Uganda Off-Grid Energy Market Accelerator

Off-grid energy in Uganda

Market Map

2020 edition

Foreword

I have been privileged to participate in the groundbreaking activities of UOMA from the onset back in 2017 and many outstanding achievements have been recorded by UOMA in the intervening three years since. The most important item brought by UOMA to the energy sector in Uganda was the provision of an independent and objective platform for the various actors (government agencies, private sector participants and development partners) in the sector who previously were without the opportunity to interact effectively on sector issues. For instance, issues important to the private sector when objectively scrutinized and tabled by the UOMA team are finding much easier acceptability by government through mechanisms funded by development partners. This always provides a win-win scenario while overcoming previous bottlenecks to increased mainstreaming of off-grid renewable energy into government policies and deployment in Uganda.

I was involved in the well acclaimed pioneering work by UOMA of putting together Uganda's Off-Grid Energy Market Map; a detailed compendium of information on who is doing what in the off-grid energy space and the status of this key subsector. Its annual update version has become a key reference document and landmark for all stakeholders in the sector.

In this year's Market Map, and as usual, a thorough overview of key components of off grid energy systems in Uganda (solar home systems, mini-grid and productive use) has been given. Financing constraints, especially for the local investors, as well as challenges of the unserved populations have been well elaborated. Up to date information and data on Uganda's off-grid has been compiled into one readily available document for policy makers, development partners, current sector participants and potential investors.

This report also includes insights on the emerging and evolving impact of COVID-19 on the sector, much as greater impacts are yet to manifest. It is obvious that the global pandemic will negatively impact the good pace that off-grid has attained over the past decade in driving Uganda towards universal access to clean modern energy.

Eng. Frank B. Sebbowa, PHD
Senior Energy Advisor, UOMA

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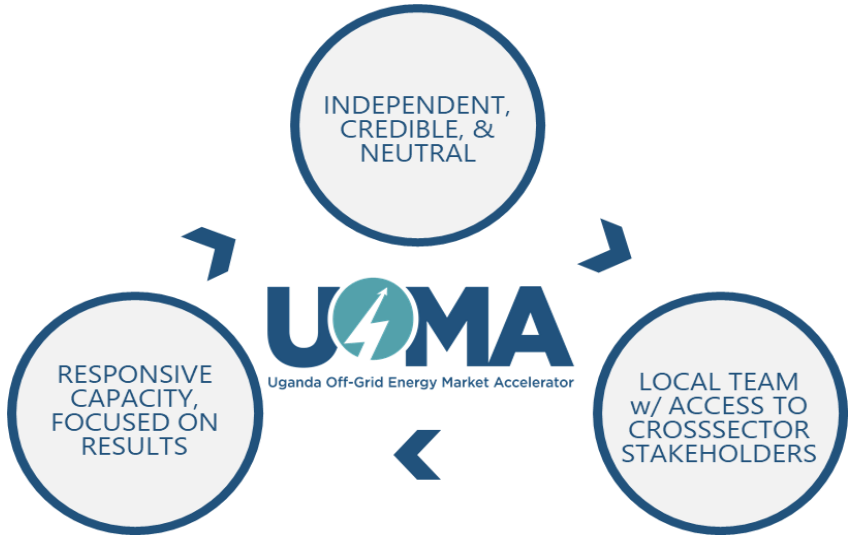
The Uganda Off Grid Energy Market Accelerator (UOMA) is a dedicated and neutral intermediary, focused on scaling off-grid energy access through 5 core initiatives

UOMA started in 2017 and is focused on supporting sustainable & universal access of affordable clean energy for Ugandans

The Uganda Off-Grid Energy Market Accelerator (UOMA), implemented by Open Capital in partnership with the **Shell Foundation, DFID, USAID, and Power Africa,** completed a 3rd successful year, growing from an early catalyst for innovation to being a trusted partner and central advisor for off-grid energy access in Uganda

Through this pioneering concept, we are coordinating industry actors, providing technical input, expertise and substantial support for private and public sector strategies to drive towards SDG 7 and universal access of affordable and clean energy for Ugandans



UOMA serves a distinct function by 1) being independent & neutral, 2) having a local team with responsive capacity focused on results, and 3) providing access to cross-sector stakeholders. This ensures that UOMA complements and accelerates other Ugandan off-grid energy initiatives

Since 2017, our activities have been focused on 5 core initiatives

Expanding access to finance for solar operators through increasing local currency debt and bridging a critical working capital shortfall and currency mismatch, enabling operators increase affordability of units

Reaching unserved populations by reducing barriers to better target low income households in Uganda, improving access for some of the hardest to reach communities

Expanding productive use technology through supporting the industry to test and validate technologies that can achieve economic benefits for off-grid Ugandans while growing energy demand

Strengthening the enabling environment by supporting the public sector to create effective policies and a conducive environment to increase off-grid energy uptake in Uganda

Facilitating communication & coordination in the off-grid energy sector in Uganda, resulting in better resource allocation and accelerated progress in achieving universal access

UOMA is run by a technical team supported by a cross cutting advisory board representing govt, private sector and development partners

Core Technical Team

The technical team is composed of a variety of professionals with regional and national experience including off-grid energy finance, distribution, business models, bank finance, economics, public relations, marketing and others. The team has experience working with regional consulting firms, statutory bodies in Uganda and government agencies. This provides a wide range of skills that can be relied on to effectively implement UOMA's initiatives

Open Capital

Locally implemented by Open Capital Advisors (OCA), who bring deep sector expertise and local Ugandan execution capability

Advisory Board

Through our comprehensive industry insights, our local team based in Kampala and Advisory Board, which comprises of senior sector stakeholders, we have quickly built relationships and achieved close working relationships with government, private sector and development partners, enabling us to connect stakeholders and present a diversity of perspectives. Senior representatives from key cross-sector stakeholders make up the Advisory Board, across government, development partners, and the private sector:

MINISTRY OF ENERGY & MINERAL DEVELOPMENT UGANDA

RURAL ELECTRIFICATION AGENCY

USEA

UNREEEA

SCALING OFF-GRID ENERGY: A GRAND CHALLENGE FOR DEVELOPMENT

USAID FROM THE AMERICAN PEOPLE

UKaid from the British people

Shell Foundation

POWER AFRICA A U.S. GOVERNMENT-LED PARTNERSHIP

Note: ERA is Electricity Regulatory Authority; UIA is Uganda Investment Authority

UOMA Uganda Off-Grid Energy Market Accelerator

The Market Map, comprised of 3 sections, seeks to provide a holistic and objective description of the off-grid industry in Uganda

Objective of the Market Map

As part of our goal to promote more cohesion and coordination in the market, UOMA releases a Market Map annually to provide a holistic & objective description of the off-grid industry in Uganda to better inform innovation, interventions and resource allocation

This edition highlights trends within the sector, impact of interventions implemented and recommends opportunities for further support to the market, focusing on 3 key technologies; Solar Home Systems (SHS), Mini-grids (MG) and Productive Use (PUE)

Methodology

Data collection & analysis: This report is a culmination of data obtained from ~200 consultations with key private & public sector stakeholders and data obtained from pilots & research with operators, gov't & financiers

Validation & publication: Prior to publication, this report was also peer reviewed by >20 stakeholders to validate findings and verify data presented

The Market Map provides a comprehensive overview of the off-grid market in Uganda with 3 sections: a market overview, key market insights, and active stakeholders

Industry overview

Gives an overview on the traction of the off-grid landscape for each technology; Solar Home Systems, Mini-grids & Productive Use, and highlights primary barriers to scale

Industry insights

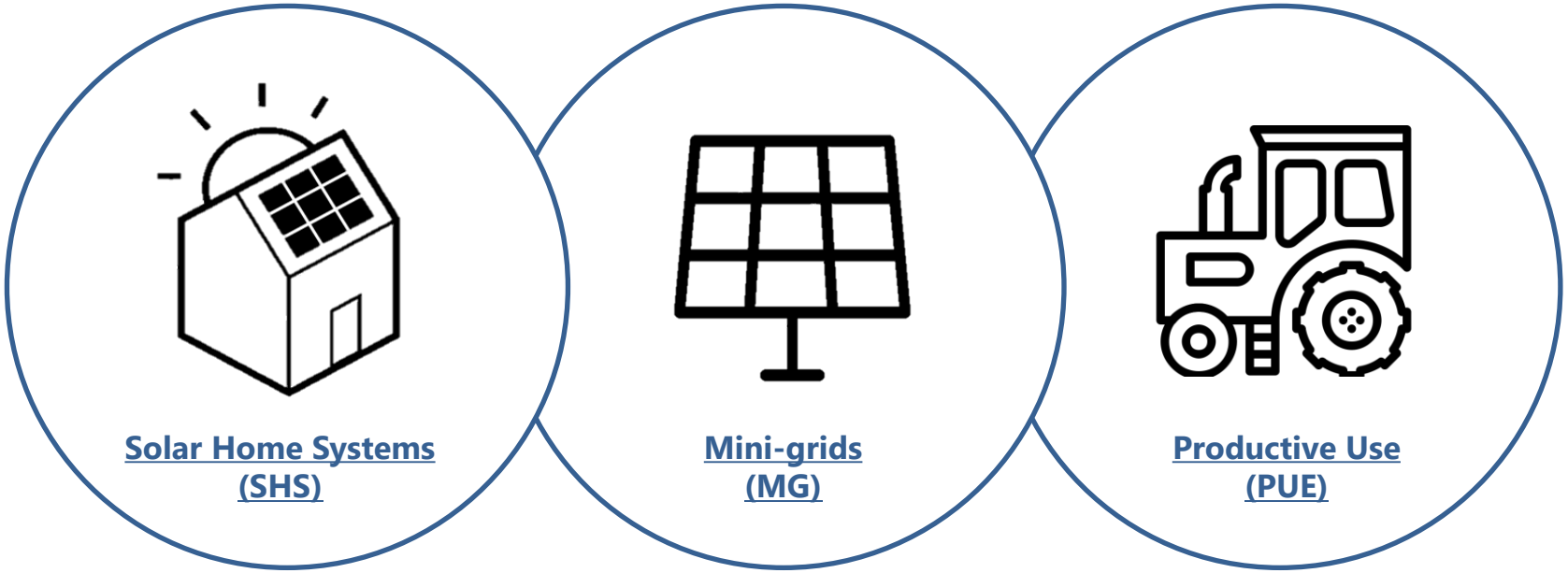
Presents data-driven analysis to provide context & trends of off-grid development; outlines key barriers to growth, opportunities for innovation & stakeholder support

Industry stakeholders

Presents information detailing stakeholders & activities currently active across in the Ugandan market, covering the private sector players, financial institutions, and government

Industry overview

This section describes the current state, trends and barriers across 3 key technologies in the off-grid market



Solar Home Systems (SHS)

Mini-grids (MG)

Productive Use (PUE)

Current state & trends

Provides context of the current landscape of each technology, highlighting product categories, their traction to date, recent sales trends, geographical coverage and unit prices

Primary barriers

Highlights existing challenges in the market, across each technology, contributing to slow growth, limited uptake especially for low income households, accessibility and affordability

Solar Home Systems: There has been a slow growth rate of sales since 2016, and volumes are expected to decrease significantly this year as a result of COVID-19

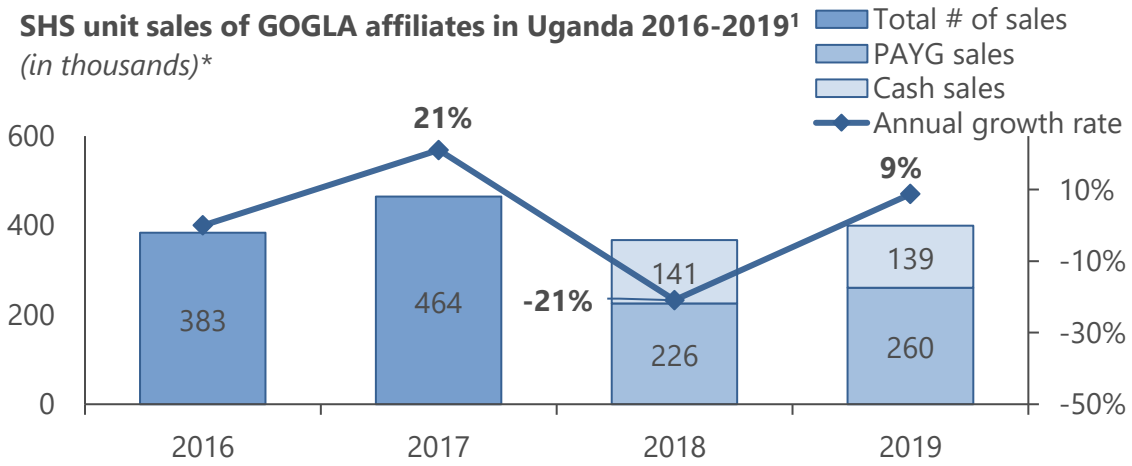
Solar Home Systems (SHS) contribute significantly to the electrification of off-grid households in Uganda. For this report, we classify solar lanterns and SHS in 4 categories, as shown in the table below, however, we focus mainly on multi-light and larger systems.

Product category	Power ranges	Avg. unit price[1]
 **Portable Lanterns (Tier 0 – Tier 1)**	0-3 W	~ US $10
 **Multi-light Systems (Tier 1)**	3-10 W	~ US $100
 **Small Solar Home Systems (Tier 1 – Tier 2)**	10-50 W	~ US $400
 **Medium to large Solar Home Systems (Tier 2)**	50-100+ W	~ US $550

SHS sales volumes have had minimal growth over the last 4 years increasing from annual unit sales of 380K in 2016 to 400K in 2019

- **Sales volumes have been fluctuating**; sales increased in 2017, but dropped by ~20% in 2018, due to introduction of a 1% levy on sending, receiving & depositing mobile money; sales then increased by 9% from 2018-2019[1,2]
- **3-10 W products have the highest sales** as users upgrade systems to meet energy needs and shift to productive uses[1]
- The **Central region accounts for ~38% of sales**, and the Northern region has the lowest sales (~19%), and lowest installed capacity, due to limited infrastructure and low population density[2]
- **2020 sales are expected to decrease significantly as a result of COVID-19**

SHS unit sales of GOGLA affiliates in Uganda 2016-2019[1]
*(in thousands)**



The primary barriers limiting scale of the SHS market include:

- **Access to capital for operators:** An estimated US$1.4Bn is needed to contribute to countrywide access by 2030[4]
- **Limited affordability** of SHS products: ~73% of the population is unserved and can't afford systems at a daily rate of US$2-3[5]
- Inconsistent **application of taxes** & exemptions and limited **customer awareness** on quality systems and providers

Notes: *From the 2020 Global Off-Grid Solar Market Trends Report, market share estimates of affiliate and non-affiliate manufacturers for both Pico & SHS in Uganda is 22% and 78% respectively

Sources: 1. GOGLA, Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, H1 2016-H2 2019; split of PAYG and cash sales not available for 2016/17, 2. USEA, Annual sales & impact data, 2018 3. Shell Foundation, Achieving SDG7: The need to disrupt off-grid electricity financing in Africa, 2018 4. SEforALL, Taking the pulse of energy access in Uganda, 2019 5. UNCDF, Digital finance for energy access in Uganda, 2020 6. UNCDF, USEA Handbook on solar taxation, 2019 Photos sourced from d.light products (portable lanterns and multi light systems), M-KOPA products (small SHS) and SolarNow products (Medium to large SHS)

Mini-grids: Operating mini-grids have an installed capacity of >11,000 kW, most being solar- & hydro-powered; highest concentration in Western & Central regions

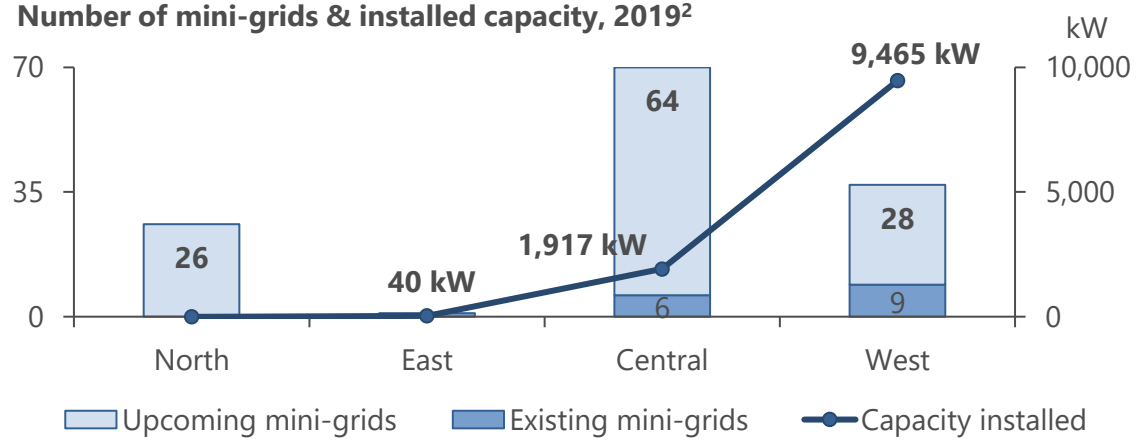
Mini-grid development in Uganda is becoming a key focus for the government and several development partners and is expected to play an important role in extending energy access to unserved regions. In this report, we discuss both existing and upcoming mini-grids, classified as shown in the table below:

Type	Known number of mini-grids in Uganda	
	Existing*	Upcoming
Bio-gas	3	0
Hydro-power	6	10
Solar powered	6	51
Solar-diesel	1	0
Total	**16** *(known operating year)*	**61** *(not conclusive)*

Majority of mini-grids are developed through grants; Western region has highest number of installed mini-grids with 83% of capacity

- **Uganda has ~34 mini-grids, 16 of which have known operating year;** mini-grids are largely hydro and solar powered**,** generating up to 50 kWP (kilowatt peak) & can serve 100-200 customers each
- There has been more mini-grid development in the Central region due to higher population density and willingness to pay compared to other regions, providing a viable business case
- **Western region has highest mini-grid installed capacity** driven by a single plant: Kabalega hydro-power with capacity of 9,000 kW[3]
- **Multiple mini-grids are currently upcoming in Uganda with over 60** to be installed in the near-term; these are expected to increase capacity available by over 3,350 kW

Number of mini-grids & installed capacity, 2019[2]



The primary barriers limiting scale of mini-grids include:

- **Access to capital**, especially debt, as financiers are skeptical about the financial viability of mini-grids; only 20% of the capital invested in the sector to date has been debt
- **Evolving policy** on tariffs and long **bureaucratic processes** on site approval and licensing which can take up to ~18 months[1]
- Tension exists in setting affordable, yet **cost-reflective tariffs**; current tariff is ~US $0.4/kWh and operators struggle to cover operational costs[2]

Notes: *Only include mini-grids with a specific operating year; additional 18 are operational but haven't been commissioned

Sources: 1. SEforALL, Taking the pulse of energy access in Uganda, 2019 2. SEFA & AfDB, Mini-Grid Market Opportunity Assessment: Uganda, 2018 3. UETCL, Uganda's generation capacity to reach 3,500 MW by 2018 ,2017

Productive Use: Low energy appliances contribute highest to sales and are sold through PAYG; larger appliances are gaining traction but are still not affordable

The market for off-grid appliances has grown, with more products in the market, such as TVs, water pumps and heaters, hair clippers, refrigerators, solar mills, etc., to increase the applications of off-grid energy in homes and small businesses. We have included the price range and capacity of some off-grid appliances below:

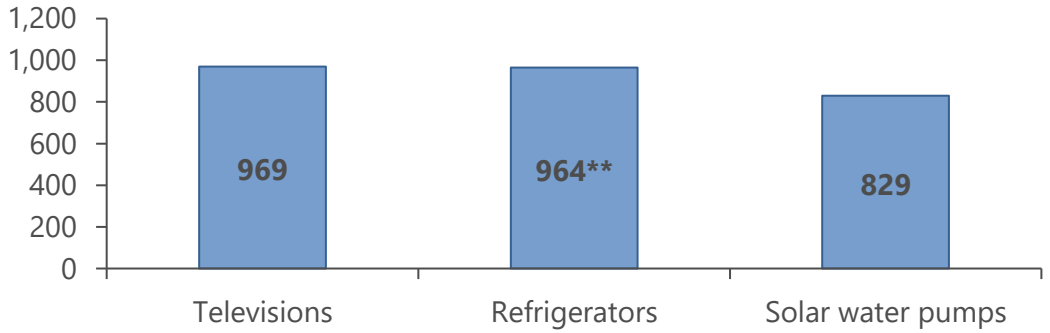
Appliance*	Capacity (kW)	Price range per unit[1]
TVs *(Particularly used for PUE)*	0.015- 0.13[1]	US $200-350
Refrigerators	0.43-0.9[1]	US $700-900
Solar water pumps	0.1-4[2]	US $1,000-3,000

Several productive use providers sell different appliances to support customers; productive use sales are gaining traction

- **Productive use providers sell a wide range of products** from household appliances that are usually upgrades from SHS e.g. TVs and business specific appliances like solar water pumps, millers, etc.
- **In 2019, ~34K appliances were sold;** 95% thereof were TVs for both household & business use.[2] Only ~3% of TVs are typically sold for PUE purposes through PAYG, amounting to ~969 units in 2019[3]

- **High capacity appliances are still nascent but gaining traction;** there is focus on solar water pumps and processing appliances like millers that have a higher business case for customers
- **There is increasing gov't interest** in PUE, particularly solar water pumps; however, regulations for such appliances are still evolving
- **Most of these appliances are still in pilot phase** and targeted towards supporting smallholder farmers

Solar appliance unit sales in Uganda, 2019[2]



The primary barriers limiting scale of productive use include:

- End users, particularly smallholder farmers, have limited affordability and willingness to pay
- Limited access to finance for productive use companies as majority are quite early stage
- Mismatch between products available & customer needs
- Limited consumer awareness on benefits of productive use appliances and quality products on the market

Notes: *Sales volumes cater for units sold only in 2019 **Refrigerator sales unable to be split across household and PUE as appliances were used concurrently for all purposes

Sources: 1. CLASP, The state of the off-grid appliance market, 2019 2. GOGLA, Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, H1 & H2 2019 3. GOGLA, Powering Opportunity in East Africa, 2019

UOMA Uganda Off-Grid Energy Market Accelerator

Industry insights

Due to COVID-19, the sector is experiencing a decline in sales, delays in customer payments and potential shut-down of some businesses

Areas impacted	Current impact
Sales & distribution	• Most operators have experienced a significant decline in sales due to limited movement of technicians and sales agents; distribution at BoP level is more critical now and requires cross-sector response especially for areas like humanitarian settlements which are densely populated, poorly sanitized with low energy access • The upcoming bi-annual USEA sales & impact data report, prepared in collaboration with UOMA, will include more details and insights on the sales decline in the sector • Particularly for mini-grids, developers are unable to proceed with construction or onboard any new connections
Customer payments	• Most operators have experienced delayed payments as it is difficult for customers (across all technologies) to make payments due to the slow down in economic activity & limited financial resources • Economic activity has reduced and hence those with PUE appliances are unable to generate income to pay operators • Most operators, for a period were unable to make collections due to limited movement of staff to client premises
Business operations	• Businesses are hibernating or slowing down operations to reduce costs & maximize margins; liquidity is currently a challenge as operators are unable to make new sales & collect payments • Most companies are holding on to available cashflows to make sales once the situation normalizes; it is also difficult for businesses to receive new stock due to import & in-country constraints • In addition, businesses are struggling to keep their teams afloat and pay salaries, considering declined sales
Sector funding & innovation	• Most funding is being re-directed to relief funds while some investors are skeptical about making new investments and hence are only working with already committed financing or existing portfolios • Mini-grid projects, PUE & SHS distribution pilots have been delayed or put on hold due to movement restrictions; innovation in businesses is limited due to lack of resources to develop new energy approaches

Source: UOMA analysis

To address COVID-19 impact, operators are refining operations to reduce costs, and dev't partners exploring relief funds; however, more efforts still required

Operators

Sales strategies

- Resorting to the use of e-commerce platforms & social media to sell products and engage customers; this means the hardest to reach without digital connection are further away from access

Client repayments

- Operators are cancelling repayments until business activity resumes; others are rolling out payment plans with reasonable grace periods which will delay cashflows
- Some mini-grid operators are providing free energy in the short-term

Internal operations

- Internally, some companies are laying off staff to reduce operational costs while others have teams working remotely/ partially to comply with social distancing requirements
- Some cut back on wages until the situation normalizes to ensure cashflows stay afloat

Dev partners & funders

Funding strategies

- Dev't partners are exploring relief funds to support businesses e.g. the Energy Access Relief Fund launched to support business survival & bridge funding gaps
- However, some investors are skeptical to fund businesses and hence there are fewer funding rounds for new business
- There is increasing need for local currency to address forex volatility and low repayments for working capital

New market focus

- There is increasing interest in new markets that intersect with energy access e.g.
  - Health: powering health centers, life-saving equipment, medication refrigeration e.g. Sendea electrified 35 health stations in rural UG[1]
  - Food security: using PUE to ensure food security for low income hh's
  - Clean water access & education (virtual learning)

Government

Short term initiatives

- GoU is extending periods within which businesses can file tax returns and deferring tax payments
- GoU ensured that contingency plans by financial institutions are put in place to guarantee safety of customers and have intervened in the forex market to smoothen excess volatility arising from the global financial markets

Long term initiatives

- While government is implementing some initiatives, there is need for a coordinated, integrated approach to specifically support energy businesses to minimize impact and longer-term sector risk

Source: UOMA analysis; 1. Sun-Connect news, Sendea electrifies 35 health stations in Uganda, 2020

This section aggregates research & findings from pilots and reports covering UOMA's initiatives across 4 key focus areas

Access to finance

Outline potential interventions to address supply & demand limitations of funding

- Highlight current traction & financing trends in the sector across technologies
- Identify supply & demand barriers, especially those limiting local currency financing & uptake
- Recommend interventions and roles of stakeholders to accelerate financing

Unserved populations

Develop potential solutions to address limited distribution, affordability & awareness

- Assess current & projected unserved populations while highlighting factors limiting distribution, awareness and affordability
- Recommend high-potential consumer financing models for stakeholders and low-cost distribution options to increase access

