



SECTOR BRIEF UGANDA:

Renewable Energy



Country Overview

Uganda is located in East Africa, covering an area of approximately 197,000 km². It has a wide range of natural resources, including fertile soils, frequent rains, copper, cobalt, oil and natural gas reserves. The country has a population of over 45 million. Kampala is its capital and largest city. Uganda is home to more than 40 ethnic groups and has received over one million refugees, mainly from South Sudan as well as from the Democratic Republic of Congo and Burundi. The main languages spoken include English and Swahili, as well as other regionally based languages such as Luganda and Luo. The climate is tropical, with the hottest month being January with temperatures of 18–28°C, and the coldest month being July with temperatures of 17–25°C (average daily minimum and maximum). Due to its landlocked location, Uganda works with its neighbouring coastal countries, Kenya and Tanzania, for the movement of its imports and exports.

The country has a medium-sized economy, with the agricultural sector accounting for the largest source of export earnings and employment, contributing about 24% to Uganda's GDP. The services sector (especially tourism) is the biggest contributor to Uganda's GDP with approximately 53%. In 2021, the Ugandan economy is expected to partially recover from the recession of the previous year. The country's real gross domestic product (GDP) is expected to grow moderately by around 3.7%. However, the partial lockdowns that have been taking place throughout the Covid-19 pandemic had a negative impact on the economy, particularly on tourism.

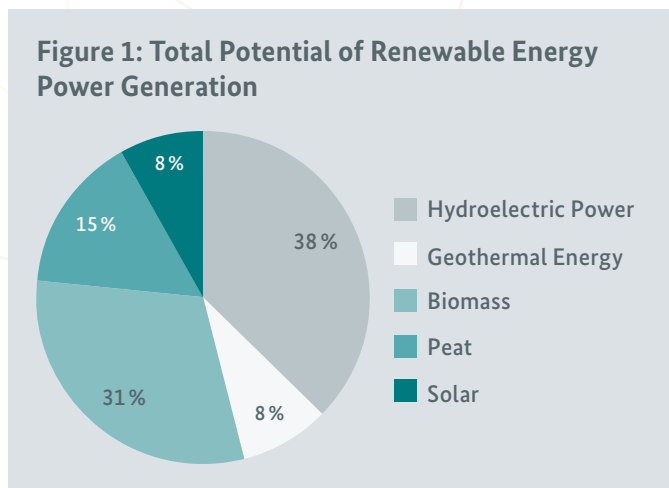
Against this backdrop, the Ugandan government, like many others around the world, has taken steps, in cooperation with international partners and organisations, to help secure its economy during the Covid-19 pandemic. Relations with fellow members of the East African Community, especially Kenya and Tanzania, are expected to be strengthened. Uganda and Tanzania are currently undertaking a greater economic integration through planned large-scale regional projects such as the crude pipeline project running through both countries.

Energy in Uganda

General

Uganda is rich in energy resources, including hydropower, biomass, solar energy, geothermal, peat, and wind. The country's physical energy resource potential includes an estimated 2,000 MW of hydroelectric power, 450 MW of geothermal energy, 1,650 MW of biomass cogeneration (often at sugar manufacturing plants), 460 million tons of biomass in stock with a sustainable annual output of 50 million tons, an average of 5.1 kWh/m²/day of solar energy, and about 250 million tons of peat (800 MW). The total potential of renewable energy power generation as illustrated below in *Figure 1* is estimated at 5,300 MW.

However, this energy potential has yet to be fully utilised. Around 50% of the country's population have access to any form of electricity and about 24% have access to electricity for more than 4 hours per day (Tier 1).



