

Dalberg

Commercial & Economic Feasibility Study for Enhancing Off-Grid Solar Inclusion in Sub Saharan Africa

Final Report

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1. ACKNOWLEDGEMENTS

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The report was prepared by a team from Dalberg Advisors.

2. KEY ABBREVIATIONS

AR	Accounts receivable
DFI	Development finance institution
DRC	Democratic Republic of Congo
EIB	European Investment Bank
EC	European Commission
FCDO	Foreign Commonwealth and Development Office
FX	Foreign exchange
GOGLA	Global Off Grid Lighting Association
ISA	International Solar Alliance
MDB	Multilateral development bank
OGS	Off-grid solar
RBF	Results-based finance
SDG	Sustainable development goal
SHS	Solar home system
SSA	Sub-Saharan Africa
TA	Technical Assistance
UNHCR	United Nations High Commission for Refugees

3. EXECUTIVE SUMMARY

Despite progress, the energy access challenge is expected to persist. While the OGS industry has successfully scaled up activities in some market segments, providing Tier 1 modern electricity services commercially to millions of households globally, there are large segments below the “commercial frontier”. In Sub Saharan Africa (SSA), approximately 120 million households lack access to adequate electricity today. Estimates based on electrification rates and population growth indicate that 60 million households will continue to lack access by 2030, jeopardizing the achievement of SDG 7 – universal sustainable electricity access.

While off-grid solar solutions primarily include solar home systems and mini grids, this study focuses on enabling energy access via private solar home system (SHS) solutions. This reflects numerous studies within energy access literature, which show that SHS is the best, most cost-effective solution to provide full Tier 1 electricity access for most unserved segments in SSA. Moreover, the SHS private sector ecosystem is mature and robust in many SSA countries and well-suited for market-driven blended finance approach (as opposed to a more conventional grant funding approach). At the same time, we recognize that other solutions, such as mini grids, have an important role to play in the energy access landscape. However, the dearth of commercially viable business models and critical regulatory barriers (e.g., licenses, grid and mini-grid interactivity, tariff limits, land acquisition, etc.) in all but a few SSA countries means that SHSs remain a safer bet for Tier 1 electricity access in the short-medium term. Zooming out, there is a need to place these solutions in a continuum, so that Tier 1 access through SHS can pave the way for higher levels of access through mini grids over a longer time horizon. To that effect, we also believe that the study’s emerging lessons will be relevant for other solutions including mini-grids.

A set of five common, cross-cutting challenges current hinder SHS sector growth. These include: (i) limited ability of customers to afford SHS products, (ii) uncertainty in markets to effectively run businesses, (iii) high costs to serving last-mile populations, (iv) cash-flow constraints stemming from working capital, and (v) instability in the political and economic environment.

Blended finance – which combines the powers of DFIs, bilateral and multilateral funders, governments – has a strong role to play in addressing these challenges and catalyzing SHS markets to reach unserved segments. The main idea of blended finance is to smartly deploy grant and other concessional capital including risk-sharing instruments such as guarantees to help anchor energy access projects and investments, which are often considered risky by standard commercial investors. Well-designed blended finance opportunities offer the ultimate win-win: reduces the average cost of capital for providers which ultimately leads to lower prices for consumers, without distorting markets. These vehicles and structure, in particular results-based financing, have seen success in expanding energy access (including to solar home systems) in countries like Kenya, Tanzania, and Nigeria, among others.

With its focus on climate change, renewable energy, and off-grid solar in Sub-Saharan Africa, EIB (along with partners like the European Commission) is well positioned to drive regional energy impact through blended finance for SHSs. EIB has already developed a strong track record of investing in several high-impact projects covering rural electrification, distribution grid extension, and last mile connections in SSA through loans and equity instruments. Off-grid solar, especially SHSs, offer EIB and EC the opportunity to build on its solid and rich base of experience and capabilities and push the frontiers of energy access in SSA. First, the need for pre-financing is still a major bottleneck for companies to scale up operations, particularly in unserved or fragile markets of sub-Saharan Africa, despite improved affordability of SHS solutions through PAYGO financing. Second, SHSs align extremely well to three of EIB’s key strategic priorities - Climate Action, private sector growth, and Infrastructure development. They mitigate against climate change through reduction in greenhouse gas emissions by offsetting dependence on fossil fuels. They facilitate the growth of SMEs (SHS enterprises and other enterprises that are enabled due to energy access) in unelectrified parts of sub-Saharan Africa and improve infrastructure for energy in various SSA countries.

It should be noted that EIB already provides specific additionality through its funding of investments in this area. Over the last years, it has placed emphasis on the off-grid component of energy access by funding

important pilot projects for the development of mini-grids and for the distribution of Solar Home Systems through the EIB **Off grid Solar Programme**, which has been successful in East and Central Africa.

The European Investment Bank, in collaboration with the International Solar Alliance, commissioned this study by Dalberg Global Development Advisors to determine the economic and commercial feasibility for enhancing off-grid solar in Sub Saharan Africa. The specific objectives of this study are to:

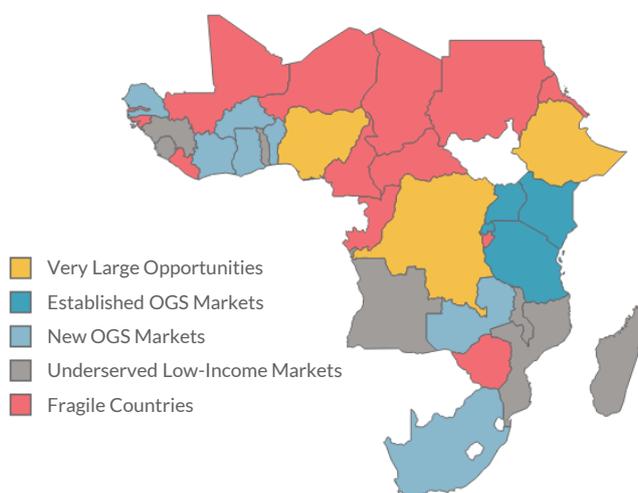
- (1) Identify unserved and underserved markets and segments for SHS in SSA
- (2) Understand the main barriers or challenges to scaling up SHS in these markets and segments,
- (3) Recommend a high-level portfolio of non-distortionary financing and technical assistance interventions for country segments with a high-level intervention plan

The study also assesses the potential and viability of aggregated purchase mechanisms as specific vehicles for deploying blended finance for universal energy access through SHS interventions. It should be noted that while the proposed set of recommendations have been tailored at a high-level to account for the EIB's and the EC's strategic objectives (to leverage the grant- making capacity of the EC through a set of blended finance instruments from technical assistance (TA), investment grants, credit enhancement risk mitigation tools, equity-like instruments, and innovative mechanisms to the lending capacity of the EIB.), they speak to the broader blended finance needs in the sector.

SSA countries were categorized into five distinct 'typologies', based on their common challenges (building from the five cross-cutting challenges), need for electricity, and maturity of OGS markets. These are described below.

- 1) **Very Large Opportunities:** Countries with very high need for electricity, with unelectrified populations greater than 50M. This cluster includes Nigeria, DRC, and Ethiopia.
- 2) **Established OGS Markets:** Countries with a mature OGS market as well as unelectrified population between 15M and 50M¹. Includes Kenya, Uganda, Rwanda, and Tanzania.
- 3) **New OGS Markets:** Countries with a relatively mature OGS market along with medium need for electricity - unelectrified population between 5M and 15M. This cluster includes Ghana, Cote d'Ivoire, and Zambia, among other countries.
- 4) **Underserved Low-income Markets:** Countries with a nascent OGS market, that are not fragile and have medium to high need for electricity - unelectrified population between 4M and 25M. Includes Madagascar, Malawi, and Sierra Leone among countries.
- 5) **Fragile Countries:** Countries with a very nascent or non-existent OGS market, and that have been classified as fragile states by the World Bank. These include Zimbabwe, Mali, and Niger, among others, commonly in the Sahel region.

Figure 1: Country typologies



Each typology requires a customized blend of financing interventions to address specific challenges. Across the board, RBFs and working capital facilities to encourage local currency loans to SHS enterprises will be critical.

Figure 2: Summary of proposed intervention structures for each typology¹

Typology	Focus Segment	Supply-Side RBF Facility	Customer Affordability RBF Facility	Working Capital Facility	Capex Facility	Technical Assistance Facility	Insurance Facility	Sample of Similar Programs in the Market	Potential Partners ⁴
1	Very Large Opportunities		✓ ¹	✓		✓		Togo CIZO Scheme (World Bank); OGEF, (AfDB)	GOGLA, European Commission
2	Established OGS Markets	✓		✓		✓		SIDA Refugee Program	SIDA, ISA
3	New OGS Markets	✓		✓				KOSAP (World Bank); BGFZ (SIDA)	World Bank
4	Underserved Low-income Markets	✓		✓		✓	✓ ²	LEAD Madagascar (World Bank); ENDEV II Mozambique (GIZ)	World Bank
5	Fragile Countries		✓	✓	✓	✓	✓ ³	ROGEP (World Bank); OGEF, (AfDB)	AfDB, ISA, GOGLA

- 1) Very Large Opportunities:** For peri-urban segments within this typology, a ‘private sector catalyst model’ consisting of working capital, results-based ‘customer affordability scheme’, and technical assistance centred on regulatory support will be most relevant. This combination will help combat key challenges of low affordability, as well as limitations on downstream working capital, regulatory barriers, and foreign exchange challenges common to this typology. Specifically, grants (for instance via the European Commission) can be leveraged for demand-side subsidies in the customer affordability scheme but must be designed to ensure adequate targeting and be paired with technical assistance to reduce tax burdens and prevent rechanneling of any savings back to governments. At the same time, concessional debt will play a role in both upstream and downstream working capital; the latter of which should be in local currency (to overcome considerable foreign exchange challenges in these countries).
- 2) Established OGS Markets:** To reach refugees - the target segment for this typology - a *UNHCR-driven aggregated purchases tender (possibly supported by ISA)* across refugee camps proves to be a viable option, followed by a supply-side RBF, downstream working capital, and technical assistance. A multitude of challenges exist in tapping the refugee segment, including low income, lack of demand and high opportunity costs to serve, amongst others. Thus, the structure is composed of a diverse instrument set: the tender process to mitigate market uncertainty; an RBF and working capital to manage high costs to serve (given low volumes in camps) for OGS players; and TA that both supports market assessment of a lesser-known market segment, and ensures best practices are captured and translated by thematic experts like UNHCR to support replication efforts in the future. Distortionary risks of the aggregated purchases tender can be mitigated by expanding the tendering process to all OGS players; yet offering exclusivity to the winning bidder in order to provide adequate support for their expansion.
- 3) New OGS Markets:** A dual-pronged supply-side RBF facility and working capital will help reorient OGS player incentives to serve peri-urban segments of this typology. Limited downstream working capital and sparse customer spread are the two main challenges for the priority segments in this typology. The report looks at ways to start with a target on those hard-to-reach groups even in peri-urban contexts before further expansion to rural areas that require even more dedicated support. Debt for a robust working capital facility will help SHS players get enough units into these markets, complemented by supply-side investment grants via the RBF to account for high costs to serve. The facility has a long-term view: the relevance of the RBF may materialize only a few years after initial set up and once SHS systems are in the country, while the working capital will have greater relevance in the initial period. Moreover, an ‘ex-ante’ element to the RBF (equivalent to capex funding but still under a pay-for-

¹ Notes: (1) Ability to target demand-side subsidies might be limited (2) Refers to Payment Default Insurance offered to the OGS player (3) Refers to the Political Risk Insurance offered to the lenders (EIB, other DFIs from the MIGA facility of the World Bank (4) Non-exhaustive list of potential partners

performance mechanism) will provide further incentive to support OGS players in these markets with expansion of distribution requirements to serve new segments.

- 4) **Underserved Low-income Markets:** A combination of working capital, a supply-side RBF, technical assistance, and a 'payment insurance facility' or credit liquidity reserve will be most relevant to driving OGS penetration into urban and peri-urban segments here. The main challenges in these segments are a lack of consumer finance, low levels of consumer awareness, and competition from cheaper substitutes (e.g., kerosene-based lamps) and low product appeal on the demand-side; as well as operational uncertainty, limited capacity of partners, limited downstream working capital, and weak government institutions on the supply and ecosystem side. Thus, this approach ties together instruments that will catalyze nascent markets to roll-out SHS to underserved households: grants for the RBF (the focus on supply-side versus demand side is because even though these are low income populations, urban segments have a relatively higher income; also demand side subsidies can be distortionary in a pre-commercial market); debt for downstream working capital; and TA to help boost customer awareness and build government capacity to provide an enabling environment. Moreover, given the nascency of the markets, risk mitigation instruments in the form of (partial risk) payment guarantees or insurance for OGS players against customer defaults are also needed; but should be designed so that players can also buy into the scheme to prevent callous customer acquisition processes or complacency.
- 5) **Fragile Countries:** Reaching urban segments within these countries will be facilitated by a *Sahel-wide aggregated purchases process*, with both demand and supply side components; followed by working capital, capex support, demand-side concessional funding, political risk insurance, and TA. Fragility being the defining factor of these regions, they are characterized by low income, operational uncertainty, downstream working capital constraints, fragility, and weak government institutions; requiring both demand and supply-side solutions to address their challenges. The aggregated purchases scheme will be a critical pre-cursor to the facility launching: designed to include the typical demand-side aggregation aspects, but also an aggregation and brokering process on the supply-side of potential local distributors (often in other industries). The latter is key to driving service to these markets, which may otherwise be deprioritized by SHS players.

Once set up, grants will play a role in demand-side financing tackling low income, and on the supply-side, for capex needs in new markets. Concessional debt should be used for downstream working capital to help overcome operational uncertainty and lack of working capital. In addition, political risk insurance such as from the Africa Energy Guarantee Facility (AEGF) or from 'MIGA' will be needed for insuring project investments and funder confidence, considering the fragility of the regions, combined with technical assistance to support with related government capacity and marketing building activities.

Finally, common across the proposed interventions is the need for collaboration and coordination with other SHS ecosystem players including governments, donors, local financing institutions, civil society organizations, and importantly, private players. Engaging with key potential partners like the United Nations High Commission for Refugees (UNHCR), Sustainable Energy for All (SEforAll), USAID Power Africa, the World Bank, and philanthropies like Ikea Foundation and Rockefeller Foundation – who are all key power brokers and influencers in the OGS sector – will be especially important. Coordination with these stakeholders is important to ensure that any new funding is truly complementary and additive to existing initiatives (of which there are several in the OGS sector). These partners will also be crucial in implementing future funding programs. Going forward, they should be part of a more detailed and targeted consultation and program design process that the EIB (along with the European Commission and other in-country stakeholders and donors) should undertake to further define and prioritize the recommendations of this study.

4. CONTEXT AND APPROACH

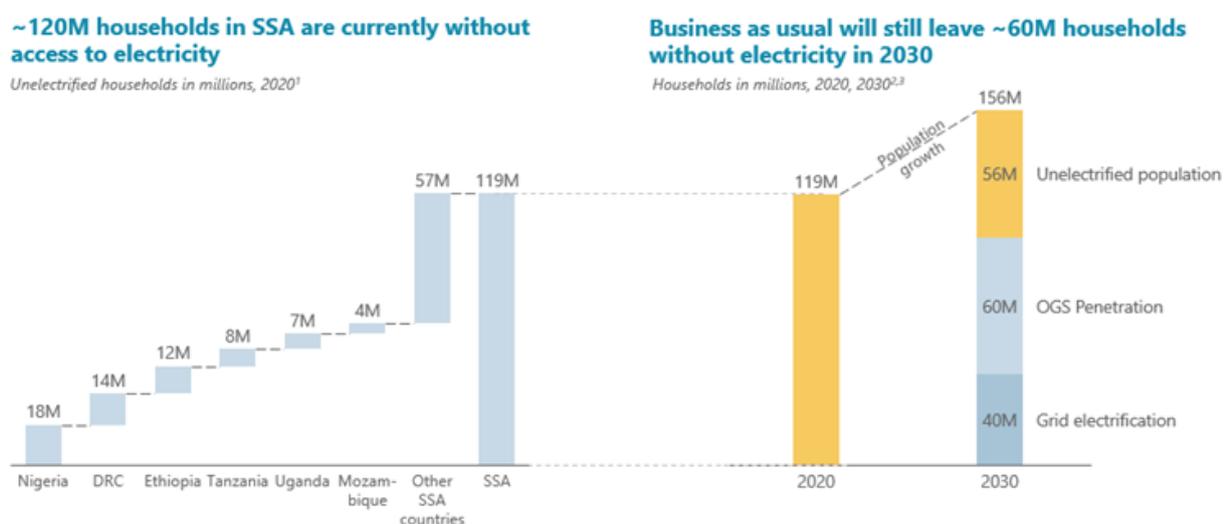
Background

Despite significant strides in the past decade on achieving SDG 7, a large population has been left behind.

Ensuring access to energy is a high-priority goal on the global development agenda. Not only is energy access a critical fundamental right, but it also serves to enable livelihoods, education, and gender equity, among other socio-economic outcomes. However, especially in SSA, sustainable energy access is still a persisting need across communities, with approximately 120 million households in the region lacking access to adequate electricity today. A third of these households are in Nigeria, DRC, and Ethiopia alone, nations with large populations and markets for commercial energy access products. Millions of others are in remote or marginalized parts of countries with otherwise established OGS markets, such as Kenya or Rwanda. Still others make up countries where a history of conflict or crippling poverty has made widespread electrification difficult to achieve. Across the continent, key market segments are systematically left behind in terms of energy access.

