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Uganda

OFF-GRID SOLAR ENERGY MARKET UGANDA

INVESTMENT OPPORTUNITIES

- Uganda is a landlocked country in East Africa, with a gross domestic product (GDP) worth $36 billion in 2020 and a projected growth-rate of 6.63 percent.[1] Uganda's population stands at 41 million, with 27 percent living in urban areas. Uganda has one of the youngest and most rapidly growing populations in the world: 54 percent of the population is younger than 18. The government of Uganda expects rapid population growth along with demand for jobs, housing, health, and energy, presenting great potential for renewable energy, particularly off-grid solar, to be adopted rapidly.[2]
- Sixty-eight percent of Ugandans work in agriculture. Trading employs 10.4 percent of the population and manufacturing four percent.[3] Uganda is richly endowed with natural resources, including large deposits of crude oil, vast forests, large bodies of water, natural hot springs, precious minerals, and year-round sunshine, with the total renewable energy potential estimated at 5.3 GW, of which only 1,364.6 MW had been installed in 2021.[4]
- Solar photovoltaic (PV) mini-grids are a nascent technology in Uganda; only a few are operational, such as the Kitobo solar power plant in Kalangala district. Most solar PV mini-grid business models are still being evaluated. By contrast, more hydropower, diesel, and biomass mini-grids have been in operation, especially in the western and northern parts of the country.[5] Nevertheless, with the falling costs of solar PV technology, the government of Uganda and partners are beginning to support solar mini-grid development on a large scale. The slow pace of mini-grid development has been due partly to inconsistent tariffs and uncertain demand owing to high connection fees.
- With a new power connection costing approximately $300, rural communities struggle to afford clean power from the grid and through mini-grids. To overcome this challenge, the government of Uganda adopted a free-connections policy in 2018.[6] The policy aims to achieve 300,000 connections per year and increased electricity demand. Increased demand should spur mini-grid expansion and attract off-grid energy companies to rural areas.

[1] Aaron O'Neill, "Uganda: Growth Rate of the Real Gross Domestic Product (GDP) from 2016 to 2026," Statista, November 23, 2021, accessed March 7, 2022, www.statista.com/statistics/447758/gross-domestic-product-gdp-growth-rate-in-uganda/.
[2] Uganda Bureau of Statistics, *2020 Statistical Abstract* (Kampala: Government of Uganda, 2020), accessed December 7, 2021, www.ubos.org/wp-content/uploads/publications/11_2020STATISTICAL__ABSTRACT_2020.pdf.
[3] Uganda Bureau of Statistics, The Uganda National Household Survey 2019/20 (Kampala: Government of Uganda, 2019), accessed December 7, 2021, www.ubos.org/wp-content/uploads/publications/06_2021UNHS2019-20_presentation.pdf.
[4] Electricity Regulatory Authority, "Installed Capacity," March 16, 2022, accessed June 7, 2022, www.era.go.ug/index.php/stats/generation-statistics/installed-capacity.
[5] Uganda Off-grid Energy Market Accelerator, *Off-grid Energy in Uganda Market Map* (UOMA, 2020), accessed December 7, 2021, https://uoma.ug/wp-content/uploads/2020/10/Download-2020-UOMA-Market-map_vFUpdated.pdf.
[6] Kenneth Kazibwe, "Government Resumes Free Electricity Connection Policy," NilePost, March 3, 2021, accessed December 7, 2021.

- Solar home systems (SHS) have been well received in Uganda, covering many areas of the country and contributing significantly to household electrification.[7] Customers have adopted plug-and-play SHS with phone charging, radio, and TV capability because of their ease of use and flexible payments through mobile money–enabled pay-as-you-go (PAYGO) business models. Rural and peri-urban areas remain a viable market for these solar products. The Uganda Bureau of Statistics estimated that, in 2020, 38 percent of the population used solar energy, up from 18 percent in 2017.