Enabling environment

Foster a conducive business & regulatory environment to increase participation

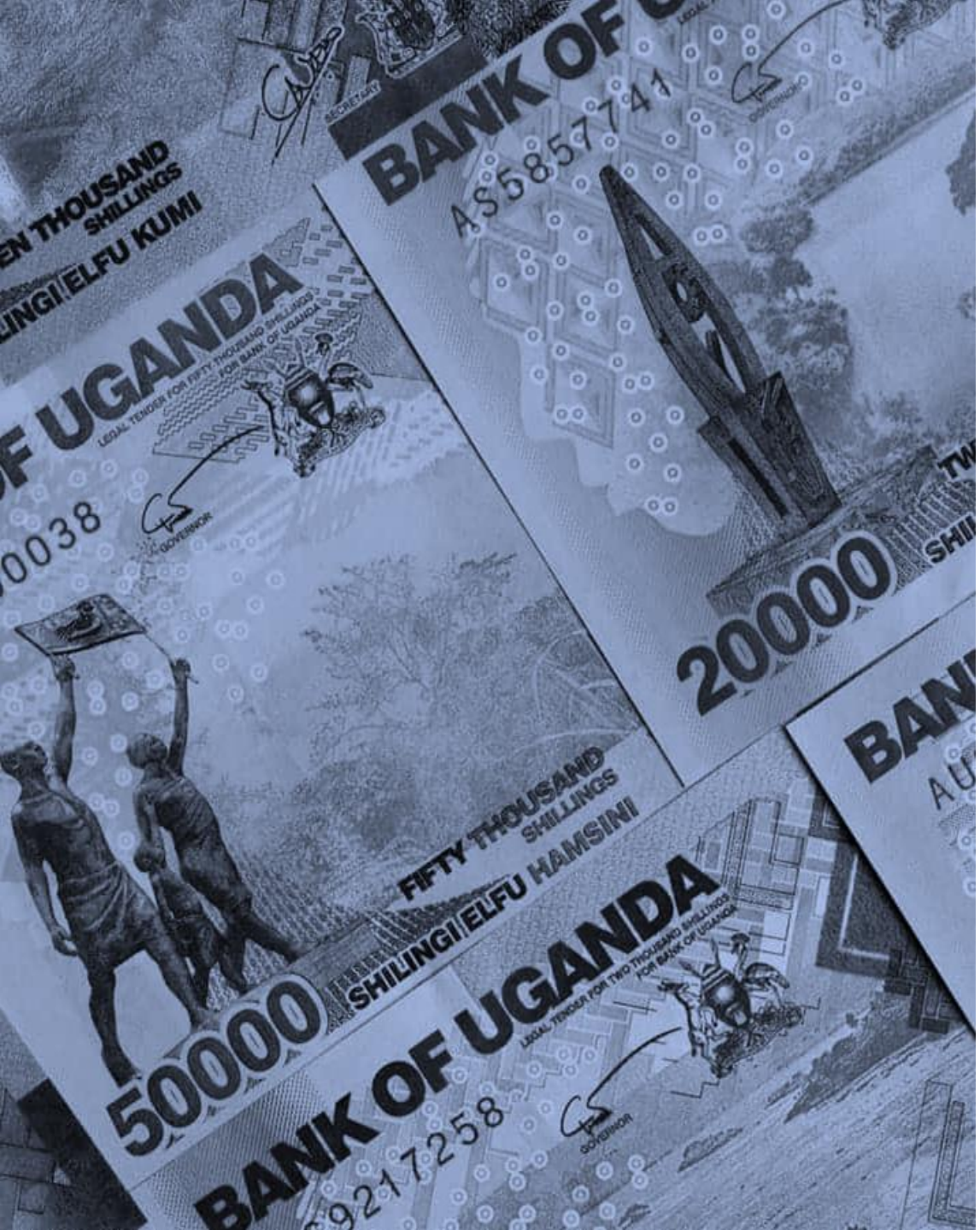
- Assess current tax regime, key policies and standards for operators & sector players
- Identify policy limitations & inconsistencies while highlighting key regulatory changes required to effectively increase & stakeholder participation

Productive use

Highlight high-potential value chains, challenges & solutions to scale use of PUE appliances

- Despite nascency of the sector, assess traction and highlight most viable value chains and appliances
- State value chain specific challenges limiting viability of PUE use cases and outline solutions to achieve economic benefits while growing energy demand

Source: UOMA



Industry insights

Access to finance

UOMA
Uganda Off-Grid Energy Market Accelerator

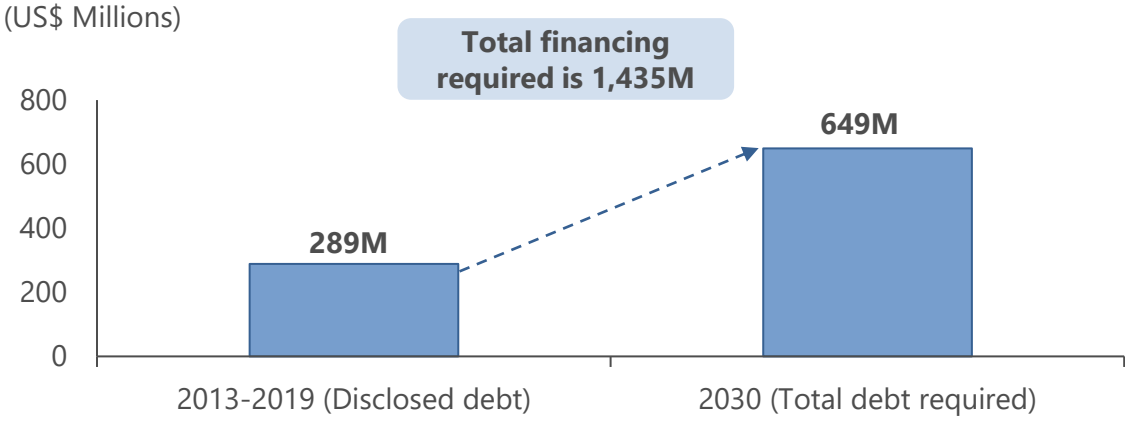
Solar Home Systems: SHS will play a role in achieving universal access in UG; this role will require cumulative investment of around US$1.4Bn by 2030

While debt is becoming popular with ~US$289M raised from known deals, most companies still struggle to raise non-grant capital

- DFIs and impact investors deployed majority of debt across Sub-Sharan Africa between 2013 and 2019; most of this debt was invested in large players like Fenix-US$12M, BBOXX-US$8M, d.light-US$18M and Greenlight Planet-US$5.3M *(list of most recent deals is included in the Appendix)*
- Sector requires more debt deals to support upfront inventory purchases while catering for PAYG working capital constraints, driven by high receivable days[2] e.g. SolarNow obtained a receivables loan from SunFunder in 2019 for working capital[3]
- Despite financing deployed, UG requires a total of US$1.4Bn in capital by 2030;[1] debt is expected to contribute ~45% while equity and grants contribute 40% and 15% respectively
- The graph below shows debt deployed to date and total debt required to achieve 2030 targets; relief funding will be required to cater for COVID-19 effects and hasn't been included below

Debt investment for SHS businesses in Uganda[1]

(US$ Millions)



The SHS landscape has several early and growth stage businesses which require multiple rounds of debt/equity financing for scale; however, limited deals of this nature have been closed

- Majority of local early-stage SHS businesses in Uganda struggle to raise equity/debt necessary to finance purchase of inventory, distribution of products and team operations while providing products on credit. Therefore, businesses utilize their own savings and available grant funding to finance their operations
- More mature businesses, usually those with international presence, have raised some debt but amounts available are not sufficient to meet investment needs; debt received is usually in foreign currency, which exposes businesses to forex losses due to volatility in currency
- Several facilities and risk sharing instruments have been made available by development financiers to unlock local currency lending through commercial banks, however, there has been limited traction of such deals due to both demand and supply side challenges[2]

Sources: 1. SEFALL, Taking the pulse of energy access in Uganda, 2019 2. Shell Foundation, Achieving SDG7: The need to disrupt off-grid electricity financing in Africa, 2018 3. SunFunder, SunFunder arranges a $9M debt financing facility for SolarNow, 2019

Solar Home Systems: Both demand and supply side challenges limit access to capital in the SHS sector; ongoing efforts are focusing on increasing deal flow

Supply-side challenges

- Local financiers are hesitant to invest in operators given uncertainty of business operations; as such, 80% of cumulative debt is from global investors who provide foreign currency
- Investors are more inclined to supporting larger operators that have proven business models and low-risk due to traction as opposed to smaller businesses; 95% of debt in 2019 went to fewer (~11), more mature companies
- Most local banks lack industry-specific evaluation procedures to determine credit worthiness of SHS businesses and hence subject them to stringent financing requirements

Demand-side challenges

- Limited collateral, with many operators focused on distribution and installation; many don't have assets and traction required to help them attain secured loans
- Many operators lack clear growth plans and strategies to attain profitability; many of the smaller local solar distributors in the ecosystem are oriented towards survival as opposed to growth
- Companies lack clear, sustainable and efficient credit management systems to track performance of receivables, making it difficult for funders to offer off-balance sheet finance

Ongoing interventions

- **Tailored support for banks:** USAID through PAUESA provides advisory support to financial institutions to encourage off-grid lending; under CEADIR, UOMA worked with 4 banks to identify potential lending opportunities in the off-grid sector[1]
- **De-risking investment:** UNCDF, UECCC, DCA, and SIDA have guarantees to encourage local currency lending e.g. USAID's $10M guarantee of 50% coverage to 2 local banks in Uganda[1] and SIDA's $10M partnership with Stanbic over 7 years
- **Local currency lending:** Stakeholders encourage local currency debt, e.g., UECCC's working capital facility that has enabled 2-3 deals[2] and UNCDF's 3 local currency loans totaling ~USD 500K[1]; there are also increased syndicated deals facilitated by junior debt positions from DFI-led facilities like CDC and FMO;[1] however, these facilities have had limited impact
- **Tailored support for operators:** Through TA support, industry players help operators refine business models, and streamline systems & processes to obtain investor buy-in; UOMA, PAUSEA, UNCDF, and the EU previously supported Technical Assistance Facility (TAF) for the Sustainable Energy for All (SE4ALL) Initiative[1]
- **Investment information:** Organizations like USEA, UOMA, UNCDF, GIZ EnDev, and PAUESA host workshops to increase business awareness on available financing options, investment processes and criteria

Note: *PAUESA and CEADIR in full are Power Africa Uganda Electricity Supply Accelerator and Climate Economic Analysis for Development, Investment and Resilience, respectively

Source: 1. Shell Foundation, Achieving SDG7: The need to disrupt off-grid electricity financing in Africa, 2018 2. UECCC, The solar working capital facility, 2017 3. GOGLA, Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, H12019 4. UNREEEA "Action areas" Market development & capacity building, 2020

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Solar Home Systems: **Additional efforts required to build local bank lending capacity, tailor de-risking mechanisms to market realities and develop industry KPIs**

Potential interventions (illustrative and not comprehensive)	
Build bank in-house capacity	Provide consistent follow-on training to bank credit teams in order to increase their knowledge of the off-grid sector and address the challenge of high attrition; provide support on due diligence and transaction advisory to banks specifically on evaluating PAYG credit models to align with industry KPIs and realities
Develop industry specific KPIs	Develop standardized performance metrics and benchmarks to guide investors as they compare KPIs to their due diligence needs; the World Bank, GOGLA, and CGAP developed an initial suite of KPIs for the PAYGO sector through their PAYGO Perform project, offering a more structured assessment of portfolio health and SHS operations[1]
Increase use of de-risking mechanisms	Improve management and ongoing technical assistance support provided by existing guarantee facilities, and expand scope of guarantees to include more local financial institutions; ensure that newly established guarantee facilities have flexible structures which are co-developed with local and regional banks to reflect market realities
Provide innovative alternatives	Explore the use of first-loss capital from DFIs, impact investors, and foundations in tiered capital facilities to "crowd-in" local bank investment; pilot facilities and partnerships which enable DFIs to invest local currency debt at smaller ticket sizes and ensure that lines of credit provide local banks with flexible lending criteria that does not limit investment based on business age
Support equity / convertible investors	Support equity investors with pipeline of high-potential businesses within the energy space and conduct due diligence to make the investment process easier; can also support investors with deal structuring and ensure businesses are investment ready with well articulated strategies and growth plans

Due to COVID-19, businesses will require short-term interest-free debt with extended grace periods, support with cash flow management and business model adaptation to survive post COVID challenges

Source: 1. FinDev Gateway, About PAYGo perform, 2020 2. UNCDF, Digital finance for energy access in Uganda, 2020 3. USAID, Accelerating access to local debt finance for solar home system businesses in Uganda, 2019 4. GOGLA, Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, H12019

Mini-grids: Mini-grid development is mostly supported by concessional finance from DFIs & gov't; debt is expected to contribute ~33% of projected capital required

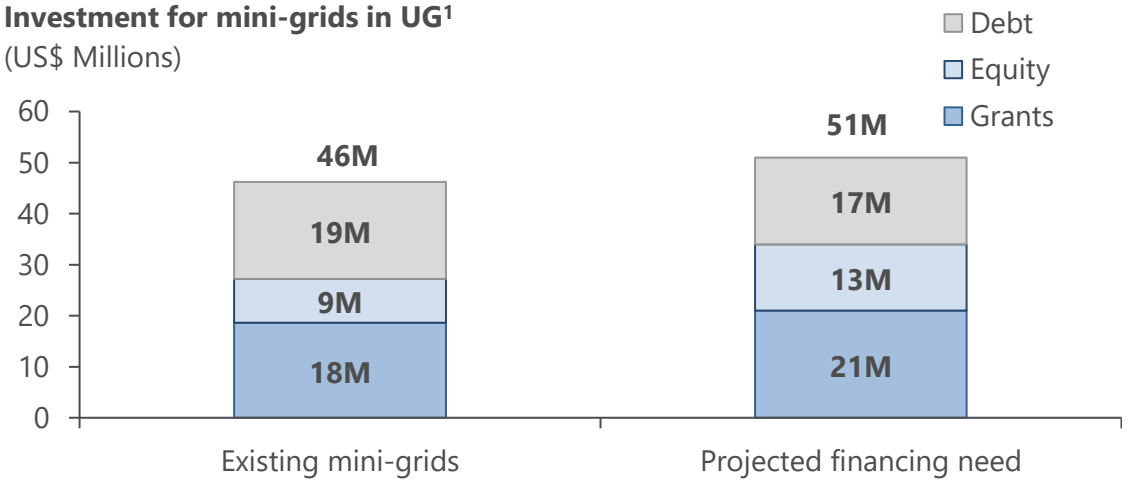
Existing mini-grids in UG have utilized ~US$46M for initial set up; longer term financing required to sustain mini-grid operations

- The overall mini-grid sector in Uganda is early stage and as such developers mostly rely on grants to set up infrastructure and manage operational costs
- ~88% of installed mini-grids utilized grant financing, with a few using debt and equity to co-finance initial stages, supplemented with subsidies from REA to develop local distribution networks[1]
- Funding is primarily required for CAPEX due to high initial setup costs; larger and longer-term funding is required to conserve cash flows, helping to keep operations running and achieve more sustainable growth
- As the market matures, future capital blend will become more reliant on debt from the private sector

- From the graph shown, the projected cumulative financing for MG enterprises is ~$51M with 33% debt, 42% grant and 25% equity; capital blend is based on enterprise maturity[2]

Investment for mini-grids in UG[1]

(US$ Millions)



Government, DFIs, and impact investors mostly support development and distribution of mini-grids

- GIZ EnDev, supported by gov't of Netherlands, Norway, UK, & Sweden provided up to ~US$12M towards development of Bwindi and Suam mini-grids[3]
- 10 upcoming mini-hydro plants obtained a grant of US$14.5M from the Dutch Development Bank through the Orio Infrastructure Fund[4]
- GIZ though KfW committed US$28.5M towards new solar powered mini-grids in 45 sites in Rakai & Isingiro, to be developed in 2019-2020[5]

Despite funding efforts, mini-grids still require sustainable funding structures from dev't partners and the private sector to support scale

- Funding ought to consider number of potential connections and shouldn't exceed level of investment required for viability of future extension; financing should also be allocated to activities that increase energy demand and community awareness

Sources: 1.UOMA research and analysis 2. SEforALL, Taking the pulse of energy access in Uganda, 2019. 3. SEforALL, Market study on available financial instruments in support of GMGs and assessment of GMG developer needs, 2017 4. Michael Wambui, "Western Uganda to Get Ten Mini Hydro Power Stations." Uganda Radio Network (September 13, 2017) 5. Taddeo Bwambale, "Germany to spend sh98b on 40 solar mini-grids in Uganda." (New Vision, November 16, 2018)

Mini-grids: Investors perceive mini-grids as high risk due to uncertain connections and low returns on investment; interventions are ongoing to curb challenges

Challenges

- Very low tariffs that don't motivate commercial investment and can't sustain operations; some low-income households are unable to afford connection and tariffs which result in uncertain cashflows for companies
- Underutilization of grids as most serve households with low energy demand; potential connections are also not guaranteed, and this reduces the chances of recovering initial set up & investment costs within a reasonable period of time
- Limited data on successful mini-grid investments due to uncertain returns; this exacerbates perception of risk for mini-grids and as a result, development is mainly funded by government grants & subsidies
- Lack of standardized metrics, parameters and criteria to assess risk and benefits of mini-grids, as well as the credit worthiness of businesses; this limits financiers from making informed investment decisions
- Operators struggle to articulate accurate financial models and demand projections for their mini-grids in order to obtain investor buy-in and investment

Ongoing interventions

- **Blended capital:** Financiers combine grant funds to support different stages of mini-grid development from feasibility studies to distribution e.g. the Energizing Development (EnDev) program[4]
- **De-risking investments:** Government agencies utilize subsidies to encourage the private sector and local communities to invest in rural electrification projects; e.g. REA, through the REF currently provides subsidies that support developers with a distribution grid network and customer connections. Only 4** of the existing mini-grids have benefited from these subsidies to date[1]
- **Standardized procedures for mini-grid tenders:** The GoU has collaborated with development partners to develop a set of simplified and standardized procedures to encourage private sector to tender mini-grid sites and help operators obtain funding
- **Developer assessment criteria:** GIZ, in partnership with REA, developed criteria to identify the best developer to install mini-grids, increasing confidence in subsidy disbursement during project development & execution based on developer assessment[2]
- **Tailored support for MG developers:** In addition to financing, developers receive TA training to tackle technical challenges e.g., GIZ partnered with Nakawa Vocational Training Institute to train and certify electricians; UOMA also worked to build a financing strategy for mini-grids in Kitobo island[3]

Note: *REF in full is Rural Electrification Fund; **The 4 mini-grids include: Bwindi, Kayanja, RMS-Pico and Eco-Garden plants

EnDev Uganda is an international partnership funded by six donors including BMZ, DGIS, MFA, DFID, SDC and SIDA, and is currently supporting several hydro and pico-hydro mini-grid projects in Uganda

Sources: 1. Fred Tuhairwe (UNREEA), Status And Development Of The Renewable Energy Based Mini-grids In Uganda, 2017 2. Ivan Nygaard et al, Market for the integration of smaller wind turbines in mini-grids in Uganda, 2018 3. GiZ, Pro Mini-Grids – Clean Electricity for Rural Uganda, 2018, 4. DTU Library, Market for the integration of smaller wind turbines in mini-grids in Uganda, 2018

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Mini-grids: Additional support is required to fund economic activity within communities, train financiers, and offer technical assistance to MG operators

Potential interventions (illustrative and not comprehensive)	
Incorporate community engagement	Incorporate community engagement that increases utilization and therefore economic viability of mini-grids. These activities include awareness programs and business training to boost economic activity that will in turn stimulate energy demand
Create innovative finance structures	Provide government backed guarantees to local banks to de-risk mini-grid investment for financiers. Other risk sharing partnerships such as syndicated deals with DFIs taking junior positions can be implemented to encourage more investment and private sector engagement
Explore other subsidy options	Governments can consider implementation of subsidy schemes that are solely focused on providing capital expenditure for mini-grid setup, such as Results-Based Financing (RBF) mechanisms
Offer TA support to developers	Support mini-grid developers with transaction advisory, e.g exploring corporate finance versus the usual project finance to spread risk across all the developer's projects that meet predefined criteria; provide investment readiness support like helping management teams understand investment criteria required by financiers, develop strategies for sustainable growth & scale
Manage FX currency risk	Explore hedging options such as internal hedges by partnering with local companies in a consortium, supporting business ventures that are involved in export to earn hard currency; also encourage local currency lending through financial institutions & local financiers

Note: PUE section is covered independently and includes key challenges & potential interventions around access to finance

Source: UOMA analysis

Industry insights

Unserved populations

UOMA
Uganda Off-Grid Energy Market Accelerator

Solar Home Systems: SHS is expected to play a role in achieving universal energy access by 2030 in UG; this role will connect >5.3M additional households

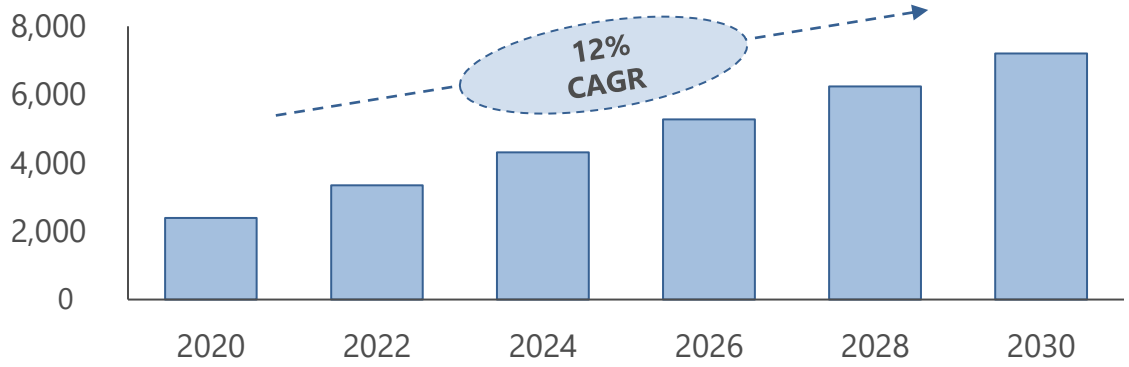
SHS connections need to grow at a 12% CAGR from 2020-2030 in order to achieve universal access

- SHS (Tier 1 or higher) plays a key role in increasing energy access to Ugandans, serving ~3% of households between 2017 and 2019[1]; however, most low-income households remain unserved
- In order to achieve 2030 targets, an additional 5.3M households will require SHS installation;[2] UG will need to connect ~481,000-500,000 new households annually,[1] which is much higher than the current annual household connectivity which is <200,000[2]
- It's critical to note that SHS volumes sold in 2020 could potentially be lower than in recent years due to the COVID-19 pandemic crisis that has stifled economic activity and sales
- Annual sales volumes in subsequent years, post-COVID-19, need to increase significantly to achieve targets

- The graph below shows projected annual household connections with Tier 1 as minimum level of service, with multi-light systems; projections below don't factor in potential COVID-19 impact

Projected cumulative SHS household connections[1,2]

(thousands)



SHS uptake is limited by 3 key aspects in the market that mostly affect low income households

- **Affordability:** Despite lower PAYG transaction rates of US$3 on average, households earning <US$2.6/day and US$1.9/day still struggle to make purchases; with PAYG, the total cost to customers is much higher due to accrued interest and competing priorities[5&6]
- **Distribution:** Distribution to last mile consumers contributes ~20%-30% of operator costs reducing operator interest in these populations; as well, full-service businesses can't set up operations in hard-to-reach areas with low population density[10]
- **Awareness:** Consumers have a limited understanding on solar more broadly, it's uses / benefits, reliable brands and providers that they can engage to purchase systems, as well as standard features of quality systems to reduce purchases of counterfeit products; customers also need information on where to obtain after sales services during the life of the system

Sources: 1. UOMA analysis & consultations 2.SEforALL, Taking the pulse of energy access in Uganda, 2019, 3. GOGLA, Uganda country brief, 2019, 4. USAID, Accelerating access to local debt finance for solar home system businesses in Uganda, 2019, 5. UNCDF, Digital finance for energy access in Uganda, 2020, 6. Jonathan Kamoga, Subsistence farming tops local sources of income, Observer, 2017, 7. World Bank, Energy access scale up project PID, 2019, 8. Paul Tentana, "Uganda government asked to support local solar vendors," EABW News, November 2019, 9. CREEC, 590 Solar products sold in CREEC "Let's Go Solar" campaign, 2019, 10. HYSTRA, "Pricing quality: Cost drivers an value add in the off-grid solar sector", GOGLA & IBAN 2019

Solar Home Systems: **Low SHS uptake is driven by limited affordability and consumer awareness, especially for lower income households**

Challenges

- 70% of SHS providers have centralized distribution channels in major cities, making it expensive to deliver SHS products to last mile consumers and remote areas like refugee settlements[1,2]
- Customers struggle to get financing due to limited collateral and are hesitant to commit to PAYG with high initial down payments and overall costs[4]
- Third party SHS distributors, like retailers, usually charge a markup on products exacerbating the problem that products are unaffordable to last mile consumers[2]
- PAYG rates still expensive for last mile consumers like refugee populations earning <US $2 a day despite the increased frequency and low average transaction rate of ~US$3[4]
- Consumers opt for cheap counterfeit systems whose performance detoriates in a short period of time, making it more expensive in the long run; this distorts demand in the market due to unfavorable customer experiences with solar
- Consumers are unable to access media on where to purchase affordable, quality products, and obtain support for installation & maintenance[4]

Ongoing interventions

- **Decentralized distribution models:** To reduce distribution costs, operators are implementing several types of models:
  - Onboard in-house regional agents to deliver products to last mile consumers, reducing costs of outsourcing delivery agents[1]
  - Partner with 3rd parties like schools & registered retail/SHS distributors; however, retailers charge a mark-up of up to 40% (or 13% for smaller SHS), increasing product prices
  - Establish community hubs as a one-stop shop for SHS products and partner with SACCOs, farmer groups e.g. Solar Today has partnerships with >14 SACCOs for distribution
- **Flexible PAYG and credit terms:** Operators offer frequent, smaller PAYG installments e.g. Fenix reduced daily commitment fee for 10W SHS from US$0.29 (in 18 months) to US$0.27 (in 24 months)[4.]. Commercial banks like Centenary & Post Bank offer consumer loans with flexible collateral & repayment schedules[5, 6]
- **SHS awareness campaigns:** Operators increase awareness though campaigns & marketing, for example the "Let's Go Solar" campaign targeted 259,000 households in Eastern Uganda and players like CREEC use radio talk shows to offer SHS information among rural communities to increase uptake and shift mindsets[7]

