

Mapping the Ugandan off-grid energy market

Prepared by the Uganda Off-grid Energy Market Accelerator (UOMA)

In partnership with:

Shell Foundation | 



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UOMA seeks to reduce barriers to scale to accelerate off-grid energy access in Uganda

Today, about 80% of Ugandans live without access to modern energy. Bringing energy to these households has become a central focus of Uganda's development agenda, with frequent discussion on reaching 'universal access' in the coming decades.

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

We do this by reducing market barriers to scale and accelerating the path to universal access 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.

UOMA was founded in 2017, borne out of a partnership between the Shell Foundation, DFID and Power Africa under their Scaling Off-Grid Energy: Grand Challenge for Development (SOGED) partnership. UOMA is managed by a team of technical experts with experience across many areas of off-grid energy, finance, business, policy & regulation, and development economics.

This market map is an updated version of an original document released by UOMA in 2017.

UOMA is run by technical team based in Kampala, with expert support team

Core technical team



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For 2018, 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 government policy & targets

Support public sector to create effective policies and an effective 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

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

1

Industry overview

Provides a holistic view of the off-grid industry in Uganda presenting actors & activities across the key stakeholder categories

2

Industry insights

Presents data-driven industry analysis to provide dimension & context to the state of off-grid development

3

Barriers to scale

Outlines the primary barriers to growth of today's market, highlighting opportunities for stakeholder support

1 Industry overview

Through research & consultations were able to map relationships & off-grid market activities

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

Private sector

- Understand available products, current market share, growth plans, challenges to scale and strategic differences

Government

- Understand different sub-industry focus areas, major initiatives underway, plans / strategies, and sensitivities

Development orgs

- Review current interventions, broader mandates, preferred models and existing collaborations

Off-grid ecosystem commonly divided by pico lamps, solar home systems (SHS), & mini-grids

- Basic lighting
- Phone charging

- Lighting
- Basic appliances

- Productive use power

- Heavy appliances
- Small commercial



Mini-grids



Larger solar-home systems (component based)



Smaller solar-home systems
(Multi-light point)

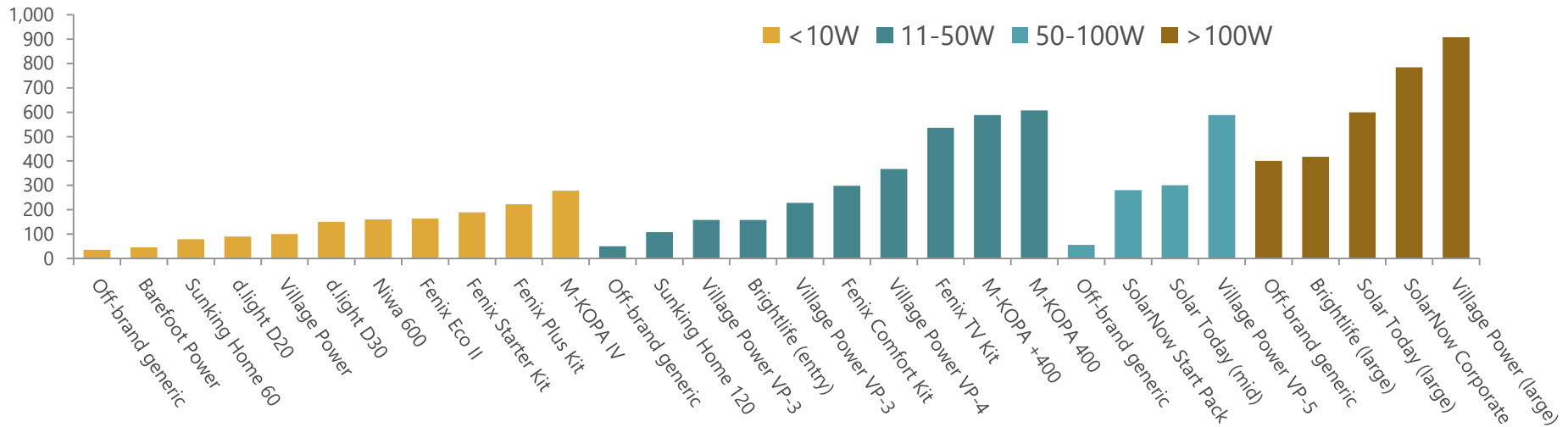


Pico lamps

Increasing in size (kW)

Solar home systems: Supplier landscape wide-ranging & divided, with price driven by quality, warranty, & after sales services

Unit cost USD



Off-brand generics

Branded retail

Branded service-level

Description

- Ultra-low cost, generally sold by individual components
- Offer similar specs to brand-name products, but often mislabeled, w/short life-span

- Brand-name, reputable systems sold via retail or through distributors
- Quality comparable to brand-name PAYG but aftersales service limited to distributors

- Brand-name, reputable systems sold directly through PAYG operators
- Highest cost due to PAYG & after-sales support systems








Example operators in UG

- Labeling varies, often intentionally misleading



Solar home systems: Distribution is driven by the private sector offering credit, with majority of sales coming from PAYG operators

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

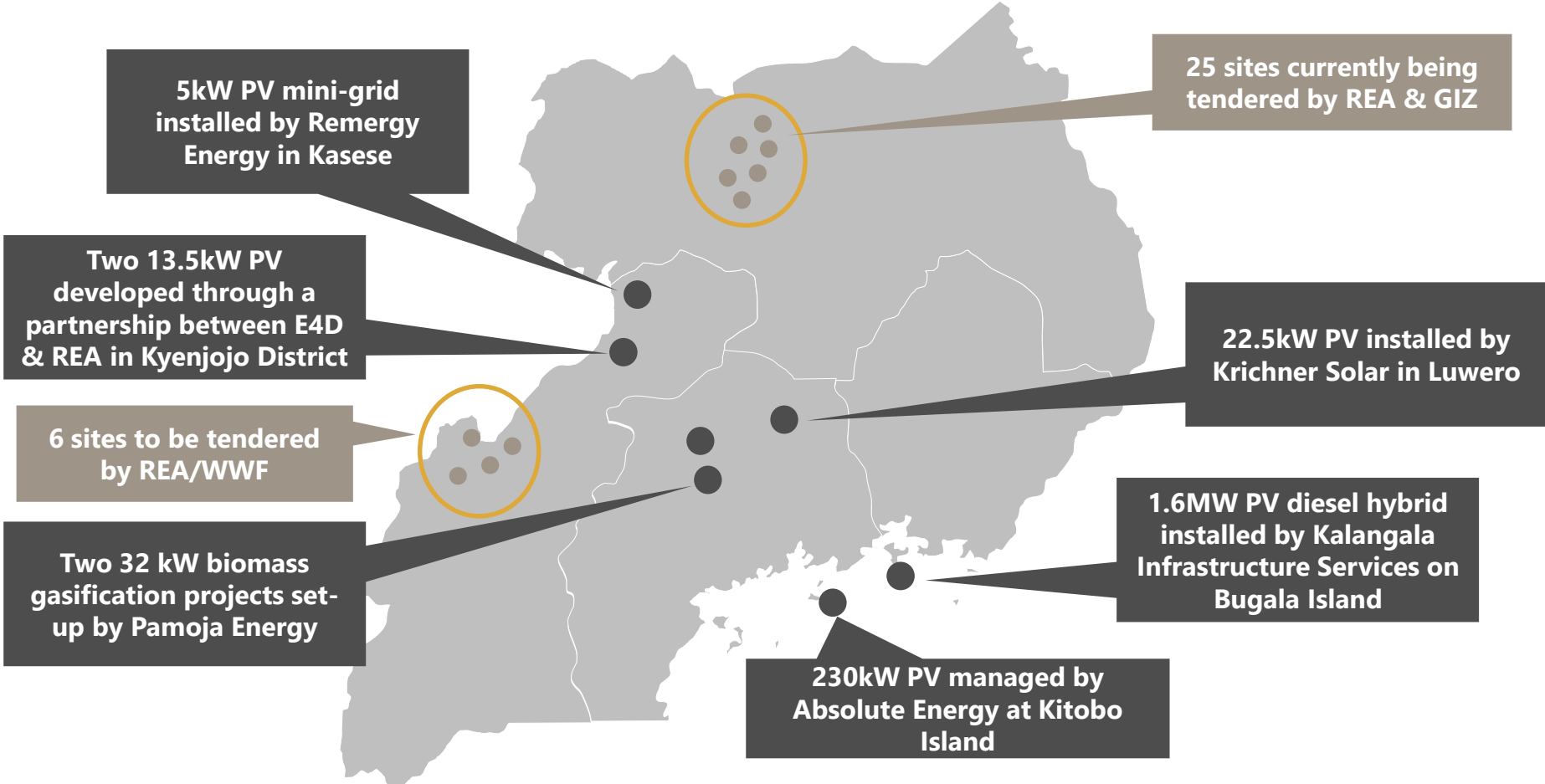
Operator	Units sold in UG ¹	Branches/Distribution points in UG					Price of lowest cost system
		Total	North	East	West	Central	
 fenix intl	120,000	89	9	24	26	30	\$189
 M-KOPA SOLAR	94,000	21	10	6	4	1	\$274
 solar now	17,500	34	4	6	13	11	\$480
 BrightLife <small>by FINCA International</small>	16,000	24 ²	4	5	7	8	\$70
 Village Power	10,000	12	2	2	3	8	\$100
 Solar today	6,000	16	-	-	16	-	\$300
 ONELAMP	450	2	-	2	-	-	\$100
Rest of market	~8000 ³	Market leverages agents across network, not enough data on spread					
Total	~270,000	198	29	45	69	58	

With growth in mobile money penetration & distribution, SHS sales driven by PAYG operators

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

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

Mini-grids: To date, only small number of 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

Mini-grids: A number of models continue to be explored for development

Mini-grids models vary according to size, ownership & management and customer base¹
















- Ownership & management of distribution & generation assets may be done by gov't, private, community or Public Private Partnerships (PPPs) and other hybrids
- Customers may include households, small businesses, large anchor clients or a mix of all

	Procurement options	Financing options	
Government led market	<ul style="list-style-type: none"> • Identified by government and then run via public tender <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> • Govt allots service territories / concessions to private sector operator(s) 	<ul style="list-style-type: none"> • Government subsidies • Export credit loans • Guarantees and • Direct funding 	<p>Regulated tariffs in parity with central grid costs so government subsidizes project to ensure viability³</p>
Private sector led market	<ul style="list-style-type: none"> • Identified by operator and developed within regulatory framework of licensing 	<ul style="list-style-type: none"> • Equity financing • DFI grants • Sovereign loans 	<p>Tariffs should cover all the costs of the mini-grid plus a margin so operate in areas with higher willingness to pay</p>

Mini-grids in Uganda currently mainly driven by public sector but managed by private sector or communities:

- REA identifies suitable sites for mini-grids and tenders to developers. There are some private sector initiated projects - these apply for license from regulator with letter of support from REA. In both cases
- With government led projects, there are several benefits for mini-grid developments:
 - Enables clearer planning in different territories to ensure economies of scale & reduced operational expenses
 - De-risks projects with added predictability on when grid is likely to be extended
 - Makes utility cheaper for end-users through subsidies on distribution & connection

Productive use: With strong market potential, some companies are incorporating productive use solar products in their offering

Category	Example products ¹			Examples of private sector* dealers in Uganda	
Household & institutional use	 Fan	 Security light	 Water heater	 ENVENTURE creating sustainable enterprises	 Village ENERGY
Small shops	 Refrigerator	 Hair clippers	 Sewing machine	 Solar today	 Village Power
Agricultural use	 Water pump	 Hammer mill	 Oil seed press	 UltraTec Energy Solutions For All	 W. WATER WORKS Water Engineering Solutions

Few examples exist of operators dealing in more commercial appliances ²

Note:
* Private sector dealers included distribute products across all tiers.