ON-GRID AND OFF-GRID ELECTRIFICATION

Uganda's national electrification rate stands at 42.1 percent, below the sub-Saharan African average of 43 percent.[8] The national electricity grid powers 60 percent of urban areas and 18 percent of rural areas.[9] However, because the use of SHS in rural areas has grown from 18 percent in 2017 to 38 percent in 2020, grid use has dropped from 22 percent to 19 percent in the same period.[10] Although grid coverage has improved significantly in the last decade, the expansion rate has been slower than the government of Uganda expected. The high cost of grid electrification and long implementation times often delay the grid's expansion. As a result, off-grid systems can help to fill the energy gap by creating demand and providing energy access in rural areas, where 73 percent of the population lives. These unelectrified rural areas present a business opportunity for off-grid energy providers to supply cleaner and more reliable power to households and businesses, helping Uganda achieve its universal electrification goal by 2030.

ENERGY ACCESS

The government of Uganda and development partners established programs to lower the financing barriers of energy companies. Implementing partners include the Uganda Energy Credit Capitalisation Company (UECCC) and the Uganda Development Bank (UDB), which finance projects and offer business-development services for large solar PV projects. UECCC provides a working-capital facility to off-grid solar companies through select commercial banks, whereas the UDB finances larger projects. In the aftermath of COVID-19, UDB is also offering working-capital to small and medium enterprises. Other notable development programs include the USAID-funded results-based financing program for SHS companies, in collaboration with ENDEV. Beyond the Grid Fund for Africa (BGFA) has launched a program to provide grants to off-grid companies to increase energy access by facilitating 600,000 connections.

KEY STATISTICS	
GDP	**$37 billion**
GDP growth potential (2023)	**6.63%**
Population size	**41 million**
Population density	**229 people per km²**
Population growth rate	**3.6%**
Household size	**4.6 people per household**
Rate of urbanization	**12%**
Urban | Rural population	**27% urban; 73% rural**
Languages	**English, Luganda, Swahili, and others**

[7] Access Insights Platform, "Uganda," accessed December 7, 2021, https://accessinsights.org/explore/ug.
[8,9] World Bank, "Access to Electricity (% of Population) – Uganda," 2019, accessed December 7, 2021, https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=UG.
[10] Uganda Bureau of Statistics, The Uganda National Household Survey 2019/20 (Kampala: Government of Uganda, 2019), accessed December 7, 2021, www.ubos.org/wp-content/uploads/publications/06_2021UNHS2019-20_presentation.pdf.

Main provider of electricity. Uganda's power sector is split into three major sub-sectors, namely generation, transmission, and distribution. The government-owned Uganda Electricity Generation Company (UEGCL) owns and supervises most public grid-connected power plants. Generation is a mix of hydroelectric, solar, and diesel powerplants, although most are hydropower plants managed by private companies.[11] Transmission is owned and managed by a single national operator, the Uganda Electricity Transmission Company (UETCL), which enters into Power Purchase Agreements with Independent Power Producers directly, and commissions power plants. The recent passing of the Electricity Amendment Act allows generation companies to supply energy to consumers, including industrial consumers, directly. This amendment also presents an opportunity for large commercial and industrial establishments to generate and use their own power through "captive" or on-site off-grid technology. The Uganda Electricity Distribution Company (UEDCL) owns all distribution lines with a capacity less than 33 kVA. The country is split into 13 distribution service territories and several distribution operators. The main electricity distribution operator is the privately owned Umeme, which operates mainly in urban areas. Six other distribution companies operate throughout Uganda; they include WENRECO in West Nile, KRECS, KIL in the western region, and PACMECS in the northern region. UEDCL also distributes electricity in several regions that are not contracted with private utilities.

Plan to increase electricity access. More than 80 percent of densely populated areas around Kampala, Jinja, Mbale, Gulu, and Mbarara have grid access, but in rural regions, access rates are much lower. More than 1.5 million grid connections have come online since 2001, when the energy sector was privatized. The government of Uganda introduced the Electricity Connections Policy, which runs from 2018 to 2027. The aim of the policy is to install 300,000 connections per year, stimulate consumer demand, and achieve 60 percent grid electrification across Uganda by 2027. Under the Electricity Connections Policy, Ugandans who wish to connect to the grid without an electricity pole can do so at no cost. To help implement this policy, the World Bank has approved a new loan which the Energy Access Scale Up (EASP) project will manage.

