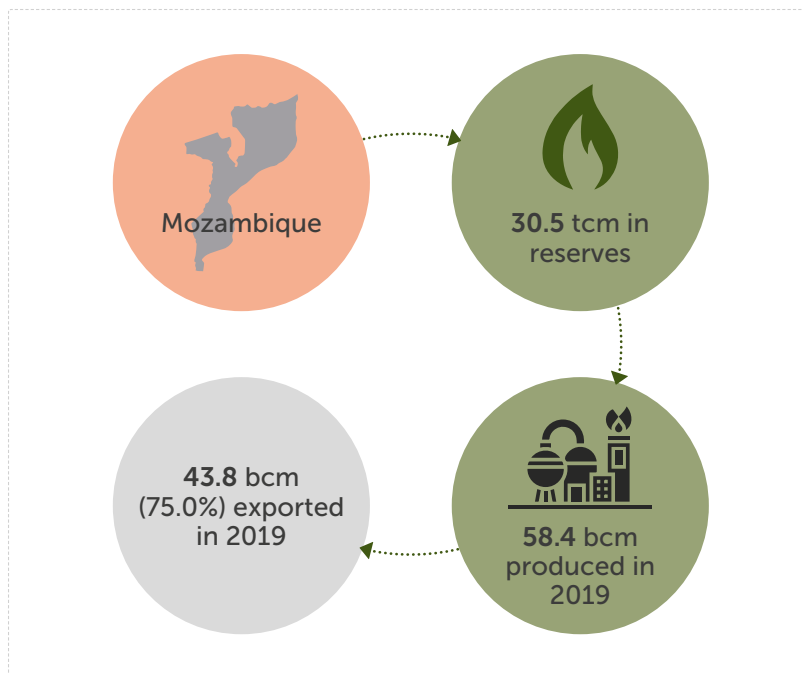
- Over 1000 bcf
- Over 100 bcf
- Over 10 bcf
- Less than 10 bcf
- No gas production

Source: MIF based on United States Energy Information Administration

However, in many gas endowed countries, little gas is used in the power supply. Gas accounts for less than 10% of the total domestic energy supply in half of the continent's gas producers. Most of the continent's gas is produced for the export market and not to meet domestic energy demand. Two out of every three dollars put into the sub-Saharan energy sector since 2000 have been committed to the development of resources for export.

Intra-regional energy trade is limited. Only 8.2% of natural gas exported by African countries in 2019 stayed on the continent, with over half (53.6%) heading to the EU. This provides government revenues and foreign currency, but it does not help local populations gain electricity access or clean cooking fuel. In Mozambique for example, three quarters of all gas is exported. Meanwhile, less than 5% of its population use clean cooking fuels and less than 30% have access to electricity.

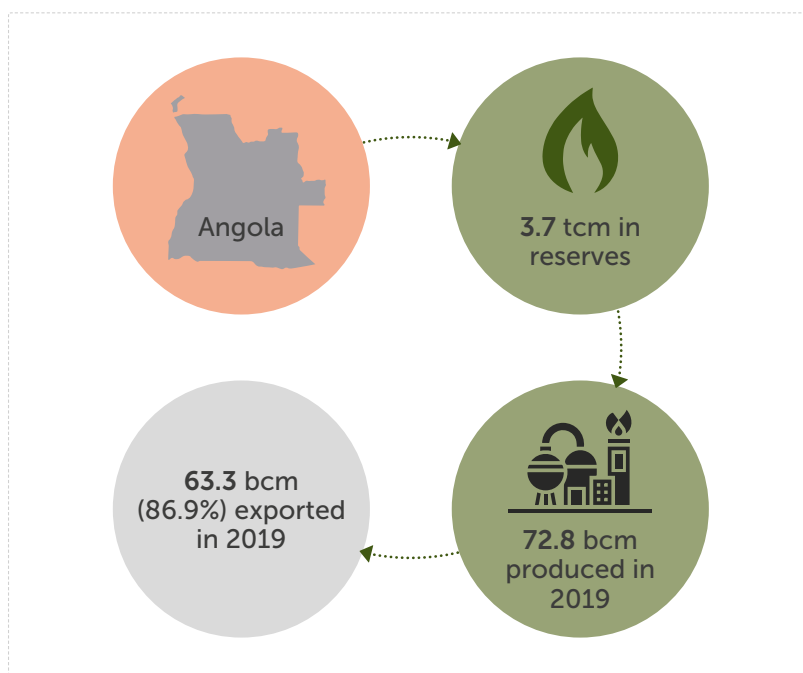
Over half (53.6%) of all natural gas exported by African countries in 2019 went to the EU