Source:
1. Respective company websites and social media pages.
2. UOMA analysis in "Promoting Productive Use Report, Uganda Off Grid Energy Market Accelerator, 2017"

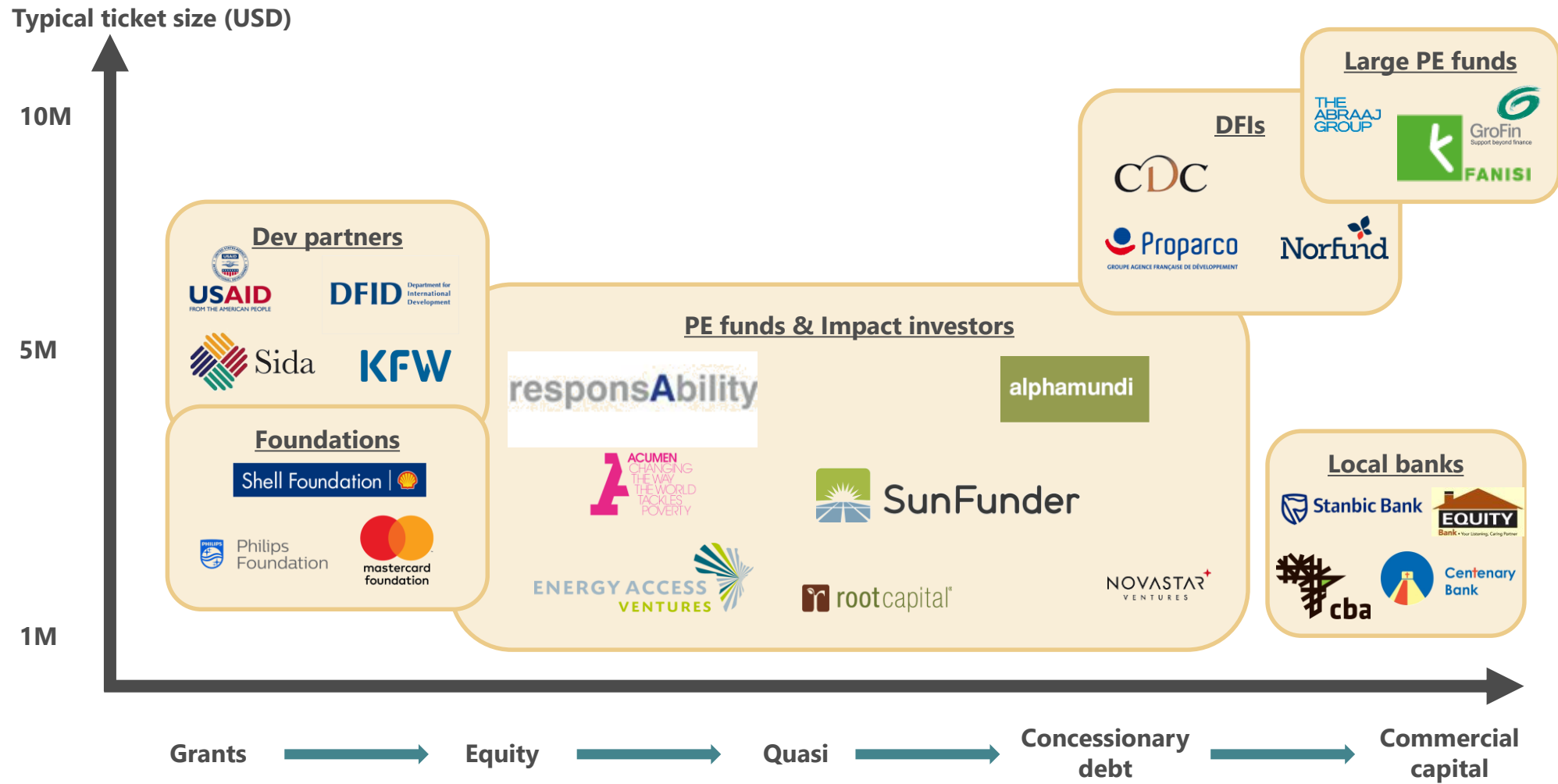
Associations: Represent private sector interests, advocate policy issues to government

Uganda National Renewable Energy and Energy Efficiency Alliance

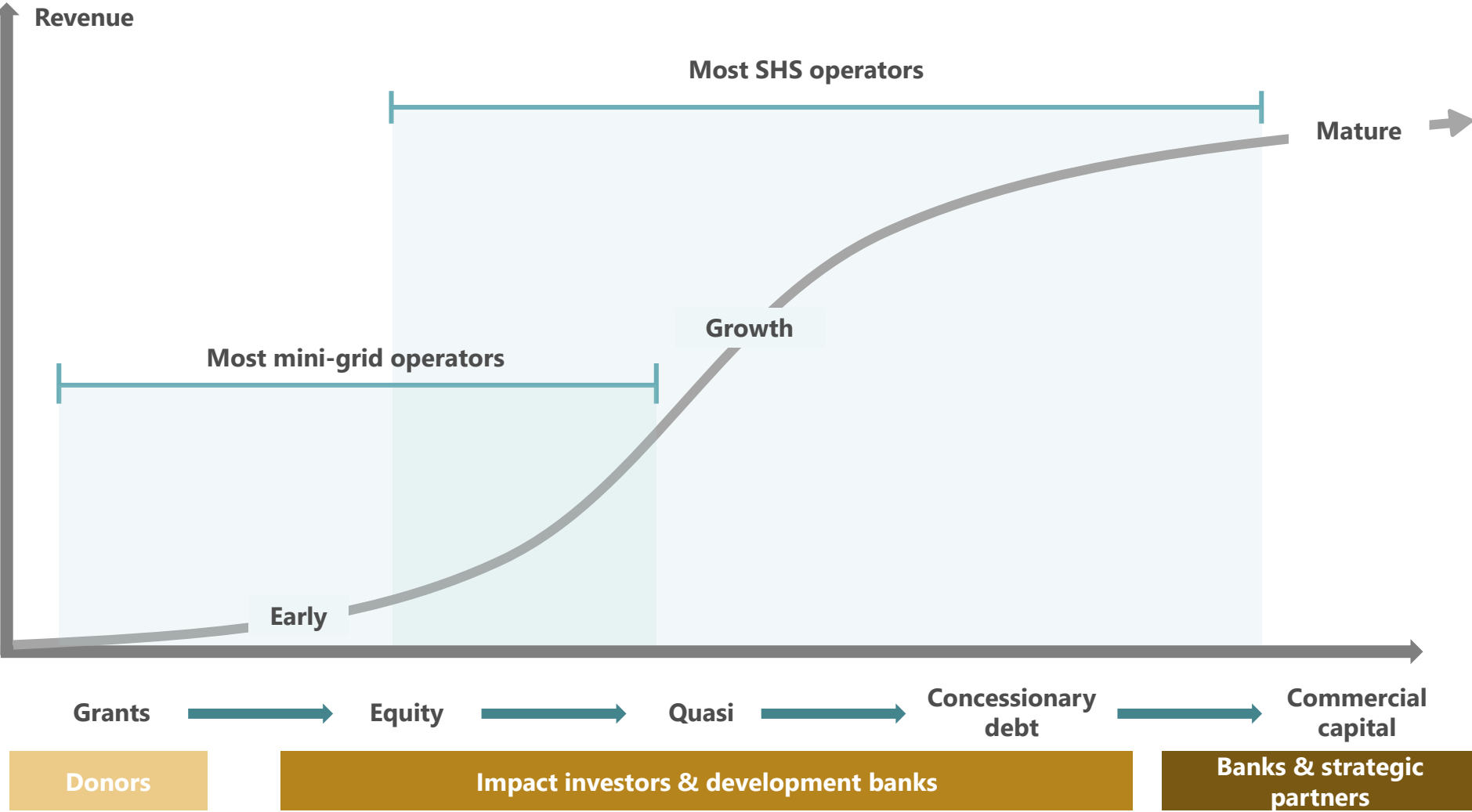
	Mandate & description	Membership & capacity
USEA Uganda Solar Energy Association	<ul style="list-style-type: none"> Seeks countrywide mobilization of solar providers, coordinating stakeholders, playing an advocacy role and capacity building 	<ul style="list-style-type: none"> 60-70 members consisting 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	<ul style="list-style-type: none"> Promotes biomass energy efficient technologies through networking, sharing information, and developing knowledge among member organizations / individuals 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Champions hydropower development in the hydropower sub-sector through advocacy, capacity devt & resource mobilization 	<ul style="list-style-type: none"> Membership open to private sector companies, organizations & associations, consumers, & policy makers; receives support from GIZ, CREEC, & WWF
EEAU Energy Efficiency Association of Uganda	<ul style="list-style-type: none"> Aims to foster provision for quality energy efficiency services, enhancing research, innovation & knowledge transfer 	<ul style="list-style-type: none"> Large capacity of technical members working to get association accreditation to certify Energy Efficiency Professionals in the country
UNBA Uganda National Bio-gas Alliance	<ul style="list-style-type: none"> Seeks to unite and support stakeholders as well as existing regional associations in the biogas sector 	<ul style="list-style-type: none"> National umbrella organization of the UG biogas sector; four associations organized according to regions, supported by partnership with GIZ

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

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



Financiers: While mini-grids remain nascent, many SHS operators are experiencing strong growth, with some securing local debt









Financiers: Many recent debt deals in the region






Investor	Company	Amount	Date
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
CBA	M-KOPA	US\$20m	2014
Barclays	Azuri	US\$1.7m	2013

>\$300M debt financing in EA over the last few years demonstrate increasing bankability of off-grid sector, particularly SHS

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
<p>Scaling-up rural electrification using innovative solar photovoltaic (PV) distribution models¹</p> <p>Ongoing</p>	 SHS  Mini-grids  Cook stoves	<ul style="list-style-type: none"> Scale up the use of solar PV systems at schools, health clinics, and business levels in the district of Kasese by building local capacity to install & maintain solar PV systems 	<ul style="list-style-type: none"> Provide business training & specific solar PV energy training to CBOs Implemented under Champion District initiative 	<ul style="list-style-type: none"> Set up pilot in Kasese with CSOs like SACCOs Scaling pilots to Arua and Masindi Planning to develop 20 mini-grids (5kw) in Kasese after successful SHS pilot 	<p>Implementers: WWF (under Champion Districts Initiative)</p> <p>Funders: ACP-EU</p>
<p>Access to energy services in rural and peri-urban areas in Northern Uganda (Teko Wa Project)²</p> <p>Ongoing</p>	 SHS  Cook stoves  Bio fuels	<ul style="list-style-type: none"> Increase the energy security of rural households in Northern Uganda through increased availability of biomass, energy-efficient stoves, and PV solar units 	<ul style="list-style-type: none"> Locals groups are trained to create and use sustainable and more environmental friendly energy sources, like energy-saving stoves and affordable solar system 	<ul style="list-style-type: none"> Training in local communities on constructing and selling clay stoves Partnership with Barefoot power providing solar lighting and accessories in Pader, Kitgum, Lamwo and Agago districts 	<p>Implementers: Church of Sweden</p> <p>Funders: ACP-EU</p>

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
<p>Providing access to modern energy for northern Uganda (PAMENU)¹</p> <p>Completed</p>	 SHS  On-grid  Cook stoves	<ul style="list-style-type: none"> Project focused on increasing the use of solar PV, improving household cookstoves and mini-hydro power for small grids 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<p>Implementers: GIZ</p> <p>Funders: ACP-EU</p>
<p>Scaling up access to modern electricity services on a regional scale in rural Sub-Saharan Africa by means of a fee for service business model²</p> <p>Ongoing</p>	 SHS  Mini-grids	<ul style="list-style-type: none"> Working to scale up access, in the predominantly rural, poor communities of the targeted countries in Cameroon, Mali, Uganda & Guinea-Bissau 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> On track to provide 8,200 households and SMEs in Cameroon, Mali, Uganda and Guinea-Bissau with access to electricity through SHS 	<p>Implementers: Foundation Rural Energy Services</p> <p>Funders: ACP-EU</p>

Sources: UOMA interviews & consultations, supplemented by

1. http://energyfacilitymonitoring.eu/page/2/?option=com_docman&task=cat_view&gid=12&limit=15&limitstart=0&order=name&dir=ASC&Itemid=12;

2. <http://database.energyfacilitymonitoring.eu/acpeu/project/4341/>; <http://database.energyfacilitymonitoring.eu/acpeu/project/4625/>


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
<p>Energy for Rural Transformation Phase III (ERT-3)¹</p> <p>Ongoing</p>	<p> SHS</p> <p> On-grid</p> <p> Mini-grids</p>	<ul style="list-style-type: none"> Increase access to electricity in rural Uganda, with focus on three components: <ul style="list-style-type: none"> — On grid access — Off-grid access — Institutional strengthening through impact monitoring 	<p>Off-grid component:</p> <ul style="list-style-type: none"> Installation of solar PV systems for public institutions in rural areas Business development support Provision of credit facilities Quality standards enforcement support 	<ul style="list-style-type: none"> USD 8.5 million fund to be disbursed to local banks to provide working capital financing to SHS PAYG operators 	<p>Implementers: REA, MOWE, MOH, MOESD, UECCC, PSFU, MEMD</p> <p>Funders: World Bank/GEF</p>