Constraints to rural electrical grid extension. Despite the free-connections policy, many Ugandans lack reliable electricity access. In 2008, the government established the Rural Electrification Agency (REA), now known as the Rural Electrification Program (REP), within Ministry of Energy and Mineral Development (MEMD). The role of the REP is to extend power grids to rural areas and work with off-grid companies to find alternative solutions where grid extension is too expensive. Rural electrification remains a challenge because of access-to-finance barriers, a lack of awareness, low affordability, and poor distribution networks.

Policy and regulation. Uganda's Ministry of Energy and Mineral Development (MEMD) oversees the energy sector, and the Electricity Regulatory Authority (ERA) regulates electricity. The Rural Electrification Program under MEMD promotes access to modern energy in rural areas.

Associations. The Uganda Solar Energy Association (USEA) is a nonprofit organization with more than 200 local, international, corporate, professional, and student members. USEA promotes renewable energy technologies in Uganda.

[11] "About," Uganda Electricity Generation Company, 2021, accessed December 7, 2021, www.uegcl.com/about-uegcl/.

SHS AND PICO-SOLAR

More than 200 pico-solar and SHS companies operate throughout Uganda. The larger companies are vertically integrated and import their products. These companies include Greenlight Planet, M-KOPA, d.light, and Engie Energy Access. Most off-grid solar companies sell, distribute, and install solar products imported from all over the world. Most locally owned companies sell modular solar systems that are designed and assembled locally. These companies install a variety of systems for small homes and offices or large institutions such as schools, hospitals, and commercial or industrial premises. Most of these companies operate in the central, eastern, and western parts of the country, although some are present in the northern region.

Consumer Finance. Banks in Uganda serve only 11 percent of the adult population.[12] Because of banks' physical inaccessibility and the high cost of opening and maintaining a bank account in rural areas, only seven percent of adults in these locations have bank accounts, compared to 24 percent of adults in urban areas. By contrast, 76 percent of Ugandan adults have an active mobile money account, through which more than $26 billion was transacted in 2020.[13] Mobile money platforms that offer several financial products have become popular in recent years, and nearly all banks and microfinance institutions (MFIs) transact with mobile money. Mobile money, which used to be overseen by the telecommunications regulator, UCC, is now regulated by Uganda's central bank. Most solar providers offer PAYGO plans through mobile money. However, access to finance is still limited, with many local off-grid solar companies unable to provide long-term consumer credit because of high interest rates.

Uganda has a well-developed microfinance sector, and several MFIs have partnered with off-grid solar companies to distribute solar products. Off-grid companies are also working with savings and credit cooperatives (SACCOs) and village savings and loan associations (VSLAs) to provide solar products and loans to their members. The government-owned microfinance support center supports SACCOs and VSLAs by training members and giving endorsements.[14]

Commercial Finance. Some local finance institutions—such as Centenary Bank, Equity Bank, and Stanbic—offer renewable energy credit lines, and are working with off-grid solar companies to finance end-users directly. Other commercial banks have relationships with off-grid companies, providing working-capital and other loan facilities.

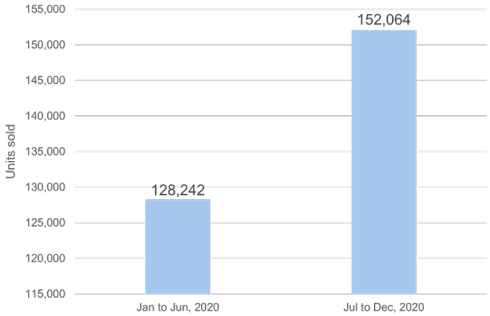
Productive Use of Energy (PUE). More than two-thirds of Ugandans rely on agriculture for their livelihood, meaning that they will benefit from solar-powered PUE. Off-grid solar technologies can support improved agricultural productivity through solar-powered irrigation, milling, and cold storage. Solar-powered irrigation is a fast-growing PUE technology, with many companies supplying solar-powered water pumps to small and large farms. The government of Uganda is subsidizing water pumps through its Microscale Irrigation Program.[15]