Sources: 1. USEA Member profiling survey 2019 2. Paul Tentana "Solar Vendors push for a revolving fund to bring down cost," EABW News, March 2019 3. Kenneth Kazibwe, ".Dealers asked government to step up fight against fake solar equipment," Nilepost, 2019 4. UNCDF, Digital finance for energy access in Uganda, 2020 5. Centenary bank Making change with centenary bank, 2020 6. Post Bank Solar loans, 2020 7. CREEC, 590 Solar products sold in CREEC "Let's Go Solar" campaign, 2019

Solar Home Systems: Dev't partners can support low cost distribution and develop risk sharing models to encourage flexible consumer financing

Potential interventions (illustrative and not comprehensive)	
Provide financing for distribution	Financiers can provide grants and subsidies that support–low cost distribution models in hard-to-reach areas, even for refugee settlements, through RBF and cost subsidies associated with establishment of regional service points; cost subsidies should also cater for market research and feasibility studies conducted to assess the viability of setting up regional stores
Engage MFIs on consumer financing	Dev't partners can incentivize MFIs through risk sharing mechanisms to offer more affordable & flexible consumer loans that will increase affordability of SHS, particularly for low income households; MFIs can also partner with community-based structures like SACCOs and famer groups to offer consumer financing; the MFIs would capitalize SACCOs as a way to help them on-lend
Offer innovative trade finance and de-risk credit	Commercial banks can explore new financial products to support distribution models such as trade finance for importation and project finance for branch set-up, to enable businesses to scale operations to rural areas that are usually hard to reach but have significant potential for uptake of SHS
Incentivize customers to increase uptake	SHS providers can incentivize existing customers that offer recommendations / referrals to other potential customers to increase uptake; this can be done through referral-based incentives like discounts on subsequent purchases & cheaper product upgrades. More SHS suppliers should introduce after sales services and warranties to boost consumer confidence in SHS products
Leverage community-based leaders to create awareness	Operators can train community leaders on benefits of solar and encourage them to make purchases as this would motivate uptake by rest of the communities that usually emulate their leaders; peer-to-peer mobilization is also necessary as individuals are easily convinced by their own neighbors, colleagues, and friends to purchase SHS

Notes: RBF is Results Based Financing

Case study on refugees: SHS distribution to refugees in UG has been limited by several challenges and requires cross sector approach to increase uptake

Challenges

- Limited information exists about the demographics, population, incomes & business activity in camps making it difficult for operators and investors to support scale in the camps
- Refugees are uncertain about resettlement in countries of origin hence don't see the need to invest in energy products; often receive hand-outs & might not adjust to commercial approach
- Operators are not certain about SHS demand in refugee camps in as much as the need is present, as well, camps are located in remote areas making it difficult to distribute products
- Many don't have phone access and can't access mobile banking services to support PAYG models; struggle to register for these services as some companies don't accept refugee IDs
- Due to insufficient documents, operators are unable to obtain historical data on refugees to access their credit worthiness limiting use of the PAYG model to increase access

Potential interventions

- **SHS Operators**
  - Pilot distribution models to refugee camps, since UG has an open market policy that allows free movement of goods
  - Recruit field agents that understand local context of camps & can train refugees on importance of SHS and incentivize sales
  - Set up stock shops near refugee camps to solve logistical challenges
  - Offer wide range of pricing structures and flexible repayment terms to meet differing abilities to pay
- **Humanitarian organizations**
  - Provide financing to operators to de-risk initial credit systems offered to refugees, given the uncertainty around their ability & willingness to pay as well as permanence
  - Provide local context on regulations and ensure alignment with humanitarian mandate
  - Reduce free and low-quality systems offered to refugees as they distort the market and reduce willingness to pay
- **Mobile Network Operators (MNOs)**
  - Directly partner with operators to use mobile services and networks as a mode of payment for solar clients; ensure mobile money access is within close proximity to refugee camps; e.g. have mobile money agents close to the camps

Note: More detailed info by UOMA on energy access case studies on private sector engagement in humanitarian settings, including key insights and learnings to inform future activities can be found here

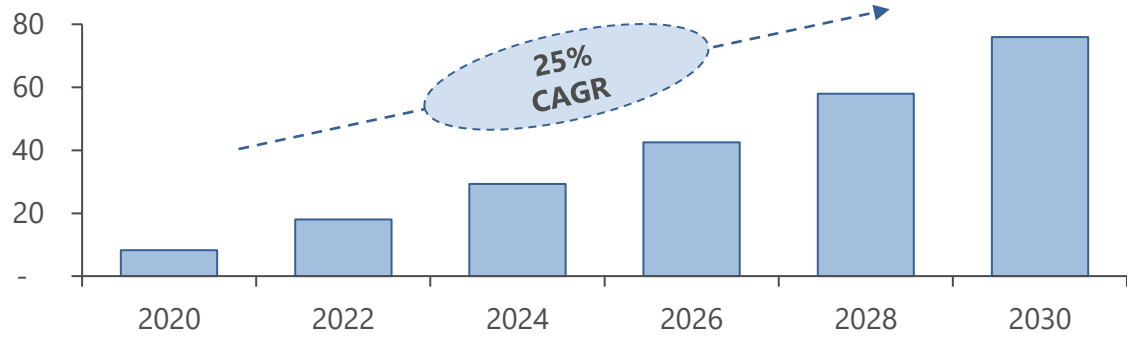
Mini-grids: UG has ~4K households connected to mini-grids and needs to connect an additional 70K to achieve its estimated contribution to universal access by 2030

To meet the 2030 target, REA has mapped out specific sites for mini-grid development that will increase connections

- Current mini-grid access rate in Uganda is 0.04% with ~4K households connected to operational mini-grids; there is potential to expand to 20,000 households once all mini-grids are operational
- REA's Master Plan expects to serve ~70K additional households by 2030, increasing the access rate to 0.5%;[1] to do this, REA has identified 320 sites for development across 10 service territories
- Most of these sites are located in Northern & Southern regions with low electrification rates; sites are primarily approved through tenders and non-solicited bids, targeting villages with 50 or more clustered households or less if the village is near a trading center
- Despite identified sites, there has been slow traction in mini-grid development, driven by unclear regulatory guidelines & processes
- Processes like licensing are lengthy and costly, discouraging private sector participation
- The graph below shows the expected CAGR of 25% in mini-grid connections from 2020-2030 to achieve REA targets

Projected cumulative mini-grid household connections[1,2]

(thousands)



For new mini-grids, developers face difficulties in licensing and identifying / obtaining approval for mini-grid sites

- The GoU is actively identifying suitable sites for tender to private developers; however, licensing processes are lengthy, bureaucratic & can take up to 18 months[2] while technical, quality standards & tariff policies are unclear and can't address affordability challenges[3] *(Policy information largely covered in Enabling Environment section)*

Existing mini-grid operations are not sustainable due to limited consumer affordability and under utilization

- Most of the existing mini-grids don't exceed 200 customers due to high connection fees and monthly tariffs; rates are typically higher or close to national grid tariffs that serve middle and high income earners[5]
- Communities are unaware of existing mini-grids, limiting uptake and use; only ~30% of the installed mini-grid capacity is utilized as most of the connections are households with low energy demand[4]

Notes: 4,000 households served by ~16 operational mini-grids but all 34 have the potential to serve 20,000 households once all operational and commissioned

Sources: 1. SEFORALL, Taking the pulse of energy access in Uganda, 2019 2. OCA research and analysis 3. Uganda Off-Grid Strategy Stand Alone Solar Systems and Mini-Grid 4. UNREEA Mini-grid report 5. Ivan Nygaard et al, Market for the integration of smaller wind turbines in mini-grids in Uganda, 2018

UOMA Uganda Off-Grid Energy Market Accelerator

Mini-grids: Some developers provide business start-up loans and training to increase utilization of mini-grids and increase affordability, despite high tariffs

Challenges

- High connection fees for consumers of US$22-125 and monthly tariffs of US$0.16-0.22; also charge monthly service fees and support services like repairs and maintenance[1]
- Lengthy process in obtaining site approval and licenses to set up mini-grids, as well as high initial capital investment; process delays are driven by limited team capacity in GoU authorities
- High maintenance costs incurred by MG providers, to repair poles & faulty transformers which contribute to high operational costs & slow power generation for consumers
- Some customers travel long distances to pay tariffs at the central mini-grid operating points incurring more expenses due to additional transportation costs
- Low utilization of mini-grids driven by limited involvement in income generating activities like milling or limited access to PUE appliances that can boost energy demand
- Limited skill & expertise available to operate and maintain the mini-grids; good talent often expensive contributing to high operational costs to providers

Ongoing interventions

- **Business start-up loans & training:** Developers like AEA* establish BSLAs** to provide loans to residents to start businesses that will boost energy demand.[2] From the businesses, residents generate income to pay connection fees & tariffs; BSLAs also provide training on business skills, AEA has trained >15 entrepreneurs at Kitobo Solar Plant through these initiatives[3]
- **MG focused working groups among key stakeholders:** UMEME and several power firms are collaborating through the Utilities 2.0 initiative to address constraints such as strict regulations and lack of funds that hinder the development of mini-grids in Uganda[4]
- **Distribution & MG access through business hubs:**
  - Operators create business hubs in the community to increase business access to energy when needed e.g. Pamoja Energy developed an agro-processing hub in Kamwenge district to provide heating services to farmers to sort & dry produce[2]
  - Operators at Kyamagurura set up battery charging outlets utilized by consumers who live far from the grid; customers visit outlets to charge devices like phones[5,6]
- **MG focused awareness campaigns:** Developers like AEA conduct awareness campaigns to educate communities on the use of MGs through PUE[2]; operators also partner with Community Based Organizations (CBOs) & community leaders to communicate benefits of mini-grid connections to the community[6]

Notes: *AEA – Absolute Energy Africa ** BSLAs - Business Savings & Loan Associations

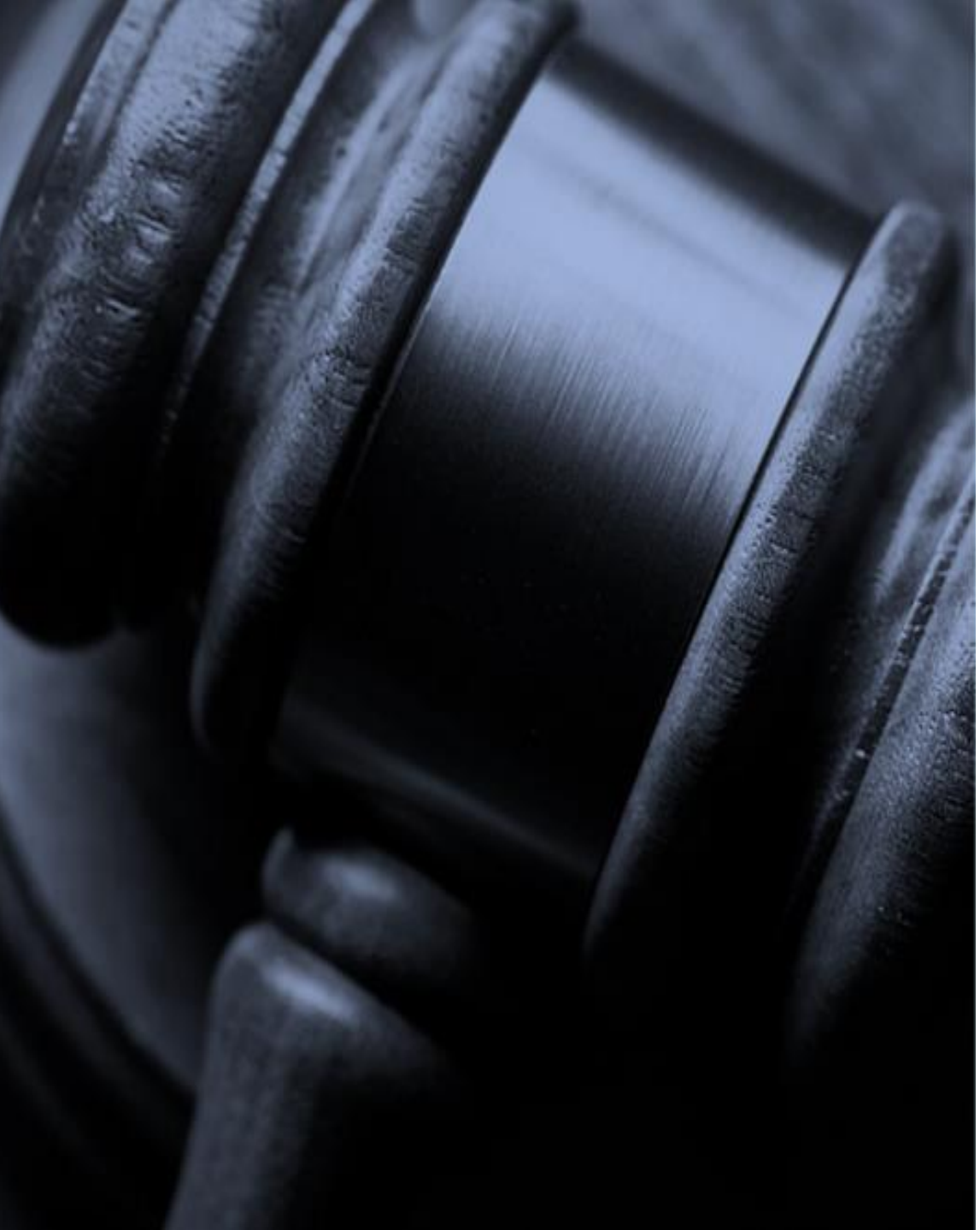
Sources: 1. Fred Tuhairwe (UNREEA), Status and development of the renewable energy based mini-grids in Uganda, 2017 2. EEP, Opportunities and challenges in the mini-grid sector in Africa, 2019 3. Ivan Nygaard et al, Market for the integration of smaller wind turbines in mini-grids in Uganda, 2018 4. Utilities 2.0: Improving Uganda's electricity, Mohammed Bin Rashid Initiative for Global Prosperity, 2020 5. Kyamugarura Solar Mini-Grid Project 6. UOMA research and analysis

UOMA Uganda Off-Grid Energy Market Accelerator

Mini-grids: Interventions should focus on equipping technicians with wiring expertise, adopting new payment technology & providing PUE in product offering

Potential interventions (illustrative and not comprehensive)	
Provide TA support for MG development	Most developers struggle to access talent & support required as they plan to roll out mini-grid projects; as such, they require TA support to conduct sufficient location analysis and feasibility studies for their mini-grids. In addition, they also need support assessing business case of the grid and understanding how they can create / find demand to make it economically viable
Provide subsidies to MG developers	The government can incentivize developers by providing subsidies to cater for some of their operational costs; this will encourage operators to set more affordable and sustainable tariff rates for low income customers. Subsidies will also encourage increased participation of private developers, to install mini-grids in low income areas
Build technical expertise	GoU & dev't partners can support development of new curriculum focused on training technicians to increase personnel that will support new mini-grids; technical teams require maintenance & wiring training to reduce faulty mini-grid connections that then reduce operational costs and increase customer satisfaction as power cuts will decrease
Use smart meters for payment collection	In addition to utilizing mobile money payments, developers/operators can adopt smart meters for tariff collection to ensure that customers can conveniently pay for energy usage without travelling long distances; operators can also install prepaid meters for consumers to reduce default rates and delayed payments, making their operations more sustainable
Promote PUE appliances for businesses	In addition to mini-grid installations, operators can provide productive use appliances as part of their business offering or partner with businesses that provide either PUE appliances or asset financing to consumers to increase energy demand; appliances can be purchased on credit as most businesses cannot afford to pay entire price in addition to monthly tariffs

Source: UOMA analysis



Industry insights

Enabling environment

Uganda Off-Grid Energy Market Accelerator

Solar Home Systems: **Policies on taxes and quality standards have largest impact on scale; inconsistent application across the different components for SHS**

The several taxes imposed on SHS components affect the overall product price and increase operator costs

- Each SHS component is subject to different tax rate combinations; the main taxes imposed on SHS components are Import Duties (ID), Value Added Tax (VAT), Withholding Tax (WHT) and Industrial Levy (ILV)
- Currently, solar panels and systems of 11-50 Wp are only subject to 6% WHT; imposing VAT, ID and ILV could increase the average product price by 31%[1]
- While inverters are ID & ILV exempt, LED bulbs & charge controllers are subject to varying ID rates and a standard ILV tax of 1.5%; all are subject to standard VAT and WTH, increasing cost of products[2]
- Import duties on batteries are imposed at 35% in line with the EAC common external tariff amendments of 2018[2, 3]
- Policy environment needs to be revised in order to reduce distribution costs & facilitate consumer financing; the table below shows a summary of current tax categories levied on key SHS components

SHS components	ID	VAT	WHT	ILV
Solar panels	0%	0%	6%	0%
Inverters	0%	18%	6%	0%
Solar LEDs	25%	18%	6%	1.5%
Charge control units	10%	18%	6%	1.5%
Batteries	35%	0%	6%	0%

Implementation of tax regime is inconsistent due to unclear product categories and limited operator knowledge:

- Current tax regime only allows for tax exemptions on solar generation components like solar panels; transmission components like inverters are subject to most taxes, however, this is **inconsistently applied** at customs
- As the SHS market continues to evolve, tax structure for new technologies needs to be considered and operators also require resources to make tax information & updates available

Existing quality standards do not cater for all product categories and are limited by ineffective implementation

- Despite existing polices on quality, some product categories like plug & play systems are not catered for and implementing teams lack the necessary expertise & understanding to apply these standards

Sources: 1. USEA, USEA handbook on solar taxation , UNCDF, 2019, 2. UNBS, UNBS Standards act, 2018, 3. EAC, Common external tariff handbook, 2017, 4. URA, URA Tax law amendments - budget breakfast, 2017, 5. REA, Rural electrification strategy and plan 2013-2022, 2013, 6. UECCC, Increase access to solar electricity through a working capital facility for solar companies, 2018

UMA Uganda Off-Grid Energy Market Accelerator

Solar Home Systems: Policy environment is limited by inconsistent application of taxes & exemptions and insufficient expertise to conduct quality tests

Challenges

- Lack of sufficient testing technology and equipment high purchasing costs of solar testing equipment for UNBS[1]
- Current tax policy does not cater for varying revenue classes across different regions in the country; households in some areas are not benefiting from existing subsidies[4]
- Limited skilled labor and technology to conduct timely thorough product checks and obtain accurate quality results that leads to delays in product delivery
- Inconsistent tax exemptions across SHS components like LED lights do not have tax exemptions (for import duty), affecting the overall costs of SHS[2]
- Existing product categories don't include many new products & combinations (like plug & play systems)[2] leading to inconsistent SHS tax implementation
- Difficulty in differentiating legitimate operators from businesses that are not entirely focused on solar development that utilize exemptions to evade taxes

Ongoing interventions

- **Tax exemptions and reduction for SHS components:** USEA is currently lobbying for tax exemptions on some SHS components; as well, reduction of the mobile money levy from 1% to 0.5% to increase affordability for PAYG customers[3&8]
- **Stringent quality standards & improved testing:**
  - UNBS has policies and procedures to ensure quality products are distributed; with the help of a donation from DFID, UNBS acquired solar battery & panel testing equipment to improve quality checks[1]
  - REA & World Bank supported the acquisition of testing equipment and set up a testing facility; World Bank is currently developing a framework to guide the application of quality standards for component-based systems
- **Awareness & training for quality teams & tax implementors:**
  - UNBS holds annual training workshops to ensure quality assurance teams stay up to date with policies;[4] one of URA's core objectives in its corporate plan is to hold comprehensive training & capacity building to enhance staff efficiency
  - UNBS ensures that distributors access information on quality compliance like where & how to get systems verified;[2] URA uses tax education initiatives like tax clinics to increase awareness of policies & promote compliance[11]

Sources: 1. UNBS, UNBS gets new battery and solar panel testing equipment, 2019 2. USEA, USEA handbook on solar taxation , UNCDF, 2019, 3. Ministry of Energy, Clarification on the social media information regarding solar power installations, 2019 .4. UOMA, Fiscal policy analysis: An assessment of the tax and subsidy options to accelerate solar home systems in Uganda, 2018

UOMA Uganda Off-Grid Energy Market Accelerator

Solar Home Systems: Interventions should build capacity of gov't agencies; UBOS can leverage 3rd party quality testing and URA can recruit & train customs personnel

Potential interventions (illustrative and not comprehensive)

Consider other tax incentives	Government can consider more direct interventions for companies selling component-based systems and productive use technology such as corporate tax holidays and incentives for market entry; can also explore incentives through implementation measures such as zero rating, reductions in withholding tax, and other taxes related to business operations
Create tax awareness through training	Government can leverage partnerships with USEA to hold trainings on exemptions and taxes across all products; this will increase tax awareness & compliance; USEA can continue to leverage tax experts to train SHS operators on implications of current tax regime and misallocated taxes
Strengthen capacity of the authority	Strengthen the capacity of regulatory bodies to lay the groundwork for more effective enforcement in future. This will involve investment in more customs personnel and technology to help with screening, and training of customs officials
Leverage 3rd party testing & ensure quality	Regulators can explore the use of alternate verification systems such as the Pre-export Verification of Conformity (PVoC). The PVoC system uses third party verification to minimize the entry of sub-standard solar components/products as verification is done at the country of origin; once found, action should be taken against counterfeits to encourage quality products

Source: UOMA analysis

Mini-grids: MG development is limited by delays in site approval and licensing, as well as unclear policies on tariffs and standards

Developers struggle to obtain approval of grid sites and licenses for mini-grid development due to the unclear regulatory framework

- Current licensing severely limits MG development taking >18 months at a cost of ~US $6,500 which is expensive for developers[1].
- Regulatory framework lacks transparency & clarity on licensing, quality & tariffs; ~60% of existing mini-grids don't have necessary permits due to lengthy processes[1]
- However, mini-grids of <2MW can get a license exemption at a fee of US $3,500 but the process could last for 6 months due to limited staff capacity at ERA;[2] only 9 mini-grids have been granted this license to-date[3]
- The GoU plays a key role in identifying suitable sites for mini-grids and integrating licensing and subsidization into the tender process[2]

- Development of MGs on gov't identified sites takes less time as surveys and feasibility studies are led by the gov't.[3] Insights from consultations suggest the timelines below:

		Period	Cost (USD)
1	Developer notifies ERA* to get a permit to find sites & conduct feasibility	~90+ days	3,000
2	NEMA** and DWRM*** assess & approve social & environmental impact	~30 days	
3	Developers submit licensing application to ERA and await approval^	~225 days	3,500

Despite existing policies, mini-grid guidelines are still unclear as most of GoU efforts were directed towards main grid extensions

- Mini-grids of >2MW that have a license exemption are required to comply with technical standards under the Electricity Order 2007 No. 39 and must offer annual updates on compliance to ERA; however, details of standards are not included in the regulation which affects consumer protection[4]
- Restrictions on mini-grid tariffs don't exist but each developer is required to submit a proposed tariff to ERA for approval.[2] However, NARUC (National Association of Regulatory Utility Commissioners) hired by USAID, has been developing regulations for isolated grid systems with ERA. This will refine the licensing and tariff setting when eventually passed; preliminary discussions indicate that tariffs will still be set at max 40 cents, which developers still call out as insufficient to meet sustainability needs[1,2]

Note: *ERA - Electricity Regulatory Authority; *** REA – Rural Electrification Agency; ** NEMA – National Environment Management Authority; *** DWRM - Directorate of Water Resource Management; ^ This stage involves advertising, holding a public hearing and detailed assessment of tariff proposal

Sources: 1. Fred Tuhairwe, Status and development of the renewable energy based mini-grids in Uganda 2. Ivan Nygaard et al, Market for the integration of smaller wind turbines in mini-grids in Uganda, 2018 3. UOMA research and analysis 4. SEforALL Africa Hub & African Development Bank, Mini-Grid Market Opportunity Assessment: Uganda, 2018

UOMA Uganda Off-Grid Energy Market Accelerator

Mini-grids: REA's new off-grid strategy provides certainty for developers on appropriate tariffs, main grid arrival processes & technical standards

Challenges

- Lack of clear order of approvals for identified sites as well as poor coordination among different authorities which delays the processes across all stages[1]
- Lack of clarity regarding the process and the length of time required before licensing certificates are issued; process is usually delayed
- Limited stakeholder participation in planning & implementation of projects and advocating for mini-grid policies which slows down development of required policies[2]
- Developers are uncertain on whose rights would continue after on grid connection and they are not compensated; as such, mini-grid developers typically target islands to mitigate risk[3]
- Difficulty in obtaining a license exemption due to the lengthy process and unclear guidelines which discourage developers and potential investors[1]
- Limited data on renewable energy sources, local demand and grid extension for existing projects, hindering identification of appropriate sites for development[2]

Ongoing interventions

- **Off-grid strategy that caters for MG:** USAID supported REA through NRECA International to develop an off-grid electrification strategy (incl. of mini-grids) which presents a comprehensive legal, regulatory and commercial framework that will address tariffs, subsidies, grid arrival, technical standards & consumer protection[3]
- **Development of data collecting tools:** GIZ in partnership with REA developed electrification planning tools that REA utilizes to identify and select priority areas for MG expansion projects; this tool has identified >300 villages in Uganda's South Service territory and 25 villages in Northern Uganda for future projects[4]
- **Capacity building and training of stakeholders:** Development partners such as GIZ organize activities like workshops to engage stakeholders to share information about key policy interventions required for Uganda[3]
- **Creation of license exemptions:** GIZ designed clear license exemption guidelines through the Pro Mini-Grids Project eligible for mini-grids with >2MW capacity; successful developers are issued an exemption certificate. The exemption period is not predetermined, and applicants can specify preferred period which is approved or adjusted by ERA[5]

Sources: 1. Fred Tuhairwe, Status and development of the renewable energy based mini-grids in Uganda 2. SEforALL Africa Hub & African Development Bank, Mini-Grid Market Opportunity Assessment: Uganda, 2018 3. UOMA research and analysis 4. GiZ, Pro Mini-Grids – Clean Electricity for Rural Uganda, 2018 5. Ivan Nygaard et al, Market for the integration of smaller wind turbines in mini-grids in Uganda, 2018 ,

UOMA Uganda Off-Grid Energy Market Accelerator

Mini-grids: Sector still requires refined licensing procedures that are tailored to the project size and a clear plan for main grid arrivals

