Will There Be an African Energy Revolution?

That Depends on Who Funds What

CHARLES KENNY

Abstract

The reach of electricity in Africa is rapidly extending, not least thanks to an explosion in imports of solar panels. This is good news for the quality of life of people in the region and is the primary route to sustainably extend electricity access, but it imposes some challenges on the utility sector. Most of the panels are being used domestically and at small scale. This worsens what were already considerable financial challenges for utility scale private provision. And it suggests a vital role for publicly funded electricity infrastructure to ensure high-quality, financially sustainable power provision, especially to industry.

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Contents

Figures

Tables

Introduction

The world is in the midst of an energy revolution. Lazard's levelized cost of energy analysis suggests that in the US solar is already a very competitive source of daytime power. Utility solar costs in 2025 were between $38 and $78 per megawatt hour. This compares to gas combined cycle costs of $48 to $109 or coal costs of $71 to $173. Adding to the technology's potential, in the US utility 'peaking battery' capacity may already be cheaper than peaking gas capacity, if it is required for four hours or less. By 2030, 10-hour batteries may cost the same as 4-hour batteries do today. Especially if solar generation and battery costs continue to fall, solar plus battery power might soon outperform fossil production over the whole 24-hour cycle (some more bullish analysis suggests we are approaching the point that wind-solar-battery combinations might be cost competitive for providing 24-hour power today).

The falling cost of solar panels has already begun to change the face of power generation in the Africa region as well. The reach of electricity in the region is rapidly extending, not least thanks to an explosion in imports of solar panels largely being used at the individual firm or household level. This is good news: access to electricity can be a significant boon to the quality of life. Solar power is also significantly cleaner than fossil power, with local health and global climate benefits. And the rollout is occurring largely without government subsidy or engagement: this is a competitive, private sector solution to household and microenterprise electricity access.

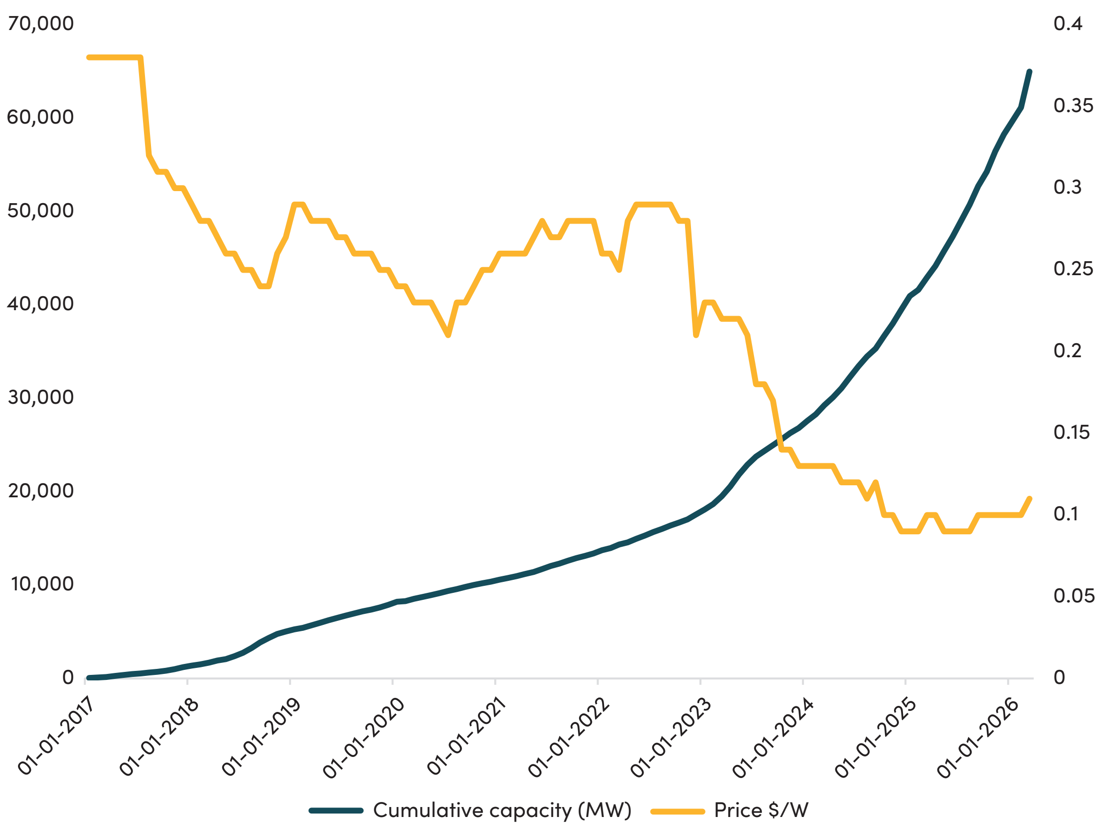
But solar power capacity in Africa (like fossil power generation capacity before it) is largely distributed: small scale, not utility scale. And that means the spread of solar presents challenges to electricity utilities in the region, because of its impact on demand for grid-based electricity. In turn, those challenges will make it harder for electricity systems to provide cheap, reliable, 24-hour grid power that is a vital part of structural transformation. And that suggests a vital role for publicly funded electricity infrastructure to ensure high-quality, financially sustainable power provision.