Sources: UOMA interviews & consultations, supplemented by

1. <http://www.energyandminerals.go.ug/downloads/ERDreportERTII1.pdf>; <http://projects.worldbank.org/P133312?lang=en>


Add'lly, 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
<p>Lighting Africa Campaign¹</p> <p>Ongoing</p>	 SHS	<ul style="list-style-type: none"> Enable access to off-grid lighting and energy products for 250 million people across sub-Saharan Africa by 2030 	<p>Catalyze the market through:</p> <ul style="list-style-type: none"> Market intelligence Quality assurance Access to finance Consumer education Business development support Policy & regulation 	<ul style="list-style-type: none"> 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 	<p>Implementers: Broad global alliance – imps. varying by country</p> <p>Funders: World Bank / IFC</p>




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

USAID / Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>The Power Africa Uganda Electricity Supply Accelerator</p> <p>Ongoing</p>	<ul style="list-style-type: none">  SHS  Mini-grids  On-grid 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Supports generation and access projects through grants, transaction advisory support, short term technical assistance and linkages with other Power Africa partner tools 	<ul style="list-style-type: none"> • Supported the Uganda Solar Energy Association to hold an Off-grid Expo; • Sector technical assessment underway to identify entities for collaboration 	<p>Implementers: Energy and Security Group</p> <p>Subcontractors: NRECA International, Nexant, African Solar Designs and Konserve Advisory Services</p> <p>Funders: Power Africa, GE Africa</p>

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




USAID / Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>The Scaling Off-Grid Energy Enterprise Awards</p> <p>Ongoing</p>	 SHS	<ul style="list-style-type: none"> Accelerate growth in the off-grid energy market to provide 20 million households in sub-Saharan Africa with access to modern, clean, and affordable electricity 	<ul style="list-style-type: none"> Incentivizes technological innovation, funds early stage companies, and supports critical elements of the off-grid ecosystem Over \$2.5 million dollars in grants awarded to off-grid companies to enable market expansion, improve payment and distribution processes, and bring down costs for customers 	<ul style="list-style-type: none"> Awards given to Greenlight Planet, Village Energy, d.light, Fenix, Orb Energy, Vitalite, PEG Africa and Shinbone Labs 	<p>Implementers: USAID</p> <p>Funders: USAID, Power Africa, DFID, Shell Foundation, African Development Bank</p>

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


USAID / Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>Quality Assurance Framework for Mini-Grids¹</p> <p>Ongoing</p>	 Mini-grids	<ul style="list-style-type: none"> Address some of the root challenges of providing safe, quality, and financially viable mini-grid power systems to remote customers 	<ul style="list-style-type: none"> Provide a flexible alternative to rigid top-down standards by defining: <ul style="list-style-type: none"> Levels of service framework Accountability and performance reporting framework 	<ul style="list-style-type: none"> 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 	<p>Implementers: NREL, DOE</p> <p>Funders: Power Africa, Global LEAP</p>
<p>The Off-grid Energy Challenge²</p> <p>Ongoing</p>	 SHS  Mini-grids	<ul style="list-style-type: none"> Promote innovative solutions that develop, scale-up of proven technologies for off-grid energy – reaching communities not served by the grid 	<ul style="list-style-type: none"> Awards grants of up to USD 100,000 each to African companies providing off-grid solutions that deploy renewable resources and power local economic activities 	<ul style="list-style-type: none"> Five Ugandan enterprises including Green Heat, One Lamp, GRS Commodities and two women-owned business have been awarded with grants 	<p>Implementers: USADF</p> <p>Funders: Power Africa, GE Africa</p>

Source: UOMA interviews & consultations, supplemented by
 1. <http://www.nrecainternational.coop/where-we-work/uganda> , www.nrel.gov/publications 2. <http://www.usadf.gov/pressreleases/2016/9/21/us-african-development-foundation-and-ge-africa-announce-new-partnership-for-women-energy-challenge>

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

USAID / Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Electricity Expansion and Improvement program Ongoing	 SHS	<ul style="list-style-type: none"> Rapidly increase electricity access in its rural areas 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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
	 Mini-grids				
	 On-grid				






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

USAID / Power Africa	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>Uganda Electricity Regulatory Partnership¹</p> <p>Ongoing</p>	 Mini-grids	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<p>Held technical workshop to:</p> <ul style="list-style-type: none"> 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 	<p>Implementers: NARUC, ERA</p> <p>Funders: USAID / Power Africa</p>

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 Campaign¹ Ongoing	 SHS  Mini-grids	<ul style="list-style-type: none"> Accelerate expansion of household solar market to help bring universal electricity access in Africa forward from 2080 on current trends to 2030 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Coordinated and signed Energy Africa Compact with Uganda government and other stakeholders making commitment to address several challenges facing the SHS market 	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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Partnership with Shell Foundation to support private sector innovations Support Innovate UK's Energy Catalyst to stimulate technology innovation Build other strategic innovation partnerships 	<ul style="list-style-type: none"> 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/>

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
<p>Milking the Sun & Harvesting the Sun¹</p> <p>Ongoing</p>	 SHS  Solar agric. app	<ul style="list-style-type: none"> • Provide dairy and crop farmers and their households with high quality, affordable and sustainable solar lighting systems and solar powered agricultural appliances 	<ul style="list-style-type: none"> • Subsidy to provide farmers with access to 37,000 solar products with reliable after sales service 	<ul style="list-style-type: none"> • 6,500 systems sold as of October 2016 (NB: Harvesting the Sun started in July 2016) 	<p>Implementers: Solar Now, Barefoot Power, Uganda Crane Creameries Cooperative Union & other value chain managers</p> <p>Funders: Government of Netherlands</p>


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 CleanStart¹ Ongoing	 SHS  Mini-grids  Cook stoves  Bio fuels	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 2015 Energy Access Challenge funding five businesses in PAYG solar and clean cook stoves through two-year partnership (2016-2017), cost share 30% (cash & in-kind) New round to fund 15 more SMEs - in clean cooking and solar (pico, larger SHS and micro-grids) through 2 to 3-year partnership, cost share TBC; Clean Cooking Challenge Window Call for EOI launched in March (cost-share 40%) 	<p>Implementers: UNCDF</p> <p>Funders:</p> <ul style="list-style-type: none"> RECF Uganda: Embassy of Sweden in Uganda (RECF), UNCDF, DFID Uganda CleanStart Global: Austrian Development Agency, Liechtenstein, Norad, Sida, UNCDF


Sources: UOMA interviews & consultations, supplemented by

1. <http://www.uncdf.org/en/cleanstart>; <https://adobe.ly/2Dzy8eT>

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
<p>Promotion of Renewable Energy & Energy Efficiency program (PREEEP)¹</p> <p>Ongoing</p>	 SHS	<ul style="list-style-type: none"> Promote sustainable use of energy for social economic empowerment, increased access to renewable energy, and efficient utilization of existing energy resources <p>Focuses on three areas:</p> <ul style="list-style-type: none"> Supporting clean energy strategies Mitigating climate change Promoting access to energy 	<ul style="list-style-type: none"> 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 	<p>Policy support:</p> <ul style="list-style-type: none"> Energy programs structured in West Nile & Lango Quality management system for the planning, steering and evaluation processes of MEMD Fully operational GIS lab <p>Market development:</p> <ul style="list-style-type: none"> Capacity building through associations Awareness campaigns <p>Licensing:</p> <ul style="list-style-type: none"> Standardized licensing procedures for small-scale off-grid energy projects with REA & ERA 	<p>Implementers: MEMD, REA, ERA</p> <p>Funders: BMZ ,KfW</p>




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
<p>Promotion of Mini-grids for Rural Electrification (Pro Mini-Grids)¹</p> <p>Ongoing</p>	 Mini-grids	<ul style="list-style-type: none"> 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 	<p>Four components:</p> <ol style="list-style-type: none"> Develop off-grid strategy for the National Electrification Policy & develop methodology to identify mini-grid project locations Develop mechanisms for license concessions, efficient tenders Implement and award tenders to private mini-grid concessionaires in villages Promote productive use in villages to raise household incomes & improve the economic feasibility of service providers' business model & tariff revenue structure 	<ul style="list-style-type: none"> 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 	<p>Implementers: GIZ, MEMD, REA, ERA</p> <p>Funders: BMZ</p>

Source: UOMA interviews & consultations, supplemented by

1. BMZ brief on "Promotion of Mini-Grids for Rural Electrification"



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 project¹ Ongoing	 SHS	<ul style="list-style-type: none"> Provide sustainable energy solutions to boarding schools in the mainly off-grid rural areas with solar energy, efficient cook stoves, and biogas technologies 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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
	 Cook stoves				
	 Bio fuels				

Source: UOMA interviews & consultations, supplemented by

1. http://www.nama-database.org/index.php/Green_Schools_in_Uganda




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	<ul style="list-style-type: none"> Developing the share of renewable energy in the energy mix in East Africa 	<ul style="list-style-type: none"> Providing technical assistance to companies & banks to assist them in identifying opportunities for green investments 	<ul style="list-style-type: none"> 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
	 Bio fuels	<ul style="list-style-type: none"> Improving energy efficiency for companies Encouraging local banks to increase lending activities towards low-carbon projects 	<ul style="list-style-type: none"> Installation & monitoring of projects Supporting partner banks in their risk assessment approach, communication strategy & marketing in green finance 		

Source:

1. <https://www.sunref.org/en/projet/promoting-investments-in-renewable-energy-and-energy-efficiency-in-east-Africa/> ; <https://ug.ambafrance.org/AFD-supports-Green-Financing-in-Uganda>





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

UNIDA	Target Industry	Target action	Approach	Results to date	Affiliated organizations
East African Centre for Renewable Energy and Energy Efficiency (EACREEE)¹ Ongoing	 SHS	<ul style="list-style-type: none"> Create increased access of modern, affordable & reliable energy services 	<ul style="list-style-type: none"> Develop & implement a coherent regional RE&EE policy framework for the EAC & facilitate its implementation on national levels 	<ul style="list-style-type: none"> 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: UNIDA, ADA
	 Bio fuels	<ul style="list-style-type: none"> Increased energy security in East Africa 	<ul style="list-style-type: none"> Develop & execute regional programs and projects in cooperation with GEF, other partners and mobilize funding 		
	 Mini-grids	<ul style="list-style-type: none"> Mitigation of negative effects e.g. local pollution & greenhouse gas emissions 	<ul style="list-style-type: none"> Provide co-funding for demand-driven programs and projects executed by the private and public sector or civil society in the region, etc. 		





Source:

1. <http://www.eacreee.org/content/history-eacreee>; <https://www.eac.int/press-releases/483-731-46-eac-centre-of-excellence-for-renewable-energy-and-energy-efficiency-eacreee-now-operational-in-kampala-uganda>


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	<ul style="list-style-type: none"> Leverage foundations, govt, private sector, DFIs and other financiers to amplify impact and accelerate market growth 	<ul style="list-style-type: none"> Market institutions used to tackle barriers and facilitate effective deployment of blended capital to accelerate market growth 	<ul style="list-style-type: none"> 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
	 Mini-grids				
	 Cook stoves				
	 Produce				

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
<p>Building an ecosystem to accelerate access to energy</p> <p>Ongoing</p>	 SHS	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<p>Implementers: Various</p> <p>Funders: Shell Foundation</p>
	 Mini-grids				
	 Cook stoves				
	 Produce				





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
<p>Village Academy</p> <p>Ongoing</p>	 SHS	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Held <i>MCE Sales Agent</i> 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 <i>Soroti Solar PV</i> 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 	<p>Implementers: Village Academy</p> <p>Funders: Philips Lighting Foundation</p>

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 (1/7)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Energising Development (ENDEV)¹ Ongoing	 SHS	<ul style="list-style-type: none"> Achieve sustainable access to modern energy services for 19 million people by 2019 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Increased access of BoP to improved cook stoves by 560,000 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 146,000 people to date Supported solar co.'s to implement end user financing such as PAYG and consumer financing with local institutions 	Implementers: GIZ EnDev Uganda Funders: Netherlands, Germany, Norway, UK, Switzerland and Sweden
	 Cook stoves	<p>EnDev Uganda:</p> <ul style="list-style-type: none"> Increasing household access to improved cooking by 560,000 people 			
	 On-grid	<ul style="list-style-type: none"> Increasing access to energy for lighting/electric appliances for 157,800 people by mid-2018 			
	 Solar lantern	<ul style="list-style-type: none"> Increasing access to energy for lighting/electric appliances for 157,800 people by mid-2018 Provide modern energy services for 1,100 social institutions and 1,600 SMEs 			