Potential interventions (illustrative and not comprehensive)	
Design technical and quality standards	Regulatory bodies like REA and ERA can design technical standards for mini-grid installations with reference to established grid codes and safety standards; standards can focus on providing specifications on which equipment to utilize during project development such as poles, cables, ready boards, etc. USAID is supporting ERA through NARUC on this to ensure consumer protection through the provision of high-quality and standardized electricity supply
Reduce licensing procedures	The government regulatory bodies can design registration and licensing processes tailored to the project size as opposed to the detailed procedures undergone by all mini-grid developers despite the project size; this will avoid long and tedious processes mainly for the small mini-grid installations
Set key financial parameters	The regulatory bodies can collaborate with developers to set key financial parameters such as payback periods and maximum target internal rate of return to enable developers assess the financial risk[1]; this will enable developers set cost reflective tariffs to ensure commercial viability as well as set targets to be achieved during the concession validity period prior to grid arrival
Develop a clear plan for grid arrival	The regulatory bodies can design a clear grid development plan that mini-grid developers can utilize to assess the risk of grid arrival prior to recovery of the investment; this will help mini-grid developers and the responsible government agencies agree on compensation methodologies prior to undertaking the development of the mini-grids

Source: 1. Fred Tuhairwe, Status and development of the renewable energy based mini-grids in Uganda

Industry insights

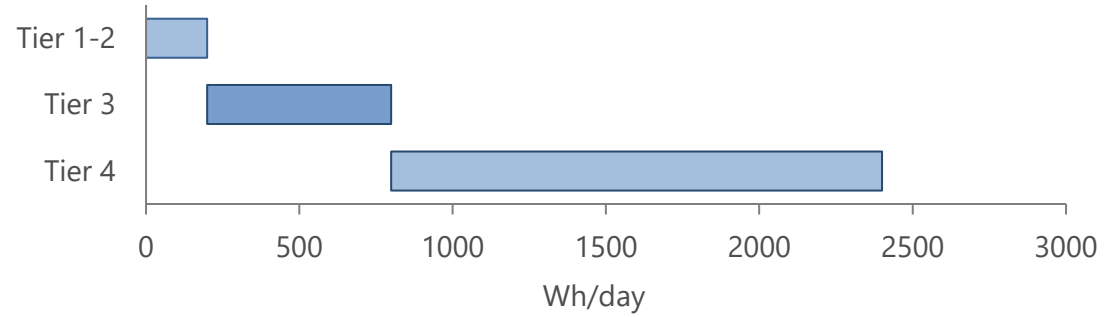
Productive Use

Uganda Off-Grid Energy Market Accelerator

Productive Use: **Appliances span across 5 energy tiers with tier 3 having the highest impact potential across the agricultural value chains in Uganda**

Impact data shows that SHS allow for PUE appliances that are classified as Tier 1-2 based on low energy consumption; tier 3 is usually used by SMEs while tier 4&5 require large power draws for commercial / industrial use

PUE energy service tiers

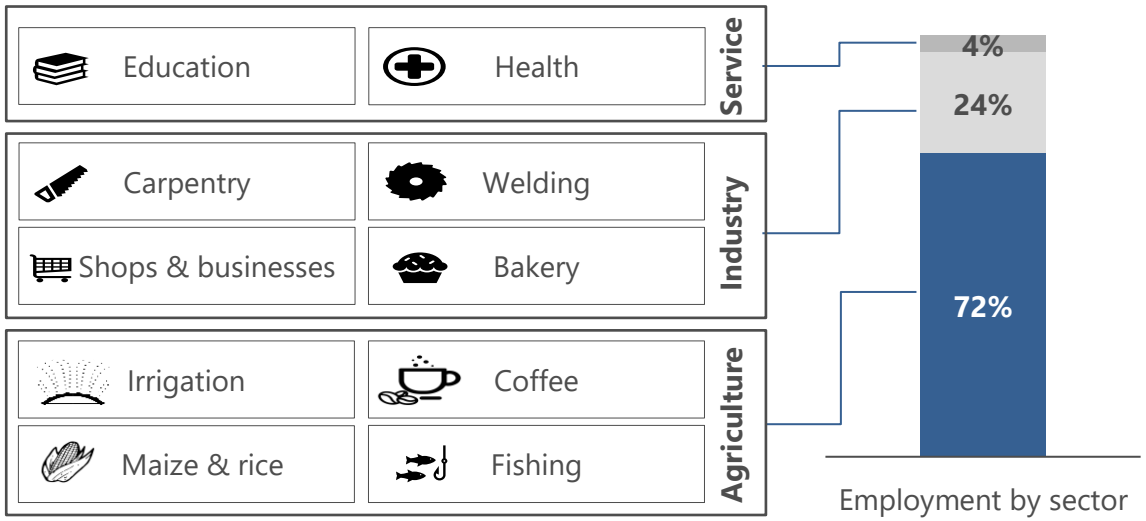


Based on energy consumption, PUE application & appliances vary across tiers *(This report will focus on tier 3)*

PUE application	PUE technologies
Tier 1-2: Lighting, charging and powering appliances in local shops	**Tier 1-2:** Lighting charging and powering appliances in local shops
Tier 3: Irrigation, agro processing ,cold chain, & refrigeration in crop farming, dairy and fishing value chains, refrigeration in retail shops	**Tier 3:** Solar water pumps, solar mills, solar oil press/ pulpers, solar refrigeration / cold units
Tier 4: Powering off-grid telecom towers, industrial plants and large business units	**Tier 4:** Tailored solar PV systems and mini-grids

- Based on potential application and technologies tier 3 appliances present higher impact potential on energy demand stimulation compared to Tier 1 lighting applications that consume low energy
- Tier 3 appliances are more business oriented and can supporting the generation of income for agricultural labour force through water pumps, mills, etc.
- 72% of Uganda's labour force is employed in the agricultural sector, presenting significant opportunities for value addition through PUE; these appliances are expected to increase household incomes by 30%

As shown below, tier 3 appliances will have most impact on agricultural value chains that employ majority of Uganda's population



Source: UOMA analysis

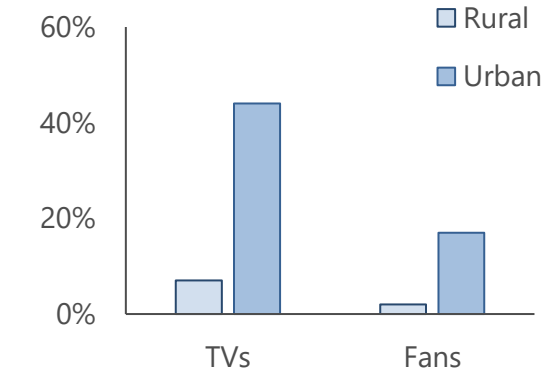
Productive Use: Despite potential, PUE still nascent with evident penetration of tier 1 appliances that receive most funding; more investment required to scale tier 3

Tier 1 appliances have largest market penetration and take up most financing deployed in this sector

- Despite potential of tier 3, there is frequent use and focus on scaling tier 1 appliances that are bundled with SHS products, especially in urban areas; investment in the sector is largely in form of grants as PUE is still nascent
- Few small-scale use cases in agriculture are gaining traction and obtaining investment e.g. SolarNow received US$9M in equity from Novastar & Shell as well as, US$740K in grant from Mastercard Foundation to design and appliances mainly for farmers, schools, businesses, etc.[2&3]
- Grant funding is mainly predominant, e.g. in 2019; USAID's Power Africa provided US$465K in total to 3 PUE providers and Aptech received US$250K to scale PUE

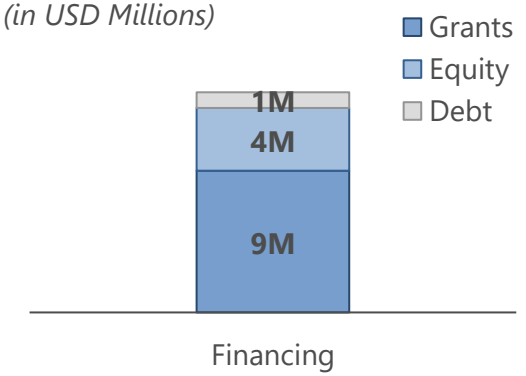
- The graphs below show the market penetration of some tier 1 appliances as well as the financing attributed to scale of PUE

% market penetration of tier 1 appliances (2012-2018)[1]



PUE investment (2017-2019, not exhaustive)[4]

(in USD Millions)



PUE sector has majorly received grant funding since businesses are still early in pilot stage and require concessionary finance to prove their models

- Despite funding available, PUE sector still needs increased participation from financiers in offering diverse range of instruments like debt and equity to support scale of these appliances
- Access to funding is limited by the lack of traction and proven business models, as well as low economic justification for some of the PUE products; this also limits impact investors that would have ideally supported these businesses
- Operators also need additional funding to cater for distribution costs associated with transporting bulk appliances to hard-to-reach areas with infrastructural challenges

Sources: 1. Dalberg advisors & CLASP; The State of the off-grid appliance market, 2019 2. SolarNow 3. Weetracker, 3 African start-ups receive grants from Mastercard Foundation, 2018 4. UOMA analysis

Productive Use: Solar powered mills, refrigerators and water pumps are beginning to gain traction but are limited by product specific challenges

From our pilots, we found that solar powered mills, refrigerators and water pumps are beginning to obtain traction; however these have specific challenges that still need to be addressed

Solar water pumps

- Absence of water sources for some smallholder farmers and hence need to dedicate resources to developing resources like boreholes which increases upfront costs
- Due to upfront costs, smallholder farmers are unable to afford pumps; even with PAYG, the initial deposit is higher than that for solar lighting products, limiting purchase
- Farmers and potential customers have not yet seen the benefits of irrigation in the long-run and hence hesitant to invest high initial capital without returns
- Sales agents don't always have agricultural expertise, making it difficult to train consumers; some leave farmers poorly trained & unable to optimize the appliance

Solar refrigerators

- Limited affordability and willingness to pay due to high initial upfront costs of purchase; appliances are perceived as a luxury for middle income households
- Cheaper alternatives exist like boiling milk to keep it from spoilage and use of smoking or drying to store fish; these present substitutes for solar refrigerators
- Product & market mismatch as consumers expect certain product design that operators need to cater for as they refine their products
- Products are also bulky to transport especially to hard to reach areas with poor infrastructure; this discourages sale of these appliances due to difficulty in transportation

Solar powered mills

- Solar mills have very high initial costs that don't economically justify the purchase for the end user; costs include the mill, panels and batteries
- Batteries and panels cost twice as much as the mill itself and hence mills are only justified when operating at full capacity which is not realistic for these communities
- Solar powered mills have lower capacity, producing ~300kg/day compared to diesel mills whose output is 1,000 kg/day, increasing sales
- Mills don't have specifications that most customers require e.g. hullers that are required to process very fine flour preferred by customers which increases sales

Sources: UOMA analysis

Productive Use: To address existing challenges, operators are exploring various distribution channels and financing to increase uptake

	Ongoing interventions
Distribution through CBOs and agents	• PUE providers have established distribution networks to target consumers e.g. Aptech Africa has established distribution partnerships with CBOs like cooperatives & local farmer groups to distribute PUE appliances, helping reduce distribution costs • Aptech is also selling to distributors who purchase many systems to on-sell to consumers; some operators also have a large network of retail stores distributed around the country
Consumer financing through PAYG and local banks	• To address affordability challenges, some PUE operators are experimenting with flexible payment plans that spread out clients' payments over 1-2 years, into seasonal or monthly payments that better match farmers' income and expenditure patterns • Financial institutions such as Centenary Bank, FINCA are also providing solar loans to enable consumers acquire systems for their businesses[5]
Technical and business training for consumers	• Private operators combine sales with technical training and farm designs to ensure proper utilization of appliances in order to optimize use for increased output and sales • Business owners also receive training from operators on how to manage own internal operations that affect the businesses for example, cashflow management and data tracking to increase efficiency
Challenge funds & initiatives	• Dev't partners and international organizations provide incentives and result-based financing to drive PUE operators to innovative business models in early stage product markets e.g. CLASP offers result-based financing incentives that enable providers procure PUE appliances at lower costs as compared to the market[4] • UNCDF offered ~$3.7M grants to >7 companies through its Clean Start Programme to de-risk their PAYGO models for PUE
CBO financing to de-risk investment	• Organisations like EnVenture finance community-based organisations at rates below the market so that these CBOs can become distributors of appliances[1] • Utilizing CBOs as distributors de-risks the investment and attracts sales as customers trust products sold by well known community organisations[1]

Sources: UOMA analysis

Productive Use: However, government and development partners still need to play key role in bearing awareness costs and offering R&D support

	Potential interventions (illustrative and not comprehensive)
Subsidize costs associated with awareness	• Government and development partners can support the creation of demo sites that will provide consumer education on the benefits of agricultural PUE applications and efficient operation & maintenance of the systems to increase uptake • The demo sites will also reduce the burden for PUE companies to incur awareness costs and encourage market growth
Manage R&D and demand mapping	• In order to reduce operator costs, development partners can also support R&D as well as demand mapping for productive use products to improve business models and support those with limited resources to target areas with highest demand • Improved product design can increase product performance and reduce product related costs associated with frequent customization to suit the market
Standardize quality guidelines & offer tax waivers	• Government can create standardized certification for quality products and regulate the sector to avoid the sale of low-quality equipment that negatively impacts end consumer perception and trust in the sector • Government needs to develop clear tax & policy guidelines for PUE as these appliances are expected to play a key role in driving food security during the COVID-19 era; also necessary to offer tax waivers that reduce upfront costs to operators
Integrate R&D learnings	• Development partners can support PUE operators conduct feasibility studies within different communities to inform product adjustments • This ensures that customer needs are met while reducing costs associated with multiple changes in product design that the PUE providers cannot incur in their early development stages
Train distributors & shoulder other service costs	• Dev't partners can train sales agents to ensure that they have some knowledge about agriculture before they can train consumers; this will reduce confusion about how to use some of the products and reduce costs for PUE providers • Dev't partners can also consider shouldering installation costs to reduce initial cost to customers as this has been a key limitation to uptake

Sources: UOMA analysis

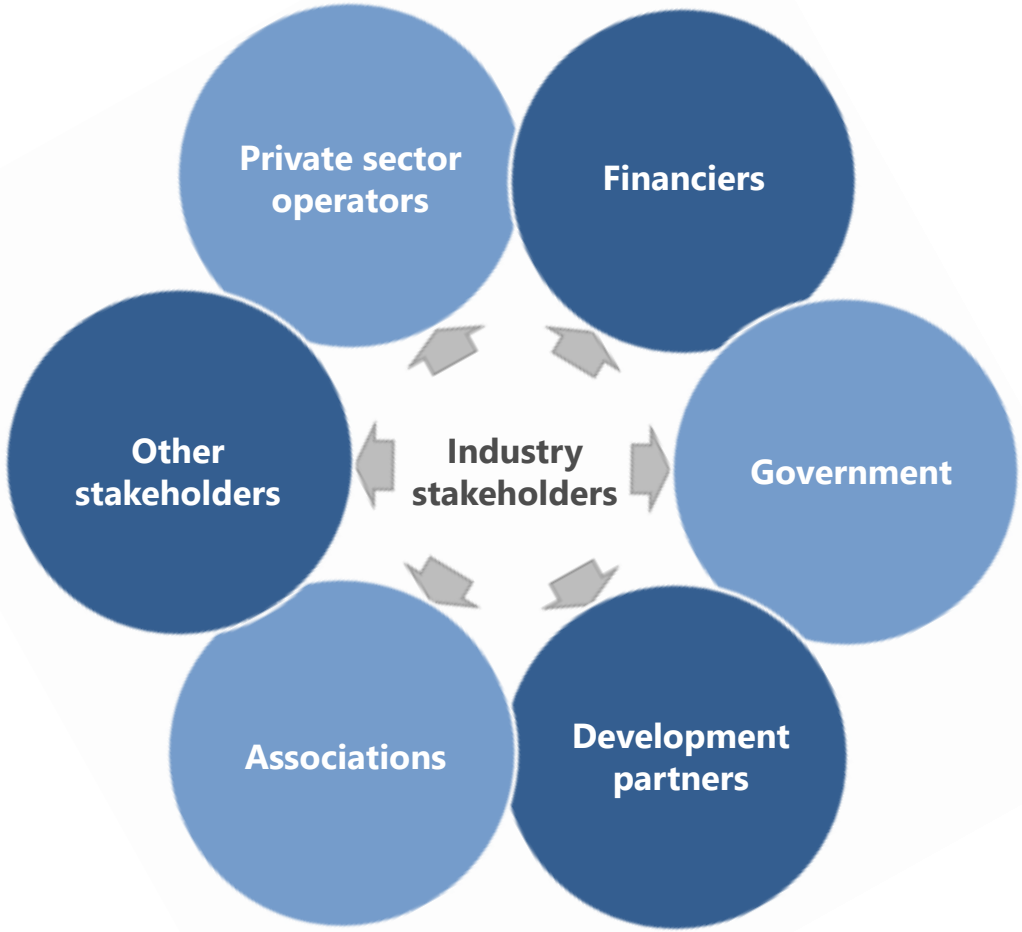
Industry stakeholders

Stakeholder landscape consists of 6 categories; private sector, financiers, development partners, government, associations & other stakeholders

Private sector operators comprise of Solar Home System, Mini-grid & Productive Use providers in the market

Other stakeholders consist of global & regional organizations that support private sector with data, market linkages, etc.

Associations are organizations that represent private sector players like operators and advocate for favorable policies and conditions to accelerate energy



Financiers consist of DFIs, PE funds, and investors that develop financing facilities to meet capital needs of energy players

Government consists of bodies that have the mandate to regulate distribution & generation of energy, as well as players within the sector

Development partners consist of international independent agencies backed by gov't to fund and support initiatives in both public & private sectors

Private Sector: The majority of Solar Home System operators are locally owned and involved in installation & distribution of products

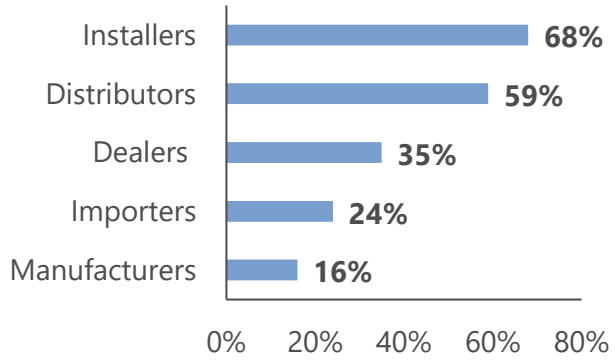
To date, Uganda has >300 solar companies, majority of which sell SHS for both domestic and commercial use. Most of these companies are locally owned, based in Central region[2], and majorly play the role of distribution & installation across the value chain as shown below

% of SHS operators in UG who are GOGLA affiliates:

60%
Of Solar Home Systems (>11 Wp) operators

45%
Of portable lanterns & multi light systems (<11 Wp)

The majority of USEA members are installers & distributors*



- Of SHS operators in Uganda, 60% are GOGLA affiliates that provide >11 Wp systems and 45% are affiliates that sell portable lanterns & systems of <11 Wp [3]
- From USEA's sample of SHS players in the UG market, only 32% provide PAYG indicating that operators prefer to remain as over the-counter businesses; PAYG however, contributes 65% of SHS sales[1]
- Stakeholders and financiers need to focus on investing in particular areas of the value chain like distribution to support scale for most operators

- Few local SHS operators are involved in manufacturing of these systems and from USEA's sample, only 16% taking part in this aspect of the value chain; most import components and products from China that are relatively affordable[3]
- SHS operators like M-KOPA and Fenix are working towards improving their product offering to stay relevant and competitive in the market e.g. some have extended PAYG terms and added PUE appliances as part of their suite of products e.g. TV's, clippers, etc.
- From a sample of 70 operators, ~85% had headquarters in Kampala, ~60% had operations in Central UG only;[2] companies like M-KOPA use sales agents to distribute products to other regions and partner with retailers to reach last mile consumers

Key insights

- **Market hasn't experienced major shifts**; interest has increased from local & small operators, but yet to see much traction from that segment
- **Largest operators are regional based like** Fenix International, the largest operator in UG, is working across ~10 countries in Africa and has sold systems to 600K households, through a network of 2,250 sales agents.[4] Others like MKOPA, GLP, Azuri run operations in UG although at a much smaller scale than other SSA countries.

Notes: *Percentages in the graph go over 100% as most companies overlap across business model types

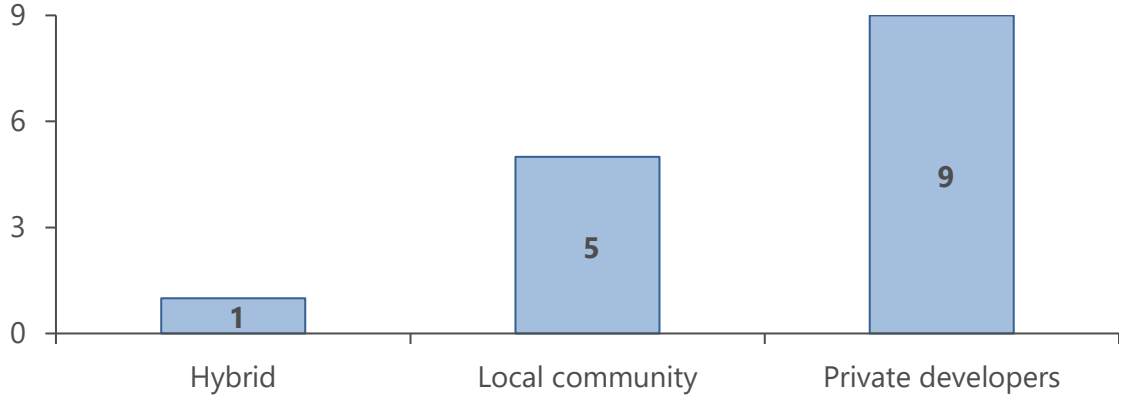
Source: 1. USEA 2019 Member profiling survey 2. UOMA Analysis 3. ENCLUDE, Market assessment of modern off grid lighting systems in Uganda, 2014 4. Fenix Int'l, Fenix Impact, 2020, 5. SolarNow, About SolarNow, 2020, GOGLA, Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, H12019

UOMA Uganda Off-Grid Energy Market Accelerator

Private Sector: Private sector developers own and install 60% of existing mini-grids in Uganda; CBOs and NGOs can provide oversight of day-to-day operations

Mini-grids in Uganda can be managed by the community, private operators or a mix of both; however, the majority have been developed and managed by private-sector developers. The number of private developers could rise given increased funding and clear sector policies

# of mini-grids by ownership in UG to-date[1]



- Private developers in UG are a mix of solar operators, investment companies, and research institutions e.g. CREEC* and AEA;** landscape is fragmented with no dominant player yet but some have key success factors like Pan-African traction, strong local presence and active R&D
- Developers typically own the mini-grid equipment and are responsible for construction costs; in some cases, GoU (REA) funds the distribution structure of the mini-grid; also work with NGOs and CBOs who provide day-to-day operational support
- Most mini-grid players are testing out anchor client models with some utilizing innovative models like containerized power units
- Most private developers work with GoU and partners (e.g. GIZ and USAID) to streamline mini-grid policies and regulations associated with tendering & site identification[2]
- Developers such as AEA offer business training to local SMEs to encourage expansion of businesses and increase utilization of energy installed; as well, some developers like Kirchner Solar train local specialists maintain the mini-grids[2]
- AEA also partners with CBOs for operational support which includes responding to customer queries; [2] operators also work with community leaders to create awareness and increase uptake[3]

Key insights

- **Mandulis Energy is developing an 8MW biomass** gasification plant with support from ACTED & USAID's Power Africa to convert agricultural residue into electricity for microgrids in Northern UG; [4,5] plan to have a similar project in Kiryandongo[3]
- **Companies like Winch & WeLight won GIZ tender;** for most tenders, companies with more traction form a consortium with local players who will play a more community engagement role
- **Under Utilities 2.0 initiative, UMEME is partnering with Equatorial Power** to design an optimal mix of technologies[6]

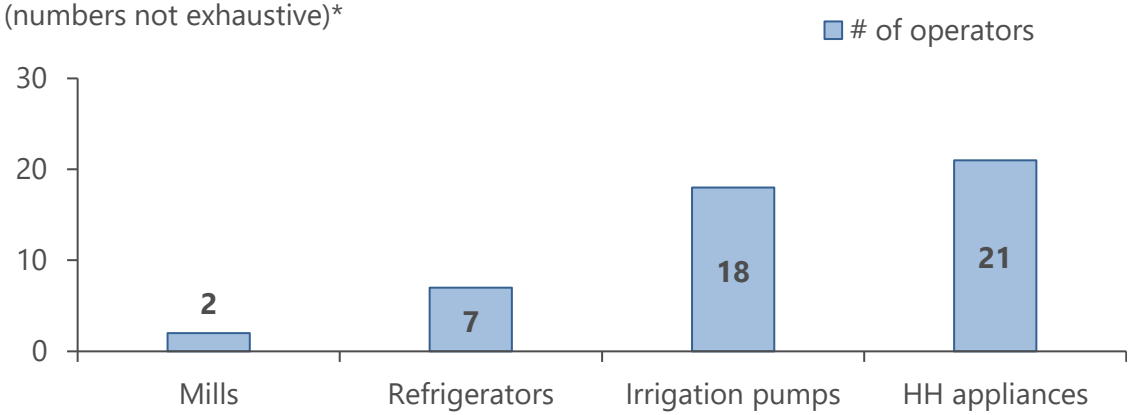
Notes: *CREEC - Centre for Research in Energy and Energy Conservation; **AEA - Absolute Energy Africa

Source: 1. Fred Tuhairwe, Status and Development of the renewable energy based mini-grids in Uganda, 2017 2. Ivan Nygaard et al, Market for the integration of smaller wind turbines in mini-grids in Uganda, 2018 3. OCA research and analysis 4. ACTED and TOTAL visit new operating site for delivering renewable energy to rural homes, ACTED. 5. REPARLE, Mandulis Energy 6. Powerforall, Utilities 2.0

Private Sector: SHS companies providing PUE appliances focus on household applications while established global manufacturers focus on large-scale appliances

The PUE sector is nascent with few players, but several players are emerging, and these include global manufacturers, SHS operators, distributor companies, specialized PUE companies and, mini-grid operators; as seen below, most operators provide household appliances

# of operators that offer various PUE appliances in Uganda
(numbers not exhaustive)*



- From the graph and sample,, most PUE providers sale household appliances & very few are involved in providing mills & refrigerators

PUE has a wide range of providers that can be categorized as follows:

