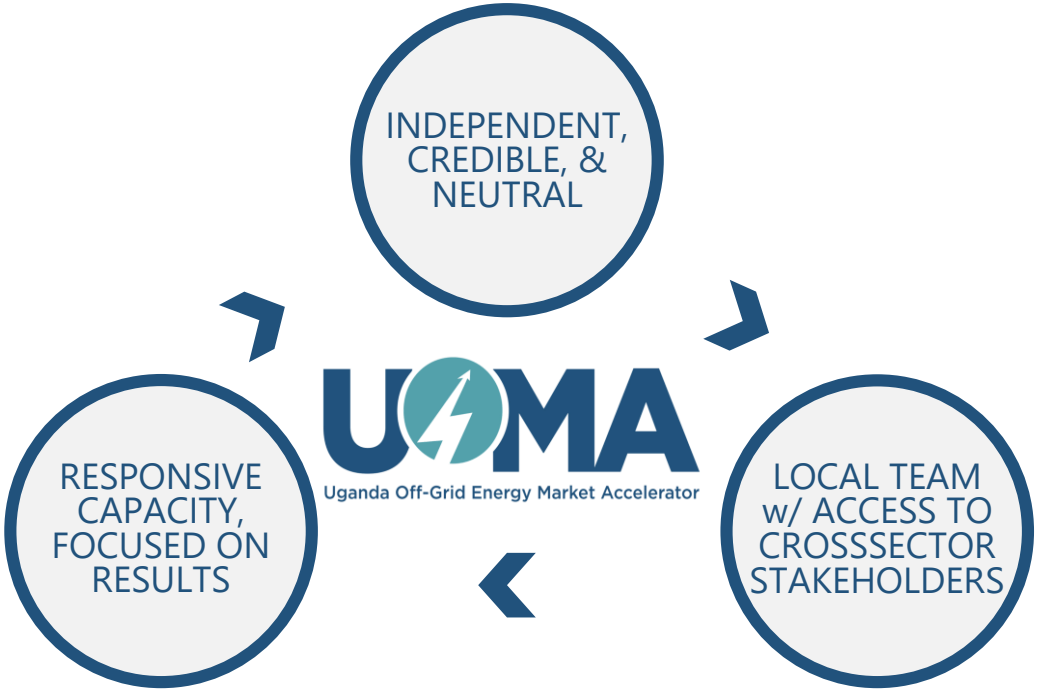
Uganda Off-Grid Energy Market Accelerator

Market Map of off-grid energy in Uganda

Full version

2019 edition

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



We accelerate the off-grid energy market in Uganda through:

- **Research & Insights:** providing data, analysis, and insights to businesses, investors, development partners, and policy-makers
- **Coordination:** coordinating industry actors and resources to increase efficiency; and
- **Direct Interventions:** catalyzing interventions where necessary to reduce barriers to off-grid energy access

In partnership with:

SCALING OFF-GRID ENERGY: A GRAND CHALLENGE FOR DEVELOPMENT

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UOMA Uganda Off-Grid Energy Market Accelerator

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

Core technical team

Dr. Frank Sebbowa
Senior Advisor
*Former Head of ERA & UIA**

Nicole DeMarsh
Associate Partner, OCA
Coordinator

Crystal Mugimba
Project Leader, OCA
Technical Lead

Reza Fazel
Snr. Project Leader, OCA
Workstreams Manager

Harry Masters
Project Leader, OCA
Off-Grid Energy Specialist

Advisory Board

MINISTRY OF ENERGY & MINERAL DEVELOPMENT UGANDA

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

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For 2019, UOMA is focusing on 5 initiatives

Expanding access to finance	Increase access to local currency debt finance for solar operators, bridging a critical working capital shortfall and currency mismatch and enabling operators to increase affordability of units
Reaching unserved populations	Reduce barriers to better target unserved populations in Uganda, improving access for some of the hardest to reach and most in need communities
Expanding productive use technology	Support industry to test and validate productive use technologies that can achieve economic benefits for off-grid Ugandans while growing energy demand
Strengthening the enabling environment	Support public sector to create effective policies and a conducive enabling environment to increase off-grid energy uptake in Uganda
Facilitating communication & coordination	Enable more effective communication and coordination in the off-grid energy sector in Uganda, resulting in better resource allocation and accelerated progress in achieving universal access

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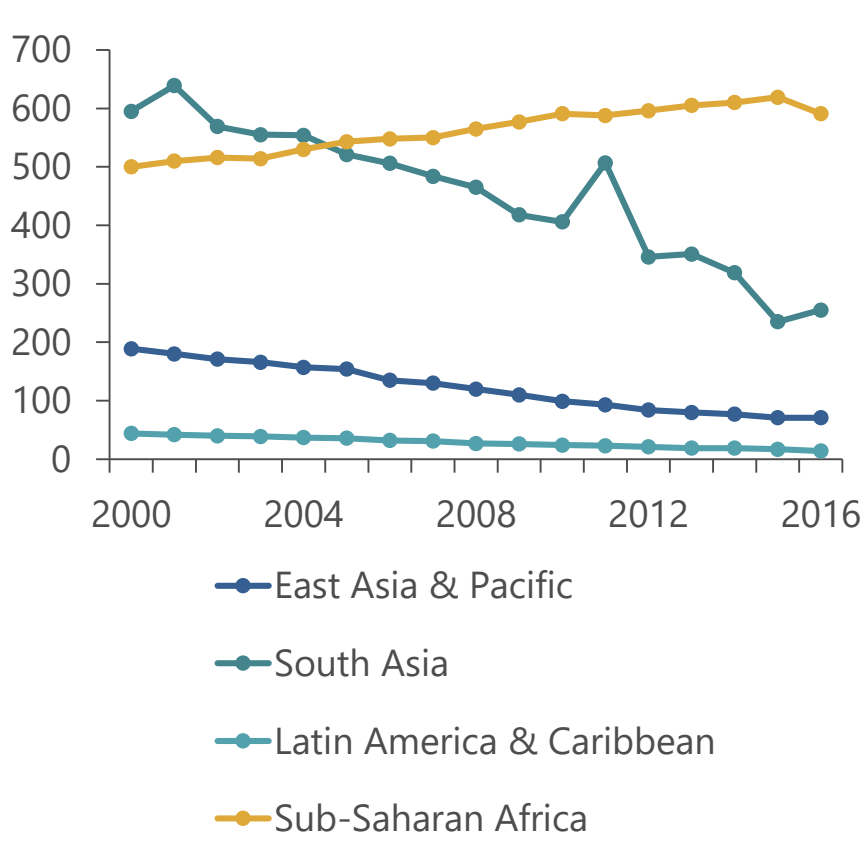
Context

Despite recent progress, gap to universal energy access continues to widen; electrification rates in UG lower than SSA average

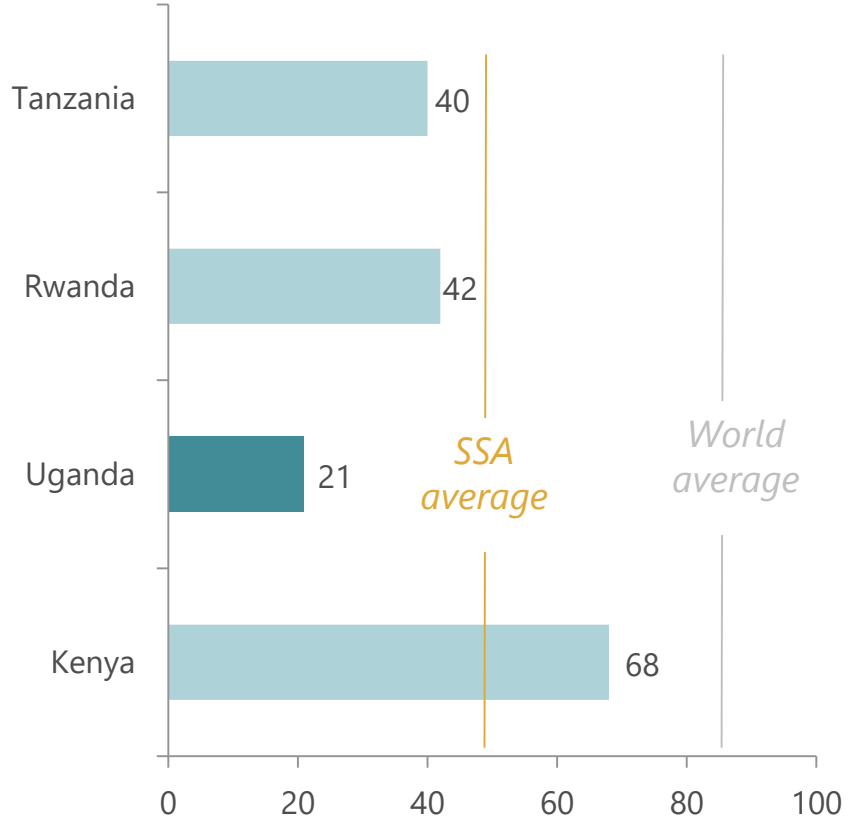
SSA not keeping up with pop growth for access

Trends in population with no access, 2000-2016[1]



UG electrification rates lower than SSA average

% pop electricity access, 2016[2]



Sources: 1. World Bank Data, 2017 2. IEA, World Energy Outlook, 2017 (latest available data), https://www.iea.org/media/sdg/WEO2018-Electricity-Database.xlsx

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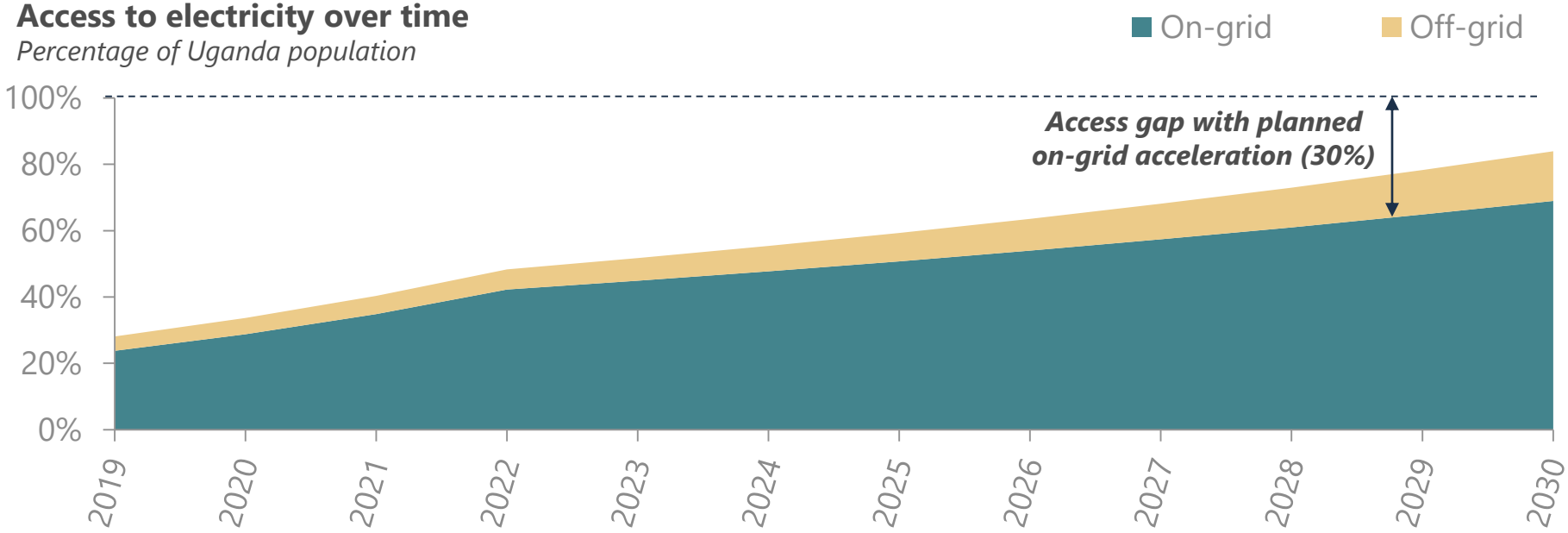
~30% of population in forecast to remain unserved by grid at 2030; off-grid essential to achieve 100% access

Access to electricity over time
Percentage of Uganda population



Despite projected growth of off- and on-grid connections, 30% of UG population forecast to lack electricity access at current trajectory; off-grid solutions critical to reach unserved populations

- Uganda population expected to grow at ~3% per year, expanding from ~8M households in 2018 to over 11M by 2030
- Given planned additional connections under the Free Connections policy and growing uptake of off-grid, millions of connections forecast to come online, however ~3M households (~16M people) will remain unserved in 2030 (~30%)

Off-grid solutions will have to play a critical role utilizing technologies such as solar home systems and mini-grids

Sources: 1. Catalyst report 2. Off-grid Strategy concept paper 3. Uganda Bureau of Statistics, Uganda National Household Survey, 2016/2017

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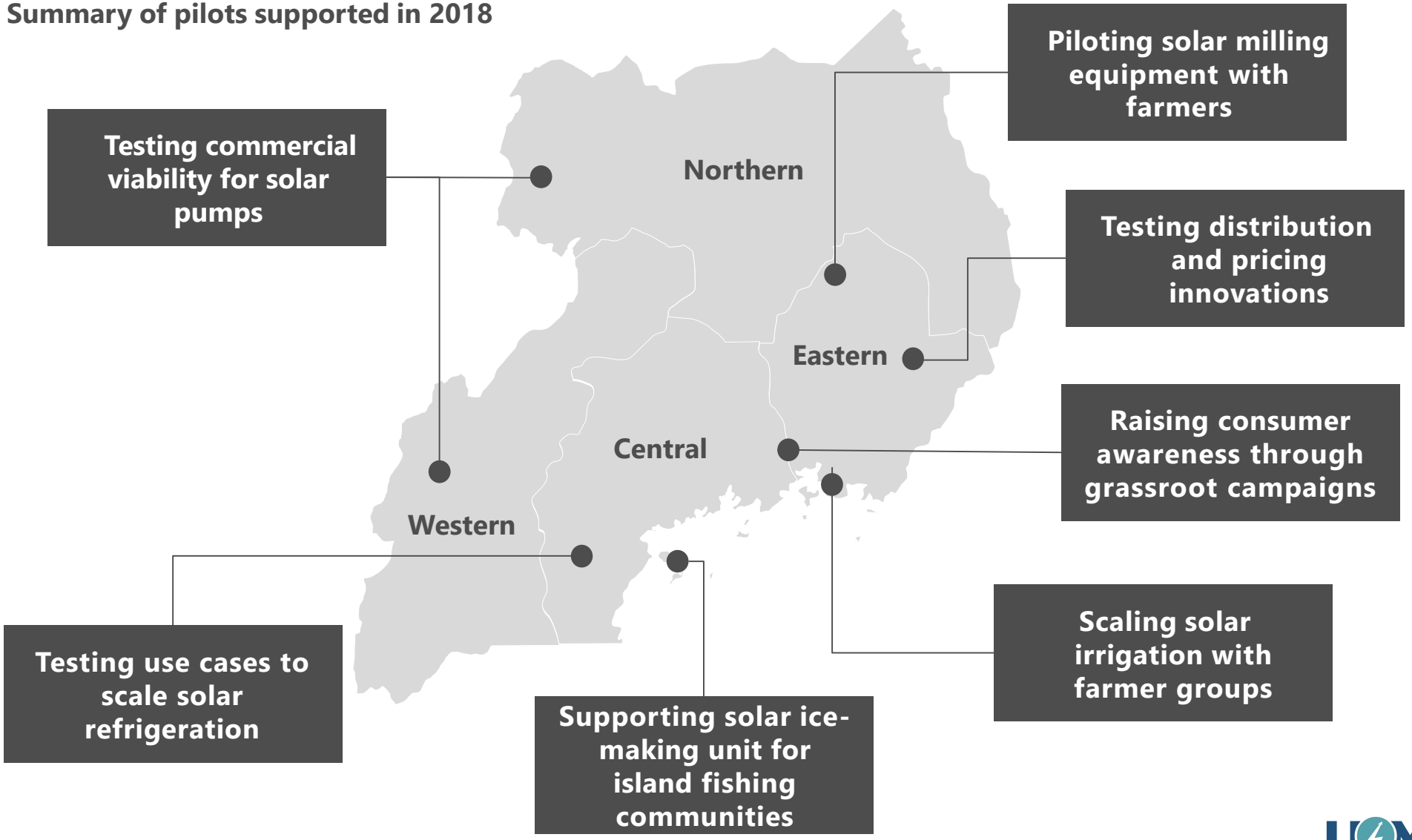
Through consultations we were able to map relationships & off-grid market initiatives

Interviews & research were tailored to understand objectives & how they interact with each other

Private sector	Government	Development orgs	Other stakeholders
• Understand available products, current market share, growth plans, challenges to scale and strategic differences	• Understand different sub-industry focus areas, major initiatives underway, plans / strategies, and sensitivities	• Review current interventions, broader mandates, preferred models and existing collaborations	• Build holistic view of facilitating market actors & their role in capital provisioning, industry research, & coordination

Insights also include learnings from pilots run by UOMA in 2018 supporting operators to test various business models

Summary of pilots supported in 2018



Source: UOMA, Annual Impact Report, 2018

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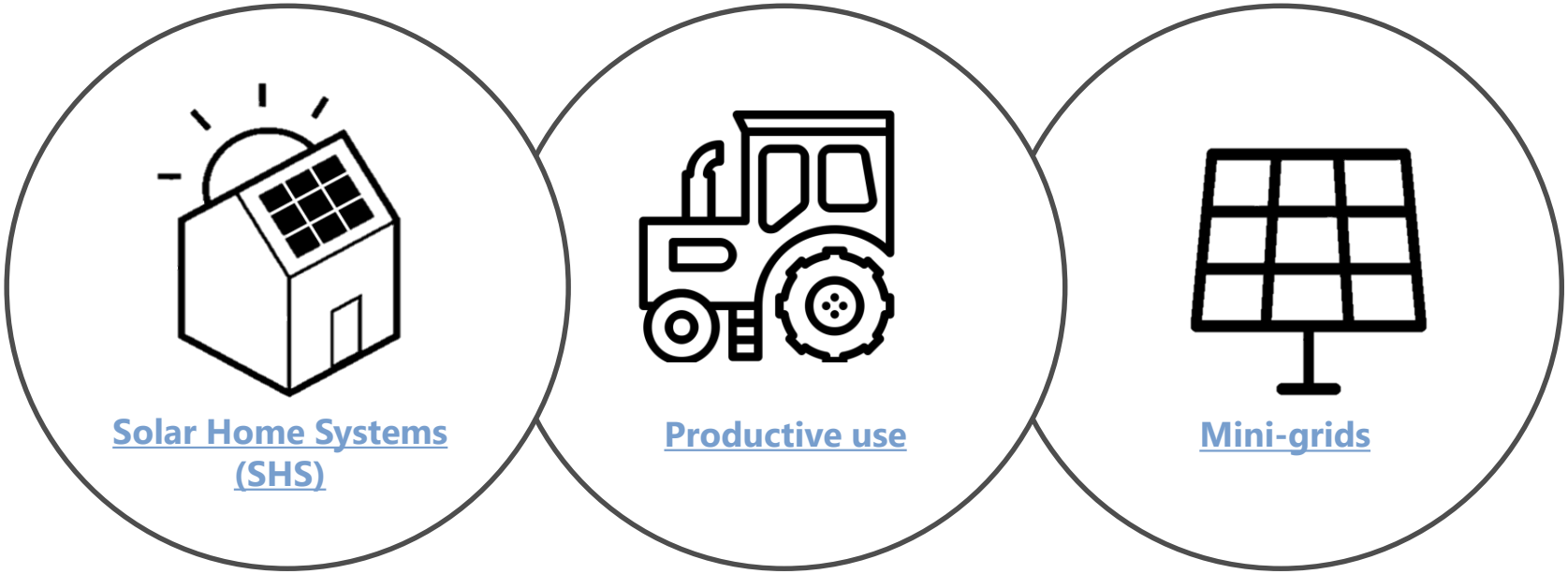
Market map seeks to provide a holistic and objective description of the off-grid industry in Uganda and is comprised of 3 sections:



Each section contains an overview and insights section:

- ***Overview:*** Provides a holistic view of the specific technology presenting actors & activities
- ***Insights***: Presents data-driven industry analysis to provide dimension & context to the state of off-grid development and further outlines the primary barriers to growth of today's market, highlighting opportunities for stakeholder support

Additionally, the Appendix contains a summary of stakeholders active in the Ugandan market

Click on specific link to jump to section of interest

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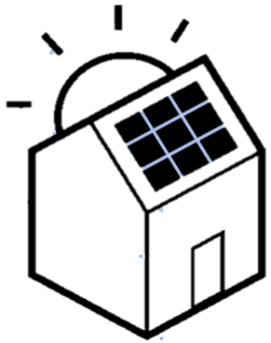
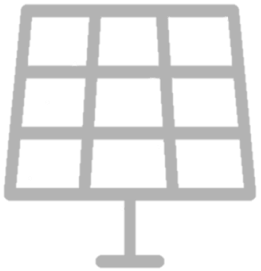


Solar Home Systems (SHS)

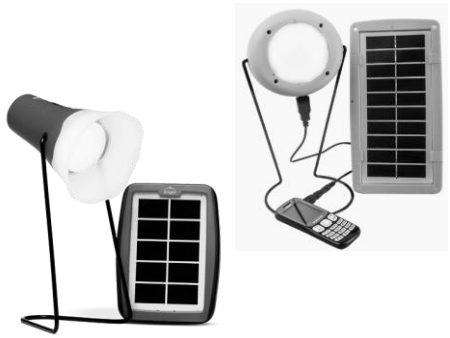
Productive use



Mini-grids

Ecosystem commonly divided by pico lamps, small & large SHS

- 0.35W-6W
- Mostly for lighting home
- Can include: lamps, USB phone charging, and solar panels in some cases



Pico lamps

- 10W-100W
- Mostly for lighting homes and small businesses
- Can include: solar panels, bulbs, regulator, charger, wiring, battery, radio, televisions

Smaller solar-home systems (multi-light point)

- > 100W
- Often for business use
- Can include, solar panels, battery, charging points, radio, lights, clippers, water heating & pumping systems, refrigerators, milling equipment, etc.

