# Concept Paper on Energy Access in Africa

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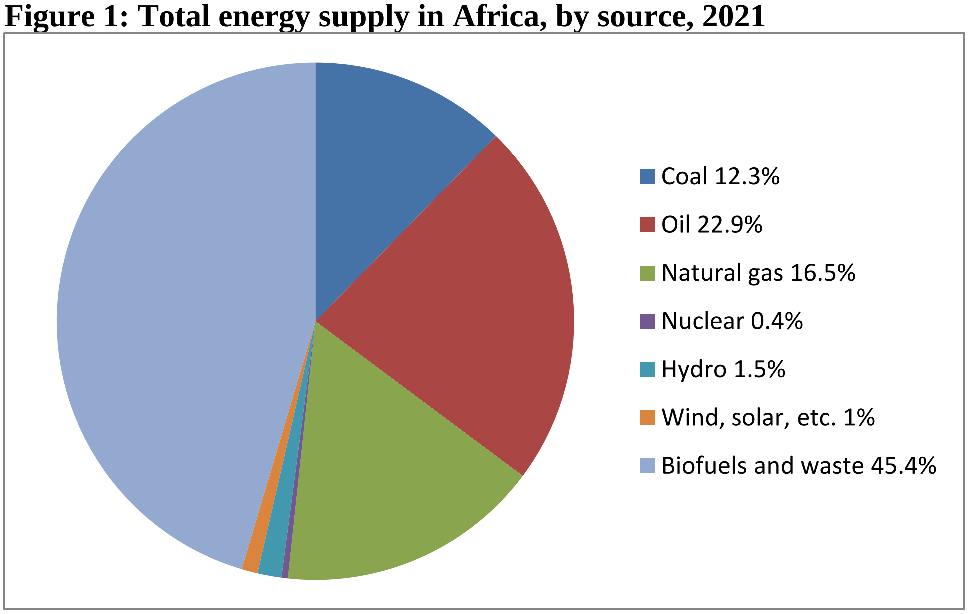
This concept paper addresses the themes of modern energy access and transition in Africa and what human, institutional and financial capacities are required to contribute to these objectives[1]. By way of summary, total energy supply in 2021 by source in Africa was nearly TJ 36 million -- or 6% of the global share. The largest share is from Nigeria (19.3% of the continental total), followed by South Africa (14.6%), Egypt (11.4%) and Algeria (7.5%).

**Figure 1: Total energy supply in Africa, by source, 2021**




Source: https://www.iea.org/regions/africa/energy-mix#what-is-the-role-of-energy-transformation-in-africa

[1] A recent initiative to establish an African Institute for Sustainable Energy and Systems Analysis (AISWSA) included a preamble that embraced many issues related to energy access and transition. This concept paper draws on that AISESA preamble and from the IEA's Africa Energy Outlook 2022 (https://www.iea.org/reports/africa-energy-outlook-2022).

## 1. Introduction

By far the largest primary energy source in Africa in 2022 was biomass and waste (45.4%), much of which is non-renewable. However, despite some extended programs to introduce more efficient and cleaner biomass cookstoves (frequently utilizing the voluntary carbon market), the focus of the modern energy access-transition agenda is on sustainable electricity for households and productive activities. In South Africa, the focus is on a transition from coal to renewables. Morocco has also made significant strides in renewable energy contributions. In many areas of sub-Saharan Africa, the rural electricity access agenda is being increasingly fueled by renewables, predominantly solar PV (which has now reached 1% of the total primary energy supplied in Africa).

At present, 600 million of the UN-estimated continental population of 1.5 billion people (more than 40% of the total African population) lack access to electricity, most of them in sub-Saharan Africa. Countries such as Ghana, Kenya and Rwanda are on track for full access by 2030, offering success stories that other countries could follow. Detailed analysis shows that extending national grids is the least costly and most prudent option for almost 45% of those gaining access prior to 2030. In rural areas, however, where over 80% of the electricity-deprived live, mini-grids and stand-alone systems, mostly solar based, are currently the most viable solutions[2].