- **Established global companies** like Lorentz, dominate the PUE market ad provide large appliances like solar water pumps; these companies initially sold large scale systems but are now shifting to small scale appliances tailored for the UG market
- **SHS operators** like M-KOPA, incorporate PUE through sale of TVs, while larger operators like Azuri provide solar water pumps
- **Established distributors like Aptech and Adritex** distribute small-scale appliances from global manufacturers; specialized PUE companies like Chloride & Exide Uganda limited and W.Water Works are also operating in the market
- **Specialized PUE companies** like Futurepump (distributing through SolarNow in Uganda), focus entirely on small-scale PUE technologies
- In addition to the 4 categories, mini-grid operators like GRS Commodities are extending services to include PUE appliances such as refrigerators
- SHS companies also provide PAYG and other credit mechanisms e.g. SolarNow also gives PAYG & asset financing credit from MFI's
- Uganda doesn't have any vertically integrated PUE operators

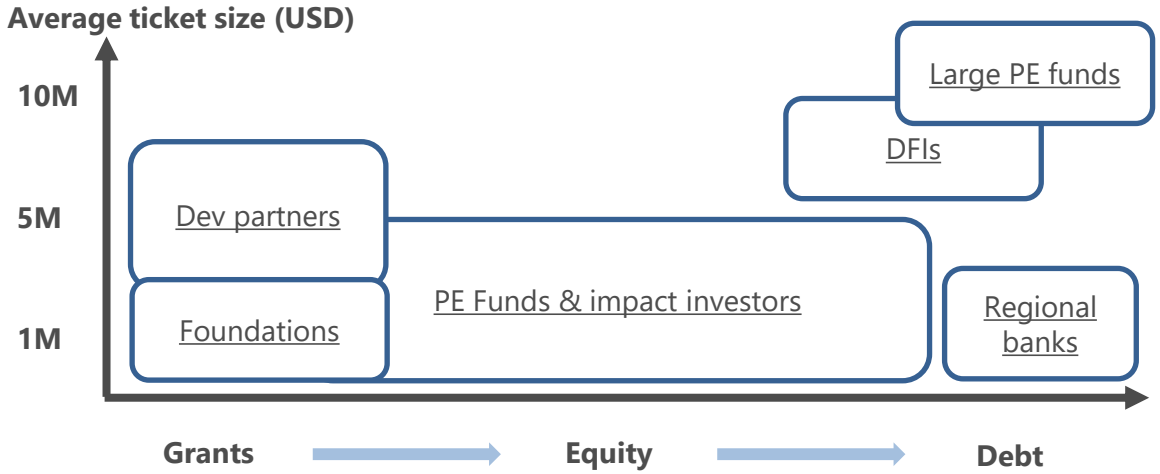
Key insights

- **There has been increased interest in UG** as players from across EA are entering the market, especially given the focus on solar irrigation e.g. Simusolar in Tanzania has now set up operations in Uganda
- **Aptech Africa, one of UG's renewable energy and water pump specialists** that has completed some large solar-powered water pump projects serving communities of >20K.[1] Aptech has distribution partnerships with global players e.g. Lorentz & Grundfos; also conduct B2B sales to distributors[1]

Notes: * Sample size (n) = 37; majority of the operators are members of USEA
Source: 1. UOMA research and analysis

Financiers: The energy sector is mainly composed of international investors offering grant, equity & debt financing of varying ticket sizes

The current financing landscape has several types of funders offering different kinds of capital in varying ticket sizes. We have categorized financier types, their ticket sizes & financing instruments as shown below



- Dev't partners & foundations typically provide grants as low as $1M to >$5M; smaller PE Funds & impact investors usually provide equity investments of ~$3M on average
- Debt investments of >$5M are usually made by DFIs and larger PE funds that focus on larger capital amounts in foreign currency; regional banks offer commercial debt of <$5M, local currency debt from banks still not prevalent
- International investors account for ~88% of total debt invested between 2013 & 2019 exposing local businesses to high FX risks[1]

- Financiers use several forms of financing like unsecured & secured loans from local commercial banks like Centenary, off-balance sheet and results-based financing from facilities in the landscape like SunFunder.; as well, new strategic equity investments from large international companies like Engie, looking for access to the market[1]
- Most of the strategic equity investments involve global conglomerates that invest regional companies and utilize their locally based teams & tailored business models to reach larger numbers of unserved e.g. ENGIE & Marubeni acquisitions
- Financiers like development partners provide grants towards distribution of solar systems to hard to reach areas like refugee settlements; also hold grant challenges that focus on supporting distribution and product development

Key insights

- **SunFunder, has facilitated investments of up to US $135M** to solar businesses across SSA; most recent deals in Uganda include a US $9M receivables debt funding facility to SolarNow, raising their total investment in SolarNow to $19M[2&3]
- **ENGIE fully acquired Fenix International** and will leverage already established local presence and expertise of the SHS company; Fenix will have wider access to debt, long term investments and supply chain expertise through the multinational company[4]

Source: 1. USAID, Accelerating access to local debt finance for solar home system businesses in Uganda, 2019 2. SunFunder, SunFunder Impact, 2020 3.SunFunder, SunFunder arranges $9M debt funding facility for SolarNow, 2019 4. Julia Pyper & Emma Foehringer Merchant, Engie's Fenix acquisition gives a major boost to energy access efforts, 2017

Gov't: Ministry of Energy & other gov't agencies are dedicated to advancing access to energy through regulatory & policy amendments, and implementation

The Ministry of Energy & Mineral Development oversees energy developments in UG; through the National Planning Authority (NPA), gov't develops strategic plans to facilitate distribution of affordable & quality technology. We have highlighted additional roles of key bodies below

Core ministry

MINISTRY OF ENERGY & MINERAL DEVELOPMENT UGANDA

Planning body

NATIONAL PLANNING AUTHORITY – PLANNING FOR DEVELOPMENT

Implementing bodies

RURAL ELECTRIFICATION AGENCY

UECCC – UGANDA ENERGY CREDIT CAPITALIZATION COMPANY – Credit Support for Renewable Energy

URA – Uganda Revenue Authority – DEVELOPING UGANDA TOGETHER

UNBS

- **REA** develops and implements strategies to introduce modern and safer energy sources in rural areas by identifying the appropriate energy service and technology for a given community
- **URA** is responsible for implementing subsides which increase product affordability e.g. tax subsidies on SHS components
- **UNBS** establishes and implements stringent standards requirements to ensure only quality products reach consumers
- **UECCC** works with different financiers to facilitate consumer and supplier financing through affordable credit[4]

- Government parastatals and bodies are playing a big role in driving the focus towards energy development and policy implementation; e.g. REA developed the rural electrification strategy and plan 2013-2022 with a goal to achieve 26% energy access in rural areas by 2022[3]
- NPA developed NDP II and the Energy Development Plan, which includes financing site procurement for mini-grid development and solar product quality control procedures[5&6]
- GoU increased the percentage of funding allocated to energy development from 9.4% in 2018/19 FY to 10.4% in 2019/20 FY[2]
- Critical to note that gov't focus and related stakeholders might shift in the next months with upcoming presidential elections in 2021

Key insights

- **In 2019, Ministry of Energy and Mineral Development developed a new energy policy** which is currently being reviewed by Parliament before approval; the new policy caters for off-grid energy development strategies across Uganda
- **National planning Authority started developing the 3rd National Development Plan in 2019**, which is under review; will focus on off-grid to achieve ~51% access across UG by 2030
- Other upcoming regulations include **Isolated Grid Systems Regulations** and the **National Electrification Strategy**

Source: UOMA interviews & consultations, 2.MoFPED, National budget framework paper FY 2019/20 - FY 2023/24, 2019 3. REA, Rural ElectrificationStrategy and Plan 2013-2022, 2013, 4. UECCC, Increase access to solar electricity through a working capital facility for solar companies, 2018,, 5. MoEMD, Energy sector development plan, 2015, 6. NPA Implementation strategy for the second national development plan 2015/16 - 2019/20, 2015 7. UNBS, UNBS gets new battery and solar panel testing equipment, 2019

Dev partners: In addition to funding, dev partners catalyze innovation and address barriers limiting off-grid energy acceleration through distribution programs

Development partners are majorly international organizations that finance and facilitate energy distribution programs e.g. USAID, World Bank, European Union, GIZ, DFID, etc.; several development partners have shown a lot of interest in the Uganda's energy landscape and as shown below, most have global operations

>17
Development partners in Uganda involved in the off-grid energy sector

>90%
Based globally with very few based in the region or country

- Dev't partners have partnerships with government & private sector organizations to implement energy distribution programs e.g. USAID's 18-month program to de-risk PAYG distribution in refugee settlements, implemented by GPTech[7]
- Programs are designed to facilitate energy distribution through providing finance and technical assistance to industry players
- Dev't partners offer different kinds of financing, depending on the nature of the program; recent funding rounds have more debt than equity & grants, attributable to the growth of the sector

- Funding and technical assistance provided by dev partners is focused on supporting energy distribution to unserved areas
- For example, DFID is one of the dev't partners greatly involved in distribution of SHS in Uganda through programs like ACE* which provides technical assistance to improve the enabling environment, finances distribution programs and tests approaches to stimulate sector investment[2]
- The Embassy Netherlands also facilitates the development of PUE through projects like TIDE*, which finances solar technology acquisitions to improve the productivity of dairy farms[3]
- USAID supports enabling environment developments by funding projects like the development USEA's solar taxation handbook[4]

Key insights

- **USAID finances energy distribution projects targeted towards refugee settlements;** in 2019 grants of up to $465K were awarded to three companies; Fenix International, Bright Life & SolarNow, to extend SHS distribution to Rwamwanja & Kiryandongo refugee settlements.[5] From this, ~4K products were sold with 22% of customers being refugees
- **GIZ is leading mini-grid development** through pro-mini-grids in Northern UG and pro-mini-grids for rural development, implemented in partnership with the MEMD, REA and ERA[6]

Notes: *ACE and TIDE in full are Africa Clean Energy program and The Inclusive Dairy Enterprise project, respectively

Sources: UOMA interviews & consultations, 2. UKAID, Africa Clean Energy Programme (ACE), 2019 3. SNV TIDE Annual report 2017, 2017, 4. USEA, USEA handbook on solar taxation , UNCDF, 2019 5. U.S. Embassy, Power Africa announces grant winners to improve energy access in Ugandan refugee settlements, 2019, 6. GIZ, Pro mini-grids - Clean electricity for rural Uganda , 2018 7. Energy4Impact Energy 4 Impact programs , 2020

Associations: Associations represent private sector interests at government level, advocate for policy reforms, and encourage industry coordination and networking

Industry-specific organizations and other trade both support private off-grid energy companies. The main associations are NGOs that support renewable energy, however other trade bodies are increasingly supporting solar energy companies.

>200
associations exist in Uganda[1]

Examples include UMA and USSIA; these generally support businesses in all sectors

6
focus on Renewable Energy companies

These are under the umbrella body of UNREEA and they include USEA, BEETA, HPAU, EEAU, UNBA and WPAU

1
is dedicated towards solar energy companies

USEA is the only association entirely dedicated to support solar operators in UG

- Majority of associations focus on strengthening partnerships among sector players & driving sector-specific growth through advocacy, networking and capacity building support to businesses
- The associations under UNREEA are dedicated to supporting specific RE technologies such as solar, wind, biogas & hydropower; most solar companies are members of at least 2 of these associations
- USEA is still the only association dedicated to solar companies in UG to date; the association is currently comprised of >142 members[2]
- Majority of SHS operators are part USEA to benefit from networking opportunities and be a part of solving sector challenges; USEA membership grew by 38 members in 2 years[2]
- Associations also lobby for policy reforms for solar products; e.g. in 2019, USEA submitted a report to the MOFPED* to facilitate the dev't of a fair tax treatment and exemptions on solar products[2]
- Associations offer targeted training opportunities and knowledge sharing activities to solar energy businesses e.g. USEA has trained >30 members on various business management skills[2]
- They also organize networking events for companies to showcase their solutions e.g in 2018, USEA hosted an off-grid solar exhibition bringing together > 40 companies to showcase their technologies[3]

Key insights

- **USEA has achieved significant traction to date**, for example, in March 2019, USEA launched a web portal to facilitate effective access to communication among members[4]
- Successfully lobbied for the reinstatement of tax exemptions on deep cycle batteries and advocated for the reduction of excise duty on mobile money transactions from 1% to 0.5%, limited to withdrawal
- Partnered with USAID's Power Africa to support awareness and promotion campaigns; > 60K people were reached[2]

Notes: * Ministry of Finance, Planning and Economic Development

Source: 1. Private Sector Foundation Uganda 2. USEA, Annual Report 2018/2019 3. New Vision, "USEA hosts off-grid solar exhibition in Kampala," (New Vision, February 6, 2018) 4. Paul Ampurire, Solar energy association launches web portal to ease communication, access to information, 2019

UMA Uganda Off-Grid Energy Market Accelerator

Others: Research institutions, consultants, and global & regional networks support policy development, strategy, & innovation in the sector

Several other global & regional stakeholders have extended their activities to support players in the off-grid energy solar sector in Uganda, categories are shown below:

Research institutions

Consultants

Global & regional networks

- These stakeholders run support programs in Uganda that help facilitate sustainable off grid by addressing a broad range of market barriers and policy challenges
- Most of their work actively revolves around research and information dissemination in the market
- Some build partnerships with development partners and government agencies to support and fund nascent technologies like mini-grid development in unserved areas e.g. CREEC and RAN

- Research institutions typically focus on conducting research, assessing market data, and distilling insights such as key drivers contributing to sales and challenges hindering uptake
- Consultants also conduct research coupled while also directly supporting operators with key business support areas including access to finance, growth strategy, and new product piloting
- Global and regional networks like GOGLA aim to address global/ country level coordination; hold and support regular conferences that bring together stakeholders to share learnings, challenges and brainstorm on a way forward for the sector

Key insights

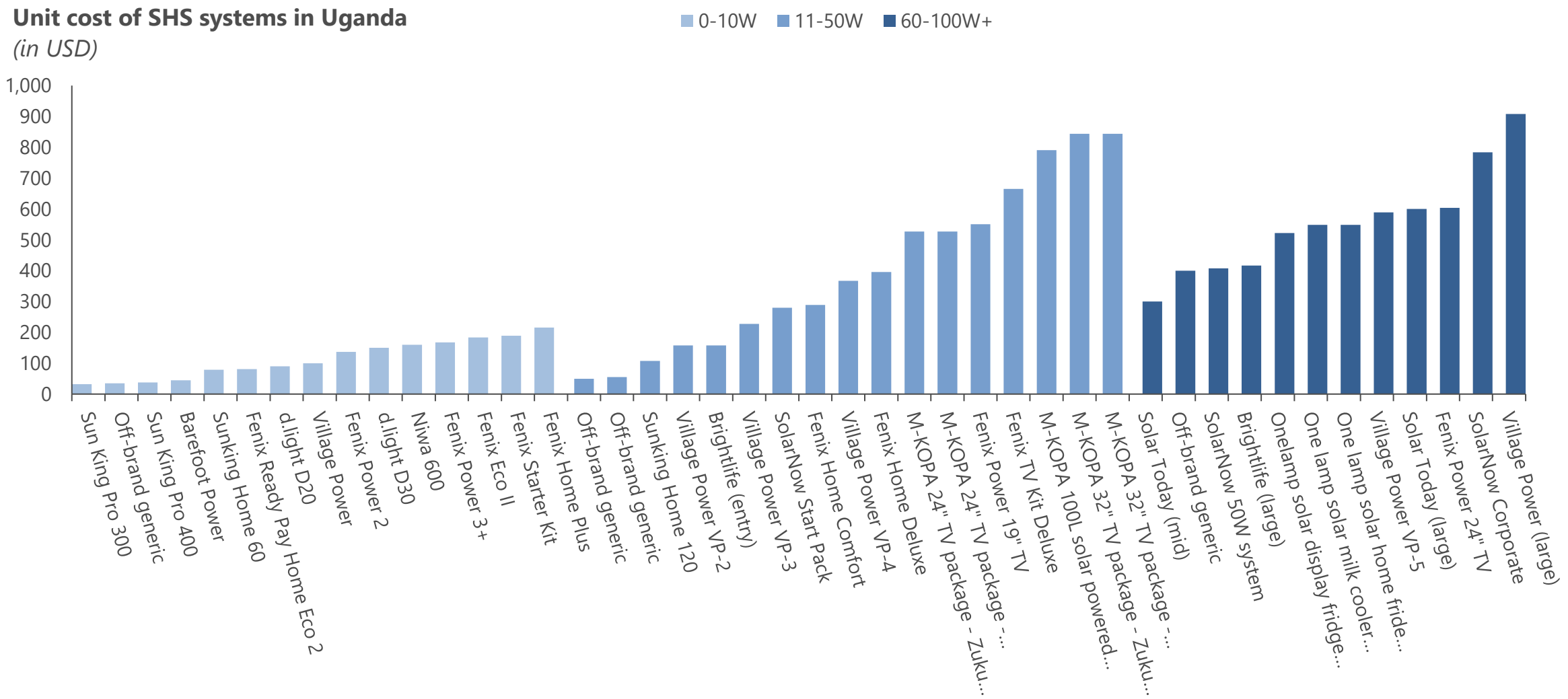
- **The Center for Research in Energy and Energy Conservation (CREEC)** has established a solar PV testing laboratory to test the performance of a variety of solar PV equipment which helps inform operators on the quality of the products sold[1]
- **The Resilient Africa Network (RAN)** has partnered with the Eastern African Resilience Innovation Lab to fund projects that can develop & scale innovative technologies that tackle climate change; one of the technologies funded to-date is a solar dryer that farmers can utilize to dry their produce at a low costs[2]

Notes: List of stakeholders provided is not exhaustive

Sources: 1. CREEC, Solar PV Laboratory 2. RAN, Rapid Solar Dryer

Appendices

SHS supplier landscape has a wide range of prices varying across different sizes of the systems



Notes: UOMA analysis

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (1/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Fenix International	Fenix International is distributor, installer, consumer financier and after sales service provider of solar home and lighting systems since 2009	Residential, commercial and institutional products, serves clients like health centres)	Kampala	89	> 220,000 SHS units
SolarNow	SolarNow is a manufacture, distributor, installer, consumer financier and after sales service provider of solar products like SHS, panels, lights, etc., since 2011	Residential & commercial products, served small businesses and institutions like hospitals	Kampala	45	>50,000 clients served
Kambasco Technologies	Kambasco Technologies is a distributor and consumer financiers of solar powered products and systems such as home lighting systems and water pumps since 2015	Residential and commercial products	Kampala	41	>500 SHS units
BrightLife Uganda	BrightLife Uganda is a social enterprise that distributes, installs, finances and offers after sale services on solar lanterns, solar home lighting systems since 2015	Residential product; mainly serves BoP consumers	Kampala	28	>15,000 SHS units
M-KOPA	M-KOPA is a manufacturer, distributor, installer, consumer financier and after sales service provider of solar products like SHS and fridges, since 2012	Residential and commercial products, serves small businesses	Kampala	21	>50,000 households

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (2/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Solantis Solar	Solantis solar is a manufacturer, distributor, installer, and consumer financier of solar products like SHS and lanterns, since 2016	Residential products	Kampala	9	>6,000 SHS
Davis & Shirtliff	Davis & Shirtliff is distributor, installer and after sales services provider of water solutions and solar products since 1996; the company offers solar products such as batteries, SHS and refrigerators	Residential, commercial and institutional products	Kampala	7	Data not available
Greenlight Planet Uganda (GLP)	GLP is a social business that designs, distributes and finances solar powered products such as lamps and solar home systems since 2009. GLP also offers consumer after sales services to its customers	Residential and commercial products	Kampala	6	>8.5M units sold worldwide
Solar Today	Solar Today is s distributor and installer of solar products like SHS and water heaters, since 2010	Residential and institutional products, serves hospitals	Mbarara	5	Data not available
Adritex (U) Limited	Adritex is a water solutions company that distributes, installs and provides after sales services for water equipment and solar such products as water pumps and water heaters since 2014	Residential, commercial & institutional products; partners with the gov't to develop large-scale irrigation projects	Kampala	4	>15,000 SHS units

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (3/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Anuel Energy	Anuel Energy is a distributor and installer of plug and play solar home systems since 2015. The company also offers consumer financing and after sales services to their customers	Targets mainly to domestic households but also provides for commercial and institutional products	Kampala	4	Data not available
Power Trust	Davis & Shirtliff is distributor, installer and after sales services provider of water solutions and solar products since 1996; the company offers solar products such as batteries, SHS and refrigerators	Residential, commercial and institutional products	Kampala	4	4 installation projects for hospitals, refugees
Village Energy	Village Energy is a distributor installer, consumer financier and after sales service provider of solar products like SHS, water pumps, water heaters and lights, since 2009	Products serve refugee camps, institutions like schools and commercial clients like SMEs	Kampala	4	>200 PUE tech installations
AB Matra (U) Limited	AB Matra is distributor and installer of solar powered products such as inverters, panels, home systems, lanterns and water heaters	Residential, commercial and institutional products, serve schools	Kampala	2	Data not available
ADH Group	ADH Group is a distributor of solar powered products such as refrigerators, panels, and batteries at both retail and wholesale since 2013	Residential and commercial products	Kampala	2	>6,000 SHS

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (4/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Assen Ventures	Assen Ventures is a distributor, installer and after sales services provider on both electrical and solar powered products such as water pumps, water heaters and irrigation systems since 2008	Residential, commercial products, products can also serve and institutional clients	Kampala	2	Data not available
Battery Plus Ltd	Battery Plus Ltd is a distributor and installer automotive batteries and solar products such as batteries, inverters and water heating systems since 1996	Residential and institutional products	Kampala	2	Data not available
D.Light	D.Light is a distributor, installer, consumer financier and aftersales services provider of solar lighting systems and solar appliances like fans and TVSs since 2017	Residential and commercial products, serves small businesses	Kampala	2	Data not available
Kirchner Solar	Kirchner Solar is a distributor an installer of solar powered products like SHS, water heaters, TVs, etc. since 1996	Residential and commercial products, serves small businesses	Kampala	2	6K solar park and roof installations
Solar Energy for Africa	Solar Energy for Africa is a distributor, installer and after sales service provider of solar products like SHS, streetlights, batteries, etc., since 1995	Residential, commercial and institutional products, serves hospitals	Kampala	2	>10K solar systems in East Africa

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (5/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Water & Pumps International	Water & Pumps international is a distributor and installer of solar products like water pumps, water heaters and street lights, since 2013	Residential products	Kampala	2	Data not available
Advanced Solar Power Ltd	Advanced Solar Power Ltd is a distributor, installer and after sales provider of solar products such as streetlights, solar water pumps and solar water heaters since 2015	Residential and commercial products	Wakiso	1	Data not available
African Energy Depot Ltd	African Energy Depot Ltd is a distributor of solar, mini-grid and power backup products since 2015; the company distributes solar products such as batteries, water pumps and lighting products	Commercial and institutional products for the government and medical centres, etc.	Kampala	1	Data not available
All in Trade	All in Trade is a distributor of quality solar products like inverters, water heaters and pumps and has installed ~25MW solar power to date since inception in 2008	Institutional, commercial products for corporate use	Kampala	1	Data not available
All Africa Ultimate Solar Energy	All Africa Ultimate Solar Energy is a distributor, installer and after sales services provider of solar products such as home systems, street lights, batteries and CCTV cameras	Residential, commercial products for hotels, gas stations, cold warehouses, etc. and institutional products for the gov't and hospitals	Kampala	1	Data not available

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (6/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Ase Solar Ltd	Ase Solar Ltd is a manufacturer and distributor of solar products such as panels, lighting products and energy backup systems like batteries and regulators since 2004	Residential products	Kampala	1	Data not available
Azuri Technologies	Azuri Technologies is a full-service provider of solar home systems and solar water pumps, offering all services across the value chain from manufacturing to after sales services since 2012	Residential and commercial products for small businesses like shops	Kampala	1	> 150,000 systems in SSA
Barefoot Uganda	Barefoot Uganda is a social enterprise that distributes solar lighting products and solar phone charging systems since 2008	Residential and commercial products; mainly serve BoP consumers	Kampala	1	Data not available
Basal Solutions	Basal Solutions is a distributor, installer and after sales services provider for solar products such as water pumps, water heaters, SHS and batteries	Residential, commercial and institutional products that can serve telecommunications companies	Kampala	1	Data not available
Aptech Africa	Aptech Energy is a solar and water pump specialist since 2012; the company distributes, installs and offers after sales services on solar products such as water pumps, heaters, streetlights and batteries	Residential and commercial products	Kampala	1	Data not available

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (7/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Baseline Africa Ltd	Baseline Africa Ltd is a distributor of solar home systems and components such as batteries and inverters since 2002	Data not available	Kampala	1	Data not available
Bitcom Delta EA Ltd	Bitcom Delta EA Ltd is a provider of both ICT and power solutions since 2017; the company distributes and installs solar products such as batteries, inverters, panels and water heaters	Residential, commercial and institutional products	Kampala	1	Data not available
Chloride Exide Ltd	Chloride Exide is a distributor and installer of automotive batteries and solar equipment such as panels, heating systems and batteries since 2001	Residential and commercial products that also serve small businesses	Kampala	1	Data not available
Crown Energy Systems	Crown Energy Systems is a distributor, installer and aftersales service provider of solar products such as panels and water pumps since 2010	Residential and commercial products	Wakiso	1	Data not available
Access to Solar Technologies	Access to Solar Technologies is a social enterprise that distributes, installs and offers after sales services for solar products such as water pumps, water heaters, TVs, refrigerators, etc since 2016	Residential products	Jinja	1	Data not available

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (8/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
ARED SMC	ARED SMC is a service company that designs and distributes smart solar powered kiosks that offer phone charging, wifi connectivity and airtime purchase since 2013	Commercial products, targeting mainly women and low-income earners	Kigali	1	Data not available
Ekorn Solar Ltd	Ekorn Solar Ltd is a distributor and installer of energy saving and solar products such as batteries, SHS, water heaters, pumps, streetlights and refrigerators since 2011	Residential & commercial products for small businesses & farmers; serves institutions like prisons, hospitals & schools	Kampala	1	Data not available
Energy Systems Limited	Energy Systems Limited is distributor, installer and after sales service provider of solar energy products such as refrigerators, water pumps and power hybrid systems since 2002	Residential, commercial, institutional products	Kampala	1	Data not available
Epicenter Africa Limited	Epicenter Africa is a distributor, installer and after sales services provider of solar products such as home lighting systems, street lightings, solar water pumps and energy back up systems since 2009	Residential, and commercial products that serve industries	Kampala	1	Data not available
E-Power Solutions	E- Power Solutions is a distributor and installer of air conditioning and solar power products such as panels, streetlights, water pumps and batteries since 2004	Residential products	Kampala	1	>6,000 SHS