Gas – 6.7% of domestic energy supply

95.1% of population without access to clean cooking

70.4% of population without access to electricity



Gas – 7.1% of domestic energy supply

49.6% of population without access to clean cooking

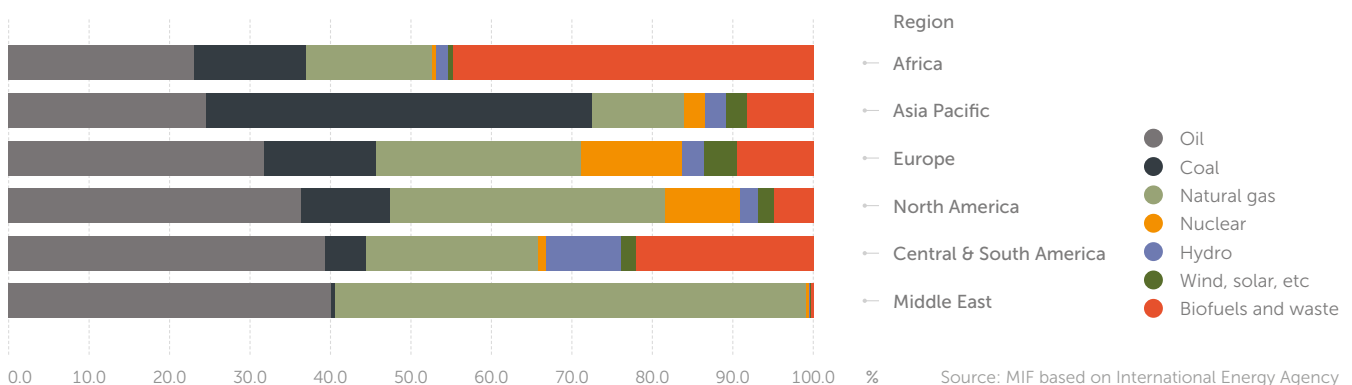
54.3% of population without access to electricity

Converting Africa's gas reserves into a base fuel for industrialisation and development requires serious investment to address the critical shortage of gas infrastructure. Funding to transform Africa's gas resources into energy for people in Africa (gas-to-power financing) has been limited in recent years, not helped by the financing restrictions from the World Bank and at COP26. Of the \$90 billion invested in the African energy sector in 2021, only \$18 billion was invested in power generation, with less than \$4 billion invested in gas to power. Storage and distribution infrastructure is lacking, with limited connections between gas fields with local power plants. Aside from coastal Nigeria there's virtually no gas pipeline infrastructure in sub-Saharan Africa.

### Gas in Africa does not spell climate disaster

Fears over gas use in Africa are misplaced. Africa's citizens consume very little energy in comparison to other regions, accounting for 17% of world's population but only 5.9% of world's energy supply. Even then, the share of fossil fuels (coal, oil, and gas) in the energy supply is lower in Africa than anywhere else, accounting for roughly half of the total energy supply.

#### World regions: total energy supply by source (2019)



#### Energy Supply:

The energy supply accounts for all fuels and technologies used for generating electricity, powering industry, transport, and infrastructure, as well as domestic cooking and heating among other uses.