Any modernization of energy access in Africa will need to explore increased access to electricity as well as clean biomass usage. Biomass thermal energy services are unlikely to disappear even with increased access to relatively expensive electricity. Nevertheless, it has been demonstrated that increased efficiencies can be achieved with expanded access, alongside reduced negative health, social and climate impact.

## 2. Background and the problem in African energy policy and planning

Sub-Saharan Africa (SSA) continues to exhibit the largest gaps with respect to the UN Sustainable Development Goals (SDGs) of any world region[1]. In 1963, per capita GDP was exactly US$163 in both East Asia and SSA. By 2022, GDP in East Asia had risen to US$12,907, while in SSA it had stagnated at US$1,690. By 2030, an estimated 90% of all people in extreme poverty will live in SSA[2]. Inclusive economic growth, with purposeful actions in education, climate action, environment, health, livelihoods, infrastructure, trade, and supportive measures to create jobs are all needed to create the conditions for healthy development pathways across the continent that places reaching the poorest as its core mission towards better and sustainable livelihoods in Africa.

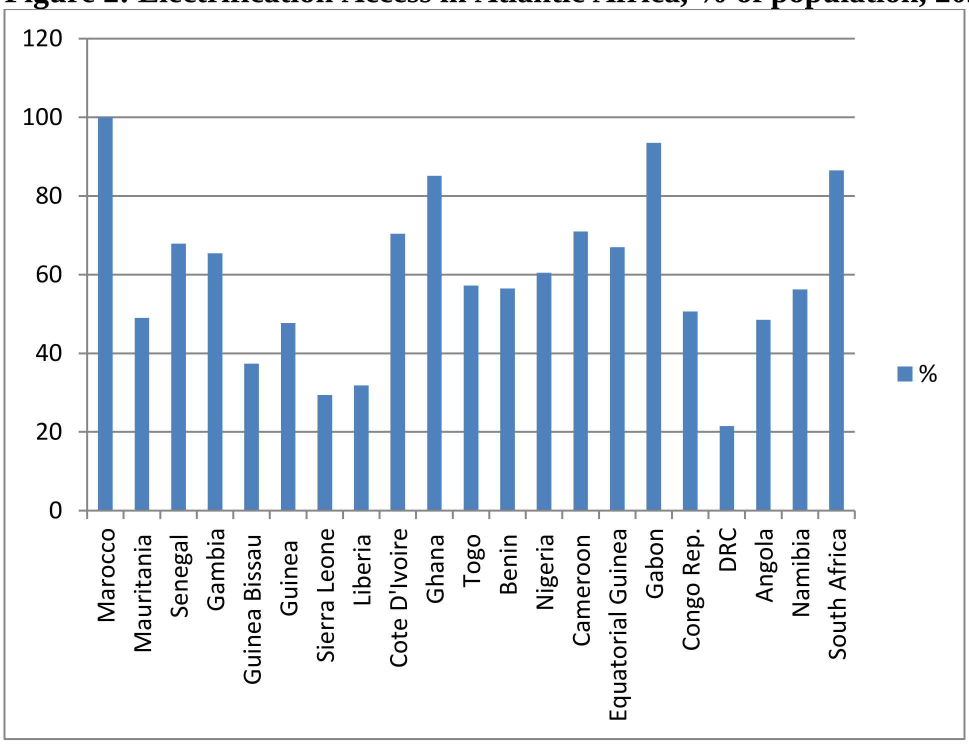
A critical and much-debated driver for Africa's development gaps is widespread energy poverty[3–7]. Various energy services are closely linked to each one of the 17 UN Sustainable Development Goals (SDGs)[8], and to the ability of being resilient in times of increasing economic, climate and health-related vulnerabilities and shocks[9]. Yet roughly 580 million people (48% of total population) in SSA lacked electricity access in 2020, and many more consume too little to be able to benefit from basic modern energy services[10]. The majority of people in SSA

[2] IEA, Africa Energy Outlook 2022 (https://www.iea.org/reports/africa-energy-outlook-2022).

have to cook on open fires, exposing themselves to a wide range of health impacts[11]. Women suffer disproportionately from the current energy system that embodies the inherent asymmetries in socio-cultural dynamics of distribution, access and control[3,12]. Taking an aggregate snapshot, the entire SSA region had an installed capacity of roughly 100 GW in 2021, less than the country of Spain, despite SSA being home to 25 times the population of Spain[2]. The infrastructure deficit that many African countries face to meet current and quickly rising energy and critical service demand imply large-scale economic[5,13,14], social[15,16], environmental[17,18], climate[17,18] and development[5] risks which are likely to further cement and exacerbate current global and regional inequalities.