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (9/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Fresca Investments	Fresca Investments is a distributor, installer and after sales provider of both electrical and solar equipment; the company offers solar products such as panels and water heating systems since 2012	Residential, commercial and institutional products	Kampala	1	Data not available
Global Solar Systems Limited	Global Solar Systems Limited is a distributor of solar powered equipment such as water heaters and water pumps since 2005	Data not available	Kampala	1	Data not available
Great Seas (U) Ltd	Great Seas (U) Ltd is a distributor of solar powered products such as water heaters, fans, refrigerators, lanterns	Residential and commercial products	Kampala	1	Data not available
Green Power International	Green Power International is a manufacturer, distributor and installer of solar powered products such as water pumps, streetlights, panels and SHS since 2017	Residential and commercial products	Kampala	1	Data not available
Hagotech Gen. Electricals & Technical Service (HTGETS)	HTGETS is a distributor, installer and after sales provider of solar products such as energy back up systems, refrigerators, water heaters and home & street lighting systems since 2015	Residential and institutional products for hospitals; also partner with NGOs on community electrification projects	Kampala	1	>6,000 SHS

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, product offering, regional distribution and sales to date by SHS and PUE operators in Uganda (10/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Solar Pipo	Solar Pipo is a system designer, installer and financier of solar cooling systems and water pumps mainly in the dairy sector	Commercial products; targeting dairy and agricultural projects	Kampala	1	Data not available
Kenni Invest Uganda LTD	Kenni Invest Uganda is a distributor, installer and consumer financier of solar home systems since 2012	Residential products	Kampala	1	>5,000 SHS
LEEM Electronics	LEEM Electronics is a distributor and installer of SHS since 2014	Residential products	Kampala	1	Data not available
Mr. Solar Limited	Mr. Solar Limited is a distributor and installer of solar products like solar panels since 2018	Residential products	Kampala	1	>6,000 SHS
Innovation Africa	Innovation Africa is a distributor & installer of solar powered products like motors and water pumps since 2005	Institutional products for schools and hospitals; supplies products for residential projects like water access in villages	Kampala	1	>300 solar & water projects in >10 countries

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, regional distribution, sales & impact, and products sold by SHS and PUE operators in Uganda (11/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Nature solar	Nature Solar is a distributor of solar products like solar panels, since 2018	Residential and commercial products; sells to other solar distributors	Kampala	1	Data not available
New Age Solar Technologies	New Age solar Technologies is a distributor, installer and after sales service provider of solar products like street bulbs, batteries, inverters, refrigerators and TVs since 2010	Residential and commercial products for small businesses	Kampala	1	Data not available
New Sun Limited	New Sun Limited is a distributor, installer and after sale service provider of solar products like solar panels, inverters, batteries, etc., since 2005	Residential & commercial products; also serves government & large organizations	Hoima	1	Data not available
New Sun Solar Systems	New Sun Solar is an installer of solar water pumps, since 2012	Institutional products for government organizations	Kampala	1	Data not available
Powercon Solar Energy Company	Powercon Solar Energy Company is an installer of solar products like SHS, since 2010	Residential and commercial products for small businesses	Kampala	1	Data not available

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, regional distribution, sales & impact, and products sold by SHS and PUE operators in Uganda (12/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Seven Hills Impex Ltd	Seven Hills Impex Limited is a distributor of solar products like solar panels and batteries, since 2001	Residential products	Kampala	1	Data not available
Solar Point	Solar Point is a distributor of solar products like solar panels and lamps, since 2014	Residential products	Kampala	1	Data not available
SoloGrid	SoloGrid is a manufacturer, distributor, installer and consumer financier of SHS, since 2012	Residential and commercial products; also serves institutions like schools	Kampala	1	Data not available
Solvic Solutions Limited	Solvic Solutions Limited is an installer of solar products like solar panels and charge controllers, since 2015	Institutional products for telecommunication companies	Kampala	1	Data not available
Sunami solar	Sunami solar is a distributor, installer, consume financier and after sales service provider of solar products like SHS, water pumps, TVs and fridges, since 2016	Residential and commercial products for small businesses	Mbale	1	>10 solar pump installations

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, regional distribution, sales & impact, and products sold by SHS and PUE operators in Uganda (13/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Sunny Money	Sunny Money is a distributor of solar lanterns, since 2008	Residential products	Kampala	1	>1.7M solar sold lights in 3 countries
SunTap Uganda Limited	SunTap Uganda Limited is a solar distributor and installer of solar products like SHS and streetlights, since 2015	Residential and institutional products; also serves international alert sites	Kampala	1	Data not available
Trans-African Supply Services	Trans African Supply Services is a solar distributor and installer of SHS, water pumps and streetlight, since 2002	Residential and institutional products for government & organizations	Kampala	1	>150 solar projects in Africa
Ugasolar Suppliers Ltd	Ugasolar Suppliers Limited is a solar distributor and installer of SHS	Residential products	Kampala	1	Data not available
Ultratech Uganda Limited	Ultratec Uganda Limited is a distributor and installer of solar products like lamps, panels, water pumps and water heaters since 1999	Residential and institutional products for government organizations	Kampala	1	>4,000 SHS

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

Business models, regional distribution, sales & impact, and products sold by SHS and PUE operators in Uganda (14/14)

Business	Summary description	Product offering	UG HQ location	# of branches	Sales to date
Village Power	Village Power is a distributor, installer, consumer financier an after-sales service provider of SHS, since 2014	Residential products	Kampala	1	>12,000 households
W.Water Works	W.Water Works is a distributor and installer of solar water pumps since 2015	Institutional and commercial products for farms and small businesses	Kampala	1	> 900 water systems
One Lamp	One Lamp is a distributor of solar lamps since 2014	Residential products	Jinja	1	Data not available
Ital Trade Solar Solutions	Ital Trade Limited is a solar distributor, installer and after sale service provider of solar powered products like inverters, solar panels and batteries since 1996	Residential and commercial products	Kampala	1	Data not available
Luk Solar Limited	Luk Solar Uganda is a distributor and after sales service provider of solar lamps since 2013	Residential clients and institutional products for government organizations	Kampala	1	>2000 lamps

Source: Information on the businesses' websites and diverse industry reports; links to the Operators' websites added as available

A number of mini-grids have been constructed in Uganda due to support from the private sector, UG government, dev't partners & other financiers (1/3)

Region	Existing mini grids	Years in operation	Technology & capacity*	Developer & partners	Funds raised and financiers
Central	**Tiribogo gasification**	7	32kW Biomass gasification 170 connections	**Developer:** Pamoja Energy Ltd **Partner:** REA	Grant from Royal Institute of Technology Stockholm & Renewable Energy Business Incubator (REBI)
	Magara gasification	6	32kW Biomass gasification 72 connections	**Developer:** Pamoja Energy Ltd **Partner:** REA	Grant from Royal Institute of Technology Stockholm & Renewable Energy Business Incubator (REBI)
	Bukuzindu solar-diesel plant	6	Hybrid gen. station 600 kW (Solar) & 1.6MW (Diesel) 40 villages (~2500 hhs)	**Developer:** Kalangala Infrastructure Services	$50M from a mixture of debt, grants and equity from Uganda Development Cooperation, Industrial Development Corporation of South Africa, Nedbank, Emerging Africa Infrastructure Fund & GuarantCo[1,2]
	Kiboga solar mini-grid	9	1kW Solar PV 11 connections	**Developer**: Centre for Research in Energy and Energy Conservation	Grant from National Council for Science and Technology (NCST)
	Kitobo Solar Plant	4	230kW Solar PV 541 connections	**Developer:** Absolute Energy Africa Ltd	$730K grant financing from Energy and Environment Partnership (EEP) , Shell Foundation, FinAfrica[3]

Notes: * The data on number of connections is from 2017 (latest available data)

Sources: UOMA research and analysis 1. InfraCO Africa, President opens Uganda's first solar thermal power plant, 2015 2. Fred Tuhairwe (UNREEA), Status and development of the renewable energy based mini-grids in Uganda, 2017 3 EEP, Opportunities and challenges in the mini-grid sector in Africa, 2019

UOMA Uganda Off-Grid Energy Market Accelerator

A number of mini-grids have been constructed in Uganda due to support from the private sector, UG government, dev't partners & other financiers (2/3)

Region	Existing mini grids	Years in operation	Technology & capacity*	Developer & partners	Funds raised and financiers
Central	**Kichner solar minigrid**	11	22kW Solar PV 60 connections	**Developer:** Kirchner Solar Ltd **Partners:** REA	$246K grant subsidy from GiZ[1]
West	**Kayanja Solar microgrid**	6	5kW Solar PV 70hhs	**Developer:** Remergy Energy Ltd **Partners:** World-Wide Fund for Nature, Access 2 innovation	Equity from Remergy Energy solutions
	Bwindi community microgrid	6	64kW Hydro 42 connections	**Developer**: Bwindi Community Hospital **Partners:** GiZ & EnDev	$1.23M - $123M grant from GiZ and EnDev[2]
	Kisiizi Hydropower	36	300kW hydro & 60 kW hydroelectric & diesel generator of 80kva 710 connections	**Developer:** Kisiizi Power **Partners:** Kisiizi Hospital, Church of Uganda	$900K; 30% equity from Kisiizi Hospital and 70% grant from the World Bank[1]
	Kyamagaruru solar plant	5	13kW Solar PV 68 connections	**Developer**: Energy for Development **Partners**: REA	Grant from University of Southampton
	Kanyegaramire solar plant	5	13kW Solar PV 74 connections	**Developer**: Energy for Development **Partners**: REA	Grant from University of Southampton

Notes: * The data on number of connections is from 2017 (latest available data)

Sources: UOMA research and analysis 1. Ivan Nygaard et al, Market for the integration of smaller wind turbines in mini-grids in Uganda, 2018 2. SEforALL, Market study on available financial instruments in support of GMGs and assessment of GMG developer needs, 2017

UOMA Uganda Off-Grid Energy Market Accelerator

A number of mini-grids have been constructed in Uganda due to support from the private sector, UG government, dev't partners & other financiers (3/3)

Region	Existing mini grids	Years in operation	Technology & capacity*	Developer & partners	Funds raised and financiers
West	**Eco-Garden micro-hydropower plant**	6	5kW Hydro 16 connections	**Developers:** Eco-Gardens Rwenzori **Partners:** Renewable Energy Business Incubator (REBI)	Equity from Eco-Garden Rwenzori
	Kabalega Hydropower plant	8	9MW Hydro 203 connections	**Developers:** Hydromax Limited **Partners:** REA	Equity from Hydromax; additional $53.7M grant from the Norwegian government and $23.7M debt from the French Development Agency[1]
	RMS Pico Hydropower	7	5kW Hydro 3 connections	**Developer:** Rwenzori Mountaineering Services (RMS)	Grant from Private Sector Foundation Uganda (PSFU)
	Pamoja gasification – Kamwenge District	2	75kW Biomass gasification 500 connections	**Developer:** Pamoja Energy Limited	$369K grant from Energy and Environment Partnership (EEP) Programme[2]
East	**Suam Micro Hydropower plant**	7	40kW Solar PV 126 connections	**Developer:** GiZ and EnDev **Partners:** REA	$1.2M - $12M grant from GiZ and EnDev[3]

Notes: * The data on number of connections is from 2017 (latest available data)

Sources: UOMA research and analysis 1. Nelson Wesonga, "Six megawatts of power lying idle at Hoima plant", (Daily Monitor, October 14, 2013) 2 EEP, Opportunities and challenges in the mini-grid sector in Africa, 2019 3. SEforALL, Market study on available financial instruments in support of GMGs and assessment of GMG developer needs, 2017

There are several up-coming mini-grids across all regions in Uganda; some of these have already raised funds from DFIs and European governments (1/2)

Region	Developer/ Tender	Technology & capacity	Partners and funds raised & financiers
Central	**Bakulu Power**	• (53) solar mini-grids total of 600kW in Buvuma district • Potential to reach ~8000 people	**Partners**: REA, Energy for Impact
	Absolute Energy	• Estimated capacity of 100kW Solar PV • Located in Kalangala District with potential impact of 5400 people	**Partners:** REA
	AfDB and REA	• (10) decentralized mini-grids on Lake Victoria	**Partners:** REA
Western	**ORIO Infrastructure Fund**	• 10) mini hydro projects • Capacity of 50 to 500 Kw	**Partners:** UECCC **Funds raised & financiers:** $14.5M grant from Emerging Africa Infrastructure Fund, FMO (Dutch development Bank)[1]
	Tiger power	• (3) Solar PV arrays in Kyenjojo Uganda • Expected to serve 1000 households	**Partners:** REA **Funds raised & financiers**: $738K The Belgium government[2]
Southern	**WeLight**	• Capacity of 30kW to 80kW • 15 villages in Rakai & Isingiro	**Partners:** GiZ and REA **Funds raised & financiers:** $28.5M grant from the German government[3]

Sources: 1. Michael Wambui, Western Uganda to Get Ten Mini Hydro Power Stations, 2017 2. Alex Masereka, "Belgium's Tiger Power, UREA Ink Deal To Light Up Kyenjojo Villages", (Business Focus, November 21, 2018) 3. 3. Taddeo Bwambale "Germany to spend sh98b on 40 solar mini-grids in Uganda", (New Vision, November 16, 2018)

There are several up-coming mini-grids across all regions in Uganda; some of these have already raised funds from DFIs and European governments (2/2)

Region	Developer/ Tender	Technology & capacity	Partners and funds raised & financiers
Northern	**Mandulis Energy**	• 20MW biomass project in Gulu	**Partners:** KfW, Power Africa **Funds raised & financiers:** $1M grant from Sustainable Energy Fund for Africa (SEFA) and African Development Bank[1]
	Winch Energy	• Capacity of 30kW to 80kW • 25 villages in Lamwo District	**Partners:** GiZ and REA **Funds raised & financiers:** $28.5M grant from the German government[2]
Eastern	**Equatorial Power**	• 600kW solar PV plant • Expected to serve 3,700 connections	**Partners:** Engie[3,4]

Sources: 1 African Development Bank, SEFA Funds preparation of first-ever Biomass Gasification Project in Uganda, 2016 2. Taddeo Bwambale "Germany to spend sh98b on 40 solar mini-grids in Uganda", (New Vision, November 16, 2018) 3. Christine Kasemiire, "Where is the middle ground in pricing electricity on mini grids?" (Daily Monitor, October 22, 2019) 4. "ENGIE Africa brings off-grid power to more than four million people" (African Review of business and technology, February 19, 2020)

Many recent debt deals in the region

Investor	Company	Amount	Date
FMO	Greenlight Planet	US$5.3M	2020
European Investment Bank	Fenix	US$12.5M	2019
SunFunder, Developing World Markets, SIMA, responsibility	d.Light	US$18M	2019
Lion's Head Global partners	BBOXX	US$8M	2019
TRINE	Greenlight planet	US$2.2M	2019
SunFunder, responseAbility, Oikokredit	SolarNow	US$9M	2019
responsAbility, SunFunder, European Investment Bank, SIMA Funds	d.light	US$50M	2018
Bamboo Capital Partners	BBOXX	US$50M	2018
ElectriFI, TRINE	Azuri	US$20M	2018
European Investment Bank	d.Light	US$25M	2018
Symbiotics group, FMO	Zola Electric	US$32.5M	2018
SunFunder	Zola Electric	US$20M	2018
Finnfund	Mobisol	US$12.4M	2017
Atlas Mara	BBOXX	US$2M	2017
Essential Capital Consortium	BBOXX	US$5M	2017
responsAbility	Mobisol	US$12M	2017
Stanbic Bank, CDC, FMO, Norfund, Triodos, responsAbility, Symbiotics	M-KOPA	US$80M	2017
SunFunder, responsAbility, Oikocredit	SolarNow	US$6M	2017
SunFunder	SolarNow	US$2M	2016
Oikocredit International	BBOXX	US$5.3M	2016
Packard Foundation, Ceniarth, the Calvert Foundation	Off-Grid Electric	US$45M	2016
OPIC	SunFunder	US$15M	2016
CBA	M-KOPA	US$4M	2016
responsibility	Off-Grid Electric & Zola Electric	US$18M & 8M	2016
SunFunder	d.light	US$2.5M	2016
OPIC, Rockefeller Foundation, MCE Social Capital	SunFunder	US$21M	2016

>US$ 630M in regional debt financing in the the last couple of years; demonstrating increasing bankability of off-grid sector

Source: Research; all data publicly available

A number of facilities have been set up in the region to promote the off-grid energy sector (1/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Acumen Fund	Support, scale and learn from innovative energy companies over 3 years	Hand-held solar power, cook stoves, off-grid, home systems, bio-gasification systems	Equity Debt Mezzanine Grants	$64M	East and West Africa
Mobile for Development Utilities Innovation Fund	Test & scale the use of mobile to increase access to energy, water and sanitation	Seed grants and market validation grants	Grant	$2.6M	SSA
SunFunder – Beyond the Grid Solar Fund (BTG)	Specialist debt financing partner for solar companies active in off-grid residential, commercial & industrial	Off-grid, productive use and C&I solar	Debt	$50M	East and West Africa
Global LEAP Awards	Highly energy-efficient, durable, off- and weak-grid appropriate refrigerators. Awards are ongoing on an annual basis	Productive use	£100k	Dependent on co. & funds raised	SSA

Sources: 1. Gregory Lopez, SunFunder: Beyond the grid solar fund, Leonardo DiCaprio Foundation, 2019

A number of facilities have been set up in the region to promote the off-grid energy sector (2/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
SIMA Fund for Off-grid solar[1]	Provide commercial capital and advisory to energy businesses with financial, social, and env. impact	High risk, earlier stage businesses	Debt	$90M	SSA
Solar Frontier Capital	Provide local currency lending for pay-as-you-go off-grid solar companies across sub-Saharan Africa	PAYG companies	Debt	$100M	Africa
Off-grid Energy Access Fund[2]	Catalyze local financial markets' support for innovative energy access strategies	The household energy access sector including distributors, manufacturers & credit providers	Debt	$500M	SSA
TRINE	Invest in solar energy in growing markets	Solar Energy	Crowdfunding	Dependent on co. & funds raised	SSA

Source: Source: UOMA interviews & consultations, supplemented by
1. SIMA, SIMA Off-Grid Solar and Financial Access Senior Debt Fund I; 2. Calvert Impact Capital, Off-Grid Energy Access Fund (FEI OGEF), 2019

A number of facilities have been set up in the region to promote the off-grid energy sector (3/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Pioneer Energy Investment Initiative	Support, scale, and learn from innovative energy companies over three years from 2017 to 2020[1]	Energy generation (SHS, Solar & hybrid mini-grids) & Energy usage (Innovations for energy use)	Common & Preferred Equity, Convertible Debt	$22.8M	East & West Africa
Energy Entrepreneur Fund	Dev. of state-of-the-art tech., products & processes in energy efficiency, power generation, heat and electricity storage	SME's Incubation support	Mezzanine debt	$50M	SSA
ResponAbility Energy Access Fund	Provide working capital to manufacturers & distributors of modern energy products	Solar, biomass, geothermal & wind distributed generation (captive generation & mini-grids)	Equity and quasi equity	$30M	Kenya, UG, TZ, Rwanda
African Renewable Energy Fund	Increase renewable energy generation in Africa	Small hydro, wind, geothermal, solar, stranded gas and biomass projects)	Equity	$10M – 30M / co	SSA excluding SA

Sources: 1. Acumen, Pioneer energy investment initiative webinar, 2019

A number of facilities have been set up in the region to promote the off-grid energy sector (4/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Efficiency for Access Coalition	Support and accelerate innovation in off-grid and weak grid appliance technologies and markets	Productive use	Grant	$1M	SSA
Facility for Energy Inclusion Off-Grid Energy Access Fund	Development of state of the art tech., electricity storage	SME's Incubation support	Mezzanine debt	$50M	SSA
EU-Africa Infrastructure Trust Fund	Mobilize additional finance for infrastructure projects in sub-Saharan Africa; fund applications closed in 2019[1]	Geothermal, hydropower, solar & wind power, transmission lines, sustainable cooking fuels	Grants blended with long term financing	~$920M	SSA
Emerging Africa Infrastructure Fund	Encourage and mobilize private investment in infrastructure in SSA to promote economic dev't	Energy, Transport Water & Sanitation ICT, Agribusiness & Mining	Senior, subordinated or mezzanine debt	~$1.2M	SSA

Sources: European Union Africa, infrastructure trust fund, ,More than 12 years of EU-AITF involvement coming to an end, 2019

A number of facilities have been set up in the region to promote the off-grid energy sector (5/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Development Innovation Ventures	Provide flexible, tiered grant funding to test and scale evidence-driven innovation to any development challenge	Sector agnostic	Grant	Not available up to $5m/co	Global
Sustainable Energy Fund for Africa	Support private-sector led economic growth through the efficient utilization of untapped clean energy resources	Clean energy	Grant and equity	$95M	SSA
USAID-Derisking PAYGO	Mobilize additional finance for SHS co.s that wish to expand sales of PAYGO SHS in refugee settlements; fund applications closed in 2019[1]	PAYGO SHS	Grant	Not available $145k-175k/co.	Uganda
AlphaMundi Foundation – Powering Ag	Catalyse financing for businesses providing clean energy solutions that inc. ag. productivity and/or value in developing countries	Irrigation co.s operating at the nexus of clean energy & agriculture	Grant, Debt, Equity or mezzanine financing	Not stated $100k-$2m/co	SSA

Source: 1. GOGLA, USAID de-risking pay-as-you-go solar home systems in Uganda refugee settlements grants program, 2019

A number of facilities have been set up in the region to promote the off-grid energy sector (6/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
BEAM	Cloud-based platform, aiming to provide developmental infrastructure for off-grid energy services across SSA	Off-grid energy	Equity	$5M	Africa
Solar Electric Light Fund[1]	Design & implement solar energy solutions to assist people living in poverty	Solar	Grant	Not available	Uganda
Energy Access Venture Fund[2]	SMEs active in electricity generation and distribution, and electricity related services in SSA	SHS, Micro-grid infrastructure & hybrid technologies	Equity and Quasi-equity	$55M	EA and Southern Africa
The EnAccess Foundation	Address innovation challenges that renewable energy companies face through lack of financing	Irrigation companies operating at the nexus of clean energy & agriculture	Grant, Debt, Equity or mezzanine financing	$0.5M	EA and Southern Africa

Source: Source: UOMA interviews & consultations, supplemented by
1. SELF; 2. CDC Group, Energy Access Ventures Fund, 2015

A number of facilities have been set up in the region to promote the off-grid energy sector (7/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Biodiversity Investment Fund	Provide attractive loan financing for businesses that can demonstrate impact or contribution towards biodiversity in Uganda	Off-grid energy	Equity	$50M	Africa
EnDev Uganda	Give support in energy policy, improved biomass technologies, rural electrification & energy efficiency.	Pico PV & SHS Grid densification	No info	€12.25M	Uganda
EEP Africa	Provide early stage & catalytic financing to innovative clean energy projects, technologies	Solar PV	Grant	Not available €200k – 500k/co.	EA and Southern Africa
Frontier Energy II Fund	Develop, construct and operate renewable energy generation projects	Renewable energy	Equity or mezzanine debt	$60M ($227M – to verify)[1]	SSA

Source: 1. Frontier Energy, Investor base, 2019

A number of facilities have been set up in the region to promote the off-grid energy sector (8/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Frontier Energy I Fund[1]	Develop, construct and operate renewable energy generation projects; fund closed in 2017	Renewable energy	No info	$60M	East Africa
USADF SCC Grants[2]	Support businesses to identify and scale innovative efforts to address energy access gaps for refugees; the grants were awarded in 2019	Off-grid energy, internet and digital technology	Grant	~$370K	Uganda
USADF Off-Grid Energy Challenge[3]	Support entrepreneurs to develop and scale up off grid proven technologies in rural communities	Off-grid energy but women-led projects are targeted in Uganda	Grant	$100K/co.	SSA
BEAM – ElectriFI Fund[4]	Provide early stage equity capital for SHS distributor companies to help further unlock debt capital	SHS	Equity	$8M	Africa

Sources: 1. Frontier Energy, Investor base, 2019 2. Paul Ampurire, U.S offers Shs 1.4Bn in grants to renewable energy projects in refugee settlements, SoftPower News, 2019, 3. Alexa Huether, Investing in women-led renewable energy projects in Uganda benefits the environment, economic empowerment, and U.S businesses, USADF, 2019 4. ElectriFi, Bamboo energy access multiplier (BEAM), 2019

A number of facilities have been set up in the region to promote the off-grid energy sector (9/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
SIMA Angaza Distributor Financing Fund[1]	Invest in off-grid distribution companies to close cash flow gaps from customer instalment payments; fund is accepting applications	PAYGO companies	Debt	$5.7Billion	Global
Renewable Energy Challenge Fund[2]	Aim to increase adoption of off grid PV solutions that can stimulate economic activity. The fund is ending in December 2020	Productive use, solar and clean cooking	Grant	~$4M	Uganda
KawiSafi Ventures Fund[3]	Invest capital to scale companies providing clean, affordable and efficient energy to low income populations	Off grid solar power	Grant and equity	$70M	East Africa
SIMA Off-Grid Solar and Financial Access Senior Debt Fund I[4]	Finance innovative companies that invest in, manufacture, and/or distribute individual SHS; 5-year fund since 2017	SHS	Senior debt	$90M	SSA and South Asia

Sources: 1. SIMA Funds, SIMA off-grid solar and financial access senior debt fund I, 2019, 2. U.N Uganda, UNCDF receives Shs15.5Bn for renewable energy access, 2015, 3. Digest Africa, Acumen's $70M fund KawiSafi Ventures has already deployed $21M, 2019, 4. SUMA Funds, SIMA Angaza distributors finance fund, 2020