Larger solar-home systems (component based)

Increasing in size (kW)

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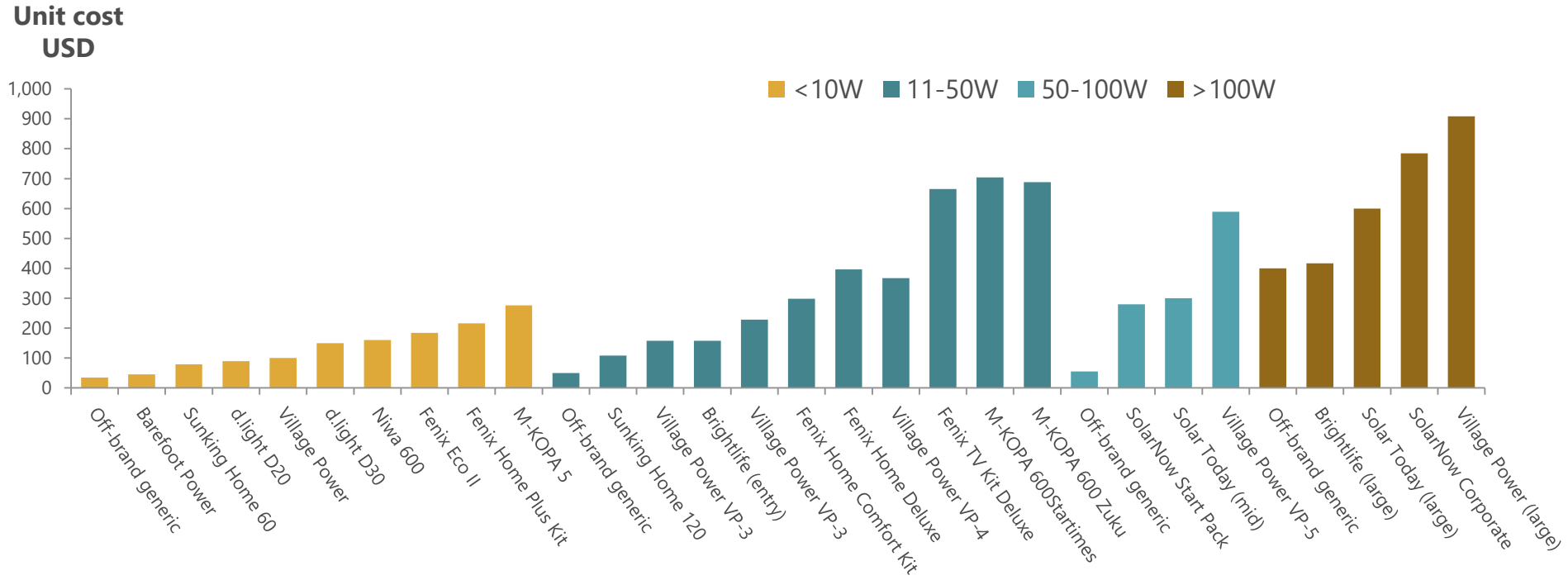
Supplier landscape wide-ranging & divided, with prices varying across the size of the SHS and many payment options available



Market typically divided in 3 categories, based on branding & services level:

- **Off-brand generics:** Ultra-low cost, generally sold by individual components, offer similar specs to brand-name products, but often mislabeled, w/short life-span
- **Branded retail:** Brand-name, reputable systems sold via retail or through distributors, aftersales service limited to distributors. Usually purchased with upfront cash or on credit from partners
- **Branded service level:** Brand-name, reputable systems sold directly through own channels and provide aftersales services. Able to provide credit to customers, many utilizing PAYG model with 6—36 months repayment period

Source: UOMA research and interviews, http://www.fenixintl.com/uganda, http://www.m-kopa.com/products, https://www.SolarNow.eu/solar-solutions, http://www.greenlightplanet.com/shop, http://power4all.org/products, https://www.lightingglobal.org/products

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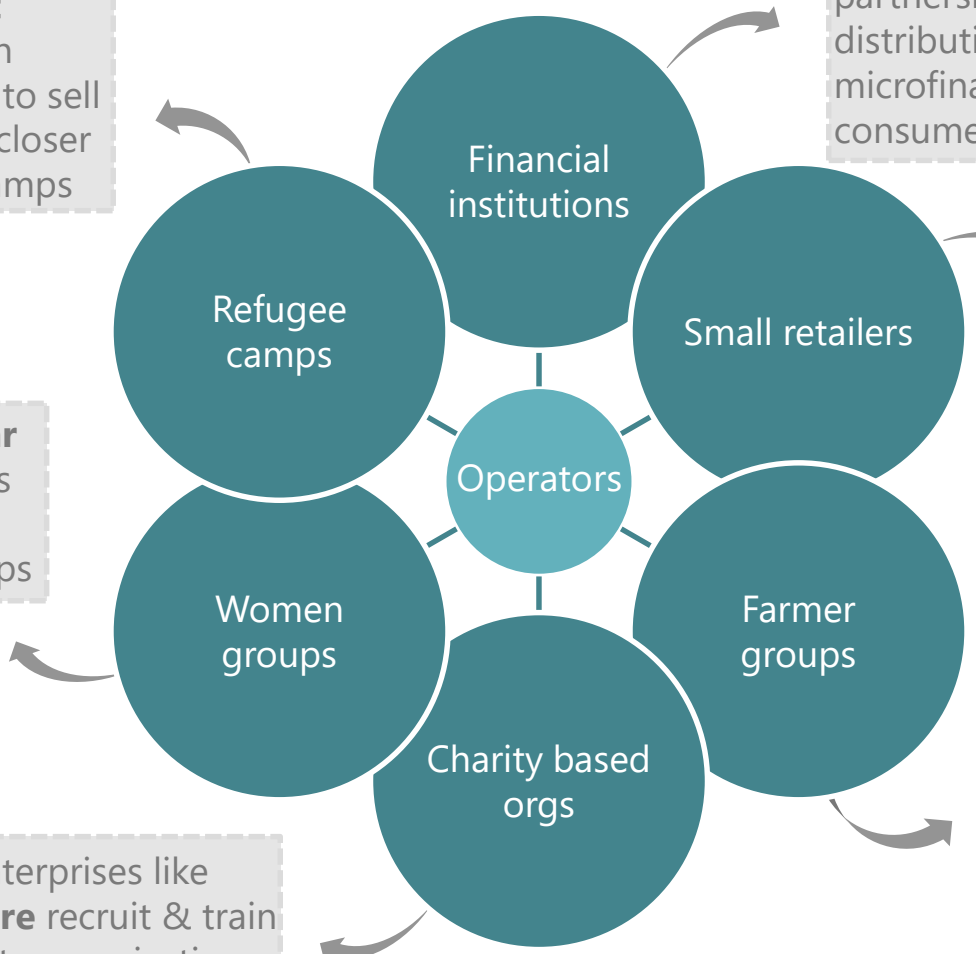
Several businesses are exploring different distribution models to reach last mile

Orgs like **Barefoot Power** partner with development orgs to sell low cost products closer to displacement camps

Some like **Brightlife-FINCA** partnership leverage larger distribution networks of microfinance & provide consumer financing



Manufacturers/importers like **Sunshine solar** distribute products through retail kiosks prominent in villages

Operators such as **Solar Sister** recruit women as agents to sell to their networks & small groups

Models like **One Acre Fund** leverage their farmer cooperatives to offer energy products on credit

Social enterprises like **EnVenture** recruit & train grassroots organizations to reach the last mile

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Majority of sales in Uganda coming from PAYG operators; highest branch density in Central & Western regions

SHS market driven by credit sales with most operator branches in higher-density regions

Operator	Units sold in UG[1]	Branches/Distribution points in UG					Price of lowest cost system
		Total	North	East	West	Central	
fenix intl	220,000	**89**	9	24	26	30	$189
M-KOPA SOLAR	120,000	**21**	10	6	4	1	$274
solar now	25,000	**34**	4	6	13	11	$480
Bright Life	15,000	**24**[2]	4	5	7	8	$70
Village Power	12,150	**15**	2	2	3	8	$100
Solar today	10,000	**16**	-	-	12	4	$300
SOLANTIS	6,000	**8**	3	2	1	2	$131
Rest of market	~10,400[3]	*Market leverages agents across network, not enough data on spread*					
Total	**~420,000**	207	32	45	66	64	

SHS distribution branches are located predominantly in higher-density areas, with fewer service centers in Northern region

Estimate represents multilight point SHS; GOGLA reports >1.5M systems sold in UG to date including pico

Sources:

1. UOMA interviews & consultations, supplemented by: http://www.fenixintl.com/uganda, http://www.m-kopa.com/products/ ,https://www.SolarNow.eu/solar-solutions/
2. Brightlife leverages the FINCA Uganda branch network but has an active agent at 8 of these branches
3. UOMA estimate of > Tier 2 products sold across the country by other distributors and small retailers

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This section aggregates research & insights from pilots and reports covering UOMA initiatives

Access to finance

To reach meaningful scale, activating local capital for operators is necessary. We believe Ugandan financial institutions are at a crucial stage where centralized support & coordination could significantly advance access to local capital

Unserved populations

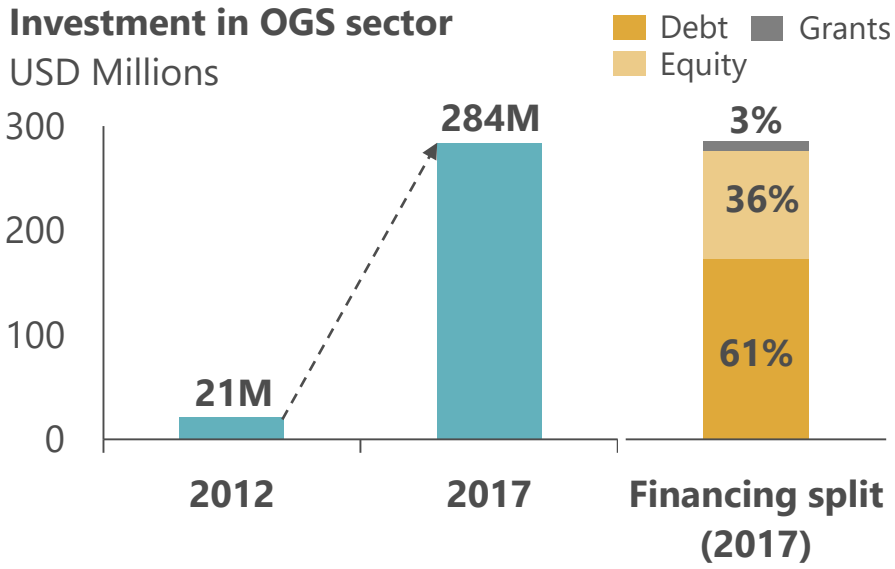
To design programs or set up distribution points for the unserved, there is an overarching need to clearly define these groups, understand their preferences and challenges, then determine pathways, and associated costs, to reach them

Enabling environment

To foster a conducive business & regulatory environment, there is need to assess impact of current policies & standards, identify gaps and advocate for suitable policies that could increase uptake & participation of stakeholders

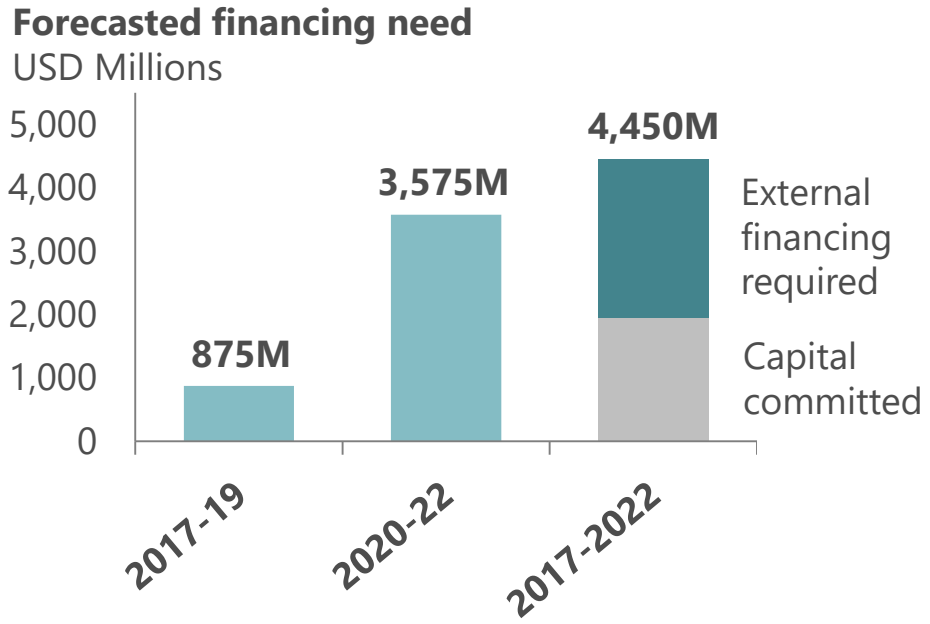
OGS sector has experienced rapid growth in investment, additional investment largely required to finance PAYG working capital needs

Significant increase in financing of OGS sector



- Investment in sector has grown significantly, doubling from 2012 to 2016
- Annual investment in 2017 reached ~$284M with ~$922M cumulative funding raised since 2012
- Investment comprises of grants, commercial debt & equity, as well as concessionary loans; debt financing increasingly dominant, making up ~61% of investment in 2017

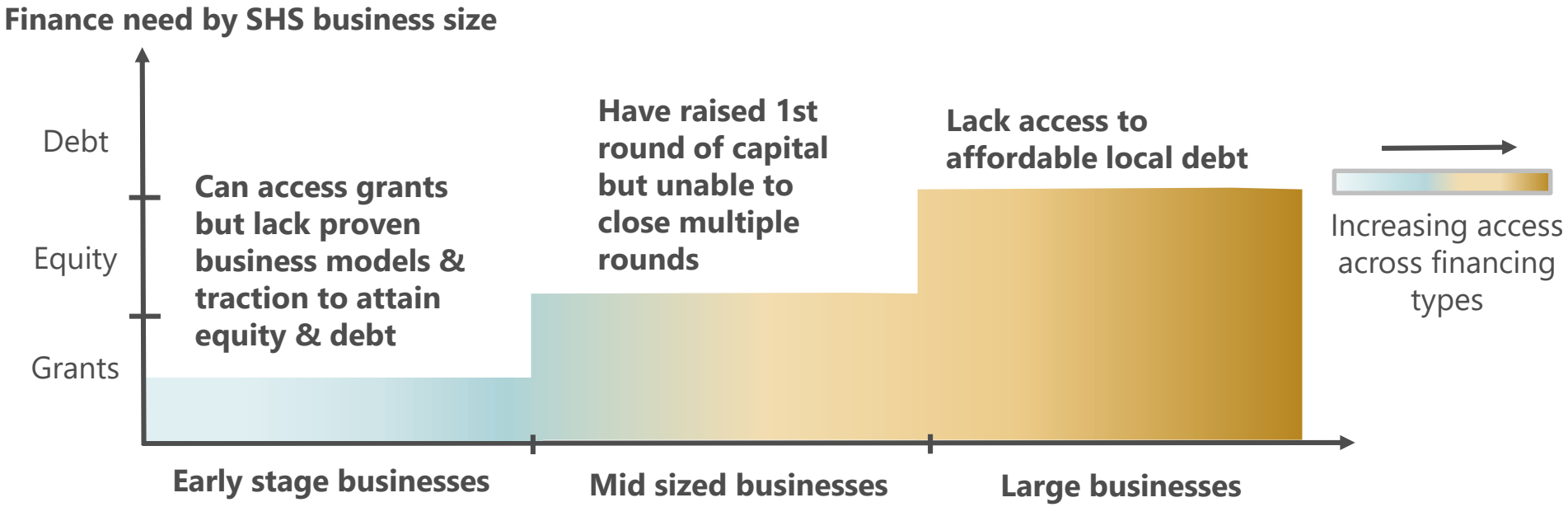
~$2.5Bn required to close financing gap



- Top OGS affiliated companies will require ~$4.4Bn from 2017-2022; with ~$1.9Bn in place, $2.5Bn will need to be raised from external sources
- Large proportion of investment required will be in form of debt to finance consumer receivables & inventory
- Equity and grants still relevant to spur innovation of business models to reach hard-to-serve consumers

Sources: 1. Lighting Global & Dalberg: Off-Grid Solar Market Trends Report 2018

Despite large investment, financing still not adequate to meet needs of SHS businesses at different stages of growth