Distributed power dominates capacity

While most electricity consumed in the region is (still) produced by utility-scale generation, most *capacity* in many African countries has long been distributed. A 2022 estimate by Benjamin Attia suggested that outside of South Africa, diesel generator capacity considerably outstripped grid capacity in sub-Saharan Africa, and was multiples of on grid capacity in countries including Kenya, Tanzania and Senegal. Across the region as a whole, there was perhaps 100GW of operational diesel generator capacity. As with solar panels, the share of generators in electricity production is considerably below their share of capacity. Nonetheless, in Western Africa, a 2019 estimate was that generators may account for 40 percent of total generated power (and in sub-Saharan Africa excluding South Africa, spending on fuel for back-up generators may equal 80 percent that of spending on the grid).

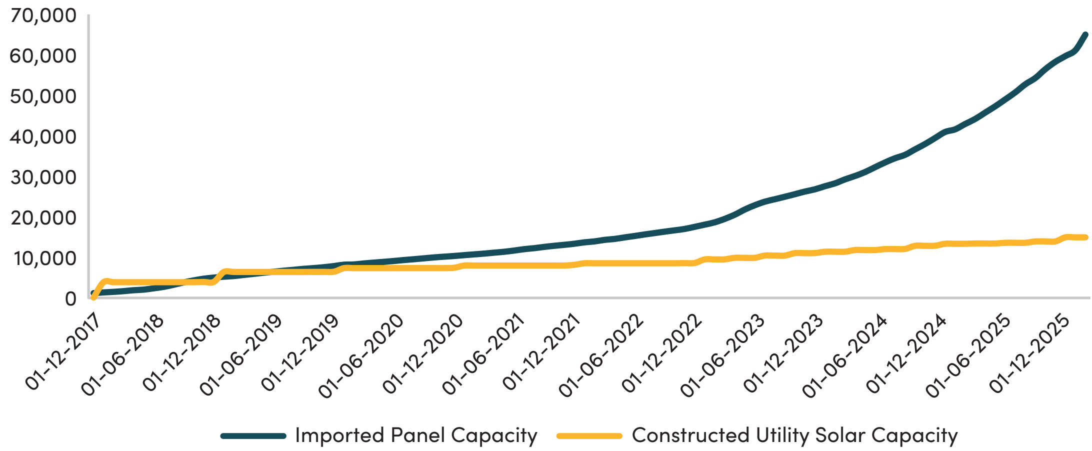
Solar capacity has followed the same pattern. The declining cost of solar panels has been associated with a massive rise in panel imports across Africa, with cumulative solar capacity increasing from an estimated 8 GW in January 2020 to 65 GW in March 2026 (See Figure 1). In the sub-Saharan Africa region outside of South Africa, those panels have a generating capacity of about 31 GW compared to utility generating capacity of about 80 GW (Table 1, although note that this is a maximum capacity measure *not* a generation/usage measure, which for solar might be close to 15 percent of capacity). The considerable majority of solar panel imports (perhaps 85 percent) have been used in distributed systems (Table 1 and Figure 2).

FIGURE 1. Africa: solar panel imports from China, price and cumulative volume



Source: https://ember-energy.org/data/chinas-solar-pv-export-explorer/.

FIGURE 2. Imported panels versus constructed utility scale solar capacity in Africa (MW)



Source for imports, for capacity.

