

OFF-GRID SOLAR MARKET TRENDS REPORT 2026



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Foreword

Every day, more people are switching on lights, and using water pumps, fridges, and phones powered by the sun.

The need for off-grid solar, and recognition of its value, has never been greater. Off-grid solar is creating jobs, supporting livelihoods, powering farms, and bringing real improvements in health, income and quality of life to hundreds of millions of people – providing a secure, resilient, and affordable source of power against a backdrop of rising fossil fuel prices. And as an El Niño year approaches, solar irrigation, cooling, back-up power and connectivity are helping communities adapt to drought and rising temperatures.

Solar now makes up the largest share of new power capacity added worldwide, and the clean energy transition is reshaping how countries plan, finance and build their energy systems. Off-grid solar is how that transition reaches the people and places the grid cannot, building new clean energy infrastructure home by home and business by business. Over the past two years, that progress has been hard won. Currencies have slid, fuel prices have climbed, and climate shocks have arrived faster than many communities can recover. For families already living close to the edge, every one of these pressures lands on the household budget. And still, the off-grid solar sector has kept growing.

Governments are now backing off-grid solar with significant public finance. Results-based financing is driving annual growth of solar home systems in numerous countries across the African continent, and through Mission 300, off-grid solar has become central to electricity planning. Meanwhile, government support and consumer choice have fueled a boom in standalone solar in India, Pakistan and the Pacific.

Companies have kept innovating. Solar generators are displacing diesel where the grid is unreliable, and many providers now offer clean cooking, mobile services, and internet connectivity alongside power. Government and industry leaders have doubled down on reaching the lowest-income populations, through subsidized cash and Pay-As-You-Go models, plus energy-as-a-service pilots.

Progress has not been even across companies and countries. Some companies have secured the capital they need to grow, but many smaller and earlier-stage companies have not. As off-grid solar solutions are reaching customers with lower disposable income, greater efforts and increased financing are needed to meet SDG 7 and Mission 300 targets.

The challenge is great. The opportunity is greater. The technology is proven, the private sector has matured, and government support is growing. Hundreds of millions of people are still waiting for power. They are counting on us to pick up the pace.



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Acronyms

A2EI	Access to Energy Institute
ADELE	Access to Distributed Electricity and Lighting in Ethiopia
AFSIA	Africa Solar Industry Association
AI	artificial intelligence
ASCENT	Accelerating Sustainable and Clean Energy Access Transformation
AVCA	African Private Capital Association
BGFA	Beyond the Grid Fund for Africa
BLd	Brighter Life by d.light
C&I	Commercial and Industrial
CAPEX	capital expenditure
CEEW	Council on Energy, Environment and Water
CGAP	Consultative Group to Assist the Poor
CRM	customer relationship management
DARES	Distributed Access through Renewable Energy Scale-up
DFI	development finance institution
DHS	Demographic and Health Surveys
dMRV	digital Monitoring, Reporting, and Verification
DRC	Democratic Republic of the Congo
DRE	distributed renewable energy
EaaS	Energy-as-a-Service
EASP	Electricity Access Scale-Up Project (Uganda)
EBIT	earnings before interest and taxes
EBT	Earnings Before Tax
EEX	Energy and Extractives (World Bank Global Practice)
EnDev	Energising Development
EPC	engineering, procurement, and construction
EPR	Extended Producer Responsibility
ESCO	energy service company
ESG	Environmental, Social and Governance
ESMAP	Energy Sector Management Assistance Program
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCDO	Foreign, Commonwealth & Development Office (UK)
FDPs	forcibly displaced persons
FTE	full-time equivalent
FX	foreign exchange
FY	fiscal year
G7, G20	Group of Seven, Group of Twenty

Acronyms

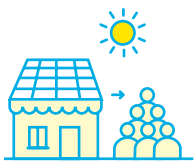
GDC	Global Distributors Collective
GEAPP	Global Energy Alliance for People and Planet
GEM	Global Economic Monitor (World Bank databank)
GEP	Global Electrification Platform
Global LEAP	Global Lighting and Energy Access Partnership
GPA	Global Platform for Action on Sustainable Energy in Displacement Settings
GRI	Global Reporting Initiative
IBRD	International Bank for Reconstruction and Development
ICR	Implementation Completion and Results Report
ICT	information and communication technology
IDA	International Development Association
IEC	International Electrotechnical Commission
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
INEP	Integrated National Electrification Programme (South Africa)
IRENA	International Renewable Energy Agency
ISR	Implementation Status and Results Report
ITAC	International Trade Administration Commission (South Africa)
JV	Joint Venture
KEREA	Kenya Renewable Energy Association
KPIs	key performance indicators
LCOA	levelized cost of access
LEAP	Lightrock Energy Access Platform
LEIA	Low Energy Inclusive Appliances
LMD	last-mile distributor
MDB	multilateral development bank
MFI	microfinance institution
MIGA	Multilateral Investment Guarantee Agency
MSME(s)	Micro, Small and Medium Enterprises
MTF	Multi-Tier Framework
NEFCO	Nordic Environment Finance Corporation
NEP	Nigeria Electrification Project
NRECA	National Rural Electric Cooperative Association
O&M	operation and maintenance
OECD	Organisation for Economic Co-operation and Development
OGS	off-grid solar
OOW	out-of-warranty

Acronyms

OPEX	operational costs
PAYG	pay-as-you-go
PIP	Poverty and Inequality Platform (World Bank)
PM KUSUM	Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (India solar-pump and farm-solar scheme)
PPM	PAYGo PERFORM Monitor
PPP	purchasing power parity
PUE	productive use of energy
PV	photovoltaic
QV	quality verified
RBF	results-based financing
RISE	Regulatory Indicators for Sustainable Energy
ROGEAP	Regional Off-Grid Electricity Access Project
SDG7	Sustainable Development Goal 7
SEforALL	Sustainable Energy for All
SHS	solar home system(s)
SNV	SNV Netherlands Development Organisation
STEM	science, technology, engineering and mathematics
SWPs	solar water pumps
TA	technical assistance
TEVET	Technical, Entrepreneurial and Vocational Education and Training
UECCC	Uganda Energy Credit Capitalization Company
UN	United Nations
UNITAR	United Nations Institute for Training and Research
UNOPS	United Nations Office for Project Services
UNREEEA	Uganda National Renewable Energy and Energy Efficiency Alliance
UNSD	United Nations Statistics Division
USAID	United States Agency for International Development
USD	United States dollar
VAT	value-added tax
WB, WBG	World Bank, World Bank Group
XOF	West African CFA franc (currency code)

Headline trends

1/4



Off-grid solar is reaching more people than ever.

149 million people were served by affiliate¹ off-grid solar products in 2025, up 26% from 2023, with 98 million reaching Tier 1+ energy access. Affiliate SHS sales grew rapidly over the 2-year period, while lanterns and cooling products declined, and solar water pumps plateaued. Growth has been achieved despite currency depreciation, inflation, climate shocks, and weak early-stage investment.



Off-grid solar is creating jobs and boosting incomes.

The affiliate sector employs an estimated 219,000 people, with companies reporting full-time employment up 29% and the agent base doubling since 2021. Affiliate off-grid solar products have generated an estimated USD 28 billion in additional income and savings for customers over the last 15 years. 7.4 million people use affiliate lanterns and SHS to support income generation, with solar generators becoming a key power source for businesses in Nigeria and South Africa. Beyond the affiliate market, agri-energy products are scaling rapidly in South Asia.



The industry is consolidating and diversifying, while continuing to prioritize commercial sustainability.

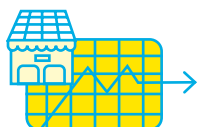
Strategic and distressed acquisitions, exits, pivots, and restructures – some of which were driven by an inability to raise follow-on capital – have reshaped the competitive landscape. Leading companies are expanding geographically while diversifying into new product categories and business models. Among reporting companies, PAYG portfolio quality is improving as companies tighten credit practices, with 90-day repayment rising from the low-80% range in 2021 to around 90% in early 2025, but profitability remains a challenge and companies' country operations are still typically loss-making.

1. The affiliate market refers to companies that participate in GOGLA's semi-annual sales reporting process. This includes GOGLA members, as well as companies selling products that meet VeraSol or International Electrotechnical Commission (IEC) quality standards, and participants in the Global LEAP Awards or LEIA program. Previous MTRs drew on the Multi-Tier Framework (MTF) survey dataset to estimate that around 70% of off-grid solar products were sold by non-affiliate companies, by comparing reported sales against the survey data. However, many MTF surveys now date back more than five years, which limits their suitability for estimating current market-wide sales. MTR 2026 therefore focuses on the affiliate market and does not include an estimate of non-affiliate sales.



Affordability remains the main constraint.

Around one-third of unelectrified households can afford an entry-level Tier 1 solar home system on PAYG, spending up to 5% of household consumption expenditure, while another third could afford it at a stretch, spending 5-10%. Affordability is likely to be lower in less mature markets, is highly sensitive to price, and is most constrained for displaced people, women and productive use customers buying higher cost technologies. Energy-as-a-service and rental models are emerging with the potential to help address affordability challenges.



Off-grid solar remains concentrated in a handful of core markets, and is not yet reaching nascent markets, displaced communities or social infrastructure at the scale needed.

In sub-Saharan Africa, 47% of SHS sales in 2025 were in Kenya, Nigeria and Zambia, while most markets in West and Central Africa remain nascent and are not growing. 37 million of the 117 million forcibly displaced people worldwide lack electricity, and humanitarian funding is declining. Nearly one billion people rely on unelectrified health facilities, and conventional procurement has failed to keep systems working long term. Annual public investment in electrification of social infrastructure needs to more than triple to close the gap, from around USD 120 million today to USD 400 million by 2028.



Corporate financing held stable at USD 315 million in 2025, but it is increasingly concentrated.

Three market leaders captured around 70% of corporate financing in the two years from 2024–25, shifting from equity to debt and the securitization of receivables. In 2026, a USD 50 million green bond backed by off-grid solar receivables became one of the first off-grid solar transactions to reach public capital markets. Debt to mid-sized and small companies fell from USD 175 million in 2022–23 to USD 79 million in 2024–25. Locally owned companies received just 3.1% of corporate financing in 2025.



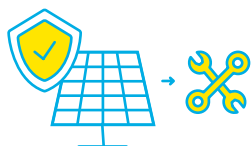
Public funding has held steady and RBF is scaling. While weaknesses in design have affected investor confidence, programs are improving as lessons are learned.

New World Bank Group commitments to off-grid solar reached USD 974 million in FY25–26, level with FY23–24, with RBF playing an increasingly important role. Well-designed RBFs have accelerated sales growth and delivered first-time access at scale in Malawi, Mozambique, Zambia and elsewhere. However where subsidies were set too high, funds were exhausted early, restrictive eligibility has excluded smaller companies, and disbursement lags have created liquidity crunches. Governments and funders are adjusting designs in response.



Scaling up the productive use of energy (PUE) has become a key priority for governments and development partners seeking to leverage energy access to achieve job creation and economic growth.

PUE's share of off-grid solar grants roughly doubled, from 35% in 2022–23 to 71% in 2024–25. Overall, PUE investment has remained broadly stable but is reaching more companies with smaller tickets, as the number of transactions rose from 79 to 118 over the same period. The PUE Design Guide accompanying this MTR provides practical guidance for governments and funders designing cross-sectoral, outcome-led PUE programs [add link].



Ensuring that access is sustained is also an emerging area of focus. Quality-verified products last far longer than assumed, and strengthening repair ecosystems could further extend product lifespans.

95% of PAYG customers surveyed reported that their Tier 1 SHS was still working four or more years after purchase, with companies extending warranties and governments increasing warranty length requirements. Only 36% of customers who experienced a technical issue felt it had been satisfactorily repaired or replaced, falling from 58% for products under warranty to 22% for those out of warranty. The main reasons were not knowing where to get a repair, the cost of out-of-warranty repair and distance to repair services. A new Off-Grid Solar Repair Lab has been set up to help address this.



Political recognition of off-grid solar continues to grow, and the challenge now is to convert it into stable, enabling policy environments and consistent delivery.

Mission 300's National Energy Compacts mark a step change in government recognition of off-grid solar, but early implementation of commitments is mixed. In 2023, 69% of sub-Saharan African and South Asian countries assessed had duty or tax exemptions for standalone systems, but Kenya, Pakistan and South Africa have since revisited theirs. PAYG is attracting dedicated regulatory attention, and stakeholders increasingly favor proportionate, PAYG-specific frameworks over applying regulation designed for banks.



Growth remains short of what is needed to achieve SDG 7, and accelerating progress will depend on how effectively public funding crowds in private capital.

As companies focus on improving portfolio quality, the immediate priority is for governments to scale up public funding, designing it to enhance commercial performance and attract private co-investment, while providing a stable policy and regulatory environment. Reaching all 398 million people for whom OGS is the least-cost solution requires around USD 11.4 billion between 2027 and 2030 - around USD 1.3 billion a year in grants and affordability subsidies, and USD 1.6 billion a year in equity and debt.



Public funding needs to sustain and deepen off-grid access.

In the medium term, this means longer warranties and enhanced repair, as well as upgrades to help people move to a higher level of service. Blended finance will be needed to unlock local-currency debt and equity for mid-sized and smaller companies. Scaling productive uses will require outcome-led program design that builds in collaboration across energy, agriculture, water and digital sectors. Public institutions should be electrified through performance-based energy service contracts that ensure sustainability. In the long term, new delivery models will be needed to reach the hardest-to-reach and forcibly displaced populations. Mission 300 has created strong momentum behind universal electricity access, and the choices that companies, governments, development partners and investors make now will determine whether off-grid solar fulfils its potential role in closing the gap to SDG 7.

CHAPTER 1

Global State of the Off-Grid Solar (OGS) Market



Key Messages



- ▶ **149 million people were being served by affiliate off-grid solar products in 2025, up 26% from the 118 million reached in 2023, despite macroeconomic and climate-linked headwinds.** Of these an estimated 98 million reached Tier 1+ access. This headline figure represents a conservative estimate, and new evidence suggests that product lifespan assumptions should be increased. 7.4 million people use affiliate solar lanterns and SHS to support income generation, and affiliate products have generated an estimated USD 28 billion in additional income and savings for customers over the last 15 years.

- ▶ **The affiliate market grew steadily from 10.7 million products sold in 2023 to 12 million in 2025: a 12% increase.** Approximately half of all SHS sales in sub-Saharan Africa took place in Kenya, Nigeria and Zambia. In 2025, sales of small solar home systems (SHS) grew by 40% and large SHS by 50%, while lanterns and cooling products declined, and solar water pumps plateaued. Several of the fastest-growing markets have large RBF programs.

- ▶ **Non-affiliate component-based, mix-and-match systems continue to be popular, particularly in South Asia.** Solar generators, irrigation and other agri-energy products are gaining traction, with distributed solar meeting almost all of Pakistan's recent demand growth and India's PM KUSUM program doubling standalone solar pump installations.