	Early stage businesses	Mid sized businesses	Large businesses
Needs & activities	Internal capacity building, product piloting, strategy, consumer & market analysis	Aggressive marketing, creating consumer awareness, working capital for PAYG models	Expansion to new markets & geographies, develop unique customer centric products
Typical capital amount & sources	Seed funding, grants, early stage debt / equity, angel investment **$10,000-$1M**	PE funds, impact investment, development finance, lines of credit **$1M-$5M**	Commercial debt, PE, syndicated debt **$5-$10M+**

Sources: 1. UOMA analysis 2. Acumen: Accelerating Energy Access, The Role of Patient Capital

Local SHS operators struggle to access capital across financing instruments due to external and internal challenges

Internal

1 Operators don't have proven business models for SHS & lack traction

- Early stage businesses have insufficient traction of revenues, cashflows & service delivery required by investors
- Continuously changing business models makes it difficult for investors to assess future performance

2 Businesses lack internal capacity to manage operations & obtain investor buy-in

- Limited technical expertise to articulate and implement growth strategies
- Inefficient company systems & processes for credit management

3 Lack of collateral as a pre-requisite to access financing especially from local banks

- Majority of businesses still too small to have sufficient collateral required by financiers to access commercial capital

External

4 Lack of available & comparable industry data to inform financing deals

- Financiers lack comparable and validated data to benchmark the industry and understand business models
- Lack of verified performance data delays financing & prolongs due diligence process

5 Limited finance industry capacity & sector knowledge to assess SHS businesses

- Investors have low understanding of market players, products & trends
- Financiers like local banks lack personnel particularly allocated to reviewing off-grid businesses

6 Lack of standard performance indicators to guide due diligence process

- Investors lack standardized indicators to guide assessment of businesses & evaluation of financing risk

Sources: UOMA interviews with local financial institutions & SHS operators

However, there are innovative financing strategies currently available to increase lending to SHS operators

	Financing strategy
Concessional lending	• Operators are given loans with more favorable payment terms compared to commercial loans; concessional loans offer lower interest rates, longer payment tenors & grace periods that reduce default risk for investors and cost of capital for operators
Guarantees	• Local financial institutions are offered guarantees from dev't organizations to cover portion of losses in case of default from operators; usually structured according to level of risk exposure with guarantors heavily involved in due diligence
Off balance sheet financing	• PAYG companies are financed based on underlying receivables without recourse on the balance sheet; operators would need to improve their credit assessment capabilities to attract more commercial financing through off balance sheet
Results based financing	• Financial incentives are usually disbursed to operators upon delivery of specific outputs that will in turn increase availability of credit and transfer risk to operators to deliver on key milestones
Special Purpose Vehicles (SPV)	• Emergence of SIV's like Microfinance Investment Vehicles (MIV's) that originally offered wholesale debt to MFI's are potential sources of funding to enable scale of PAYG model

Sources: 1. Lighting Global & Dalberg: Off-Grid Solar Market Trends Report 2018 2. SNV: Innovative Finance for Renewable Energy Solutions 3. The World Bank & Climate Investment Funds: Options for Developing Financing Instruments Using Public Funds

OGS sector has also seen greater prevalence of local currency financing through partnerships to increase affordability of capital

	Examples	Outcomes
Syndicated asset financing facilities	• ***SolarNow*** *received $6M syndicated asset financing arranged by* ***SunFunder*** *designed to finance customer receivables; each financier provided $2M*	• *Enhances focus on expansion of PAYG to reach over 25,000 clients and tackle unserved market*
Local & multi currency debt facilities	• ***M-KOPA solar*** *secured US$55M* ***local currency debt*** *equivalent, led by* ***Stanbic Bank*** *for PAYG solar installations for 1 million households.*	• *Presents a more cost-effective way to fund last mile distribution while delivering sustainable returns to lenders*
Working capital facilities	• ***UECCC**** *funded by* ***World Bank*** *extended an $8.5M line of credit to PFIs as working capital loans to solar providers. PFI's include:* ***Centenary Bank, Barclays Bank, Finance Trust Bank, Stanbic Bank and Post Bank***	• *Reduces skepticism of financial institution to lend to solar operators*

Investors are more inclined to offer debt financing to large companies, leaving smaller businesses to struggle for more expensive debt:

- Since 2012, capital deployed has largely been allocated to already established businesses; over 80% of capital financed was attributed to ~10 market leading companies

Sources: 1. "SunFunder closes $2m multi-currency debt facility in Mozambique with MFX Solutions for SolarWorks!," SunFunder, https://sunfunder.com/news/solarworksdebtfacility
2. "SunFunder leads $6m syndicated receivables financing facility for SolarNow - SolarNow Uganda," SolarNow Uganda, https://www.solarnow.eu/sunfunder-leads-6m-syndicated-receivables-financing-facility-solarnow 3. "Breaking records in financing off grid," M-KOPA Solar, http://www.m-kopa.com/breaking-records-in-financing-off-grid/

* UECCC = Uganda Energy Credit Capitalization Company is a government institution established to facilitate investment in the renewable energy sector

Consultations with local banks in East Africa revealed 4 key risk drivers that limit lending to SHS businesses

1. Enterprise risk

- Banks struggle to find pipeline of businesses suitable for available ticket sizes & that match traction requirements; those with sufficient traction require larger loans
- Misalignment of bank off-grid lending efforts and overall credit strategy influences design & performance of loan products; high transaction costs of financing also limits deals closed

2. Operational risk

- Limited number of bank personnel focused on off-grid lending; lack technical expertise to understand SHS trends, business models and evaluate investment risks
- Typical bank processes & systems are not synced to technology used by SHS businesses and cannot capture relevant data to assess performance e.g. links to mobile money data

3. Legal & regulatory risk

- Bank interpretation of reporting standards like IFRS 7* leads to more stringent collateral requirements for SHS businesses to account for unsecured loans
- Single lender limit of USD 2M in Uganda hinders financing offered to larger SHS businesses; also limits large international banks with local presence

4. Investment risk

- Due to high perceived risk of lending, banks offer small loans, with short tenors & high interest rates that are expensive for operators in comparison with social impact investors
- Majority of businesses are at growth stage and have high defaulting potential due to low sales & evolving business models; uncertainty of credit worthiness limits bank financing

Sources: 1. UOMA analysis supplemented with consultations from local banks *IFRS 7 requires entities to provide disclosures in their financial statements that enable users to evaluate the significance of financial instruments, the nature and extent of risks arising from them and how entities manage those risks

To increase lending, banks need to build in-house capacity, develop new products, business pipeline and stakeholder partnerships

Build in-house capacity

- Conduct consistent training for bank credit teams to increase knowledge of off-grid sector
- Refine current bank systems to align with industry KPI's

Develop business pipeline

- Partner with intermediaries to build pipeline; long run, opportunity exists to offer pre-investment support to businesses
- Participate in sector events to identify & build relationships with potential businesses

Design new products

- Review & assess current product design to better align with bank strategy
- Onboard external capacity to support suitable product development

Partner with key stakeholders

- Partner with dev't organizations to access financing facilities to boost liquidity
- Engage external financiers like DFI's to obtain guarantees that hedge investment risk

Sources: 1. UOMA analysis supplemented with consultations from local banks

In order to reach unserved it is critical to address themes on affordability, access & awareness

Affordability

Important to understand how to reach the poor & insecure non-poor:

- Some cannot fully afford current products or WTP lower than products available
- Some earn seasonal income and will require innovative finance structures to serve
- Live below poverty line cannot afford the products available

Access

Important to think through what models are commercially viable & effective:

- Sparse population & poor infrastructure has made it costly to set up branch networks to serve entire region

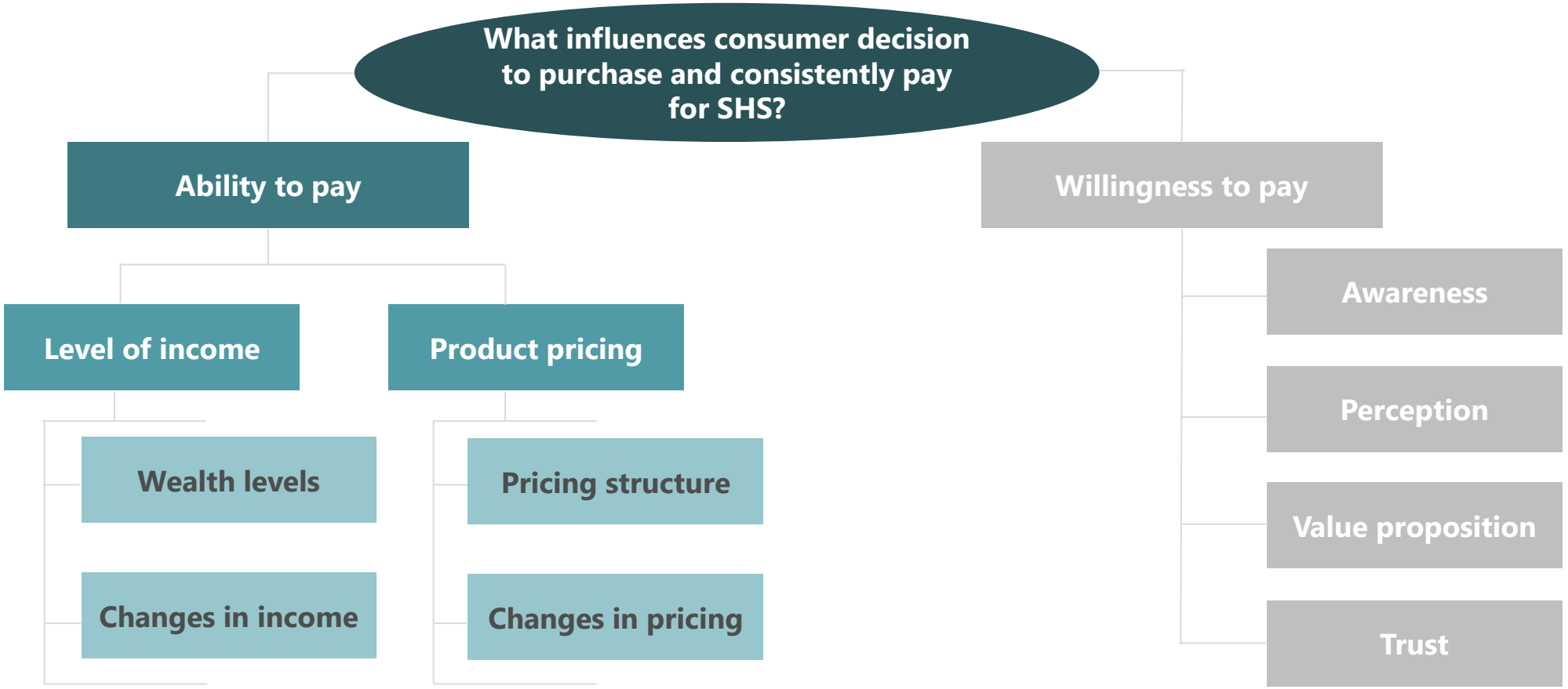
Awareness

Important to understand what is framing consumer's understanding of solar and purchase of energy:

- A number can afford but do not trust or have skewed perception of value & benefits

Sources: UOMA analysis

Affordability: In order to develop strategies to serve, our framework examines affordability as key theme for segmentation



Customers segmented based on how their purchasing power would be influenced by a change in income or price

Customers segmented based on their ambitions around energy, how much they understand or value solar, how adapted products are to their needs and who they trust to make a purchase

Sources: UOMA analysis and research

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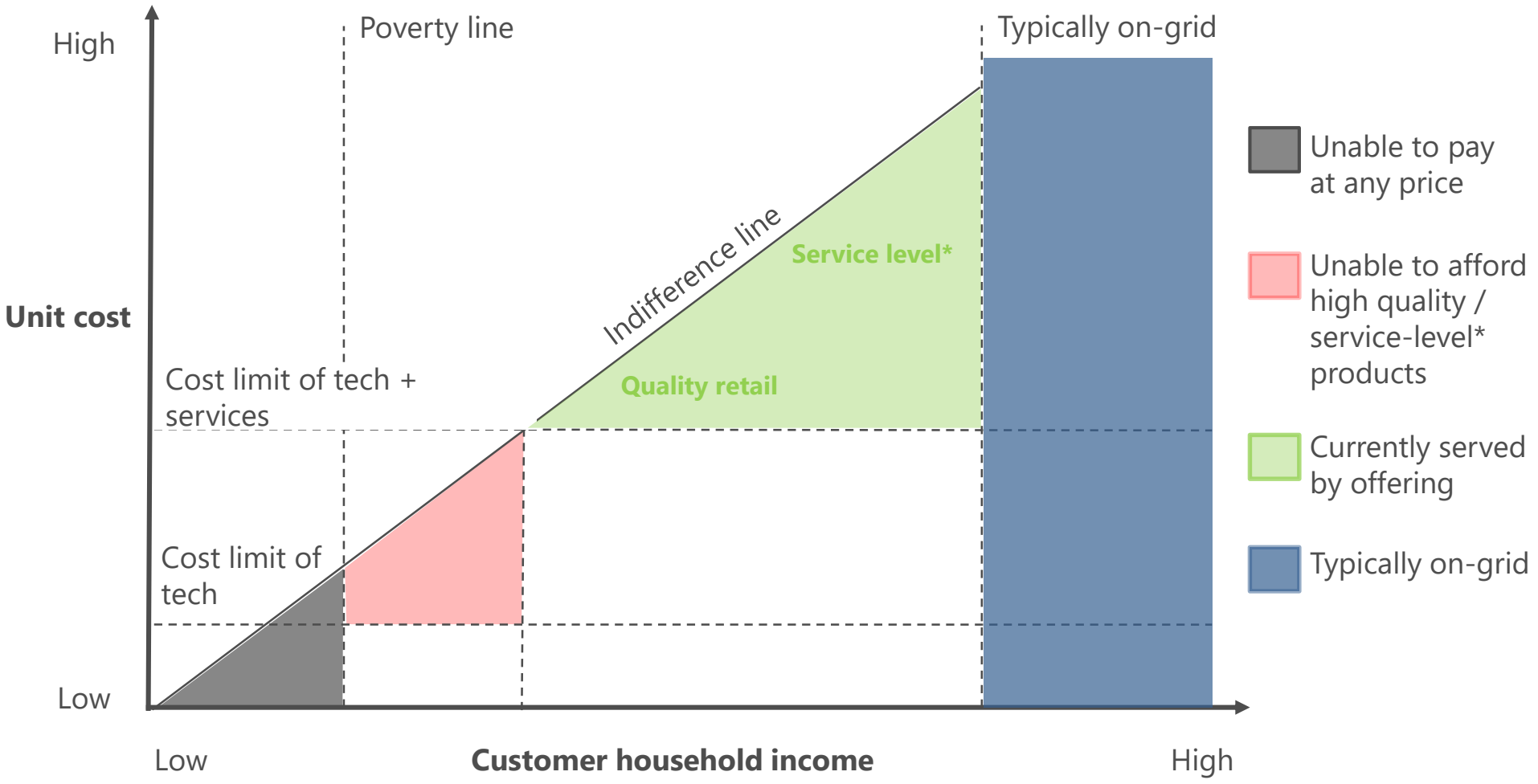
Affordability: Leading operators sell to upper market, with lower income populations unable to afford, left to buy low-quality units



High cost to provide service means many households unable to afford, left to buy cheap units or continue with traditional fuels

* Service-level defined as products offered by businesses able to provide servicing & warranties. These products are of higher quality and are more expensive than off-brand generics.

Sources: UOMA analysis

Distribution: Operators are increasingly focusing on distribution models for women & refugees to achieve social and business impact

	Social impact	Business case
Women	**Opportunity exists to improve livelihoods of women** • Majority of women are primary caretakers of households and have limited time to participate in income generating activities • SHS access increases amount of time available for women to manage own businesses and earn incomes	**Potential exists to boost revenues of SHS businesses** • Women are considered hidden influencers and play a critical role in making SHS purchase decisions • Recent studies show that women can sell to twice as many households as compared to men due to their network effect
Refugees	**Opportunity exists to improve livelihoods of refugees** • UG hosts ~1.4 million refugees, majority of whom use wood fuels & kerosene to meet energy needs • There is a growing need to find better ways for refugees to achieve self-sufficiency and serve as economic engines in their host countries	**Potential exists to fill energy gap in refugee camps through PAYG SHS** • Refugees provide an opportunity for PAYG operators to test new markets & products • Increasing energy access to refugees enables outreach to new off-grid customers and hence growth in operator sales

Source: 1. Calvert Impact Capital., Just Good Investing, 2018, https://www.calvertimpactcapital.org/2018-impact-report

Women: Distribution of SHS to women has been limited by perception of their ability to pay & make purchase decisions

Women are perceived as unable to purchase SHS

Sales agents don't perceive women as final decision makers for SHS

- Since majority of men are breadwinners in homes, sales agents usually focus on selling to them as they can make the purchase decisions

Women are not deemed creditworthy since they struggle to afford SHS & access finance

- Operators are hesitant to sell to women since as they rarely manage income generating activities
- Women are also not considered creditworthy because they struggle to access finance due to lack of collateral

Operators don't include women as part of their distribution strategies

- Operators usually focused on meeting sales targets and don't consider women when developing sales & distribution strategies

However, innovative models are being explored

To reach more women, operators are exploring innovative women-focused distribution models

- Targeting women-led activities like market days
  - Market days are used to demonstrate & sell SHS products to women; also help operators identify potential customers
- Including women as part of sales teams
  - Operators like Solar Sister, have women as part of their sales teams to influence other women purchase SHS
- Leveraging women influencers to inform purchase decisions
  - Community women influencers are used mobilize other women and speak positively about the purchase of SHS
- Increasing awareness through informal community-based women financial groups
  - Operators partner with women financial groups to distribute & offer credit for SHS

Sources: UOMA analysis

Women: More efforts are required by SHS operators to consider women when developing distribution strategies

Adjust mindsets of sales personnel

Communicate importance of gender inclusion to adjust mindsets of sales & distribution teams

- Communicate impact created by increasing access of SHS to women as well as their role in making purchase decisions and influencing communities

Train distributors to reach out to women

Train sales personnel on more effective techniques of distributing SHS to women

- Train distributors on how to tailor strategies to reach more women; for example, include women-specific customer messaging during after sales services

Incorporate gender focus in sales strategy

Incorporate women-focused sales approach as part of distribution strategy for SHS operators

- Develop sales strategy that includes focus on reaching out to more women; recognize women as end consumers of SHS, assess and include their needs in product design

Sources: 1. Shell Foundation, A business first approach to Gender Inclusion, 2018, https://shellfoundation.org/app/uploads/2018/10/A-business-first-approach.pdf

Refugees: SHS penetration & distribution to refugees in UG has been limited thus far by several challenges

Limited information about refugee camps	• Limited information exists about the demographics, population, incomes & business activity in camps
Commercial approach limited by hand-out culture	• Refugees often receive hand-outs from humanitarian organizations and might not adjust to commercial approach
Impermanence of potential customers	• Refugees are uncertain about resettlement in countries of origin hence don't invest heavily in energy products
Logistical constraints to supply goods to camps	• Refugee camps are located in remote areas making it difficult to distribute & supply goods to customers
Insufficient market	• Operators are not certain about SHS demand in refugee camps in as much as the need is present
Low level of connectivity & mobile banking	• Many don't have phone access and can't access mobile banking services to support PAYG models
Refugee ID's not accepted by some companies	• Refugee ID's are not accepted by some companies in UG limiting registration for services like mobile money, banking, etc.
Limited data on refugees	• Due to insufficient documents, operators are unable to obtain historical data on refugees to access their credit worthiness