Moreover, these markets will continue to remain unserved or underserved for the foreseeable future under a business-as-usual scenario. Although market projections suggest 100 million more households will be electrified by 2030 - both through the expansion of existing grid infrastructure and through increased OGS penetration in these markets - considerable population growth will mean 60 million households will continue to lack access by that time. This reality jeopardizes the achievement of SDG 7, i.e., universal sustainable electrification by 2030.

Figure 3: Current and project household electricity access in SSA²



There is a growing understanding of this pressing market gap, especially among OGS funders, and emerging consensus on the need for innovative financing solutions. Funders have recognized the need for continued grant-funding for OGS sector in many SSA countries to accelerate energy access. At the same time, they are cognizant of the need to deploy funds in a way that catalyzes and supports OGS markets and private players, rather than crowds-out market activity.

Blended finance – which combines the powers of DFIs, bilateral and multilateral funders, governments – has a strong role to play in catalyzing and accelerating markets to reach unserved segments. The main idea of blended finance is to smartly deploy grant and other concessional capital to help anchor energy access projects and investments, which are often considered risky by standard commercial investors. Well-designed blended finance opportunities offer the ultimate win-win: reduces average costs (of capital) for providers and lower prices for consumers, without distorting markets. These vehicles and structure, in

² Source: 1) World Bank Database - assuming growth rate remains constant across all populations in SSA; SDG7: 2) Data and Projections", IEA, Paris – 20M people are projected to gain access every year; 3) Off-grid Solar Market Trends Report 2020, Lighting Global

particular results-based financing, have seen success in expanding energy access (including to solar home systems) in countries like Kenya, Tanzania, and Nigeria, among others.

With its focus on climate change, renewable energy, and off-grid solar in Sub-Saharan Africa, EIB (along with partners like the European Commission) is well positioned to drive regional energy impact through blended finance for SHSs. EIB has already developed a strong track record of investing in several high-impact projects covering rural electrification, distribution grid extension, and last mile connections in SSA through loans and equity instruments. Off-grid solar, especially SHSs, offer EIB and EC the opportunity to build on its solid and rich base of experience and capabilities and push the frontiers of energy access in SSA. First, the need for pre-financing is still a major bottleneck for companies to scale up operations, particularly in unserved or fragile markets of sub-Saharan Africa, despite improved affordability of SHS solutions through PAYGO financing. Second, SHSs align extremely well to three of EIB's key strategic priorities - Climate Action, private sector growth, and Infrastructure development. They mitigate against climate change through reduction in greenhouse gas emissions by offsetting dependence on fossil fuels. They facilitate the growth of SMEs (SHS enterprises and other enterprises that are enabled due to energy access) in unelectrified parts of sub-Saharan Africa and improve infrastructure for energy in various SSA countries.

It should be noted that EIB already provides specific additionality through its funding of investments in this area. Over the last years, it has placed emphasis on the off-grid component of energy access by funding important pilot projects for the development of mini-grids and for the distribution of Solar Home Systems through the **EIB Off grid Solar Programme**, which has been successful in East and Central Africa.

Objectives for this study

EIB commissioned this study by Dalberg Global Development Advisors to determine the economic and commercial feasibility for enhancing off-grid solar in Sub Saharan Africa. The specific objectives of this study are twofold:

- (1) Identify unserved and underserved markets and segments for SHS in SSA
- (2) Understand the main barriers or challenges to scaling up SHS in these markets and segments,
- (3) Recommend a high-level portfolio of non-distortionary financing and technical assistance interventions for country segments with a high-level intervention plan

The study also assesses the potential and viability of aggregated purchase mechanisms as specific vehicles for deploying blended finance for universal energy access through SHS interventions.

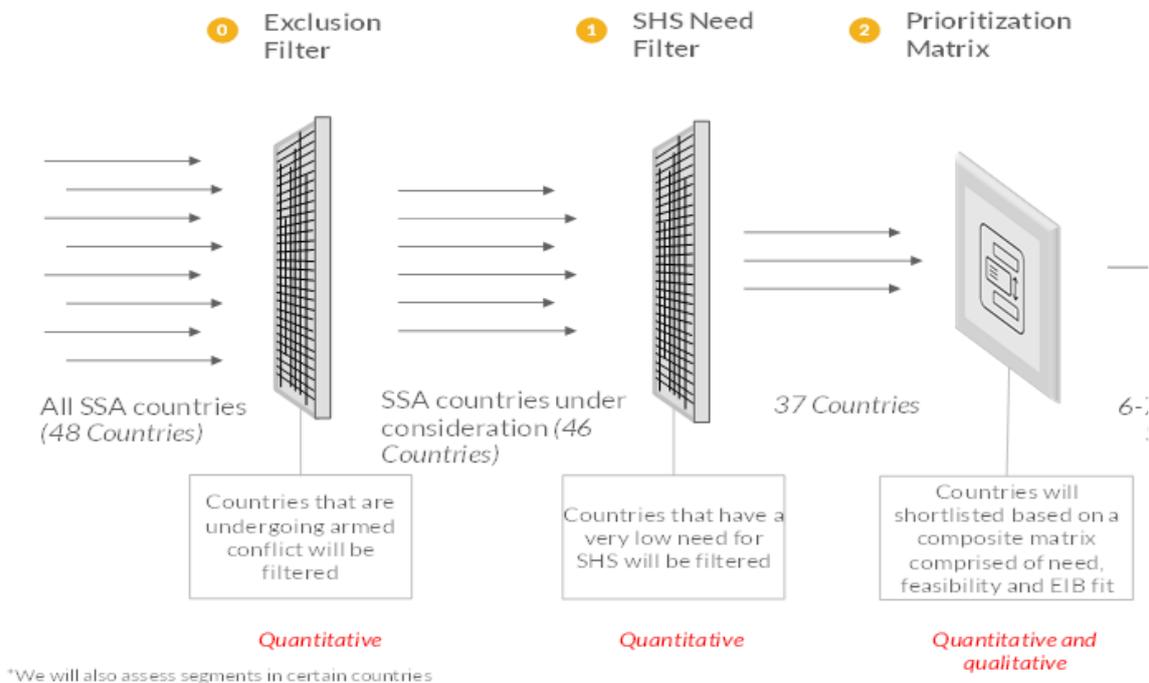
This study focuses on enabling energy access via private solar home system (SHS) solutions. This reflects numerous studies within energy access literature, which show that SHS is the best, most cost-effective solution to provide full Tier 1 electricity access for most unserved segments in SSA. Moreover, the SHS private sector ecosystem is mature and robust in many SSA countries and well-suited for market-driven blended finance approach (as opposed to a more conventional grant funding approach). At the same time, we recognize that other solutions, such as mini grids, have an important role to play in the energy access landscape. However, the dearth of commercially viable business models and critical regulatory barriers (e.g., licenses, grid and mini-grid interactivity, tariff limits, land acquisition, etc.) in all but a few SSA countries means that SHSs remain a safer bet for Tier 1 electricity access in the short-medium term. Zooming out, there is a need to place these solutions in a continuum, so that Tier 1 access through SHS can pave the way for higher levels of access through mini grids over a longer time horizon. To that effect, we also believe that the study's emerging lessons will be relevant for other solutions including mini-grids.

High-level approach and methodology

Dalberg followed a two-phased approach (one phase for each of the objectives described above) to develop an intervention strategy for unserved segments. The following methodology was adopted:

- (1) **Understand market challenges:** We developed rapid hypotheses on the main barriers and challenges based on our experience of the sector, research, and key expert interviews.
- (2) **Identify and develop country clusters or ‘typologies’:** We first removed countries with active armed conflict or low need. We then conducted deep quantitative analysis across various indicators (e.g., annual off-grid household expenditure, ease of doing business), and grouped countries based on their electricity need, maturity of OGS markets, and common challenges (and sub-challenges).

Figure 4: High-level country typology process



- (3) **Develop landscape of potential solutions:** We collected a menu of intervention instruments from secondary research and evaluated existing programs in the market from other DFIs and MDBs, with a view to identifying important funding gaps and opportunities for EIB’s and other energy access funders’ involvement.
- (4) **Recommend possible portfolio of interventions:** We mapped barriers to typologies and relevant financial instruments, to recommend potential intervention structures consisting of a range of instruments and a high-level intervention plan.

In addition, over the course of the study we conducted 100+ consultations with stakeholders including market actors, funders, and sector experts, to support and validate our analyses. *Please refer to Annex 1 for a full list of organizations and experts consulted for this study.*

5. CROSS-CUTTING CHALLENGES

While each country environment is different and unique, there are five common sets of challenges that affect SHS players in SSA, cutting across demand, supply, and ecosystem factors. These challenges focus on identifying what is currently preventing market players from entering unserved and underserved segments. They include:

1. Low customer affordability for SHS products (demand side)
2. Uncertainty in markets to effectively run businesses or drive sales (supply side)
3. Difficult last-mile distribution and resultant high costs to serve remote populations (supply side)
4. Insufficient liquidity stemming from constrained working capital availability (supply side)
5. Instability in the political and economic environment (ecosystem)

These challenges can be understood as arising from several factors, as described below. *Please refer to Annex 2 for further details of the sub-challenges encompassing each challenge set.*

Figure 5: Main challenges to electricity access in Sub-Saharan Africa

Challenge Set	Factors
Low customer affordability	<ul style="list-style-type: none"> • Low and often volatile incomes of end customers affect their ability to make consistent and regular payments (especially to mobile money models) • Low cost of energy substitutes such as diesel power diminishes the willingness of customers to pay for SHS; as does the proliferation of low-quality solar products that tarnish the credibility of SHS • Combined, these lead to decreased demand for SHS products from new customers, or an increase in payment defaults for existing customers
Market Uncertainty	<ul style="list-style-type: none"> • Limited information or uncertainty about projected market demand restricts operations, especially in markets that are relatively untouched • There is also operational uncertainty, such as hiring local staff or identifying local partners, as well as associated operational costs. • Finally, an opportunity cost of switching to serve these markets from existing ones exists, in terms of overcoming additional barriers to entry
Difficult last-mile distribution	<ul style="list-style-type: none"> • Costs incurred in serving customers in remote areas e.g., those linked to poor road or port services, limited or no mobile network penetration, or the unit economics of reaching sparsely populated regions • Limitations to the availability and capacity of partners to service these regions further complicates selling SHS to these customer segments
Insufficient liquidity	<ul style="list-style-type: none"> • There are constraints in terms of upstream and downstream working capital requirements for SHS players, which translates to insufficient cash liquidity to expand operations. • SHS businesses often must pay suppliers upfront, tying up cash for months while components are shipped or finished products are being sold • 99% of SHS sales are made via mobile money; it might take 12-24 months to recoup upfront costs from the time of sale and recover cash-flow.
Political and macroeconomic challenges	<ul style="list-style-type: none"> • Political instability, civil strife and potential conflict lead to unstable trading conditions and higher costs that can make regions not commercially viable • An unfavourable regulatory environment (e.g., OGS regulations, labour laws, taxes) and foreign exchange challenges significantly impact the sale of SHS.

To craft a targeted intervention strategy, it is critical to understand the drivers of these challenges, as well as the manner and extent in which they manifest themselves in different countries or market segments. We begin to do this mapping in the next section, where SSA is split into five country typologies, each with a common set (and intensity) of challenges.

6. COUNTRY TYPOLOGIES AND PRIORITY SEGMENTS

SSA's under-electrified population can be categorized into six main country clusters or 'typologies' based on need for electricity and maturity of the OGS market. Each typology has a set of common challenges.

Eleven countries were filtered out due to ongoing armed conflict and very low need for SHS. Following this, we characterized 37 countries into six clusters, and one cluster was deprioritized for further analysis due to low feasibility and low need. We provide details on each of the five final typologies below. *Please refer to Annex 3 for a full mapping of sub-challenges to typologies.*

Figure 6: Country typologies and respective focus segments

	1	2	3	4	5
Focus Segments	 <p>Very Large Opportunities Peri-urban</p> <p>Countries with a very high need for electricity where OGS penetration is high in certain regions and low in others</p>	 <p>Established OGS Markets Refugees</p> <p>East African countries with mature OGS markets but certain segments, such as refugee populations remain untouched</p>	 <p>New OGS Markets Peri-urban</p> <p>Countries that have an OGS market but where the market is not as developed as the established markets</p>	 <p>Underserved low-income Markets Urban and Peri-urban</p> <p>Countries that have limited fragility but have very nascent or non-existent OGS markets despite significant need for electricity</p>	 <p>Fragile Countries Urban</p> <p>Countries with very nascent or non-existent OGS market and have been classified as fragile states by the World Bank</p>
Need for electricity	Extremely High (Unelectrified Pop. >50M)	High (Unelectrified Pop. 15-50M)	Medium (Unelectrified Pop. 5-15M)	Medium to High (Unelectrified Pop. 5-25M)	Medium to High (Unelectrified Pop. 5-20M)
Maturity of OGS market¹	Nascent (1-4 OGS Players with low penetration)	Mature (4-6 OGS Players with high penetration)	Relatively Mature (2-4 OGS Players with medium penetration)	Nascent (1-2 OGS Players with very low penetration)	Non-Existent (Negligible penetration of OGS)
Key Challenges	Low customer affordability Political/economic environment	Low customer affordability Market uncertainty	Difficult last-mile distribution Insufficient liquidity	Low customer affordability Insufficient liquidity	Market uncertainty Political/economic environment

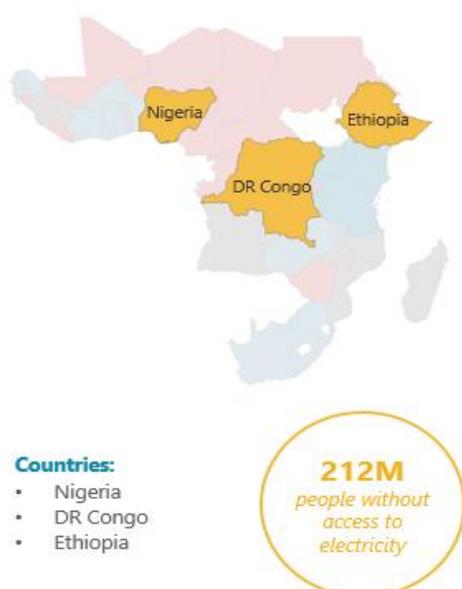
1. Very Large Opportunities

Very large opportunity countries have a high unmet need for SHS despite some market penetration, mostly due to a large population and low electrification rates. OGS players partly serve urban areas in some of these countries, but several segments remain underserved. Considering the size of the need these countries, peri-urban areas by themselves would provide large markets for SHS players and would be easier to serve than rural areas.

1.1 Common Challenges & Features

- **Need:** Nigeria has an unelectrified population of 90 million, Ethiopia is 60 million, and DRC is 70 million. A large portion of the need for electricity in these countries is concentrated outside the urban areas with a significant difference between rural and urban electrification rates.
- **Maturity:** Most countries in these segments have relatively active OGS markets in the urban areas; however large parts of peri-urban and rural areas remain unserved or underserved.
- **Conflict:** Some parts of these countries are undergoing conflict (e.g. northern Nigeria, parts of DRC).

Figure 7: Map of countries and total unelectrified population in 'Very Large Opportunities' typology



Common challenges:

Low customer affordability. In the focus segment, low mobile money penetration along with the high prevalence of unreliable counterfeit products significantly lower customer capacity and willingness to pay for SHS products.

Political and Economic Environment. Regulatory barriers including high import duty and VAT for SHS products significantly increases the cost to serve for private OGS operators.

2. Established OGS Markets

Despite relatively high OGS penetration, certain segments, such as low incomes, difficult geographies and segments such as refugees, remain untouched in these markets, which could be well-served by SHS. It should be noted that mini-grids could also potentially be used to service these segments, especially refugees, since mini-grids are more feasible for populations that are geographically concentrated – like refugees. However, (1) SHSs remain the lowest cost and quickest option for Tier 1 energy access for most refugee populations, and (2) SHSs offer greater opportunities for blended finance given that the private sector is far more advanced and mature relative to that for mini grids (mini grids, especially in most refugee settings, will require substantial grant funding for the foreseeable future), and (3) the potential itinerant nature of refugees (e.g., right of return to home country and/ or repatriation) means that fixed assets like mini grids are far more risky for these segments relative to SHSs.

2.1 Common Features & Challenges

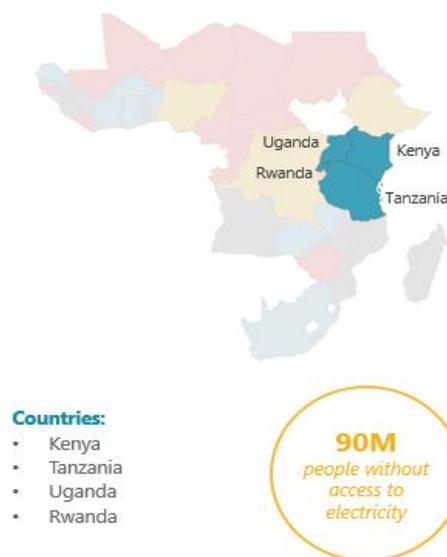
- **Need:** Mostly high need countries (greater than 20 million, except Rwanda) with certain segments that remain unserved and have significant need for electricity. One such segment – of focus in this study – is the refugee population in East Africa. This segment alone represents a significant opportunity (number of un-electrified people ~2million) in the region.
- **Maturity:** These countries have a mature OGS market with about 4-6 active players, but the refugee segment remains largely underserved, other than sub-scale pilots and energy access initiatives.
- **Regulatory Barriers:** Due to the fragile nature of the most camps, there are regulatory barriers with respect to operating private business in these regions.