TABLE 1. Sub-Saharan Africa solar and generating capacity

Country	PPI Solar (MW) (2024)	Utility Solar (MW) (Q4 2025)	Solar Imports Cumul. (MW) (3/2026)	Total Capacity (MW) (2024)
South Africa	5,133	6,425	16,970	63,425
Nigeria	103	86	5,680	14,146
Angola	820	424	163	6,860
Ethiopia		2	201	6,780
Ghana		163	1,216	5,963
Zambia	423	228	1,386	4,058
Sudan		70	1,026	4,005
Kenya	229	287	2,642	3,743
Congo-Kinshasa	629	189	2,426	3,294
Mozambique	572	107	1,386	2,888
Tanzania	–	25	1,742	2,727
Cote d'Ivoire	100	42	787	2,651
Zimbabwe	370	134	803	2,515
Uganda	40	100	501	2,064
Senegal	236	239	2,235	1,914
Cameroon	71	41	991	1,795
Mali	193	169	398	1,325
Guinea	262	8	364	1,281
Other	1,243	1,732	6,706	12,232
Total	10,424	10,470	47,622	143,666
(Total ex SA)	*5,290*	*4,045*	*30,652*	*80,241*

Data Sources: PPI Solar: World Bank PPI Database—cumulative MW of private solar deals with financial closure. Utility Solar: GOGLA 2025-Q4 satellite-detected utility-scale solar installations (capacity_mw summed by country). Solar Imports Cumul.: Cumulative panel import capacity (MW) as of latest available month (March 2026 for most countries), Panels commodity type only. Total Generating Capacity: EIA International Energy Statistics, latest available year (mostly 2024). Cabo Verde had a PPI entry but capacity was listed as "Not Available" in the source data.

The rollout of distributed solar capacity to households and enterprises off the grid as well as to customers on or off the grid that also rely on diesel generators for backup or sustained power is a considerable positive development. Solar (and especially solar plus even limited battery capacity) can provide the electricity demanded by lower-income households for lighting, phone charging, television, as well as by small farms and businesses—including refrigeration and pumping.

Meanwhile, diesel generated power costs perhaps 30 cents/kwh for fuel alone and solar is considerably cheaper than small-scale diesel generation over the medium term: if a 420 Watt solar panel retails for $60 and diesel is priced at $0.66 USD per litre, payback time on the solar panel just in diesel savings would be as short as six months assuming continuous daytime use (although fixtures, inverters and installation will add to the cost of switching). This is to say nothing of the benefits in terms of reducing local pollution.

Nonetheless, and despite off-grid solutions being cheaper in sparsely populated areas, this level of dominance of distributed power in Africa is technically (and environmentally) inefficient compared to grid power. As a rule, it is more efficient to get electricity through a grid supplied by large producers. In the US, for example, Lazard's levelized cost of energy analysis reports that utility scale solar costs between $38 and $78 per megawatt hour as compared to community/individual systems at $81–$217. And because PV panels are a larger part of total costs in utility-scale solar than community/individual scale projects (where preparing the site and labor costs are higher on a per-panel basis), falling panel costs are likely to lead to a rising relative price differential between utility and community power. At a given cost of capital, grid power should out-compete distributed power at least in urban and peri-urban areas. It should also be far better in terms of guaranteeing 24-hour power availability and quality because the grid can dispatch power from multiple power plants using different technologies.

The explanation for the dominance of distributed power capacity despite its lower technical efficiency and 24-hour reliability lies in part in the financial sustainability of grid rollout in low-income settings, but also in the political economy of the power sector in Africa. Regarding the economics of grid rollout, it cost about $1,400–$1,900 to connect a new customer to the grid in Kenya in the late 2010s, with costs higher for rural areas with low existing connectivity, but the connection charge was only $350. Monthly consumption per customer in rural areas was about 35 kWh, suggesting an annual electricity bill (at 22c per kWh) of a little over $90. Even at a low cost of capital, that suggests total (connection and consumption) electricity payments were barely sufficient to cover the costs of connection with little if anything left over to pay for the power consumed.

Regarding the political economy of the power sector, levelized generation costs look very different in Africa than in the US. Utility-scale generation and distribution projects are large scale, distribution in particular is a natural monopoly, payback periods are long, and the price of electricity is a politically sensitive variable. That makes institutional and macroeconomic instability a significant deterrent to private investment in utility systems, so that private investors demand a very high return. And in low-income settings, that means the technical cost savings of scale are dwarfed by the price of financing it, unless that finance is public. Public finance is scarce, and the result has been under-investment in the reliability of grid power.