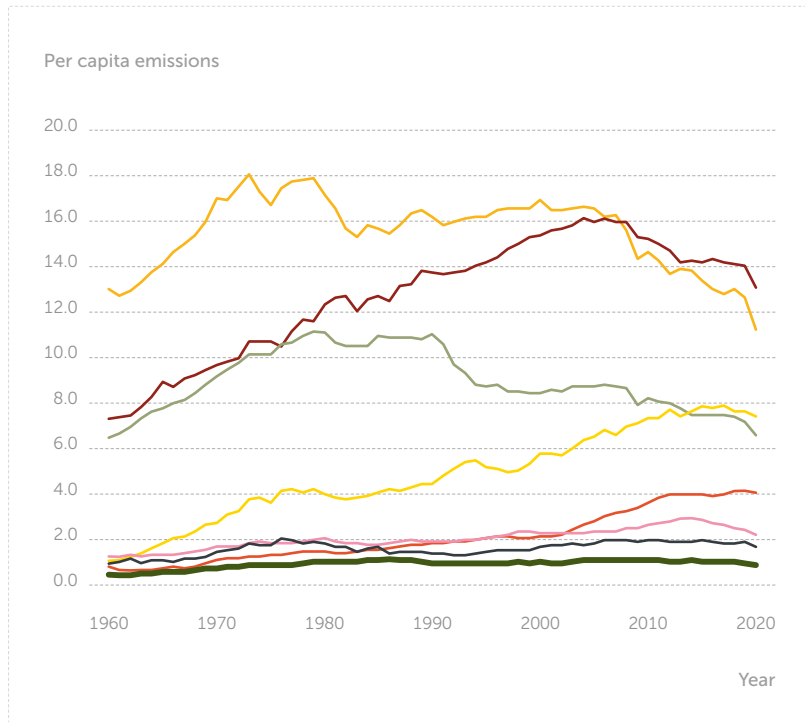
In fact, African countries generate 40.5% of their electricity from renewable sources, higher than the global average (34.1%) and higher than the rate in the EU (39.1%), Japan (18.6%) and the US (17.9%). As it stands, zero-carbon electric grids are extremely rare anywhere in the world.

In total, Africa has only contributed to 3.3% of global emissions since 1960 and has recorded the lowest per capita emissions of any region in each of the last 60 years. It is evident Africa has substantial wiggle room to expand natural gas use without causing a climate disaster. If sub-Saharan Africa (minus South Africa) were to triple its electricity consumption using entirely gas it would only add 0.6% to global carbon emissions.

If the whole of sub-Saharan Africa (minus South Africa) were to triple its electricity consumption using entirely gas it would only add 0.6% to global carbon emissions



World regions: territorial carbon emissions (1960-2020)

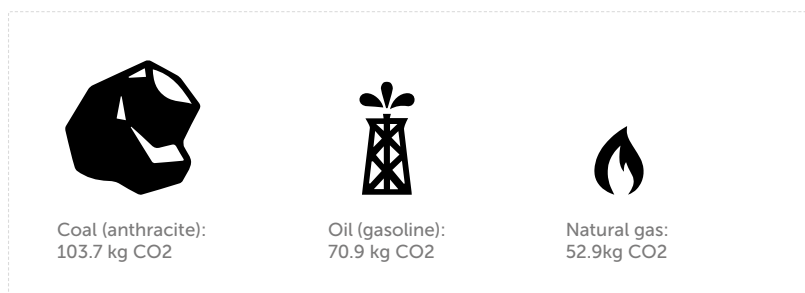


Africa has registered the lowest per capita emissions of any world region every year since 1960

Source: MIF based on Global Carbon Atlas

Natural gas is also by far the cleanest burning fossil fuel. Coal produces almost twice as much CO<sub>2</sub> per million units of energy as gas, while oil produces roughly one third more. Cutting finance for gas may delay the transition away from dirtier fossil fuels such as coal and oil.