Figure 8: Map of countries and total unelectrified population in 'Established OGS Markets' typology

Common challenges:

Low customer affordability. Refugees typically have low income along with high income volatility, which significantly lowers customer affordability.

Market Uncertainty. Refugees often have different characteristics, such as uncertain residency status, no acceptable means of identification, language, standard of living, familiarity with OGS, access to finance and credit compared with host countries, which increases the market uncertainty of this segment.



3. New OGS Markets

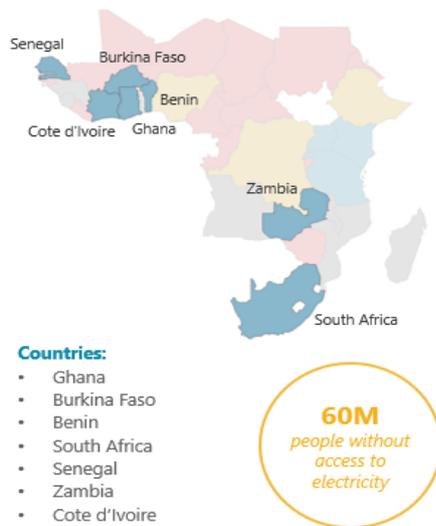
New OGS markets are evolving rapidly and attracting a lot of private sector interest but have an underdeveloped ecosystem for SHS businesses. OGS players have some penetration in urban areas, but large parts of these countries remain underserved. Hence, the next focus market for commercial operations in these countries should be peri-urban areas.

3.1 Common Features & Challenges

- **Need:** Markets with medium need of electricity with 5-15 million unelectrified in each country.
- **Maturity:** Most countries are maturing OGS markets that have achieved a baseline level of OGS penetration, and have at least a couple of OGS players already operating in the market

- **Mobile Money:** Most of these countries have a higher penetration of mobile money, which is a key driver of the OGS market.
- **Regulatory Environment:** While the regulatory environment is favourable in these countries, inconsistent enforcement has hampered the growth of SHS.
- **Capacity:** Inadequate Human capacity/skills needed to expand OGS SHS operations to the underserved areas.

Figure 9: Map of countries and total unelectrified population in 'New OGS Markets' typology



Common challenges:

Difficult Last Mile Distribution. These countries are new markets for OGS, and hence the low capacity of local partners remains a key challenge, especially for the focus segments.

Insufficient liquidity. The increase in market penetration has been concentrated in specific regions within the countries, and private players suffer from the limited availability of working capital to expand into underserved segments.

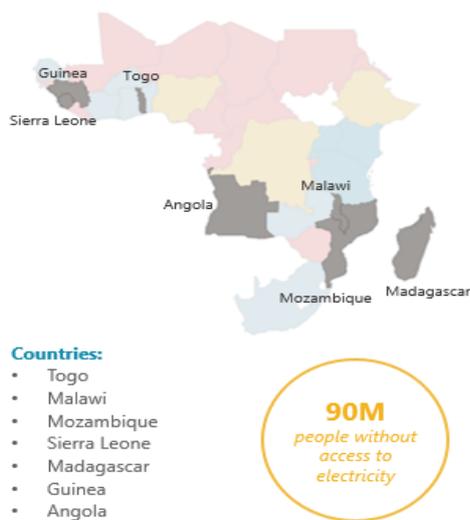
4. Underserved Low-Income Markets

Despite a favourable business environment, lack of customer affordability remains the main roadblock for SHS players to enter and grow in these markets. Most of these countries have single digit OGS penetration, therefore OGS players should concentrate on increasing their presence in the country and capturing market segments that are easier to reach.

4.1 Common Features & Challenges

- **Need:** These are markets with medium to high need of electricity with the number of electrified populations between 4-25 million for each country. Additionally, many of these countries are sparsely populated with large rural populations.
- **Maturity:** Most of these countries have an extremely nascent OGS market with the possibility to focus on increasing penetration in easier to serve segments (e.g., urban areas).
- **Fragility:** While none of the countries is currently fragile, several countries were recently excluded from the World Bank "FCAS" classification, indicating some level of fragility.
- **Ease of Doing Business:** Despite some level of fragility, the ease of doing business in these countries is higher than other fragile regions.

Figure 10: Map of countries and total unelectrified population in 'Underserved Low Income' Markets



Common challenges:

Low customer affordability. All countries in this segment are largely rural, low-income countries which affects customers' ability to pay for SHS.

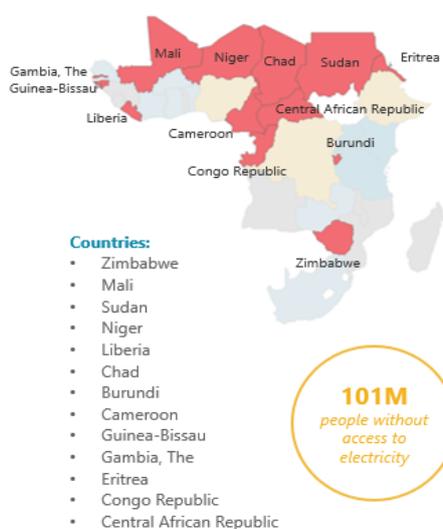
Insufficient liquidity. Limited liquidity in these countries curtails expansion of SHS players into these less lucrative markets.

Fragile countries are largely unserved by SHS players due to their high-risk profile despite the opportunity they present for SHS penetration. There is very limited OGS activity in these countries, and OGS players may want to focus on easier to serve segments (e.g., urban areas)

5.1 Common Features & Challenges

- **Need:** These are markets with medium to high need of electricity with the number of unelectrified populations between 5-20 million for each country.
- **Maturity:** Due to prevailing fragility, OGS players are hesitant to enter these markets due to the high political risk exposure (E.g., of personnel loss or significant operational challenges) and anticipated market risk.
- **Fragility:** These countries either have an ongoing armed conflict or have high institution and social fragility, and most countries that are undergoing conflict lie in the fragile Sahel region.
- **Ability to pay:** Ability to pay remains a considerable challenge across most countries, primarily down to the overall political and economic environment.

Figure 11: Map of countries and total unelectrified population in 'Fragile Countries' typology



Common Challenges

Political and Economic Environment. All countries in this segment are largely rural, low-income countries which affects customers' ability to pay for SHS.

Market Uncertainty. High risk operating environment along with the nascent business in terms of policy and regulatory environment makes these markets extremely uncertain for private OGS players.

Thus, five distinct country typologies emerge along with respective focus segments based on these common challenges, need for electricity, and maturity of OGS markets. Understanding the region, its political and market related challenges and opportunities this way, would allow the blended finance

providers to develop a risk mitigating intervention strategy to unlock markets in the most appropriate and customized way.

7. CURRENT LANDSCAPE OF INTERVENTIONS

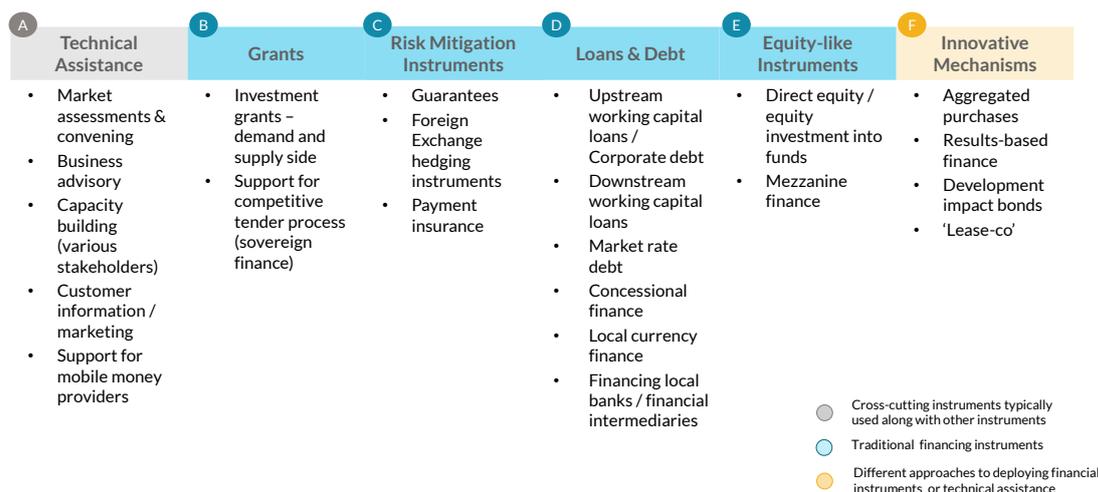
Menu of financial and non-financial instruments

DFIs and MDBs like EIB have a range of financial and non-financial instruments at their disposal to catalyse markets and commercial actors towards driving sustainable development goals. Across the SHS ecosystem in SSA, these institutions typically use a range of instruments, including using technical assistance and investment grants, equity, debt, and risk sharing or risk-mitigation tools to intervene in the energy access landscape, often 'blended' or in combination. The World Bank, for example, has deployed concessional debt and insurance guarantees in its 'CIZO cheque' program in Togo. Similarly, USAID and FCDO have set up the 'Beyond the Grid' program in Zambia with working capital and RBF to support market actors. In addition, philanthropies such as the Rockefeller Foundation, Ikea Foundation, Shell Foundation, and MacArthur Foundation, among others, have increasingly focused on the energy access sector and contributed to innovative financing instruments, especially results-based financing, aiming to reach last mile populations through SHS and mini-grid initiatives.

Last-mile electrification initiatives and programs can draw from this range of instruments from within six categories to develop its intervention structure. Each instrument category will be optimized to address different challenges across the typologies; an effective design structure will propose how they best work in combination:

1. **Technical Assistance:** Cross cutting, market building instruments to improve efficacy of other funding activities, and typically addressing challenges in market uncertainty or the political/institutional and macroeconomic environment. Examples include market assessments and capacity building at public sector/policy level.
2. **Investment Grants:** Non-reimbursable funds, which are particularly relevant where required to support early-stage activities, proof of concept, market development, or to address affordability gaps. There is a spectrum of conditionality that can be applied, across typically three dimensions: (i) type of product (debt or equity type); (ii) eligibility and the specificity of purposes for the funding and (iii) the level of specificity of what triggers a payment. Examples include performance-based demand- or supply-side cross subsidization to commercial debt.
3. **Risk Mitigation Instruments:** Tools that manage the costs that can arise due to challenges in the macro environment and help crowd in private investors by absorbing and/ or hedging for key market and operational risks. Examples are credit guarantees, first loss pieces, political risk insurance, liquidity reserves or FX risk mitigation derivatives.
4. **Debt:** Intervention set that is best positioned to address challenges central to SHS operations, primarily related to last mile distribution and insufficient liquidity. Examples include working capital loans and concessional finance (including non-energy access loans provided by the EIB).
5. **Equity and equity-like Instruments:** Return generating financial instruments that typically imply some ownership of the entity or project that is receiving funds (and/or subordination to debt) with an expectation of the returns from a combination of the increase in the value of the equity itself and future payments; given the lack of immediate requirement for payment equity is particularly essential to catalyse commercial debt for funding early-stage growth before businesses or projects can generate any or significant profits.
6. **Innovative Mechanisms:** Adaptations of traditional financing forms that reframe incentives for market actors to solve across a range of challenges faced by SHS players. Examples include aggregated purchases to reduce supply side unit investment costs and results-based conditional financing.

Figure 12: Menu of financial and non-financial interventions for blending (non-exhaustive)³



A closer look at aggregated purchases

This study called for a closer look at 'aggregated purchases' as an instrument, in terms of its value and considerations for use within an intervention structure. This reflects the increasing interest and momentum among key stakeholders (especially funders) around the idea of aggregate procurement for the renewable energy sector, especially for the off-grid solar space. Aggregate purchase agreements are a mechanism to reduce the prospective service or product provider's cost of delivering products by aggregating the demand for those products (typically from governments), thereby unlocking economies of scale in the operations for delivery.

They have been used effectively to reduce prices and market uncertainties and catalyze increased access to key development sector products and services. A few are described below:

- The COVAX facility, managed by GAVI, the Vaccine Alliance:** COVAX brings together governments, global health organizations, manufacturers, scientists, private sector, civil society and philanthropy, with the aim of providing innovative and equitable access to COVID-19 diagnostics, treatments and vaccines. Gavi acts as coordinator of COVAX together with the Coalition for Epidemic Preparedness Innovations (CEPI) and the WHO. COVAX acts as a platform that will support the research, development, and manufacturing of a wide range of COVID-19 vaccine candidates and negotiate their pricing. The COVAX Facility maximizes the chances of people in participating countries getting access to COVID-19 vaccines as quickly, fairly, and safely as possible. The Facility continually monitors the COVID-19 vaccine landscape to identify the most suitable vaccine candidates, based on scientific merit and scalability, and works with manufacturers to incentivize them to expand their production capacity in advance of vaccines receiving regulatory approval.
- KUSUM Solar Water Pumps Scheme (India), International Solar Alliance:** ISA, working with the Indian government and other implementing partners launched the world's first aggregate procurement program for solar water pumps. The program used an innovative and comprehensive price-discovery mechanism that reduced prevailing prices by nearly 50%, making them affordable to many small and medium farmers in rural India.

A four-step process is required to enact this mechanism: (i) 'needs assessment' to project demand in close cooperation with the host government and development partners, (ii) activities to aggregate demand – this may be at the regional, national, or sub-national levels as well as cross-national segments such as refugees, (iii) coordination between buyers and a third-party expert to conduct market studies and run price discovery, and (iv) tendering process issued to source suppliers. If the tendering process as step (v) results in a price that is lower than what the market is deemed to be able to tolerate in step

³ Note: List is non-exhaustive, just details a range of relevant options for EIB to target underserved markets in multifaceted ways
 Sources: Broad based desk research; Stakeholder interviews; Dalberg analysis

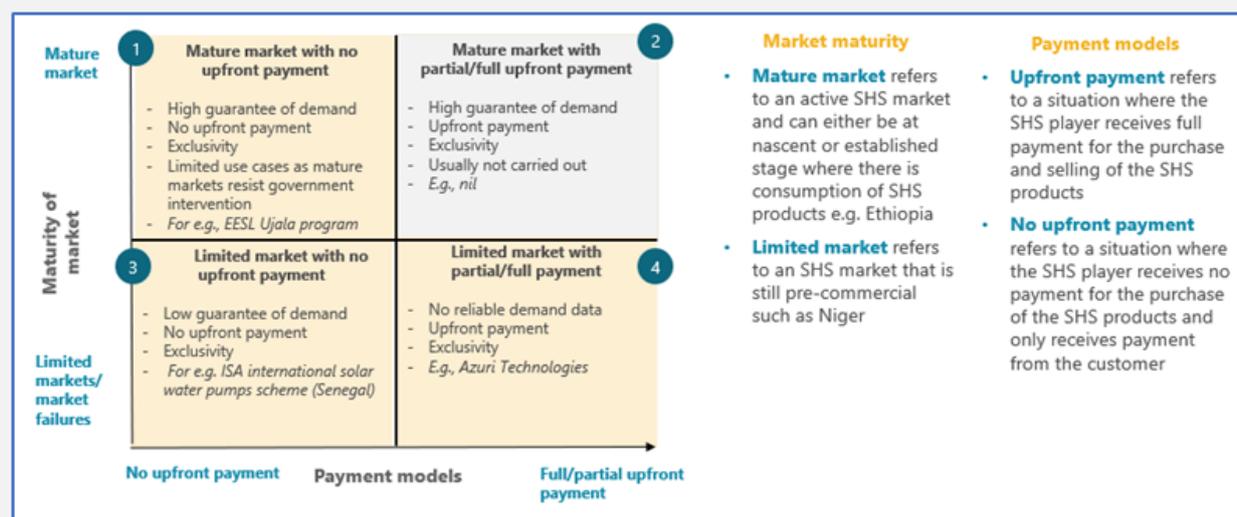
(iii), the difference can be used as a key input to determine the efficient level of subsidy to effectively make the market clear.

Aggregated purchases are seen to be particularly effective in sectors where economies of scale exist (contexts where buying increased quantities can lower average fixed or transaction costs) and where there are similar market or product needs across individual countries. In the case of the SHS market, however, only one of these conditions is met. Most nascent OGS markets have similar needs for SHS products; but for SHS players, the potential for efficiencies through aggregating up demand is relatively minimal.

At the same time, market actors highlight risks associated with applying aggregated purchases. These include the risk of exclusivity reducing competition in commercial markets, coordination challenges associated with government involvement in the process (which is critical), and the possibility that even aggregated volumes will be too small in low volume markets (e.g., some refugee segments).