- ▶ **2024–25 saw continued industry consolidation, with company failures and pivots occurring alongside diversification and innovation.** Distressed and strategic acquisitions reshaped the competitive landscape, with several distressed sales driven by a lack of follow-on capital, while insolvencies removed some established players. Companies continued to expand into new product lines to spread risk, and business models such as battery rental and energy-as-a-service continued to grow.

- ▶ **PAYG portfolio quality is improving as companies tighten credit practices, but profitability remains fragile and uneven.** PAYG continued to gain as a share of affiliate sales, rising from 39% in 2023 to 48% in 2025, even as the industry worked through a legacy of over-financing and liquidity constraints. Among reporting companies, 90-day repayment rose from the low-80% range in 2021 to around 90% in early 2025, and median loan tenors shortened from around 19 to 14 months. Profitability has recovered from its 2022 low but remains volatile, and the median country firm is still loss-making. Performance varies considerably between companies and countries.

- ▶ **The affiliate OGS sector employs an estimated 219,000 people.** Among companies reporting regularly since 2021, full-time employment rose 29% and the agent base doubled, with sales agents now making up around three quarters of the workforce. Local assembly is adding jobs in more mature markets, but distribution and after-sales will remain the sector's main source of employment. Women are underrepresented in technical and leadership roles in large companies but well represented among small local distributors, where they hold 56% of management roles.

- ▶ **Energy access for forcibly displaced persons (FDPs) remains severely limited, with 37 million of the 117 million FDPs worldwide lacking electricity.** Humanitarian funding has declined since 2024, and agencies are shifting from purchasing and distributing products toward supporting market-based approaches delivered by governments, utilities, and private companies. Programs such as Uganda's Humenergi facility and Mozambique's BRILHO program have shown success, yet these remain isolated examples.

- ▶ **Progress in electrifying social infrastructure such as schools and health centers remains far below what is needed, with nearly one billion people still reliant on unelectrified health facilities.** The closure of USAID disrupted ongoing healthcare electrification programs, and conventional procurement has repeatedly failed to keep systems working beyond three to five years. The World Bank's Public-Private Partnership for People's Prosperity (5P) framework is beginning to shift delivery toward long-term, performance-based energy service contracts, and Mission 300 Compacts are bringing health facility electrification into national planning, increasingly financed through IDA. Even so, an estimated 286,000 healthcare facilities are expected to remain poorly electrified in 2030.

1.1 People and Businesses Reached with Affiliate OGS



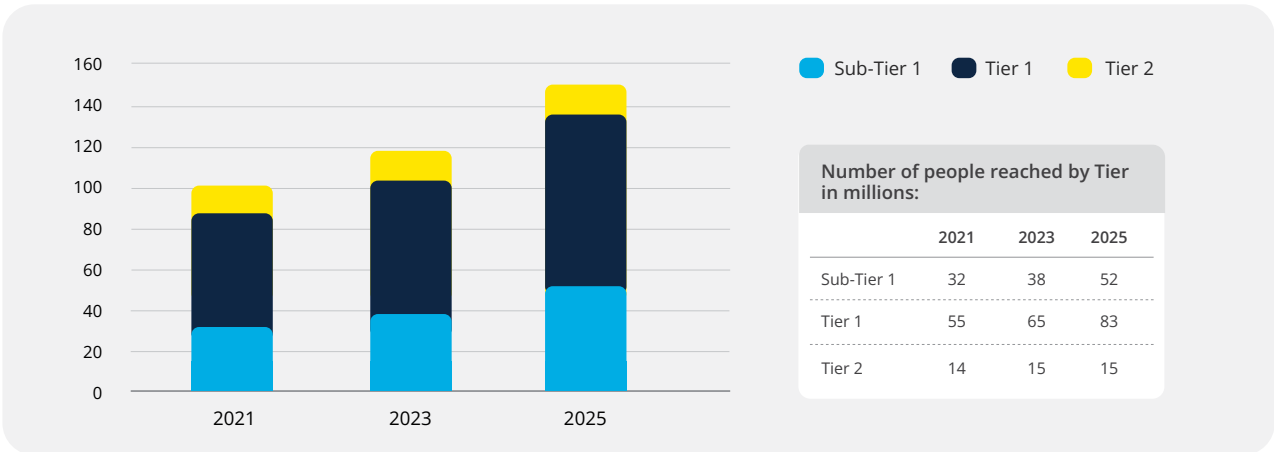
Key Concept: ‘Affiliate’ vs. ‘Non-Affiliate’ OGS companies

- **The affiliate market refers to companies that participate in GOGLA’s semi-annual sales reporting process** — this includes GOGLA members, as well as companies selling products that meet VeraSol or International Electrotechnical Commission (IEC) quality standards, and participants in the Global LEAP Awards or LEIA program.
- **The non-affiliate market covers companies that do not report their sales to GOGLA.** The quality and durability of these products are generally assumed to be lower than that of affiliates.

149 million people were actively served by affiliate standalone off-grid solar solutions in 2025, an increase of 31 million people, or 26%, since 2023 (Figure 1). Of these, an estimated 15 million people had Tier 2 energy access, and 83 million had Tier 1, while 52 million

benefited from sub-Tier 1 access through the use of solar lanterns. The market continued to see robust, ongoing demand for off-grid solar solutions, despite macroeconomic headwinds, high inflation, and climate-linked natural disasters.

Figure 1: Number of people provided with improved energy access, through use of off-grid solar products sold by affiliate companies (in millions)



Source: GOGLA analysis 2026

The true number of people served by affiliate products is likely to be higher: a growing body of evidence shows affiliate OGS products typically last 5+ years (see Chapter 4, Sustaining Access through OGS). The access estimates presented in this report rely on the current GOGLA Impact Metrics, which conservatively set access duration at 1.5 times the product warranty period

(usually 1-2 years for a solar lantern and 2-3 years for an SHS).² Even a moderate extension of the durability estimate to 3 years for lanterns and 5 years for solar home systems, would raise the number of people actively served by affiliate products in 2025 to almost 170 million.³ GOGLA is currently undertaking a consultative process to revise the Impact Metrics.

2. Source: GOGLA analysis, 2026
3. Estimated using GOGLA sales data (2021-2025) and the GOGLA standardized impact metrics.

According to the SDG7 Tracking Progress Report 2026, an estimated 449 million people were served by off-grid solar providing a Tier 1+ level of service in 2024.⁴ This figure includes both affiliate and non-affiliate products, while excluding those with sub-Tier 1 access. Previous MTRs and the SDG Tracking Reports assumed that ~70% of OGS products were sold by non-affiliates, based on comparing GOGLA affiliate sales data with multi-tier framework (MTF) survey data, which gave a sense of the share of the population that owned any off-grid solar product. However, many MTF surveys were undertaken more than five years ago, and the dataset is no longer considered a sufficiently reliable source for this assumption. MTR 2026 therefore focuses on the affiliate market.

7.4 million people are using affiliate solar lanterns and SHS to power micro-enterprises and/or support income generation - extending the working day, enabling businesses to operate low-energy appliances, and enhancing connectivity.⁵ At least 30% of people use the savings made from switching to off-grid solar, to

invest in businesses and farming.⁶ USD 10.95 billion in additional income has been generated by customers since 2010 through the use of affiliate OGS products. Coupled with savings, the total financial benefit to households is estimated at USD 28 billion over the last 15 years.⁷

Solar generators are becoming a key power source for Micro, Small and Medium Enterprises (MSME) in countries with unreliable grid electricity. 83,000 affiliate solar generators were sold in 2024/5: a recent study found that 60% of these products are likely used by businesses.⁸ Nigeria and South Africa are the primary solar generator markets in Africa, due to unreliable grid access, extensive fossil fuel generator usage which can be displaced, and rising energy prices. The solar generator market is also emerging in other African and Asian markets such as Zimbabwe and Pakistan. This growth is matched by a rapid increase in Commercial and Industrial (C&I) solar across Africa and Asia, which is proving cheaper than diesel generation and more reliable than the grid.^{9,10} (see Section below *Product Diversification*).



Key Concept: OGS Product Categorization

Solar lanterns are portable, small-scale lighting devices powered by solar panels, primarily used for single-point illumination and often phone charging. They provide sub-Tier 1 access for a household, although lanterns with phone charging (1.5–3 Wp) can provide full Tier 1 access for an individual.¹¹

Solar Home Systems (SHS) are often sold as 'plug-and-play kits' which come packaged as full systems that may include efficient appliances, especially within the affiliate market. These include:

- **Small SHS (capacity rating: 3 to 49.99 Wp):** Tier 1+ products typically designed to provide electricity for multiple lights, phone charging, and small appliances such as radios and fans. Small SHS sold with highly efficient televisions can also now sometimes constitute a Tier 2 product due to the energy service level they provide.
- **Large SHS (capacity rating: 50 Wp and above):** Tier 2+ products with the capacity to power larger devices such as TVs or refrigerators.

4. Source: IEA, IRENA, UNSD, World Bank and WHO, [Tracking SDG 7: The Energy Progress Report 2026, 2026](#)

5. Source: GOGLA, [Global Off-Grid Solar Market Report – Annual Sales and Impact Data, 2026](#)

6. Source: 60 Decibels analysis, 2026

7. Source: GOGLA, [Global Off-Grid Solar Market Report – Annual Sales and Impact Data, 2026](#)

8. Source: 60 Decibels, ZE-Gen, and GOGLA analysis, 2026

9. Africa Solar Outlook 2026. AFSIA. 2026. [Africa Solar Outlook 2026 Launched: New Data Positions Africa as the World's Fastest-Growing Solar Market – AFSIA](#)

10. Ember. 2026. [Africa is on track for a record year of solar installations in 2026, up 45% year-on-year, driven largely by distributed solar | Ember](#)

Households choose systems not only based on price and quality, but also based on the appliances they can afford to run with them. Capacity sets the ceiling regarding which appliances a household can use. The desire to run appliances such as a TV often drives the decision to buy a larger system.

Component based systems are built from separate panels, batteries and other components, and are often large SHS (100Wp+). They are more common in the non-affiliate market.

Solar Generators typically consist of panels ranging from 200 Wp to 3.5 kWp, inverters from 0.3 to 8 kW, and batteries up to 10 kWh.¹² These systems serve both off-grid and weak-grid users, operating independently of the grid or in conjunction with it via an integrated architecture to take advantage of the dual power source.

Productive Use of Electricity (PUE) OGS equipment encompasses solar-powered devices that are specifically designed to drive income-generating activities and boost productivity. These include products such as solar irrigation, cold storage and milling machines, and appliances used in commercial settings such as refrigerators, power tools, and ICT equipment.¹³

1.2 The Non-Affiliate Market

Most non-affiliate solar lanterns are not quality verified and are predominantly sold for cash through informal retail channels. The non-affiliate OGS market varies dramatically by country and product category, but as hard data is not available, characterization is necessarily qualitative. Non-affiliate products are typically sold for cash, although larger non-affiliate systems may be bought with third-party consumer financing from MFIs or other sources. In established OGS markets non-affiliate products typically have a lower purchase price, targeting more price-sensitive buyers. In less established markets, where the supply of affiliate products is limited, the cost may be high. Many non-affiliate solar lanterns lack durability, which can limit benefits for consumers, cause market spoilage, and erode consumer trust in solar technology.

For SHS, the non-affiliate market is dominated by component-based mix-and-match configurations. In South Asia and parts of East Africa, a large share of SHS

demand is met by component-based systems, assembled from individually purchased solar panels, batteries, controllers, and lights. Studies estimate that mix-and-match systems account for 50–80% of the Ugandan SHS market, with local solar vendors playing a central role in system assembly, sales, and after-sales support.

In some Asian countries, non-affiliate component-based SHS have been supported by funded electrification programs. For example, large government and donor-supported programs in Bangladesh and Myanmar distributed millions of component-based systems; and open-market channels continue to supply households with individually assembled systems. In Myanmar, field observations found that many off-grid households operated multiple solar panels and several batteries within a single system, suggesting that generation and storage capacity may be expanded over time.¹⁶

11. Lighting Global/ESMAP, GOGLA, Efficiency for Access and Open Capital Advisors, *Off-Grid Solar Market Trends Report 2022: State of the Sector, 2022*, Figure 22.

12. Source: [GOGLA-Solar-Generator_July_2026_Final.pdf](#)

13. Source: GOGLA, [Powering Lives and Livelihoods: Scaling Productive Uses of Renewable Energy \(PUE\), 2023](#).

14. Source: Verasol, [Quality Assurance for Modern Off-Grid Solar Solutions, 2026](#).

15. Source: Energy for Sustainable Development, [From fake solar to full service: An Empirical Analysis of the Solar Home Systems Market in Uganda, 2020](#).

16. Source: Institute for Applied Ecology, Report on the Fact Finding Mission on the Management and Recycling of End-of-life Batteries used in Solar Home Systems in Myanmar, 2018

In several Asian markets non-affiliate off-grid solar agri-energy products and solar generators are gaining traction, with notable growth in Pakistan. Between 2023 and 2025, Pakistan’s total electricity demand rose by 21%, and was met almost entirely by distributed solar generation. Accelerated uptake of solar ‘tubewell’ irrigation systems took total agricultural solar deployment in 2025 to 8.1 GW.¹⁷ In India, under the PM KUSUM scheme,

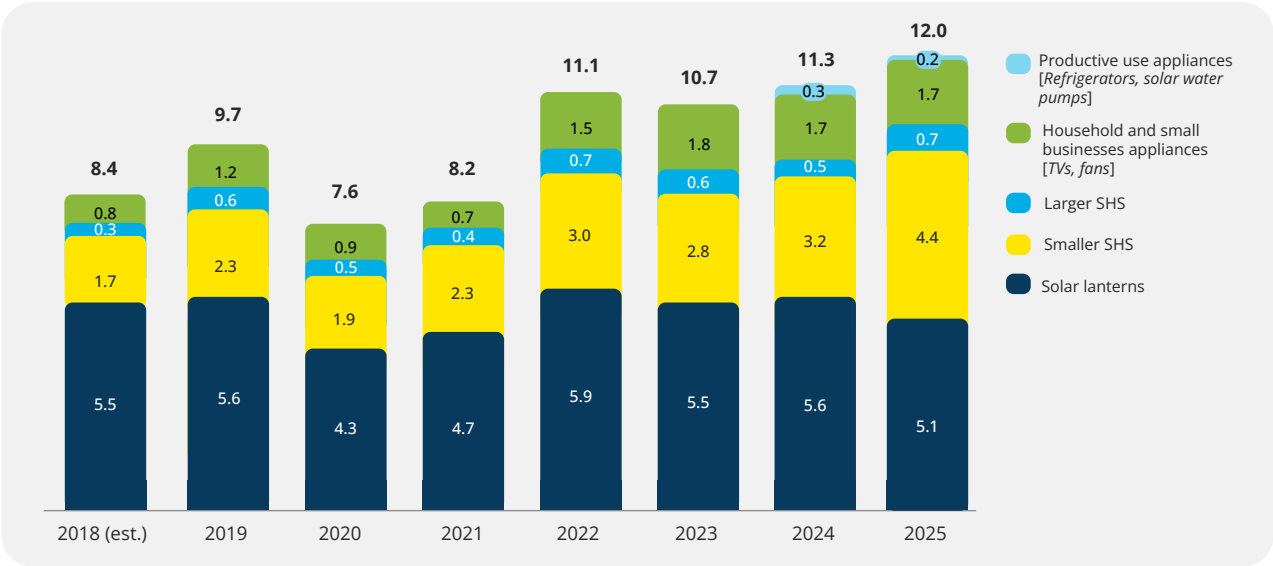
cumulative installation of standalone solar pumps doubled from 2024 to 2026,¹⁸ rising from 540,499 pumps in October 2024 to 1,168,667 in September 2026. A wide range of off-grid solar agriculture and livelihood products are now in use across the country with a recent report from SELCO capturing over 175 solar products supporting income generation, including a wide range of solar mills, dryers and processing machines.¹⁹

1.3 Overview of the OGS Affiliate Market

The affiliate market for OGS products has grown steadily over the past two years, with volumes growing from 10.7 million in 2023 to 12 million in 2025: an increase of around 12%. Between 2024 and 2025, small SHS sales grew by 40.1% and large SHS sales by

50.1%. Sales of solar lanterns and recorded productive use of energy (PUE) equipment declined, while household appliance sales remained broadly stable. Longer term, combined SHS sales have grown at an average annual rate of around 17% since the 2020 pandemic-era trough.