A number of facilities have been set up in the region to promote the off-grid energy sector (10/10)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Climate Investor One[1]	Provide funding to develop renewable energy projects to reduce power deficits, energy costs and CO2 emissions	Clean energy	Debt and equity	$80M	SSA
GEEREF NeXt Funds[2]	Catalyse private sector investment for renewable energy through being an anchor investor to encourage other investors to co-invest	Renewable energy and energy efficiency	Grant, equity	$765M	Global
ARCH Africa Renewable Power Fund (ARPF)[3]	Invest capital to scale companies providing clean, affordable and efficient energy to low income populations	Wind, solar PV, hydro power, geothermal and biomass	Equity	$25M	SSA
Universal Green Energy Access Programme (UGEAP)[4]	Increase financing for renewable energy scaling up investments from local financial markets and the international private sector.	SHS, mini grids, on-grid installations	Debt, mezzanine debt, guarantees	$500	SSA

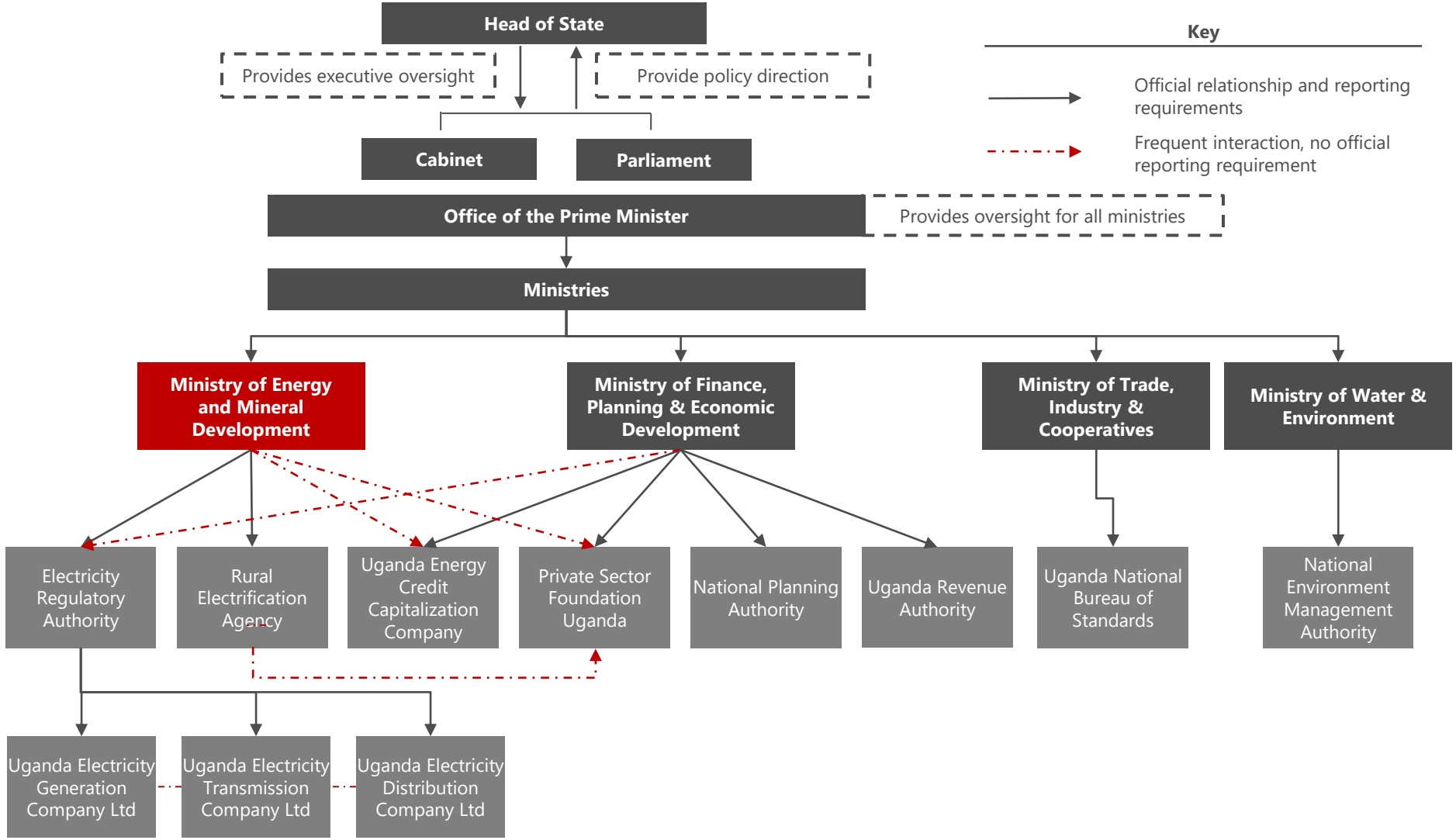
Source: 1. African Power Platform, USAID Southern Africa Energy Program (SAEP): Climate Inventor One (CIO), 2020 2. Green Climate Fund, Projects & programs - Investment info, 2020, 3. Teresia Njoroge, AfDB approves $25m for Africa renewable energy projects, Construction Review Online, 2019, 4. Green Climate Fund, Projects & programs - Overview, 2020

Ministry & several agencies dedicated to advancing access to energy

Government body	Mandate in industry
Ministry of Energy and Minerals Development (MEMD)	• Has the overarching mandate to promote development of sustainable-use of energy and mineral resources • Renewable energy department serves under this Ministry and runs a number of the programs for access both on and off the grid
Rural Electrification Agency (REA)	• Promotes equitable rural electrification access with special regard to marginalized communities • Provides oversight lead on how government sponsored projects are designed and sequenced to provide appropriate energy services based on their value to advance access & economic development
Electricity Regulatory Authority (ERA)	• Regulates the electricity supply industry and issues licenses for generation, transmission, distribution or sales of electricity, as well as ownership or operation of transmission systems • Establishes tariff structures and investigates tariff charges, approves rates, terms, and conditions of electricity services provided by generation, transmission and distribution companies
Uganda Energy Credit Capitalization Company (UECCC)	• Facilitates investments in renewable energy sector by providing innovative financing products and technical assistance to firms in the sector • Channels investment to projects as the administrator of Uganda Energy Capitalization Trust, the framework for pooling resources from gov't and development partners

Source: UOMA interviews & consultations, supplemented by
1. REA, Functions of REA, 2020, 2. UECC, About UECCC, 2020

Several additional government institutions are interlinked with oversight on issues affecting off-grid



Source: Analysis from interviews and government websites

The European Union is supporting a number of programs to influence the private sector and advance off-grid access (1/3)

European Union (EU)	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Scaling–up rural electrification using innovative solar photovoltaic (PV) distribution models **Near completion: Ends Jun-2020**	SHS Mini-grids	• Scale up the use of solar PV systems at schools, health centers, and business levels in the districts of Kasese, Arua, Masindi and 17 other districts in Albertine & build local capacity to install & maintain solar PV systems	• Provide business training & specific solar PV energy training to CBOs • Provide 51 social institutions with solar PV systems • Set up solar mini-grids in 6 trading centers in Kasese and Rubiziri districts	• 1341 SHS sold • Solar systems (1000W each) installed in 31 schools and 20 health centers in 6 districts • Contractor selected f or installation & management of 6 mini grids • Capacity of CBOs to install & manage solar photovoltaic tech. strengthened	**Implementers:** WWF in partnership with Kasese District Local Government and Enterprise Uganda Foundation **Funders:** ACP-EU

Source: UOMA interviews & consultations

The European Union is supporting a number of programs to influence the private sector and advance off-grid access (2/3)

European Union (EU)	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Access to energy services in rural and peri-urban areas in Northern Uganda (Teko Wa Project) **Near completion: Ends Apr-2020**	SHS Cook stoves Bio fuels	• Sustainable management of bio – energy resources, increasing use by households and social institutions of solar PV energy and energy efficient cook stoves	• Provide a no. of social institutions with energy efficient cooking stoves and solar systems • Disseminate, in co-op with private co.'s, SHS & cooking stoves to households • Inc. awareness & build capacities of local communities in sustainable mgmt. of bio- energy resources	• 2924 ha of woodlots & orchards established within by the project & a no. of tree seedling biz. set up • 35,366 households & 24 institutions accessed energy efficient stoves • 25,750 households & 24 institutions accessed with SHS for lighting	**Implementers:** Church of Sweden in Partnership with Lutheran World Federation Uganda **Funders:** EU

Source: UOMA interviews & consultations

The European Union is supporting a number of programs to influence the private sector and advance off-grid access (3/3)

European Union (EU)	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Scaling up access to modern electricity services on a regional scale in rural Sub-Saharan Africa by means of a fee for service business model **Near completion: Ends Dec-2020**	SHS Mini-grids	• Working to scale up access, in the predominantly rural, poor communities of the targeted countries in Cameroon, Mali, Uganda & Guinea-Bissau	• Provide several households and SMEs with access to energy services via SHS and solar mini-grids • Facilitate bi-annual workshops for areas in the four countries concerned	• The project has 3460 new SHS customers in Mali and Uganda (42% of the target). Target achieved in Mali and 60% customers recruited in Uganda. • 4,496 SHSs have been installed in Mali, Guinea-Bissau and Uganda.	**Implementers:** Foundation Rural Energy Services **Funders:** ACP-EU

Source: UOMA interviews & consultations

World Bank has partnered with the government to implement the 15-year ERT initiative to improve lives of rural households

World Bank	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Energy for Rural Transformation Phase III (ERT-3)[1] **Near completion: Ends Dec-2020**	SHS On-grid Mini-grids	• Increase access to electricity in rural Uganda, with focus on three components: —On grid access —Off-grid access —Institutional strengthening through impact monitoring	**Off-grid component:** • Installation of solar PV systems for public institutions in rural areas • Business development support • Provision of credit facilities • Quality standards enforcement support	• USD 8.5 million fund to be disbursed to local banks to provide working capital financing to SHS PAYG operators	**Implementers:** REA, MOWE, MOH,MOESD, UECCC, PSFU, MEMD **Funders:** World Bank/GEF

Sources: UOMA interviews & consultations, supplemented by
1. World Bank, Energy For Rural Transformation III, 2020

Additionally, World Bank runs independent programs to advance access & create a conducive environment for private sector growth

World Bank	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Lighting Africa Campaign[1] **Ongoing: Ends 2030**	 SHS	• Enable access to off-grid lighting and energy products for 250 million people across sub-Saharan Africa by 2030	Catalyze the market through: • Market intelligence • Quality assurance • Access to finance • Consumer education • Business development support • Policy & regulation	• Market assessment study to determine demand for solar products, market bottlenecks, & assess options for supporting the growth • Consumer awareness campaigns • Supporting UNBS in adopting and enforcing internationally recognized standards • 2M people impacted, ~920k quality verified products sold & ~185k GHG gas emissions avoided	**Implementers:** Broad global alliance – imps. varying by country **Funders:** World Bank / IFC

Source: UOMA interviews & consultations, supplemented by
1. Lighting Africa, Uganda - Enabling a market-led approach, 2018,

USAID's Power Africa is playing a crucial role in leading and coordinating initiatives in Uganda (1/5)

USAID/Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
The Power Africa Uganda Electricity Supply Accelerator **Near completion: Ends 2020**	 SHS  Mini-grids  On-grid	• Facilitate the increase of clean energy electricity generation and electricity access among rural and urban communities in Uganda by working with clean energy generation and access project developers to reach financial close and project commissioning, • And enhance the enabling environment for clean energy investment	• Supports generation and access projects through grants, transaction advisory support, short term technical assistance and linkages with other Power Africa partner tools	• Organized the 2nd Project East Africa summit in collaboration with the Office of the Prime Minister • Supporting REA in the promotion of the ECP* by supporting publishing/airing of public information messages • Supported USEA and UNCDF effort to create solar awareness hotline • Supported Mandulis Energy in technical proposal to AfDB	**Implementers:** Energy and Security Group **Subcontractors:** NRECA International, Nexant, African Solar Designs and Konserve Advisory Services **Funders:** Power Africa, GE Africa

Sources: UOMA interviews & consultations,

USAID's Power Africa is playing a crucial role in leading and coordinating initiatives in Uganda (2/5)

USAID/Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Quality Assurance Framework for Mini-Grids[1] **Ongoing**	Mini-grids	• Address some of the root challenges of providing safe, quality, and financially viable mini-grid power systems to remote customers	• Provide a flexible alternative to rigid top-down standards by defining: – Levels of service framework – Accountability and performance reporting framework	• Provided a formalized, common standard for classifying energy consumers • Facilitated aggregation of mini-grid projects & unlock private investment from data generated • Supporting implementation of consumer protections, thus a better consumer service	**Implementers:** NREL, DOE **Funders:** Power Africa, Global LEAP

Source: UOMA interviews & consultations

USAID's Power Africa is playing a crucial role in leading and coordinating initiatives in Uganda (3/5)

USAID/Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Last Mile Distribution Results-Based Finance **Ongoing**	 SHS	• Incentivize solar home system companies to more rapidly expand into commercially viable last-mile markets	• Exploring results-based incentives • Approach to be defined in the coming months	• Work will soon begin after approach is finally defined	**Implementers:** EnDev **Funders:** USAID

Source: UOMA interviews & consultations

USAID's Power Africa is playing a crucial role in leading and coordinating initiatives in Uganda (4/5)

USAID/Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Electricity Expansion and Improvement program **Ongoing**	SHS Mini-grids On-grid	• Rapidly increase electricity access in its rural areas	• Develop 12 new master plans for all the rural service territories in Uganda • Support REA to the develop a connections policy • Support REA to develop an Off-grid Policy	• The first 3 masterplans completed & identified >100 mini-grid sites in only 3 service territories • > 120,000 new connections identified within the existing distribution footprint • Electricity Connections Policy developed could add 1,400,000 new connections by 2022 • Connections policy & implementation plan developed • Options Paper draft presented to REA and stakeholders	**Implementers:** NRECA, REA **Funders:** Power Africa

Sources: UOMA interviews & consultations

USAID's Power Africa is playing a crucial role in leading and coordinating initiatives in Uganda (5/5)

USAID/Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Uganda Electricity Regulatory Partnership[1] **Ongoing**	Mini-grids	• Support the development of a regulatory and policy framework for electricity access with focus on the role of mini-grids to address the electricity needs of rural customers	• Develop a practical guide to the regulatory treatment of mini-grids to outline the practical issues and potential decision-making tracks for regulators • Implement a technical workshop on mini-grid technical, performance and interconnection guidelines to assist ERA in developing tailored technical and performance guidelines for mini-grid providers of electricity in rural service territories	• Examine international best practices on mini-grid technical requirements (e.g. interoperability, compatibility) • Develop an outline on mini-grid technical requirements, interconnection to the national grid and business models for interconnection, power quality, and service quality • Developed an outline for mini-grid regulation	**Implementers:** NARUC, ERA **Funders:** USAID / Power Africa

Source: UOMA interviews & consultations, supplemented by
1.NARUC) Uganda Electricity Regulatory Partnership: Supporting improved electricity service for all Ugandans, 2020

DFID initiatives work to increase investment in off-grid energy firms, overcome regulatory barriers & foster innovation

DFID	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Energy Africa Campaign[1] **Near completion: Ends 2020**	 SHS  Mini-grids	• Accelerate expansion of household solar market to help bring universal electricity access in Africa forward from 2080 on current trends to 2030	• Campaign to improve policy and support conditions to accelerate market-based SHS delivery • Core tool is Energy Africa Country Compacts matched with a coordinated multi-donor support offer	• Coordinated & signed Energy Africa Compact with Ug government and other stakeholders making commitment to address several challenges facing the SHS market • Market assessment to be conducted in all countries in then campaign	**Implementers:** MEMD, DFID, REA, SE4ALL, USEA, USAID / Power Africa, UNCDF, et al. **Funders:** DFID

Sources: UOMA interviews & consultations, supplemented by
1. UK Government, Energy Africa Campaign, 2015, 2. U.K Government, DFID 7621 Transforming Energy Access - Research program delivery consortium, 2016, 3. Practitioner Network, Applied research program - Transforming Energy Access, 2015

DFID initiatives work to increase investment in off-grid energy firms, overcome regulatory barriers & foster innovation

DFID	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Transforming Energy Access (TEA)[2] **Ongoing**	 SHS  Cook stoves  Bio fuels	• Address critical evidence gaps, test innovative technology applications, business models, financing, & skills development to accelerate the provision of affordable, clean energy-based services to poor households & enterprises	• Partnership with Shell Foundation to support private sector innovations • Support Innovate UK's Energy Catalyst to stimulate technology innovation • Build other strategic innovation partnerships	• Shell Foundation created Uganda Off-Grid Energy Market Accelerator to advance off-grid access • Testing P2P Solar crowding platform • Scoping potential partnership with Gates Foundation on Mission Innovation	**Implementers:** Shell Foundation, Innovate UK **Funders:** DFID

Sources: UOMA interviews & consultations, supplemented by
1. UK Government, Energy Africa Campaign, 2015, 2. U.K Government, DFID 7621 Transforming Energy Access - Research program delivery consortium, 2016, 3. Practitioner Network, Applied research program - Transforming Energy Access, 2015

DFID initiatives work to increase investment in off-grid energy firms, overcome regulatory barriers & foster innovation

DFID	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Africa Clean Energy Program (ACE)[1] **Ongoing:** **Revised end:** **Mar-2023**	 SHS  Mini-grids	• Catalyze a market-based approach for private sector delivery of solar home system (SHS) products and services which will lead to improved energy access to people across 14 countries in SSA	• Provide TA to improve the enabling environment for market-based approach for private sector delivery of SHS • Finance businesses wanting to enter new and emerging SHS markets in SSA • Test innovative approaches to stimulating private sector investment and market development	• REACT-HS awarded US$ 7.4 million to 10 household solar companies with 8 disbursements beginning • Compact actions aimed at improving policies & regulations that facilitate a market approach to solar energy implemented in 7 countries • Invested US$ 72.7M in technical assistance services to governments & companies entering the solar industry • Invested US$ 25M in development of the mini-grids sector	**Implementers:** AECF, TBC, IFC, DAI **Funders:** DFID, World Bank, AfDB

Sources: UOMA interviews & consultations supplemented by
1. UKaid, Africa Clean Energy Programme (ACE), 2019

DFID initiatives work to increase investment in off-grid energy firms, overcome regulatory barriers & foster innovation

DFID	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Renewable Energy and Adaptation to Climate Technologies (REACT) Window, Africa Enterprise Challenge Fund[1] **Ongoing: Planned end; Jul-2021**	 SHS	• Incentivising private sector delivery of low-cost clean energy and climate adaptation technologies to help rural beneficiaries adjust to climate change and escape poverty using grant funding to catalyse greater investments into these sectors	• Facilitate a market driven approach to increased energy access through off-grid renewable energy, as well as increasing resilience & adapting to climate change in rural areas	• Helping to demonstrate the viability of many of the companies that have accessed commercial investment (e.g. M-KOPA, Mobisol and Off-Grid Electric) • Had invested >US$ 20.6M by 2017 to developing low cost clean energy and climate change technologies in selected African countries	**Implementers:** AECF **Funders:** DFID

Sources: UOMA interviews & consultations

1. UKaid, Renewable Energy Adaptation Climate Change Technologies, (Africa Enterprise Challenge Fund), 2020

Embassy of the Netherlands runs programs to support the private sector & advance energy access

Netherlands	Target Industry	Target action	Approach	Results to date	Affiliated organizations
The Inclusive Dairy Enterprise (TIDE) Project (Phase II)[1&1.2] **Ongoing: Ends 2023**	SHS Solar agric. app	• Provide dairy and crop farmers and their households with high quality, affordable and sustainable solar lighting systems and solar powered agricultural appliances	• Subsidy to provide farmers with access to 20,000 solar products with reliable after sales service (Phase I) • Encourage commercialization of the dairy sector by actively supporting farmers to adopt a business approaches to dairy farming	• Over 10,000 systems in collaboration with lead partner Solar Now • Encouraged farmers to co-invest at total of US$ 7.4M in their farms to improve productivity • Increased export value from dairy products, from US$ 5.6M in 2015 to US$ 111M in 2019 • Regional production capacity has increased from 100K to 1.5M litres of milk per day • 300K students now have access to milk at school	**Implementers:** Solar Now, Barefoot Power, Uganda Crane Creameries Cooperative Union & other value chain managers **Funders:** Government of Netherlands

Sources: UOMA interviews & consultations

1. SNV, SNV signs partnership with the Netherlands Embassy for phase II of its Uganda dairy project, 2019, 2. SNV, The Inclusive Dairy Enterprise (TIDE) project - Phase II, 2019

UNCDF's global CleanStart program has partnered with other dev partners to provide financing to local businesses & advance access

UNCDF	Target Industry	Target action	Approach	Results to date	Affiliated organizations
UNCDF CleanStart[1] **Near completion: Ends 2020**	SHS Mini-grids Cook stoves Bio fuels	• Supports low-income household transition to renewable energy • Co-invests in early stage business ideas of private companies that can bring affordable clean energy to under-served markets • Emphasis on the inclusion of women and youth in value chain • Increase consumer-product awareness and protection	• Performance-based grant to bring early stage business ideas to market • Advisory services to address implementation bottlenecks • Research initiatives, M&E, & networking events • Nationwide campaigns • Partnerships with government, dev partners, & other stakeholders to leverage resources & strengthen sustainability & impact	• Providing finance and business advisory services to 6 businesses under the Renewable Energy Challenge Fund-Clean cooking window • Providing finance and business advisory services to 8 businesses under the Renewable Energy Challenge Fund-Solar Window • With the Schatz Energy Research Center (SERC) Humboldt State University released study on Energy Access and Off-Grid Solar	**Implementers:** UNCDF **Funders:** • RECF Uganda: Embassy of Sweden in Uganda (RECF), UNCDF, DFID Uganda • CleanStart Global: Austrian Development Agency, Liechtenstein, Norad, Sida, UNCDF

Sources: UOMA interviews & consultations
1. UNCDF, CleanStart Program, 2020

BMZ has provided support to both the government and private sector to further advance access & support clean energy (1/3)

BMZ	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Promotion of Renewable Energy & Energy Efficiency program (PREEEP)[1] **Ongoing: Ends 2023**	SHS Cook stoves	• Promote sustainable use of energy for social economic empowerment, increased access to renewable energy, and efficient utilization of existing energy resources • Focuses on three areas: – Supporting clean energy strategies – Mitigating climate change – Promoting access to energy	• Support the Ministry of Energy in areas of energy policy, improvement of market structures and energy efficiency. • Support activities in implementation of energy programs at district level, monitoring and evaluation and mainstreaming of cross cutting issues such as gender and HIV / AIDS • Work through EnDev to achieve advance access	• Supported development of the 2002 energy policy • Supported planning for clean energy access for 17 districts • Conducted energy management trainings for 100 SMEs and 40 energy audits • Equipped 800K households with household cooking stoves, 100K people with solar lighting products, 2.7K SMEs and 800 social institutions with modern energy equipment	**Implementers:** MEMD, REA, ERA, EnDev **Funders:** BMZ ,KfW, EU

Source: UOMA interviews & consultations

1. GIZ, Promotion of Renewable Energy and Energy Efficiency Program (PREEP), 2019

BMZ has provided support to both the government and private sector to further advance access & support clean energy (2/3)

BMZ	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Promotion of Mini-grids for Rural Electrification (Pro Mini-Grids)[1&2] **Near completion: Ends 2020**	Mini-grids	• Promote decentralized electrification strategies such as mini-grids to support employment and economic development • Develop mechanisms to support private sector capacity for installation and operation of off-grid systems	• Work to develop a mini-grid strategy to define stakeholder roles and areas that exhibit potential for mini-grid installation • Select eligible concessionaries for the installation & operation of 40 mini-grids • Select a company from the eligible concessionaries through a tender system to set up the mini-grids • Support use of productive use of electricity by consumers	• Developed a tender mechanism for private sector involvement in mini-grid development with REA • Developed an electrification planning tool with REA for prioritization of mini-grid development areas, which identified 300 areas • Developed a multi-level training program for solar electricians with the help of Nakawa Vocational Training Institute & Cologne Chamber of Skilled Crafts & Small Businesses	**Implementers:** GIZ, MEMD,REA, ERA, Nakawa Vocational Training Institute, HWK **Funders:** EU

Source: UOMA interviews & consultations

1.GIZ, Pro Mini-Grids - Clean Electricity for Rural Uganda, 2018, 2. GIZ, Clean, Reliable Electriciy for Rural Communities, 2016

BMZ has provided support to both the government and private sector to further advance access & support clean energy (3/3)

BMZ	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Green People's Energy **Ongoing: Ends September 2022**	Mini-grids SHS Cook stoves Solar agric. app	• Promotion of productive use of electricity (off-grid, mini-grids, solar irrigation) • Energy access for schools (Solar PV, biogas) • Technical advice to enterprises intending to invest into decentralized renewable energy solution such as captive power etc. (development of bankable proposals) • Skills development/training for RE technicians and RE technology users and support to VTIs	• Introduce practice-oriented curricula with a focus on renewable energies at three training centres; • Train 25 teachers and 150 renewable energy specialists; support 80 businesses to use decentralised renewable energies; and • Convince 100 social institutions to purchase decentralised renewable energy systems with our support.	• Set up hub in Gulu as part of efforts to focus on Northern Uganda • Signed a contract with SoloGrid as an outcome of a tender process to increase electricity access for primary schools. • SoloGrid has trained ~100 head teachers, local government staff and setup demonstration installation at a primary school in Gulu • Until the end of 2020, the company intends to equip 100 primary schools in Northern Uganda with Solar Home Systems	**Implementers:** GIZ Uganda and GIZ Regional Office South **Funders:** Federal Ministry for Economic Cooperation and Development and the Bavarian Ministry of Economic Affairs, Regional Development and Energy.