Despite this, a clear advantage of adopting aggregated purchases relates to the process of estimating demand, which mitigates challenges related to demand uncertainty for SHS players. This then allows them to source capital, allocate cash for operations, and plan marketing strategies better. Distortionary risks can also be mitigated to a certain extent by following good design principles: e.g., ensuring that the price discovery process is comprehensive and includes all existing market players as well as opportunities to absorb newer players over time, focusing on a small set of core quality standards that allow private actors to innovate and reduce prices over time, etc.

In general, four models exist as options for leveraging aggregated purchases:



We propose model 3 as being the most relevant to SHS market conditions in key segments: This model would be most relevant to the refugee segment within ‘Established OGS Markets’, and would help provide an organizing framework to reduce market risk and uncertainty for SHS players, who currently have little involvement with the refugees; and to the ‘Fragile Countries’ typology, where it would have a limited distortionary affect due to the nascency of OGS markets.

Please refer to the succeeding section on ‘Proposed Intervention Structures’ for additional details on how to structure and implement aggregated purchases with these two typologies’ intervention structures.

Supply of finance landscape for driving SHS penetration in SSA

MDBs and DFIs are already combining financial and non-financial instruments to develop vehicles or programs to drive energy access. World Bank, FCDO, and USAID are the leading investors in the SHS space in SSA, primarily active in the countries within Established and New OGS Markets typologies. Evaluating their programs sheds light on instrument combinations that have been effective and highlight important partnership opportunities.

Figure 13: Snapshot of energy access programs in SSA ranked by facility size (see Annex 5 for full list)

Program	Funders	Objective	Description	Financial instrument	Non-financial instrument	Facility size	Geographic Focus
Power Africa Beyond The Grid	USAID FCDO	To scale the penetration of the SHS market in SSA	The program aims to scale the SHS market by increasing access to financing by creating a consortium of investors	<ul style="list-style-type: none"> Debt RBF Grant Working capital 	<ul style="list-style-type: none"> Business advisory Investment facilitation 	USD 1 billion	SSA
CIZO Program Togo	World Bank	To electrify the Togolese population, particularly low-income households	The project seeks to support the private sector by providing some financial and non-financial support to a selected group of SHS suppliers	<ul style="list-style-type: none"> Concessional debt Insurance guarantees Demand subsidy 	<ul style="list-style-type: none"> Business advisory Gov't support 	USD 720 million	Togo
ElectriFI	EU USAID SIDA	To finance early-stage private companies and projects for sustainable energy sources	ElectriFI aims to support investments that increase and/or improve access to modern, affordable and sustainable energy services	<ul style="list-style-type: none"> Equity Debt 	Business advisory	EUR 215 million	SSA
ROGEP	World Bank	To increase the provision of OGS products in the ECOWAS region	ROGEP provides and technical assistance and grants to private and public sector to scale OGS penetration	Grants	<ul style="list-style-type: none"> Business advisory Customer assistance Gov't support Investment facilitation 	USD 200 million	ECOWAS

Nonetheless, gaps exist in the nature and amount of funding suited to DFIs and MDBs in this context. Based on our analysis we identified key areas of opportunity for grant and concessional funders to address the gap. These fall into four key areas:

- **DFIs and MDBs typically lend in hard currency, creating a gap in much needed local currency financing** (especially for working capital to finance customer receivables) and exposing SHS players with long customer repayment contracts to material FX risk. This is exacerbated by limited FX risk mitigation tools being used in the market, often due to their perceived high cost versus simply assuming a level of FX depreciation per annum as part of the unavoidable costs of doing business.
- **There is a tendency to fund the same, 'leading' SHS players** given a limited risk appetite in many contexts or insufficient ushering in of private, risk tolerant investors. Often this due to the limited cashflow outlook of newer SHS players or the lack of patient capital in the market.
- **There are valid concerns around market distortion from offering grants (in the form of subsidies) or concessional capital to SHS players especially where substantial headroom for commercially funded growth exists.** But this can effectively mean that sub-commercial or non-commercial market segments that exist in every country, which will naturally be down-prioritized by firms but which offer substantial scope for impact are not given sufficient attention. In business as usual, existing market players are more likely to focus on increasing the scope of services and products (e.g., loans, entertainment products) to existing households that already have effective access to energy and credible payment history. In absence of targeted support these unserved segments, as mentioned above, will continue to lack access to energy in the foreseeable future. Nevertheless, market distortion risks should be kept in mind while designing programs and measures should be taken early to reduce these risks. A few are highlighted below:
 - *Targeting segments effectively:* Using a combination of geographical segmentation, data from existing social welfare programs, engaging community and civil sector stakeholders, and emerging technological innovations (such as GIS-mapping and geo-tagging) to target the right end beneficiary.
 - *Focussing on market-based, blended-finance instruments:* These include, as mentioned above, RBFs, risk-based instruments like credit guarantees (to incentivize local working capital), currency hedges, consumer defaults, etc. rather than handouts.
 - *Providing technical assistance to enhance the eco-system.* See below.

- **There is need for technical assistance funding to support market development activities, beyond specific transactions, that address common market barriers and create a better business environment.** The chief technical assistance needs encompass consumer awareness and demand generation activities, capacity building initiatives to develop sales agents and technicians, training policy makers and bankers, market intelligence, project development support, and advocacy for enabling regulations like tax and tariff exemptions.

These funding and capacity gaps further exacerbate the energy access challenge, continuing to leave certain market segments underserved or unserved. The funding intervention's design will thus have to be positioned to limit the replication of these issues and instead bridge the gaps to access.

8. PROPOSED INTERVENTION STRUCTURES

Portfolio of solutions

We recommend a portfolio approach to address each typology's unique context and challenges. The succeeding section provides recommendations for what instruments could be brought together into structures that address the needs of a given typology and segment. It proposes a portfolio of interventions to drive energy access across the region.

The EIB's distinct role within this solution set is likely to be instrumental both in the design and structuring stages of the intervention and in being a key provider of EU blended financing. EIB will likely lead any subsequent exercise to refine options for interventions, finalise the design and structuring of interventions, and lead the identification of funding and implementing partners, including if necessary, selecting actors required to manage the program or facility. EIB, along with other DFIs, is also likely to be a key provider of debt, potentially on a concessional basis, which is a common requirement across the anticipated interventions.

Figure 14: Overview of proposed intervention structure across typologies and corresponding intervention vehicles

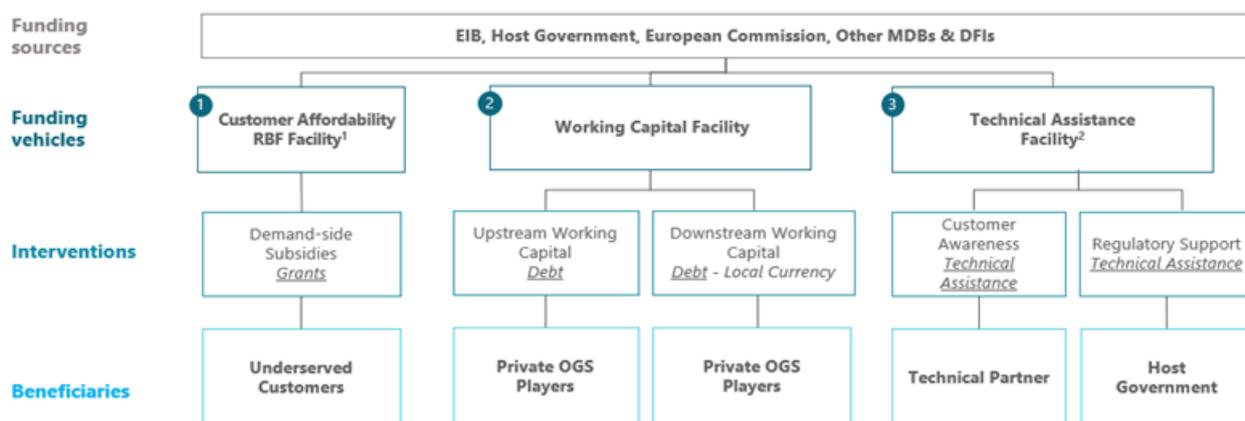
#	Typology	Focus Segment	Supply-Side RBF Facility	Customer Affordability RBF Facility	Working Capital Facility	Capex Facility	Technical Assistance Facility	Insurance Facility
1	Very Large Opportunities	Peri-Urban		✓ ¹	✓		✓	
2	Established OGS Markets	Refugees	✓		✓		✓	
3	New OGS Markets	Peri-Urban	✓		✓			Aggregated purchases
4	Underserved Low-Income Markets	Urban and Peri-Urban	✓		✓		✓	✓ ²
5	Fragile Countries	Urban		✓	✓	✓	✓	✓ ³

1. Very Large Opportunities

For peri-urban segments in the 'Very Large Opportunities' typology, a private sector catalyst model consisting of working capital, a results-based 'customer affordability scheme', and technical assistance centred on regulatory support, will be most relevant.

This approach catalyzes the growth of existing players by targeting the challenges that prevent them from expanding their customer base to customers that are low cost to serve, but have low capacity to pay, and in contexts with challenging supply chain and inventory management, and often some regulatory challenges. While there are a number of different market segments that could be considered sub-commercial and therefore relevant for this type of market, given the sheer scale of what may be required, we suggest an initial focus on low-affordability peri-urban customers; this segment is predominantly geographically adjacent to or within where SHS players are already focusing and can therefore both be quickly addressed with relatively low initial concessions, and can also support forms to create larger and more robust platforms to serve the broader market. Conversely, an initial focus on, for example, rural customers that have low affordability, or those in areas of instability, would require existing SHS players to largely set up somewhat dedicated distribution, operational, and local skill-building capabilities, which they report would be a significant barrier to them participating in any program or intervention while substantial headroom for continued customer acquisition on a fully commercial basis exists.

Figure 15: Proposed intervention structure for 'Very Large Opportunities' typology



Structure set-up and approach (pre-implementation)

For all the countries within this typology, a conventional facility design and set up approach would be sufficient. This would entail conducting market studies to test the facilities' size and early evaluation of loan terms, engagement with peer MDBs and DFIs to gauge co-financing opportunities, orientation of the host governments, as well as manager selection for the working capital and TA components. For Ethiopia, the government would need to be engaged on regulatory exemptions to enable mobile money players.

Structure components (implementation)

Vehicle	Interventions employed / challenges addressed	Role of EIB and other stakeholders, and potential partners	Operational considerations / possibilities
1) Customer Affordability RBF	<ul style="list-style-type: none"> Demand-side, results-based subsidies, intended to increase the affordability of SHS systems and tackle the lack of consumer finance 	<ul style="list-style-type: none"> <u>EC, other DFIs, and Host Government:</u> Pool grant capital to fund subsidies and cover program costs and identify recipient populations <u>Host Government:</u> Issue and distribute subsidies to end customers via a voucher scheme, incorporating results-based element by tying voucher disbursement to purchase of SHS/usage of systems <u>TELCOs:</u> Expand mobile money coverage to enable PAYGO for SHS purchases 	<ul style="list-style-type: none"> Could be implemented through a voucher program to the customer (calibrating the subsidy via market analysis of maximum viable affordability and minimum viable servicing cost); this could be verified by existing welfare and income-support schemes in countries that currently have them
2) Working Capital Facility	<ul style="list-style-type: none"> Concessional debt is employed here in response to a lack of both upstream and downstream working capital constraining 	<ul style="list-style-type: none"> <u>EIB/ other debt providers:</u> Provide lead concessional debt either through a) a line of credit for supplier payments to 	<ul style="list-style-type: none"> Upstream, this would entail the provision of corporate debt to purchase systems and system components from manufacturers

	<p>OGS players' ability to grow</p> <ul style="list-style-type: none"> • Credit guarantee schemes/ FLDGs: Incentivize provision of debt in local currency is to mitigate foreign exchange risks stemming from contexts that have fraught political or macroeconomic situation 	<p>be drawn from or b) the creation of a fund (to be supported by other DFIs, MDBs, philanthropic capital and private investors) for both working capital loan types</p> <ul style="list-style-type: none"> • <u>EC</u>: To provide risk-sharing instruments for credit guarantees • <u>Fund/Facility Manager</u> (if fund approach adopted): Credible, private debt provider with on-ground expertise to define terms, issue loans from the fund, and manage debt portfolio, ideally a regional or local financial intermediary • <u>Local banks and financial intermediaries</u>: To provide loans on the basis of credit guarantees 	<ul style="list-style-type: none"> • Downstream, debt in local currency would both close a gap in local currency financing in this typology's countries. • This facility could be implemented through the EIB financing envelope, possibly managed by an independent, credible fund manager/ local financial intermediary
<p>3) Technical Assistance Facility</p>	<ul style="list-style-type: none"> • TA subsidies could help address regulatory barriers related to high customs tariffs or VAT and optimize the regulatory framework that impacts the ability of OGS players to do business • In addition, TA can be leveraged for campaigns to drive awareness and acceptance of OGS offerings and local capacity building initiatives (technicians, sales agents, entrepreneurship, etc.) 	<ul style="list-style-type: none"> • <u>EIB</u>: Provide TA support for awareness campaign (collaborating with existing programs, not new financing) • <u>Host Government/ Technical Expert</u>: Design and execute (existing) marketing campaign for reaching underserved customers • <u>EIB/Host Government/ Technical Expert</u>: Drive TA focused on tariffs reduction or other regulatory reforms on limits to OGS activity, via advocacy or convening efforts 	<ul style="list-style-type: none"> • Ideally regulatory reform would be OGS specific (e.g., tariff treatment of OGS appliances) but might include some more general measures (e.g., concessions on local ownership minimums for the off-grid energy sector) where efficient and feasible • This would also prevent rechanneling of any savings from the customer affordability scheme back to governments

Risks

- Lack of government buy-in:** Government buy-in is needed to support expansion into peri-urban segments of these typologies, and there may be resistance to removing existing tariffs.
- Ineffective marketing campaigns:** The efficacy from an SHS awareness campaign may be muted unless implemented via a data-driven, targeted approach/clear benefits indicators.
- Market Distortion:** Demand-side subsidies risk the creation of grey markets and more importantly, the inaccurate targeting of the subsidies (e.g., to middle income groups that could afford the system without the subsidy). **Possible mitigant:** Using a USSD based reimbursement mechanism or linking it to existing welfare schemes in the country.

Similar components in other programs

CIZO-Cheque Scheme (Togo, World Bank) and ELAN (DRC, FCDO)

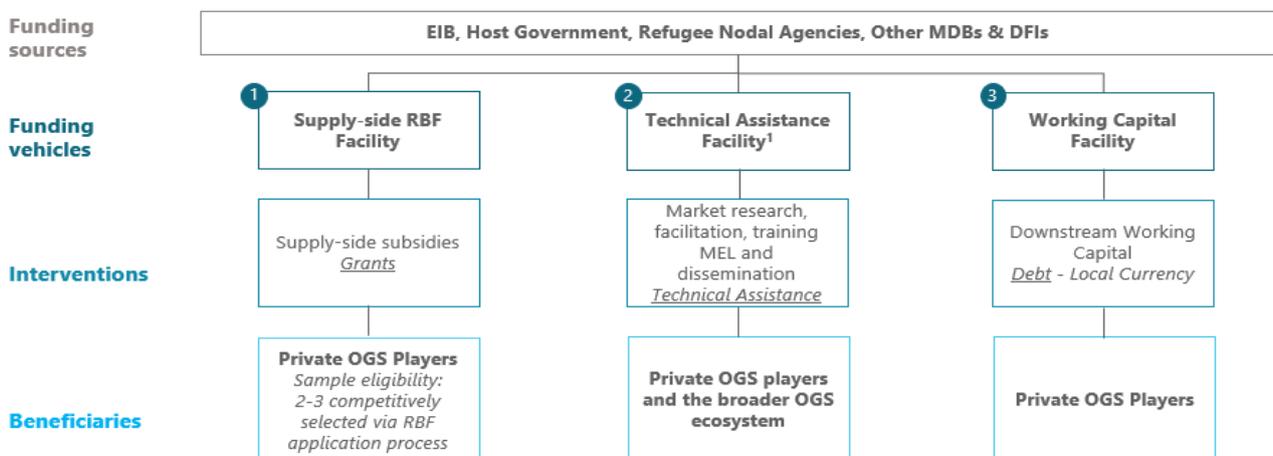
2. Established OGS Markets

To reach refugees in 'Established OGS Markets', a viable option is a UNHCR-driven aggregated purchases tender (supported by ISA) across refugee camps, complemented by a supply-side RBF, downstream working capital, and technical assistance.

Within established markets of East Africa, there are refugee camps that have limited access to energy. These refugees often have high penetration of mobile phones and mobile money. However, serving this segment is challenging because refugees have often low and/or inconsistent incomes, there is a lack of demand data, high operational set up costs, high opportunity costs to serve, there are few partners available, weak logistics, and a lack of working capital.

Market uncertainty can be mitigated by working with UNHCR and the governments of Uganda and Rwanda, and therefore incentivize OGS players to provide energy to these communities – supporting more than 1 million refugees in the process. Moreover, the supply-side RBF is positioned to manage the high cost to serve by encouraging OGS players in neighbouring established markets to use their existing infrastructure to supply refugee camps, while having access to working capital. The tender process will be open to all OGS players, but the UNHCR will offer exclusivity to the successful OGS players to provide adequate support for their expansion. If successfully executed, such a program could serve as a model to other refugee programs.