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 (2/7)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>Africa-EU Renewable Energy Cooperation Programme (RECP)¹</p> <p>Ongoing</p>	<p> SHS</p> <p> Mini-grids</p> <p> On-grid</p>	<p>Catalyze development of markets to:</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Policy advisory to support the development of regulatory frameworks Private sector cooperation by facilitating co-investment and sharing of expertise Access to finance by supporting development of bankable projects Innovation and skills development through African-European network, including research and private sector institutions 	<ul style="list-style-type: none"> Provided critical information on energy markets through in-depth studies Helped identify concrete project opportunities through on the ground scouting and matchmaking btw project developers, tech suppliers & service providers Organized networking and information events Supported access to finance through targeted advisory services and an online database of funding instruments 	<p>Implementers: GIZ</p> <p>Funders: Germany, European Commission, the Netherlands, Austria</p>




Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (3/7)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>Scaling Off-Grid Energy (SOGE): Grand Challenge for Development¹</p> <p>Ongoing</p>	<p> SHS</p> <p> Mini-grids</p>	<ul style="list-style-type: none"> Accelerate growth in the off-grid energy market to provide 20 million households in sub-Saharan Africa with access to clean and affordable modern energy services 	<ul style="list-style-type: none"> Platform for leading donors and investors to incentivize technological innovation, fund early stage companies, and support critical elements of the off-grid ecosystem 	<ul style="list-style-type: none"> Support companies by helping geographic expansion, test new business models and tap into private and public sources of finance Encourage innovation in products and services customers want and need, including energy efficient household appliances, energy storage, and digital financial services. Promote policy and regulatory reforms, spurring the growth of mobile payment systems, and building capacity in local markets 	<p>Implementers: USAID</p> <p>Funders: USAID / Power Africa, DFID / Energy Africa, Shell Foundation</p>



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 (4/7)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>Energy and Environment Partnership/Southern and East Africa¹</p> <p>Ongoing</p>	<ul style="list-style-type: none">  SHS  Mini-grids  Cook stoves 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<p>Implementers: KPMG Finland</p> <p>Funders: Ministry of Foreign Affairs of Finland, DFID and The Austrian Development Agency</p>



Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (5/7)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
Off-Grid Refrigeration Challenge¹ Ongoing	 SHS  Mini-grids	<ul style="list-style-type: none"> Seek to catalyze new technological advancements and identify best-in-class commercially available off-grid refrigerators Increase the availability of these high-demand products, and in turn increase demand for appropriate solar home systems. 	<ul style="list-style-type: none"> USD 600,000 competition to increase the availability of off-grid energy refrigeration solutions 	<ul style="list-style-type: none"> Have closed application window , finalists going through lab and field testing of products Will announce winners in August 2017 	Implementers: Global LEAP Funders: USAID / Power Africa, US Global Dev't Labs, DFID / Ideas to Impact, Global LEAP

Many development partners have partnered on initiatives to further accelerate progress towards shared access goals (6/7)

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>New Deal on Energy for Africa¹</p> <p>Ongoing</p>	<p> SHS</p> <p> Mini-grids</p> <p> On-grid</p>	<p>Achieve universal access to energy in Africa by 2025 by:</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Mobilizing domestic and international capital for innovative financing in Africa's Energy sector Supporting African countries in strengthening energy policy, regulation and sector governance 	<p>Approval of 29 energy sector operations worth USD 1.7 billion to deliver:</p> <ul style="list-style-type: none"> 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 	<p>Implementers: AfDB</p> <p>Funders: AfDB, Africa Energy Leaders Group, Sustainable Energy Fund for Africa, SE4ALL, UK's Energy Africa Campaign and Power Africa</p>

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

Multi-lateral	Target Industry	Target action	Approach	Results to date	Affiliated organizations
<p>Uganda Solar Energy Association¹</p> <p>Ongoing</p>	<p> SHS</p> <p> Mini-grids</p>	<ul style="list-style-type: none"> Partnership aimed to spur off-grid solar industry-led advocacy and coordination to support universal energy access together with the Uganda Solar Energy Association 	<ul style="list-style-type: none"> Work with USEA to review and reform its governance and management structures Build capacity in USEA to provide members with value-added services such as market intelligence, big data customer research Business development training for solar companies and other industry stakeholders 	<ul style="list-style-type: none"> Working with consultants to build governance structure and provide guiding documents for the association Empowering association as the lead of a number of sector initiatives and conferences such as Solar Expo 	<p>Implementers: UNCDF CleanStart</p> <p>Funders: DFID, UNCDF</p>

Government: 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)

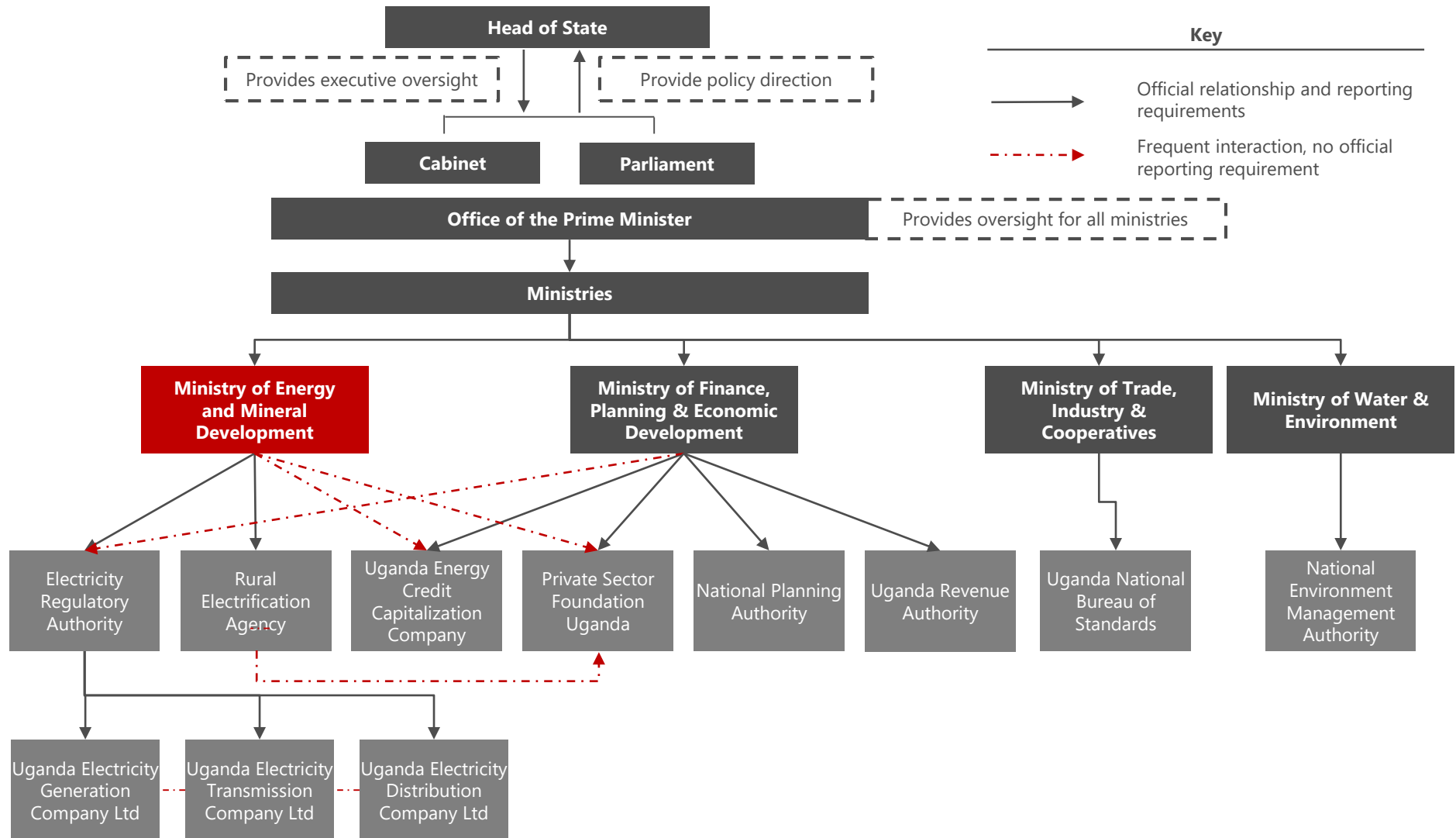
- Regulates the electricity supply industry and issues licenses for generation, transmission, distribution or sales of electricity, as well as ownership or operation of transmission systems
- Establishes tariff structures and investigates tariff charges, approves rates, terms, and conditions of electricity 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

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



Government: Current energy guiding docs do not reference off-grid directly or have inconsistent targets but increasingly being aligned

Document	Implementing org	Overarching goal	Energy specific target
Energy Policy, 2002	MEMD	Meet energy needs of population	No specific access targets
Renewable Energy Policy, 2007	MEMD, UECCC	To make modern energy services, like electricity, a substantial part of energy consumption	Increase renewable energy use to 61% by 2017
NDP 2013-2020	NPA, et al	To lead to an average growth rate of 6.3% and per capita income of USD 1,039 by 2020	Increase access to 30% by 2020
RESP II	REA	Achieve accelerated pace of rural penetration	26% access for rural areas by 2022
ERT III	MEMD, PSFU, REA, MOH, MOES, UNBS, et al	Develop Uganda's energy and technology sectors to make a significant contribution to rural transformation	No specific targets for connections
Uganda Vision 2040	NPA, MEMD, et al	Transform UG to middle income country	80% access by 2040
SE4ALL	MEMD	Provide universal access to modern energy services by 2030	98% of population with electricity access by 2030 99% of population with access to modern cooking solutions
EAC Vision 2050	MEMD, NPA, et al	Vision focuses on development pillars that create opportunities for employment and accelerate sustainable growth	74% electrification rate by 2050 with 62% of rural population

However, GoU is now developing the Electrification Expansion and Improvement Program that will enable and guide a significant scale up and alignment of investments in the off-grid sector

Others: There are a number of research institutions and consultants active in UG working to support the market (1/3)

Organization

Work in Uganda



- 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



- 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



- 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

Others: There are a number of research institutions and consultants active in UG working to support the market (2/3)

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



- Supports businesses serving off-grid communities with a range of services from 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

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

Organization

Work in Uganda



- 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



- 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

Others: Global networks and associations are also enabling private sector players to leverage support services

Organization



Work in Uganda

- 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 "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-term 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

2 Industry insights

This section aggregates initial research & insights from 3 key initiatives that UOMA has focused on since 2017

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

Productive use



Potential value of productive use technologies is acknowledged by key players in the Ugandan market, however, there has not been a centralized, consolidated effort to describe the opportunity and assemble the relevant stakeholders across the sector

Access to finance

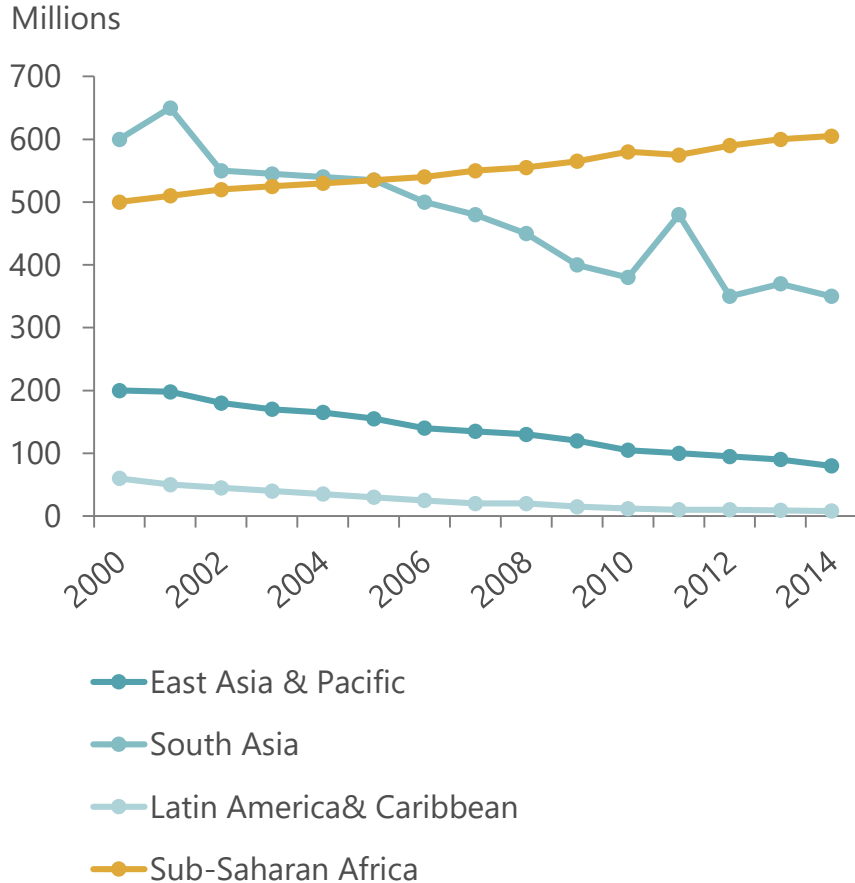


To reach meaningful scale, activating local capital for operators is necessary. We believe Ugandan financial institutions are at a crucial stage where centralized support & coordination could significantly advance access to local capital