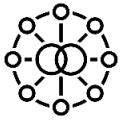
Sources: 1. IFC, Kakuma as a Marketplace, 2018 2. USAID Power Africa, Implemented by Green Powered Technology, in partnership with Energy 4 Impact, De-Risking Pay As You Go Solar Home Systems in Uganda Refugee Settlements Project

Refugees: Public private efforts like the Smart Communities Coalition seek to increase connectivity, access to digital tools and energy

The Smart Communities Coalition (SCC) is a public private effort co-chaired by USAID Power Africa & Mastercard to transform the operating model in refugee camps and settlements

SCC will mobilize & organize stakeholders according to their core strength to address fundamental pillars of connectivity, digital tools & energy access

- **Connectivity:** A recent study found that mobile phone and internet access is as critical to refugees' safety and security as food, shelter & water



- **Digital tools:** Implementing agencies increasingly rely upon digital technology to reach refugees and locals; digital tools open up new education, training, livelihood and information opportunities

- **Energy access:** Power is not provided in settlements as a service, so refugees rely on poor quality, expensive diesel generators; SHS using PAYG models offer opportunities to enable livelihoods

SCC objectives

- Increase efficiencies in camp management and service delivery
- Empower refugees to provide for themselves and their families
- Equitably address the needs of host communities in/around targeted settlements

SCC ecosystem approach

- Identify market opportunities
- Establish cross-sectoral working groups
- Enable exchange of expertise and ideas across the working groups
- Implement pilot projects via working groups
- Track KPIs as part of M&E and learning

Sources: 1. Smart Communities Coalition (SCC), October 2018

Refugees: Recent study reveals findings on digital technology for refugees; insights relevant for mobile-enabled PAYG SHS

MasterCard & Western Union conducted a study to understand digital technology infrastructure of refugees; the study was based on 2 largest refugee settlements in Kenya – Kakuma & Kalobeyei

- From research conducted, a digital model was created to focus on mobile money, digital vouchers & card-based solutions and key insights were observed

1. *Camps comprised of three key income segments, which include impoverished new arrivals, intermediate residents & economically active residents; economically active refugees more commercially viable for PAYG SHS*

2. *Refugees that have spent a long period in the camp have a higher likelihood of transitioning from impoverished to more economically active making them able to afford SHS*

3. *Most refugees that contributed to market research had smart phones, bought from local merchants through installment plans; phones were particularly used to communicate with networks and receive funds. Access to mobile phones will support payment collection through mobile money*

4. *Refugees prefer withdrawing remittances and saving in cash or mobile money; majorly use remittances for food, lighting, education and purchasing business assets like sewing machines*

5. *Financial aspirations and desires of those in Kakuma and Kalobeyei are no different than higher-income segments despite their complex financial situation*

Opportunity to leverage DFS in the camps to extend energy access

Sources: 1. MasterCard, Western Union. Using digital technology to create sustainable refugee economies

Refugees: To increase SHS distribution to refugees, important to assess roles of various stakeholders in tackling challenges

PAYG SHS providers	• Participate in piloting distribution models to refugee camps, since Uganda 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 appropriately 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 SHS operators to de-risk initial credit systems offered to refugees, given the uncertainty around their ability & willingness to pay as well as permanence • Give operators local context on regulations and ensure they are aligned with humanitarian mandate • Reduce free and low-quality solar systems being offered to refugees as they distort the market and reduce willingness to pay
Mobile Network Operators (MNO's)	• Directly partner with SHS operators to use the MNO's mobile services and networks as a mode of payment for solar clients • Ensure mobile money access is within close proximity to refugee camps; for example, have mobile money agents close to the camps

Sources: 1. GSM Association, The case for pay-as-you-go solar home systems in Kakuma Refugee Camp, February 2019

Awareness: Important to understand factors that influence consumer behavior in order to improve perceptions in the market

To influence consumer decision-making and increase solar uptake, effective communication is needed across 4 key areas:

Building awareness → **Changing mindsets** → **Gaining credibility** → **Influencing purchase**

Consumer awareness
What is solar?

Exposing consumers to basic understanding of off-grid solar products

Consumer education
Why solar?

Educating consumers on benefits of using solar products

Value proposition
How to select?

Helping consumers understand the different products available & how offerings can be adapted to their needs

Distribution & quality
Where to get quality?

Communicating where & who can provide quality approved products

Effective communication in this process should incorporate a concrete understanding of the target audience:

- What cultures and norms influence purchase & ambitions around energy for this group?
- Who are the influencers and decision makers in the community?
- What value and benefits are most appealing to specific regions and groups?

Sources: 1. Soltherm Europe - Campaign Guidelines, van der Ree B., Mert W., 2003

Awareness: Based on pilots, operators leveraged existing community groups & partnerships with mobilisers to create awareness

1 *Consumer response and perception was greatly defined by community influencers*

- *From pilots conducted, consumer perception and interest in awareness campaigns and road shows was shaped by the kind of influencers hosted; for example, LC's, MP's, community leaders, etc.*

2 *On ground coordination by operators and local mobilisers was more effective in creating awareness*

- *It was important to have operator teams work with local community mobilisers who could easily influence their fellow members and offer context on when to hold awareness initiatives*

3 *More effective to conduct trainings and info sessions through already existing community groups*

- *Easier to reach and mobilize large numbers of potential consumers through existing groups of farmers, women, savings, faith-based groups, etc.*

4 *Information communicated ought to resonate with consumer needs and community characteristics*

- *Necessary for operators to understand characteristics of consumers in targeted communities of outreach and tailor messaging to suit these groups*

5 *Follow up group meetings and one-on-one after sales services were key in influencing purchase*

- *Initial awareness campaigns needed to be coupled with subsequent on ground group visits to offer after sales services and influence purchase decisions; these built credibility & trust in operators*

Source: UOMA pilots

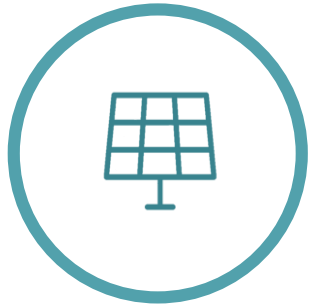
Fiscal policy and product standards for SHS are a large focus in creating a conducive enabling environment for off-grid acceleration

Fiscal policy

Section looks at current tax regime & fiscal interventions in order to:

- Assess impact of current tax regime and draw comparisons with various tax scenarios
- Consider other fiscal policy interventions like subsidies and assess their impact on SHS uptake
- Goal is to obtain flexible tax structure that balances tax revenues & consumer uptake

Product quality & standards



Section looks at standards regulating quality of SHS products on the market in order to:

- Assess current standards on product quality, identify existing gaps and recommend ways to implement solutions
- Develop strategies that can build consumer trust in suppliers & increase credibility of products on the market

Fiscal policies: UOMA conducted fiscal policy analysis that revealed current tax regime as reasonably conducive for SHS growth

Fiscal policy analysis assessed five tax scenarios for SHS components & potential effects on uptake

- Currently, SHS operators are exposed to corporate income tax and product-based tax like Value Added Tax (VAT) & import duties; analysis focused on VAT & import duty only
- Tax scenarios reviewed included:
  - Current tax regime with exemption on solar generation components only
  - All taxes removed
  - Only VAT applied to both solar generation & transmission components
  - Only import duties applied to both solar generation & transmission components
  - All taxes applied

Findings from the analysis revealed that current regime is conducive for SHS growth

- Full VAT and import duty exemptions on solar products was not suitable due to difficulties in enforcement; despite having the largest growth in connections, it also led to significant loss in gov't tax revenue of >$18M
- Similarly, without any exemptions on solar products, government accrued tax revenue of ~15M but enabled only 4% growth in connections
- Current tax regime with VAT and import duty exemptions only on solar generation accrued government tax revenue of ~$18M and had a 10% growth in connections hence optimal and favorable for growth

While current tax regime is favorable for SHS growth, more efforts need to be attributed to effective implementation

Source: UOMA, Fiscal Policy Analysis: An assessment of the tax and subsidy options to accelerate solar home systems in Uganda, 2018, Kampala Uganda

Fiscal policies: Implementation of fiscal policies largely limited by inconsistent application of taxes across SHS components

Tax policies are inconsistently applied across SHS

Lack of clarity on current tax policies & inconsistent application of tariffs across similar solar components

- Operators report inconsistent taxes and exemptions being applied to similar product components; for example:
  - Solar generation components like panels & batteries are tax exempted when part of plug & play systems
  - However, in some cases, batteries are not exempted especially when imported as stand-alone components

Inconsistent tax application also driven by lack of trust between regulators & operators

- Tax regulators are hesitant to offer exemptions to some stand-alone components as they are not fully certain of operator's intended use of these products

However, efforts are underway to tackle barriers

Industry stakeholders like Uganda Solar Energy Association (USEA) plan to foster uniform application of taxes

- Currently developing a tax handbook with Uganda Revenue Authority (URA) to provide clarity on tax guidelines for market players
- Provides approval letters for several operators to obtain exemptions when importing solar components
  - Operators will need to be registered members of USEA to obtain approval letters

To ensure effective implementation, more efforts need to be directed to creating awareness & clarity on tax policies

Sources: 1. UOMA analysis supplemented by consultations with stakeholders

Fiscal policies: Analysis also examined ways to stimulate demand and supply of solar home systems through subsidy options

1 Stimulating supply by supporting operators to reach unserved populations

- **Operator incentives:** Government agencies can incentivize operators to distribute to hard to reach areas that are not commercially feasible through subsidy and other results based funding
- **Working capital facilities:** Financial institutions can provide working capital to operators to finance inventory for products offered to consumers on flexible credit terms

Analysis recommended phasing supply stimulating interventions first before demand is increased

2 Stimulating demand by offering price subsidies to consumers to increase affordability

- **Direct subsidies:** Government can work directly with consumers to finance purchase of SHS products at a lower price; this can be done through vouchers
- **Partial subsidies:** Government can incentivize operators to reduce prices by funding a proportion for their costs that would have reflected in price
- **Consumer financing:** Financial institutions can offer affordable and flexible credit options to end consumers to support purchase of SHS

While interventions are helpful in increasing demand and supply of SHS products, they cannot fully serve entire unserved population

- Interventions like working capital facilities will increase number of operators in the market and volume of sales, but only serve consumers that can afford these products in commercially attractive areas
- Demand stimulating subsidies run the risk of slowing down sector growth and can only be implemented in specific regions in the country

Source: UOMA, Fiscal Policy Analysis: An assessment of the tax and subsidy options to accelerate solar home systems in Uganda, 2018, Kampala Uganda

Fiscal policies: Analysis also examined ways to stimulate demand and supply of solar home systems through subsidy options

Interventions are have most impact when phased; first stimulating supply then

- Interventions like working capital facilities will increase number of operators in the market and volume of sales, but only serve consumers that can afford these products in commercially attractive areas
- Demand stimulating subsidies run the risk of distorting the market and should only be implemented in specific regions of the country after commercial options have scaled

1 Stimulating supply by supporting operators to reach unserved populations

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Source: UOMA, Fiscal Policy Analysis: An assessment of the tax and subsidy options to accelerate solar home systems in Uganda, 2018, Kampala Uganda

Fiscal policies: **Important to address challenges limiting effective implementation of fiscal policies**

Strengthen capacity of local tax authority	• Strengthen capacity of local tax authority by investing in larger customs personnel & screening technology to ensure effective implementation of policies for various components
Create clarity on current tax policies	• Develop handbook that clearly outlines guidelines to understand tax treatment for each SHS component • Conduct convenings with operators & regulators to discuss misinterpretation of tax policies and align on application across products
Review & implement efficient subsidy delivery models	• Pilot subsidy delivery models provided either to operators or directly to consumers; also market package models for operators. For example, offer subsidies for a single supplier to sell systems in a specific area
Train operators & regulators on fiscal policies	• Train both operators & regulators on tax policies to ensure uniform application of taxes across solar components; conduct follow-up trainings when policies are updated in order to build trust between operators & regulators

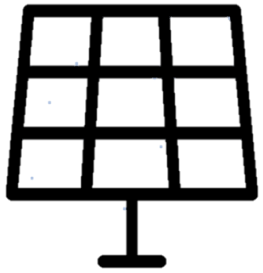
Source: UOMA, Fiscal Policy Analysis: An assessment of the tax and subsidy options to accelerate solar home systems in Uganda, 2018, Kampala Uganda

Quality & standards: **Regulation of product quality is limited by inadequate standards, minimal capacity, equipment & awareness**

	Challenges	Ongoing strategies
Inadequate quality standards	• Standards don't cater for component-based and inadequate for plug & play for example, only 30 standards cover generation components and not as whole kits	• UNBS currently working to include quality standards for component-based systems
Limited equipment to test products	• UNBS doesn't have sufficient equipment to test quality of imported products and determine operator compliance of standards	• UNCDF & ERT III are in the process of enabling UNBS purchase machinery to test product quality
Limited team capacity	• Lean inspection team unable to serve entire country; UNBS currently has 15 personnel that work across all sectors and regions in the country	• UNBS is partnering with Pre-Export & Verification of Conformity contractors to test product quality from country of origin
Lack of awareness on standards	• Operators, consumers and quality regulators lack awareness of standards guiding quality of various SHS components	• REA will work with UNBS under ERT III to promote quality assurance & awareness of solar products in rural areas

Solar Home Systems (SHS)

Productive use



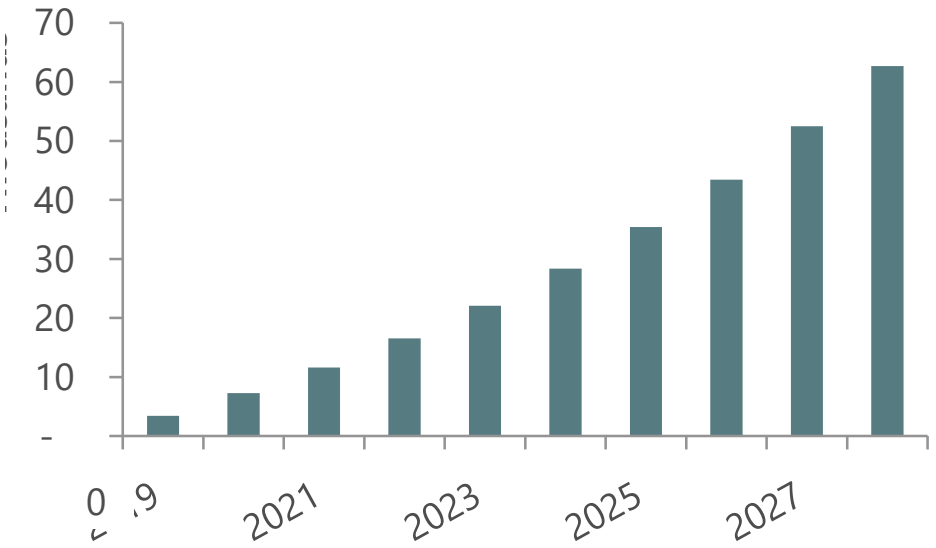
Mini-grids

UOMA
Uganda Off-Grid Energy Market Accelerator

Mini-grids forecasted to play a central role in electrification of UG

Forecast of cumulative mini-grid connections across 10 service territories in Uganda

'000 Households

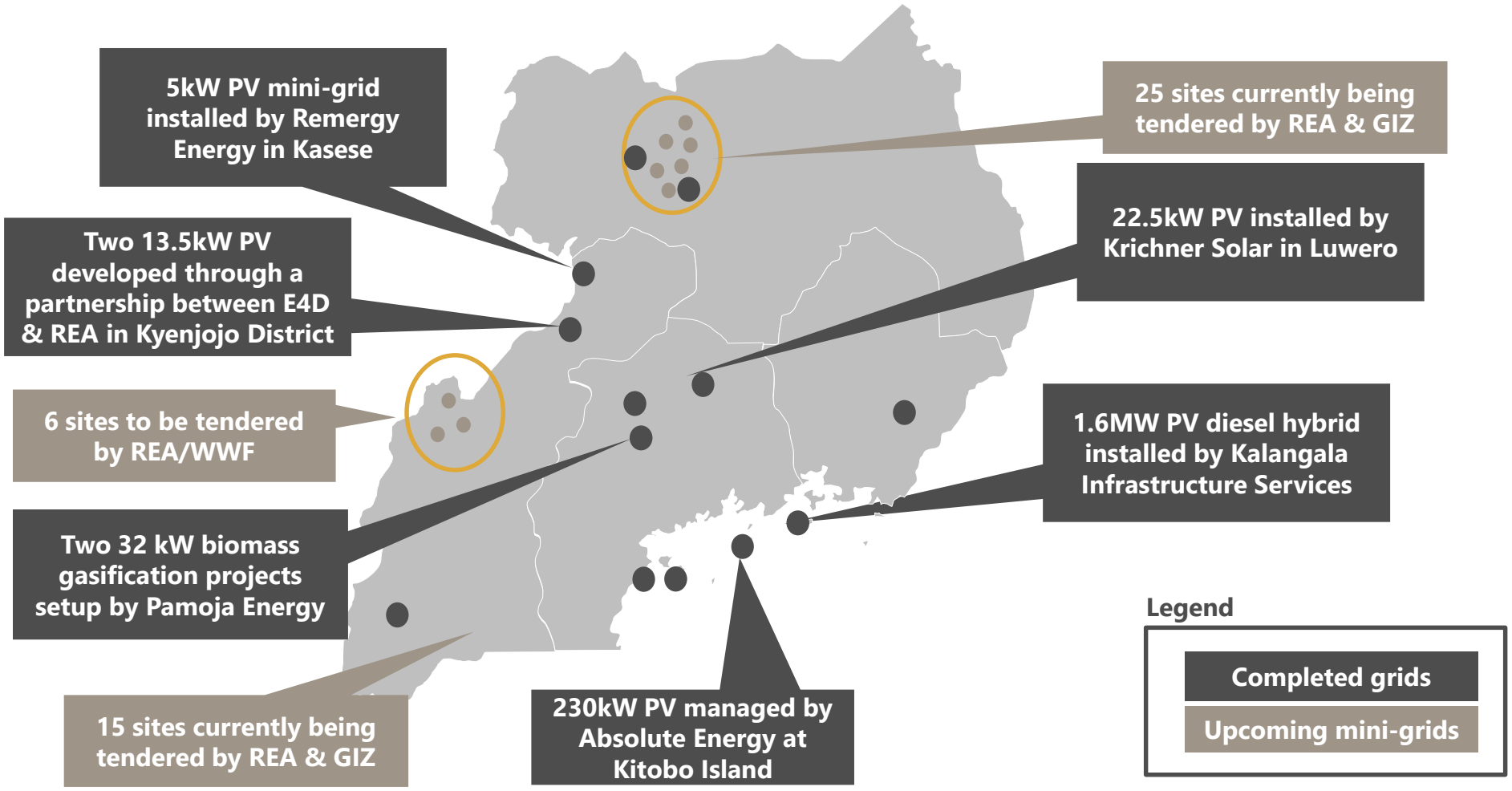


- Master Planning exercise for REA identified mini-grid sites after grid expansion analysis was completed
- Sites were identified where:
  - 50 or more households clustered (smaller number where they may serve trading centre)
  - Clusters corresponding to grid expansion but –ve NPV or cost per consumer >$2000
- The analysis also assumed consumption per customer is inversely proportional to the penetration level