Figure 16: Proposed intervention structure for 'Established OGS Markets' typology



Structure set-up and approach (pre-implementation)

An 'aggregated tender' set up approach would be required for this program, consisting of two parts. First, by engaging technical experts such as ISA, to carry out demand aggregation and price discovery, while also leveraging existing relationships with government stakeholders to identify policy adjustments that could support the success of the program such as reductions in applicable tariffs. Second, the UNCHR would lead a competitive pooled tender for multiple refugee camps, with clear guidelines for the procurement process, and ensuring the tender is open and competitive.

Structure components (implementation)

Vehicle	Interventions employed / challenges addressed	Role of EIB and other stakeholders, and potential partners	Operational considerations / possibilities
1) Supply-side RBF Facility	<ul style="list-style-type: none"> Serving refugee camps typically requires incurring upfront set-up costs for distribution, customer service and after sales care; supply side subsidies could be structured to support some level of pre-financing of these set-up costs – but the case for supply versus demand side subsidies will require further assessment 	<ul style="list-style-type: none"> <u>EC & DFIs</u>: Provide grants for subsidies and program costs <u>RBF Program Manager</u>: Define RBF selection criteria, select bids, and support subsidy issuance (e.g. SNV in KOSAP scheme) <u>RBF Independent Evaluator</u>: Align on targets for OGS player and verify outputs achieved over time <u>Host government</u>: Define target refugee camps and assist with proportional subsidies when outputs have been achieved 	<ul style="list-style-type: none"> In this case, the supply-side scheme would also be designed to be results-based - i.e., tying subsidies primarily to the number of devices sold, but also tying part of the subsidies to an 'upfront' activity or output by the OGS to assist them with set-up costs
2) Technical Assistance Facility	<ul style="list-style-type: none"> The UNHCR could draw from its experience working across multiple camps to help OGS players get through operational challenges or in overcoming regulatory barriers of operating in these camps. Given the novelty of the program, it is important to parse out learnings to improve the program over time, as well as apply to other refugee contexts 	<ul style="list-style-type: none"> <u>UNHCR</u>: Drive business facilitation in refugee camps by using deep network and knowledge e.g., UNHCR employees could be seconded to OGS firms <u>Grant-providers</u>: Create a learning agenda and drive the MEL activity through BDS consultants; enable distillation of learnings through high profile forums <u>ISA</u>: Leverage existing training modules to train technicians on managing SHS 	<ul style="list-style-type: none"> A structured learning agenda and MEL expertise will help distill best practices systematically

		product to create local economies around maintenance <ul style="list-style-type: none"> • <u>Host government:</u> Facilitate knowledge session on specific regulations for refugee camps 	
3) Working Capital Facility	<ul style="list-style-type: none"> • A working capital debt facility in local currency would help OGS players reduce daily payments and attract more customers, thus addressing a critical working capital need in refugee contexts; this could be in the form of a credit default/ FLDG for local commercial banks to lower the cost of debt and to enable the flow of funds to OGS enterprises 	<ul style="list-style-type: none"> • <u>EIB/ other debt providers:</u> Provide lead concessionary downstream working capital debt for the facility's fund (to be supported by other DFIs, MDBs, philanthropic capital and private investors); aim for minimum transaction costs • <u>Fund/Facility Manager:</u> Credible, private debt provider with on-ground expertise to define terms, issue loans from the fund, and manage debt portfolio, ideally a local financial intermediary 	<ul style="list-style-type: none"> • Structuring the debt as concessional debt can help attract more SHS players and offset high opportunity costs. • EIB's financing envelope can be used for local currency concessional debt for downstream working capital, however given the size of demand, transaction costs will have to be minimized

Risks

1. **Lack of government buy-in:** Buy-in from the government is needed to allow private SHS businesses to operate in refugee camps in some countries – which is complex as governments often have to weigh support for local low-income populations over refugee support; East African governments have been particularly progressive in implementing refugee policies in allowing access to social services and aid (especially the governments of Rwanda and Uganda).
2. **Grey market:** There is a risk of grey markets given lower prices enabled by aggregate purchases. **Possible mitigant:** unique mobile money accounts and tracking can minimize this risk. Moreover, physical access of refugees is limited, preventing people from selling systems outside the camps.
3. **High transaction costs for debt facility:** Given low SHS volumes, transaction costs of delivering debt could be high. In some cases, it may be cheaper to hand out the SHS systems to refugees.
4. **Stunted competition due to exclusivity.** Exclusive contracts to OGS players could lock in the market, limiting the choice of products to consumers.
5. **Imprecise targeting:** A differentiation of grant funding levels may be desirable or required in many cases (e.g., higher subsidies for rural zones, avoidance of subsidizing SHS for grid-connected households, etc.). Targeting between different groups is challenging and even more so in settings with weak institutions and lack of required information.

Similar components in other programs

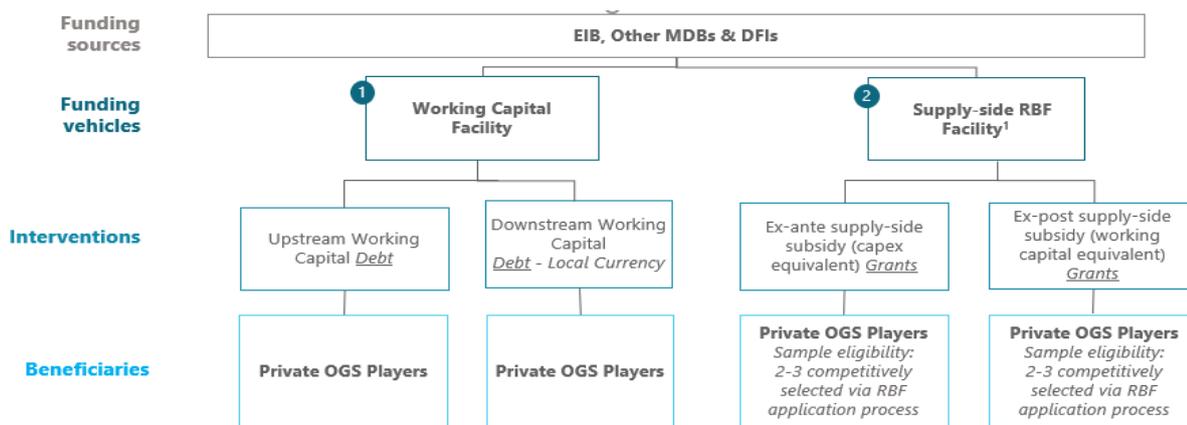
IDCOL (Bangladesh), SIDA Refugee program

3. New OGS Markets

A combination of a supply-side RBF facility and working capital facility could accelerate the speed at which OGS players reach peri-urban segments of smaller ‘New OGS Markets.’

New OGS markets have one or more firms operating and are typically at early stages in covering the market. Similar to the largest markets, an initial focus on rural communities with low affordability is challenging for such players to accommodate as there is substantial growth to pursue in their current footprints; as a result, we advise an initial focus on accelerating these players growth by providing working capital financing, and potentially targeted supply-side results based financing (e.g. to support the setup of distribution in rural areas, or for customers that can be proven to have low affordability and would not have been able to afford the service otherwise), if the ‘targeting’ required is feasible, efficient and non-distortionary to take forwards.

Figure 17: Proposed intervention structure for ‘New OGS Markets’ typology



Structure set-up and approach (pre-implementation)

Set up for this facility would entail conducting market studies to test the facilities’ size and early evaluation of loan terms, engagement with peer MDBs and DFIs to gauge co-financing opportunities, orientation of the host governments, and manager and independent evaluator selection for the working capital and RBF components. *Aggregated purchases are not recommended in this structure set up, as the distortionary risks inhibiting entry efforts of nascent SHS players are likely too high.*

Structure components (implementation)

Vehicle	Interventions employed / challenges addressed	Role of EIB and other stakeholders, and potential partners	Operational considerations / possibilities
1) Working Capital Facility	<ul style="list-style-type: none"> Local currency debt facility to mitigate OGS cash-flow constraints related to AR financing from stretched customer repayment cycles in remote communities; this could be structured in the form a credit guarantee/ FLDG to local financing institutions Support upstream or inventory working 	<ul style="list-style-type: none"> <u>EIB/ other debt providers</u>: Provide lead debt or concessionary funding for the facility’s fund (to be supported by other DFIs, MDBs, philanthropic capital and private investors) <u>EC</u>: To provide grant funding for credit guarantees <u>Fund/Facility Manager</u>: Credible, private debt (or 	<ul style="list-style-type: none"> Upstream finance in hard currency, while leveraging EIB’s impact financing envelope to unlock the local currency for the downstream debt

	capital needs to help SHS players scale in new, last mile or rural segments (with the understanding that existing cash on hand is insufficient for such expansion)	equity?) provider with on-ground expertise to define terms, issue loans from the fund, and manage debt portfolio (e.g. SunFunder in KOSAP)	
2) Supply-side RBF Facility	<ul style="list-style-type: none"> • Supply-side subsidies executed via a results-based mechanism to SHS players. • The RBF facility is intended to mitigate high costs to serve, in terms of reach. Reach and not affordability is the bigger challenge in these contexts, and therefore better suited to supply versus demand-side subsidies. 	<ul style="list-style-type: none"> • <u>EC & other DFIs</u>: Pool grant capital to fund a blended facility and cover program costs • <u>RBF Program Manager</u>: Set RBF selection criteria, screen bids, and support subsidy issuance (e.g., SNV in KOSAP scheme); • <u>RBF Independent Evaluator</u>: Define targets for OGS player and verify outputs achieved over time. • such program manager and independent evaluator could be funded with TA funds • <u>Host government</u>: Issue proportional subsidies when outputs achieved 	<ul style="list-style-type: none"> • The design would ensure that the concessional funding were unlocked on the achievement of either SHS activities, like the provision of SHS systems, or “services”, like the number of SHS connections brought ‘live’. • Moreover, in the set-up of the facility, “ex-ante subsidies” (those could play the equivalent of a capex funding role) could help cover initial set up costs like setting up distribution channels for an SHS player and reduce risk in an unfamiliar market.
3) Technical Assistance	<ul style="list-style-type: none"> • Consumer awareness campaigns and funding to develop and enhance capacity of local workforce to distribute and service SHSs • Funding for the establishment recruitment and capacity of the RBF fund manager and independent evaluator 	<ul style="list-style-type: none"> • <u>Private OGS Player, Host Government, or Expert 3rd Party</u>: Design and execute the marketing campaign targeting underserved customers • <u>EIB & Advocacy/ Technical Expert</u>: Drive technical assistance focused on building capacity of government officials in engaging OGS Players, and on regulatory reform aspects as well • <u>Local financial intermediaries</u>: For 	<ul style="list-style-type: none"> • The awareness campaign can be designed for an OGS player’s target audience or via broad industry awareness; both achieve the same goal • Material funding is often required to establish and capacitate the RBF financing facility – it is important to factor these costs into the total cost of the program

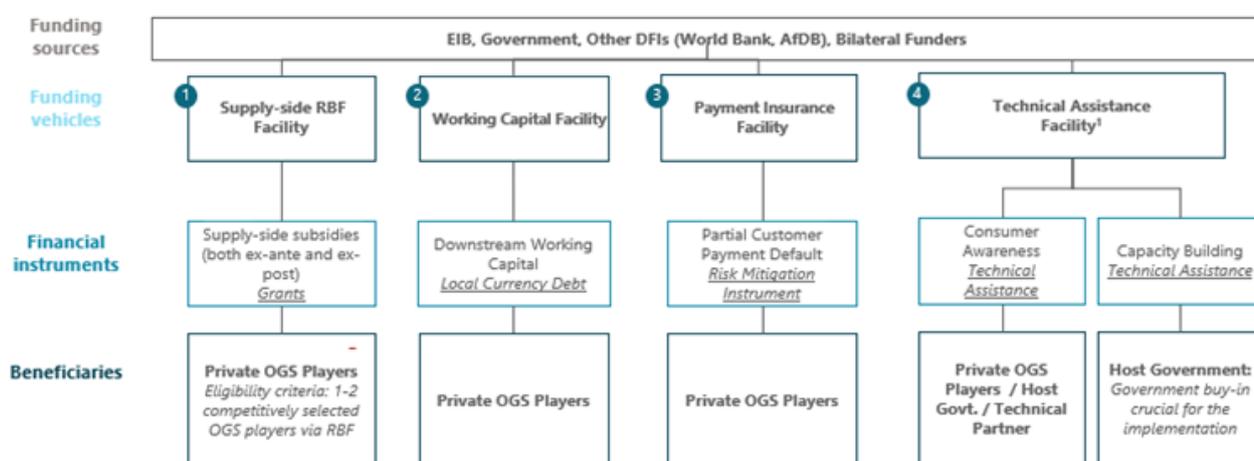
		RBF fund manager role	
Risks			
<ol style="list-style-type: none"> No non-financial intervention: A TA facility may need to be supplemented in the long run to support market building activities to sustain the financial interventions and build customer buy-in to the SHS players' products (and possibly to cover for the RBF Program manager and the Independent Evaluator) Market Distortion: RBF scheme runs the risk of crowding out other players from entering these markets. Possible mitigant: Strict regulations, tied to the performance-based nature of RBF, that prevent SHS players from pushing prices too low via their subsidy scheme and/or serving other adjacent markets. The RBF could also be designed so as not to restrict the project to one winner. 			
Similar components in other programs			
KOSAP (Kenya, World Bank), BGFZ (Zambia, SIDA & Power Africa)			

4. Underserved Low-Income Markets

In 'Underserved Low-income Markets', a combination of working capital, a supply-side RBF, technical assistance, and a 'payment insurance facility' could be most relevant to driving OGS penetration into urban and peri-urban segments.

Given the nascent maturity of the OGS sector in these markets – where often there are virtually no operations established – we recommend focusing on support to help kick-start operations in these countries. This involves a couple of approaches to 'buy down' the market uncertainty and 'pioneer' costs for prospective OGS players through a potential insurance product / guarantee and technical assistance for building customer awareness and an enabling environment. Non-concessional, but local currency, working capital can more generally support players in addressing potential FX uncertainty in markets with either low familiarity or a paucity of affordable FX hedging products. Finally, either initially to promote players to start up operations, or over time to support expansion into more sparsely populated regions, supply side grants could be offered, potentially on a partially or fully returnable basis, to reduce the actual or perceived risks associated with 'testing' markets with in-country or in-region operations.

Figure 18: Proposed intervention structure for 'Underserved Low-Income Markets' typology



Structure set-up and approach (pre-implementation)

Set up for this facility would entail conducting market studies to test the facilities' size and early evaluation of loan terms, engagement with peer MDBs and DFIs to gauge co-financing opportunities, orientation of the host governments, and manager, independent evaluator, and selection of experts for the working capital, RBF, and TA components. *Aggregated purchases are not recommended in this structure set-up as large government contracts are likely to diminish competition in nascent but emerging markets.*

Structure components (implementation)

Vehicle	Interventions employed / challenges addressed	Role of EIB and other stakeholders, and potential partners	Operational considerations / possibilities
1) Supply-side RBF Facility	<ul style="list-style-type: none"> Intended to incentivize OGS players to expand to underserved regions, the RBF could be structured to address operational uncertainty By providing subsidies only to companies that sell quality-verified products, the RBF may also limit market of cheaper low-quality products increasing the product appeal 	<ul style="list-style-type: none"> <u>EC & other DFIs</u>: Pool grant capital to fund a blended facility and cover program costs <u>RBF Program Manager</u>: Set RBF selection criteria, screen bids, and support subsidy issuance (e.g., SNV in KOSAP scheme), which could be funded by TA funds <u>RBF Independent Evaluator</u>: Define targets for OGS player and verify outputs achieved over time <u>Host government</u>: Issue proportional subsidies when outputs achieved 	<ul style="list-style-type: none"> Could be structured to address (i) start-up costs via an “ex-ante” performance-based payment system and (ii) allowing for scale up for operations and/or training of staff in new locations within the country via a more traditional understood payment for outputs scheme or “ex-poste” scheme
2) Working Capital Facility	<ul style="list-style-type: none"> Downstream local currency debt to solve for liquidity challenges and limited downstream working capital availability, which could be in the form of a credit guarantee/ FLDG Possibly even challenges to low income and affordability are addressed, if increased liquidity for players is translated to provision of more mobile money credit lines for poor customers. 	<ul style="list-style-type: none"> <u>EIB/ other debt providers</u>: Provide lead debt or concessionary funding for the facility’s fund (to be supported by other DFIs, MDBs, philanthropic capital and private investors) <u>Fund/Facility Manager</u>: Credible, private debt provider with on-ground expertise to define terms, issue loans from the fund, and manage debt portfolio (e.g. SunFunder in KOSAP) 	<ul style="list-style-type: none"> Leverage EIB’s financing envelopes to unlock the local currency debt required for this facility (or through financial intermediaries, MFI’s, Fintechs, etc.)
3) Payment Insurance Facility	<ul style="list-style-type: none"> Coverage on lending by mobile money players to unbanked customers Enables increased lending by mobile money players and solve for the 	<ul style="list-style-type: none"> <u>EIB/ others</u>: Structure the facility/ fund. Potentially a simple pool of capital that OGS players pay premiums into as well as some donors, to provide partial 	<ul style="list-style-type: none"> Design to cover partial non-repayment by compensating OGS players for deviation against expected repayment performance. In other words, the insurance payment

	<p>challenges related to low Income and lack of consumer finance by providing customer credit to more people who are unbanked and cannot afford upfront payment for the system</p>	<p>payment to OGS players on customer defaults; this could also be structured as a partial loss guarantee scheme</p> <ul style="list-style-type: none"> • <u>Private OGS Players:</u> Put up some initial capital to buy into the scheme. Also, increase consumer finance operations (i.e., providing credit to new customers, especially increasing loan tenures to lower daily repayment rates) 	<p>should be capped at a certain deviation level to ensure that it does not hamper with supplier's incentives to collect payments from customers.</p>
<p>4) Technical Assistance Facility</p>	<ul style="list-style-type: none"> • Directed specifically to capacity building for host governments to bolster weak government institutions and support the sector • Secondly used for customer awareness to tackle challenges of low product appeal, by increasing customer access to information and education about SHS products, training for operations and maintenance in rural areas • Funding for the recruitment and capacity of the RBF fund manager 	<ul style="list-style-type: none"> • <u>Private OGS Player, Host Government, or Expert 3rd Party:</u> Design and execute the marketing campaign targeting underserved customers • <u>EIB & Advocacy/ Technical Expert:</u> Drive technical assistance focused on building capacity of government officials in engaging OGS Players, and on regulatory reform aspects as well 	<ul style="list-style-type: none"> • The awareness campaign can be designed for an OGS player's target audience or via broad industry awareness; both achieve the same goal

Risks

1. **Lack of coordination with other donors:** Given that these countries have been attracting a lot of donor interest and have similar programs ongoing/starting (e.g., in Madagascar, see below), energy access funders looking to provide fresh capital should work towards ensuring coordination and not duplication with peer funding agencies.
2. **OGS Player Accountability:** (*Payment insurance scheme*). While the insurance scheme is likely to increase sales made via mobile money, the insurance should not dissuade SHS players from collecting payments from the customer (knowing they will be covered in case of default). **Possible mitigant:** The right set of caps can mitigate this risk.
3. **Failure of government institutions:** Given the high levels of governance risk and nascent system of checks and balances, there is an increased chance of leakages of finance, especially for the RBF scheme. **Possible mitigant:** A robust mechanism of monitoring in the intervention, along with a particular focus on government capacity building could mitigate this risk.

