ENERGY
CATALYST

Country Guide: Uganda

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Uganda is a landlocked country in East Africa. It is bordered to the east by Kenya, to the north by South Sudan, to the west by the Democratic Republic of the Congo, to the south-west by Rwanda, and to the south by Tanzania. The southern part of the country includes a substantial portion of Lake Victoria, shared with Kenya and Tanzania.

Uganda has substantial natural resources, including fertile soils, regular rainfall, substantial reserves of recoverable oil, and small deposits of copper, gold, and other minerals. Agriculture is one of the most important sectors of the economy, employing 72% of the workforce.

Figure 1 Map of Uganda. Source: d-maps

Table 1: Uganda at a glance	
Capital	Kampala
Total Area	241,038 km^2
Population	42.7 million (2018)
Official languages	English Swahili
Rural Population	% (2018)
GDP	US $ 102 659 M (2019)
GDP Per Capita	US $ 2,566 (2019)
Currency	Ugandan shilling (UGX)
Exchange rate 01/03/2020	1 GBP = 4760 UGX
Exchange rate 01/03/2018	1 GBP = 5007 UGX
Access to Electricity	22% (2017)
Urban electricity access	57%
Rural electricity access	11.4%

Uganda has a small industrial sector that is dependent on imported inputs like refined oil and heavy equipment. Overall, productivity is hampered by a number of supply-side constraints, including insufficient infrastructure, lack of modern technology in agriculture, and corruption.

The Ugandan economy reported strong growth in 2019, estimated at 6.3%, largely driven by the expansion of services. Services growth averaged 7.6% in 2019, and industrial growth 6.2%, driven by construction and mining. Agriculture grew by just 3.8%. Retail, construction, and telecommunications were key economic drivers. Inflation is expected to remain below 5%, strengthening the domestic economy.

Uganda is a member of the African, Caribbean, and Pacific Group of States (ACP), the African Union (AU), Common Market for Eastern and Southern Africa (COMESA) and the East African Community (EAC). With the latter, Uganda has formed a customs union.

In the yearly World Bank survey on "Doing Business", a comparison of business regulation in 190 economies, Uganda scores below the regional average for Sub-Saharan Africa. The 2020 edition of Doing Business ranks Uganda as 169 out of the 190 with a score of 71.4 out of 100 for the ease of starting a business. Figure 2 provides a comparison of Uganda to similar economies for starting a business.

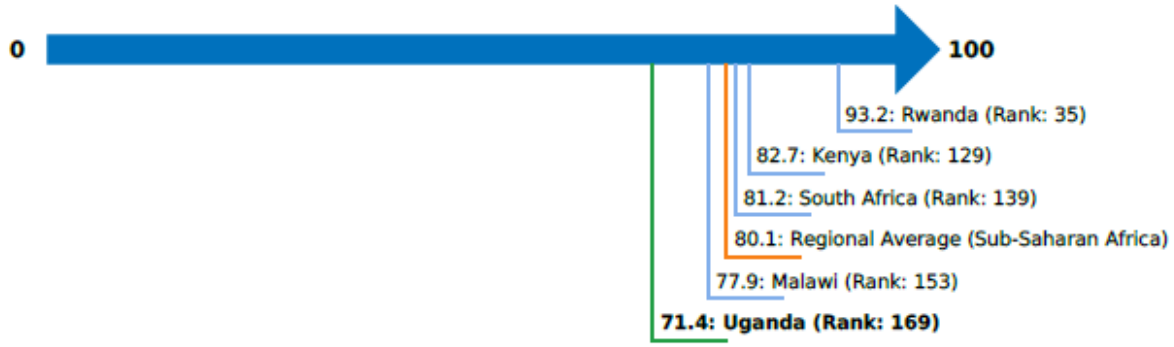

Figure 2 Doing Business 2020 score for starting a business. Data from: World Bank Group, 2020