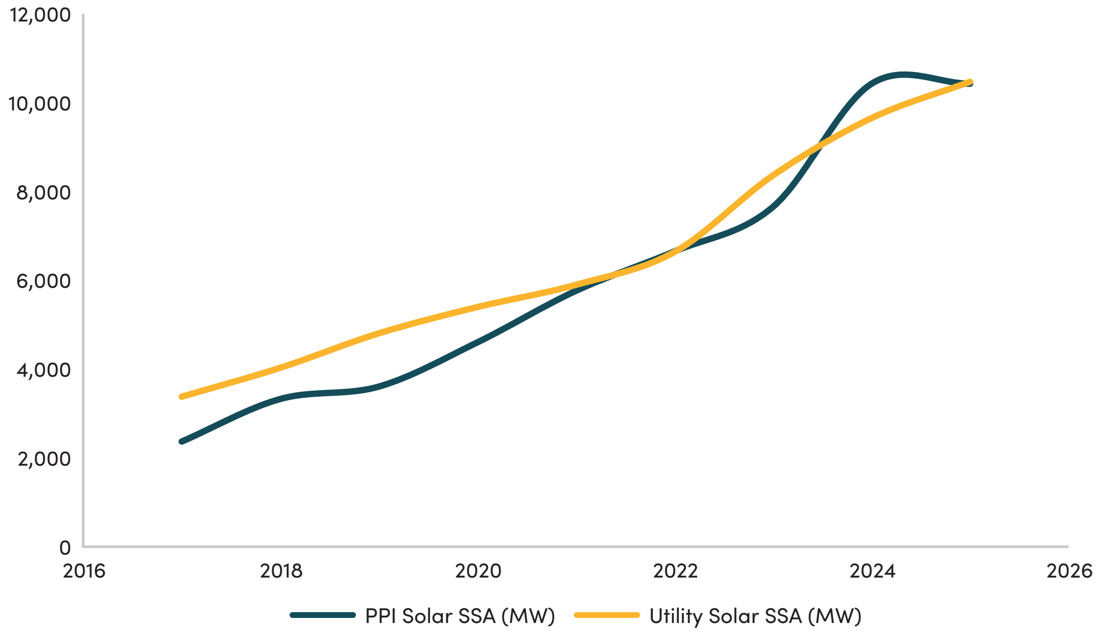
And this brings us to an additional major reason for the high level of distributed capacity: it is not only vital to supply those off the grid but for those on the grid who need consistent power. The average African enterprise experiences power interruptions averaging more than 50 hours each month. Backup generation capacity is a necessity for many firms under the circumstances and far from a luxury for households. Indeed, more than half of firms in Ghana, for example, have generators. That rises to more than two thirds in Kenya and Nigeria.

The utility electricity sector in Africa is nearly all publicly financed

About three-quarters of investment in electricity distribution and 97 percent of investment in electricity transmission is sponsored by public entities in developing countries as a whole, and public finance will have a greater share. But utility-scale *generation* can sometimes attract private finance. Even though about 74 percent of investment in generation capacity in developing countries is sponsored by the public sector, utility-scale solar (and wind) investment in low- and middle-income countries is overwhelmingly part of a public-private partnership. In 2017, about 85 percent of utility-level investments in solar involved PPIs. This dominance of PPIs in utility scale provision is also suggested by aggregate data on PPIs and utility scale solar for the Africa region (Figure 3).

The problem is that private sponsors and investors want very high returns to accept the uncertainty and risk of a long-term infrastructure project in the region. IMF staff analysis suggests regional returns on equity in infrastructure range between 8 and 37 percent. Sub-Saharan Africa was at 37 percent. For electricity, the global range is 8 to 29 percent, and sub-Saharan Africa was at 27 percent. Compared to a (2023) estimate of cost of debt for a utility solar project in the US of 5.3 percent, the same cost in Zambia might be 45.4 percent (Table 2).

FIGURE 3. PPI solar projects and utility-scale solar in sub-Saharan Africa (MW)



Notes: PPI Solar: World Bank PPI Database—cumulative MW of private solar deals with financial closure. Utility Solar: GOGLA 2025-Q4 satellite-detected utility-scale solar installations PPI Solar runs to 2024. Utility Solar uses satellite detection dates (constructed_before). South Africa accounts for roughly 50% of PPI and 61% of utility-scale solar across SSA throughout the series.