Despite recent progress, gap to universal access continues to widen; off-grid playing key accelerating role in Uganda, & region

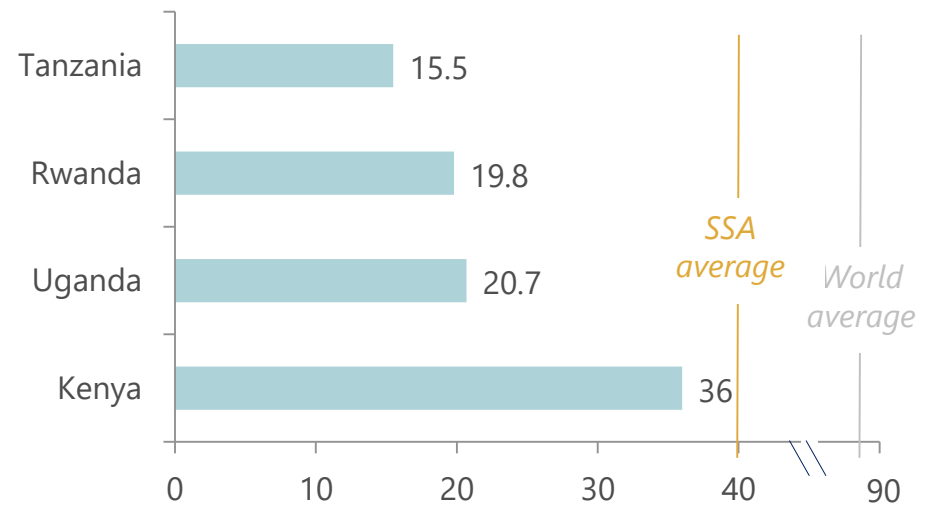
SSA not keeping up with pop growth for access

Trends in population with no access, 2000-2014¹



EA need to accelerate electrification for universal access

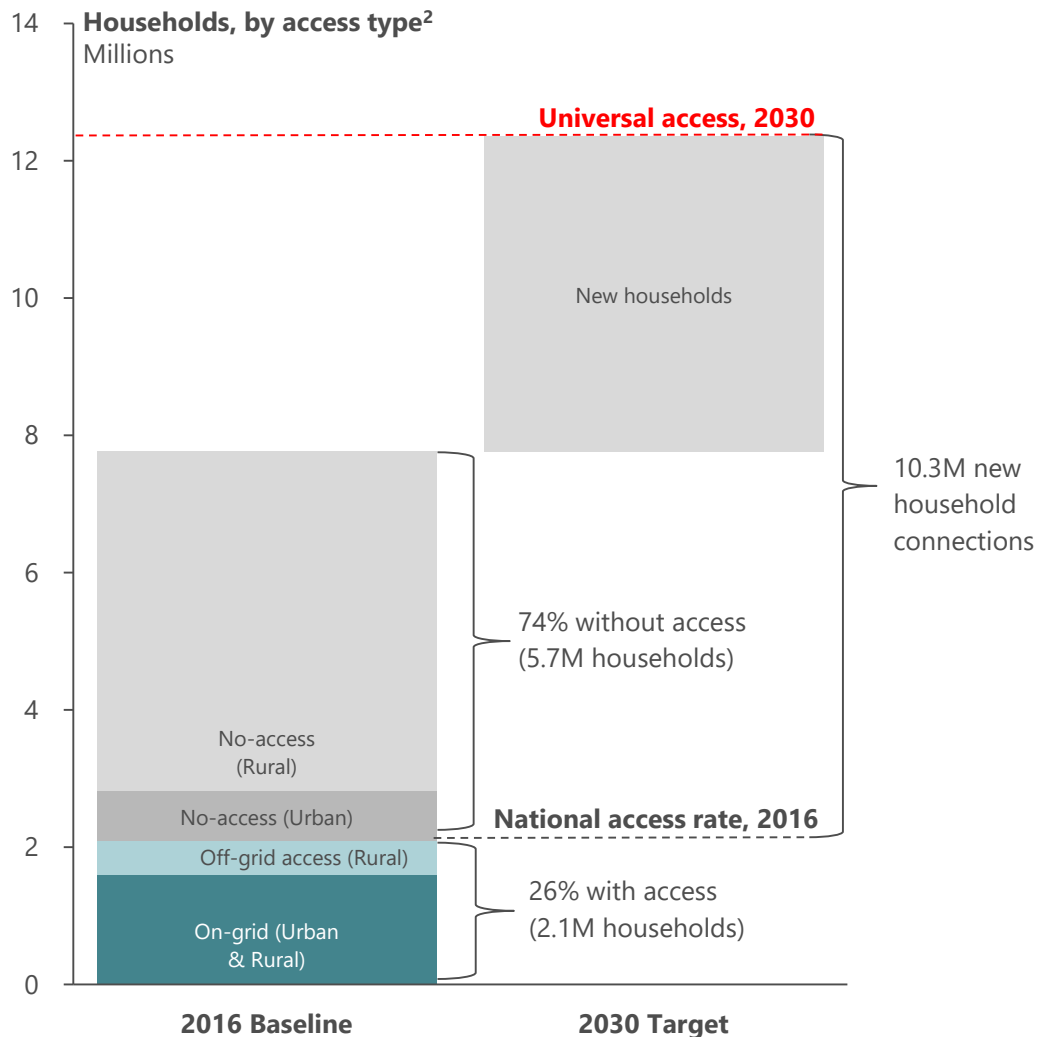
% pop electricity access, 2014²



Important for UG, and wider region, to continue to recognize role of off-grid to accelerate access, and to incorporate as key part of electrification efforts, especially in rural areas

To reach 100% access by 2030, UG must make 10.3M additional connections

74% without access today; 4.8M additional by 2030



Reaching goal will require investment, coordination

SE4ALL defines universal access targets at 2030¹

- Uganda's population is expected to grow at 3.3% per year, expanding from just under 8M households to over 12M by 2030
- To reach 100% of households, Uganda must add 10.3M connections in just 14 years

To meet target, we must understand UG's current trajectory

- To determine a feasible path to universal access, it is first necessary to assess current growth trajectory of on- & off-grid to understand size of additional efforts needed

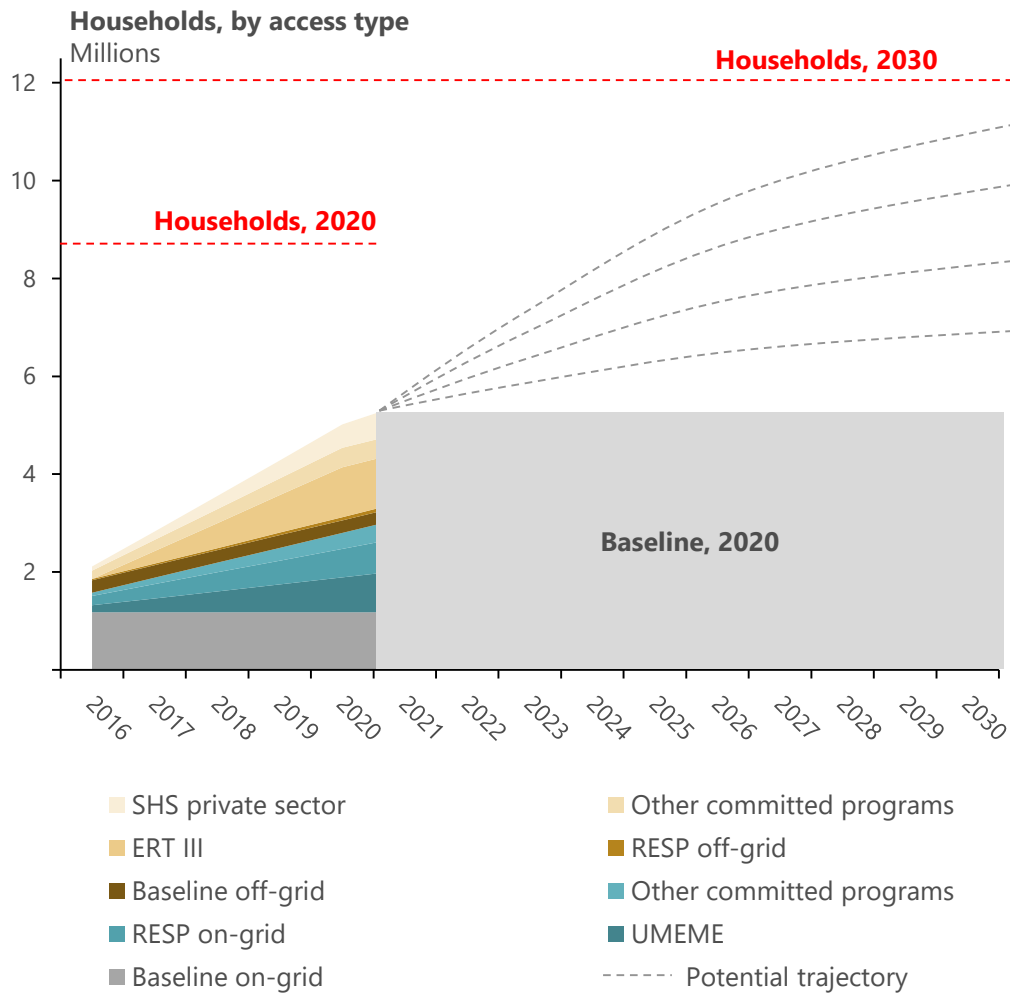
Based on size of gap, determine path to provide access

- Explore possible paths to fill, providing estimates on investment needed and roles to execute

Key assumption:

- Electrified households:** Households with Tier 2 or greater

At 2020, >4M expected to remain without access; reaching 100% access requires improved understanding of unserved segments



We expect ~4M hhs unserved by 2020...

- Despite considerable growth, current trajectory predicts ~4M hhs (~20M people) will remain without energy in 2020

...with an additional ~3M hhs to serve by 2030

- Pop'n will grow to ~12M hhs at 2030, so there will be ~3M add'l hhs to serve if population growth rates hold at 3.3%
- In order to reach these, a number of interventions will need to happen in addition to macro economic growth

Exploring sustainable and scalable off-grid solutions for unserved population segments is necessary if Uganda is to reach universal access by 2030

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

1



Affordability



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

- Some cannot fully afford current products or willingness to spend 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

2



Distribution



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

3



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

Affordability: To develop strategies to serve important to understand consumer willingness to pay (WTP) vs ability to pay (ATP)

WTP influenced by consumer perceptions

- Influenced by levers that shape consumer perceptions and ambitions around energy
- These dictate the percentage of income they are willing to pay for a particular technology
- Some of these include:¹
 - Welfare rate & highest level of formal education for hhs
 - Socio-economic factors like condition of owned house
 - Quantity, quality & continuity of product(s)
 - External factors such as ease or cost of payment like mobile money charges