CO<sub>2</sub> emissions by fuel: kg emitted per million units of energy



Since 2010, coal-to-gas switching has saved around 500 million tonnes of CO<sub>2</sub>

Source: MIF based on United States Energy Information Administration

The IEA note that since 2010, coal-to-gas switching has saved around 500 million tonnes of CO<sub>2</sub> - an effect equivalent to putting an extra 200 million electric vehicles running on zero-carbon electricity on the road over the same period. The organisation also notes that given the time it takes to build up new renewables and to implement energy efficiency improvements, coal-to-gas transitions represent a potential quick win for emissions reductions. For countries such as South Africa where over 70% of the energy comes from coal, challenges in securing gas finance may delay the phasing out of coal.

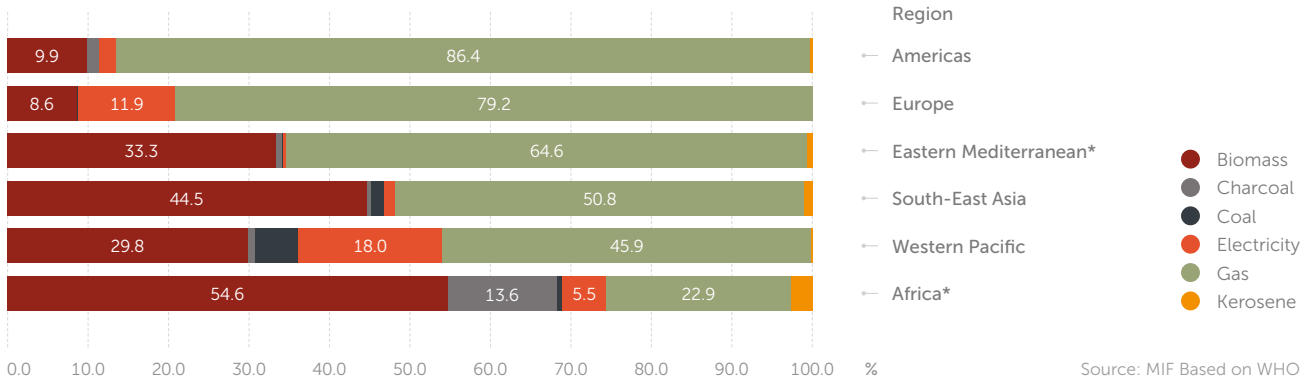
**Biofuels:**

Biofuels refer to all fuel sources created from organic matter. This includes primary biofuels such as timber, wood chips, pellets and other types of wood traditionally used for heating and cooking purposes, as well as secondary biofuels that have been processed such as bioethanol and biodiesel sometimes used in transport.

In sub-Saharan Africa, around 70% of households depend on wood fuel for energy.

Investing in gas could also increase the access and affordability of less polluting fuels for cooking and heating, replace unclean fuels such as biomass, charcoal, and kerosene. In addition to the clear health benefits that would be accrued, this can also be positive for the climate. Biofuels and waste make up just over 40% of Africa’s energy supply, while biomass accounts for over half of cooking fuel in Africa (54.6%) more than in any other region.

World regions: primary cooking fuel by source (2019)



\* WHO regions Africa and Eastern Mediterranean have been manually adjusted. All countries covered in the Ibrahim Index of African Governance have been moved into the Africa region for the purposes of this analysis. This includes Djibouti, Egypt, Morocco, Somalia, Sudan, and Tunisia.

Wood fuel produces almost twice as much carbon per million units of energy as gas. In sub-Saharan Africa, around 70% of households depend on wood fuel for energy, it can take hundreds of years for trees to regrow, if they are replaced at all, and reabsorb this carbon from the atmosphere. Wood fuel can also contribute to deforestation. In 2020, Nigeria lost 97,800 hectares (377 square miles) of natural forest, equivalent to 59.5 million tonnes of CO2 emissions, while the use of wood for cooking and heating is contributing to the deforestation of the Congo Basin, the world’s second largest carbon sink.