These issues have been recognized by African leaders, with the 2023 Nairobi Declaration setting out visions of rapidly expanding renewable energy capacity and increased funding for energy-enabled sustainable development[1]. The current rates of connection in African countries located on the Atlantic rim, according to the World Bank, are listed below in terms of the percentage of each national population.

**Figure 2: Electrification Access in Atlantic Africa, % of population, 2022**




(Source: [https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2022&locations=ZG-AO&start=2022&view=map](https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2022&locations=ZG-AO&start=2022&view=map))

Caution should be considered when interpreting the differentiation between “access” and “connection” as definitions vary from country to country across the continent.

The electrification of Africa is increasingly in focus, expanding access steadily. However, some landlocked African countries have been left behind, such as Burundi (10.3%), Malawi (14%), South Sudan (8.4%) and Niger (19.4%). Interesting mini-grid projects and related businesses

have been established, employing innovative and often progressive regulations. Mini-grids and standalone systems are seen in most countries as a precursor to full grid electrification.
The continent suffers from the lack of indigenous institutional, research and financial capacities. These are the issues that the rest of this paper concentrates upon.

**3. Critical institutional and research gaps**

SSA's ability to drive sustainable and climate resilient development through clean energy is fundamentally impaired by the lack of solid energy institutions at national levels in most countries.

This translates into knowledge crises in African energy systems, planning and implementation. Specifically, there are three interwoven challenges: (1) a general shortage of home-grown research due to weaknesses of domestic institutions; (2) limited African knowledge ownership; (3) a disconnect between knowledge and economic as well as political decision-making, both in the energy sector specifically as well as in wider cross-sectoral development planning bodies:

(1) There is a critical paucity of research and institutions addressing systems design for energy-enabled sustainable development in Africa[4,5], especially on a national level. While several least-cost power sector expansion studies have been produced[20–22], mostly outside of Africa, nuanced and context-specific just energy transition pathways which endogenously consider wider economic, social, climate and environmental development as well as feasible implementation options are often lacking. Currently, not a single such integrated just transition planning study exists for roughly 40 African countries, among them natural gas-rich countries like Mozambique, the Republic of Congo, Mauritania or Angola[5,20,22]. Hence, much of the knowledge produced is agnostic to the significant context-specificity and system complexities of designing clean energy pathways for sustainable development.

    As a consequence, crucial national energy decisions with decade-long implications, such as new large-scale investments in natural gas infrastructure, are being made largely in the dark. It is potentially even worse if planning is guided by generic studies developed out of context[5]. Related knowledge gaps include a lack of understanding of optimal local-level implementation approaches[20,23–25] and policy mechanisms[26–28] that foster sustainable development in on-grid and off-grid settings, and how best to mobilize sufficient sums of low-cost finance to fund these solutions[29–32].

(2) The vast majority of research on energy planning in Africa[22], renewable energy system assessments[33], and energy project implementation and community impact assessments[20], has been led and produced outside of Africa[34]. In the last 15 years, SSA-based research institutions on their own have published only six academic studies featuring integrated energy, climate and development considerations[5,20,22]. Crucially, this implies a limited ownership of the available knowledge on African energy and climate issues, and how they influence development on the continent itself[35]. It further hampers progress in knowledge creation where the real world solutions require in-depth local understanding[36]. Moreover, failure to 'domesticate knowledge systems' risks the introduction of

significant foreign biases when defining Africa's energy, climate and development research agendas[5,37]. The well-known bias of academics to cite research originating from their own geographical background[38] further helps to increase the visibility of Western knowledge, which not only devalues but undercuts African knowledge creation globally[33].