Source: UOMA interviews & consultations

1. https://gruene-buergerenergie.org/en/countries/uganda/

UNDP has partnered with the government to provide sustainable energy solutions to boarding schools in off-grid areas in Uganda

UNDP	Target Industry	Target action	Approach	Results to date	Affiliated organizations
NAMA-Green Schools project[1] **Ongoing: Ends 2030**	 SHS  Cook stoves  Bio fuels	• Provide sustainable energy solutions to boarding schools in the mainly off-grid rural areas with solar energy, efficient cook stoves, and biogas technologies	• Create a revolving loan fund for the planned large-scale roll out of green technologies in the schools & designing new business models for schools to pay back installation costs • Complement the technologies with capacity-building & awareness trainings for companies and a Life Skills Programme for youth and local communities • Streamline the roles and responsibilities of public and private stakeholders	• Project has been pre-selected to receive funding by Germany and the UK of up to US$ 73.7M to support the development phase • Installed 55K improved Institutional Cookstoves in 22K schools in rural Uganda • Installed 1.1K biogas cook stoves fed by latrine bio-fuels • Installed 1.6K solar PV systems in rural Uganda	**Implementers:** UNDP, MEMD **Funders:** UK, Germany

Source: UOMA interviews & consultations

1. NAMA Database, Green Schools in Uganda, 2017, 2. UNDP,, Integrated sustainable solutions for schools in Uganda, 2016

AFD has partnered with local banks to finance renewable energy investments in order to reduce the carbon footprint in East Africa

AFD	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Sustainable Use of Natural Resources and Energy Finance East Africa (SUNREF)[1] **Ongoing**	 SHS  Bio fuels	• Developing the share of renewable energy in the energy mix in East Africa • Improving energy efficiency for companies • Encouraging local banks to increase lending activities towards low-carbon projects	• Provide technical assistance to companies & banks to assist them in identifying opportunities for green investments • Install & monitor projects • Support partner banks in their risk assessment approach, communication strategy & marketing in green finance	• A cumulated commitment of > US$ 147M to finance green investments in East Africa (Uganda, Kenya and Tanzania) • Set up the Duomo House, a solar powered commercial real estate project which received US4 255K funding from DTB	**Implementers:** AFD, Diamond Trust Bank **Funders:** AFD, EU-Africa Infrastructure Trust Fund

Source: 1.Sunref, Uganda: first green energy project in construction sector, 2018

UNIDO supports the EAC's initiative aimed at refining energy policy, capacity development and knowledge management in East Africa

UNIDO	Target Industry	Target action	Approach	Results to date	Affiliated organizations
East African Centre for Renewable Energy and Energy Efficiency (EACREEE)[1] **Ongoing**	SHS Bio fuels Mini-grids	• Create increased access of modern, affordable & reliable energy services • Increased energy security in East Africa • Mitigation of negative effects e.g. local pollution & greenhouse gas emissions	• Develop & implement a coherent regional RE&EE policy framework for the EAC & facilitate its implementation on national levels • Develop & execute regional programs and projects in cooperation with GEF, other partners and mobilize funding • Provide co-funding for demand-driven programs and projects executed by the private and public sector or civil society in the region, etc.	• Holding of various workshops that have culminated in the formulation of an Action Plan which outlines strategies & measures for the successful implementation of the first phase of the center • Continue to conduct training workshops and establish networking platforms & events that give industry stakeholders insights on the regional status of the off-grid energy sector	**Implementers:** EACREEE **Funders:** UNIDO, ADA

Source: 1.EACREE, EACREE Regional Status report, 2016

The Shell Foundation has launched several initiatives to catalyze sustainable and scalable solutions (1/2)

Shell Foundation	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Market Development **Ongoing**	 SHS  Mini-grids  Cook stoves  Prod. use	• Leverage foundations, govt, private sector, DFIs and other financiers to amplify impact and accelerate market growth	• Market institutions used to tackle barriers and facilitate effective deployment of blended capital to accelerate marker growth	• Help build demand through communications and market advisory • Providing learning and analysis for key themes such as last mile distribution, rural utilities & gender impact • Funding for industry associations such as GOGLA, GACCC • Supporting local accelerators to act as neutral market influencers such as EPD in RW and UOMA in UG • Supporting innovation for market infrastructure such as impact valuation	**Implementers:** Various **Funders:** Shell Foundation

Source: UOMA interviews & consultations

The Shell Foundation has launched a number of initiatives to catalyze sustainable and scalable solutions (2/2)

Shell Foundation	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Building an ecosystem to accelerate access to energy **Ongoing**	 SHS  Mini-grids  Cook stoves  Prod. use	• Support entrepreneurs in the off-grid sector by working with partners to provide investment, business skills and market linkages in order to scale their businesses and deepen impact on BoP	• Provide grants, innovative financing products & technology • Support development of business skills training & market linkages • Provide support for development of disruptive solutions to increase the availability of energy	• Financing and technical assistance provided to: • Energy Product manufacturers and service providers that providers aimed at rural households, productive use, communities and urban populations for example energy efficiency & storage, PAYG solar, waster to energy fuels etc • Market Enablers such as supply chain intermediaries, financing facilities and catalytic institutions and bodies	**Implementers:** Various **Funders:** Shell Foundation

Source: UOMA interviews & consultations

Philips Lighting Foundation supports youth-focused, female-focused as well as SME training activities in Uganda

Phillips Lighting Foundation	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Village Academy **Ongoing**	SHS	• 48 young men & women trained to be PV solar electricians by 2018 • 60 out-of-school Ugandan & urban refugee youth trained to be by 2018 • 20 of small/ medium size business owners trained in productive use of energy by 2019 • At least 60% of graduates placed in employment and/or have increased income by 3Q2018 • At least 50% of trainees targeted being female graduates	• In-village trainings for youth on technical skills, sales & soft skills necessary to enter the solar industry • Tailor made courses for energy companies on capacity building and soft skills • Facilitate access to start-up financing, high quality solar products & mentorship on scaling for SMEs	• Held *MCE Sales Agent* Training on September 2017 where 20 youth were trained as solar sales agents and equipped with stock in partnership with MCE Uganda and d.light • Conducted *Soroti Solar PV* Training on May 2016 where 10 young men and women were trained and certified, 8 of whom found work in the solar industry in Soroti	**Implementers:** Village Academy **Funders:** Philips Lighting Foundation

Source: UOMA interviews & consultations, supplemented by

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (1/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Energizing Development (EnDev)[1&2] **Ongoing: Ends 2021**	 SHS  Cook stoves  On-grid  Solar lantern	• Achieve sustainable access to modern energy services for 21M people across 21 countries by 2021 **EnDev Uganda:** • Increasing household access to improved cooking by 680,200 people • Increasing access to energy for lighting/appliances for 157,800 people by mid-2019 • Provide modern energy services for 1,100 social institutions & 1,600 SMEs	• Business development support for local stove companies (cookstoves & solar) in production and sales & distribution • Rural partner synergy & private sector development approaches for cook stoves & solar market development • Implement innovative financing & distribution schemes • Grid densification projects targeting no-pole connections	• Access to electricity or modern cooking equipment to over 21M people in private house holds • 21K social institutions and 46K SME's have access to efficient & sustainable energy • Trained over 40.5K stove producers **EnDev Uganda:** • 131K people gained access to electricity , with 1.6M people gaining access to modern cooking energy • 584 social institutions & 1.4K SMEs gained access to modern energy	**Implementers:** GIZ EnDev Uganda **Funders:** Netherlands, Germany, Norway, UK, Switzerland and Sweden

Source: UOMA interviews & consultations, supplemented by
11. GIZ, Energizing Development (EnDev) - programme for energy access, 2005,

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (2/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
GET.invest[1] **Ongoing**	 SHS  Mini-grids  On-grid  Cook stoves	**Catalyze development of markets to:** • Promote access to energy, supporting sustainable economic growth • Develop value chains, providing employment opportunities • Enhance energy security and mitigate the impacts of volatile fossil fuel prices • Mitigate climate change by substituting clear energy sources for fossil fuels	• Targeted advisory services to help projects and businesses gain access to finance • Information and matchmaking for developers and financiers on regulatory framework and opportunities • Create an enabling environment to assist regulators implement processes for private investments • Country briefs and in-depth market insights to help entrepreneurs identify opportunities	• Project Development Support - 330+ applications by project developers - 50+ project and business developers received advisory support - 17 projects successfully assisted in accessing investment • 34 national & international events with more than 4,400 participants	**Implementers:** GIZ **Funders:** Germany, European Union, the Netherlands, Austria

Source: UOMA interviews & consultations, supplemented by 1.GET.invest, About GET.invest, 2019

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (3/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Support Uganda Solar Energy Association **Ongoing**	 SHS  Mini-grids  On-grid	• Promote industry-led market development for off-grid • Supporting USEA to have proper governance and management structure, • Empower USEA to deliver services to its member services such as provision of BDS services, sales data collection to ascertain number of solar system sold and big data customer research	• Develop annual work plan and strategy plan. • Recruit and train three full time secretariat staff. • Develop toolkit on building strong associations	• Developed handbook for solar taxation • Implemented awareness campaigns in Eastern and West Nile • Launched 161 IVR Solar channel on Airtel to increase awareness for solar • Trained 40 technicians on installation and troubleshooting solar systems • Business diagnostic for BDS support • Provided financial & human resource support to help USEA develop the 2018 sales data report[1]	**Implementers:** UNCDF **Funders:** Energy Africa, DFID

Source: UOMA interviews & consultations supplemented by
1. USEA, USEA handbook on solar taxation , UNCDF, 2019

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (4/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Scaling Off-Grid Energy (SOGE): Grand Challenge for Development[1] **Ongoing**	 SHS  Mini-grids	• Accelerate the growth of a dynamic, commercial off-grid energy market to provide clean, modern, and affordable energy access to 20M of households and businesses beyond the grid in sub-Saharan Africa	• Platform for leading donors and investors to incentivize technological innovation, fund early stage companies, and support critical elements of the off-grid ecosystem	• 50+ companies & market enablers supported across 18 countries in sub-Saharan Africa • 3.75M expected connections reaching over 15M people in SSA • $435M in private investment catalyzed	**Implementers:** USAID **Funders:** USAID / Power Africa, DFID / Energy Africa, Shell Foundation

Source; UOMA interviews & consultations, supplemented by
1. GOGLA, USAID Scaling Off-Grid Grand Challenge for Development (SOGE), 2018, , 2.Scalling Off-Grid, Interactive year-in-review, 2018

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (5/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Energy and Environment Partnership/ Southern and East Africa[1] **Ongoing**	SHS Mini-grids Cook stoves	• Contribute to reduction poverty by promoting inclusive and job-creating green economies, and by improving energy security in the Southern and East Africa regions while mitigating global climate change	• Funding projects in all fields of renewable energy and energy efficiency, bridging the gap between a good idea and a bankable project • Projects are selected through two funding windows from early stage to market ready projects, including last mile feasibility studies, pilots, demonstrations, commercial scale-ups, replication and rejuvenating projects	• Providing sustainable energy and agro hubs in Kamwenge district, clean energy for the Ugandan dairy industry, biogas for milk cooling & sustainable energy services for Kitobo island • Had 15 grant funding calls for innovative programs and businesses since 2010 • Invested US$ 85.9M in renewable energy ventures, impacted 5.1M people with enhanced energy access & created 8.2K jobs across 15 countries	**Implementers:** KPMG Finland **Funders:** Ministry of Foreign Affairs of Finland, DFID and The Austrian Development Agency

Source: UOMA interviews & consultations, supplemented by
1. NDC Partnership, Energy and Environment Partnership in Southern and East Africa (EEP S&EA), 2019

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (6/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
New Deal on Energy for Africa[1] **Ongoing: Ends 2025**	 SHS  Mini-grids  On-grid	• Increasing on-grid generation & transmission to add 160 GW of new capacity & create 130M new connections • Increasing off-grid generation to add 75M • Increasing access to clean cooking energy for ~130M households	• Mobilizing domestic and international capital for innovative financing in Africa's Energy sector • Supporting African countries in strengthening energy policy, regulation and sector governance	Approval of 29 energy sector operations worth USD 1.7 billion to deliver: • 546 MW of additional installed capacity of which 526 MW are from renewable energy sources • 21,264 km of distribution lines • 641 km of transmission lines and associated substations • 7,800 public lighting units • 688,950 new households/ businesses receiving electricity access	**Implementers:** AfDB **Funders:** AfDB, Africa Energy Leaders Group, Sustainable Energy Fund for Africa, SE4ALL, UK's Energy Africa Campaign and Power Africa

Source: UOMA interviews & consultations

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (7/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Facility for energy Inclusion[1,2&3] **Ongoing: Ends 2025**	 SHS  Mini-grids  On-grid	• Providing consumer and corporate financing solutions to solar off-grid companies in the related ecosystem (OGEF) • Offering flexible project and corporate finance solutions to rural electrification projects of less than 25 MW and mini-grids (on-grid)	• Operate with a clear mandate to maintain focus on underserved markets • Encourage innovative transactions that create long term market value for investments • Provide flexible capital on commercial basis, including local currency • Have management set up from across Africa to maximize local engagement & understanding	• Reached its final equity close with US$ 59M in committed equity capital & US$ 36M in debt facilities to support off-grid energy access • Raised US$ 160M targeted towards financing rural electrification and mini-grid development projects	**Implementers:** LHGP & Fieldstone **Funders:** African Development Bank, UKaid, USAID, Shell Foundation, Nordic Development Fund, Global Investment Facility, All On, Calvert Impact Capital, DFID

Source: 1. AfDB, Facility for Energy Inclusion – Overview, 2018, 2. AfDB, African Development Bank sponsored Off-Grid Energy Access Fund reaches final equity close with partner contributions, 2020, 3.AfDB, The African Development Bank's Facility for Energy Inclusion attracts $160m in commitments for small-scale renewable energy, 2020

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (8/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Smart Communities Coalition[1,2&3] **Ongoing**	 SHS  Productive use	• Increasing efficiency in refugee camp management & service delivery • Empowering refugees to provide for themselves and their families • Addressing the needs of community members in and around refugee settlements	• Employ an ecosystem approach to technology deployment: – Identify opportunities by engaging stakeholders on ground – Establish working groups – Encourage exchange of ideas across groups – Implement pilot projects – Monitor & evaluate progress	• Created market profiles highlighting the latest data in purchasing power, refugee skillsets, energy & mobile access in target settlements • Hired expert staff in Nairobi and Kampala to lead stakeholder engagement, facilitate pilot implementation and reinforce capacity to drive results • Awarded US$ 465K in grants to 3 companies to increase energy access in refugee settlements in Uganda	**Chairs:** Mastercard & USAID/Power Africa **Members:** Over 35 members including; Mastercard, Mercy Corps, USAID, GIZ, SNV, Microsoft, Net Hope, Energy 4 Impact, Energy Peace Partners, FSD Africa, Lutheran Foundation, Total, World Vision, NRC, GSMA, etc.

Source: 1. U.S Embassy, Power Africa announces grant winners to improve electricity access in refugee settlements in Uganda refugee settlements, 2019 2. UNHCR,, Smart Communities Coalition, 2018 3.Mastercard, Smart Communities Coalition - Year-in-review, 2018

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (9/9)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Utilities 2.0 **Ongoing**	 SHS  Productive use  Mini-grids  On-grid	• Seeks to combine centralized and decentralized technology (including solar home systems, mini-grids, grid, & smart grid systems) into an integrated, intelligent, & interactive energy network that can deliver customer-centric, clean energy solutions to end energy poverty at the lowest cost, in the fastest time	• To illustrate how the comparative advantages of centralized and decentralized energy can create a robust, integrated energy system for grid and non-grid customers alike • Leverage digitization and data analytics to integrate DRE technologies so that utilities can have new alternatives to grid extension, faulty transformers, and unprofitable connections	• Particularly in Uganda, Utilities 2.0 launched the "Twaake" pilot with UMEME, Makerere University, The Rockefeller Foundation & Power for All • The pilot will establish whether appliance financing can accelerate PUE for electricity and establish whether the integration of utility operations with distributed renewable generation (DRE) can create more economically viable connections, faster	**Funder** The Rockefeller Foundation **Implementers:** Power for All **Participants:** Shell Foundation, AMDA, ENGIE, PowerGen, Rensource, Fenix, East African Power (EAP), UMEME, Equatorial Power, EnerGrow, ZOLA Electric and others

Source: 1. Power For All, Utilities 2.0: Integrated Energy for Optimal Impact, 2019

Associations represent private sector interests, advocate policy issues to government

Uganda National Renewable Energy and Energy Efficiency Alliance is an umbrella body whose aim is to avail a platform that consolidates Uganda energy sector leadership

	Mandate & description	Membership & capacity
USEA *Uganda Solar Energy Association*	• Seeks countrywide mobilization of solar providers, coordinating stakeholders, playing an advocacy role and capacity building	• >100 members consisting of engineers running local businesses and solar product distributors; receives targeted support from dev partners like RECP, DFID, UNCDF & PSFU
BEETA *Bio-mass Energy Efficient Technologies Association*	• Promotes biomass energy efficient technologies through networking, sharing information, and developing knowledge among member organizations / individuals	• 50 member companies involved in production of biomass efficient technologies, such as briquettes & stoves, & institutions involved in research and development of biomass energy
HPAU *Hydropower Association of Uganda*	• Champions hydropower development in the hydropower sub-sector through advocacy, capacity devt & resource mobilization	• Membership open to private sector companies, organizations & associations, consumers, & policy makers; receives support from GIZ, CREEC, & WWF
EEAU *Energy Efficiency Association of Uganda*	• Aims to foster provision for quality energy efficiency services, enhancing research, innovation & knowledge transfer	• Large capacity of technical members working to get association accreditation to certify Energy Efficiency Professionals in the country
UNBA *Uganda National Bio-gas Alliance*	• Seeks to unite and support stakeholders as well as existing regional associations in the biogas sector	• National umbrella organization of the UG biogas sector; four associations organized according to regions, supported by partnership with GIZ

Source: UOMA interviews & consultations supplemented by
1. UNREEEA, UNREEEA home page, 2020

Associations represent private sector interests, advocate policy issues to government

Organization	Work in Uganda

UNREEEA	• UNREEEA is an NGO for profit incorporated 2014 as result of the private sector players in the various renewable energy and energy efficiency sub-sectors signing a memorandum of understanding to come under one umbrella body. 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
	• The association members of UNREEEA include: Biomass Energy Efficient Technologies Association, Uganda National Bio-gas Alliance, Hydro-Power Association of Uganda, Uganda Solar Energy Association, Energyy Efficiency Association of Uganda, Wind Power Association of Uganda
	• The alliance aims to among other objectives:
	  • Identify and disseminate best practices related to market development for renewable energy and energy technologies in Uganda.
	  • Establish permanent working relationships with government institutions, civil societies as well as other sector stake-holders in the energy sector.
	  • Initiate and upgrade a strong private sector led approach in the development of the renewable energy sub-sector in Uganda

Source: UOMA interviews & consultations, supplemented by
1. Harald Schůtzeinchel & Stfturng Solarenergie, A new support for solar entrepreneurs: Sendea, Sun Connect News, 2015

Associations represent private sector interests, advocate policy issues to government

Organization	Work in Uganda
USEA UGANDA SOLAR ENERGY ASSOCIATION	• Uganda Solar Energy Association was formed by companies operating in the solar sector with support from the Private Sector Foundation Uganda and had 120 members by end of January 2019. • The aim of USEA is to facilitate business growth and promote self regulation and aimed at spurring off-grid solar industry-led advocacy and coordination to support universal energy access **To further its' objective, USEA has partnered with the following organizations:** • **USAID's Power Africa Uganda Electricity Supply Accelerator** – supporting USEA in solar market development, public awareness and promotion, creating linkages through the supply chain, business development and capacity and monitoring and evaluation • **UNCDF/DFID** – market sales data collection in collaboration in with GOGLA & Dalberg data insights to run a data collection pilot for the sector, business development services, media and PR campaign to increase visibility and reach and tax advisory services in conjunction with URA & government to develop a tax handbook • **PSFU/WORLD BANK** - Through the World Bank Energy for Rural Electrification project (implemented by PSFU), USEA has obtained support in setting up the secretariat infrastructure, hiring staff and providing HR & Finance Expertise as well as TA in business strategy and financing models to adopt for an association

Source: UOMA interviews & consultations, supplemented by
1. Harald Schützeinchel & Stfturng Solarenergie, A new support for solar entrepreneurs: Sendea, Sun-Connect News, 2015

There are a number of research institutions and consultants active in UG working to support the market (1/4)

Organization	Work in Uganda
PRIVATE SECTOR FOUNDATION UGANDA – Your Partner in Private Sector Led Development	• Created to enhance private sector competitiveness by providing capacity through policy advocacy and enhanced business development services • Also play a key role in implementing some government and donor projects • Currently implementing technical capacity aspects of the Energy for Rural Transformation phase III such as empowering USEA
CREEC – CENTRE FOR RESEARCH IN ENERGY AND ENERGY CONSERVATION – Energy for generations	• Focuses on the thematic areas of rural electrification, energy for productive use, household energy and energy entrepreneurship • Has two departments: testing services for product development & independent testing of cookstoves & solar, and project engineering for project implementation and consultancy
REBi – Renewable Energy Business Incubator	• Implemented by the Department of Electrical and Computer Engineering at Makerere University in close cooperation with The Royal Norwegian Society for Development (Norges Vel). The incubator was initially funded by Nordic Climate Facility (NCF) and now funded by NORAD • Main focus is on entrepreneurship, improved co-operation with SMEs and technology transfer from countries outside Uganda which are all innovative project activities which makes the project idea a unique and sustainable option for development

Source: UOMA interviews & consultations, supplemented by
1. REBi, About REBi, 2020 2. PSFU, About PSFU, 2019

There are a number of research institutions and consultants active in UG working to support the market (2/4)

Organization	Work in Uganda

Global Green Growth Institute	• Signed five-year working relationship with GoU to foster green economic growth implementing a planning framework with three outcomes:
	  • Mobilize financing for implementation of green growth strategy
	  • Support improved planning of secondary cities to catalyze green growth & urbanization
	  • Support govt efforts to expand electricity investing in renewable energy

NRECA International	• Partnered with REA to define the country's electrification strategy through the Uganda Accelerated Rural Electrification Program. Funded by the World Bank, developed a master electrification plan for one new electric service territory in Uganda • Today, the team is on a path to lay the groundwork to produce master plans for all 13 of the country's electric service territories funded by the USAID/Power Africa
ENERGY4IMPACT ACCELERATING ACCESS TO ENERGY	• Supports businesses serving off-grid communities with a range of services form business development services, access to finance and project development for innovative models • Supporting the implementation of a number of initiatives such as the Off-grid Refrigeration Challenge and Transforming Energy Access programs

Source: UOMA interviews & consultations, supplemented by
1. Energy4Impact, About Energy4Impact, 2020, 2. NRECA About NRECA, 2020

There are a number of research institutions and consultants active in UG working to support the market (3/4)

Organization	Work in Uganda
Rocky Mountain Institute	• Engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables • Supporting the government of Uganda to develop and implement an integrated electrification strategy to drive energy access and economic growth
Duke Nicholas Institute for Environmental Policy Solutions	• Research and policy effort that aims to address the challenges around increasing access to modern energy solutions to underserved populations around the world • Supporting the development of new, disruptive tools, such as the means to evaluate electricity access through machine learning techniques applied to aerial imagery data
Catalyst Off Grid Advisors	• Support businesses, investors, development partners & governments globally to identify appropriate, impactful ways to support off-grid energy access • Supporting NRECA as they help the REA develop an off-grid electrification strategy for Uganda. This will involves actively engaging private sector service providers and developers to coordinate renewable energy mini-grids and stand-alone energy solutions as part of a larger national electrification planning paradigm

Source: UOMA interviews & consultations, supplemented by
1. RMI, About RMI, 2020 , 2. Catalyst, About Catalyst, 2020,

There are a number of research institutions and consultants active in UG working to support the market (4/4)

Organization	Work in Uganda
University of Southampton – Energy for Development	• The E4D Network is run by the Sustainable Energy Research Group (SERG) at the University of Southampton. • It's aim is to enable a step-change in collaborative research and project development addressing the energy needs of rural communities in developing countries • In Uganda, it has installed (2) mini-grids with a capacity of 13.5 kW
Alliance for Rural Electrification – Shining a Light for Progress	• The Alliance for Rural Electrification (ARE) is an international business association that promotes a sustainable renewable energy industry for the 21st century, activating markets for affordable energy services, and creating local jobs and inclusive economies. • They accept members from Uganda who enjoy the benefits of advice and advocacy, knowledge and intelligence, business promotion & marketing & business creation and support
Makerere University; ResilientAfrica Network – solutions through innovation	• Research sustainable e-waste management and next generation battery technology, with the purpose to promote critical industry advocacy and build a body of evidence to inform responsible corporate waste management programs and policies around end-of-life disposal, recycling, and repair of solar home systems.

Source: 1. Africa Mini-Grids, 6th Africa Mini Grids summit, 2020, 3. INESUS, About INESUS, 2020

Global and regional networks and associations are also enabling private sector players to leverage support services (1/2)

Organization	Work in Uganda
GOGLA The Voice of the Off-Grid Solar Energy Industry	• GOGLA represents over 100 global members as a neutral, independent, not-for-profit industry association. Its mission is to help its members build sustainable markets, delivering quality, affordable products and services to as many households, businesses and communities as possible across the developing world • Their key focus areas on access to finance working on standardizing reporting metrics for PAYG, creating a conducive enabling environment by working in advocacy around key issues like tax and on socio-economic research & insights for the market more broadly • Will be running pilot in partnership with GiZ on market database for data collection in PAYG in Uganda in 2018
sendea	• Sendea "solar entrepreneur network for decentralized energy access" is a capacity development platform for solar entrepreneurs to build their solar company and let it grow • Their key focus is providing support to a cohort of early stage local companies with finance, technical assistance and long-tern coaching and mentorship to nurture these companies and help them grow • In Uganda, will be carrying out business skills training, supporting productive use elements like solar irrigation and SME use and looking at the case for PV back up systems in institutions like schools and health centers

Source: UOMA interviews & consultations, supplemented by
1. GOGLA, GOGLA home page, 2020, 2.SENDEA, SENDEA home page, 2020,

Global and regional networks and associations are also enabling private sector players to leverage support services (2/2)

Organization	Work in Uganda
AMDA	• Collaborating with industry, policy-makers, government authorities, donors, and other stakeholders to advocate for optimal policies and efficient capital deployment that will benefit the mini-grid sector and the people it serves • Serving as the voice of the mini-grid development industry in Africa to promote the growth and sustainable development of the mini-grid sector and act as a unified focal point for stakeholders to engage the sector • Provide a platform that enables transparency in industry performance through comprehensive market data and analytics in order to establish, evaluate and promote key financial, business and policy solutions to overcoming the major barriers to growth for the sector
Open Capital	• Over the past 10 years, Open Capital has had 600+ engagements for businesses, investors, development organizations, and government across 20+ countries raising >US$600 million in capital • In the off-grid energy space in Uganda, Open Capital has completed ~50+ engagements for private sector, development partners, and investors, supporting many of the large solar home system businesses with strategy and operations • Completed strategy and growth engagements with off-grid energy distributors & PAYG operators, has close relationships with >12 mini grid companies and continues to support the ecosystem through tailored support for commercial banks to accelerate local currency funding or operators & developers

Source: UOMA interviews & consultations, supplemented by https://www.africamda.org

UOMA

Uganda Off-Grid Energy Market Accelerator

Do contact us if you have any feedback or interest in partnering:

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https://uoma.ug/