Wood fuel produces twice as much carbon as gas and contributes to deforestation

## Ukraine crisis triggers European backtrack, but Africa's gas must serve Africa's people first

Since the Russian invasion of Ukraine, a renewed focus on energy security among European countries has seen some backtracking on fossil fuel use. Germany began firing up coal power plants previously scheduled for closure, while Norway, the UK and US have all begun increasing oil and gas production. The EU have also recently ruled that gas can be classified as a green investment under certain conditions in the EU taxonomy for sustainable activities.

At the G7 summit in June, members officially opened the door to more gas financing stating, "with a view to accelerating the phase out of our dependency on Russian energy, we stress the important role increased deliveries of liquefied natural gas (LNG) can play and acknowledge that investment in this sector is necessary in response to the current crisis. In these exceptional circumstances, publicly supported investment in the gas sector can be appropriate as a temporary response (...)". All but Japan were original signatories to the COP26 commitment, but many are now turning to Africa to fill the gap.

Germany have entered discussions with Senegal about funding offshore gas fields. Italy have struck gas deals with Algeria, Angola, Egypt, and Republic of Congo in recent months in moves to reduce its dependency on Russia. Italy, France, Portugal, and Spain are all looking for gas in Nigeria, while investments put on hold in Mozambique and Tanzania may be restarted.

While the investments are welcomed, the fact that they have been driven by Europe's anxiety for its own energy security, rather than through a greater appreciation of Africa's unique energy situation, is a cause for concern. For too long, the global North has not given Africa's energy needs importance in their own right. African energy needs have been treated as expendable when governments in the North want to display their green credentials, but European energy needs have justified the rolling back of climate commitments.

Despite this, the renewed investment interest in African gas can be a boon for the continent, but only if integrated with plans for national and regional energy, as opposed to just providing an alternative source of fuel for European homes and industries. Investments must also support local infrastructure development plans, that supply energy to African markets. For example, plans such as Senegal's 'Gas to Power' strategy, that seek to establish a framework to optimise the entire natural gas value chain, from primary energy supply to power distribution to final consumers, can ensure that investments help to further energy access on the continent.

To guarantee, that this renewed bout of investment in African gas does not reduce African energy needs to an extension of external agendas, COP27 in Sharm El Sheik, Egypt, must place Africa's unique energy landscape and needs at the centre of discussions. The energy poverty faced by many of Africa's citizens and the continent's development agendas must be factored in. Plans must be made for a nuanced energy transition, that moves towards a low-carbon future, with the biggest historic polluters taking on the biggest burden, delivering on previous commitments for renewable investments, while recognising Africa's unique situations and clearing the way for the use of gas as a transitional fuel on the continent.

### Recommendations from Ibrahim Governance Forum 2022:

#### Address Africa's people's right to energy access

- Balance net zero, energy access, and energy security
- Consider gas as a key transitional fuel, to be developed in parallel with renewables
- Whether for gas or renewables, look beyond just production alone
- Clean cooking solutions are key to both climate and health goals.

*See more recommendations in the 2022 Forum Report - The Road to COP27: Making Africa's Case in the Global Climate Debate.*



World Health Organization (WHO) (2022). The Global Health Observatory. Variable used: Proportion of population with primary reliance on clean fuels and technologies for cooking (%) <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-phe-primary-reliance-on-cleanfuels-and-technologies-proportion>  
Accessed 20 June 2022

World Health Organization (WHO) (2022). The Global Health Observatory. Variable used: Population with primary reliance on fuels and technologies for cooking, by fuel type (in millions) <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/population-with-primary-reliance-onfuels-and-technologies-for-cooking-by-fuel-type>  
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