(3) There is a stark disconnect between academic knowledge and actual energy system decision makers in Africa[39,40], driven by both knowledge supply and demand shortfalls. Knowledge supply is characterized by a gross imbalance of global research funding: While the OECD countries and Africa have roughly the same population, the OECD spent nearly US$1,500 bn on research and development (R&D) in 2020, whereas Africa spent US$9 bn[2,41]. The consequence is a paucity of means and heavy reliance on Westernized research agendas[5,35,42] which limit the ways in which African academics can meaningfully produce knowledge that enables them to engage with decision makers. On the demand side, scant energy planning resources and technical skills mean that African governments are not able to call on researchers within the country to make evidence-based energy decisions for sustainable development[5]. Furthermore, crucially, there is little institutional capacity in Africa for complex systems analyses. Instead, existing energy planning and implementation have largely kept relevant stakeholders in siloes[39,40]. As a result, energy research commonly has limited presence in wider development planning institutions in much of SSA[43,44]. In order to reap synergies of energy for sustainable and climate resilient development, however, energy planning needs to be firmly integrated into national development planning and institutionalized as an integral part of national planning bodies.

A recent opinion piece by Rajiv Shah, president of the Rockefeller Foundation, in the New York Times in late September2024 ("Want to End Poverty? Focus on One Thing") argued that access to clean energy is the single most powerful development intervention given that it also positively affects so many of the other SDGs[3].

**4. US$90bn World Bank and African Development Bank plan on the table to electrify Africa.**

In September 2024, EE Business Review reported that: "The World Bank Group, together with the African Development Bank (AfDB), has committed to providing access to electricity to 300 million people in Sub-Saharan Africa by 2030". Known as "Mission 300", the plan is attracting widespread interest and support. Mission 300 is an electrification initiative that recognizes the critical role of electricity in driving economic and social development across Africa, where over 600 million people currently lack access to reliable power. The initiative requires US$90bn to meet its target, with an initial $30bn already pledged by the public and private sectors. The World Bank has committed $25bn, while AfDB has contributed $5bn. Additional funds will come from philanthropic organizations and climate-focused entities like the Rockefeller Foundation and the Global Energy Alliance for People and Planet (GEAPP), and regional organizations like the Common Market for Eastern and Southern Africa (COMESA). Mission

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[3] Rajiv Shah, "Want to End Poverty? Focus on One Thing", New York Times, September 22, 2024 (https://www.nytimes.com/2024/09/22/opinion/clean-energy-electricity-poverty.html).

300 focuses on sustainable and clean energy solutions such as mini-grids, solar power and rooftop installations to provide energy to underserved regions, and relies on partnerships between governments, regional organizations and the private sector, which are seen as crucial to scale transmission, distribution and energy infrastructure on the continent. Mission 300 is tied closely to broader development goals, including poverty reduction and the fostering of climate resilience. Increased energy access will power hospitals, schools, and climate-resilient agriculture, helping African nations to better withstand climate impacts. The initiative aims to address the severe energy deficit in Africa, where 83% of the world's unelectrified population resides.

**Some conclusions**

The African continent is underdeveloped, as 600 million Africans (out of the UN-estimated continental population of 1.5 billion) still lack access to sustainable and reliable energy. In 2022, 45.4% of Africa's total primary energy was based on biomass, with the balance almost entirely based on fossil fuels, including coal, oil and natural gas.

Few countries on the continent have been fully electrified; fewer still have embarked on just transitions to energy sources that are considered sustainable. Levels of electricity access in countries along the Atlantic rim of the continent are higher than the continental average, and certainly higher than access levels in the continent's landlocked countries.

The continent has too low a level of energy-related human and institutional capacities to be able to undertake indigenously driven, fact-based planning for the expected energy transitions required to meet the sustainable development goals, and that take into account global climate change challenges.

In September of 2024, the World Bank Group, together with the African Development Bank (AfDB), committed itself to a process of providing access to electricity to 300 million people in Sub-Saharan Africa by 2030 at a cost of US$90 bn.

How institutions and networks within the Atlantic Basin Initiative can assist in undertaking the modernization of African energy systems could be an important contribution that could facilitate the 'leapfrog' potentially involved in the transformation of Africa's currently stunted energy development into the future.

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