The Ugandan energy sector

Table 2: Overview of actors in the energy sector

Institution	Role
MEMD	Policy and strategy formulation
Electricity Regulatory Authority (ERA)	Regulates the generation, transmission, distribution, sale, export and import of electrical energy in Uganda. Manages licensing and tariffs
Uganda Electricity Generation Company Ltd (UEGCL)	Electric power generation and sale within Uganda or for export to neighbouring countries. Builds, operates and maintains a number of electricity generation power plants
Uganda Electricity Transmission Company Ltd (UETCL)	Owns and operates the High Voltage Transmission Grid, coordinates the power supply system, dispatches generation facilities, negotiates all bulk power purchase agreements
Uganda Electricity Distribution Company Ltd (UEDCL)	Owns and manages substations and voltage networks
Rural Electrification Agency (REA)	Operationalises the government's rural electrification function under a public-private partnership framework
Energy Sector Working Group (SWG)	Government and development partners discuss matters influencing the sector, and approve long-term plans and policy measures
UMEME	Largest electricity distribution company, mandated to: (i) operate, maintain, upgrade and expand the distribution network, (ii) retail electricity to its customers, and (iii) improve efficiency within the electricity distribution system

Uganda has one of the lowest per capita electricity consumption rates in the world. Generation capacity is dominated by hydropower, supported by heavy fuel oil and biomass cogeneration power plants. As in other Sub-Saharan African countries that predominantly rely on hydropower, erratic rainfall and droughts have affected electricity supply in recent years and led to frequent load shedding. Currently, thanks to increased capacity and 50 MW of capacity from heavy fuel oil plants, incidence of load shedding has declined to almost zero.

Small hydropower

In Uganda, small hydropower is generally defined as hydropower plants with generation capacity of up to 20 MW. The total installed capacity of small hydropower plants of up to 20 MW in operation in Uganda is 82.8 MW, whereas the potential is estimated at approximately 258 MW, indicating that approximately 32% of potential capacity of SHP has been developed.

Solar energy

The average solar radiation is 5.1 kWh/m^2/day, and solar is the renewable energy resource with the highest adoption rate in Uganda. Existing solar data clearly indicates that the solar energy resource in Uganda is high throughout the year with a variation (max month/ min month) of only about maximum 20% (from 4.5 to 5.5 W/m^2), which is due to its location near the equator. The insolation is highest in the dryer area in the north-east and very low in the mountains in the east and south-west.

Currently, 30 MW of solar IPPs are connected to the grid: Soroti (10MW), Kabulasoke (20MW) and Bufulbi (10MW). There are plans for development of new plants in West Nile and eastern Uganda.

The Uganda off-grid solar market is a niche, rapidly growing market, with a 138% increase in PAYG solar customers in 2017 and 160% in 2018. The latest estimate is nearly 1 million active PAYG solar customers in Uganda as of December 2018.

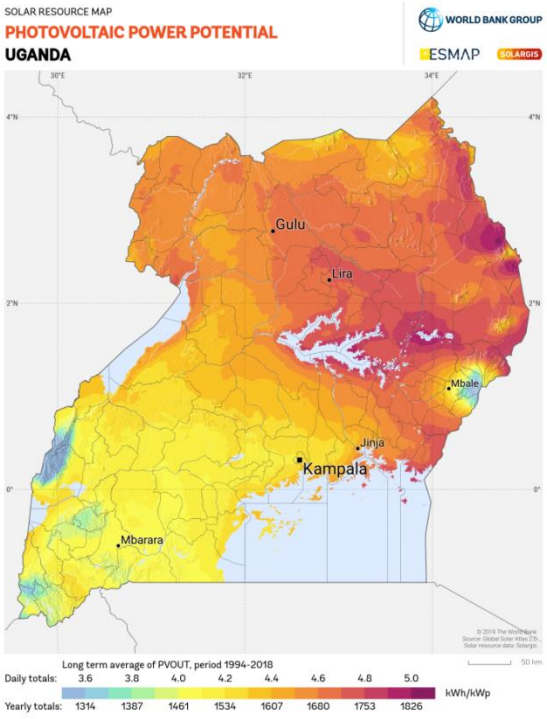

Figure 3 Solar resource Uganda (2019 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis)

Biomass

Biomass is abundant and diverse due to different vegetation and land use types. The total standing biomass stock is stated at 284.1 million tons with a potential sustainable biomass supply of 45 million tons. The major sources are hardwood plantations, which consist of eucalyptus (50%), pine trees (33%) and cypresses (17%). Current accessible, sustainable wood biomass supply lies at 26 million tons. The theoretical potential production of agriculture residues lies between 1.186 million and 1.203 million tons annually. So far, the only sub-sector that significantly utilises biomass residues for electricity production is the sugar industry. A small amount of coffee and rice husks are also utilised for heat production in cement and tiles manufacturing and the production of briquettes.