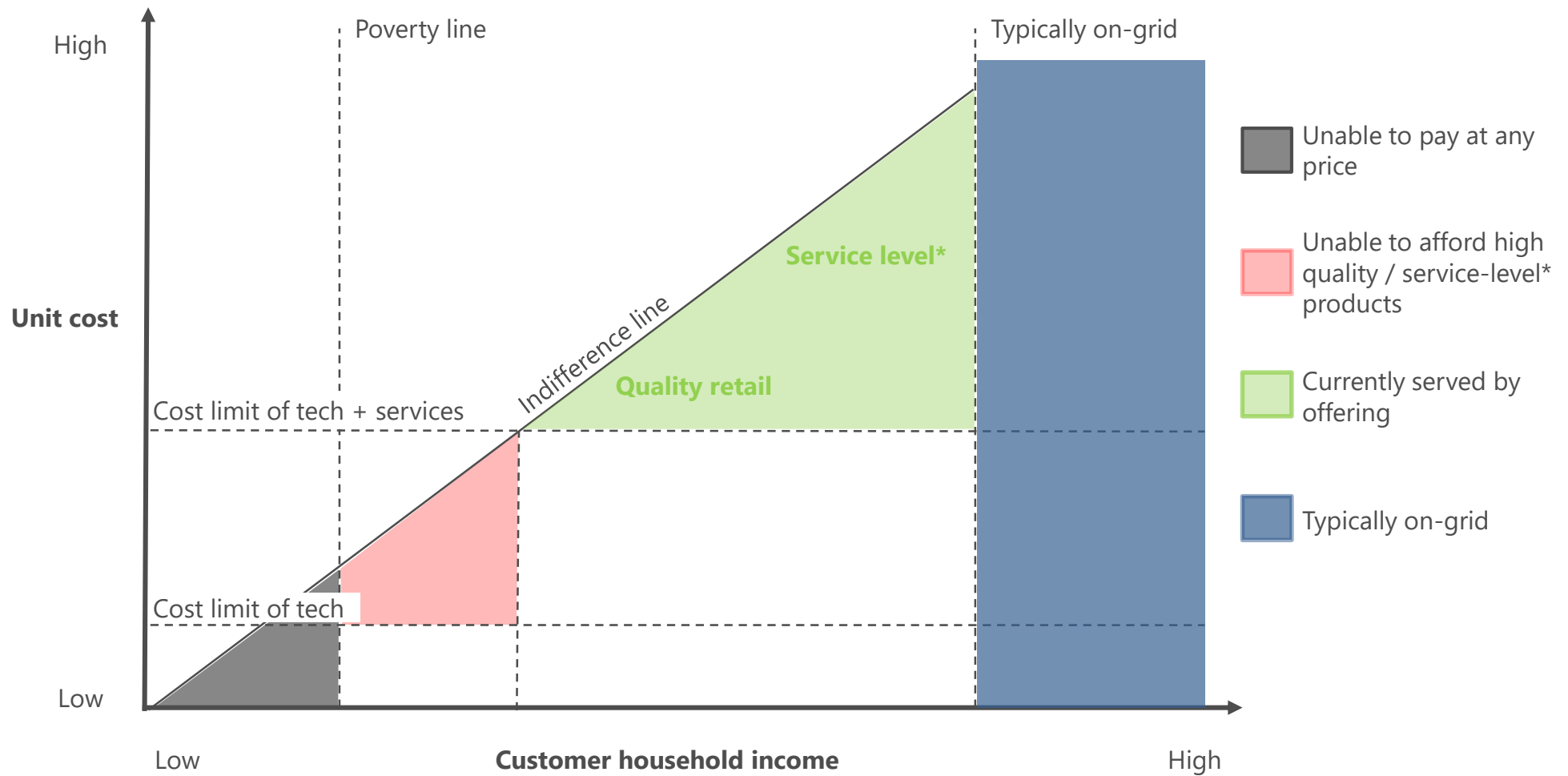
ATP influenced by economic activities & dev't

- Dictated by the income levels of individuals versus the pricing of available products
- In developing countries like Uganda we classify these levels as:²
 - *Middle class ~ 37% have some assets and stable incomes*
 - *Insecure non-poor ~ 43% highly vulnerable and susceptible to shocks due to seasonal incomes or lack of assets*
 - *Poor~20% living on < \$1.25 a day mostly unemployed*
- In UG, proportion of the population living in poverty declined from 56.4% in 1993 to 19.7% in 2013³, however, hhs that managed to move out of poverty still have consumption below twice the poverty line

Education & awareness required to shift mindsets alongside careful assessment of customer base for product dev't & marketing

Affordability remains a key hinderance for energy access; important to understand economic activities & level of dev't in these areas to reach

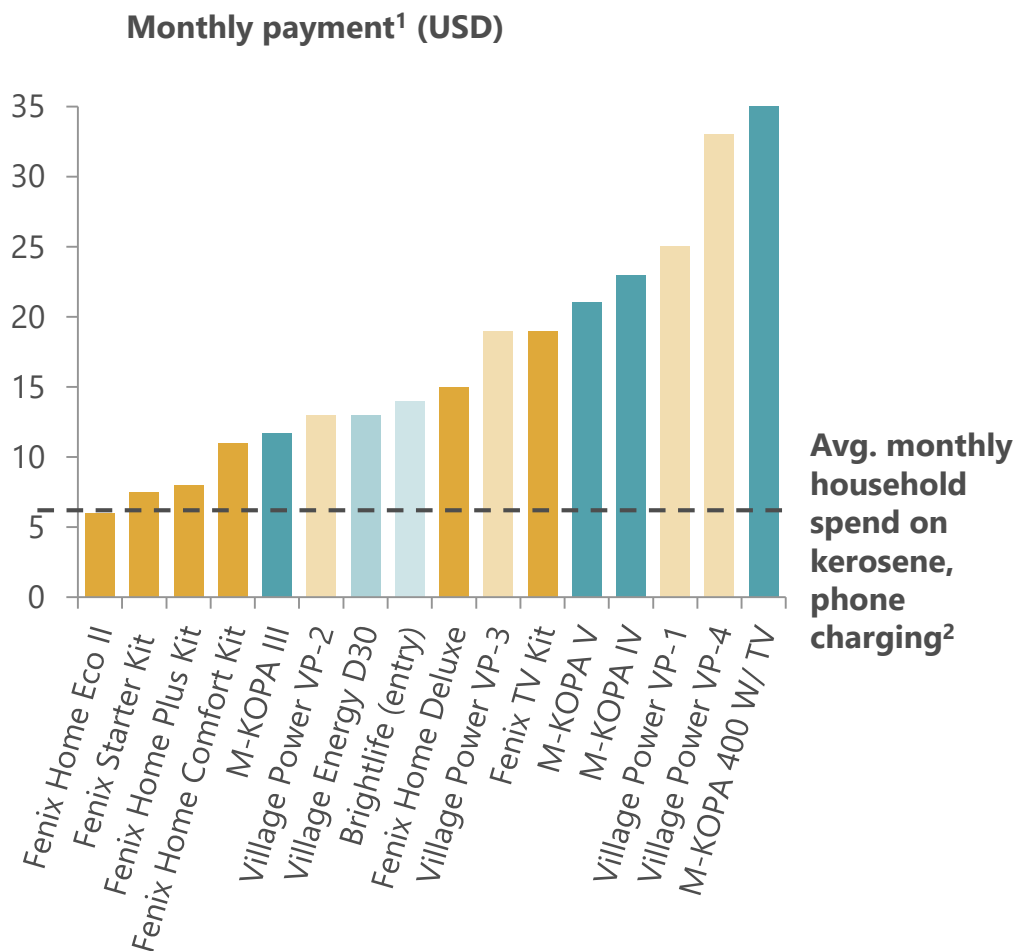
Affordability: Leading operators sell to upper market, with lower income populations unable to afford, left to buy low-quality units



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.

Affordability: PAYG monthly payments on cheapest units are typically above the avg. monthly displaced spend, with only two units below



Affordability of SHS is key market constraint; those who lack ability to pay have two main options:

1. Purchase lower-functionality 'pico' units:

- Pico units provide basic light & phone charging at lower prices than SHS
- Some see pico as an important entry to the 'energy ladder' where displaced spending on kerosene / phone charging will allow savings & eventual purchase of larger systems

2. Purchase low-cost off-brand generic SHS:

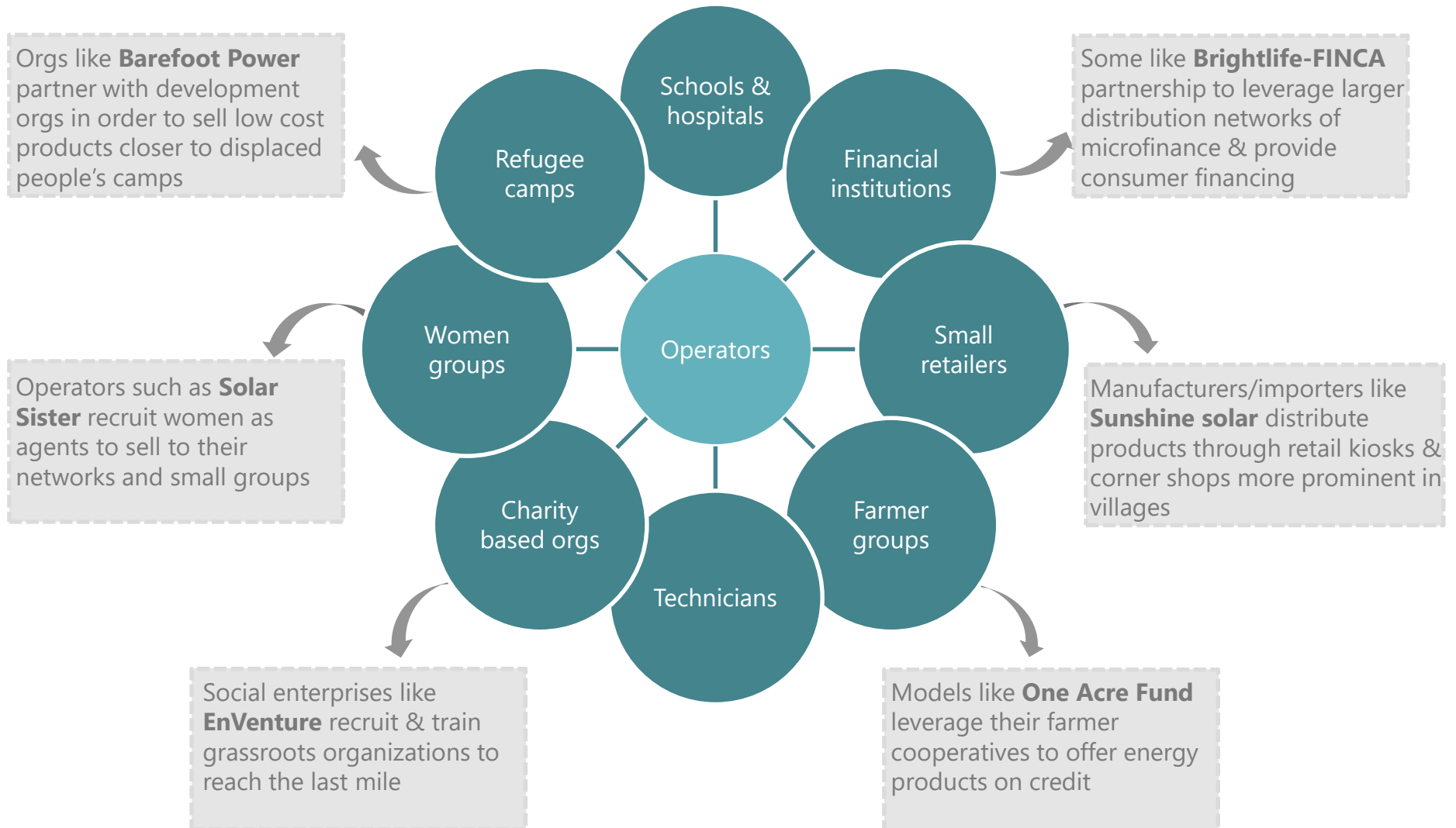
- Low-cost, off-brand generics can cost up to 8x less than higher-quality & service-level products
- These units are often mislabeled (e.g., a 5w panel labeled as a 7w), break easily, & have short lifespans relative to higher-quality products
- Their prevalence in the market harms consumer confidence & is thought to slow uptake of higher-quality, higher-priced units

Sources:

1. Monthly payment information from respective company websites and social media pages. Some operators (e.g., M-Kopa) offer financing that is paid per-day or per-week; in these instances payments were scaled to compare total monthly spend.