- REA's Master Plan forecasts that in the next 10 years, there will be opportunity to electrify up to 62,000 households across 10 service territories of Uganda through mini-grids
- Majority of sites noted in North, West, South Western, and Central service territories
- The business case highlighted in the Master Plan for electrification implies mini-grids will continue to play a crucial role in the electrification of Uganda to achieve universal access

UMA Uganda Off-Grid Energy Market Accelerator

To date, only 14 mini-grid projects installed in UG, however several sites are currently up for tender



Vast majority of UG projects are solar / battery hybrid grids, with some donors considering mini-hydro pilots

Source: UOMA interviews & research supplemented by REA documents on mini-grid opportunities

A number of mini-grids have been constructed due to support from the private sector, Ugandan government & other financiers (1/4)

Mini-grid	Capacity and technology	Developers/Partners
Tiribogo gasification	• **Tech:** 32kW Biomass gasification • **Current connections**: 170	**Developer:** Pamoja Energy Limited **Partners:** REA, Royal Institute of Technology Stockholm, & Renewable Energy Business Incubator
Magara gasification	• **Tech:** 32kW Biomass gasification • **Current connections**: 72	**Developer:** Pamoja Energy Limited **Partners:** REA, Royal Institute of Technology Stockholm, & Renewable Energy Business Incubator
Bukuzindu solar-diesel plant	• **Tech:** Hybrid gen. station 600 kW (Solar) & 1.6MW (Diesel) • **Current connections:** 40 villages (~2500 hhs)	**Developer:** Kalangala Infrastructure Services **Partners:** InfraCo, Nedbank, USAID, DFID, UDC, and Emerging Africa Infrastructure Fund.
Kayanja Solar microgrid	• **Tech:** 5kW Solar PV • **Current connections:** ~70hhs	**Developer :** Remergy Energy A/S **Partners:** WWF, Access 2 Innovation & Joint Energy and Environment Project

A number of mini-grids have been constructed due to support from the private sector, Ugandan government & other financiers (2/4)

Mini-grid	Capacity and technology	Developers/Partners
Kiboga solar mini-grid	• **Tech:** 1kW Solar PV • **Current connections**: 11	**Developer:** Centre for Research in Energy and Energy Conservation **Partners:** National Council for Science and Technology
Bwindi community microgrid	• **Tech:** 64kW Hydro • **Current connections**: 42	**Developer:** Bwindi Community Hospital **Partners:** GIZ EnDev
Kisiizi Hydropower	• **Tech:** 300kW & 60 kW hydroelectric & diesel generator of 80kva • **Current connections:** 710	**Developer:** Kisiizi Power Ltd **Partners:** Kisiizi Hospital, Church of Uganda
Kyamagaruru solar plant	• **Tech:** 13kW Solar PV • **Current connections:** 68	**Developer :** Energy for Development **Partners:** REA, University of Southampton

A number of mini-grids have been constructed due to support from the private sector, Ugandan government & other financiers (3/4)

Mini-grid	Capacity and technology	Developers/Partners
Kanyegaramire solar plant	• **Tech:** 13kW Solar PV station • **Current connections:** 74	**Developer :** Energy for Development **Partners:** REA, University of Southampton
Eco-Garden micro-hydropower plant	• **Tech:** 5kW Hydro • **Current connections**: 16	**Developer:** Eco-Garden Ltd **Partners:** Renewable Energy Business Incubator (REBI)
RMS Pico Hydropower	• **Tech:** 5kW Hydro • **Current connections:** 3	**Developer:** Rwenzori Mountaineering **Partners:** Private Sector Foundation Uganda (PSFU), Centre for Research in Energy and Energy Conservation (CREEC)
Kitobo Solar Plant	• **Tech:** 230kW Solar PV • **Current connections**: 541	**Developer:** Absolute Energy Africa Limited **Partners:** REA, EEP Africa, Shell Foundation, FinAfrica

A number of mini-grids have been constructed due to support from the private sector, Ugandan government & other financiers (4/4)

Mini-grid	Capacity and technology	Developers/Partners
Kabalega hydropower plant	• **Tech:** 9000kW Hydro • **Current connections:** 203	**Developer :** Hydromax **Partners:** REA
Kichner solar minigrid	• **Tech:** 22kW Solar PV • **Current connections**: 60	**Developer:** Kichner solar **Partners:** REA, GIZ

There a number of up-coming mini-grids that are set to increase energy generation and access (1/2)

Developer/Tender	Capacity and technology	Partners
Bakulu Power	• (53) solar mini-grids total of 600kW in Buvuma district • Potential to reach ~8000 people	REA Energy for Impact
Absolute Energy	• Estimated capacity of 100kW Solar PV • Located in Kalangala District with potential impact of 5400 people	REA
Pamoja Energy Africa Ltd	• Biomass plant • Capacity of 50kW in Kamwenge District	REA
TBD	• Capacity of 30kW to 80kW • 15 villages in Rakai & Isingiro & 25 villages in Lamwo District	REA GIZ, Pro Mini-grids project

There a number of up-coming mini-grids that are set to increase energy generation and access (2/2)

Developer/Tender	Capacity and technology	Partners
AfDB and REA	• (10) decentralized mini-grids on Lake Victoria	REA
ORIO Infrastructure Fund	• (10) mini hydro projects • Capacity of 50 to 500 kW	Emerging Africa Infrastructure Fund, FMO (Dutch development Bank) UECCC
Mandulis Energy	• 20MW biomass project in Gulu, Northern Uganda	KfW, AfDB and Power Africa
Tiger Power	• (3) Solar PV arrays in Kyenjojo Uganda • Expected to serve 1000 households	REA The Belgium government

Setting up mini-grids in Uganda has several steps involving government licensing and community outreach

Site ID / assessment

Govt & private sector identify mini-grid sites

Government

- Identify potential sites & run them via public tender

Private sector

- Identify & develop sites within regulatory framework of licensing

Grid setup

Different permits & licenses processed from:

- Electricity Regulatory Authority
- National Environment Management Authority
- District and local community leaders

Generation

Mini-grids generate electricity from:

- Solar panels
- Diesel generators
- Biogas
- Hydro power generators
- Hybrids of various generating technologies

Sales & distribution

Developers partner with REA for last mile distribution

- With exception of few, most mini-grid developers partner with REA to provide distribution subsidy

Metering & payment

Operators use IT systems to effectively manage smart metering

- Systems receive & effectively track customer payments

After sales

Operators offer maintenance & technical assistance to customers

- Operators have technical staff that respond to customer queries
- Also provide maintenance as needed

 Source: UOMA interviews

Site ID: Mini-grid sites are identified by government and private sector operators; approved through tender or non-solicited bids

Government identified sites

- Sites are identified during master planning process or service territory concessions allotted by government
- Tenders are awarded through a competitive selection process for sites or concessions
- Setup process is considerably shorter as upfront surveys & feasibility studies have already been conducted by government
- **Regulated tariffs in parity with central grid costs hence government subsidizes project to ensure viability**

Private sector identified sites

- Sites are identified by private developers or community
- Private operator has site surveyed, initial feasibility studies conducted, and confirmation received from REA before setting up or developing the mini-grid
- **Tariffs should cover all costs of the mini-grid plus a margin; sites are likely applied in areas with higher willingness to pay**

Mini-grids in Uganda are mainly identified by public sector but managed by private developers:

- Government-led projects result in several benefits for mini-grid developments:
  - Clear planning in different territories to ensure economies of scale & reduced operational expenses
  - De-risked projects with added predictability on when grid is likely to be extended
  - More affordable utility for end-users through subsidies on distribution & connection

Grid setup: Need to process licenses & permits to operate, and leverage local partnerships for procurement

Several steps involved in receiving clearance

1. Identify proposed project in line with rural electrification master plan; project must be less than 2MW & located more than 1km from the grid to qualify for an exemption
2. Develop project feasibility study including detailed social economic assessment and environmental project brief
3. Obtain clearance of project brief from NEMA
4. Submit developed documents to ERA for consideration
5. ERA then processes and confirms the application. This involves advertising, holding a public hearing and detailed assessment of tariff proposal

Mini-grid setup begins after ERA clearance

After necessary regulatory requirements are met, developers begin setting up the mini-grid

- Mini-grid developers start constructing necessary infrastructure required to run the grid
- Components are assembled at mini-grid sites; majority of developers usually import these components
- Local partnerships are instrumental in procuring components, processing them through customs and finding a construction company to develop the infrastructure

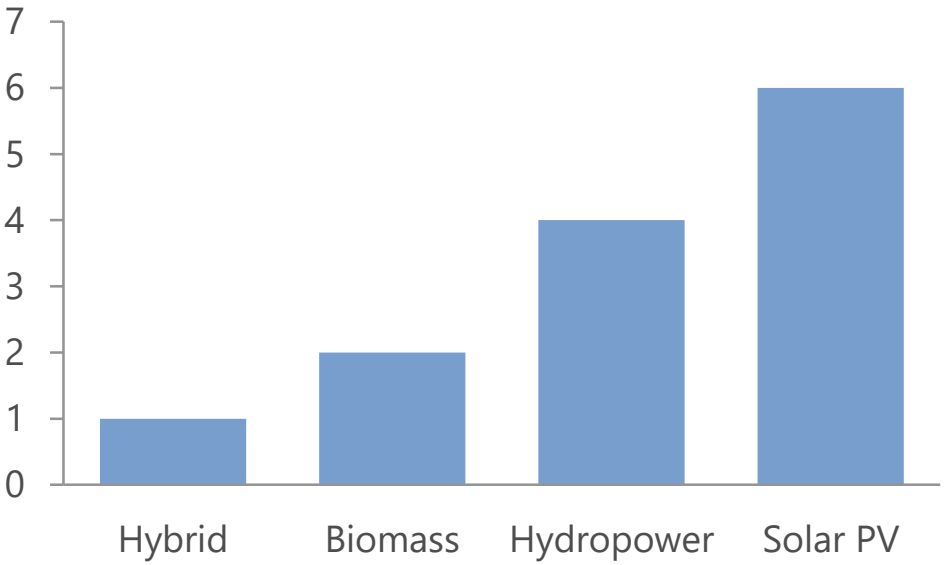
- For generation projects less than 2MW, the developer must apply to ERA for an exemption from the requirement to obtain a license
- For those sited on land held in trust by the government, the developer is required to obtain a license or concession from the Land Commission

Source: UOMA interviews & research supplemented by ERA documents on license processing procedure

Generation: **Solar & hydro dominate generation technologies of mini-grids in Uganda; trend is encouraged by reduced costs**

Solar & hydro powered mini-grids prevalent

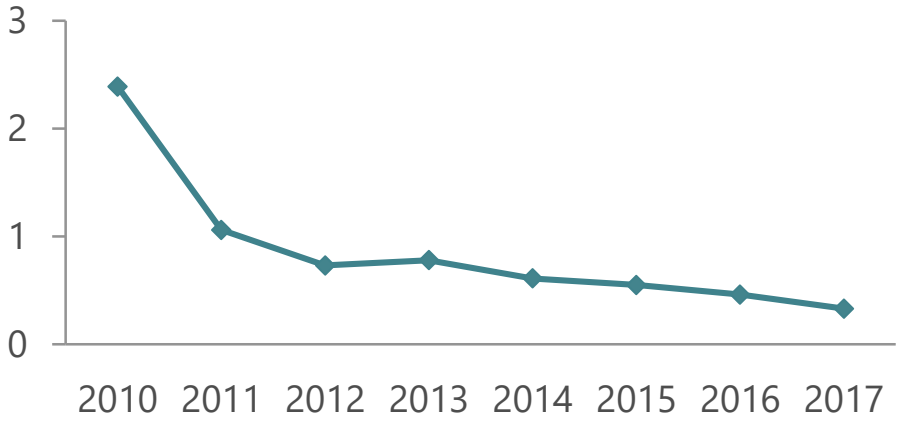
Generation mix for minigrids in UG
Mini-grids



- Solar PV & hydropower are most common generation technologies used to setup mini-grids; recently biomass tech has also been used
- Several hybrid generation technologies also exist for example, solar diesel, hydropower diesel, etc.

Reducing costs encourage use of solar assets

Cost of C-Si solar modules across the world[1]
$/W



- Uganda has solar irradiation levels of up to 2000kWh per m^2 which makes solar power relatively easy to generate
- Introduction of new & more efficient technologies has led to reducing cots and contributed to the dominance of solar generating technologies
- However, the challenge to have a good storage system for energy collected during the day still prevails

Source: UOMA interviews & research supplemented by GIZ documentation on mini-grids in Uganda

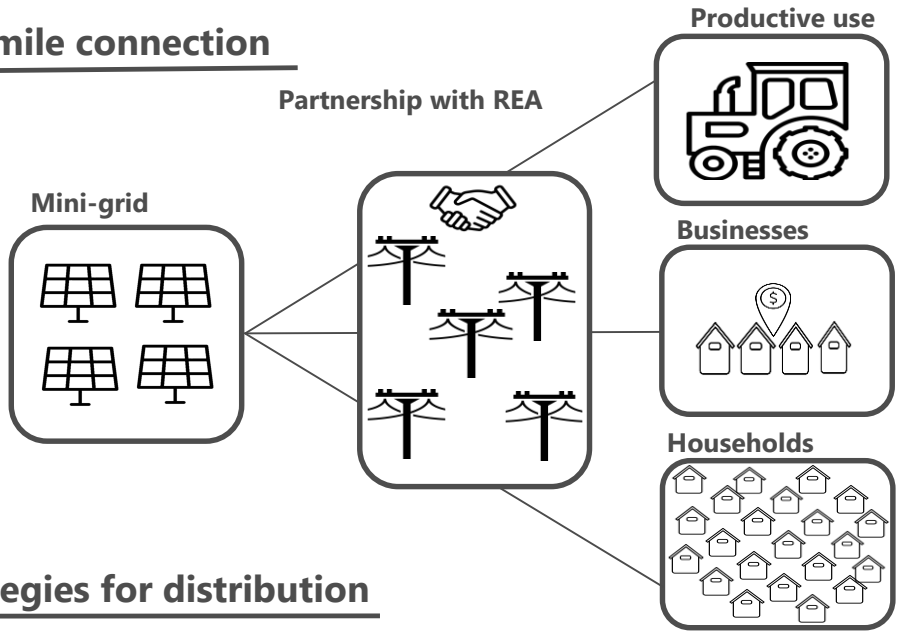
1. Lighting Global & Dalberg: Off-Grid Solar Market Trends Report 2018

UOMA Uganda Off-Grid Energy Market Accelerator

Distribution: **Last mile distribution for mini-grids is usually done in partnership with government authorities or local community**

Number received subsidy from REA for last mile connection

Many successful mini-grids have partnered with government agencies like REA for last mile distribution



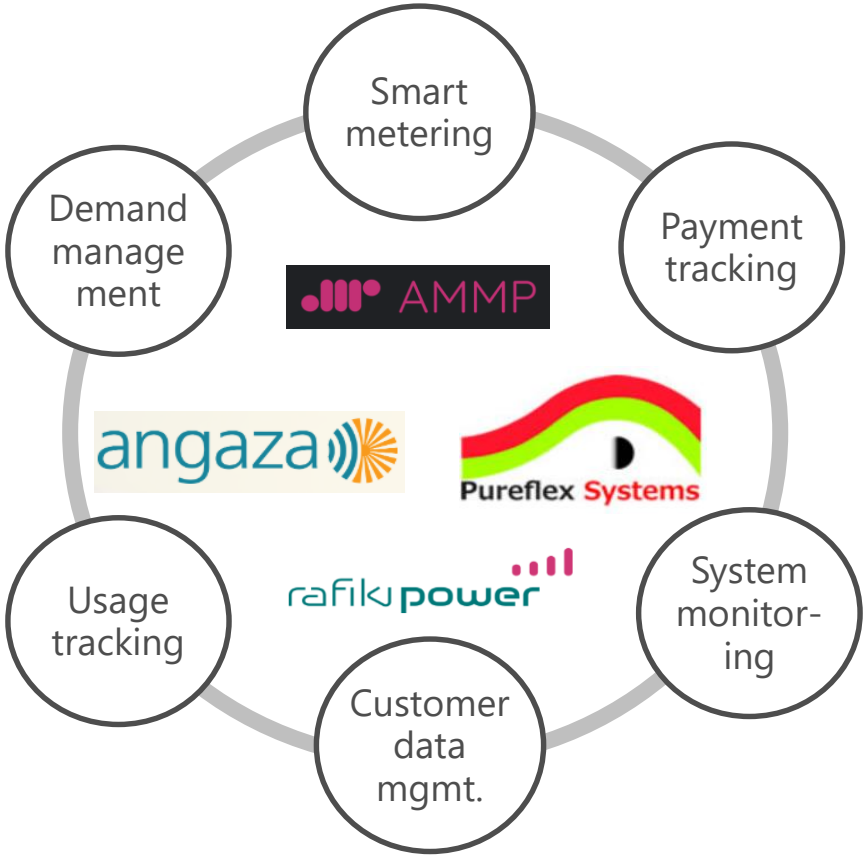
However, potential to leverage other strategies for distribution

Distribution to low-density areas can take up to **30-40%** of total project costs; mini-grid developers reduce these costs by:

- Setting productive use zones (usually commercial centers where all businesses can access electricity) E.g. Pamoja Energy Ltd.'s agroprocessing hub in Kamwenge
- Setting up business hubs with all appliances (carpentry, milling and the like) and charging service fees
- Setting up battery charging stations for consumers who live too far from the grid (near common market place/commercial center) E.g. Kisiizi Hospital Power Ltd.'s battery charging outlets

Samuel Booth et al, *Productive use of energy in African micro-grids: Technical and business considerations*(Location: National Renewable Energy Laboratory and Energy 4 Impact, August 2018), https://www.nrel.gov/docs/fy18osti/71663.pdf Opportunities and Challenges in the mini-grid sector in Africa: Lessons learned form the EEP portfolio, [, 38]

Metering & collections: **Mini-grid operators use integrated IT systems for more efficient management**



Both international and regional software providers offer systems that developers in Uganda can use to track different functions of the mini-grid

Integrated IT systems can cost 13% or more of total CAPEX for the project and are used to track and monitor customer usage

- Used to consolidate consumer data, track payments and usage for better billing (especially for PAYG systems)

Most use smart meters to monitor and track power consumption of customers

- Smart meters are used to monitor customer usage and track data on power consumption
  - Some mini-grids provide scratch cards for customers to buy and load on their meters
  - Others use prepaid mobile systems where customers pay and receive units of electricity purchased
- Smart meters are used in collaboration with mobile money services to process and collect payments without having to pay directly at the mini-grid operator's office

Source: Opportunities and Challenges in the mini-grid sector in Africa: Lessons learned form the EEP portfolio, [, 27] Pol Arranz-Piera, *Benchmarking study of Solar PV mini-grids investment costs*(USA: The World Bank, Climate Investment Finds and Energy Sector Management Assistance Program, December 2017[,14]

After-sales: **Customer support varies across different types of operators; key challenge is long distances between customers**

Type of mini-grid operator	Response to customer queries	Efficiency of after sales service delivery
Private operator	Often have dedicated team to respond to customer queries	Often have technical team dedicated to providing efficient after-sales services
Community operator	Often have team members handling a variety of tasks including responding to customer queries	Often lack technical skill required to deliver efficient after-sales service

- Long distances between customers are a key challenge across all operators; mini-grid customers are often far apart, making it difficult to efficiently provide good after sales services to all of them
- Mini-grid operators often lack technical skill required to deliver good quality services to customers

Source: UOMA interviews & research supplemented by GIZ documentation on mini-grids in Uganda