4. **Imprecise targeting:** A differentiation of subsidy levels may be desirable or required in many cases (e.g., higher subsidies for rural zones, avoidance of subsidizing SHS for grid-connected households, etc.). Targeting between different groups is challenging and even more so in settings with weak institutions and lack of required information.

Similar components in other programs

LEAD Madagascar (World Bank), ENDEV II Mozambique (GIZ)

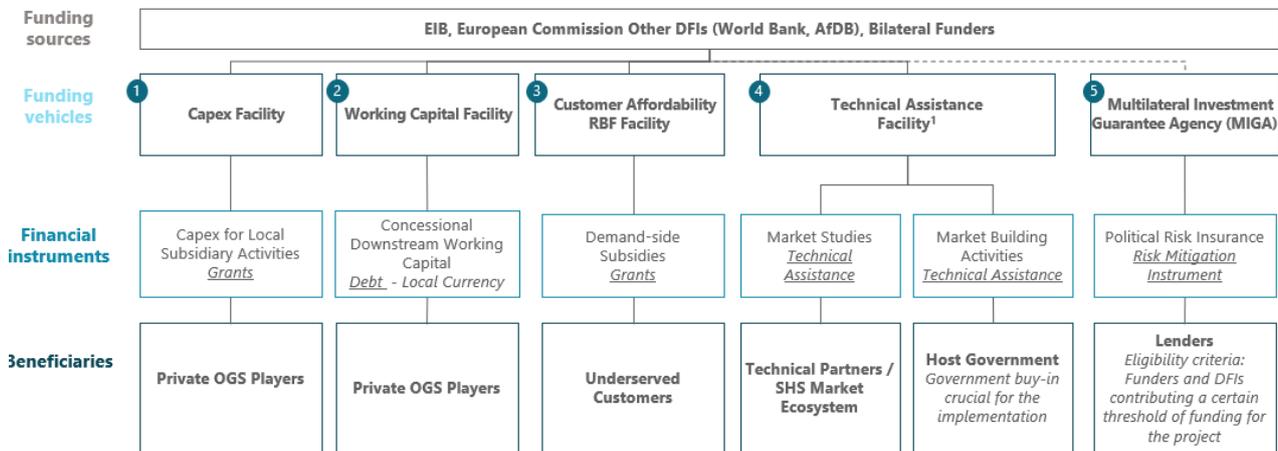
5. Fragile Countries

Reaching urban segments in 'Fragile Countries' can be facilitated by a Sahel-wide aggregated purchases process, with both demand and supply side components; followed by working capital, capex support, demand-side subsidies, insurance, and TA.

this region is characterized by low income, operational uncertainty, downstream working capital constraints, political and economic instability, and weak government institutions; requiring both demand and supply-side solutions to address these challenges. Most customer segments are potentially serviceable, but the cost to serve and lack of affordability increase exponentially as we move from urban to rural areas. Hence, given the nascent maturity of the OGS sector, we recommend focusing on the urban and peri-urban customers that are within reach of providers and can afford SHS systems through some form of customer credit.

The aggregated purchases scheme will be a critical pre-cursor to the facility launching: designed to include the typical demand-side aggregation and price discovery aspects, but also an aggregation and brokering process on the supply-side of potential local distributors (often in other industries). The latter is key to driving service to these markets, which may otherwise be deprioritized by SHS players.

Figure 19: Proposed intervention structure for 'Fragile Countries' typology



Structure set-up and approach (pre-implementation)

This de-risking approach incentivizes private players to enter the market with the help of local distributors in OGS or allied supply chains, by connecting them through a supply-side focused aggregated scheme. Thus, it would require a *supply-side focused aggregated purchases approach to set up the facility*.

This would involve the usual step of engaging technical experts like ISA, to ensure the process of demand aggregation and price discovery is carried out, while also leveraging existing relationships with government stakeholders to advocate for lower tariffs or taxes. In addition to this, however, a second supply-focused step would be required, to identify potential local distributors in OGS and allied supply chains, along with other non-private organizations that may have distribution capacities like UNFPA, ECHO or Red Cross. Following this, a brokering process would help interested suppliers broker

partnerships with large OGS players for in-country operations players to help them. The government would then have to be engaged to leverage existing relationships to advocate for lower tariffs or taxes. Finally, one or more governments would have to hold a competitive tender process. Alternatively, relevant UN organizations may be leveraged to run and manage the bid process, with government support and buy-in, of course.

Structure components (implementation)

Vehicle	Interventions employed / challenges addressed	Role of EIB and other stakeholders, and potential partners	Operational considerations / possibilities
1) Capex Facility	<ul style="list-style-type: none"> The grants from the capex facility will ease the burden on OGS players with respect to expanding in fragile markets and help mitigate operational set up uncertainty by covering initial costs of setting up distribution channels, building relationships with local partners, and hiring staff. 	<ul style="list-style-type: none"> <u>EC & other DFIs</u>: Pool loans and Investment grants to fund capex and cover program costs <u>Grant Program Manager</u>: Set up grant selection criteria, screen bids, and support disbursement of grants 	<ul style="list-style-type: none"> Tie capex grants to hitting certain milestones to ensure proper targeting like onboarding retailers, hiring x number of sales agents
2) Working Capital Facility	<ul style="list-style-type: none"> Downstream local currency debt will help mitigate challenges to downstream working capital availability; could be in the form of credit guarantees/ FLDGs Being concessionary in nature can help support low-income challenges, where increased liquidity can be used to increase loan tenure and lower monthly payments to deal with the extreme affordability challenges 	<ul style="list-style-type: none"> <u>EIB/ EC</u>: Provide lead debt or concessionary funding for the facility's fund (to be supported by other DFIs, MDBs, philanthropic capital and private investors), and/ or funding for credit guarantees/ FLDGs <u>Fund/Facility Manager</u>: Credible, private debt provider with on-ground expertise to define terms, issue loans from the fund, and manage debt portfolio (e.g., SunFunder in KOSAP) 	<ul style="list-style-type: none"> Leverage EIB's financing envelopes to unlock the local currency debt required for this facility
3) Customer Affordability RBF Facility	<ul style="list-style-type: none"> Demand-side subsidies will be instrumental in combatting affordability constraints, and while distortionary, may be needed in these 	<ul style="list-style-type: none"> <u>EC and other DFIs</u>: Pool grant capital to fund blended facility and cover program costs <u>Affordability Scheme Implementor</u>: Structure the provision of grant 	<ul style="list-style-type: none"> Designed based on insights from the market studies by fixing grant element amount as a % of the difference between supplier price and customer's ability to pay

	contexts that are coming out of conflict	<p>funding by identifying populations in need by leveraging existing welfare program or conduction detailed household-level data analysis</p> <ul style="list-style-type: none"> • <u>Host Government:</u> Issue and distribute subsidies to end customers via a voucher scheme 	
4) Technical Assistance Facility	<ul style="list-style-type: none"> • TA is a crucial component in this structure, given the nascency of the markets along with high levels of fragility. It could primarily help bolster weak government institutions by providing convening capabilities for developing the appropriate policy and regulatory frameworks or assisting in market studies also through pilot/ demonstration schemes in specific areas; essentially in all capacities where the government's ability to support the market is limited • Funding for the establishment recruitment and capacity of the RBF fund manager – ideally a local financial intermediary 	<ul style="list-style-type: none"> • <u>EIB/Financiers:</u> Drive technical assistance focused on supporting the institutional policy and regulatory environment and convening public and private stakeholders. Additionally, support the formation of local associations for the off grid solar sector to increase advocacy efforts • <u>Host Government, or Expert 3rd Party:</u> Undertake market studies focused on understanding customer demand and availability of local partners • <u>Local financial intermediary:</u> To host the facility to structure and manage RBFs 	<ul style="list-style-type: none"> • The market building activities can be designed to focus on catalyzing public-private partnerships to increase private sector participation¹
5) Political Risk Providers, E.g., Africa Energy Guarantee Facility (AEGF)	<ul style="list-style-type: none"> • Political risk insurance will be leveraged to address fragility of regions by covering for unforeseen political events or other disruptions. This can lend to both lenders and OGS players 	<ul style="list-style-type: none"> • <u>AEGF, Re-insurance companies, EC risk-sharing instruments, World Bank (MIGA)</u> 	<ul style="list-style-type: none"> • NA

	penetrating these markets despite the underlying risk		
Risks			
<ol style="list-style-type: none"> Lack of government buy-in. Government buy-in is essential for this structure, as the disbursement of the demand-side subsidy will have to be carried out in close coordination with the government Supply-side Market Distortion. Providing grants for financing upfront capex requirement will have to be supplemented by a robust monitoring mechanism; otherwise, they could end up distorting the supply-side of the market by providing unfair cost advantages to certain SHS players Demand-side Market Distortion. Demand-side subsidies if not appropriately targeted could lead to the setting up of a grey market. <i>Possible mitigants:</i> could include using an e-wallet or linking it to existing welfare schemes in the country Price effect of aggregation. Given the large volumes sold by OGS operators, there is a risk that demand aggregation may not significantly decrease cost for these players. Hence, real value of aggregate purchases process may lie in partnership facilitation 			
Similar components in other programs			
ROGEP (Pan West-Africa, World Bank), Togo Electrification Projects (World Bank), and ELAN (FCDO)			

6. LESSONS AND FEEDBACK FROM COUNTRY CONVENINGS

Background

As a follow up to our study, three country convenings were held between March -April 2021 with a view to socialize and validate our study’s findings. These convenings aimed to generate informed roundtable discussions with key energy access stakeholders on the potential of aggregate purchase mechanisms to address universal energy access obligations among in-need segments, including the design, feasibility, challenges, and opportunities for these mechanisms. Going forward, these inputs will be especially helpful to develop an additive and complementary funding strategy for each country and set the stage for a broad and productive collaboration with other ecosystem stakeholders.

Countries were selected mainly based on their Tier 1 energy access need, feasibility of designing and implementing an aggregate purchase program, and alignment with EIB’s strategic objectives and priorities and on-ground networks. The table below highlights the three countries and rationale for selection.

Figure 20: High-level rationale for country selection

Country	Segment	Rationale
Rwanda	Refugees	<ul style="list-style-type: none"> Potential to target close to 1.5 M refugees in Rwanda and Uganda, mostly from Sudan, DRC, and Somalia Situated in established markets of East Africa, refugee camps have high penetration of mobile phones and mobile money Presence of several large OGS players in East Africa with strong capabilities and potential to serve the refugee segment Strong, global partner in UNHCR, which could play an aggregator and could help scale any the aggregate purchase program globally Presence of international donors/ energy access programs that could be leveraged for partnerships
Uganda	Refugees	
Nigeria ⁴	Peri-urban	<ul style="list-style-type: none"> Extremely high need in terms of unserved households

⁴ The Democratic Republic of Congo (DRC) was another option explored under Very Large Opportunities. However, due to domestic political challenges and other immediate priorities, the study team was unable to engage with key government stakeholders. Noting the utmost importance of government buy-in and support, DRC was de-prioritized from our list of potential countries for validation.

		<ul style="list-style-type: none"> • Presence of a few large OGS players in both countries • Significant interest from market players to enter both these markets, given the size of the untapped demand • Strong government interest in exploring off grid solar solutions
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Participants were drawn from relevant and influential ecosystem players:

- Government ministries and agencies (e.g., ministries of energy, finance, agriculture, PMO, etc.)
- Donors, donor-driven programs and energy access initiatives (e.g., Power Africa, World Bank, SE4All etc.)
- International and local coordination agencies (e.g., UNHCR, etc.)
- Private sector players, and global/ regional energy access initiatives

Each convening was 2.5 hours long and had the following basic agenda:

Figure 21: Agenda for the convenings

#	Session
1	Welcome address
2	Presentation: What is an aggregated purchase mechanism and how can it enhance access to energy in the underserved segments?
3	Panel discussion: What are some key lessons from the implementation of aggregated purchases mechanisms in the energy sector globally?
4	Group discussion: How should we develop an aggregated purchase and financial solution that suits this unique context?
5	Close out and next steps

The section below highlights the main takeaways from the country convenings.

Takeaways

There were several cross-cutting takeaways from the convenings.

- We noted enthusiasm and excitement on the part of key stakeholders to explore the idea further in each of the three countries and prioritized segments. There was strong engagement in discussions (especially in Nigeria and Rwanda) leading to free-flowing and insightful information sharing. Positively, there appears to be a critical mass of organizations and institutions in each country to explore and define the idea further in collaboration with EIB.
- Blended finance opportunities, especially those that involved results-based financing approaches seeking to incentivize and catalyze private sector players emerged as having strong potential in all three countries. Successful energy access RBF pilots and programs exist in each country that can be leveraged for EIB funding opportunities. Stakeholders were generally less supportive of “pure” subsidies due to fears of market distortion.
- Government stakeholders, who would be critical to anchor and execute aggregate purchase programs, were especially keen to explore how they could contribute to 2030 universal energy access targets. At the same time, they indicated that any new program must consider existing energy access initiatives already ongoing and strive to ensure additionality and complementarity. It should be noted that Government support was stronger in Nigeria and Rwanda than in Uganda.
- Government stakeholders also highlighted that any funding/ subsidy should incentivize long-term, valuable customer relationships. Tangibly this means ensuring that subsidies/ RBFs are tied not just to sales, but also to other aspects like installation, after-sales care, trouble-shooting complaints, etc.

- Funders were similarly concerned about additionality and were keen to discuss how EIB could tap into existing initiatives and programs, with a view to scale these to reach target segments, instead of opening new lines of funding altogether. There is potential to do this in each of the three countries but comes with trade-offs (less independence in funding decisions, coordination, etc.).
- Market distortion was a common concern, especially for private sector providers in more mature SHS markets like Nigeria and Uganda. There are some misconceptions about aggregated purchasing schemes being an alternative to market-based programs. In the communication with stakeholders, it is important to emphasize how aggregated purchasing schemes can unlock OGS market opportunities and provide a framework of commercial offers to otherwise un/under-served segments. Providers also stressed that there was a strong need for any funding program to address critical challenges (beyond demand aggregation) such as local currency working capital, improving distribution capacity and infrastructure, providing training and capacity building support, etc.
- From an operational point-of-view, establishing smart ways to target and track customers over time will be critical to reducing potential distortionary effects of an aggregate procurement program (especially those that incorporate end-user subsidies), according to on-ground players like Practical Action and SEforAll.

We also highlight the main country-specific takeaways in the table below.