TABLE 2. Estimated cost of private capital for solar projects across countries (2023)

Country	S&P Rating	Cost of Debt	Required Rate of Equity Return
Germany	AAA	2.8%	8.3%
USA	AA+	5.3%	10.3%
India	BBB-	11.4%	17.2%
South Africa	BB-	20.3%	25.8%
Ghana	B-	22.7%	28.3%
Tanzania	B	24.1%	29.6%
Nigeria	B+	25.2%	30.8%
Egypt	B	29.5%	35.1%
Uganda	B+	30.2%	35.8%
Mozambique	CCC+	32.8%	38.3%
Tunisia	CCC+	36.5%	42.1%
Zambia	CCC-	45.4%	51.0%

Source: https://www.climatepolicyinitiative.org/wp-content/uploads/2023/06/Discussion-Paper-EM-Cost-of-Capital-for-RE-and-GCGF-FINAL-Jun-2023.pdf.

Focusing on solar, the problem with private financing of utility-grade projects in Africa is illustrated by two 50-MW solar projects in Zambia backed by the IFC (the World Bank's private sector arm) in 2015, which took more than $3.50 of public international finance (equal to $2 in grant equivalent finance) to bring in each dollar of private finance. It also took free land, tax breaks, and project preparation support. Again, a more recent mini- and metro-grid project in DRC involves a 'private' sponsor where two of the three original investors are public sector and the considerable majority of project funding comes from development finance institutions.

Thus despite private *sponsorship*, utility-scale solar in the region outside of South Africa is overwhelmingly publicly *financed*. In 2024, an estimated $40bn out of a total $60 bn of clean energy investment on the African continent came from public sources, and the proportion was higher in the poorest countries. Looking at all privately sponsored solar projects in sub-Saharan Africa outside of South Africa listed in the PPI database, bilateral and multilateral support (grants and loans) account for 55 percent of reported total investment costs (Table 3). This is misleadingly low, however: the largest solar PPI project not to list multilateral or bilateral support in the data is the $600m Kinshasa solar plant, which was cancelled. The second largest, Zambia Serenje, due to come online in 2022, appears to be moribund after being dramatically downsized in 2023. The third largest reported as unsupported by bilateral or multilateral finance, Gabon Plaine Ayeme, has been halved in size and is now in fact financed by the Afrigreen consortium of bilateral and multilateral investors. Looking only at projects that list multilateral or bilateral support, that support amounts to 86 percent of project costs, likely closer to the reality of the dependence of utility scale 'public-private' solar projects in sub-Saharan Africa outside of South Africa on international public finance.

TABLE 3. PPI solar projects in sub-Saharan Africa ex-South Africa: Investment sources

	Total Project Costs	Multilateral Support (Exc guarantees)	Bilateral Support
All PPI Solar Projects	6,874	1,637	2,170
All PPI projects with Multilateral or Bilateral support	4,422	1,637	2,170

Data: World Bank PPI Database. The Mozambique Temane project, listed as solar although it is gas, was removed. In some cases, total multilateral and bilateral support listed is larger than reported total project costs by a small amount. Limiting total multilateral and bilateral support to a maximum of 100 percent for each project reduces the total of such support from $3,807m to $3,784m.

The necessity for dominant financing from public sources will be one reason why utility solar is not seeing the exponential growth seen with panel imports in Africa, adding 1,590MW to constructed capacity in 2025 compared to 1,967MW in 2024 and 1,893MW in 2023 according to satellite estimates.

Across all generation types in the region, if public finance for investment is not available, costs frequently become unsustainable. Ghana demonstrated the problem: in response to rolling blackouts in 2013–2016, the country directly negotiated a number of expensive take-or-pay agreements with private providers (which meant the country had to pay for power whether it was used or not) that left the country with about 850 MW of excess thermal capacity by 2022. Combined with tariffs set below cost-recovery, this resulted in revenue shortfalls for the power sector worth 1.7 percent of GDP in 2023, requiring annual budget transfers in the region of $1.5 billion. Restructuring, renegotiation and debt payment has been a painful multi-year process (although it has left sector governance in a considerably better place).

While private power production at utility scale in Africa is usually financially unsustainable unless it comes with considerable public finance, that finance—for private generation or public generation, alongside transmission and distribution—is scarce.