2. Kerosene estimate; p.8, fn 7 at USD 71 per year; phone charging estimate p.14, at USD 0.26 per week: <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/10229.pdf>

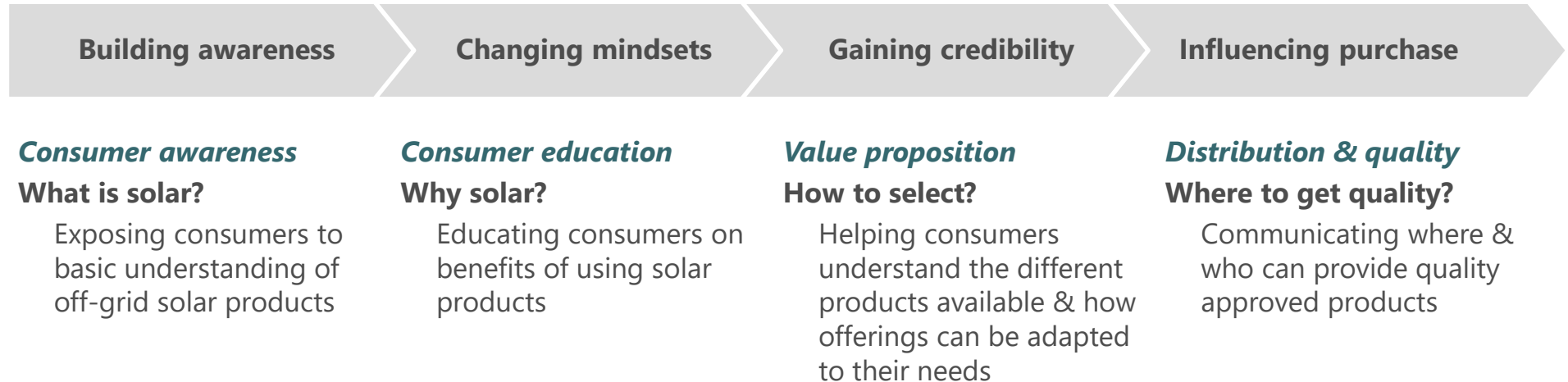
Distribution: A number of businesses exploring different distribution models to reach more hard to reach last mile



Add'l partnerships could possibly help lower cost of acquisition & reduce risk of repayment

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:



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?

Awareness: Consumer understanding has been limited thus far by challenges in quality, technical support & distribution

Building awareness

Do consumers know what products are available to substitute their current energy source? How does this reconcile with their current energy ambitions?

- Strategies through traditional advertising & social media have not been particularly effective to disseminate information in these communities

Changing mindsets

Do consumers understand the benefits of these products over what they are using?

- Surveys show that consumer consideration for value differs from cost, safety, health and so on; this varies with age, income levels & aspirations¹

Gaining credibility

Do consumers trust that the products will give value for money?

- In the past, a number of unbranded products flooded the market & were mostly low quality which has lowered confidence for many consumers
- Limited tech support presence for malfunctioning products has further lowered trust

Influencing purchase

What are the most efficient distribution channels for different operators?

- Independent surveys have shown that consumers are likely to purchase energy service products from people they know and receive a lot of their information by word of mouth rather than through bulk advertising channels²; meaning consistent effort is needed to gain consumer trust and loyalty

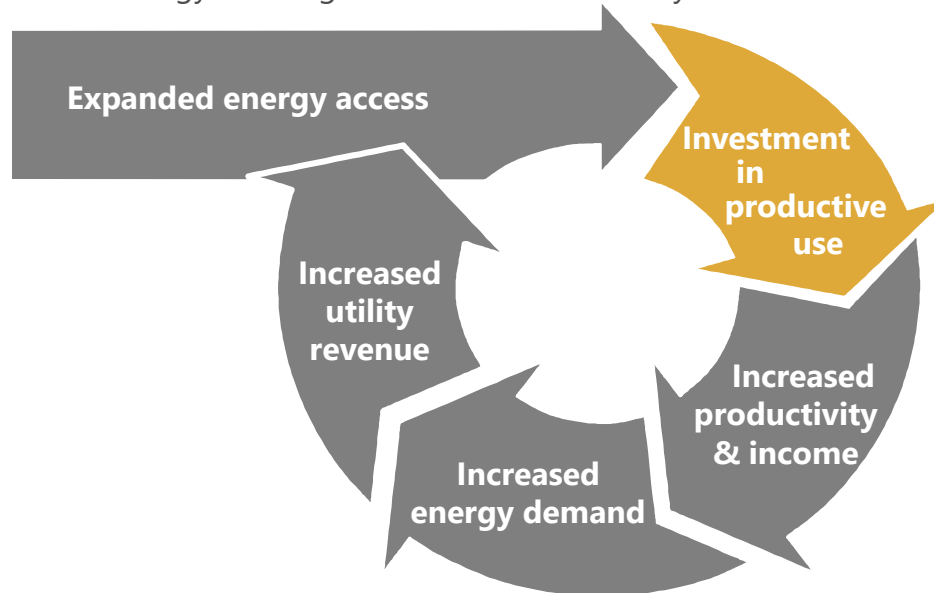
The cycle to increase energy access requires external support

Investment in productive use tech will increase incomes & expand energy access

Access can be stimulated by private sector revenue

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



Productive use can be defined as¹: *"Agricultural, commercial and industrial activities involving electricity services as a direct input to the production of goods or provision of services"*

Sources: UOMA analysis & interviews for "Promoting Productive Use Technologies, 2017" report 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>

3. CIA World Fact Book: <https://www.cia.gov/library/publications/the-world-factbook/fields/2048.html>, National Survey and Segmentation of Smallholder Households in Uganda

Agricultural appliances have high potential in UG

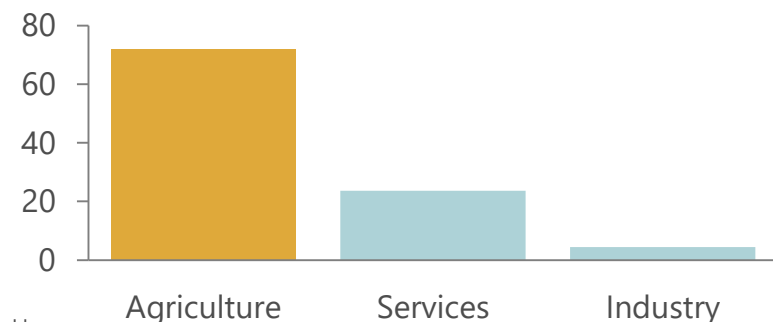
Productive use technologies have the potential to supplement demand, lower costs & drive growth

- Residential demand and growth is often insufficient to make the business case for high capacity generation tech; results into either high tariff structures or long capex payback

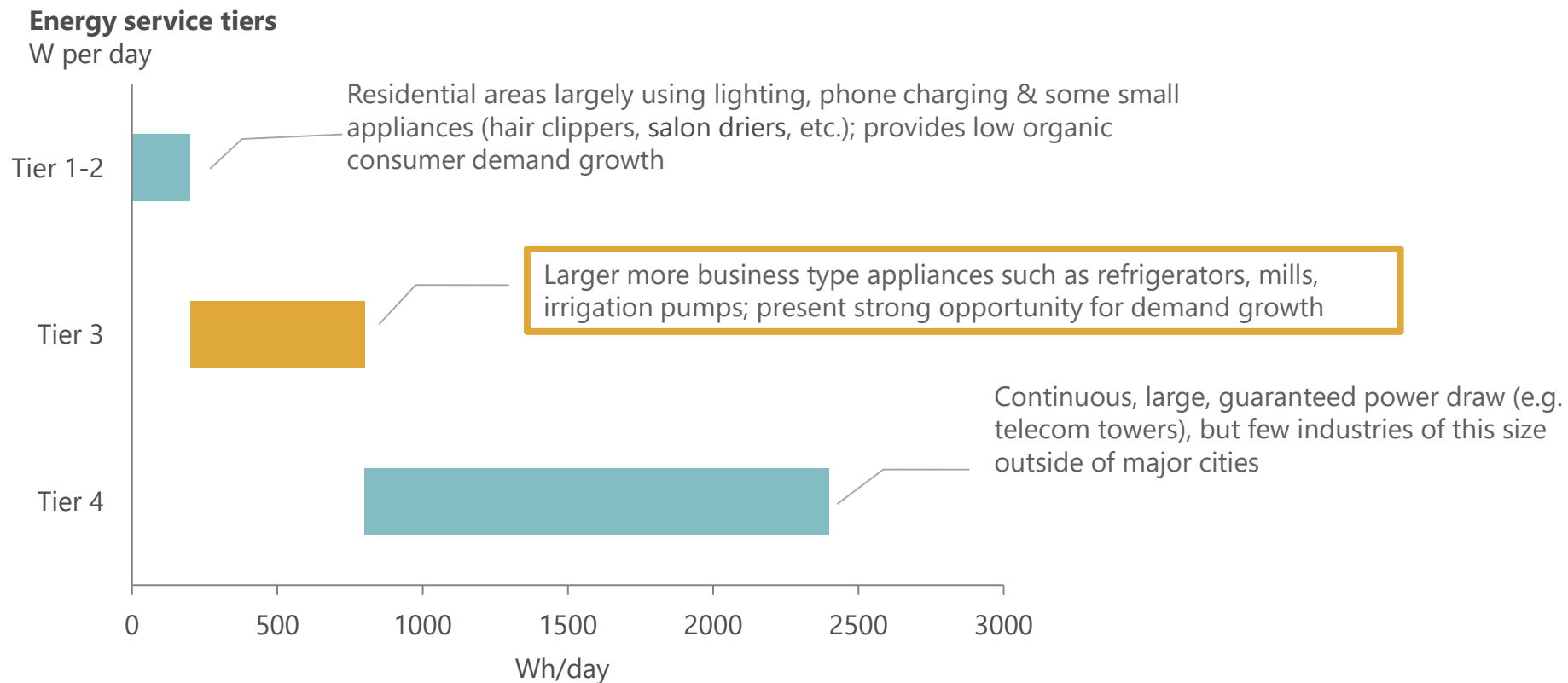
Agricultural sector in Uganda employs the majority and provides the highest potential for impact

- Agricultural sector employs over 70% of Uganda's work force and has the significant potential for value addition across the country³
- Productive use equipment in agriculture could potentially increase individual monthly incomes by 30%⁴

Employment by sector, %



SMEs have potential to generate significant demand and reach large customer base



- 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

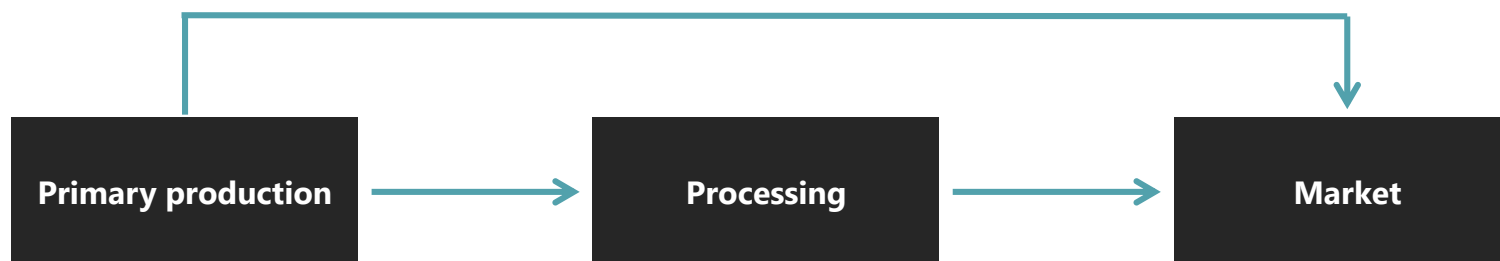
Sources: UOMA analysis & interviews supplemented by

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 Off-Grid Energy Market Accelerator":

Vital to consider entire value chain to optimize impact of productive use technologies

In order to have an impact on farmer livelihoods & increase energy demand, we must consider the value chain holistically, from efficiency at primary production stage to access to secondary markets



Example technologies

- Irrigation pumps
- Post harvest storage & transport

- Grain mills
- Coffee pulpers
- Seed pressers

- Ice machines
- Refrigerators
- Storage silos

Challenges

- Lack of awareness
- Limited business training
- Limited access to finance

- Lack of awareness
- Limited local supply of tech
- Limited access to finance

- Limited capacity to meet demand
- Lack of information

Potential interventions

- Awareness campaigns
- Consumer financing
- Technical training for farmers

- Incentive programs for increased supply
- Consumer financing

- Business incubation
- Investment in post harvest programs

Productive use projects are difficult to implement in Uganda due to a lack of: funding, reliable machinery, awareness and good data

In order to scale and promote productive use tech, important to prioritize awareness, pilot execution & gov't policy development

1 Boost demand through consumer awareness, particularly through increased roll out of more established and tested technologies like solar irrigation and pumps

Raising awareness would lead to a rise in demand, and in turn encourage existing and new companies to utilize productive use technologies

2 Running pilots and incentive programs to encourage innovation for high-potential industries identified such as coffee, nuts & oil seeds