Figure 22: Key country takeaways

	Nigeria	Rwanda	Uganda
Date	February 8	March 18	March 22
Participants	28	22	28
Key participants	<ul style="list-style-type: none"> • Federal Ministry of Power • Nigeria Rural Electrification Agency • Nigeria Off Grid Market Accelerator • World Bank Nigeria • d.light • SEforAll 	<ul style="list-style-type: none"> • UNHCR • Ministry of Emergency Management • USAID Power Africa • World Bank Renewable Energy Fund • BBOX Rwanda • Practical Action Rwanda 	<ul style="list-style-type: none"> • UNHCR • Office of the PM • Electrical Regulatory Authority • USAID Power Africa • Uganda Off Grid Market Accelerator • Mercy Corps • Engie Uganda
Emerging implications	<ul style="list-style-type: none"> • Strong opportunity to complement existing programs on SHS and mini grids for rural electrification led by the Ministry of Power, the Rural Electrification Agency, and foreign donors. Nigeria has demarcated 360,000 clusters as high priority for electrification - a classification that can be used handily by EIB/ EC for their program. • Effective targeting of high-need segments critical to avoid market distortion and arbitrage opportunities. 	<ul style="list-style-type: none"> • Additionality of a new OGS-focused program was questioned by few actors like USAID Power Africa as existing Rwandan Government SHS programs such as the Renewable Energy Fund have national coverage, although not in refugee communities/ settlements. • UNHCR highlighted that most refugees still did not possess Tier 1 energy access and stressed the need for immediate and targeted funding to help plug the gap. • According to them, SHSs offer a ready solution and 	<ul style="list-style-type: none"> • Like Rwanda, additionality of the program was a key point of discussion – given (1) existing government SHS and OGS initiatives in partnership with foreign donors, (2) pilot programs in refugee settlements. There was a push to dive deeper into understanding the landscape of interventions in Uganda and plug into/ expand something that is already showing evidence of success. Government stakeholders stressed not re-invent the wheel. • UNHCR showed strong interest in participating in

	Nigeria	Rwanda	Uganda
	<ul style="list-style-type: none"> • Incentivizing local finance will be a key enabler and will require targeted support and technical assistance for local commercial institutions. • Several stakeholders highlighted the wider need to consolidate different relevant datasets currently residing in silos with donors, NGOs, and government agencies. • SEforALL's partnership with All On and the Nigerian government which targets 5 M solar connections also offers opportunities to collaborate –on data. • OGS players indicated that it would be crucial to avoid providing subsidies in areas where markets already operate. They remained unconvinced about the price reduction potential of aggregate purchases for SHSs claiming it was not clear how will the cost savings from aggregated purchases be passed on to the consumers • Focusing on other incentives – accelerated entry into segments, access to local working capital finance – will be important to secure buy in. • Several stakeholders highlighted the need for TA support in the form of technical and capacity building support, especially to develop local technicians, installers, etc. 	<p>have worked in small-scale pilot programs (such as with Ikea Foundation and Practical Action).</p> <ul style="list-style-type: none"> • UNHCR also mentioned that Aggregate Purchases programs would fit well into UNHCR's pivot to market-orientated energy access funding as part of a new strategy. • Scale was also an important point of discussion – given that there are about 100,000 refugees (~25,000 households) in Rwanda, there may be value in extending existing national SHS programs to cover refugees or to aggregate demand from refugees in Rwanda with those in neighboring countries like Uganda. • Stakeholders stressed the importance of catalytic market development support (loan guarantees, working capital, training, and capacity building, etc.) for the long-term economic sustainability of SHS in Rwanda. 	<p>a program with EIB/ EC. The Uganda UNHCR team is developing energy access strategy that highlights private sector development as a key priority.</p> <ul style="list-style-type: none"> • Targeting refugees will likely prove to be an operational challenge since most live in settlements (not camps) that are often indistinguishable from other low-income Ugandan areas. • There is an opportunity to expand the potential SHS funding opportunity to cover refugees and last-mile segments in adjacent areas – which would need to be further explored, especially with government partners. • Focus on bureaucracy/ technical layer, not ministry level stakeholders is more sustainable.

7. CONCLUSION AND NEXT STEPS

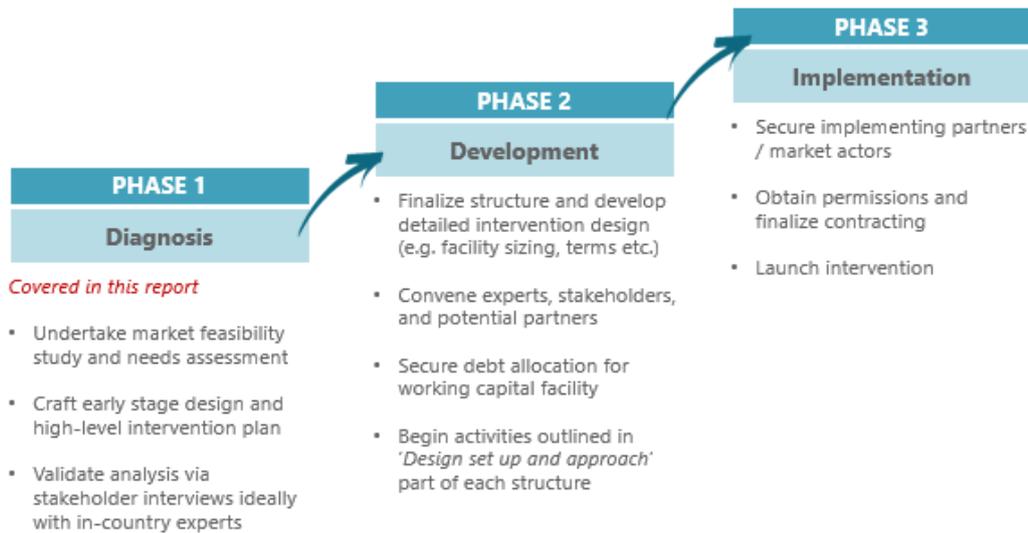
Subsequent phases to intervention design

Considering that different typologies of countries face different challenges and context; we recommend a tailored portfolio of interventions for each of the typologies. A plethora of demand, supply, and ecosystem challenges map differently to five typologies on the continent, each with a priority target

segment for SHS players to reach the market. Within these typologies, peer DFIs and MDBs are experimenting via a range of programs and financial instruments on how to best catalyse these underserved markets. For EIB and other likeminded donors interested in providing blended capital, a portfolio approach is proposed to address the gaps in this funding landscape, leveraging the bank’s role in providing concessionary debt, in particular, and the grant-making capacities of other funders like the EC.

The development of these five proposed intervention structures brings the first phase of the intervention strategy design to a close. To translate these recommended structures into on ground implementation, we propose two more phases as next steps:

Figure 23: Next steps in intervention strategy design to reach unelectrified populations in SSA



Once a relevant financing structure is confirmed, the next level of detailing and analysis is necessary on key design questions (including on the question of which unserved segments require a country-level versus a regional approach – e.g., for refugees). This design process will need to be participative and must include deeper inputs from in-country actors highlighted above, who will eventually be long-term partners for funders like EIB. In particular, the need for buy-in and support from the government and existing energy sector stakeholders, including private players, will be critical for the successful execution and sustainability of the program.

ANNEX

Annex 1: Full stakeholder list. 25 conversations completed over 15 stakeholders in 3 groups over the course of the project

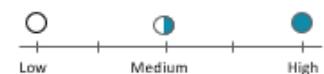
Stakeholder Types	Funders	OGS and ecosystem players	Sector Experts
	MDBs/DFIs, banks, impact investors etc.	SHS distributors and manufacturers, ecosystem players such as PAYG providers, insurance companies etc.	Researchers, universities, industry associations
Conversations completed	<ul style="list-style-type: none"> CDC Acumen AfDB Nordic <u>Devt.</u> Fund <u>SunFunder</u> World Bank 	<ul style="list-style-type: none"> <u>D.Light</u> (<i>multiple calls</i>) Lumos Global (<i>multiple calls</i>) Greenlight Planet (<i>multiple calls</i>) <u>Oolu Solar</u> Orange <u>Energie</u> Fenix Intl. <u>Azuri</u> Ignite Solar 	<ul style="list-style-type: none"> International Solar Alliance (<i>multiple calls</i>) SE4All POAP (Power Africa Off-Grid Project)

Annex 2: Sub-challenges encompassing each challenge set

1. Low customer Affordability

			Challenge Severity*
Ability to pay	Low income	Low income affects the ability to pay for SHS. If current trends continue, ~20M households in SSA cannot afford SHS (>10Wp) in 2030 ¹ despite lower costs due to technological advancement and increased GDP/capita	
	Lack of Consumer Finance	Capital availability impacts a customer's ability to buy SHS even if they can afford regular instalments. Presence of PAYG models such as Mobile money and MFIs help with this. Even in PAYG models, a high upfront deposit might impact the customer's ability to pay	
	Seasonal Income Volatility	Customers, particularly those who depend on agriculture income, contend with seasonal income changes which makes it difficult to take a long-term loan that requires regular payment	
	Unpredictable Income Volatility	Low income households rely on irregular income sources and face frequent economic shocks which impacts their ability to make PAYG commitments or results in frequent delays/defaults in PAYG payments	
Willingness to pay	Low cost of substitutes	SHS penetration suffers when substitutes such as diesel power are available at low costs.	
	Low product appeal	Unfamiliarity with solar products or penetration of low-quality white labeled SHS products affects the perception of SHS thus affecting the sales of SHS	

*Challenge Severity - is the impact of that sub-challenge on SHS penetration in SSA



2. Market Uncertainty

		Challenge Severity
Lack of demand data	SHS players are reluctant to enter new markets because they either cannot determine the market size, or are unable to determine the type of products in demand since these markets are relatively untouched and have very little demand level data	
High opportunity cost	With large untapped populations in existing markets, SHS players are reluctant to expand to new markets due to the additional entry barriers in new markets	
Operational setup cost	Entering each additional country requires setup costs for local offices, local staff and local partner tie-ups which increases the cost of entering new markets instead of growing in existing markets.	
Operational setup uncertainty	There is uncertainty around identifying local staff and local partners in each new market. This can impact the quality of service and increase the cost of service on the SHS player and thus increasing the barriers to entry into new markets.	

3. Distribution & Last mile reach

		Challenge Severity	
Supply-side constraints	Limited availability of local partners	SHS players depend on the presence of partners such as distributors, technicians, and mobile money operators to run their business. SHS businesses will face high costs to service customers where these partners are not available	
	Limited capacity of local partners	Even when partners are available, they may not meet the quality requirements of SHS players thus impacting their ability to spread awareness of SHS, assess credit worthiness, provide PAYG products, or provide technical and aftersales support	
	Weak logistics	Costs to reach customers that are remote increase exponentially due to weak logistics infrastructure such as roads, rail and ports and the absence of logistics ecosystem businesses	
Demand-side constraint	Sparse Customer Spread	Marketing, logistics, and after-sales service constitute a significant portion of the SHS cost and therefore economies of scale reduce the end-cost of each SHS system. In regions where customers are sparsely populated, SHS business lose out on economies of scale and thus have a significantly higher cost to serve	

4. Insufficient Liquidity

			Challenge Severity
Central need	Limited start-up and growth capital	Limited availability of investment to launch or grow an SHS business affects SHS penetration. This is especially true for businesses in fragile regions as investors are reluctant to invest in entry and expansion in these markets	
	Upstream working capital	SHS business have to pay the manufacturer upfront even though it might take them 2-3 months to ship and another 4 months to sell the product to customers. This locks in working capital and affects SHS players ability to grow their business	
Regional need	Downstream working capital	With 99% of SHS sales relying on PAYG, downstream working capital becomes critical for SHS players who might take 12-24 months to recoup their costs from the time of sale. While IFIs can fund this, they have limited appetite for working capital funding, often lend in foreign currency making capital more expensive, and struggle to service smaller working capital requirements. Local institutions on the other hand are reluctant to lend since OGS is an unfamiliar industry, has a materially lower risk-adjusted rate of return than alternative options, and the industry is collateral light whereas local institutions often require 100% collateral	

5. Political & Economic Environment

			Challenge Severity
	Fragility of regions	Political instability leads to conflict, riots, looting and general disorder in a country/region which creates an unfavorable business environment for OGS businesses. Economic fragility on the other hand exposes SHS players to uncertainty in the business and thus poses a reluctance to serve.	
	Weak government institutions	Weak institutions imply high levels of corruption, create uncertainty around processes and timelines, and limit the ability to enforce contracts thus impacting an SHS player's ability to do business	
	Foreign exchange challenges	With OGS manufacturing primarily in China and funding often raised in foreign currency, foreign exchange challenges such as exchange rate volatility, currency devaluation and currency transferability, can have a detrimental effect on OGS businesses	
	Regulatory barriers	Unpredictable and unfavorable regulatory environment affects OGS support and OGS-specific regulations, labor laws, trade policies, taxation laws etc. For example, high VAT rates on OGS products and unclear customs processes have slowed OGS growth in countries	

Annex 3: Mapping of sub-challenges to typologies

Typologies	Customer Affordability						Market Uncertainty				Difficult last-mile distribution			Insufficient liquidity		Political and economic environment					
	Low Income	Lack of Consumer Finance	Seasonal Income Volatility	Unpredictable Income Volatility	Low cost of substitutes	Low Product appeal	Lack of demand data	Operational setup cost	Operational setup uncertainty	High opportunity cost	Limited availability of local partners	Limited capacity of local partners	Weak logistics	Spare Customer Spread	Low start-up, initial, or growth capital availability	Upstream working capital	Downstream working capital availability	Fragility of regions	Weak government institutions	Foreign exchange challenges	Regulatory Barriers
Very Large Opportunities (Peri-Urban)		█	█		█	█										█					█
Established OGS Markets (Refugees)	█			█			█			█	█						█				█
New OGS Markets (Peri Urban)						█								█			█				█
Underserved Low-Income Markets (Urban and Peri Urban)	█	█	█						█								█				
Fragile Countries (Urban)	█	█	█						█						█		█	█	█		█

█ Critical challenge
█ Relevant challenge

Certain critical sub-challenges such as downstream working capital availability, limited capacity of local partners, low income and regulatory barriers affect nearly all segments

Dalberg

Annex 4: Instrument details - Role, applicability to challenges, and considerations in implementation

1. Technical Assistance

Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed		Considerations
1 Market assessments and convening	Needs assessment of a market and bringing in diverse stakeholders to facilitate market building	When future funding is dependent on accurate market assessment and limited data exists to provide this	Lack of demand data Regulatory barriers	Operational set up uncertainty Weak government institutions	<ul style="list-style-type: none"> Often the critical first step to plan or effectively implement most other financial interventions Success heightened by adopting a localized/ground-up approach to assessment
2 Business advisory	Technical or managerial support to build capacity in varied bus. functions + bankability of SHS players	SHS player is the key stakeholder to address a challenge but requires support to do so	Operational set up uncertainty	Limited partner capacity	<ul style="list-style-type: none"> Success driven by pairing advisory with a financial intervention, to boost SHS ability to best leverage the funding being provided May require significant customization to on-ground circumstances, thus incurring costs
3 Capacity building (various stakeholders)	Training, awareness, and network building of local banks, SHS, and ecosystem players, (even govt. where applicable/ possible)	When perceived risks, info asymmetry, and operational issues limit stakeholders ability to deliver/serve SHS players effectively	Limited partner capacity Regulatory barriers	Downstream working capital	<ul style="list-style-type: none"> Can be particularly successful if targets overcoming systemic challenges, provides adequate tools, and understanding of policy/regulator environment
4 Customer information / marketing	Analogous to advertising or public education campaigns for end users	To build market demand/ invite customers with minimal distortion	Low product appeal		<ul style="list-style-type: none"> A component of driving success here could be the development of and sensitization to quality certificates (e.g. Lighting Global, IFC)
5 Support for mobile providers	Advisory for mobile money actors and enabling the market for their growth	To overcome SHS challenges by ecosystem strengthening	Low household income	Lack of consumer finance	<ul style="list-style-type: none"> Some TELCOs/mobile-money players (e.g. Orange Energie) are developing their own SHS capabilities, with possible implications on access for other players

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2. Grants

Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed		Considerations
1 Unconditional grants	Fund early-stage or concessionary activities to demonstrate viability or crowd in other forms of capital	When markets too risky to finance on commercial terms alone, or in conditions where grants can demonstrate viability before/to crown in other capital sources invested	Lack of demand data Operational set up cost High opportunity cost Fragile regions	Sparse customer spread Operational set up uncertainty Limited partner availability Weak government institutions	<ul style="list-style-type: none"> Adaptable instrument that should be blended with TA or loans (to bolster concessionally) Often only has short term value, which can then be supplemented by supporting institutional or legal reforms to prevent future market failures Risk market distortion or the creation of grey markets if not effectively designed
2 Supporting a competitive tender process (sovereign finance)	Where SHS providers bid for a government issued tender for a certain asset at scale, and the winning bid goes to the actor(s) that can provide the service at the lowest cost; DFIs can provide capital to bolster such bids	Relationship with govt. agency issuing the tender; typically undertaken when a number of players involved in bidding, to ensure competitiveness of process	Low income	Sparse customer spread	<ul style="list-style-type: none"> Tenders can be distortive if not properly designed; must be managed so as not to disrupt innovation/operational flexibility for winning bidder; and account for risks of corruption or undue government influence Success often dependent on the right market actors with strong operational capabilities winning the bid; but can be constraining if tender requirements are too stringent or not properly informed by market assessments

Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed		Considerations
3 Demand-side subsidies / vouchers	Support for govt. cash payments targeting OGS consumption, and allowing distributors to charge only a % of the actual price	Significant social and environmental benefits can be unlocked or market failures corrected by providing the subsidy	Low household income Lack of consumer finance	Unpredictable income volatility Unpredictable income volatility	<ul style="list-style-type: none"> If executed via PAYGO or customer e-wallet, can ensure subsidy's use for intended purpose Should be implemented after considering transaction costs, affect on different social groups, and efficacy of passing subsidy to intended audiences Efficacy of program facilitated by benchmarking and monitoring of OGS being subsidized Enabled by buy-in of host govt. to plan, implement, and scale
4 Supply-side subsidies	Designed to close the gap between affordable prices for customers and the developers' actual costs	Conditions where the cost to serve is too high (even if customers can afford) or there is an access/impact imperative to enter a market	Limited partner availability Limited partner capacity Weak logistics	Low cost of substitutes Sparse customer spread	<ul style="list-style-type: none"> Can be capital subsidies (upfront) or tied to performance Must be properly planned to ensure the subsidy program does not compete with an existing private project/where competitive alternatives can exist, or jeopardize commercial viability in the future

3. Risk Mitigation Instruments

Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed		Considerations
1 Guarantees	Rebalances assessment of risk/reward to lender, or facilitates 'credit enhancement of borrower', by guarantor taking on full or partial obligations of borrower in case of default	When capital needs to be attracted that may otherwise regard a given transaction as too risky	Downstream working capital Limited start up capital	Upstream working capital	<ul style="list-style-type: none"> Broad application across financing cycle, including mitigating counterparty or macroeconomic risks; and typically used in tandem with debt or equity instruments Analysis reveals that loan guarantees to banks are not always drawn down. They can reduce the cost of the loan but do not always lead to higher likelihood of lending*
2 FX Hedging instruments	Swaps, options, and other derivatives to protect against currency fluctuation between borrowing and repayment rates	Where market for hedging instruments in place and require faster execution than ramping up local currency finance	Foreign exchange	Downstream working capital	<ul style="list-style-type: none"> Can incur high underlying transaction costs to hedging manager or be unsupported in target markets, so alternatives such as back-to-back loans and letters of credit may be more viable
3 Payment Insurance	Design to cover partial non-repayment by compensating OGS players for deviation against expected repayment performance	Contexts where there is a high risk of unanticipated factors (macroeconomic or related to customer affordability) affecting customer's ability to pay back to loans on SHS	Unpredictable Income Volatility Lack of consumer finance	Fragility of regions	<ul style="list-style-type: none"> If not properly designed, risks incentivizing 'bad behavior' of OGS players i.e. minimizing the need to acquire quality customers To mitigate, can be designed so that OGS players pay premiums into a scheme as well as capital from EIB - providing partial payment to OGS players on customer defaults, while incentivizing better consumer finance operations (increased loan tenures, lower daily rates etc.)