Source: Based on data from UNREEEA, Overview of the Ugandan Energy Sector, 2021

Renewable Energy

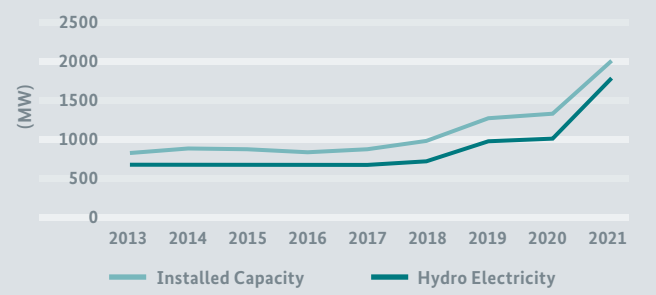
Uganda has many renewable energy resources that can be used for energy production and the provision of energy services. These resources include bioenergy, through biomass and biogas, water/hydro, solar, geothermal and wind energy potential. Many of these resources are yet untapped. The Ugandan government, in cooperation with international partners, is involved in several projects aimed at promoting and improving the conditions and implementation of renewable energy in the country.

Key Market Segments

Uganda's current hydropower sector is the country's largest source of renewable electric energy. The country's electricity sub-sector has rapidly expanded since 2001, from just three generation plants to over 40 plants and still increasing in 2021. The total installed generation capacity started at 60 MW in 1954, and increased to 400 MW in 2000, 800 MW in 2013, and about 2,000 MW in mid-2021.

The most recent part of this development, from 2013 to present, is shown in *Figure 2* below:

Figure 2: Installed Electricity Generation Capacity 2013 – 2021 (MW)



Source: Graph based on data from Uganda Bureau of Statistics (2021), Installed Electricity Generation Capacity in Megawatts & ERA, Uganda's Electricity Sector Overview

Some of the generation plants spread throughout the country have been designed to operate off-grid, while others supply the grid. Most of the country's electricity generation comes from hydro plants owned by the state-run Uganda Electricity Generation Company (UEGCL), with the largest located along the River Nile.

Bioenergy, through biomass and biogas, is the most commonly used source of energy in Uganda, accounting up to 94% of the country's total energy consumption. Out of the biomass options, charcoal is most commonly used in urban areas while firewood, agro-residues and wood wastes are generally used in rural areas. An interesting case is the sugar cane industry which uses agro-residues to produce electricity in a co-generation process. The total standing biomass stock is 284.1 million tons per year with a potential sustainable biomass supply of 45 million tons per year. However, the accessible sustainable wood biomass supply stands at 26 million tons per year. This amount meets 59% of the total demand of 44 million tons per year. The remaining 41% is met by the biomass supply according to representatives of the Uganda National Renewable Energy and Energy Efficiency Alliance (UNREEEA).

Solar energy in Uganda has the highest adoption rate among all renewable energy options. The average solar radiation is 5.1 kWh/m²/day, with the current solar data showing that solar energy is high throughout the year with a variation (minimum month/maximum month) of only about 20% maximum.

Geothermal energy potential in Uganda is estimated at 450 MW. Katwe-Kikorongo, Buranga and Kibiro are three suitable locations which have been identified and singled out for exploration as their temperature levels (150 C°–200 C°) are adequate for electricity generation.

Micro-grid systems and off-grid systems provide a solution in the rural areas and villages of the country where the electrification rate is very low at around 38%. Particularly solar energy solutions have been featured in the country's strategy to scale-up energy access.

Legal, Political, Institutional and Regulatory Framework for Renewable Energy

The legal framework for renewable energy in the country is founded on the Constitution of the Republic of Uganda (1995, as amended) and specific laws and statutory instruments including the Electricity Act (1999) and the National Electrification Strategy (NES), which was concluded in 2022. These provide the regulatory framework for the electricity sub-sector and the Biofuels Act (2018) which regulates production, storage and transportation of biofuels and blending of biofuels with petroleum products.



The Energy Policy (2002) is the primary policy framework for the country's entire energy sector, which the Government has continued to implement. Programmes such as the Promotion of Renewable Energy and Energy Efficiency Programme (PREEEP) implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, have also supported the development and implementation of the Energy Policy.