Partnerships: To implement mini-grids, working with government institutions, funding bodies, and local communities is vital

Financial partners

- Financial partners provide financing across the different stages which include; feasibility studies, infrastructural development, operations, and distribution
- Nearly all projects start off with a grant, subsidy or other type of infrastructure financing to reduce capital costs

Local community partners

- SACCOs provide loans to customers that enable them afford the initial setup
- Operators partner with local community leaders to manage operations of the mini-grid & accelerate buy in from local community members and businesses

Gov't agencies

- Uganda Rural Electrification Agency supports with infrastructure dev't and last mile consumer connection
- Government electricity agency subsidizes price of mini-grid to customers, making it more affordable to make a connection

Technology partners

- Technology partners support with operating the grid; they provide a platform used to collect payments, monitor different components of the grid and consolidate data collected

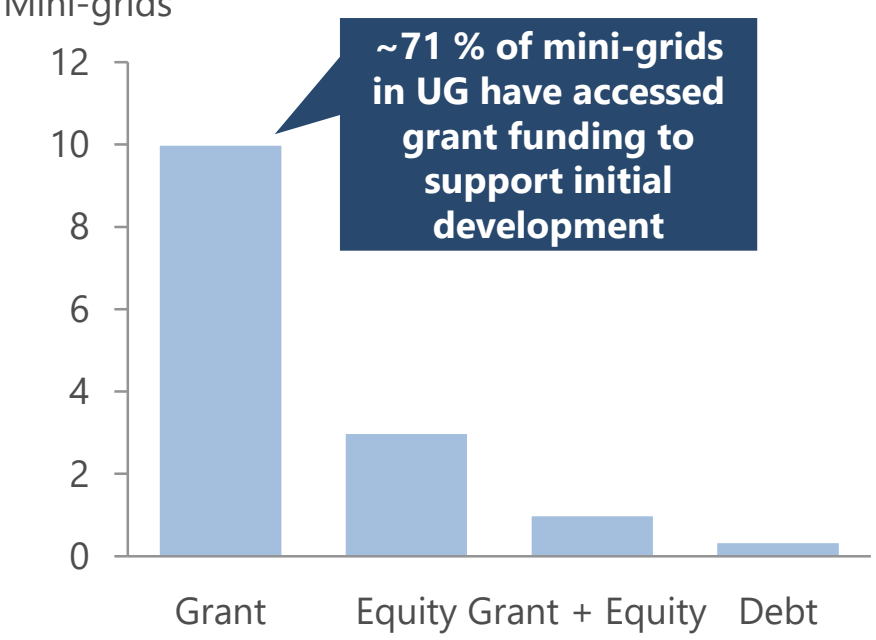
Source: Opportunities and Challenges in the mini-grid sector in Africa: Lessons learned form the EEP portfolio Samuel Booth et al, *Productive use of energy in African micro-grids: Technical and business considerations*

Despite availability of capex financing, developers lack funds to scale operations & serve hard to reach customers

Mini-grid developers have accessed concessionary finance for setup and development

- Majority of the developers have accessed grant financing; developers also use their equity to finance initial stages of development
- Debt finance providers still skeptical to provide investment due to unproven business models

Financing mix for minigrids in UG



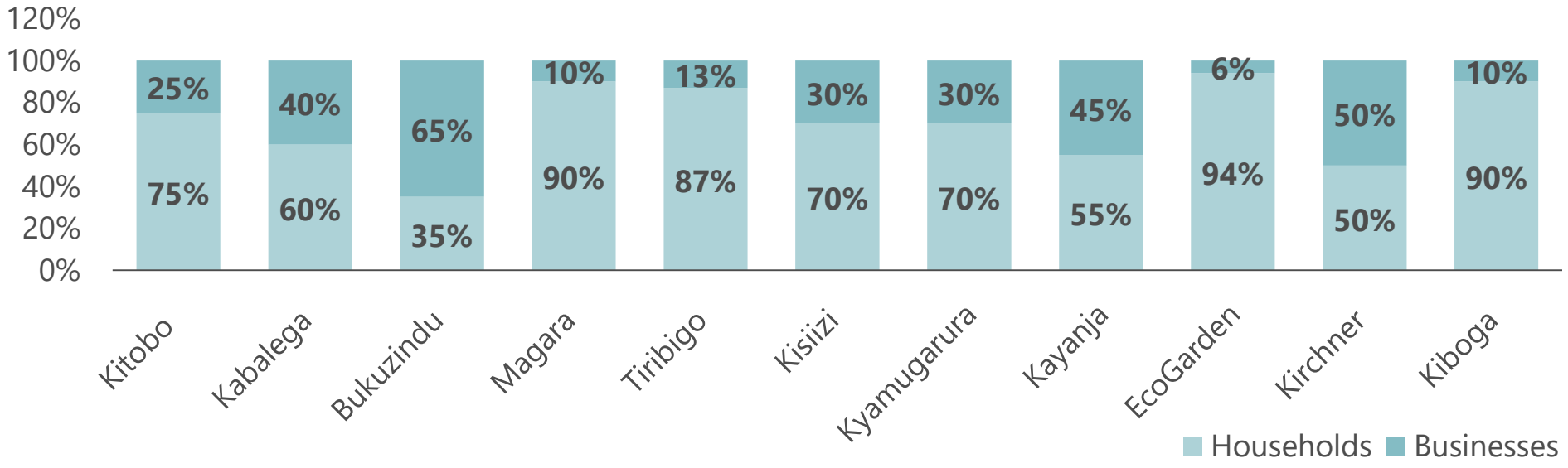
Financing structures should promote sustainability

- Subsidy allocation scenarios should ensure that grants don't exceed the level of investment required for viability of grid extension projects within the foreseeable future
- Grant allocations should also consider number of customers to be electrified, electricity demand and ability & willingness to pay
- Financing should also be allocated to activities that increase energy demand and community awareness

Source: UOMA interviews & research

Unserved populations: Households contribute largest proportion of connections; mini-grids utilize <30% of installed capacity

Percentage of connections by mini-grid



Household customers make up the largest percentage of mini-grid connections

- Households account for largest proportion of connections to mini-grids and mostly use electricity for lighting and phone charging; due to small loads utilized, mini-grids use less than 30% of installed generation capacity
- Mini-grids utilizing more than 50% of installed capacity usually serve institutional buyers like hospitals and other commercial customers

To maximize capacity, developers need to incorporate productive use in feasibility and implementation phases

Source: UOMA interviews & research

Developers face additional challenges in setting tariffs, managing operational costs, forex risk & obtaining skilled personnel

Difficulty in setting retail tariffs

- Mini-grid developers still face a challenge in setting the right tariff that enables the developer to recover costs of setup and be financially sustainable while remaining affordable to the customers.

High operation and maintenance costs

- Mini-grid developers incur high costs in operating (hiring a competent team, monitoring the grid) and maintaining the grid that are often recovered over a long time

Inadequate skill & expertise

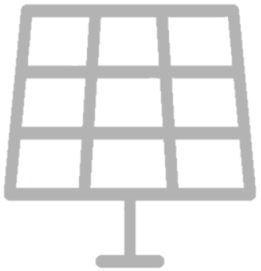
- From developers, operators, community engagement leaders, local engineers & project management staff, there is limited available skill & experience for development, operation & maintenance of the grid

UOMA is looking to support more research and pilot work with mini-grids this year. Do reach out if interested in partnering

Source: Green Mini-Grids in Sub-Saharan Africa: Analysis of barriers to growth and the potential role of the African development bank in supporting the sector

Solar Home Systems (SHS)

Productive use



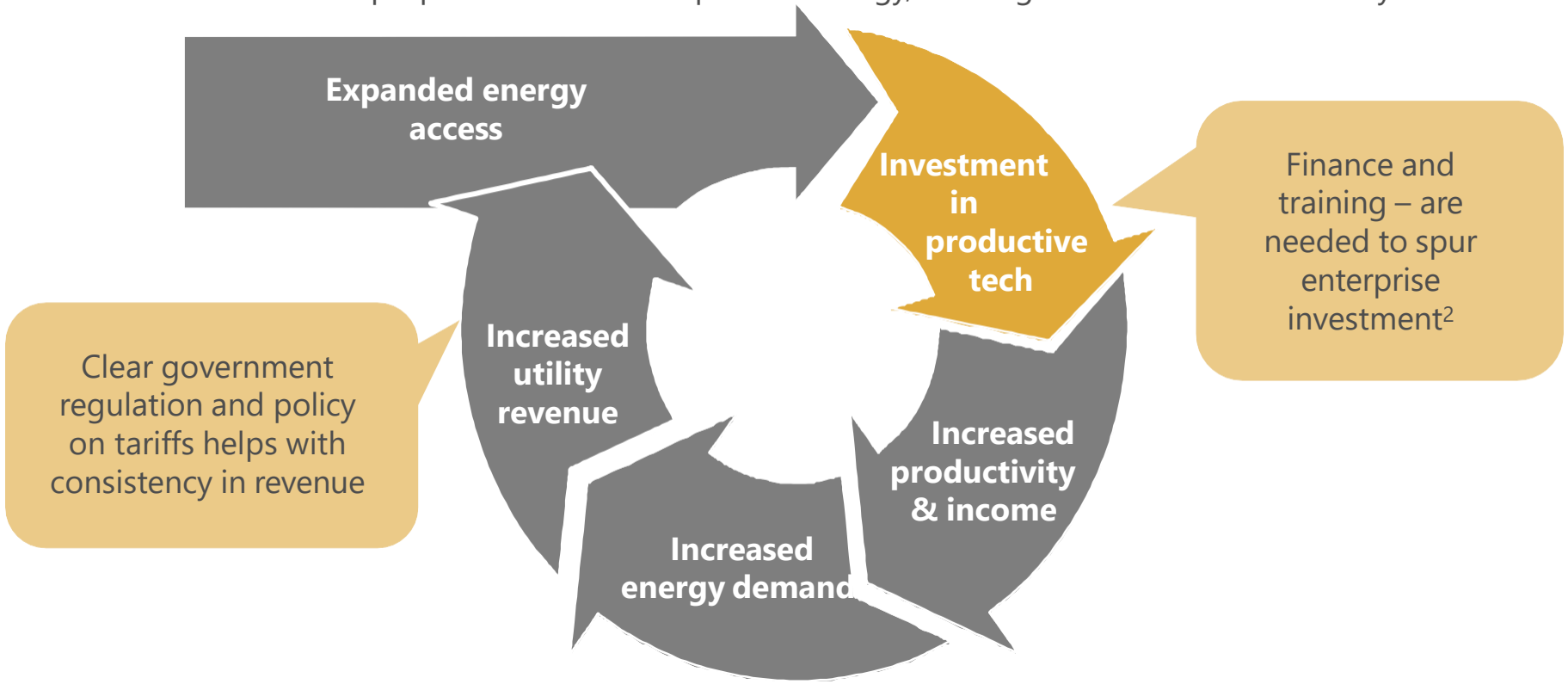
Mini-grids

Cycle to increase energy demand requires investment in productive use technology to increase incomes

According to GIZ, productive use can be defined as[1]: *"Agricultural, commercial and industrial activities involving electricity services as a direct input to the production of goods or provision of services*

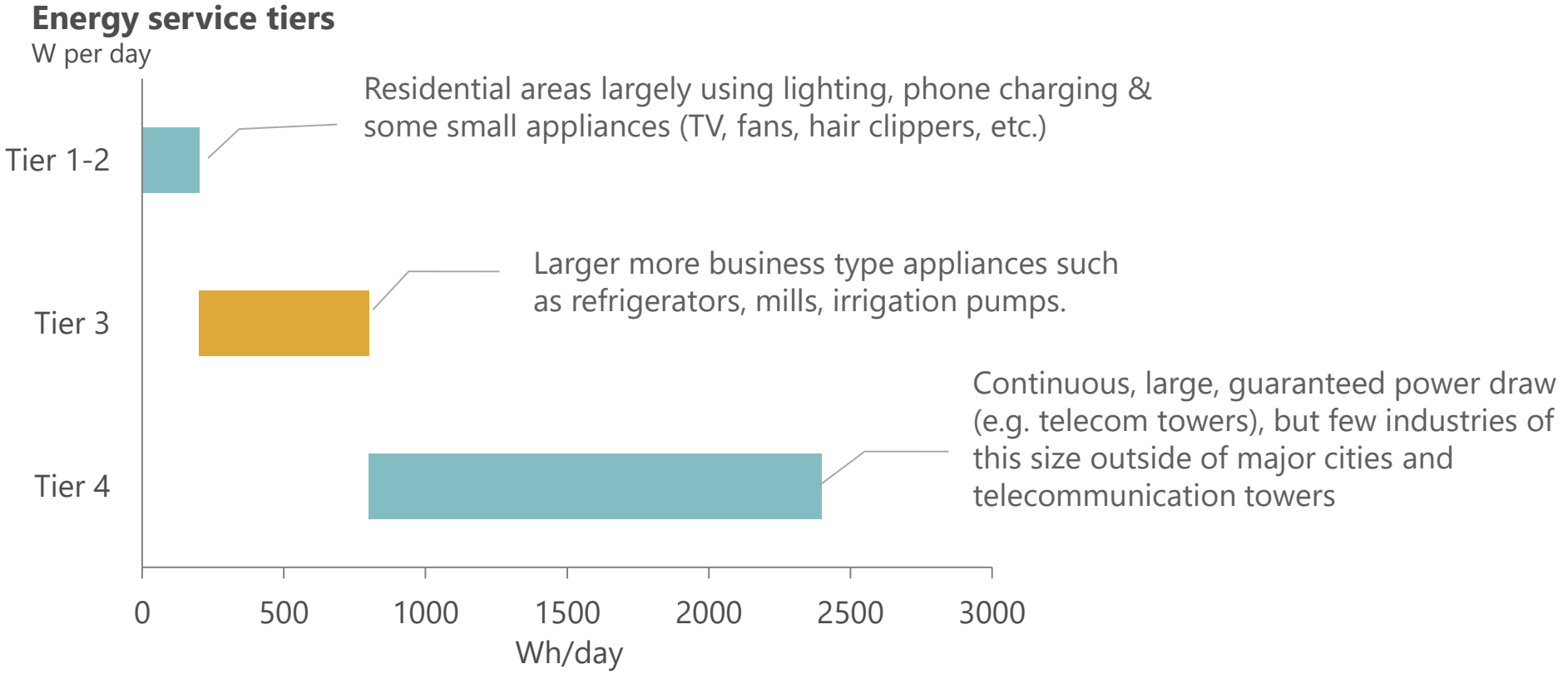
Through increased productivity, energy access can be stimulated by private sector revenue

- In the long term, increased energy access stimulates economic activity in communities, which in turn increases income and proportion of income spent on energy, creating a continuous virtuous cycle



Sources: UOMA analysis & interviews supplemented by 1. GIZ's "Productive Use of Energy – PRODUSE A Manual for Electrification Practitioners": https://www.giz.de/fachexpertise/downloads/giz-eueipdf-en-productive-use manual.pdf 2. ESMAP "Maximizing the Productive Uses of Electricity to Increase the Impact of Rural Electrification Programs": https://www.esmap.org/node/714

Productive use appliances are accessible across the 4 tiers; SHS providers focusing on tiers 1-2 with increased interest in tier 3



- Access programs have typically overlooked tier 3 uses of power because they require substantial capital expenditure[1,2]
- However, businesses using tier 3 technology have potential to generate significant energy demand and positive externalities

Sources: OCA analysis & interviews supplemented by

1. Tier categories are based on the International Renewable Energy Agency's 2015 definitions, described in "Off-grid Renewable Energy Systems: Status and Methodological Issues":
2 Overview of access programs in Uganda from Open Capital Advisor's "Ugandan off-grid energy market accelerator":

Increased opportunity for productive use technologies across various stakeholders

SHS operators	• Support expansion – cross subsidizing operations in rural areas by diversifying product range to include higher tier appliances / prod use tech • Provide the opportunity to support existing customers to move up the energy ladder and own larger value assets
Utility & mini-grid developers	• Have the potential to significantly, and perhaps sufficiently, supplement residential energy demand, enabling shorter payback periods on capital invested; and as a result accelerating residential connectivity
Government	• Can be used as a solution to generate increased off-grid energy awareness and sustainable uptake in rural areas where supply is expensive & communities are predominantly agrarian • Can increase constituents' income and improve standard of living
Development partners	• Can increase synergies across various programs currently supported, (e.g. agriculture value chains, financial inclusion and energy), enabling great impact in consumer income, productivity and economic growth

Productive use appliances are distributed by mini-grid operators, SHS providers & non energy providers through different channels

Business hub

- Usually set up by communities or mini-grid developers where productive use appliances are set up and managed at the hub e.g. setting up a milling machine or milk chilling machine and charge people a fee for using the appliance

Standalone appliances

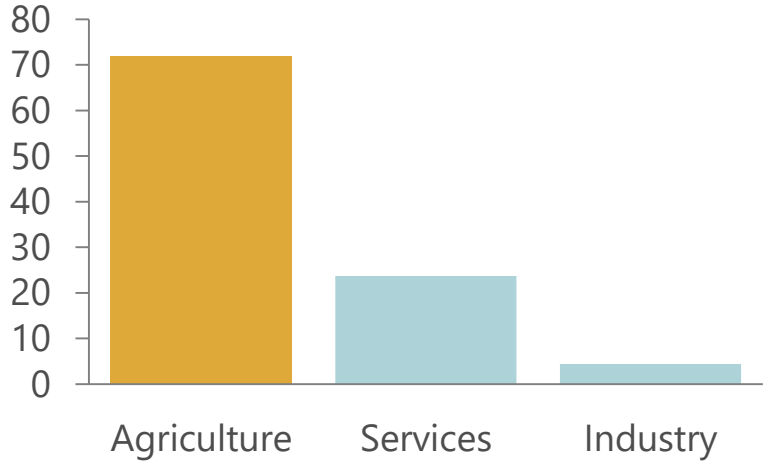
- Independent providers of SHS distribute productive use appliances through their agents and distribution centers
- These are usually smaller appliances for individual or household use e.g. small-scale irrigation pumps, refrigerators

- Specific technologies should be adapted to power generation, production quantities, and local technical capacity to install, maintain, and repair
- DC appliances considered more energy efficient and compatible with most SHS & mini-grid providers, however, are more expensive and less accessible on the market
- AC appliances are most readily available on the market especially for large appliances where consideration for grid connection is made

Prod use tech has potential to boost overall demand; agricultural applications most relevant to building an economic case in UG

Agricultural sector in Uganda employs the majority and provides the highest potential for impact

Employment by sector
Percentage



- Agricultural sector employs over 70% of Uganda's work force and has the significant potential for value addition across the country[1]
- Productive use equipment in agriculture could potentially increase individual monthly incomes by 30%[2]

Sources: OCA analysis & interviews supplemented by
1. CIA World Fact Book: https://www.cia.gov/library/publications/the-world-factbook/fields/2048.html
2, National Survey and Segmentation of Smallholder Households in Uganda

This section aggregates research & insights from pilots and reports covering UOMA initiatives

Access to finance

Since quite nascent, important to consider financing instruments and awareness to investors to promote funding in the productive use space

Unserved populations

To design programs or set up distribution points for the unserved, there is an overarching need to clearly define these groups, understand their preferences and challenges, then determine pathways, and associated costs, to reach them

Enabling environment

To foster a conducive business & regulatory environment, there is need to assess impact of current policies & standards, identify gaps and advocate for suitable policies that could increase uptake & participation of stakeholders

Businesses looking to provide productive use technology struggle to access finance due to internal & external limitations

Internal

1. Limited business traction

- Businesses are at prototype & pilot stage and don't have sufficient traction of operations to support investor assessment
- Investors usually require traction of revenues, cashflows & customers to assess the business

2. Poor management of businesses

- Majority of businesses are not managed professionally, have poor systems for data collection and limited skill for scale
- Investors are hesitant to finance such businesses due to high perceived risk

3. Unproven business models

- Productive use still nascent and businesses don't have proven models with clear visibility on customers, distribution strategies, revenues, etc.