4. Debt

	Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed		Considerations
SHS use of funds	1 Upstream working capital loans / Corporate debt	Inventory finance (e.g. via a line of credit), trade finance for product imports, or capital for growing a supplier network	Market actors have cash-flow constraints that inhibit expansion plans; SHS corporate office is typically in a different country/has different risk profile than local subsidiary	Upstream working capital	Operational set up cost	<ul style="list-style-type: none"> Can be achieved via supply chain finance i.e. paying SHS players' invoices to supplier in advance of payment, thus allowing SHS payers to benefit from extended payment terms and supplier from early cash flow Effective implementation requires coordination with not only with SHS players' finance leads, but also procurements teams
	2 Downstream working capital loans	Including capital to extend credit/payment terms to end-users; provides AR financing for growing pipeline of projects	Market actors have cash-flow constraints that inhibit expansion plans, or require providing further flexibility to customers	Downstream working capital	Sparse customer spread	<ul style="list-style-type: none"> Addresses market gap in current supply of these loans in local currency due to stringent collateral asks, long approval timelines, and short-term nature of issued loans. Risks inherent in SHS AR financing (vs other industries) is link between financing and usage i.e. that any physical product issues could lead to nonpayment
SHS loan terms	3 Market rate debt	Market rate loans for bankable market actors and funds that loan to them	Where recipients are at operational maturity to manage market rates	Downstream working capital	Low start-up capital	<ul style="list-style-type: none"> Could expose lender to multiple levels or risk related to direct recipient and their network of distributors Concessional rates (see next slide) likely to be favored over this option given pre-commercial nature of target markets; but transition to market terms possible in long run
				Upstream working capital	Operational set up cost	

	Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed		Considerations
SHS loan terms	4 Concessional finance	Finance offered on terms more favorable than market rates or conditions	When financing at market rates is unavailable or unviable; or market actors need cheaper capital or support to scale until they can work with commercial terms	Downstream working capital	Low start-up capital	<ul style="list-style-type: none"> Concessional can be achieved through reduction of market rates; flexibility in maturity, security, or rank; or serving market actors not reached by commercial lenders Blended concessional finance is typically understood as a combination of concessional finance and commercial finance, often by private actors, to develop new markets or crowd-in private investors to fund projects
				Upstream working capital	Sparse cust. spread	
	5 Local currency finance	Minimizes risk of currency 'mismatch' (devaluation in time to repay) of borrowing in a hard currency; and helps deepen domestic capital markets	Borrower's exposure to currency mismatch is high (e.g. in volatile macro economic conditions) or they face challenges to access local capital sources	Downstream working capital	Limited start up capital	<ul style="list-style-type: none"> Dev. finance is dominated by hard currency loans so there is a need for this instrument, which can be transferred/shared with local financing organizations in the long-run SHS players caution there may be other channels that may be cheaper to acquire from than MDB solutions
				Operational set up costs		
	6 Financing local banks / intermediaries	Local banks (that independently lend or intermediate AR financing for example) and institutions like MFIs or microcredit financiers	The existence of a local banking/MFI ecosystem with noted capacity or funding gaps	Downstream working capital	Limited start up capital	<ul style="list-style-type: none"> Typically better operationalized when paired with capacity building of banks Although development of local banks/MFI ecosystem can drive sustainability for SHS financing eventually, the current limited scale/number of existing MFIs funding SHS in SSA suggests this intervention is only valuable via a long term, systemic approach

5. Equity and Mezzanine

	Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed		Considerations
	1 Direct equity / equity investment into funds	Direct injection of capital to drive strategic growth, via partial ownership of the project (can be patient capital)	When likelihood and amount of possible returns is worth the investment risk	Limited Start-up capital	Operational set up cost	<ul style="list-style-type: none"> Can allow for significant influence into investee operations and scale strategy Challenges exist around exiting (exacerbated by potential volatility), as well as constraints around smaller ticket sizes for direct equity raises
				High opp. cost	Operational set up uncertainty	
	2 Quasi-equity or Mezzanine Finance	An instrument that blends debt and equity, including subordinated debt, convertible debt, or preferred equity	When there is a need for capital for rapid growth but flexibility in capital sources use to fuel that growth	Limited Start-up capital	Operational set up cost	<ul style="list-style-type: none"> Inherent to the structure is the low seniority/higher risk compared to senior loans, and loans made may not be collateralized; but possibility of higher returns than senior loans as well It can be very difficult to assess the additionality of this instrument
				High opp. cost	Operational set up uncertainty	

6. Innovative Mechanisms

Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed	Considerations
1 Aggregated demand / Aggregated purchases	Diminishes uncertainty of purchase volumes for both buyers (govts.) and sellers (SHS players), and can in theory, help drive economies of scale for SHS players by reducing system COGS	When procurements costs are high and could be lowered from higher purchase quantities or OGS players require a degree of certainty or exclusivity to enter a market	<ul style="list-style-type: none"> High opportunity cost Operational set up cost Lack of demand data 	<ul style="list-style-type: none"> Could be highly distortionary by crowding out other OGS players through offering exclusivity to one/a few; best applied in nascent markets with no current actors May be ineffective in low-volume markets (even if aggregated) or where system COGS are insubstantial, therefore aggregation does not provide cost efficiencies See detailed deep-dive in succeeding slides
2 Results-based finance (RBF)	Ties the distribution of funds (often as grants or subsidies) to the achievement of pre-established outputs/ activities by 'implementors' (i.e. SHS players)	Implementors require incentives for activities; funders seek proof of results to disburse payments; results need to be measurable, verifiable, accountable	<ul style="list-style-type: none"> Low household income Low cost of substitutes Limited partner availability Weak logistics Sparse customer spread 	<ul style="list-style-type: none"> Success driven by ability to define and rigorously monitor outcomes, as well as often an implementor with a strong track record and target/data-oriented culture An independent evaluator is typically needed to ascertain delivery of outcomes/targets Unsuccessful in contexts where implementors need upfront payments to begin operations (since payments are made <i>after</i> an activity is complete). This can be mitigated by tying payments to an activity <i>prior</i> to operations – e.g. the completion of a due diligence exercise by the implementor – so that payments can be disbursed early and effectively substitute the role of upfront capex (e.g. World Bank KOSAP program)

Instrument	Description	Pre-conditions	SHS Sub-challenges Addressed	Considerations
3 Development Impact Bonds	A pay-for-performance mechanism like an RBF, but one where an investor provides capital (and often also a market assessment) upfront, and an outcomes funder pays the principal plus a return if pre-established outputs are met	Divergent risk appetites between the investor and outcomes funder, and a need for upfront capital. Typically also, implementors with proven track record to operationalize activities to hit targets	<ul style="list-style-type: none"> Low household income Low cost of substitutes Limited partner availability Operational set up cost High opportunity cost Weak logistics Sparse customer spread Lack of demand data Operational set up uncertainty 	<ul style="list-style-type: none"> Often requires careful consideration of implications of underperformance so as not to deter future investments/investors Can incur high transaction costs relative to total disbursement amount e.g. payments to independent evaluator Offers strategic flexibility i.e. bond can be designed to target a range of outcomes, from scale to deepened impact to quality outcomes
4 'Lease-Co'	An asset financing model where a lease-co purchases/finances systems from OGS players for partial upfront payment, and the OGS player is responsible for collecting the remainder of the asset price from customers	A relatively established financial ecosystem for leasing companies to exist/be set-up, plus credibility of OGS player to service customers or secondary company to collect payments if OGS player goes out of business. Also an appetite for investors to pool capital into lease-co (diversifying risk)	<ul style="list-style-type: none"> Downstream working capital 	<ul style="list-style-type: none"> Susceptible to similar risks as in any individual company's off-balance sheet vehicle i.e. default or insolvency if OGS player unable to service customer loans High transaction/set-up costs and some operational complexity in setting these structures up

Given their varied success in addressing different challenges, the instruments can be optimally mapped to each typologies' context and challenges

#	Typology	Key Challenges	Market assessments & convening	Business advisory	Capacity building (various stakeholders)	Customer information/marketing	Support for mobile money providers	Unconditional grants	Demand-side subsidies	Supply-side subsidies	Private insurance schemes	Guarantees	FX hedging instruments	Payment instruments	Upstream insurance	Downstream working capital loans	Concessional finance	Local currency finance	Financing local banks/local intermediaries	Development of customer savings accounts	Mezzanine finance	Aggregated purchases	Results-based finance	Development impact bonds	Lease-co
1	Very Large Opportunities Peri-urban	Customer affordability; Political and macroeconomic environment																							
2	Established OGS Markets Refugees	Low customer affordability; Market uncertainty																							
3	New OGS Markets Peri-urban	Difficult last-mile distribution; Insufficient liquidity																							
4	Underserved Low-income Markets Urban & Peri-urban	Low customer affordability; Insufficient liquidity																							
5	Fragile Countries Urban	Market uncertainty; Political and macroeconomic environment																							

Program	Funders	Objective	Description	Financial	Non-financial	Facility size	Geographic focus
LEAD Madagascar	World Bank	To increase the supply of SHS products in Madagascar, by addressing affordability	The program provides an RBF subsidy and working capital debt to eligible OGS players	<ul style="list-style-type: none"> RBD Working capital debt 	<ul style="list-style-type: none"> Business advisory Customer assistance 	USD 150 million	Madagascar
Off-Grid Energy Access Fund	AFDB KFW NDF	To increase capital availability for SHS players in the ECOWAS region	Provides flexible debt instruments in local currency to OGS players	Local currency debt	N/a	USD 90 million	ECOWAS
Transforming Energy Access (TEA)	DFID	To promote innovation in the OGS sector	Facility to support early stage OGS players with innovative technologies and business models	N/a	<ul style="list-style-type: none"> Business advisory Investment facilitation 	GBP 65 million	SSA
World Bank KOSAP	World Bank	To increase supply of off-grid SHS products in underserved counties	RBF facility awarded to private SHS players to serve 14 counties in Kenya	<ul style="list-style-type: none"> RBF Local currency debt 	Business advisory	USD 48 million	Kenya
Smart Communities Coalition	Mastercard Foundation USAID	To pool technology, solutions and experience from multiple sectors to transform refugee settlements	SCC provides outcome-based market expansion grants up to \$100,000 to selected OGS players	RBF	<ul style="list-style-type: none"> Business advisory Customer assistance 	Undisclosed	Kenya Uganda

Program	Funders	Objective	Description	Financial	Non-financial	Facility size	Geographic focus
Lighting Africa	World Bank IFC	To electrify the sub-Saharan African population	Provides result-based incentives such as grants, working capital loans to OGS players	<ul style="list-style-type: none"> Debt Working capital RBF 	<ul style="list-style-type: none"> Business advisory Investment facilitation Customer assistance Gov't support 	Undisclosed	SSA
Lighting Africa Ethiopia	World Bank IFC	To provide SHS player with foreign currency to purchase SHS products	The program established a credit facility that can provide players with working capital	Working capital loans	N/a	USD 40 million	Ethiopia
DESCO Program	AFDB SocGen	To increase the availability of local currency financing	The program provides concessional loans to financial intermediaries in local currency	<ul style="list-style-type: none"> Concessional debt Local currency financing 	Business advisory	USD 28 million	SSA
Zambia Beyond the Grid	World Bank SIDA REEP	To electrify underserved populations in rural Zambia	BTGZ is an RBF facility awarded to SHS players to serve underserved markets	RBF	N/a	USD 20 million	Zambia

Program	Funders	Objective	Description	Financial	Non-financial	Facility size	Geographic focus
Africa Clean Energy Program	DFID	To improve energy access of people in SSA	ACE provides technical assistance to national governments and industry associations in 14 countries in Sub-Saharan Africa to encourage the reform of policy and regulation, improve investment readiness, and facilitate learning and coordination.	N/a	<ul style="list-style-type: none"> Business advisory Investment facilitation Government support 	GBP 15 million	SSA
PAS Solar Nigeria	EU (ElectriFi) FMO Finn Fund DFID	To increase electrification of rural Nigerians and to create jobs in the process	PAS is a 10m syndicated loan facility co-financed by REPP and the EC-supported financing initiative, ElectriFi, the company is now looking to increase OGS connections	Debt	N/a	USD 10 million	Nigeria
ELAN DRC	DFID	To support producers distributors of OGS products to increase access of SHS	The program provides market intelligence on market systems and capacity building in terms of marketing, distribution, etc.		<ul style="list-style-type: none"> Business advisory Government support 	Undisclosed	DRC
ENDEV PICO project Tanzania	SNV	To increase penetration of SHS products in underserved communities	The program is an RBF to improve market access for pico-solar devices for rural and off-grid households	RBF	N/a	Undisclosed	Tanzania

Program	Funders	Objective	Description	Financial	Non-financial	Facility size	Geographic focus
NESAP Niger	World Bank IFC	To address supply-side barriers in increasing access and affordability to consumers	NESAP provides market intelligence studies and provides a credit line to banks and MFIs for onward lending to OGS players	Debt	<ul style="list-style-type: none"> Business advisory Gov't support 	USD 7 million	Niger
AMADER Mali	World Bank IFC	To increase penetration of the OGS market by addressing distribution challenges	The project provides an RBF to address constraints on the private sector delivery of SHS products to underserved regions	RBF	N/a	Undisclosed	Mali
ENDEV Pico Project Kenya	SNV	To increase penetration of SHS products in underserved communities	The project supports with capacity development for rural entrepreneurs, and business linkages between value chain actors at different levels	N/a	<ul style="list-style-type: none"> Business advisory Customer assistance Gov't support 	Undisclosed	Kenya
ENDEV Mozambique	DFID SIDA German Coop NDF SDC	To increase access to clean energy in low-income countries by providing financial incentives to private businesses	Through the financial incentives, the facility provides elevated returns to the companies on serving these markets for a fixed period	RBF	Business advisory	Undisclosed	Mozambique
Trine	SIDA	To increase equity investments towards SHS players using	SIDA provided a guarantee on equity investments given to SHS players	Guarantees	N/a	Undisclosed	<ul style="list-style-type: none"> East Africa Zambia

Program	Funders	Objective	Description	Financial	Non-financial	Facility size	Geographic focus
Energy Access and Quality Improvement Project	World Bank	To improve access to modern energy for households, enterprises, and public institutions in Rwanda and to enhance the efficiency of electricity services	Providing funding for the country's ongoing program of expanding grid connections for residential, commercial, industrial, and public sector consumers, as well as by providing grants to reduce the costs of SHS	Grants and Loans (50% each)		USD 150 million	
Smart Power Africa	Rockefeller Foundation	Bring reliable, renewable electricity to half a billion people in SSA	RF will invest in mini-grid infrastructure and projects, work with Power for All to facilitate new partnerships with utilities, develop mini-grid financing vehicles	Equity, debt	TA for various market support activities	USD 1 billion over 10 years	SSA
Energy Entrepreneurs Growth Fund	Shell Foundation, FMO	Improve access to renewable electricity sources across sub-Saharan Africa	Recipients will be companies that are in the growth stage and that specialize in providing electricity supply options derived from renewable sources to local households and small to medium-sized enterprises	Equity and debt	• n/a	USD 120 million	SSA