Figure 2: Global annual number of affiliate off-grid solar products sold, 2018–2025 (millions of units)



Source: Dalberg analysis 2026, based on GOGLA sales data

Affiliate solar lantern sales declined from 5.5 million in 2023 to 5.1 million units in 2025, with performance varying by region. The decline occurred in markets outside of sub-Saharan Africa due to a combination of factors, including a drop in global humanitarian procurement; continued falling demand in South Asia

linked to growing grid connection (-57% lantern sales since 2023); the rise in battery-powered back-up systems; and, likely, a growing non-affiliate lantern market share. Lantern sales in sub-Saharan Africa, by contrast, rose from 4.1 million in 2023 to 4.7 million in 2024, before falling by 3% to 4.5 million in 2025.

17. Source: Ember & Renewables First, [The Solarisation of Pakistan's Energy Economy, 2026](#)
18. Source: [National Portal for PM-KUSUM](#)
19. Source: Selco Foundation, [175 Sustainable Energy Driven Livelihood Applications, 2023](#)

Within the affiliate domestic appliance market (fans, radios, TVs), sales remained stable 2024–25 while PUE equipment sales declined. Solar-powered radio sales which are commonly bundled with SHS or built into solar lanterns, remained strong across 2024–25. TVs, which are also often bundled with larger SHS and are an aspirational product for many households, grew 2%. Some affiliates continued to expand mobile phone sales, including d.light and Sun King. Sales of solar irrigation systems in Africa have plateaued due to limited expansion into new markets where awareness of solar water pumping is low, and where related market linkages and appropriate financing methods are yet to be developed. Solar-powered fridge and freezer sales declined 13% over the period, with leading player SureChill going into administration. However, innovation continues in the solar cooling space: in late 2025 Sun King began trialing the PowerFreeze fridge-freezer in Nigeria, targeting households, businesses, and public institutions.

While there is no universally accepted definition of "PUE equipment", the MTR's companion PUE Design Guide defines PUE as commercial use of energy that enhances productivity and leads to job creation, increased incomes, cost savings and economic growth.

It proposes a common vocabulary for PUE program design whilst encouraging designers to adapt their language to cross-sectoral audiences. PUE market data is very limited - GOGLA's dataset covers equipment sold by its affiliates, but the broader market includes a wide range of equipment and components sold through general and agricultural retail channels, for use in grid and mini-grid as well as off-grid settings. The Design Guide recommends that governments, the World Bank and other development partners work to align around a shared set of indicators that could be used to track PUE equipment, outcomes and investments to help close these data gaps.²⁰



PUE Sector Growth Remains Elusive, Despite its Huge Impact Potential

Four structural barriers continue to limit uptake of PUE in countries with large unelectrified rural populations:²¹

- **Fragmented value chains.** Many PUE equipment providers operate in fragmented and underdeveloped value chains where scaling requires more than selling a product. In addition to building importation, distribution, and maintenance capacities, providers may need to support end-users.
- **End-user support needs.** Providers often need to give extensive support to end-users or PUE asset owners and operators to help them convert asset acquisition into the increased incomes needed to repay PUE consumer finance or service fees. These requirements are particularly demanding in infrastructure-heavy segments such as cold storage and agro-processing, where longer development cycles and higher capital needs can place a significant burden on lean early-stage companies.
- **Policy gaps.** In many countries, tax exemptions do not extend to PUE technologies, compounding the cost challenge.
- **Poorly sequenced financing and support landscape.** Companies often receive fragmented grants and technical assistance without a coherent pipeline linking support to their stage of development, leaving promising businesses unable to bridge the gap from pilot to commercial scale.

Two key initiatives have emerged since 2024 that seek to encourage holistic approaches, and catalyze economic and agricultural activity through clean energy: the [Agri-Energy Coalition](#), a global alliance of partners working on energy, water, agriculture, nutrition, climate and finance; and the [PUE Center of Excellence](#), announced in April 2026 by the World Bank and the Global Energy Alliance for People and Planet. For more information on how these challenges can be addressed, see this MTR's companion PUE *Design Guide* publication.

20. Source: ESMAP/World Bank, Productive Use of Energy: A Program Design Guide, 2026 (forthcoming)

21. Source: ESMAP/World Bank, Productive Use of Energy: A Program Design Guide, 2026 (forthcoming)

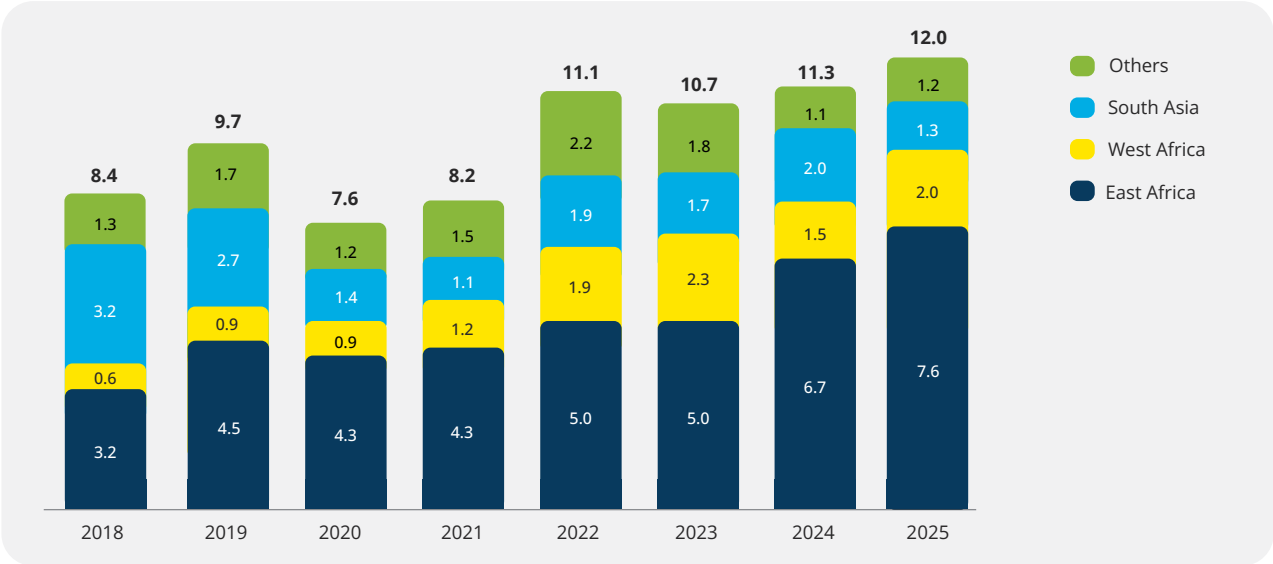
Affiliate product volumes remain highly concentrated in a handful of core markets and growth is unevenly distributed, with RBF playing an increasingly important role in driving growth. In sub-Saharan Africa, 47% of total SHS sales volumes in 2025 were recorded in the top 3 markets - Kenya, Nigeria, and Zambia. In several countries, including Malawi, Nigeria, and Zambia, growth has been linked to results-based financing (RBF) programs and other public interventions. Governments increasingly support the OGS sector, attracted by its ability to rapidly deliver on energy access goals (see [Chapter 5, Policy and Planning](#)),

with RBF enabling companies to expand into new geographies, and unlocking rural and underserved market segments previously considered unviable.²²

Public funding is more actively shaping market structure. The scale-up in RBF since 2024 has influenced which products companies sell, where they operate, and the competitive landscape, since some companies have proven more able to capitalize on RBF opportunities – and manage the risks and costs involved – than others (see [Chapter 3, Access to Finance](#)).

AFFILIATE OGS MARKET – REGIONAL BREAKDOWN

Figure 3: Global annual number of affiliate off-grid solar products sold by region, 2018–2025 (millions of units)



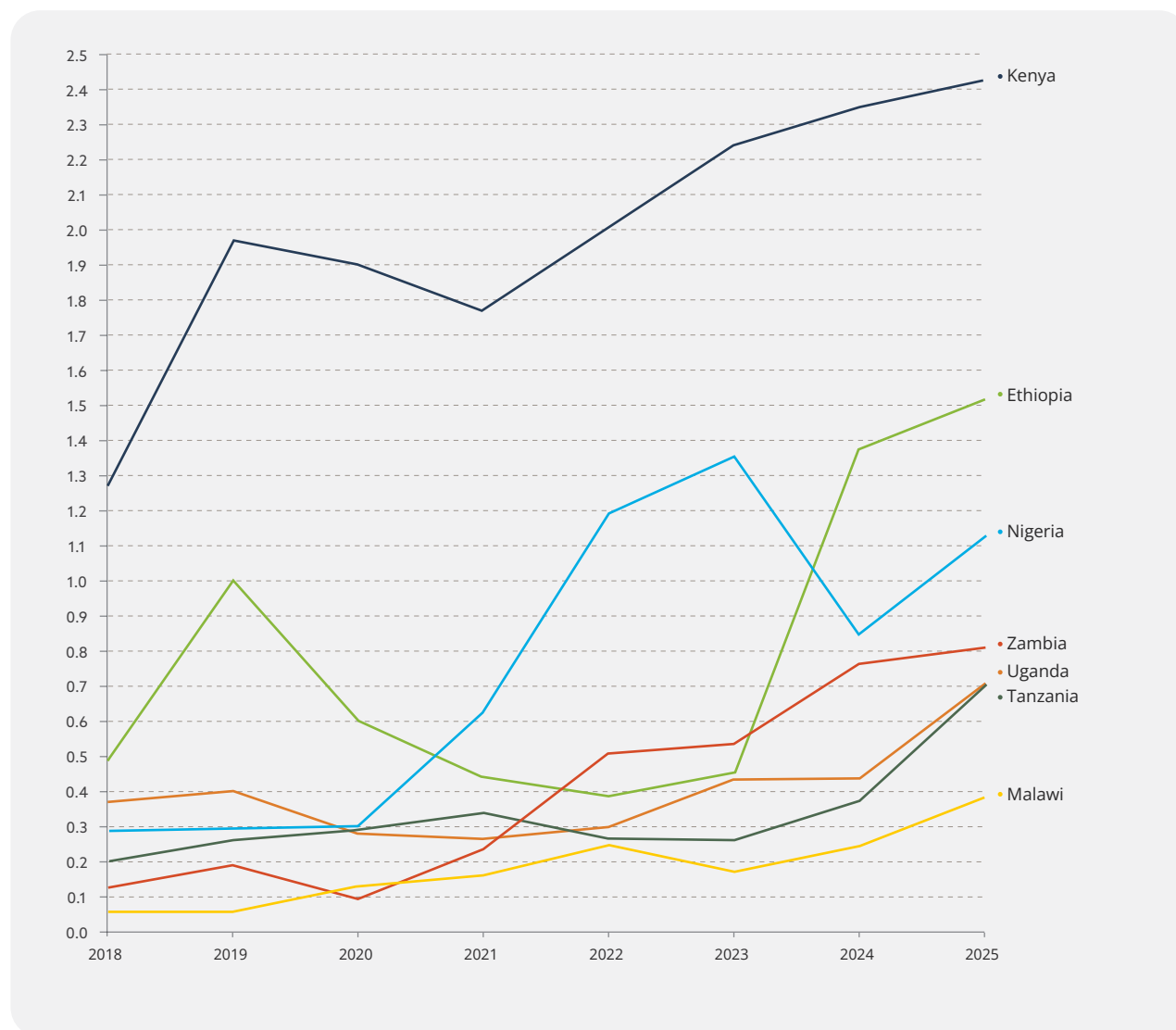
Source: Dalberg analysis 2026, based on GOGLA sales data
Note: Others include Central Africa, Southern Africa, East Asia and Pacific, Latin America and Caribbean, Europe & Central Asia, Middle East and North Africa and North America and all other countries not covered in the graph or list above

As in previous years, East and Southern Africa represented the largest share of global affiliate sales, accounting for approximately 60% of total sales volumes, with sales increasing by 51% from 2023 to 2025 (Figure 3). In this period, significant growth was seen in Ethiopia (+290%), Kenya (+61%), Tanzania (+85%), Uganda (+158%), and Zambia (+225%).²³

The top 7 markets for affiliate OGS products in 2025 consist of six East and Southern African nations, plus Nigeria (Figure 4). This concentration reflects East Africa's early donor investment, established distribution networks, and relatively mature, stable regulatory environments.

Kenya remains the clear leader throughout the period, with consistent growth across OGS technologies over 4 years (compound annual growth rate of 8.2%), from just over 1.7 million units in 2021 to 2.4 million in 2025. Sales trends in Nigeria are linked to availability of RBF for solar home systems and improvements in the macroeconomic environment: Nigeria accounts for 13% of total affiliate sales volumes in 2025. Ethiopia stands out for its sharp rise from 2023 onward, driven in large part by bulk procurement of solar lanterns and public programs. The remaining markets, Malawi, Tanzania, Uganda, and Zambia, started from a much lower base, but showed consistent growth over the period, also bolstered by public funding programs.