[12] FSD Uganda, "Report on Banking and the Status of Financial Inclusion in Uganda: Insights from Finscope 2018 Survey," 2019, accessed December 7, 2021, https://fsduganda.or.ug/wp-content/uploads/2019/05/FSDU-Thematic-Report-on-Banking.pdf.
[13] Bank of Uganda, "Financial Inclusion Indicators," 2019, accessed December 7, 2021, https://bou.or.ug/bou/bouwebsite/bouwebsitecontent/PaymentSystems/DataStatistics-/Financial-Inclusion-Indicators.xlsx.
[14] "Who We Are," Microfinance Support Centre, 2021, accessed December 17, 2021, www.msc.co.ug/about.
[15] UgIFT Micro-scale Innovation Program, "A Guide for Smallholder Farmers," 2020, accessed December 7, 2021, www.agriculture.go.ug/wp-content/uploads/2020/11/UgIFT-%E2%80%93-Micro-scale-Irrigation-Program-%E2%80%93-Farmers-Brochure-Part-1-Aug2020.pdf.

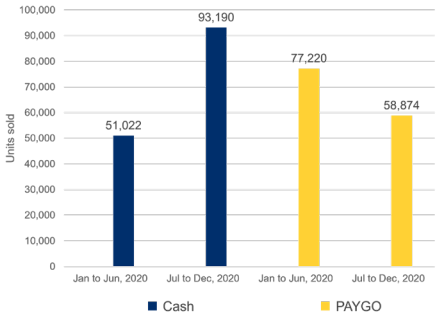
MARKET INTELLIGENCE USING GOGLA DATA

Sales and investment data from the Global Off-grid Lighting Association (GOGLA) provide details about off-grid solar energy in Uganda.

Sales of pico-solar or SHS units
Jan to Dec 2020



Sales by business model
Jan to Dec 2020



MINI-GRID

The 2007–2017 Renewable Energy Policy encouraged renewable energy development, including through mini-grids, and the Rural Electrification Strategy and Plan 2013–2022 aims to increase off-grid connections significantly by encouraging mini-grid development.[16] The government of Uganda has earmarked more than 600 mini-grids to be developed by 2030 as part of the national electrification strategy. Power Africa helped to map these mini-grid sites to support Uganda's rural electrification masterplan. In 2020, the Electricity Regulatory Authority, with support from Power Africa and the National Association of Regulatory Utility Commissioners (NARUC), published the Isolated Grid Systems regulations, which seek to enhance mini-grid regulations to encourage development.[17] These regulations guide developers of systems with a generation capacity less than 0.5 MW, and includes information on what mini-grid operators can do once the national grid arrives in off-grid companies' areas of operation. Development partners and private companies installed 40 solar mini-grids on islands and in several areas in the country.[18]

[16] Uganda Off-grid Energy Market Accelerator, *Off-grid Energy in Uganda Market Map* (UOMA, 2020), accessed December 7, 2021, https://uoma.ug/wp-content/uploads/2020/10/Download-2020-UOMA-Market-map_vFUpdated.pdf.
[17] Electricity Regulatory Authority, "Electricity Isolated Grid System Regulation 2020," 2021, accessed December 7, 2021, www.era.go.ug/index.php/resource-centre/regulatory-instruments/regulations-codes/625-electricity-isolated-grid-system-regulation-2020.
[18] Uganda Off-grid Energy Market Accelerator, *Off-grid Energy in Uganda Market Map* (UOMA, 2020), accessed December 7, 2021, https://uoma.ug/wp-content/uploads/2020/10/Download-2020-UOMA-Market-map_vFUpdated.pdf.

Power Africa aims to achieve 30,000 megawatts of new generated power, create 60 million new electrical connections, and reach 300 million Africans by 2030.

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