External

4. Low emphasis on energy demand

- Financiers are overwhelmingly focused on increase of household access to energy as opposed to energy demand

5. Limited market information on successful business models

- Market still nascent with limited information on successful business models for productive use from which investors can leverage learnings
- Some investors are not aware of productive use opportunities that can be can financed

6. Lack of impact measurement metrics for productive use appliances

- Financiers hesitant to invest due to lack of standardized impact measurement metrics to evaluate impact created on customers through productive use

In order to promote productive use tech, important to train SMEs & support pilot execution through innovative financing mechanisms

1. **Offer technical support to businesses to develop efficient systems for data collections and build strategies for growth to attract more financing**

   Support operators to increase their chances of raising capital for productive use projects; for example, businesses can be supported to develop data collection tools for traction & business plans for investor outreach

2. **More concessional and grant financing to support businesses run pilots and incentive programs to encourage innovation for high-potential industries**

   Providing more concessional financing, grants & equity required by industry players and manufacturers to test opportunity within significant industries like agriculture; opportunity exists to encourage manufacturers through challenge competitions & local testing

3. **Develop innovative financing mechanisms like guarantees to stimulate private sector sales**

   Developing innovative financing mechanisms to incentivize businesses to supply productive use appliances; opportunity exists to use guarantees to mitigate a portion of default risk equipment providers face when appliances are offered to customers on credit

4. **Further market research needed to help identify investment gaps and explore productive use opportunities**

   More information in this nascent sector will help operators and investors fully understand and take advantage of potentially large market, and stimulate innovation of highly-scalable business models

Based on consumer pilots conducted, we identified key themes influencing consumer uptake of productive use technologies

Affordability

How affordable is the purchase & installation of productive use technologies for consumers?

- Many consumers such as rural farmers that require technologies to increase productivity, don't have stable incomes to make high capital investments; need credit financing

Suitability & adaptation

Do products suit consumer needs and meet quality standards required?

- With high initial investment, consumers are keen to have quality products with low maintenance and suitable features like autonomy, low energy consumption, etc.
- Also key to assess consumer behavior as a driver of adaptability to new technologies

Awareness & training

Are consumers aware of products available & their impact on businesses? Do consumers have skill required to spur enterprise sustainability?

- Consumers ought to be aware of products & value of productive use to utilize available opportunities; require technical & business training to manage enterprises effectively

Distribution

What are the most effective distribution strategies for productive use technologies?

- Operators require cost effective distribution channels that increase uptake while maintaining affordability of technologies; need to be coupled with technical & ongoing consumer support

Affordability: Possible to tackle affordability challenges of productive use through innovation of business-specific PAYGo models

High cost of products key hinderance of uptake

Important to understand factors driving high costs of productive use technologies

- **Most products are imported and have high initial costs of production and distribution**
  - Operators transfer cost burden to consumers in form of high prices, reducing affordability
- **Locally manufactured products are often inefficient and of poor quality**
  - Ongoing costs incurred to cater for repairs & maintenance are expensive in the long run
  - Foreign products run risk of high maintenance costs due to lack of skilled technicians
- **Productive use tech requires supplementary costs to be effectively maximized**
  - Additional costs like installation, technical & training costs also contribute to overall affordability

Potential to increase affordability through PAYGo

Operators can leverage PAYGo model used for SHS to increase affordability of productive use

- Learnings from PAYGo solar solutions can be transferred to productive use to increase affordability
- To do this, operators would need to understand consumers and sector-specific nuances for successful implementation
  - What is the revenue potential and income cycle of the consumer?
  - What payment structures will positively impact customer cashflows and increase ability to pay?
  - How do operators assess credit worthiness of customers and potential impact of default?
  - Is use of productive use asset economically feasible and viable, etc.?

Affordability: To develop flexible payment models, operators need to assess business models, product types and target consumers

From pilots conducted, we identified key findings on consumer payment of productive use appliances

- Consumers found down payments too high to be paid in a lumpsum; introduction of short payment tenors (weekly) for down payments influences uptake and makes products more affordable;
- Consumers like farmers were unable to meet additional costs like installation; these can be catered for by operators to gain customer trust and create brand awareness

Operators require in-depth knowledge of business needs, target consumers & product types to develop sustainable payment structures

Understand business models of consumers, production processes and income cycles

- Businesses have varying income cycles and revenues based on products / services offered, business stage (early stage, mid sized) and market available
- Operators need to assess cashflows for different consumer groups like farmers who are more inclined to seasonal payments during harvests

Assess willingness & affordability to pay of target consumers through product pilots

- From surveys, some customers were willing to pay installments outstanding during after sales services as opposed to mobile money payments as they found it more convenient
- Important to also assess income levels and social factors that influence affordability & willingness to pay when developing PAYGo structures

Modify products to suit businesses across size, functionality & capacity, etc.

- From our surveys, product features like size, and complexity in functionality informed prices; usually larger sized appliances with difficult functions were more expensive than small, easy-to-use products
- Operators will need to align products to match affordability & needs of customer groups

Suitability & adaptation: **Consumers consider product quality, functionality and adaptability when making purchase decisions**

Suitability

Quality

- Consumers considered quality as an indicator of product suitability; quality products were characterized by low maintenance & minimal technical support
- Quality products had little or no downtime, creating high impact like increased revenues, farming yields, etc.

Energy efficiency

- Energy efficient products were considered suitable due to lower energy costs associated with running the appliance especially when powered by mini-grids
- Operators need to match products with consumer energy needs, power generation & required production quantities

Functionality

- Easy-to-use products were considered suitable as they were easily adopted; consumers were inclined to purchase products that could be used after one initial training
- Consumers like farmers, required multipurpose functionality to mill a variety of grain types, hull to separate grains from husks, etc.

Adaptation

Consumer perception

- Consumers easily adapted to technologies they deemed valuable; for example, farmer change in technology was influenced by technical training though demonstrations or successful pilots with neighboring farmers

Social beliefs

- Social beliefs hindered adaptation of technologies; for example, communities that believed women shouldn't run businesses made it difficult for them to adapt to new appliances

Other factors like availability of land, water & technical expertise need to be considered

Awareness & training: **Targeted information campaigns and technical & business training are necessary for success of productive use**

To influence productive use uptake, target-oriented communication is needed across 4 key areas:

Consumer awareness

- Conduct well targeted information campaigns to expose consumers to the concept of productive use
- Operators need to assess:
  - Who is the target group?
  - What information needs to reach the targeted group, etc.?

Impact of productive use

- Provide information on the relevance of new technologies to increase uptake
- Understand whether:
  - Target groups have basic knowledge about the importance of new technologies?
  - There are any other convincing arguments in addition to profit?

Appropriate use of technologies

- Provide information on technologies available, quality & providers available
- Support consumers choose cost-effective technologies that suit their needs
- Offer technical training on appropriate use of technologies through demonstrations, product pilots, etc.

Business development

- Offer entrepreneurship training & coaching to prepare consumers for roles as business owners
- Support includes, development of business plans, product pricing, assessment of profits & turnover, etc.

Sources: 1. Energy for Development, GIZ. An Overview of Technology Options and Approaches for Promotion, http://www.euei-pdf.org/sites/default/files/field_publication_file/Productive_Use_of_Thermal_Energy_Overview.pdf

Awareness & training: To scale productive use uptake, it's necessary to leverage partnerships to conduct awareness campaigns

1 Important to consider the right type of partnerships to create consumer awareness

- *Campaigns were easily conducted through partnerships with existing groups like savings & farmer groups; this supported outreach to large numbers of consumers*
- *Increased referrals once products were piloted since groups with similar needs shared information amongst themselves*

2 Technical support required on case-by-case basis to choose suitable products

- *One-on-one guidance when choosing appliances was necessary to assess consumer needs like capacity required, power consumption and investment need to purchase machinery*
- *Consumers were also not aware of products available and distributors of quality which was necessary to make purchase decisions*

3 Important to communicate the relevance and impact of productive use appliances

- *Consumer decisions were largely driven by understanding the economic and social importance of productive use appliances*
- *Consumers were keen on understanding how they can increase their incomes, farming yields, customer base, etc.*

4 Products work best with entrepreneurs that had received both technical & business training

- *Such consumers understood the benefits of the product and were willing to increase uptake as well as influence other community members*

Distribution: **Operators can leverage learnings from PAYG to pilot cost-effective distribution models for productive use**

1. Distribution partnerships

- Operators can partner with grass root structures like savings, farmer & women groups that reach rural populations
- Operators can also partner with MFI's, especially those with rural presence, to distribute productive use appliances coupled with financing

2. Product bundles

- Regular SHS products can be bundled with productive use appliances to increase distribution
- For example, portable saloon kits can be sold together with solar lamps

3. Agent models

- Equipment providers can deploy sales agents in different communities to distribute products to customers and offer technical training
- Local sales agents are usually effective as they have community context

Important to address challenges at regulatory level that hinder acceleration of productive use technology

Develop policies & standards

- Develop policies & standards to increase credibility of the market and attract financiers to support innovations

Create awareness on policies

- Create awareness to ensure market is not saturated with poor quality appliances; awareness increases affordability when tax exemptions are utilized
- Provide business training to businesses in order to ensure appliances are income generating

Offer subsidies on products

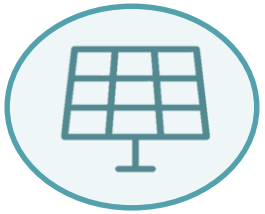
- Introduce subsidies to increase affordability of productive use appliances, government should introduce subsidies on imported products
- Introduce government programs to encourage local manufacturing of quality products to make appliances more accessible

Industry stakeholders

There are a number of private sector players in both the SHS & productive use technologies in the off-grid energy space

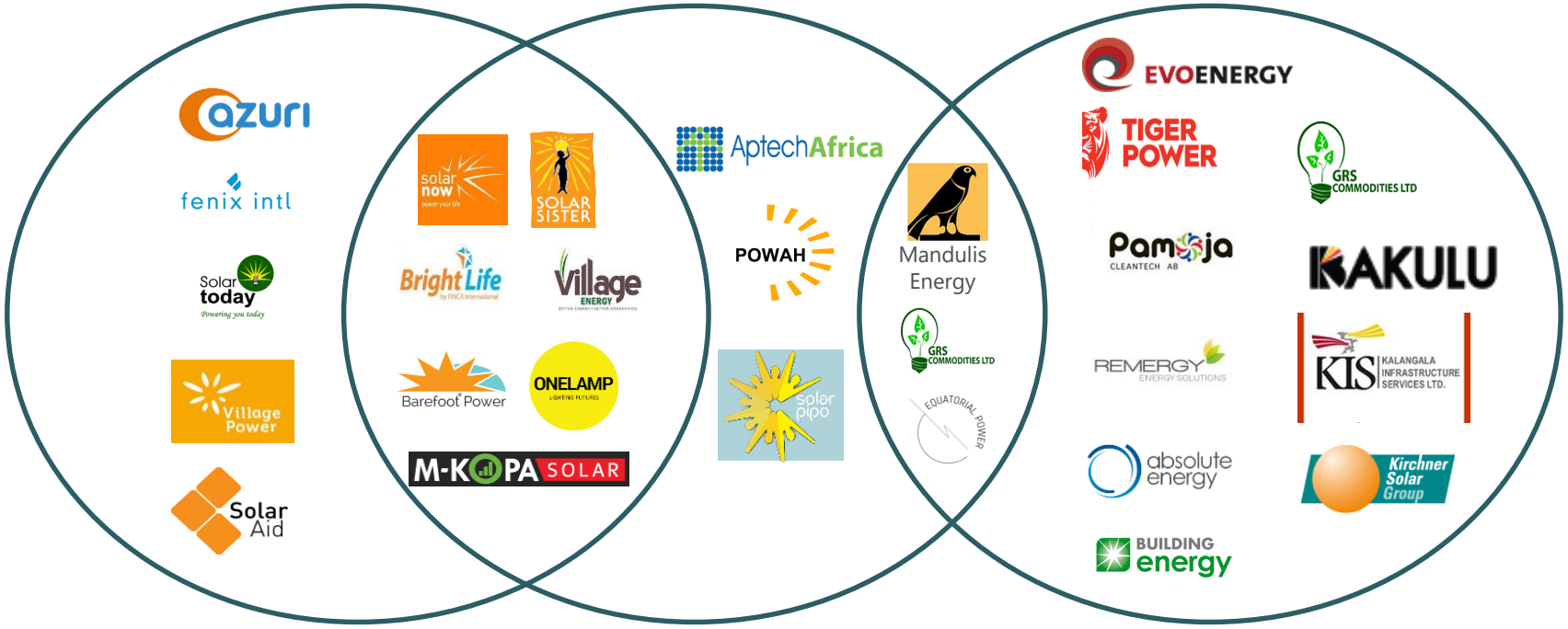
Solar Home Systems

Productive use



Mini-grids

PLAYERS



The private sector plays a vital role towards achieving universal electricity access through off-grid in Uganda

 Sources: Various company websites, OCA Team analysis, https://www.energy4impact.org/file/2039/download?token=8ardN8he

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, http://unreeea.org

Associations: **Represent private sector interests, advocate policy issues to government**

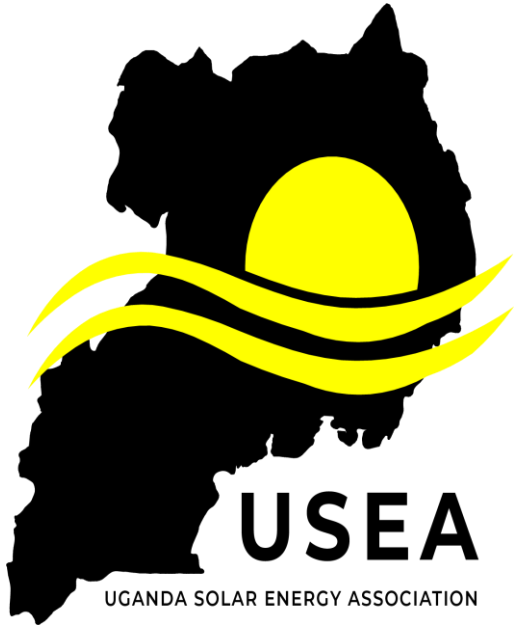
Organization	Work in Uganda

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 https://www.gogla.org/ , http://sendea.org/ , http://www.sun-connect-news.org/articles/business/details/a-new-support-for-solar-entrepreneurs-sendea/

Associations: **Represent private sector interests, advocate policy issues to government**

Organization	Work in Uganda



- 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

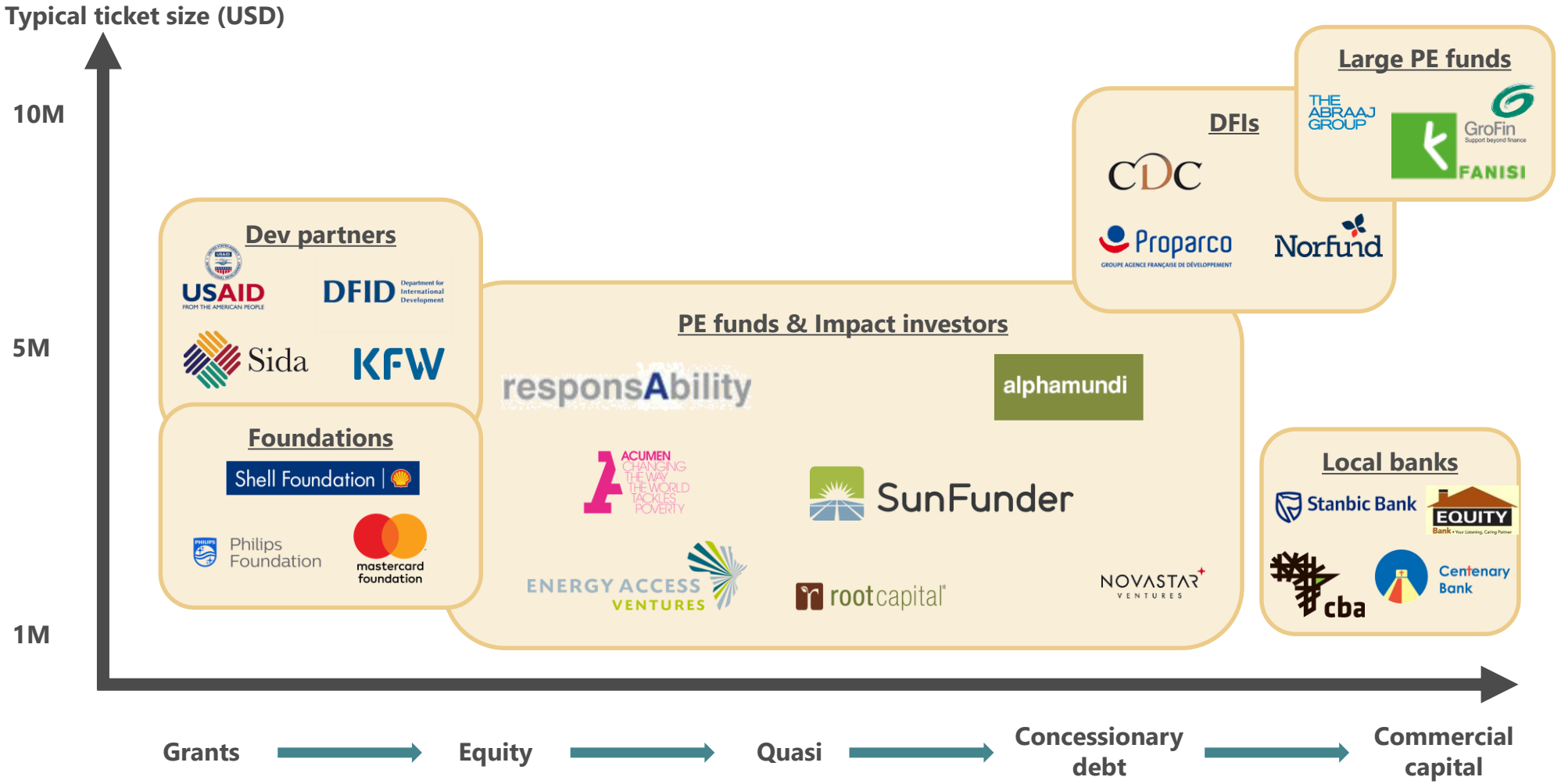
To further its' objective, USEA has partnered with the following organizations:

- **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 https://www.gogla.org/ , http://sendea.org/ , http://www.sun-connect-news.org/articles/business/details/a-new-support-for-solar-entrepreneurs-sendea/

Financial institutions & donors provide capital to the off-grid sector to enable scale