22. Source: Dalberg analysis, 2026
23. Note: Classified as East Africa under the GOGLA data

Figure 4: Annual number of affiliate off-grid products sold in the top 7 markets, 2018-2025 (millions of units)

Source: Dalberg analysis 2026, based on GOGLA sales data

In smaller or more nascent markets, sales growth is subdued outside East Africa. Central Africa has shown no sign of growth, including in the largest affiliate markets of Cameroon and the Democratic Republic of the Congo (DRC). West Africa offers a few bright spots: Togo continues to grow, and Niger has recorded a pick-up in sales for the first time. However, beyond these, most

markets in the region are stalling or seeing sales decline. The new Regional Distributed Access through Renewable Energy Scale-up (DARES) program, which covers 20 West and Central African countries is expected to accelerate progress in the region.

1.4 OGS Market Dynamics

In recent years there has been a contraction in the number of companies in the sector, with the market leaders and high-growth companies becoming more resilient through expanded geographic presence, growing product portfolios and diversified financing streams. In 2025 Ignite Energy Access joined Sun King and d.light as a market leader.²⁴ Ignite Energy Access's rapid expansion into twelve markets was achieved through consolidation. A second wave of companies,

including BioLite-Izili, Solar Panda, and Yellow, have experienced significant growth in the past two years, through consolidation and geographic expansion. Many single-market companies continue to grow incrementally or operate profitably within their niche but are unlikely to reach the scale of the current market leaders. The bankruptcies, exits, restructurings, and transitions witnessed at all company sizes are the marks of a maturing industry.

1.4.1 CONSOLIDATION IN THE OGS INDUSTRY

2024-25 saw a continuation of the industry consolidation trend observed in the 2024 MTR, with notable company failures and pivots. Consolidation in the off-grid solar sector has taken four forms, with different consequences for market capacity:

1. **Portfolio acquisition** transfers a struggling operator's customers and systems to a company able to service the existing portfolio (e.g., Solar Panda's acquisition of Azuri receivables in 2022).
2. **Distressed acquisition** transfers a struggling operator's assets, receivables, and team to a stronger buyer, to prevent them filing for insolvency (e.g., Bboxx's acquisition of PEG Africa in 2022).
3. **Strategic acquisition**, in which a well-capitalized player buys into a new geography, adding capital and capability to a market (e.g., Sun King's acquisition of Soleva Energy in Togo).²⁵
4. **Vertical acquisition**, in which a manufacturer acquires a distributor or vice versa (e.g., BioLite's acquisition of a majority stake in Baobab+, which was later rebranded Izili).

Distressed acquisitions continued in 2024-25. Acquisitions are an ordinary feature of any maturing market, but the pattern in the OGS sector in 2024-25 has a distinct driver: a lack of follow-on capital. Several of the acquired operators, including Mwezi, Oolu, and Pawame (all acquired by Ignite Energy Access), are understood to have been unable to secure follow-on capital, making sale the most viable path to continuity for their customer base.

Strategic and vertical acquisitions allowed several key players to expand their reach. Solar Panda's acquisition of VITALITE Zambia in June 2025, for example, gave the company its first foothold in Zambia.²⁶ BioLite's acquisition of Baobab+ extended the manufacturer into last-mile distribution.²⁷ EDF's acquisition of a majority stake in upOwa strengthened its position in Cameroon's decentralized-energy market, building on an existing partnership and broader presence in the country.²⁸ Ignite Power's acquisition of ENGIE Energy Access, and subsequent rebranding to Ignite Energy Access in 2025, allowed the company to establish operations and customer networks in nine additional African countries.²⁹ SunCulture took a minority stake in iPOS to gain access to its agro-dealer and farmer data and distribution network.³⁰

24. Note: The term 'market leader' may be equated to GOGILA's classification of 'scale-up' companies (i.e. those that have raised more than USD 100 million)
Source: GOGILA, [The Sector is Maturing, Capital in Concentrating](#), 2025

25. [CIZO: Sun King Group buys Soleva - Togo First](#)

26. Source: Solar Panda, [Solar Panda acquires VITALITE Zambia Limited, marking further expansion in Africa](#), 2025

27. Source: Izili, Baobab+ becomes Izili, Strengthening Last-Mile Distribution of Energy and Digital Solutions, 2025.

28. Source: EDF, [Décryptages](#)

29. Source: Ignite Energy Access, [Our Acquisition History — How Ignite Built Africa's Largest DRE Platform](#), 2026

30. Source: SunCulture, [LinkedIn post on December 2025](#), 2025 https://lnkd.in/p/evxWAI_3

Insolvencies removed two key players from the affiliate market with another undergoing a significant restructure. Bboxx, once among the sector's most heavily capitalized operators, entered administration, with liabilities substantially exceeding anticipated asset recoveries.³¹ Their African operations continue under a new structure.³² SolarNow entered voluntary liquidation in Kenya in May 2025, and SureChill Africa entered administration in early 2025 despite having secured strategic investment months earlier - reflecting ongoing challenges in translating innovative and well-funded technology into a commercially sustainable business.

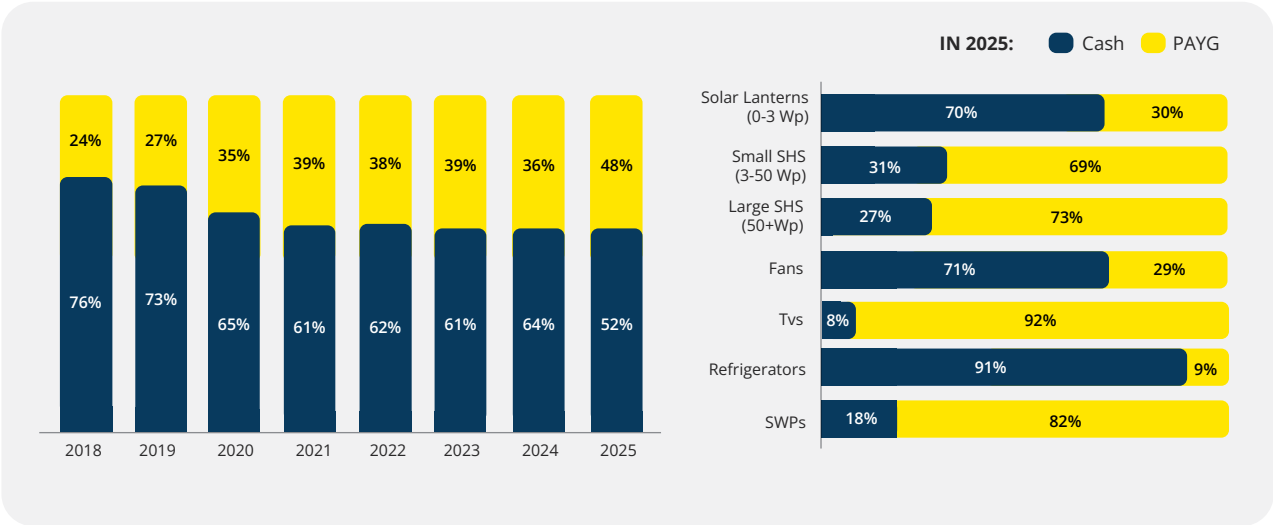
It is still too early to determine whether consolidation will translate into higher average profitability across the sector. Industry experts expect the surviving company base to be financially stronger on average; weaker operators have exited or been acquired, newer players have entered with tighter cost control and greater commercial discipline, and larger operators can benefit from scale. Early evidence points in this direction, but profitability remains uneven, and the available financial data is too limited to draw a definitive conclusion.

1.4.2 PAYG PERFORMANCE AND PROFITABILITY TRENDS

The share of OGS affiliate sales made through PAYG rose from 39% in 2023 to 48% in 2025, driven by growth in PAYG sales of RBF-eligible small SHS (3–50Wp), and PAYG solar lanterns, alongside a decline in bulk cash procurement of lanterns (**Figure 5**). PAYG accounted for

more than two thirds of small and large SHS, and over 90% of TV sales, in 2025. While a high proportion of fans and refrigerators were sold for cash, it is likely many of these products were bought with third-party financing from MFIs or other sources.

Figure 5: Proportion of affiliate off-grid solar products sold through PAYG and cash, 2018–2025, and by product type in 2025 (%)



Source: Dalberg analysis 2026, based on GOGLA sales data

31. Source: UK Companies House, [Bboxx Administrator's progress report](#), 2026
32. Source: Bboxx, [Bboxx lays new foundations for future growth](#), 2025

Companies are applying more commercially disciplined credit practices as they work through a legacy of over-financing while managing ongoing liquidity constraints. In the sector's early years, OGS companies moved into offering credit to fill a financing gap. This helped address affordability, enabled customers to access a higher level of service, and expanded the addressable market. However, a lack of credit management experience, drive to gain market position, and pressure to meet investor expectations led companies to prioritize sales growth over sound credit risk management.³³ Over-financing weakened portfolio quality and strained liquidity, with challenges exacerbated by economic downturns, currency depreciation, and climate-linked natural disasters.³⁴ Poor credit quality has negatively affected profitability and investor appetite, creating a vicious cycle where companies have found it harder to raise the funds needed to work through portfolio quality challenges, and leading to mergers, acquisitions, and exits (see section 1.4.1 on Consolidation in the OGS Industry).

There are signs of improvement in repayment rates.

For companies that report to the PAYGo PERFORM Monitor, 90-day³⁵ repayment has improved from the low-80% range in 2021 to around 90% in early 2025.³⁶ Repayment measured further into the contract has also climbed steadily: at 0.3x contract term, rates for new cohorts rose from 26% (2022) to 32% (2025), and at 1.5x term, from 72% (2022) to 77% (2024).³⁷ Customer ownership at 2x term followed a similar arc, rising from 49% (2023) to 62% (2024), before easing back to 57% (2025).³⁸ This reflects stronger internal analytics, tighter

credit discipline, and increased investor scrutiny, linked to receivables financing. Correlation analysis confirms 90-day repayment is a moderate predictor of 2x-term outcomes: customers that delay on payments in the first 90 days are unlikely to complete payments within the contract term. The two measures move together, but 90-day performance explains just part of later repayment and ownership results. Performance also varies considerably by market, with average collection rates at country-level ranging from above 80% to below 60% in 2024.³⁹

Consumer finance terms have the greatest impact on portfolio quality: shorter contract terms, smaller financed amounts, higher deposits, and meaningful credit checks are associated with stronger repayment.⁴⁰ The median loan tenor has shortened, from around 19 months in 2022–23 to 14 months in 2025, reflecting growing recognition that longer tenors compound FX exposure and reduce repayment performance.⁴¹ The PAYG industry is evolving toward a model of stronger consumer protection and credit risk management ("PAYGo 2.0"), with changes to strategy and operations such as enhanced consumer onboarding and engagement. Results from a group of 12 companies in 2024–25 showed that ten of the twelve improved 90-day repayment by 6.75% on average while continuing to grow sales volumes, applying this approach.⁴² However, better performance among new cohorts does not repair weaker legacy portfolios: some companies remain constrained by existing receivables and debt obligations even as new-sale economics improve.⁴³

33. Source: [PAYGo Lab, PAYGo 2.0 Pioneers](#), 2025

34. Source: Murphy, [Ending the Vicious Circle in PAYGo Solar: How Companies and Investors can Move the Sector Toward 'PAYGo 2.0'](#), 2025

35. Note: The PAYGo PERFORM Monitor is a standardized digital benchmarking and data visualization platform that tracks key performance metrics for the off-grid solar industry, with each company reporting on a country-by-country basis. Each company's operations in a given country are recorded as a separate "country firm", and results are not weighted by portfolio size. Data collected through the PPM covers a sub-set of companies in the sector, so it does not capture the industry as a whole, but it offers a useful picture of broader trends.

36. Source: MFR/GOGLA, PAYGo PERFORM Monitor, 2025 data

37. Source: MFR/GOGLA, PAYGo PERFORM Monitor, 2025 data. Note: A cohort is a group of PAYG contracts that started in the same period, which are then tracked together over time. Contract term completion is measured against the contractual term rather than calendar time, so 0.3x marks roughly four months into a 12-month contract.

38. Source: MFR/GOGLA, PAYGo PERFORM Monitor, 2025 data. Note: the number of country firms reporting on this indicator fell over the period (17 in 2023 to 13 in 2025), so part of the 2025 dip may reflect which country firms are reporting rather than a uniform reversal.

39. Source: MFR/GOGLA, PAYGo PERFORM Monitor, 2024 data. Note: collection rate is portfolio-level data and draws on a different reporting sample from the cohort-level repayment indicators cited above.

40. Source: Dalberg Analysis, 2026.

41. Source: MFR/GOGLA, PAYGo PERFORM Monitor, 2025 data; Stakeholder Consultations. Note: median contract tenor is shorter than actual repayment periods, as companies typically plan for repayment over approximately 1.5x the contract period.

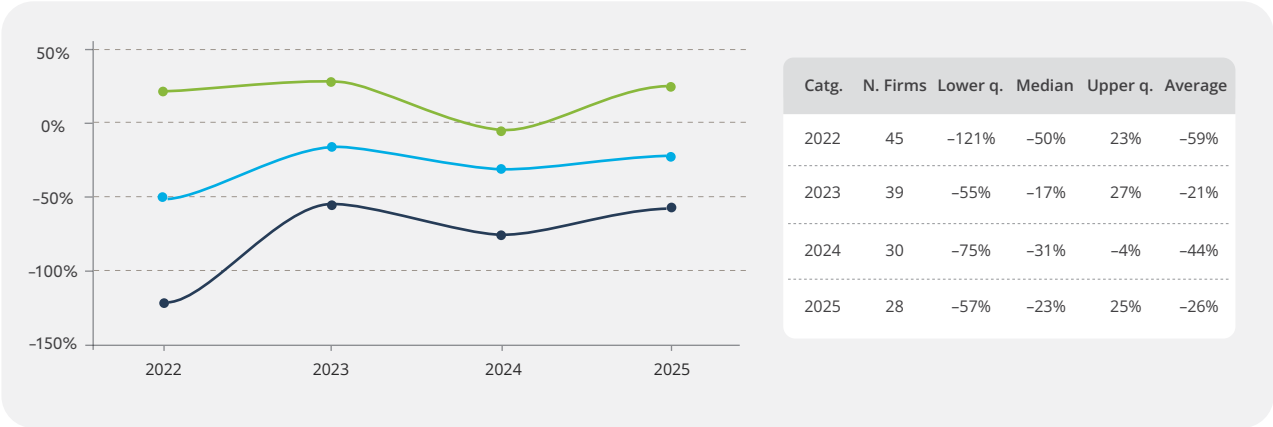
42. Source: PAYGo Lab, PAYGo 2.0 Pioneers, 2025.

43. Source: Murphy, [Ending the Vicious Circle in PAYGo Solar: How Companies and Investors can Move the Sector Toward 'PAYGo 2.0'](#), 2025.