The Renewable Energy Policy (2007) is the framework for renewable energy in the country. It is intended to increase the share of renewable energy in the national energy mix. The sector is governed by additional relevant sector policies including the Gender Policy (2007), Climate Change Policy (2015), Environment and Social Safeguards Policy (2018). The renewable energy sector in Uganda also subscribes to legal and policy frameworks of both regional and international scopes such as the Sustainable Development Goals, Sustainable Energy for All (SEforAll) and East African Community laws and policies.

The Government of Uganda, through the Ministry of Energy and Mineral Development (MEMD), is the lead institution overseeing the renewable energy sector in the country. MEMD works closely by implementing regulations, standards and quality together with stakeholders such as Electricity Regulatory Authority (ERA), National Environment Management Authority (NEMA), Directorate of Water Development (DWD), Uganda National Bureau of Standards (UNBS), Centre for Research in Energy and Energy Conservation (CREEC), Centre for Integrated Research and Community Development Uganda (CIRCODU) and Uganda National Renewable Energy and Energy Efficiency Alliance (UNREEEA). Another critical player are the local governments, which have oversight of policy and co-ordination.

External projects by GIZ, World Bank, United Nations, Royal Norwegian Society for Development or Energy4Impact, to name a few, have significantly helped develop the framework for renewable energy in the country.

Drivers of the Renewable Energy Sector in Uganda and the Region

Uganda has been seeking out ways to fulfill its energy requirements and broaden the capacity and accessibility to eventually embrace the entire country. The need to secure efficient long-term solutions to its energy needs is likewise increasing due to a number of factors, including its growing population and increasing urbanization. Due to the country's favourable situation of possessing abundant renewable energy resources such as biomass, hydro, solar and wind, this sector allows the country a sustainable and efficient path to provide for its energy needs and to power the long-term growth of its economy.

Climate change is a huge concern for Uganda and is a key driver for the renewable energy sector in the country. Uganda has experienced increased adverse weather patterns such as devastating floods, landslides in the east and prolonged drought in the north. These weather conditions in the recent past have led to loss of livestock, crops and human life. Fuelwood and charcoal are primary sources of household energy across Uganda and are associated with serious environmental and health problems, including deforestation, the destruction of wetlands and (indoor) air pollution. As an intervention, the government is increasingly promoting the use of climate-friendly energy in form of renewable energy options such as solar power. With the help of GIZ, high-level vocational training curricula for experienced solar technicians are being developed and implemented in the country's educational institutions. Furthermore, in recent years, the Ugandan government has promoted solar energy through tax breaks and consumer subsidies as well as rural electrification projects. More than 200 companies, including foreign investors, are active in the Ugandan PV and solar thermal field.

Uganda was the first country in Africa to formulate and support its Nationally Determined Contribution Partnership Plan (NDC-PP) in June 2018. It made important commitments in this respect, including reducing national greenhouse gas emissions by 22% by 2030, reducing climate vulnerability of climate sensitive sectors building climate resilience of key sectors and managing disaster risks.

GIZ projects in Uganda and the region have been fundamental in pushing forward and tangibly growing the renewable energy sector on all levels, from development to training, education and implementation, and more. Such projects include the Promotion of Mini Grids for Rural Electrification in Uganda and the PREEEP Uganda; establishing renewable energy sources in Kenya; promoting the energy sector in Tanzania; and energising development in Ethiopia.

Opportunities and Risks for German/European Companies in the Renewable Energy Sector in Uganda

Opportunities	Risks
The PDP (Project Development Programme) implemented by GIZ supports East African companies to develop projects that can leverage on experience and knowhow of German/European companies.	Influx of unreliable low-quality products have, in some instances, led to customer aversion to renewable energy products such as solar panels and batteries.
Various programs funded by Germany and the EU are developing the sector, e.g., the Energising Development programme (EnDEV).	Several RE projects are too small for mainstream investors or banks to partake in (Environmental Alert 2019).
Innovative payment solutions such as Pay-As-You-Go, especially in off-grid areas, for enhanced accessibility.	Local financial institutions lack the technical capacity to evaluate projects and finance them.
Uganda's Vision 2040 has recognised that due to climate change emphasis will be on sources of energy for achieving this vision.	Given the landlocked nature of the country, trade and communication links can be disrupted resulting in detrimental effects on business and the overall economy.
As of Nov 2020, there are nine licensed electricity distribution operators allowing for multiple avenues to provide renewable energy.	Oil discoveries along Uganda's western border may divert the government's attention away from renewable sources of energy.