Wind energy

Recent studies indicate that the wind speed in most areas of Uganda is moderate, with average wind speeds in low heights (less than 10 m) ranging from 2 m/s to about 4 m/s. Based on wind data collected by the Meteorology Department, it was concluded that the wind energy resource in Uganda is only sufficient for small scale electricity generation and for special applications, such as water pumping, mainly in the Karamoja region. Small industries in rural areas where targets for a mill range from 2.5kVA to 10kVA could benefit from the wind resource.

Mini grid sector development

Mini grid development has been on the rise in Uganda for the past few years, owing to the government's strategy to integrate mini grids in national electrification plans. As a result, there has been a growing interest in the off-grid sector from local and international developers, as well as donors and investments.

Uganda, through the SEforAll agenda, plans to achieve over 98% electricity access by 2030, with over 90% output from renewable energy. The government has made progressive steps to improve the mini grid sector as one of the enablers to meet these ambitious targets. As such, Uganda is one of the most attractive markets for mini grid development in eastern Africa.

Some of the key enabling elements for mini grid development include:

- A rural electrification fund (REF) that supports both private- and public-sector-led rural electrification projects. Projects supported are on-grid extensions, independent mini grids, and standalone solar systems
- A fully unbundled model for electricity generation, transmission and distribution
- A standardised power purchase agreement (PPA) framework
- Streamlined licensing processes for different mini grid sizes, with exemptions for mini grids less than 2MW in capacity
- Provision for cost-reflective tariffs, subject to approval by the rural electrification agency (REA) to protect consumers
- Annual performance monitoring and reporting to inform mini grid design and planning
- Provision for various mini grid ownership models (government, private sector, public-private partnerships, or community)
- Standardised templates to help mini grid developers in developing project feasibility studies, business plans and financial models
- Streamlined project procurement processes either through public tenders or service concessions, which aid in clear planning

Provisions for the arrival of the main grid are, however, still not clear. REA is in the process of revising the regulatory framework, albeit at a slow rate.

By 2018, there were at least 10 mini grids being operated by private developers, and about 31 sites being tendered by REA. This number has significantly risen due to ongoing tendering activities by the government, with support from development organisations such as GIZ and the German development bank KfW. The companies active in the mini grid space in Uganda include:

- Absolute Energy
- Bakulu Power Ltd
- Eco Gardens
- Equatorial Power
- GRS Commodities
- Kalangala Infrastructure Services (KIS)

- Mandulis Energy
- Microgen Renewables
- Pamoja Energy
- Remergy Energy
- Tiger Power

Organisations such as GIZ, Habitat for Humanity and WWF have also been involved in developing mini grids in the country through their development programmes.

The table below highlights some of the active mini grid and off-grid energy programmes in the country. It is by no means an exhaustive list. Many development organisations are implementing off-grid programmes in the country either independently or in partnership with the government.

Table 3: Active support programmes in Uganda

Programme	Main activities
Scaling–up rural electrification using innovative solar photovoltaic distribution models	A $5 million programme funded by the EU's ACP-EU Energy Facility and implemented by WWF. The project aims to scale up the use of solar PV for electricity generation and use in the Kasese district of Uganda. Project targets include installations in 50 social institutions, setting up 20 energy kiosks, and selling 15,000 solar PV systems to households through local community-based organisations.
Access to energy services in rural and peri-urban areas in Northern Uganda (Teko Wa Project)	A $5 million programme funded by the EU's ACP-EU Energy Facility and implemented by the Church of Sweden. The main objective of the project is to increase energy security for rural communities in Northern Uganda to enable social and economic development. Focus activities include promoting clean cooking through production and use of fuel-efficient stoves, access to electricity through use of solar PV systems for households and schools, and tree planting and capacity building activities to encourage sustainable natural resource management.
The Green Mini Grid Help Desk	Funded by the Africa Development Bank as part of the Green Mini Grid Market Development Programme (GMG MDP). Mini grid developers receive technical assistance, from support on demand assessments to technical sizing, capital raising, procurement and installation support, commissioning, and optimisation of operations.
Energy for Rural Transformation	A $135 million project funded by the World Bank and implemented by the government. The project aims to increase access to electricity in rural Uganda using three main strategies: on-grid activities (extension and densification); off-grid activities (solar PV installation for public institutions, business development support, access to credit, and enforcing quality standards); and strengthening institutional capacity and impact monitoring.
GETFiT	Applicable for power plants of up to 20 MW and first published in 2007, the GET FiT programme provides premium payments through participation in a competitive Request for Proposal and a subsequent evaluation process. The programme was officially launched in 2013. It has been jointly developed by the Government of Uganda, ERA and KfW and is designed to leverage private investment into renewable energy generation projects. The Premium Payments constitute a result-based incentive grant designed to enhance the financial viability of the selected projects. Premium Payments are structured as payments per kWh to chosen private developers, calculated on the basis of expected generation of eligible projects over the lifetime of the 20-year-long PPA. The GET FiT scheme originally focused on small hydro, bagasse (sugarcane waste) and other biomass. In 2014, solar PV was included in the list of eligible technologies.