Profitability has recovered from its 2022 low but remains volatile, and while some country firms have robust positive results, the median country firm continues to be loss-making. Median Earnings Before Tax (EBT) margin (cashflow) improved from -50% in 2022 to -17% in 2023, fell back to -31% in 2024, and partially recovered to -23% in 2025 (Figure 6). At one end, a group of country operations combines healthy profitability, sound liquidity, and a solid debt-to-equity position, and this group has remained stable or improved further, with the top-performing quartile now posting a median EBT

margin of 25%. At the other end, a group of operations shows signs of real financial distress, with the lowest-performing quartile firmly in negative EBT margin territory, with tightening liquidity. The gap between the best and worst performers has narrowed considerably, driven mainly by improvement in the lower quartile from -121% to -57%. While the number of country firms reporting fell from 45 to 28 over the period, most of the improvement in the lowest quartile reflects better performance in continuously reporting country-firms.

Figure 6: EBT margin (cashflow) by quartile, 2022–2025 (%)



Source: MFR/GOGLA, PAYGo PERFORM Monitor, 2025 data
Note: The number of country firms reporting was 45 in 2022, 39 in 2023, 30 in 2024 and 28 in 2025.

1.4.3 BUSINESS MODEL TRENDS

Energy-as-a-Service (EaaS)⁴⁴ has continued to gain traction, with several companies (Easy Solar, Moon and SolarAid) testing the model alongside their existing operations. These companies focus on EaaS centered on Tier 1 SHS, designed to target very low-income communities and provide them with power at a fixed rate (see [Chapter 2, Affordability of Off-Grid Solar](#)). The EaaS business model is growing in the productive use of energy space, where asset owners sell a service such as cooling via a walk-in cold room, and in the electrification of public institutions, where it is proving a more sustainable alternative to traditional engineering, procurement, and

construction (EPC) models (see section [1.7, OGS for Social Infrastructure Trends](#))

Other growing business models include battery rental and cooperative ownership. Battery rental is proving successful in West Africa (see MOPO case study) and South Africa (bPOWERd). Cooperative ownership is more nascent but is being explored within the agri-energy space for higher-cost assets such as solar irrigation – for example via the Irri-Go pilot in Northern Nigeria⁴⁵ and the community-owned solar pumps initiative in Chhattisgarh, India.⁴⁶

44. Note: Under the EaaS model, operating companies retain ownership and responsibility for the maintenance of products, and customers pay for the provision of electricity
45. Source: Propcom+, [UK Government Investment in Irri-Go Model Boosts Rice Production in Northern Nigeria](#), 2024
46. Source: CEEW, [Community-Based Solar Irrigation in Chhattisgarh: Prospects and Challenges](#), 2022



Case Study: MOPO Battery Rental

MOPO's battery rental model provides an alternative for those who cannot afford solar ownership or prefer flexibility. Portable batteries are charged at solar hubs and rented daily or hourly on a pay-per-use basis, with no ownership, installation, or contract. The company operates community-based solar hubs out of existing buildings, charging and renting out batteries ranging from entry-level units for lighting and phone charging to larger ones capable of powering businesses and e-bikes, or as an alternative to petrol generators. Local residents are engaged as rental agents. Customers start or stop rentals as needed and as incomes allow. Batteries circulate between hubs and users, allowing supply to respond dynamically to shifting demand and maximizing return on CAPEX. By retaining ownership of its batteries, the company remains accountable for their maintenance and disposal.

MOPO has reached meaningful scale. As of May 2026, it had delivered 40 million rentals across 576 active hubs in sub-Saharan Africa, having crossed one million rentals per month for the first time in 2025. There is evidence that some customers move into higher-capacity products over time: 65% of users of MOPO's highest-capacity battery system, started as entry-level customers.

1.4.4 DIGITAL SERVICES AND ARTIFICIAL INTELLIGENCE (AI)

Specialized digital monitoring service providers are emerging to provide reliable, accessible data needed to verify results and deploy finance: Odyssey and Prospect are operating at scale. Odyssey provides digital infrastructure through which energy companies, financiers, and program managers can coordinate project financing, monitor performance, and verify results, helping reduce the costs and complexity of managing results based finance (RBF) programs.^{47,48} Prospect consolidates data from multiple sources into a common platform, creating trusted and standardized datasets that can be used to monitor impacts, strengthen accountability, and inform funding and investment decisions.⁴⁹

AI is creating opportunities to build on off-grid solar sector's digital foundations. PAYG providers pioneered the use of mobile money payments, remote system locking and unlocking, embedded connectivity, and digital customer management platforms. Recent advances in artificial intelligence and advanced analytics represent the latest phase of a broader digital evolution. AI, advanced analytics, and integrated data platforms are enabling increasingly automated credit management, customer support, portfolio monitoring, and operational decision-making. As the sector matures, these tools may help companies reduce operating costs, improve customer outcomes, and support larger-scale deployment in underserved markets. (See Table 1)

47. Source: Odyssey Energy Solutions. Available at: <https://odysseyenergysolutions.com/>

48. Carbon Trust, Transforming Energy Access (2025). *Odyssey: How digital financing is enabling the epic journey to universal energy access*. Available at: [Transforming Energy Access](#)

49. Source: Access to Energy Institute (A2EI), Prospect Energy Platform

Table 1: Current and Potential Future Applications of AI (Illustrative)

Business Function	Current AI Applications	Potential Future Applications
 Software & Platform Operations	AI-assisted coding, troubleshooting, anomaly detection, and platform maintenance	Automated monitoring, cybersecurity, incident response, and system optimization
 Credit Underwriting	Early use of machine learning to analyze repayment and customer data	Dynamic credit scoring, risk-based pricing, personalized financing, and improved underwriting accuracy
 Collections & Portfolio Management	Data-driven repayment tracking and portfolio analytics	Early warning systems, automated collections strategies, and improved portfolio performance
 Customer Service	Initial use of AI support tools and automated responses	Multilingual chatbots, automated troubleshooting, and proactive customer engagement
 Asset Monitoring & Maintenance	Remote monitoring of connected systems, largely using rule-based analytics	Predictive maintenance, remote diagnostics, and automated fault detection
 Manufacturing & Product Design	Limited adoption to date	AI-assisted product design, quality control, component optimization, and production planning
 Geospatial Planning & Market Intelligence	Early AI applications for demand estimation and spatial analysis	Automated site selection, demand forecasting, customer targeting, and productive-use identification
 Sales & Marketing	Digital customer databases and CRM systems	Customer segmentation, lead prioritization, churn prediction, and personalized product recommendations
 Financing & Investor Reporting	Digital platforms aggregate and analyze operational and portfolio data	Automated due diligence, risk assessment, portfolio benchmarking, and Environmental, Social and Governance (ESG) ⁵⁰ reporting
 Results-Based Financing (RBF)	Digital monitoring, remote verification, and CRM integration	AI-assisted verification, fraud detection, claims processing, and program monitoring
 Supply Chain & Inventory	Limited AI deployment	Demand forecasting, inventory optimization, procurement planning, and logistics management
 Circularity & End-of-Life Management	Limited digital tracking of repairs and replacements	Battery replacement planning, repair prioritization, spare-parts forecasting, and reverse logistics optimization

Note: Future applications are illustrative scenarios, not forecasts or documented deployments.

50. Note: Environmental, social and governance (ESG) refers to a set of non-financial factors used to assess an organisation's impacts on, and the risks and opportunities it faces from, environmental, social and governance issues. Organisations measure and report on these factors through frameworks such as the GRI Standards and the IFRS Sustainability Disclosure Standards. The term originated in investment practice: it was coined in 2004 in a UN Global Compact-led report with financial institutions, which framed ESG factors as material to investment analysis (UN Global Compact, 2004). It has since taken on a wider meaning, and is now also used as shorthand for an organisation's overall approach to sustainability and corporate responsibility (Pollman, 2024). Source: Pollman, E. (2024). "The Making and Meaning of ESG." Harvard Business Law Review, 14, 403–453. Earlier version: ECGI Law Working Paper No. 659/2022. See also: UN Global Compact (2004). Who Cares Wins: Connecting Financial Markets to a Changing World. New York: United Nations.

Looking ahead, as AI adoption deepens in underwriting, product manufacturing and maintenance/servicing, cost efficiency and quality of service could improve. Embedding AI in underwriting and collections with richer payment and usage data will let companies price risk more precisely. Predictive maintenance and remote diagnostics could help

anticipate system failures in harder-to-reach locations. The net effect on product cost should remain relatively modest, for example with better forecasting and predictive maintenance lowering lifetime service costs. Better AI-driven credit scoring could also help improve repayment rates.

1.4.5 DIVERSIFICATION

OGS companies continue to diversify their product ranges to reduce risk, increase revenue streams, and meet consumer demand. Companies are broadening the range of products they sell and the markets and customer segments they serve, allowing them to spread risk across multiple portfolios and revenue streams rather than relying on a single market or PAYG portfolio. Ignite Energy Access illustrates this trend, leveraging acquisitions to diversify across customer segments. Following its acquisition of ENGIE Energy Access in early 2025, Ignite Energy Access operates four product lines across twelve markets as an integrated platform, financing solar home systems through PAYG while delivering mini grid electricity through an EaaS model.⁵¹

The range of products being trialed by established OGS players has widened noticeably in the last two years. Leading OGS operators have been selling mobile phones for several years, and additional product lines have become increasingly common, such as clean cookstoves, C&I solar, e-mobility, solar generators, and Wi-Fi routers. For example, Sun King is deploying electric induction stoves in Zambia, piloting solar refrigerators in Nigeria, and building out its solar generator range.⁵² In Zimbabwe, Natfort Energy began offering larger systems for grid backup or primary power, using the higher margins from these customers to support its continued work with lower-income off-grid households.⁵³

In addition to new product ranges, companies are continuing to trial new services to reduce risk, enhance performance, or fill gaps in the market. For example, before its acquisition, Mwezi, a Kenyan last-mile distributor (LMD), pivoted to offering paid field-testing services to manufacturers as an additional revenue stream.⁵⁴ SunCulture launched SunCulture Protect in late 2025 — a parametric climate insurance product integrated directly into its PAYG solar irrigation financing, to provide Kenyan smallholder farmers with automatic payouts triggered by predefined indicators such as drought or extreme rainfall, without the need for a traditional claim.⁵⁵

Local assembly is being tested or expanded in multiple markets, driven by fiscal incentives, efforts to strengthen supply chains, reduce costs, improve responsiveness to customers, and increase local value addition. Ignite Energy Access recently announced it has rolled out assembly operations across Benin, Nigeria, Uganda, and Zambia with a plan to assemble 50,000 units per month across these 4 countries, following a gradual ramp-up based on demand.⁵⁶ Sun King opened its first facility in Kenya to produce up to 700,000 solar-powered TVs and smartphones annually, and is exploring domestic assembly in Nigeria.⁵⁷ Solar Run leverages a Joint Venture (JV) factory model in Ethiopia to assemble solar lighting products.⁵⁸

51. Source: Ignite Energy Access, [Our Products — Solar Home Systems, PUE, Mini-Grids, C&I Solar](#)

52. Source: Modern Cooking Africa, [Scaling Up Access to Electric Cooking Solutions across Zambia](#), 2025

53. Source: Global Distributors Collective, [Last Mile Distribution: State of the Sector Report 2025](#), 2025

54. Source: Global Distributors Collective, [Last Mile Distribution: State of the Sector Report 2025](#), 2025

55. Source: SunCulture, [SunCulture Launches Climate Insurance to Protect Smallholder Farmers](#), 2025

56. Source: Ecofin Agency, [Made in Africa: Ignite Launches Solar Kit Assembly in Four Countries](#), 2026

57. Source: Sun King, [Sun King Opens First African Manufacturing Facility in Kenya, with Nigeria to Follow](#), 2025

58. Source: South-South Galaxy, [Solar offgrid technology benefit life in Africa](#)

1.5 Access to Energy in Displaced and Conflict-Affected Contexts

Energy access for forcibly displaced persons (FDPs) remains severely limited, but efforts to close this gap are ongoing. As of mid-2025, an estimated 117 million people were forcibly displaced worldwide, 37 million of whom lack access to electricity.⁵⁹ Among FDPs living in camps and settlements in Africa, around 80% of households do not have access to electricity.⁶⁰

Government policy and planning is beginning to address this gap: several countries now explicitly include displaced or conflict-affected populations in their energy policies and development strategies, and a small number of countries have incorporated them into Mission 300 National Energy Compacts.⁶¹ At the same time, last-mile distributors (LMD) are already active in these markets: the Global Distributors Collective (GDC) notes that as of 2025, 44% of surveyed LMDs specifically target refugees and host communities.⁶²

The humanitarian sector is increasingly moving from “purchase and distribute” towards supporting market-based approaches, driven by funding pressures, and lessons learned from free distribution programs.⁶³

Historically, many energy access interventions in humanitarian contexts relied on bulk procurement and distribution of free or heavily subsidized products.⁶⁴ While this model may be appropriate in emergencies, it is difficult to sustain at scale, especially in protracted displacement contexts, as it depends on repeated grant funding, restricts local market development, creates friction with host communities, and does not build self-reliance for communities.⁶⁵ Humanitarian agencies are increasingly acting as facilitators, helping companies reach displaced communities and coordinating the stakeholders needed to make market-based models work.

Humanitarian funding has fallen since 2024, and smaller budgets can no longer sustain large-scale energy access programs in displacement settings.

Energy access for displaced people now has to be delivered by governments, utilities, and private companies through national electrification strategies, subsidies, and financing.⁶⁶ Commercial operators are already moving into this gap. Altech, for example, has run several electrification projects inside refugee camps in the DRC.⁶⁷ In Uganda, the Uganda Energy Credit Capitalization Company (UECCC) RBF program goes further: it offers higher incentives to companies serving refugee-hosting districts and removes administrative barriers to operating in refugee settlements⁶⁸.

The use of subsidies to stimulate market-based approaches in displaced and conflict-affected contexts has shown promise but is yet to be scaled beyond the most developed OGS markets. East African countries have begun this transition, supported by an established private-sector presence, market infrastructure, and enabling conditions. In Kenya, SNV's Humanitarian Market-Based Energy Access program supported private-sector companies to sell OGS products to refugee and host communities; Uganda's Humenergi facility is providing concessional working capital to off-grid energy companies operating in refugee settlements,⁶⁹ and BRILHO in Mozambique has extended its market-development approach to conflict-displaced populations.⁷⁰ However, these remain isolated proof points rather than evidence of sector-wide scale.

59. Source: GPA Secretariat, UNOPS, [Quantifying the global sustainable energy access gap amongst forcibly displaced people](#), 2026

60. Source: GPA Secretariat, UNOPS, [Quantifying the global sustainable energy access gap amongst forcibly displaced people](#), 2026

61. Note: Humanitarian and displaced contexts feature in Mission 300 mainly through select country-level programs rather than as a standalone planning pillar: Kenya references solar e-cooking for displacement and host communities, Malawi includes demand-side subsidies for low-income and/or displaced populations, and Mozambique flags uneven access in conflict-affected provinces.