Present Market Entry Options and Business Opportunities for Companies

Market Entry Options

Foreigners have a wide variety of entities which include partnerships, registered branches of a foreign company and limited liability companies.

Uganda has bilateral investment agreements with Denmark, France, Germany, the Netherlands, Switzerland and the United Kingdom. Double Taxation Agreements (DTAs) are in force with Denmark, Italy, the Netherlands, Norway and the United Kingdom. Uganda's employment legislation allows for an employee to be seconded. For permit work applications, it is required to be employed by a local entity. Uganda currently does not have foreign exchange control restrictions. It has established a one stop centre for investors where applications such as company registrations and obtaining an investment licence can be acquired. Please see the link: <https://www.ebiz.go.ug/>.

The Uganda Investment Authority issues the investment licence to both domestic and foreign companies. Acquiring an investment licence from the Uganda Investment Agency is a mandatory requirement for foreign investors as it is the instrument that legalises the investment in Uganda.

Business Opportunities for Companies

Uganda's population is underserved within the energy sector. Uganda is amongst the top 20 access deficit countries, with 26 million people not having access to electricity as of 2019. The electric connection policy introduced in 2018 aims to increase Uganda's electricity access to 60% by 2027. As of 2019 the urban electricity access rate was 71% and rural electricity access rate was 32%.

The above paints a picture of a country that has the potential for renewable energy to meet its energy needs. As of April 2018, the Electricity Regulatory Authority has listed opportunities within large and small hydro, biomass, geothermal, solar and wind energy. It also references the capacity to develop waste into energy. Maps showing the solar and wind energy availability may also be accessed here. Please see the full list at https://www.era.go.ug/index.php?option=com_content&view=article&id=214:renewable-energy-opportunities&catid=100:renewable-energy-investment-guide.

The Uganda Investment Authority has also published a list of viable projects within Uganda, including a solar car manufacturing plant. The list includes a geothermal exploration and development project, the Mukoki hydro power project, Kyenjogyera mini hydropower generation project and an initiative for bioenergy production. The geothermal project indicates sub surface temperatures of approximately 150 degrees to 200 degrees Celsius. The temperatures are suitable for electricity generation and direct use. The Mukoki hydro power project has an internal rate of return on equity after tax of 23.3% and an internal rate of return on capital of 14.2%. Please see the list here <https://www.ugandainvest.go.ug/wp-content/uploads/2019/06/BANKABLE-PROJECTS-2.pdf>.

Renewable energy projects require more than just equipment. Technical knowhow of the design and planning phase is sought after. Companies with this expertise have several opportunities.

Examples of Companies on the Market in Uganda and their Business Model

ENGIE Energy Access is an expandable solar home system providing lighting, phone charging, TV and radio which is financed through affordable instalments over mobile money. It can be linked to a Pay-As-You-Go model using mobile money. The company is part of

the Engie group, a global reference in low-carbon energy and services. Together with their 170,000 employees, their customers, partners and stakeholders, the company is committed to accelerating the transition towards a carbon-neutral world through reduced energy consumption and more environmentally friendly solutions.

In 2020, the independent power producer Amea Power signed an agreement in Uganda to develop a wind farm with a capacity of 120 MW and a solar PV plant of 10 MWp. Amea Power specialises in acquisition, development, ownership and operation of power projects.