In part, that is because the sector does not generate sufficient revenues to invest in additional capacity. A majority of electricity utilities in the region have annual revenues lower than their operational costs. Operational costs are high by global standards in part because of a greater reliance on oil-fired generation in some countries, and low capacity factors in others. Utility generation capacity in many African countries is twice or more actual generation because of intermittent generation (in the case of solar and wind, for example), insufficient grid capacity and variable demand. This will be one cause of low capital and/or labor productivity, low demand per customer will be another significant reason. In addition, transmission and distribution losses are high while many countries see very low bill collection rates. While electricity prices are high by low- and middle-income country standards, they are insufficient to cover these high costs.

Distributed solar and the utility death spiral

Distributed solar rollout adds to the financial challenge facing utility-scale solar in particular. We have seen it is likely that much distributed solar generation is replacing (daytime) distributed diesel generation. Certainly this makes financial sense.

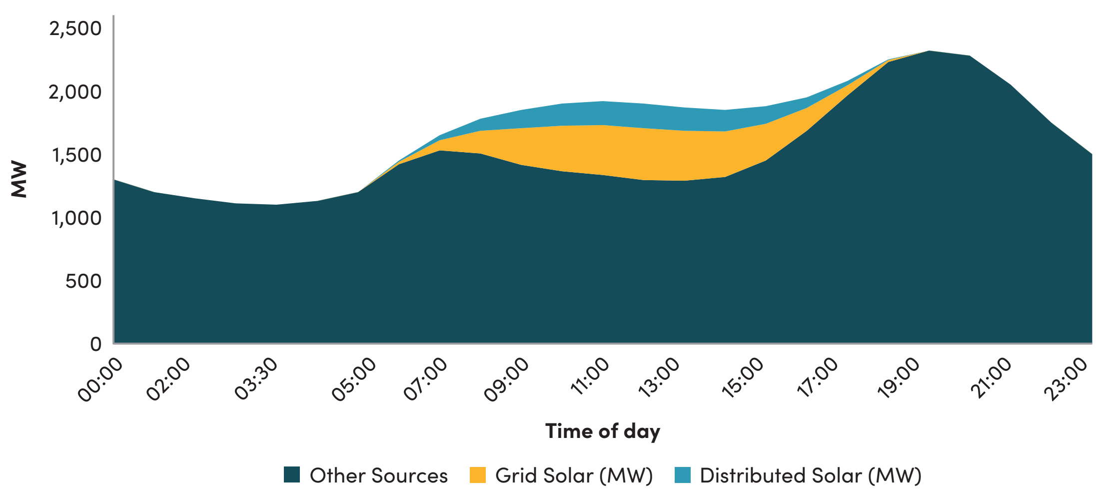
But whereas generators are often used only as backup because of the high marginal cost of generation created by the need for fuel (with a per kilowatt hour marginal price an average of twice the price of grid power in the region), the marginal cost of solar is zero. Firms and households that have purchased solar panels are likely to use the power generated even if connected to a powered grid. As distributed solar reduces daytime demand for grid power, there is a growing risk that utility solar produces power for which there is no market. Under the common 'take-or-pay' model of utility contracting, the distributor will still have to pay for that unneeded power, so the cost is passed on to the public sector, further reducing finance to improve grid reliability and reach.

Figure 4 presents an illustrative picture of electricity demand and supply in a mid-sized African country today. It is estimated using Claude Code from data sources in Kenya given in the appendix; given the sources and opaque methodology, it should be seen as illustrative only. But it suggests the potential for further growth in distributed solar to push demand for grid power to the lowest point in the 24-hour cycle.

Meanwhile, peak demand is in the evening. But solar isn't available after the sun goes down. A 2022 case study found that at a solar mini-grid site in Omorate, Ethiopia, power supply is off for 13 hours a day, for example. Although battery costs are falling, adding two-to-four-hour battery storage capacity to utility solar in the US raises the per megawatt hour utility cost of solar from $38–$78 to $50–$131, or a little above the cost of utility gas-powered electricity. This is nearly all capital cost, adding to the financing challenge in Africa and suggesting a considerably higher levelized cost in the region.

And widespread community/individual solar uptake, if it involves already connected customers, still implies relying on grid power at night. This means that the fixed costs of grid construction and maintenance (as well as power plants available for night-time generation) is distributed across fewer total megawatt hours of power, leading to a higher average cost. Extending the grid to users who already have solar will also be less financially sustainable, potentially leading to a smaller grid size. More expensive and less reliable grid power will encourage faster growth in distributed power, continuing the spiral.