62. Source: Global Distributors Collective, [Last Mile Distribution: State of the Sector Report 2025](#), 2025

63. Source: UNEPCCC, [Business and Financing Models for PV-Supported Clean Cooking as a Critical Climate Technology for Last Mile Communities](#), 2025

64. Source: UNEPCCC, [Business and Financing Models for PV-Supported Clean Cooking as a Critical Climate Technology for Last Mile Communities](#), 2025

65. Source: GPA, [Energy Access in Displacement Settings](#), 2025

66. Source: SDG7 TAG, [Policy Brief: Interlinkages between SDG 7 and SDG 16](#), 2026

67. Source: Creating Hope in Conflict, [Altech awarded \\$1.5M to provide affordable energy solutions in the Democratic Republic of the Congo](#), 2022

68. Source: UNECCC, [Results Based Financing Manual](#), 2026

69. Source: GPA, [Energy Access in Displacement Settings](#), 2025

70. Source: GPA, [Leveraging subsidies to achieve SDG 7 in humanitarian and displacement settings](#), 2026

1.6 Jobs and Employment Trends

OGS is a meaningful and growing source of employment with an estimated 219,000 people working in the affiliate market at the end of 2025.⁷¹

Among companies sharing jobs data with GOGLA on a regular basis between 2021 and 2025,⁷² full-time employment rose by 29% and the agent base doubled during that period. The number of sales agents grew faster than full-time staff, to approximately three quarters of all people working in the affiliate market, reflecting the continued importance of local presence and trust-building in OGS sales, installation and maintenance. Governments and impact investors seeking to expand economic opportunity in underserved and rural markets can treat support to OGS companies as a deliberate and proven lever for job creation.

In more mature markets, large companies are generating additional jobs through local assembly, yet the greatest job opportunities will continue to come from distribution and after-sales. Companies including Sun King,⁷³ Solar Run,⁷⁴ and Ignite Energy Access⁷⁵ have begun building out local assembly operations. Where markets have the facilities and skilled labor base to support it, local assembly can extend the sector's employment footprint. While this will generate valuable new roles in some markets, the sector's main job generation will remain centered in its extensive distribution and after-sales operations.

Women's participation in the off-grid solar workforce is meaningful but uneven, with persistent gaps in technical and leadership roles.⁷⁶ Across the energy sector, women are underrepresented in technical occupations and leadership positions, reflecting barriers such as limited access to STEM education, vocational training, and workplace support.⁷⁷ This is particularly evident in large companies, responsible for the bulk of employment numbers. However, among small local companies, GDC research covering 80 last-mile distributors⁷⁸ across 45 countries, found that women account for 57% of sales agents, 50% of staff, and 56% of management, while 47% of member companies were women-owned.⁷⁹

Several National Energy Compacts and country-led initiatives target job and skill creation through OGS.

Among 35 Compacts, five explicitly link jobs or skills to OGS, while a further 17 link them to broader DRE or clean energy encompassing OGS.⁸⁰ Namibia proposed vocational training and certification for off-grid system maintenance;⁸¹ and Malawi committed to supporting Technical, Entrepreneurial and Vocational Education and Training (TEVET) programs for installation, wiring, and maintenance of off-grid systems.⁸²

71. Note: This calculation uses FTE and Agent multipliers to estimate current jobs in the sector based on sales data across GOGLA affiliates, GOGLA affiliates and GOGLA PURE-focused affiliates. The multipliers were built using data from 45 companies reporting employment and sales data in 2025.

72. Note: Active jobs data is drawn from voluntary reporting from GOGLA affiliate companies. Companies do not always consistently report across periods, especially smaller companies. The 2021–25 trend therefore uses a fixed cohort of 11 affiliates that reported full-time employment data consistently over the period. Sales agent figures are reported for the same cohort.

73. Source: Sun King, [Sun King Opens First African Manufacturing Facility in Kenya, with Nigeria to follow](#), 2025

74. Source: South-South Galaxy, [DC solar eccentricities light the lift the life from Bottom of Pyramid](#), 2026

75. Source: Presswire, [Ignite Completes First Phase of Local Assembly Lines Built Up Across Four African Markets](#), 2026

76. Source: IRENA, [Renewable energy and jobs: Annual review 2025](#), and GDC, <https://www.globaldistributorscollective.org/sos-report-2025>

77. Source: Power for All, [Powering Jobs Census 2022: The Energy Access Workforce](#), 2022

78. Note: GDC members predominantly selling off-grid solar

79. Source: Global Distributors Collective, [Last Mile Distribution: State of the Sector Report 2025](#), 2025

80. Source: GOGLA [Analysis of Mission 300 Energy Compacts](#), 2025

81. Source: [Namibia National Energy Compact](#), 2026

82. Source: [Malawi National Energy Compact](#), 2025

1.7 OGS for Social Infrastructure Trends

Progress in electrifying social infrastructure such as schools and health centers through off-grid solar remains far below what is needed. The closure of USAID in 2025 affected ongoing and planned healthcare OGS electrification programs: with projects cancelled mid-implementation, equipment and inventory stranded, procurement processes halted, and long-term operation and maintenance (O&M) arrangements left without committed financing. Traditional engineering, procurement, and construction (EPC) approaches have repeatedly failed to deliver sustainable outcomes, with many systems becoming non-functional within three to five years due to inadequate maintenance budgets, unclear institutional responsibilities, and lengthy procurement processes for replacement components.⁸³

The scale of the challenge is significant: nearly one billion people rely on unelectrified health facilities, while hundreds of millions of students attend schools without reliable electricity,⁸⁴ particularly across sub-Saharan Africa and South Asia. Public resources alone are insufficient to bridge this gap, making the mobilization of private capital essential.

Since 2024, the World Bank's Public-Private Partnership for People's Prosperity (5P) framework has begun shifting social infrastructure electrification toward long-term, performance-based energy service delivery through EaaS models.⁸⁵ The 5P framework, first piloted under Uganda's Electricity Access Scale-Up Project and now being adapted in countries including Benin, Madagascar,

and Nigeria, shifts the focus from procuring energy assets to procuring long-term energy services. Under this model, energy service companies enter into performance-based contracts with ministries, and payments are linked to independently verified key performance indicators (KPIs)—such as system uptime, energy availability, and battery performance—and monitored remotely throughout the contract period. This model incentivizes companies to maintain service provision.

Healthcare electrification through OGS is increasingly embedded in electrification planning. Mission 300 has elevated social infrastructure into national electrification planning across Africa, with National Energy Compacts proposing DRE solutions for rural health facilities. As a result, a growing share of healthcare electrification is now financed through sovereign operations that governments borrow for, principally from World Bank IDA. Bilateral donors such as the European Union and FCDO also finance large-scale healthcare electrification and resilient public infrastructure programs, often combining capital investments with policy and regulatory support. According to SEforAll, after accounting for all projects currently under implementation or firmly financed, an estimated 286,186 healthcare facilities globally, including 81,423 facilities in sub-Saharan Africa, are expected to remain poorly electrified or without reliable electricity access in 2030.⁸⁶ It is important to note that much first-time electrification and reliable back-up for healthcare facilities will not be best served by OGS.

83. Source: GOGLA Analysis, 2024

84. Source: SEforAll State of the Market Report for Healthcare Facility Electrification, 2024 <https://www.seforall.org/publications/state-of-the-market-report-for-healthcare-facility-electrification>

85. Source: ESMAP, *Sustainable Energy for Schools and Health Centers: Public-Private Partnerships for People's Prosperity*, ESMAP Papers, 2026. <https://www.esmap.org/publications/sustainable-energy-schools-and-health-centers-private-public-partnerships-peoples>

86. Source: ESMAP, *Sustainable Energy for Schools and Health Centers: Public-Private Partnerships for People's Prosperity*, 2026

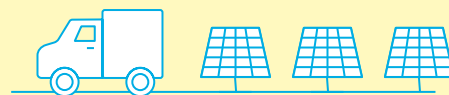
CHAPTER 2

Affordability of Off-Grid Solar



photo credit: Joel Mutwa for GOGILA

Key Messages



- ▶ **One third of unelectrified households can afford an entry-level Tier 1 SHS on PAYG, and a further third can afford one at a stretch.** The estimate assumes tax-exempt pricing in mature markets, with a total price of USD 90 paid over 12 months, so affordability in less mature markets is likely to be considerably lower. The figures are more positive than in MTR 2024, reflecting improved pricing data and revised assumptions on rural costs, cross-subsidy, and taxes. Affordability is highly sensitive to price, as a 15% increase would cut the share able to afford these systems to 28%, while a 15% reduction would raise it to 40%.

- ▶ **Serving remote, hard-to-reach households costs around 23% more, but companies typically spread this cost across their national customer base.** Lower ability to pay, higher logistics costs and a higher cost of capital all add to the cost of reaching last-mile customers, and with finite resources companies rationally prioritize more accessible segments. Most nonetheless cross-subsidize to maintain uniform national prices.

- ▶ **At least USD 4.2 billion in subsidies would be needed to close the affordability gap for the 398 million people for whom off-grid solar is the least-cost solution.** This assumes the cheapest quality-verified Tier 1 system, and real programs rarely differentiate subsidy levels by household income because of the cost and complexity of fund management. Higher landed costs in less mature markets would push the requirement higher still.

- ▶ **Sharp currency depreciation has squeezed affordability in some markets.** In Ethiopia, Nigeria and Malawi, local prices rose steeply even where underlying USD costs were stable, contributing to declines in sales. In Kenya and Tanzania, where currencies were more stable, prices held and sales grew steadily.

- ▶ **Alternative delivery models are emerging for households that cannot afford PAYG, but most remain small or unproven at scale.** Energy-as-a-Service pilots by Easy Solar, Moon and SolarAid in Malawi, Senegal and Sierra Leone have shown significant promise but scaling EaaS through long-term, government-funded concessions remains high-risk, as earlier concessions in Senegal and South Africa showed, and neither the scale economics nor effective risk mitigation has yet been demonstrated. Battery rental through solar charging hubs lets customers pay only when they have funds and now accounts for millions of rentals a month, although the model depends on enough customers living within reach of a hub and suits more densely populated areas. Lay-by, in which customers pay a local retailer in instalments and receive the product after the final payment, avoids financing costs and remains a feature of the market, although little data exists on its reach.

- ▶ **Affordability constraints are structurally more severe for forcibly displaced people.** Restricted rights to work and move make their incomes lower and less predictable, reliance on humanitarian assistance limits purchasing power, and a lack of credit history or recognized collateral limits access to PAYG. Energy-as-a-service is being used to cut diesel dependence in humanitarian operations.

- ▶ **Women own a smaller share of larger off-grid solar products, and affordability is a central cause.** Across 79,000 customers in more than 30 countries, women owned 42% of solar lanterns but accounted for only 20–30% of SHS, appliance, and mini grid connections. Lower and less consistent incomes, less control over household budgets, weaker access to credit, and digital exclusion all contribute. Programs in Rwanda and Nigeria that built gender-specific delivery channels, targets and incentives in from the start reached women at scale. Reaching women also makes commercial sense, since their referral rates can outperform men's.

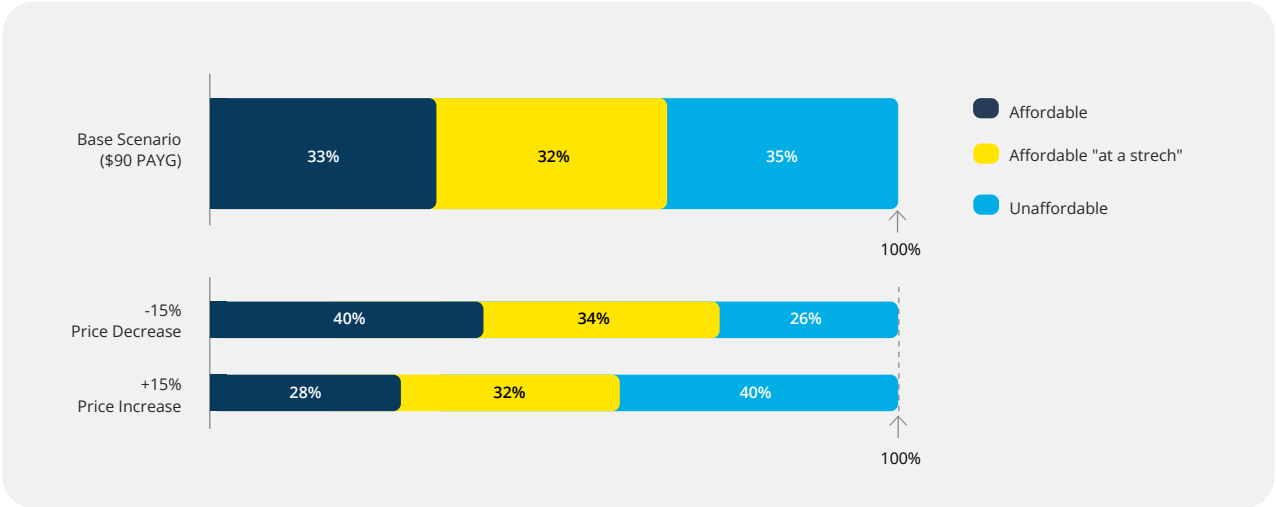
- ▶ **Productive use equipment remains unaffordable for most potential users, with only 7–16% of the addressable market serviceable for key technologies.** Solar water pumps, refrigerators, and mills cost between roughly USD 770 and USD 1,190, out of reach for most smallholder farmers and MSMEs, whose incomes are often seasonal and uncertain. Financing helps, but most target customers still need subsidies, and whether the equipment pays off depends as much on access to markets and reliable off-takers as on its upfront price.

2.1 Affordability of SHS

It is estimated that 33% of households lacking access to electricity globally can afford an unsubsidized entry-level Tier 1⁸⁷ SHS on PAYG, while an additional 32% can do so “at a stretch”. In line with the multi-tier framework for energy access, a system is considered “affordable” at up to 5% of household monthly consumption expenditure, and “affordable at a stretch” at 5%-10%.⁸⁸ This calculation is based on a Tier 1 system, sold for a total of USD 90,

paid over 12 months. A 15% increase in price, that may occur, for example, due to an increase in duties or taxes, would reduce the share of households able to afford such products to 28%, and afford at a stretch to 32%. A 15% decrease in pricing that may be achieved, for example, through subsidization, would increase the share of households able to afford these products to 40%, and afford at a stretch to 34%.

Figure 7: Affordability of PAYG Tier 1 OGS products for households



Source: Dalberg analysis 2026



Estimating Affordability – Methodology Note

Affordability in this report is assessed using Tier 1 pay-as-you-go (PAYG) pricing, reflecting prevailing market conditions: PAYG accounts for approximately 69% of SHS (3–50 Wp) sold by affiliates (see [Chapter 1, Global State of the OGS Market](#)), making it the dominant and most relevant benchmark for assessing affordability among the unconnected population. Almost all governments target Tier 1, delivered by the private-sector, or in partnership with the private-sector, as a minimum service level for electricity access.