A list of companies working in solar energy can be found at <https://www.useaug.org/about-us/our-members.php>. Below are some of these companies:

Company Name	Website
Enlight Institute	www.enlightinstitute.com
COH Intergrated Services	www.coh-isl.com
Equator Solar Systems Ltd	www.equatorsolar.co.ug
W.water Works (U) Limited	www.wwaterworks.com
Greenlight Planet Uganda	www.greenlightplanet.com

Practical information and Contacts

- **Business Scouts for Development Uganda**, Plot 24B Akii Bua Road, Nakasero, Kampala, Uganda | Email: business-scout_uganda@giz.de
- **Electricity Regulatory Authority**, ERA House, Plot 15 Shimoni Road, Nakasero P.O. Box 10332, Kampala, Uganda | Tel: +256 414 341852, +256 393-260166 | Email: info@era.or.ug
- **Ministry of Energy and Mineral Development**, Amber House, Plot 29/33, Kampala Road, P.O.B Kampala, Uganda | Tel: +256 414 344 414 | Fax: +256 414 234 732, | Email: ict@energy.go.ug
- **Private Sector Foundation Uganda (PSFU)** Plot 43 Nakasero Road Kampala Box 7683 Uganda | Tel: +256 312 263850 | Email: psfu@psfuganda.org.ug
- **Rural Electrification Agency** Plot 10 Windsor Loop Kololo, House of Hope 2nd Floor | Toll free Line: 0800211013 | Email: rea@rea.or.ug | Call Line: +256 312 318100

Financing

The Netherlands Enterprise Agency (RVO) provides a selection of programmes, including the Guarantee SME loans (BMKB) which guarantee loans for investments for SMEs, including first time buyers. Their Develop2Build (D2B) programme provides funding for governments in developing countries to develop infrastructure projects with a positive impact on people, the environment and society. More information can be found at <http://www.rvo.nl/subsidies-regelingen>.

- **UEDCL TOWER**, 6th Floor – Nakasero, Kampala. | Tel: +256 312 330 300 | Email: info@uedcl.co.ug | Web: www.uedcl.co.ug
- **Uganda Investment Authority**, The Investment Centre, Plot 22B, Twed Plaza Lumumba Avenue, Nakasero P.O. BOX 7418, Kampala | General line: 0414301000 | One Stop Centre: 0417788300 | Ebiz Call Center: +256 06300968
- **Uganda Revenue Authority**, URA Tower, plot M 193/4 Nakawa Industrial Area, P.O. Box 7279, Kampala | Phone: +256 324 43610 | Email: services@ura.go.ug
- **Uganda Electricity Generation Company Ltd.** Block C Plot 6–9 Okot Close Bukoto Victoria Office, P.O. Box 75831, Kampala, Uganda | Tel: +256 312 372165 | Email: info@uegcl.go.ug
- **UNREEEA (Uganda National Renewable Energy and Energy Efficiency Alliance)** | Tel: +256 414 699577 | Email: info@unreeea.org
- **USEA (Uganda Solar Energy Association)** P.o.Box 23493, Kampala, Uganda | Tel: +256 200 923 345 | Email: info@useaug.org

Uganda Energy Credit Capitalization Company provides financial, technical and other support for renewable energy infrastructure development in Uganda, with a focus on enabling private sector participation. For more information please visit their website at <http://www.ueccc.or.ug/>.

Trade Fair/Expo

Name	Links
Uganda Construction & Real Estate Expo	https://www.fwafrica.net/ugconstruct/
Build Expo Africa 2021	https://expogr.com/uganda/buildexpo/

Business Etiquette

As in most Eastern Africa countries, formal greetings are important, especially at the first meeting. Business meetings are typically attended in formal wear. Normal business hours are between 8am and 5pm with a lunch break between 1pm and 2pm. English is used for business discussions. In general, appointments should always be made in advance with a clear agenda. Visitors are encouraged to keep time and be flexible on punctuality. As of 2021, there are many ongoing infrastructure projects which may result in heavy traffic jams. Please be advised to allocate sufficient time for travel and

consider planning travel to only one area of Kampala in one day.