Many investor types exist with several active players; some examples below



UMA
Uganda Off-Grid Energy Market Accelerator

A number of organizations have funds in place with an energy focus in Uganda

Organization	Focus Areas	Instruments Used	Capital committed in EA	Companies invested in
Bamboo Capital Partners	Clean energy through innovative disruption Off-grid technology	Equity Debt	$52M	BboX Greenlight Planet
OikoCredit	Off-grid solar Off-grid projects focusing on SDG7 Clean cooking	Debt Equity	$90M	Bbox PEG Africa SolarNow
Crossboundary Energy	Aggregate finance for medium scale renewable self-generation projects	Equity	$33M	Garden city Kigali Genocide Memorial
Symbiotics	Unspecified	Debt	~$45M	M-KOPA Zola-Electric
Cordiant Capital	Unspecified	Debt	$564	Off-grid Electric (now Zola-electric)
CDC Group	Renewable energy	Debt	~$27.5M	Off-grid Electric d.Light M-KOPA
Nordic Funds	Unspecified	Equity Debt	~$15M	M-KOPA

Many recent debt deals in the region

Investor	Company	Amount	Date
SunFunder, responsibility, Oikocredit	SolarNow	US$9m	2019
EIB	d.Light	US$29m	2018
ElectriFI, TRINE	Azuri	US$20m	2018
Bamboo Capital Partners	BBOXX	US$50m	2018
responsAbility	Mobisol	US$12m	2017
Stanbic Bank, CDC, FMO, Norfund, Triodos, responsAbility, Symbiotics	M-KOPA	US$80m	2017
Banque Populaire du Rwanda (Atlas Mara)	BBOXX	US$2m	2017
SunFunder	SolarNow	US$2m	2016
Oikocredit	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
responsAbility	Off-Grid Electric	US$18m	2016
SunFunder	d.light	US$2.5m	2016
OPIC, Rockefeller Foundation, MCE Social Capital	SunFunder	US$21m	2016
Developing World Markets	d.Light	US$7.5m	2016
Oikocredit, responsAbility	PEG Africa	US$1.5m	2016
OPIC	Nova-Lumos	US$50m	2016
Developing World Markets	Off-Grid Electric	US$7.5m	2016
DEG	Mobisol	Undisclosed	2015
LGTVP-led	M-KOPA	US$6m	2015
Oikocredit	BBOXX	US$0.5m	2015
IFC	Off-Grid Electric	US$4.5m	2015
Cordiant Capital	Off-Grid Electric	US$2.5m	2015
Centenary Rural Development Bank	SolarNow	Undisclosed	2015
Acumen	SolarNow	US$1.4m	2014

>$600M debt financing in East Africa over the last few years demonstrate increasing bankability of off-grid sector, particularly SHS

Source: UOMA interviews & research; all data publicly available

A number of facilities have been set up in the region to promote the off-grid energy sector (1/7)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Acumen Fund	Support, scale and learn from innovative energy companies over 3 yrs	Hand-held solar power, cook stoves, off-grid, home systems, bio-gasification systems	Equity Debt Mezzanine Grants	$64M	East & 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	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	Productive use	Grant	£100k	SSA

A number of facilities have been set up in the region to promote the off-grid energy sector (2/7)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
SIMA Fund for Off-grid Solar	Provide commercial capital and advisory to energy businesses with financial, social, and env. impact.	High risk, earlier stage businesses	Debt	$75M	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	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

A number of facilities have been set up in the region to promote the off-grid energy sector (3/7)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Pioneer Energy Investment Initiative	Support, scale, and learn from innovative energy companies over the next three years.	Energy generation (SHS, Solar & hybrid mini-grids) & Energy usage (Innovations for energy use)	Common & Preferred Equity, Convertible Debt	$20M	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 & 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	$10-$30M/co	SSA excluding SA

A number of facilities have been set up in the region to promote the off-grid energy sector (4/7)

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Efficiency for Access Coalition	Supports and accelerates 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	Mobilizes additional finance for infrastructure projects in sub-Saharan Africa	Geothermal, hydropower, solar & wind power, transmission lines, sustainable cooking fuels	Grants blended with long-term financing	~$920M	SSA
Emerging Africa Infrastructure Fund	Encourages and mobilizes private investment in infrastructure in SSA to promote economic dev.	Energy, Transport Water & Sanitation ICT, Agribusiness & Mining	Senior, subordinated or mezzanine debt	~$1.2M	SSA

A number of facilities have been set up in the region to promote the off-grid energy sector (5/7)

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	Supporting private-sector led economic growth through the efficient utilization of untapped clean energy resources.	Clean energy	Grant and equity	$95M	SSA
USAID-Derisking PAYGO	Mobilizing additional finance for SHS co.s that wish to expand sales of PAYGO SHS in refugee settlements	PAYG SHS	Grant	Not available $145k-175k/co.	Uganda
AlphaMundi Foundation – Powering Ag	Catalyzing 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

A number of facilities have been set up in the region to promote the off-grid energy sector (6/7)

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	Design & implement solar energy solutions to assist people living in poverty	Solar	Grant	Not available	Uganda
Energy Access Venture Fund	SMEs active in electricity generation and distribution, and electricity related services in SSA	SHS, Micro-grid infrastructure & hybrid technologies	Equity Quasi-equity	$55M	EA and Southern Africa
The EnAccess Foundation	Address innovation challenges that renewable energy co.s face through lack of financing	Irrigation co.s operating at the nexus of clean energy & agriculture	Grant, Debt, Equity or mezzanine financing	$0.5M	EA and Southern Africa

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

Fund/Facility	Purpose	Focus	Instrument	Fund Size	Region Focus
Biodiversity Investment Fund	Providing attractive loan financing for businesses that can demonstrate impact or contribution towards biodiversity in Uganda	Off-grid energy	Equity	$50M	Africa
EnDev Uganda	Giving support in energy policy, improved biomass technologies, rural electrification & energy efficiency.	Pico PV & SHS Grid densification	No info	€12.25M	Uganda
EEP Africa	Providing 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	Developing, constructing and operating renewable energy generation projects	Renewable energy	Equity or mezzanine debt	$60M	SSA

The European Union is supporting a number of programs to influence the private sector and advance off-grid access (1/2)

European Union (EU)	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Scaling–up rural electrification using innovative solar photovoltaic (PV) distribution models[1] **Ongoing**	 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 for installation & mgmt of 6 mini grids • Capacity of CBO's to install & manage solar photovoltaic tech. strengthened	**Implementers:** WWF in partnership with Kasese District Local Government and Enterprise Uganda Foundation **Funders:** ACP-EU
Access to energy services in rural and peri-urban areas in Northern Uganda (Teko Wa Project) [2] **Ongoing**	 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

UOMA Uganda Off-Grid Energy Market Accelerator

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

European Union (EU)	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Providing access to modern energy for northern Uganda (PAMENU)[1] **Completed**	 SHS  On-grid  Cook stoves	• Project focused on increasing the use of solar PV, improving household cookstoves and mini-hydro power for small grids	• Disseminate solar PV and improved stoves • Build capacity for intermediaries & training of local stove builders • Create awareness campaigns • Coordinate installation of MHP and mini-grids	• Distribution of clean cookstoves to hhs • Street lighting project in Yumbe Town Council • Construction of the pico-hydro power sites • Provision of health centers with solar PV & drug storage	**Implementers:** GIZ **Funders:** ACP-EU
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[2] **Ongoing**	 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 a number of 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

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] **Ongoing**	 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. http://www.energyandminerals.go.ug/downloads/ERDreportERTII1.pdf; http://projects.worldbank.org/P133312?lang=en

Add'ly, 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**	 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 veified 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. https://www.lightingafrica.org/country/uganda/,

USAID's Power Africa is playing a crucial role in leading and coordinating initiatives in Uganda (1/4)

USAID / Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
The Power Africa Uganda Electricity Supply Accelerator **Ongoing**	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 (2/4)

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
Last Mile Distribution Results-Based Finance **Beginning**	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 (3/4)

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 three masterplans completed& identified over 100 mini-grid sites in only three 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 (4/4)

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	**Held technical workshop to:** • 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. https://www.naruc.org/international/where-we-work/africa-middle-east/uganda

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] **Ongoing**	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
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. https://www.gov.uk/government/news/energy-africa-campaign; https://www.contractsfinder.service.gov.uk/Notice/1a44f944-fe22-4e77-b300-2da4fbb6068e
2. http://energyaccess.org/news/recent-news/applied-research-program-transforming-energy-access/

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) Ongoing	 SHS	• 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 in SSA who are currently without modern energy	• Provide TA to improve the enabling environment for mkt based approach for private sector delivery of SHS • Finance businesses wanting to enter new and emerging SHS markets in SSA	• REACT-HS awarded US$ 7.4 million to 10 household solar co.s with 8 disbursements beginning • Compact actions aimed at improving policies & regulations that facilitate a market approach to solar energy implemented in 7 countries	**Implementers:** AECF, TBC, IFC, DAI **Funders:** DFID
Renewable Energy and Adaptation to Climate Technologies (REACT) Window, Africa Enterprise Challenge Fund Ongoing	 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	• Facilitates 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)	**Implementers:** AECF **Funders:** DFID

 Sources: UOMA interviews & consultations

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
Milking the Sun & Harvesting the Sun[1] **Ongoing**	 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 37,000 solar products with reliable after sales service	• Over 10,000 systems in collaboration with lead partner Solar Now	**Implementers:** Solar Now, Barefoot Power, Uganda Crane Creameries Cooperative Union & other value chain managers **Funders:** Government of Netherlands

 Sources: UOMA interviews & consultations

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] **Ongoing**	 SHS  Mini-grids  Cook stoves  Bio fuels	• Supports low-income hhs 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	• Risk capital (performance-based grant) to bring early stage business ideas to market • Advisory services to address implementation bottlenecks, facilitate linkages to partnership & funding opportunities • Knowledge and learning in the form of research initiatives, M&E, & networking events • Nationwide campaigns to improve consumer awareness & protection • 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

BMZ has provided support to both the government and private sector to further advance access & support clean energy (1/2)

BMZ	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Promotion of Renewable Energy & Energy Efficiency program (PREEEP)[1] **Ongoing**	 SHS	• 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	**Policy support:** • Energy programs structured in West Nile & Lango • Quality management system for the planning, steering and evaluation processes of MEMD • Fully operational GIS lab **Market development:** • Capacity building through associations • Awareness campaigns **Licensing:** • Standardized licensing procedures for small-scale off-grid energy projects with REA & ERA	**Implementers:** MEMD, REA, ERA **Funders:** BMZ ,KfW, EU

 Source: UOMA interviews & consultations

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

BMZ	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Promotion of Mini-grids for Rural Electrification (Pro Mini-Grids)[1] **Ongoing**	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	**Four components:** 1. Develop off-grid strategy for the National Electrification Policy & develop methodology to identify mini-grid project locations 2. Develop mechanisms for license concessions, efficient tenders 3. Implement and award tenders to private mini-grid concessionaires in villages 4. Promote productive use in villages to raise household incomes & improve the economic feasibility of service providers' business model & tariff revenue structure	• Created task force with REA & the Ministry to develop directive and support development of mini-grid tender mechanism • Ongoing support to REA to promote development of site identification expertise	**Implementers:** GIZ, MEMD,REA, ERA **Funders:** EU

 Source: UOMA interviews & consultations

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**	 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	• Creating an appropriate financing vehicle (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 • Complementing the technologies with capacity-building & awareness trainings for companies and a Life Skills Programme for youth and local communities	• Project has been pre-selected to receive funding by Germany and the UK of up to € 60 million to support the development phase	**Implementers:** UNDP, MEMD **Funders:** UK, Germany

 Source: UOMA interviews & consultations

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	• Providing technical assistance to companies & banks to assist them in identifying opportunities for green investments • Installation & monitoring of projects • Supporting partner banks in their risk assessment approach, communication strategy & marketing in green finance	• A cumulated commitment of > €120 million to finance green investments in East Africa (Uganda, Kenya and Tanzania)	**Implementers:** AFD, Diamond Trust Bank **Funders:** AFD, EU-Africa Infrastructure Trust Fund

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 centre	**Implementers:** EACREEE **Funders:** UNIDO, ADA

The Shell Foundation has launched a number of 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 Produse	• 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 Produse	• 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

Philips 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 • Facilitating 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 https://www.villageenergy.com/village-academy/

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (1/6)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Energizing Development (EnDev)[1] **Ongoing** ***until 6/2019 with new phase from 7/2019 – 12/2022***	 SHS  Cook stoves  On-grid  Solar lantern	• Achieve sustainable access to modern energy services for 19M people by 2019 • Target for upcoming phase to be elaborated & new global targets to be defined **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	• Increased access of BoP to improved cook stoves by 680,000 people • > 500 rural stove artisans trained and able to sell higher number of stoves and to increase their income • Increased household access to energy for lighting/electric appliances for 125,000 people to date • Supported solar co.'s to increase distribution outreach with quality solar products	**Implementers:** GIZ EnDev Uganda **Funders:** Netherlands, Germany, Norway, UK, Switzerland and Sweden

Source: UOMA interviews & consultations, supplemented by

1. https://www.giz.de/en/worldwide/24209.html ; http://endev.info/content/Uganda

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (2/6)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations

GET.invest[1]
 	
Ongoing
	 SHS
	  Mini-grids
	  On-grid
		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
			• Project and Business Development support helps projects achieve readiness for & access to financing
			• Information and matchmaking for developers and financiers on regulatory framework and opportunities
			• Creating an enabling environment to assist regulators implement processes for private investments
				• 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 file:///C:/Users/Business%20Analyst/Downloads/GETinvest%20fact%20file.pdf

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (3/6)

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	• Developed annual work plan and strategy plan. • Recruited and trained three full time secretariat staff. • Developed 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 • USEA sales data collection on-going (public report will be available end of June 2019)	**Implementers:** UNCDF **Funders:** Energy Africa, DFID

 Source: UOMA interviews & consultations

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (4/6)

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 the millions 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 • 3.75 million expected connections • $435 million in private investment catalysed	**Implementers:** USAID **Funders:** USAID / Power Africa, DFID / Energy Africa, Shell Foundation

Source; UOMA interviews & consultations, supplemented by

1. http://www.cleanenergyministerial.org/Events/scaling-off-grid-energy-grand-challenge-for-development-new-funding-opportunity-80276; https://www.scalingoffgrid.org/

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (5/6)

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 • Providing clean energy for the Ugandan dairy industry, biogas for milk cooling • Providing sustainable energy services for Kitobo island	**Implementers:** KPMG Finland **Funders:** Ministry of Foreign Affairs of Finland, DFID and The Austrian Development Agency

Source: UOMA interviews & consultations, supplemented by

1. http://eepafrica.org/projects/uganda/

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

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
New Deal on Energy for Africa[1] **Ongoing**	 SHS  Mini-grids  On-grid	Achieve universal access to energy in Africa by 2025 by: • Increasing on-grid generation to add 160 GW of new capacity by 2025 • Increasing on-grid transmission & grid connections that will create 130 million new connections by 2025 • Increasing off-grid generation to add 75 million connections by 2025 • Increasing access to clean cooking energy for ~130 M 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

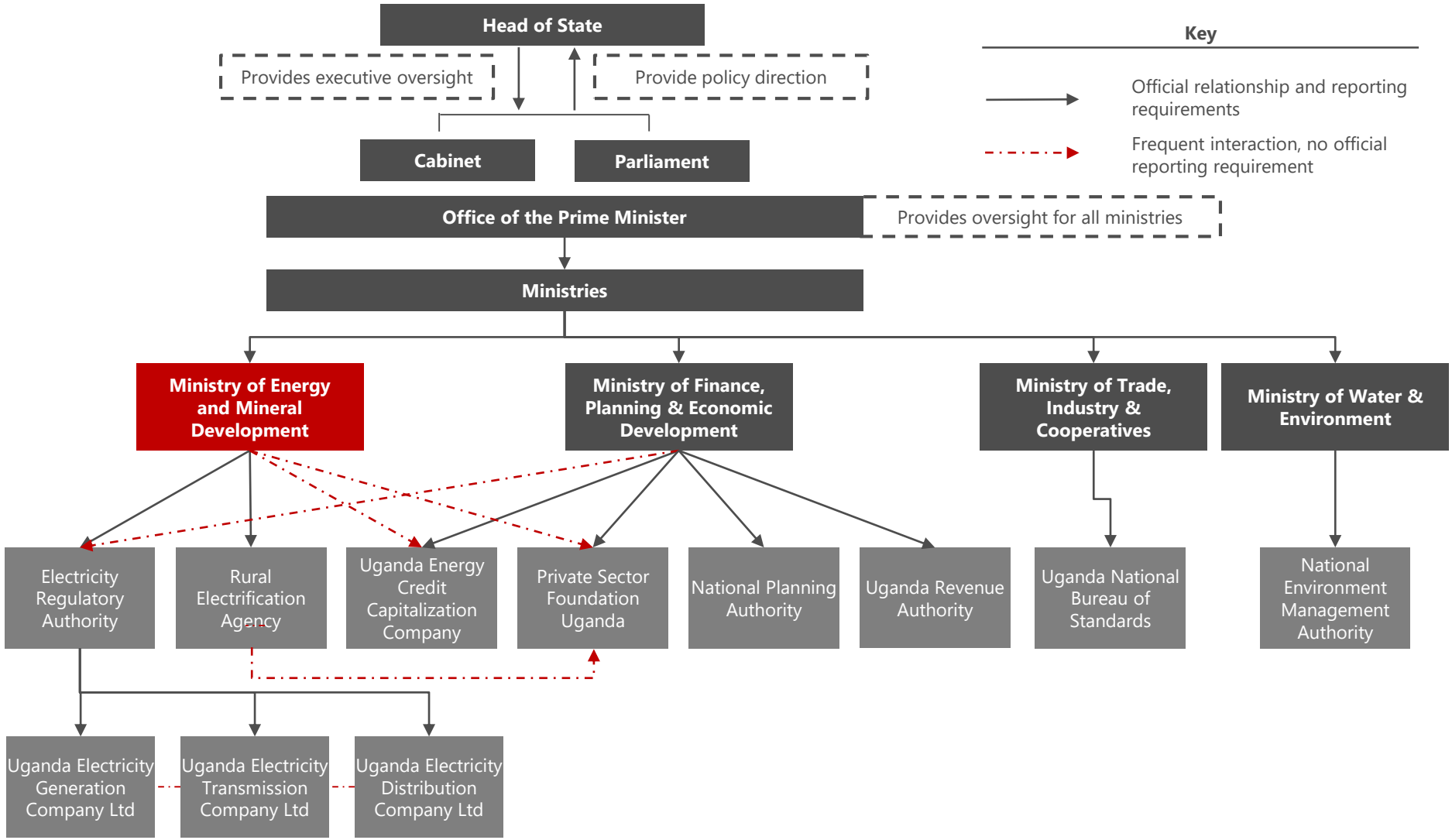
Source: 1. https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Brochure_New_Deal_2_red.pdf ; https://www.huffingtonpost.com/kristina-skierka/new-deal-for-energy-a-big_b_9051000.html

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 http://www.rea.or.ug/functions.html , www.ueccc.or.ug

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



Source: Analysis from interviews and government websites

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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 http://creec.or.ug http://energyincubator.org , http://www.psfuganda.org

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 www.energy4impact.org , East African Business Week , NRECA

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 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 https://www.rmi.org/ , Catalyst, , NRECA

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.

http://www.africaminigrids.com/Partners-Supporters-Africa-Mini-Grid, https://www.inensus.com/

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 https://www.gogla.org/ , http://sendea.org/ , http://www.sun-connect-news.org/articles/business/details/a-new-support-for-solar-entrepreneurs-sendea/

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

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

Uganda Off-Grid Energy Market Accelerator

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

contact@uoma.ug
https://uoma.ug/