Affordability estimates are calculated based on a total PAYG price of USD 90, reflecting actual prices in mature OGS markets, where tax exemptions are in place. Payment terms are assumed to include a 5% deposit, with the remaining balance spread over a 12-month loan tenor, resulting in a monthly cost of approximately USD 7.10.⁸⁹

87. Note: an entry-level Tier 1 system is a 3 light, plus phone charging system, with a 6-10Wp panel

88. Source: ESMAP, [Multi-Tier Framework for Energy Access](#).

89. Source: Dalberg/GOGLA analysis based on stakeholder consultations

Compared to the MTR 2024, four key improvements to the sources used and the methodology applied have led to a more positive affordability estimate:

- **Improved pricing data** – improved pricing data was gathered from companies in partnership with GOGLA. Real-world PAYG pricing from mature markets was utilized, where VAT/tariffs exclusions are likely in place.
- **Reduced rural cost-to-serve premium** – the estimated additional cost that companies incur serving rural households was revised downward following consultation with companies.
- **Cross-subsidy modeling** – the MTR 2024 assumed that rural customers would have to pay the rural ‘cost-to-serve premium’ in full, but MTR 2026 assumes that companies cross-subsidize rural customers to maintain uniform national pricing, in line with observed company pricing strategies (see section 2.1.1 below).

In less mature markets, affordability could be considerably lower than shown. Single company product pricing varies 50-70% across markets,⁹⁰ reflecting the wide range of costs and risks that companies face in different settings.

2.1.1 COST-TO-SERVE LAST MILE POPULATIONS

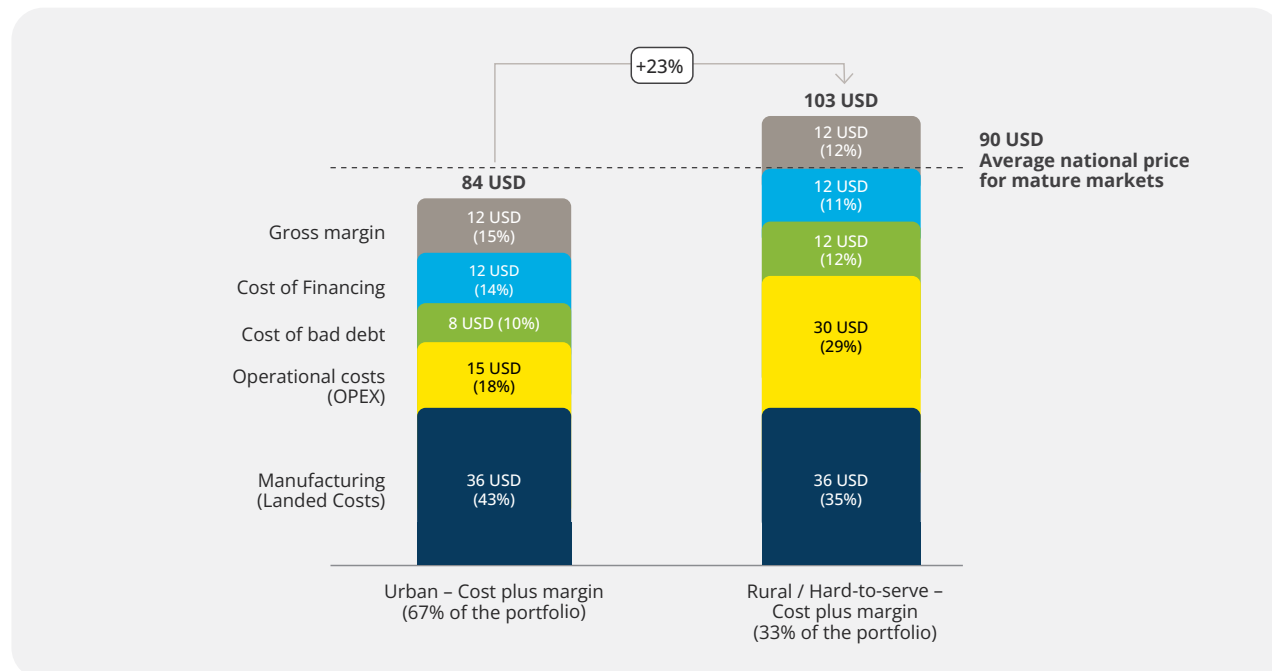
Beyond the significant affordability gap, it is also important to note that reaching the most remote, last-mile populations is more difficult and costly.

First, ability to pay is often lower in more remote regions, increasing credit risk and making it hard to achieve customer density or economies of scale. Second, OGS companies incur additional logistics costs operating in more remote and sparsely populated areas. Third, the higher perceived repayment risk associated with last-mile customers raises the cost and availability of capital. Finally, opportunity costs reinforce these dynamics: with

finite resources, companies will rationally prioritize more accessible, higher-return segments, over operations that may not yield a profit.

Despite the cost differences of serving distinct geographies within the same nation, companies typically cross-subsidize and offer uniform national retail prices. The cost of serving remote customers is estimated to be roughly 1.23x that of a customer in a more densely populated area.

90. Source: GOGLA data collection, 2026

Figure 8: Difference in Cost-plus-Margin for a Tier 1 PAYG OGS product in urban vs. rural/hard-to-reach settings (USD)

Source: Dalberg analysis 2026

2.1.2 SUBSIDY NEED FOR UNIVERSAL ACCESS

A minimum of USD 4.2 billion in total subsidies would be required to close the affordability gap for the unelectrified population for whom off-grid solar (OGS) is identified as the least-cost solution.⁹¹ According to the World Bank's Global Electrification Platform, off-grid solar represents the least-cost electrification solution for approximately 398 million people, equivalent to 41% of those requiring electricity access by 2030.⁹² The subsidy need is calculated as the sum of two components: a downpayment subsidy and a monthly PAYG subsidy.

- **Downpayment subsidy:** the gap between what a household can afford to put toward a downpayment, calculated as 5 months of savings at 5% of consumption expenditure (using the World Bank Poverty and Inequality Platform (PIP) Database) and the actual downpayment required for a Tier 1 system (USD 4.50).
- **Monthly PAYG subsidy:** the gap between the required monthly PAYG payment (USD 7.10) and what a

household can afford to pay per month calculated as 5% of annual consumption expenditure on electricity, spread across 12 months.

The total estimated subsidy need should be treated as a lower-bound estimate, for two reasons. First, it is based on the lowest available cost of a quality verified (QV) Tier 1 system, meaning the affordability gap, and the corresponding subsidy requirement would be larger for more expensive systems. Second, the estimated subsidy only covers the gap between the monthly payment a household can afford and the required PAYG payment as a fixed monthly average. For example, if a given household can afford USD 4 per month against a required USD 7.10 payment, the estimated subsidy need is USD 3.10 per month, but in practice the subsidy levels are unlikely to be differentiated by income percentile, due to the complexity and related cost of fund management. Please see [Annex B](#) for the detailed methodology underlying the subsidy need calculation.

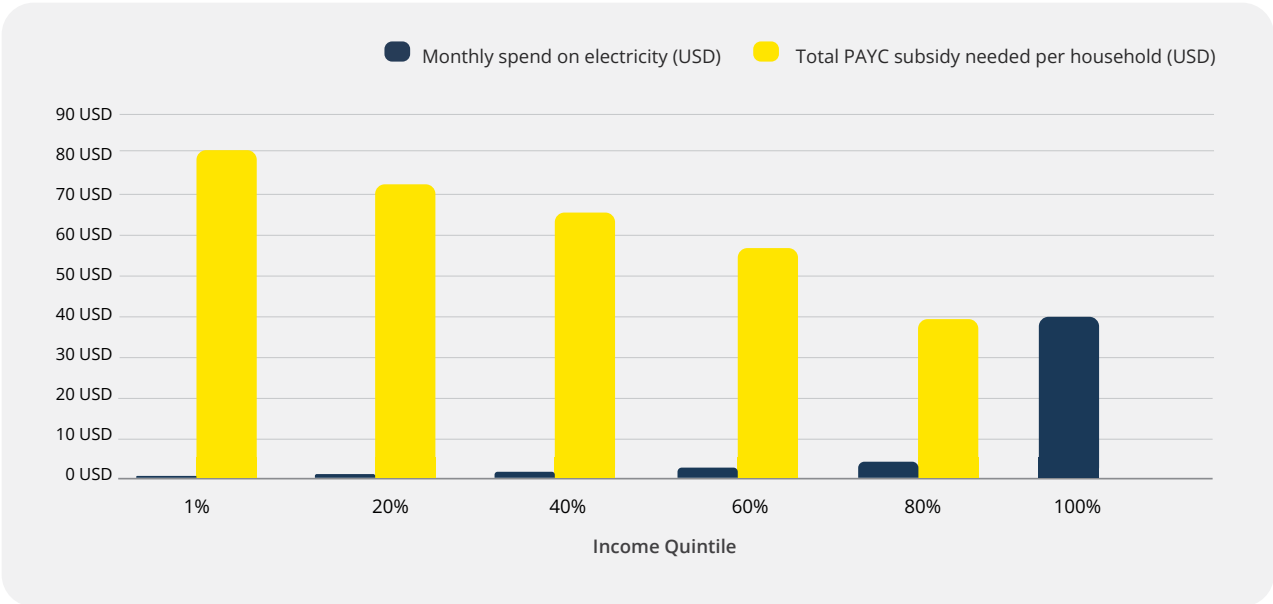
91. Source: IEA, IRENA, UNSD, World Bank and WHO, [Tracking SDG 7: The Energy Progress Report 2026](#), 2026

92. Source: World Bank/ESMAP, [Global Electrification Platform \(GEP\) Explorer](#), version 3.0.

Figure 9 provides an indicative example of how the subsidy requirement for an entry-level Tier 1 SHS varies across income percentiles, World Bank Poverty and Inequality Platform (PIP) data.⁹³ These illustrative subsidy levels are based on theoretical data derived from the

World Bank’s PovCal tool and have not been validated with local research. Estimating country-specific subsidy needs requires detailed assessments, leveraging local data sources and validation with relevant stakeholders.

Figure 9: Illustrative Estimated PAYG Subsidy Required per Household (Mozambique) at different percentile levels (USD)



Source: Dalberg analysis 2026

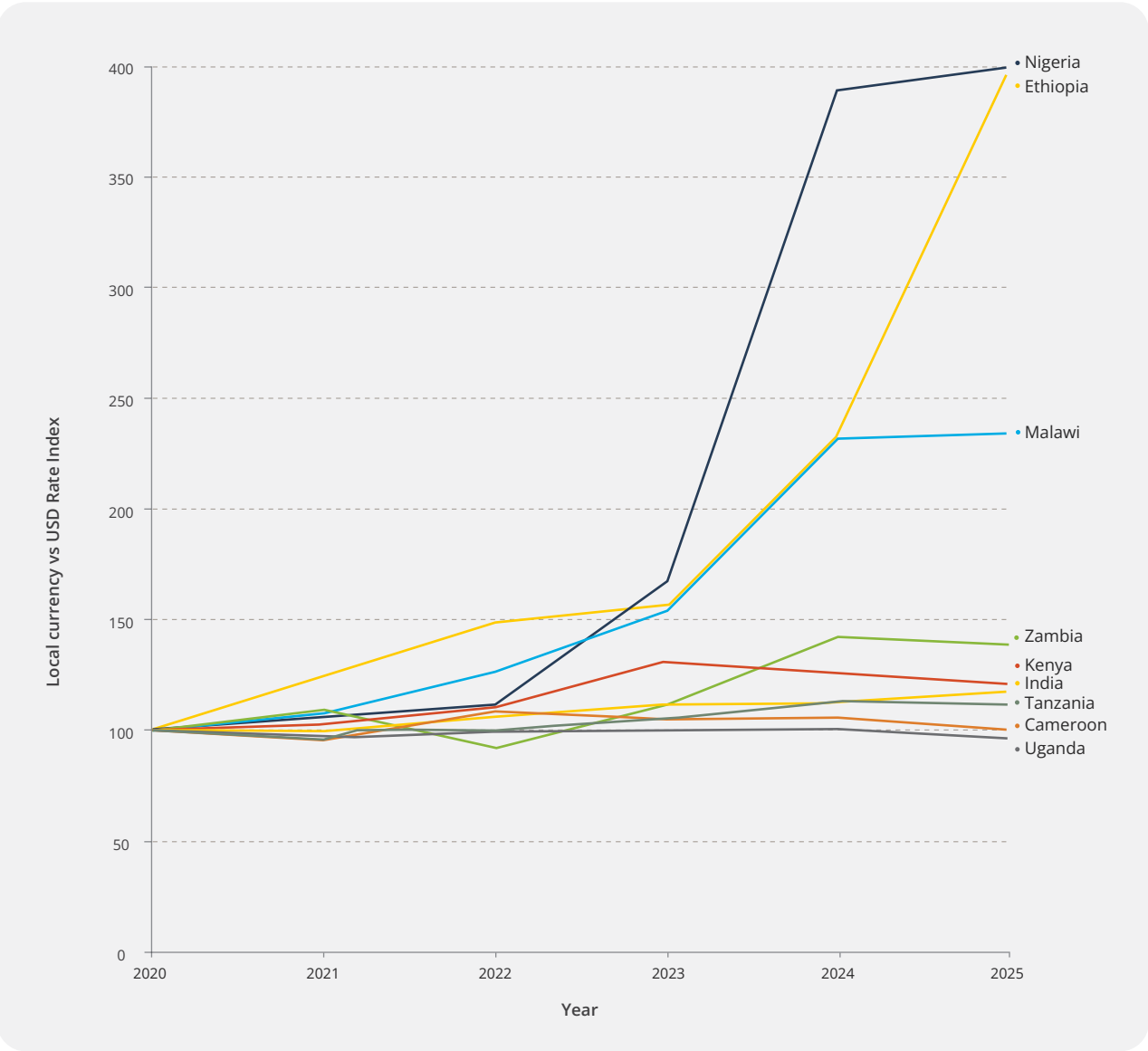
93. Dalberg analysis, 2026.

IMPACT OF FOREIGN EXCHANGE FLUCTUATIONS ON AFFORDABILITY

Exchange-rate movements continue to adversely affect the affordability of OGS products. Sharp depreciation of local currency pushes local prices up, because importers need more local currency to buy the same goods in hard currency, decreasing affordability, even where the underlying USD cost may have remained

stable. Rapid local currency depreciation contributed to sales declines in markets such as Ethiopia, Nigeria and Malawi. In markets with more stable currencies, such as Kenya and Tanzania, Tier 1 SHS local prices have remained largely unchanged, and sales volumes have steadily increased.