Kampala is located close to Lake Victoria. Temperatures range between 18 and 30 degrees centigrade depending on the season. Due to its location and weather, mosquitoes are prevalent in Uganda and Kampala. Foreigners are advised to take necessary precautions such as sleeping under a treated mosquito net. It is mandatory to have a yellow fever vaccine before entry. Vaccinations at the airport are available for a fee.

List of Potential German/European Partner Companies

Name of Company	Links	Brief Description
Achelis Uganda	https://achelis.net/	Involved in various projects within Uganda.
Solar Now	https://www.solarnow.eu/about-us/	SolarNow sells high quality European standards solar energy solutions in Uganda and Kenya.
Tulima Solar	https://tulimasolar.com/who-we-are/	They partner with agricultural co-ops, capacity builders/NGOs, input suppliers and offtakers to reach and train farmers.
Green Power International	https://www.greenpowerint.com/	Green Power International (GPI) is a multinational company operating across the global solar industry covering many places such as Southeast Asia, Africa and Europe.
Gopa-intec Uganda Limited	https://www.gopa-intec.de/branch-office-uganda	Gopa-intec Uganda Ltd is engaged in various power systems and renewable projects as a consultant to multiple clients. The parent company is GOPA-International Energy Consultants GmbH.
Elite Consulting Engineers Limited	https://www.zera.de/contact/locate-us/zera-international/uganda/	ZERA is a German company that develops, manufactures and sells devices and systems for producing, measuring, testing and calibrating electrical quantities. Their focus lies in meter and instrument transformer test systems as well as precision laboratory systems. Their local contact is Elite Consulting.



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Sources and useful links:

- Afrik21: <https://www.afrik21.africa/en/uganda-in-the-face-of-covid-19-giz-and-psfu-support-green-energy-companies/>
- Electricity Regulatory Authority: <https://www.era.go.ug/index.php/sector-overview/uganda-electricity-sector>
- ERA, Uganda's Electricity Sector Overview, 2020: <https://www.era.go.ug/index.php/sector-overview/uganda-electricity-sector>
- Euler Hermes: https://www.eulerhermes.com/en_global/economic-research/country-reports/Uganda.html#link_internal_1
- GIZ, Promotion of Mini-Grids for Rural Electrification: <https://www.giz.de/en/downloads/giz2020-en-pro-mini-grids.pdf>
- GIZ, Promotion of Renewable Energy and Energy Efficiency Programme: <https://www.giz.de/en/world-wide/19268.html>
- Government of Uganda (Uganda Vision 2040) <https://www.gou.go.ug/content/uganda-vision-2040>
- GTAI: <https://www.gtai.de/gtai-de/trade/wirtschaftsumfeld/wirtschaftsausblick/uganda/weiterhin-nur-gebremstes-wachstum-604328>
- IRENA, Renewable Energy Policies For Cities, Experiences In Uganda: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/May/IRENA_Policies_for_Cities_Uganda_2021.pdf?la=en&hash=B6AF54CF466F70B83E96E9F322C09D8139AF9D03
- MEMD, Draft National Energy Policy: https://www.energyandminerals.go.ug/site/assets/files/1081/draft_revised_energy_policy_-_11_10_2019-1_1.pdf
- UNREEEA, Overview of the Ugandan Energy Sector: <https://unreeea.org/>
- World Bank, Uganda Energy Access Scale-up Project (EASP): <https://pubdocs.worldbank.org/en/822811581437816457/12136-Project-Concept-Information-CTF-DPSP-3-Uganda-WB-EASP.pdf>



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<https://www.kenia.ahk.de/>

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NEW MARKETS – NEW OPPORTUNITIES

In order to support the sustainable engagement of German companies in emerging and developing countries, Germany Trade & Invest (GTAI), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the German Chambers of Commerce Abroad (AHKs) as well as other partners combined their expertise in the German publication series “New Markets – New Opportunities”. The booklets show companies the economic potential of future markets as well as the funding and consulting opportunities offered by the German development cooperation.

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Business Scouts for Development

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