FIGURE 4. Illustrative electricity demand and supply



Kenya may be a bellwether of these issues. It has comparatively high tariffs (22c/kwh in 2020). Nonetheless, the country's main distribution company, KPLC, was in recent financial difficulties that stemmed in part from the signing of power purchase agreements with variable renewable energy producers including Lake Turkana Wind Power and the Garissa Solar plant. KPLC has struggled to use the electricity generated: technical and non-technical system losses climbed above 26 percent in 2018 in part as a result. Much of this power was paid for but not used under take-or-pay agreements. Kenya has 'excess generation capacity' in that peak generation capacity is above peak load, but with intermittent renewable sources accounting for 20 percent of that capacity, it frequently does not have the power to meet evening peak demand. This is both a reliability and financial issue.

A new policy model for African energy

There is a growing role for solar generation in Africa's energy mix. A number of recent World Bank (publicly financed) projects in the region supporting solar power have been predicated on the economic rate of return for solar power or solar plus diesel being sometimes equal to or higher than for fossil power alone.[1] And as the costs of both panels and batteries fall further, the role for solar in particular will grow. Nonetheless, there is a need for both caution and reform.

Meet most access goals with distributed solar: Small-scale solar power, perhaps at some point upgraded with battery capacity, provides households, farms, and small enterprises with many of the amenities of electricity without requiring a financially unsustainable grid connection. It is largely rolling out without the need for significant government intervention. It should be the key tool to extend access in the short term. Grid expansion should only occur when an unconnected area has the financial capacity to pay for the costs of rollout through cost-reflective connection and electricity charges.

Exploit on-grid distributed solar: Electricity utilities and regulators should explore capacity to buy and utilize solar power from distributed generation in place of their own utility scale solar projects given the marginal cost to owners of unused distributed solar power is zero.

Ensure demand for new utility generation projects: Utility solar is producing power at a time in the day where demand for grid power may be falling. African governments and the donors backing utility scale solar without accompanying battery capacity in the region should proceed with caution, on the basis of electricity demand forecasts that incorporate the rapid growth of distributed solar power and its impact on demand for daytime grid power.

Increase financial sustainability: Reducing transmission and distribution losses, ensuring grid expansion is at least financially neutral and that all consumers of grid power pay for grid power should at least reduce the need for subsidy of electricity utility operational costs and debt service in the region. These savings could be used to invest in grid improvements and power plants.

Improve reliability: Governments and donors should focus greater attention on meeting peak needs and ensuring industrial power stability through public sector projects to support a robust grid, battery storage, geothermal and hydro, and gas. Reliable industrial power is key for structural transformation and the Africa region significantly lags.

1 This (even) excluding climate mitigation benefits. See P179631 P180547 P180575 P181328 P181341 P181494 Accelerating Sustainable and Clean Energy Access Transformation Projects, P174576 Guinea-Bissau: Solar Energy Scale-up and Access Project, P179687 Nigeria Distributed Access through Renewable Energy Scale-up Project and details in https://www.cgdev.org/sites/default/files/do-climate-targets-affect-lending-world-bank.pdf.

Reconsider the PPI Model in Africa: Whatever the technology, electricity utility power purchase agreements in Africa generate expensive, locked in power. Governments and donors should eschew a bespoke approach to investment in power generation based around large subsidies and extensive finance to individual private sector generation projects (at least until private sector risk perception dramatically changes). Instead, they should adopt a wholesale approach using multilateral development banks to deliver low-cost finance for public generation. Nigeria's cost of debt for a private solar power project was in the region of 25 percent in 2023. Nigeria could take out a 10-year-dollar-denominated loan from the IBRD at about 5.8 percent at the end of April 2023. If you want cheap, reliable power to drive industrial transformation in Africa, you are going to have to put the public sector behind it. And the necessity of a larger public sector role highlights the priority for institutional and governance reform to ensure the public sector delivers.

The solar revolution means that governments and donors are trying to use market and state provision of electricity services in the wrong places in Africa. Private power generation and state-sponsored household electricity access through grid extension are both financially unsustainable. Core utility power generation should be predominantly publicly provided, while extending household access (especially in rural areas) should predominantly rely on private rollout of solar and battery systems.