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The Africa Energy Program	Implemented by the Rocky Mountain Institute (RMI). RMI works with various stakeholders in the public and private sector to develop affordable, resilient and efficient distributed energy systems. Its focus in Uganda is on improving local stakeholders' capacity in identifying investment beyond traditional power supply and developing demand stimulation programmes to increase the value of energy access.
Power Africa Uganda Electricity Supply Accelerator	Implemented by USAID. Providing support to the public and private sectors to improve investment and enabling environment for on-grid and off-grid electrification. Support includes: TA services for generation projects to reach financial close; support in master planning for 13 distribution company concessions, over 800,000 on-grid connections and identifying over 400 sites for mini grid development; financial linkages support; and support in piloting innovative off-grid products and payment platforms.
CleanStart Programme	Implemented by the UNCDF. The programme co-invests in early stage innovations with providers of wholesale retail financing for clean energy, with the aim of facilitating access to commercial financing for off-grid energy business models. The programme aims to invest $26 million in six countries in Africa and Asia by 2020 using a challenge fund mechanism. Other programme activities include technical assistance to companies, knowledge management, and advocacy.
GETAccess Uganda	Funded by KfW and implemented by Multiconsult to improve electricity access through renewable energy powered, isolated grids.
De-risking PAYGO SHS in Uganda refugee settlements	An 18-month project funded by USAID and implemented by GPTech in partnership with Energy 4 Impact and the Smart Communities Coalition (SCC). The project aims to incentivise the private sector to consider refugee settings as a market for PAYGO solar. This is a market-driven programme to prove viability of PAYGO solar business models for refugee communities. It involves a grants aspect to support two to three selected solar companies to roll out solar home systems on a PAYGO basis in Kiryandongo and Rwamwanja refugee settlements and their host communities.

Industry associations

The primary role of **the Uganda National Renewable Energy and Energy Efficiency Alliance (UNREEEA)** is to avail a platform for consolidating the renewable energy and energy efficiency private sector wing, as well as improving its business environment. UNREEEA is a not-for-profit organisation incorporated in 2015, when private sector players in renewable energy and energy efficiency sub-sectors signed a memorandum to come under one umbrella body.

As an umbrella organisation, the allinace brings together a network of six member associations under which various companies and enterprises subscribe. These associations are:

- Biomass Energy Efficient Technologies Association (BEETA)
- Uganda National Bio-gas Alliance (UNBA)
- Hydro-power Association of Uganda (HPAU)
- Uganda Solar Energy Association (USEA)
- Energy Efficiency Association of Uganda (EEAU/Energy Auditors)
- Wind Power Association of Uganda (WPAU)

References and further reading

Renewable Energy Investment Guide by ERA
https://www.era.or.ug/index.php/oppotunities/renewal-energy-investment-guide

World Small Hydropower Development Report 2016 Uganda
https://www.smallhydroworld.org/fileadmin/user_upload/pdf/2016/Africa_Eastern/WSHPDR_2016_Uganda.pdf

Doing Business - World Bank
https://www.doingbusiness.org/en/data/exploreeconomies/uganda

Official UK Government travel advice for Uganda
https://www.gov.uk/foreign-travel-advice/uganda

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