There is room to better understand and potentially work with industry players and manufacturers to test opportunity within significant agricultural sub-sectors; opportunity exists to encourage manufacturers through challenge competitions & local testing

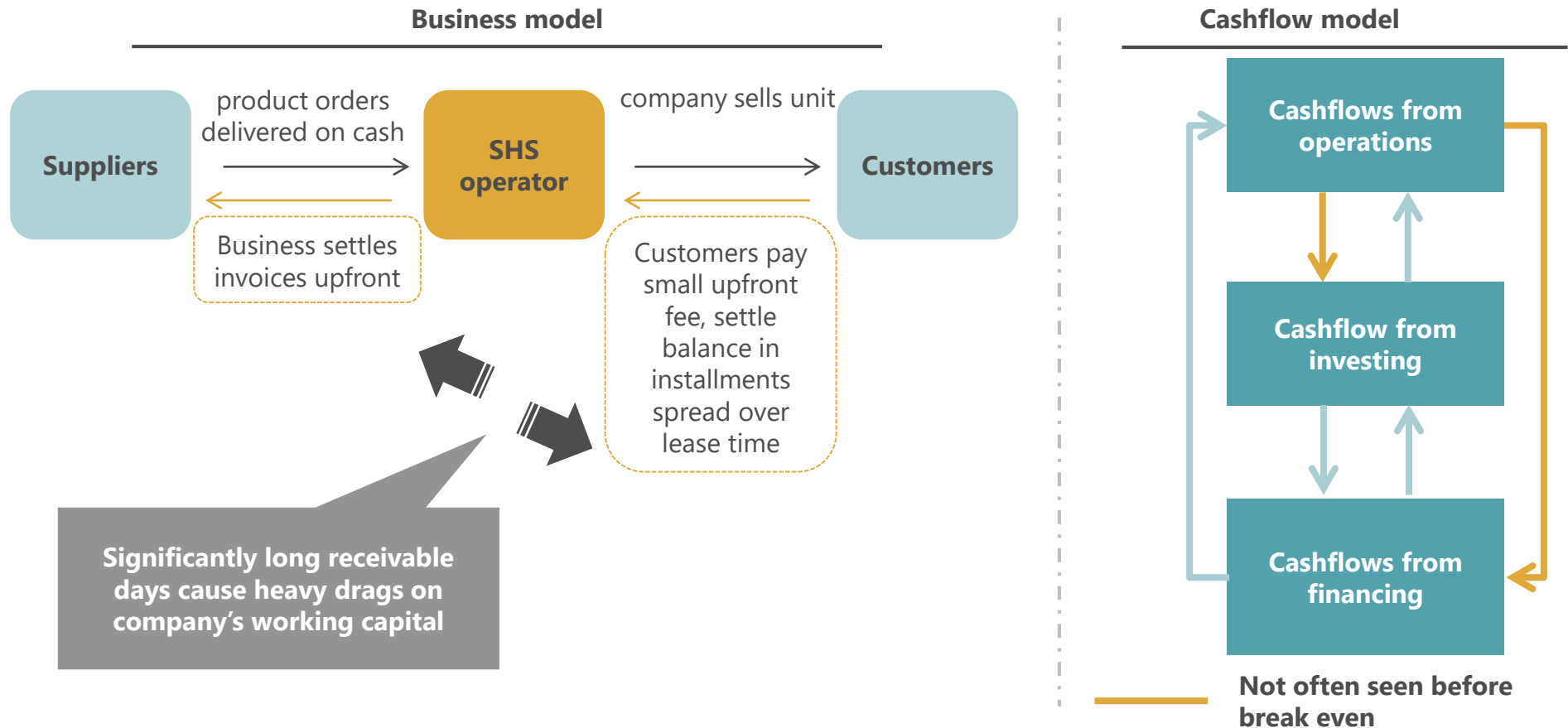
3 Further market research needed to help identify investment gaps and explore value creation

More information in this nascent sector will help operators and investors fully understand and take advantage of potentially large market, and stimulate innovation of financing mechanisms for lower income households

4 Lobbying government to consider specific tariff and trade policies to encourage investment

At present, there are no specific policies that provide incentives for investment into the sector - consistent dialogue with gov't is required to consider attractive policy development for high-potential opportunities; in conjunction, opportunity exists to prove to public sector the potential for prod use in increasing energy demand, expanding energy access and improving standards of living

Business model for PAYG companies quite unique compared to other trading companies; require financing to scale



- Companies require external funding to support deferred fee arrangements
- Given unique cashflow model and most investment in hard currencies, there's large FX risk that requires mitigating measures

There are three key approaches SHS firms are using for currency risk management

	Strategy	Examples
1 Internal Hedging	<ul style="list-style-type: none">Take positions in another currency to offset potential losses from currency exposure	<ul style="list-style-type: none">Netting & matching- take positions in another currency to offset lossesPricing- prices indexed to the value of hard currency
2 External hedging	<ul style="list-style-type: none">Purchase derivative instruments to convert future HC loans to local currency liability	<ul style="list-style-type: none">Through TCX & MFX purchase instruments such as forward contracts, futures, swaps & options
3 Local debt financing	<ul style="list-style-type: none">Limit funds received in foreign currency by refinancing in local currency	<ul style="list-style-type: none">LCY from social investors and banksCapital markets instruments like Asset securitization, Africa local currency bond, commodity hedges

Local debt financing is most efficient approach

Local currency deals are often facilitated by credit enhancement mechanisms & other forms of support

Back to back lending

- Bank deposit used as cash collateral by giving the local bank a contractual right of set-off against the deposit, the SHS operator then borrows a loan denominated in local currency

Letters of credit

- SHS operator provides hard-currency collateral, to an international commercial bank that then provides a letter of credit to a domestic bank

Currency devaluation account

- SHS operator converts HCY loan into LCY and throughout the lifetime of the loan, in addition to its regular interest payments, also deposits pre-agreed amounts of hard currency into a currency devaluation account

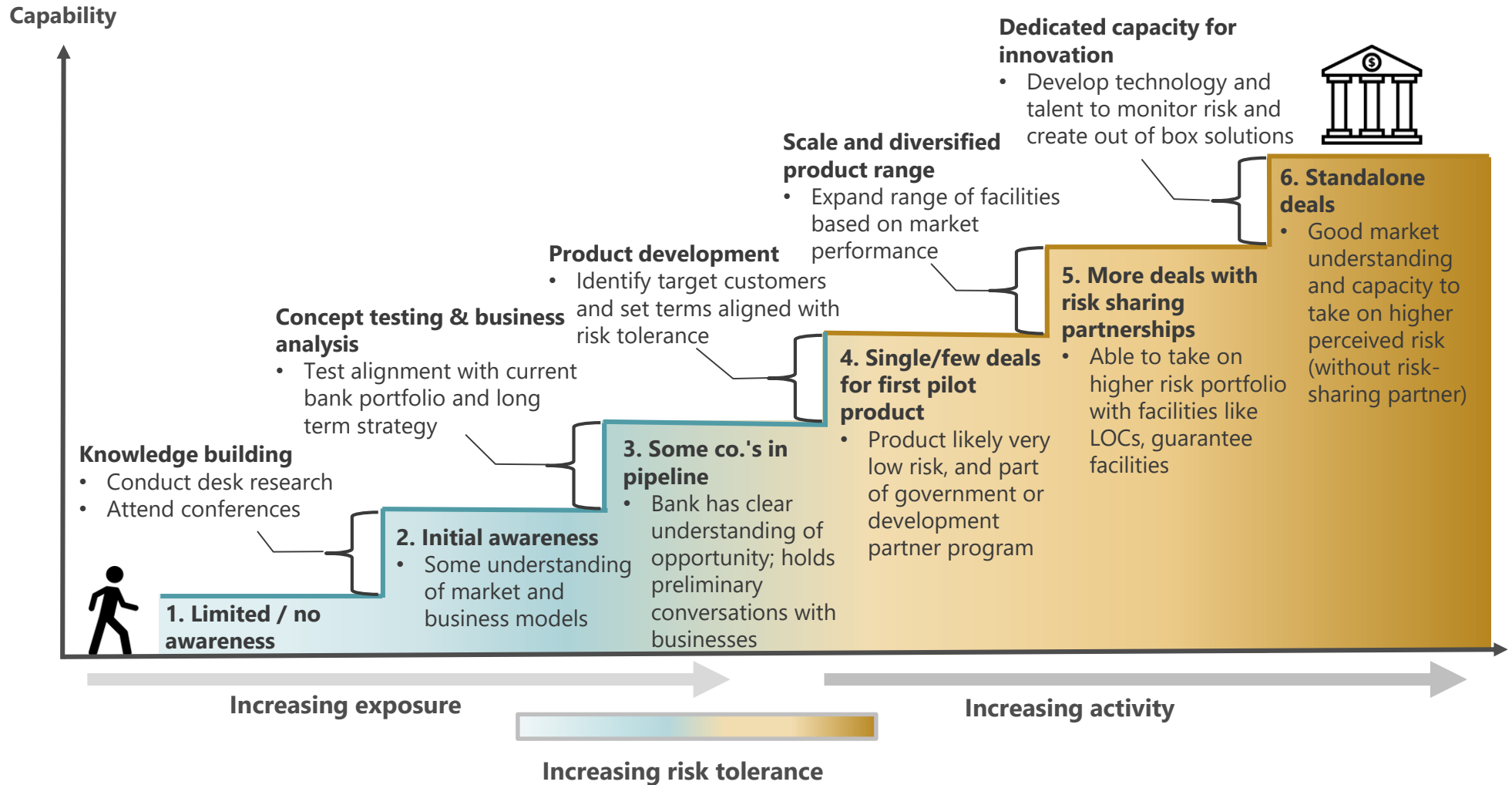
Revolving lending

- Commercial banks may lend the SHS operator as revolving lender if there is a first loss layer supporting their transactions.
- Donors and development institutions could support commercial banks by providing this underwriting layer such as guarantee facilities and risk sharing agreements

Unique model creates opportunity for debt products with innovative financing structures (as seen in some recent deals)

	Example products	Typical terms
Unsecured loans / Mezzanine	<ul style="list-style-type: none"> • Unsecured term loans • Loans that share % profit in addition to interest expense • Loans + warrants • Convertible loans 	<ul style="list-style-type: none"> • No collateral required • Higher capital cost, variable interest in addition to fixed
Secured loans	<ul style="list-style-type: none"> • Inventory financing / trade finance • Receivables financing • Overdraft & lines of credit 	<ul style="list-style-type: none"> • Collateral required and debenture or similar all-asset cover • Overdraft typically provided by relationship bank, often requires guarantee
Off-balance sheet	<ul style="list-style-type: none"> • Securitizes receivables by purchasing directly from the company, without recourse to company's balance sheet • Investors finance SPV and receive return if portfolio performs 	<ul style="list-style-type: none"> • 'Advance rate' or LTV is measure of over-collateralization required • Typically higher implied collateral required since financier doesn't have recourse to company

Experience in off-grid grows as banks step up capacity and ability to assess risk



Banks in UG lie across the spectrum and require tailored support to reconcile their individual interests in the market

3 Barriers to scale

Research & consultations with industry stakeholders have revealed several key market challenges

Access to finance:

- **Access to local debt financing** Although several deals have closed in the market recently, most have been foreign currency. Need to increase local debt lending to help reduce fx losses & enable deeper scale
- **PAYG KPIs** : Lack of standardized PAYG portfolio performance definitions & reporting methods limit investment. These would help de-risk the market for more commercial lenders like banks

Government policy:

- **Fiscal policy**: Unclear tax on components and inconsistent application of import duties hurts SHS business case, prevents operators from planning pricing & orders
- **Mini-grid regulation**: Investment in mini-grids is limited by evolving policy around concessions, feed-in tariffs, guarantees, & duties

Productive use:

- Research for productive-use technologies is less developed than for SHS & mini-grids; potential benefits & capital requirements are not yet well understood

Product standards:

- **Definitions**: UBOS working to adopt IEC standards for pico PV & smaller home systems but there exist no clear global standard for component based systems at the moment
- **Enforcement**: UBOS lacks capacity to fully enforce product standards which creates low consumer confidence by allowing low-quality products & servicing to persist

Reaching unserved populations:

- In order to increase access, businesses struggle to understand customer segments and appropriate strategies to reach
- Important for businesses to intentionally address affordability, awareness, and appropriate distribution to effectively reach more rural based populations

Talent and capacity:

- Businesses struggle to find the technical expertise required to develop requisite systems and maintain those installed. Many do not have the capacity or technical expertise, to raise necessary capital

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