Annex: Sources/notes for Claude's estimate of Kenya electricity demand vs supply

DEMAND CURVE: The daily load profile shape is based on Kenya's well-documented demand pattern: baseload (~900–1,100 MW) around 03:30, peak around 19:40 (Wikipedia, "Energy in Kenya"). The curve is scaled to 2025–2026 levels: Kenya Power recorded 2,316 MW peak on 12 Feb 2025 (Kenya Power newsroom); KenGen reported 2,362 MW in July 2025 (mygov.go.ke); by Dec 2025 the system peak reached 2,439 MW against firm capacity of 2,495 MW—a 2.3% reserve margin (P. Twesigye, Univ. of Cape Town, via Capital Media, March 2026). Baseload is estimated at ~1,100 MW, scaled up from the historical ~900 MW in proportion to peak demand growth. The midday plateau (~1,850–1,920 MW) and morning/evening ramp rates follow typical sub-Saharan African load curve shapes. The curve represents a typical weekday; weekend/holiday patterns differ.

GRID-SCALE SOLAR (~514 MW INSTALLED): Total installed solar PV is approximately 514 MW as of early 2026. EPRA (June 2025) reports solar PV at 14.12% of 3,840.8 MW total installed capacity. The National Energy Compact 2025–2030 lists 442.9 MW as of 2024, targeting 806.9 MW by 2030. Grid-connected capacity grew from 212.6 MW (June 2023, Powerelec Kenya/EPRA) to ~340 MW by end-2024 (Energy Tracker Asia, June 2025) to ~514 MW by 2025–2026. The output curve assumes ~80% peak capacity factor at solar noon, yielding ~410 MW peak from ~514 MW installed—typical for Kenya's equatorial location (~1°S) with 5–7 peak sun hours/day (Energypedia). The bell curve runs 06:00–18:30, reflecting near-equatorial sunrise/sunset with minimal seasonal variation.

DISTRIBUTED/ROOFTOP SOLAR (~300 MW ESTIMATED): Kenya had 154.9 MW captive (behind-the-meter) solar as of June 2023 (Powerelec Kenya); total captive capacity across all sources reached 603.8 MW by June 2025 (EPRA). The ~300 MW estimate covers: captive C&I rooftop systems (e.g. Mabati Rolling Mills 2.9 MW, Sept 2025; Two Rivers Mall 3.2 MW, early 2025), smaller commercial/residential rooftop installations, and solar home systems and mini-grids (KOSAP programme: 1.3 million people, 137 mini-grids). A ~65% effective peak factor is applied (vs ~80% grid-scale), yielding ~195 MW peak—reflecting suboptimal tilt/orientation, shading, smaller inverter ratios, and the proportion of very small (10–50 Wp) solar home systems.

GENERAL NOTES: All solar figures are clear-sky estimates; actual output varies with weather. Off-grid solar home systems reduce grid demand indirectly rather than feeding back into it but are included to show total solar contribution. Kenya's grid is ~86–92% renewable (geothermal, hydro, wind, solar, biomass); thermal serves as the essential balancing source. The generation mix percentages are from EPRA's FY 2024/25 data (year ending June 2025): geothermal 39.5%, hydro 24.2%, wind 13.2%, imports 10.6%, solar 3.5%, thermal/biomass ~9%.

SOURCES: EPRA, Energy & Petroleum Statistics Report, June 2025—epra.go.ke; Kenya Power Newsroom, “Electricity Demand Hits Record High of 2,316 MW”, 17 Feb 2025—newsroom.kplc.co.ke; Kenya Gov/KenGen, “Power consumption hits record high” (2,362 MW), July 2025—mygov.go.ke; KenGen, “Kenya Records New Peak” (2,363 MW, hydro dispatch data), Aug 2025—kengen.co.ke; P. Twesigye (Univ. of Cape Town), “Power cuts are the new normal in Kenya”, Capital Media, March 2026; Africa Digest News, “How Kenya Met Its Highest Power Peak”, Sept 2025—renewableenergynews.co.ke; Kenyan Wall Street, “Kenya’s Electricity Output Up 5.8%”, Dec 2025; “Power Generation Hit Record 1.16 TWh in July”, Oct 2025; Wikipedia, “Energy in Kenya”—en.wikipedia.org/wiki/Energy_in_Kenya; Energypedia, “Kenya Energy Situation”—energypedia.info/wiki/Kenya_Energy_Situation; Energy Tracker Asia, “Solar Energy in Kenya”, June 2025—energytracker.asia/solar-energy-in-kenya/; Kenya National Energy Compact 2025–2030, World Bank/Ministry of Energy—thedocs.worldbank.org; Powerelec Kenya/EPRA, solar capacity breakdown, June 2023—powereleckenya.com.