Figure 10: Change in local currency per USD in the top 9 SHS markets in 2025, 2020 - 2025 (normalized each currency to an index (2020 = 100))



Source: World Bank, [Global Economic Monitor \(GEM\) Databank](#), 2026
Note: The World Bank Global Economic Monitor (GEM) databank has no official exchange rate series for Somalia, so it is not included in the graph above

2.2 Business Models Seeking to Improve Affordability

2.2.1 HOUSEHOLD ENERGY-AS-A-SERVICE

Energy-as-a-Service (EaaS) has emerged as a mechanism that is being tested to reach particularly low-income households and may be suitable in other contexts to address affordability challenges. Under the EaaS model, operating companies retain ownership and responsibility for the maintenance of products, and customers pay for the provision of electricity. In theory, operators can charge USD 2.50-4 per month⁹⁴ and still cover lifetime O&M costs (including battery replacement), overhead and a profit margin. This depends on three conditions: 100% CAPEX subsidies, concessions that create customer density and economies of scale, and access to low-cost infrastructure-style financing coupled with political risk insurance.⁹⁵ This compares to around USD 7 per month for unsubsidized PAYG companies that do not benefit from concessions, have a higher cost of financing, no insurance, and must recover their full costs within a shorter repayment period.

EaaS and concession approaches have a mixed track record in the OGS sector. Senegal's PPER concessions connected just 3,726 of 106,000 targeted households between 2008 and 2015, held back by delayed tariffs, overlapping utility electrification and weak regulatory capacity.⁹⁶ In South Africa's INEP, three of six SHS concessions launched in 2001 had closed by 2011, and only 60% of systems were functional by 2015, following subsidy shortfalls, persistent institutional and contractual disputes and a political shift to grid extension.⁹⁷ In contrast, Peru⁹⁸ and Argentina⁹⁹ successfully scaled long-running, subsidy-dependent EaaS concession models for larger systems.

Early commercial EaaS models in the OGS industry proved unsuccessful and gave way to PAYG. Off-Grid Electric (later ZOLA) moved to rent-to-own in Tanzania and Rwanda, as customers preferred ownership, and servicing dispersed assets eroded profits. Bboxx likewise replaced its 10-year hybrid service model in Rwanda with PAYG. However, as neither company targeted whole communities and both sold larger systems, their operations had different characteristics to the new wave of EaaS pilots.

The results of recent EaaS pilots by Easy Solar, Moon and SolarAid under the REAL Programme Catalyst are encouraging.¹⁰⁰ Three pilots in Malawi, Senegal, and Sierra Leone have led to thousands of new connections. Four out of five participating households gained electricity for the first time, sign-up rates reached 70–100% of target communities, and usage has held up well once connected: all three pilots sustained active usage above 87% over a six-month tracking period.¹⁰¹

Both concessions and effective risk mitigation instruments need to be demonstrated in practice. GEAPP's Structuring for the Last Mile report argues that a sole operator in a defined territory can achieve efficiencies, but the extent to which this unlocks savings in practice remains uncertain.¹⁰² Concession holders must serve every household, including the least viable, for a decade or more, and will likely face economic or climate shocks that leave their solvency dependent on discretionary government renegotiation. Neither the scale economics nor effective risk mitigation has yet been demonstrated.

94. Source: REAL Programme Catalyst, [Why Energy-as-a-Service Works for the Hardest to Reach: Insights from REAL Programme Catalyst's Energy Access Pilots](#), 2026

95. Source: REAL Programme Catalyst, [Why Energy-as-a-Service Works for the Hardest to Reach: Insights from REAL Programme Catalyst's Energy Access Pilots](#), 2026. See also Global Energy Alliance for People and Planet (GEAPP) and Lightrock Energy Access Platform (LEAP), [Structuring for the Last Mile: Financing the Next Era of African Electrification](#), 2026

96. Source: World Bank, [Evaluation of Rural Electrification Concessions in sub-Saharan Africa: Senegal Case Study](#), 2015

97. Source: World Bank, [Evaluation of Rural Electrification Concessions in sub-Saharan Africa: Detailed Case Study — The South African Solar Home System \(SHS\) Concessions](#), 2015

98. Source: World Bank, [Results in the Latin America and Caribbean Region: Promoting Rural Electrification in Peru](#), 2019

99. Source: World Bank Independent Evaluation Group, [Argentina – Renewable Energy in the Rural Market Project: Implementation Completion Report Review](#), 2015

100. Source: REAL Programme Catalyst, [Why Energy-as-a-Service Works for the Hardest to Reach: Insights from REAL Programme Catalyst's Energy Access Pilots](#), 2026

101. Ibid

102. Source: Global Energy Alliance for People and Planet (GEAPP) and Lightrock Energy Access Platform (LEAP), [Structuring for the Last Mile: Financing the Next Era of African Electrification](#), 2026

The key question is whether governments can implement this model. Senegal's PPER and South Africa's INEP concessions show these risks are not hypothetical. Both had the proposed architecture on paper, and both struggled once political support, contracting capacity, or operator delivery capability fell short. Three risks stand out:

- **Political:** sustaining government commitment over a 20–25 year term or longer
- **Procurement and regulatory capacity:** designing, tendering, monitoring and enforcing complex long-term contracts where state capacity is often weak
- **Operator delivery:** serving a dispersed, low-income territory without the competitive pressure that disciplines cost and quality

Further pilots are worth pursuing, and should be able to take advantage of developments over the last decade. These include more sophisticated potential private sector partners, more committed and capable government counterparts in some markets, and new digital monitoring, reporting and verification solutions that could help to monitor operators' performance and make timely disbursements. However, sustaining an institutionally and fiscally demanding model over long periods of time in fiscally constrained, and often politically volatile environments, is likely to require significant and sustained support. See [Chapter 6, Outlook and Recommendations](#).

2.2.2 OTHER EMERGING MODELS TARGETING AFFORDABILITY

Battery rental provides access to customers who cannot afford the cost of an SHS as a cash sale or via PAYG. The model allows users to rent a battery when they have available funds, with a 50Wh system costing from USD 0.20 per day, with millions of rentals made each month (see Section 1.4.3 Business Model Trends).¹⁰³ Because customers collect and return batteries at charging hubs, the model depends on sufficient customer density around each hub and is best suited to villages, peri-urban areas and other more densely populated settings.

The lay-buy or layaway approach remains a feature of the industry and can help very low-income customers to purchase OGS. However, there is little data available to track its prevalence or the average charging structures. In the model, customers pay a trusted local retailer for their OGS product in installments and receive it after the final payment. Product prices are kept low as there is no cost of financing. Namene, which operates in countries across Southern Africa, has highlighted the potential of this approach to reach lower income customers within their cash-based business model. Recent research into Productive Use of Energy (PUE) business models also revealed that the lay-buy approach is used by some customers to purchase solar agri-energy products.¹⁰⁴

103. Note: Based on the cost of batteries offered by MOPO and Jaza Energy.

104. Source: Powering Protection: Navigating Consumer Risks in the PURE sector. GOGLA and MFR. 2025

2.3 Affordability Considerations for Underserved Customer Groups

2.3.1 AFFORDABILITY CHALLENGES IN DISPLACEMENT SETTINGS

Affordability constraints are amplified for FDPs, limiting market participation even where products are available. Restricted rights to work and movement make earnings lower and less predictable than host communities', while reliance on humanitarian assistance creates dependency rather than purchasing power (see Chapter 1, Global State of the OGS Market on the shift toward market-based approaches). Where PAYG financing exists, the lack of in-country credit histories, business accounts, or recognized collateral limits access.¹⁰⁵

The EaaS model is being adapted to cut diesel dependence in humanitarian operations but has not yet extended to FDPs. Specialist providers finance, install and maintain solar-plus-storage systems for UN agencies and NGOs, allowing clients to procure power as an operating expense rather than needing to fund, operate and replace assets themselves. Examples include HumEn's ESCO offering, replacing diesel at UN and Mercy Corps facilities in Ethiopia,¹⁰⁶ and the Zero Emission Utility set up by A2EI, helping UN institutions build the evidence and contracting structures to shift from standard procurement to EaaS.¹⁰⁷

2.3.2 AFFORDABILITY CHALLENGES FOR WOMEN

Women face compounding structural barriers to off-grid solar affordability and consumer financing: lower and less consistent incomes, less control over household budgets, weaker access to formal credit and accounts, and digital exclusion through lower phone ownership, digital literacy, and ID access. Across a 79,000-customer dataset spanning 30+ countries, women owned 42% of solar lanterns but only 20–30% of SHS, appliance, and mini grid connections.¹⁰⁸ Additional research in Nigeria, for example, found little difference in energy demand between male- and female-led households, with affordability explaining lower uptake among women.¹⁰⁹

Closing the affordability gap for women is not only an equity goal — it can be a growth strategy. Even where women make up a minority of direct purchasers, their referral and repayment behavior can outperform men's, giving companies a commercial reason to design for them. Fenix International's early PAYG data found that although women made only ~20% of direct kit purchases, they referred an average of four new customers each, against

three for men — evidence that reaching women pays off for company growth.¹¹⁰

Programs succeed when designed around how women access finance and markets, with gender-specific delivery channels, targets and incentives built in from the start. Rwanda's Renewable Energy Fund Project channeled subsidies and loans through local savings and credit cooperatives rather than commercial banks, lowering barriers for female-headed and low-income households, while setting gender-inclusive targets and monitoring progress. Women constituted 52% of beneficiaries, over a third of loan recipients, and secured 45% of the off-grid solar jobs created.¹¹¹ Nigeria's Electrification Project paired financial incentives and targets for female-headed households and MSMEs with a STEM internship program, more than doubling female employment at distributed renewable energy companies, while reaching 470,000 female-headed households and 3,600 women-owned businesses.¹¹²

105. Source: GPA Secretariat, UNOPS, [Barriers to Increased Private Sector Engagement for Energy Access in Fragile and Displacement Contexts](#), 2026

106. Source: Mercy Corps, [HumEn: The Partner of Choice for Humanitarian Energy](#), 2022

107. Source: Zero Emission Utility, [End the diesel generator era](#), 2026

108. Source: 60 Decibels, [Women's Vital Role in the Off-Grid Energy Sector](#), 2024

109. Source: Janghorban et al., [Willingness to Pay for an Electricity Connection: A Choice Experiment Among Rural Households and Enterprises in Nigeria](#), 2024

110. Source: IFC: [The Business Case for Gender and Energy](#)

111. Source: IEA, IRENA, UNSD, World Bank and WHO, [Tracking SDG 7: The Energy Progress Report 2026](#), Chapter 1: Access to Electricity ("Gender-inclusive interventions in electricity access"), 2026

112. Source: IEA, IRENA, UNSD, World Bank and WHO, [Tracking SDG 7: The Energy Progress Report 2026](#), Chapter 1: Access to Electricity ("Gender-inclusive interventions in electricity access"), 2026

2.4 Affordability of OGS Productive Use Equipment

Measuring the affordability of standalone solar-powered productive use of energy (PUE) equipment is considerably more challenging than for household solar products. The range of products and related costs vary vastly, ranging from a multi-port phone charger to a walk-in cold room. End users are cooperatives, farmers, micro-entrepreneurs, and MSMEs whose ability to pay depends on future income, that may be seasonal and shaped by market access, equipment utilization rates, and wider business performance. Droughts or floods can further increase income volatility.¹¹³

High product pricing is consistently cited as one of the main barriers to PUE adoption.¹¹⁴ Purchasing high-cost equipment on the promise of increased income is challenging, as without market linkages asset acquisition is unlikely to lead to economic returns.¹¹⁵ End-user financing may increase affordability, but most target customers would still require subsidies.¹¹⁶ From the supply-side, low demand equates to high production and last-mile distribution costs, and limits investor appetite. Hystra's Market Access for Agro-PURE Companies suggests that improving affordability of PUE solutions is not solely a matter of reducing upfront costs: strengthening market access and securing reliable off-takers can increase farmer incomes and investment returns, thereby improving the financial viability of adopting productive-use energy technologies.¹¹⁷

The Efficiency for Access 2024 Leave No One Behind report provides indicative affordability estimates for selected off-grid solar PUE technologies. The estimates draw on the prices identified through stakeholder interviews in India, Kenya, and Nigeria alongside web-based price comparisons:¹¹⁸

- **Solar water pumps were estimated to typically cost USD 843–966, remaining unaffordable for most smallholder farmers.** The report estimates that just

16% of the addressable market is serviceable under current conditions.

- **Solar refrigerators were modeled at USD 782–1,186, placing them out of reach for the majority of rural Micro, Small and Medium Enterprises (MSMEs).** The report estimates that just 13% of the addressable market is serviceable.
- **Solar mills were modeled at USD 766–1,116 and operators must achieve sufficient utilization rates to reach profitability, which is difficult given low-value crops and the low-cost alternative of manual milling.** The report estimates that just 7% of the addressable market is serviceable.

Other PUE technologies face similar affordability constraints. Solar dryers can range from USD 1,500 for 40kg cabinet dryers,¹¹⁹ to USD 7,000 for 1 ton greenhouse dryers. Walk-in cold rooms below 5 metric tons can cost USD 10,000–30,000;¹²⁰ these large cooling solutions are often offered through pay-as-you-store or cooling-as-a-service models.¹²¹

Businesses use different models to tackle affordability. PAYG spreads costs over time, with agricultural repayment schedules reflecting seasonal or harvest-linked cashflows, while retailers offering lay-by or layaway can help customers pay in installments before taking the product home. Service-based models, including rental and energy-as-a-service, allow users to pay for access or for services delivered, and are especially relevant for larger assets shared by multiple end-users. Cooperative ownership can also help to reduce the cost for an individual. Some PUE companies also provide advisory support or act as off-takers to help users generate the revenues needed to make their business models viable. This MTR's companion PUE Design Guide provides examples of these models, as well as insight into how PUE affordability gaps can be overcome.

113. Source: FAO, [The impact of climate variability and extremes on agriculture and food security - An analysis of the evidence and case studies](#), 2019

114. Source: Next Billion, [Productive Use Has Challenges: What's Holding the Sector Back — And How Companies and Investors Should Respond](#), 2026

115. Source: Agri-Energy Coalition, [Beyond Silos: Strengthening Nexus Collaboration to Power Food Systems with Off-Grid Solar](#), 2025

116. Source: Efficiency for Access, [Leave No One Behind Bridging the energy access gap with innovative off-grid solar solutions](#), 2024

117. Source: Hystra, [Market Access for Agro-PURE Companies](#), 2025

118. Source: Efficiency for Access, [Leave No One Behind Bridging the energy access gap with innovative off-grid solar solutions](#), 2024

119. Source: Efficiency for Access Coalition, [Tech Trends in Energy Access: Assessing the Solar Dryer Market](#), 2024

120. Source: World Bank, [Sustainable Cooling in Off-Grid Rural Areas: The Nexus between Access to Energy and Clean Cooling](#), 2024

121. Source: Efficiency for Access, [Life Cycle Assessment of Off-Grid Solar Products in Kenya](#), 2023

CHAPTER 3

Access to Finance



Key Messages



▶ **Corporate financing for off-grid solar held stable at USD 315 million in 2025 - within its historical range since 2016 - but has failed to grow in line with sector ambition.** Macroeconomic headwinds have led to a contraction in African venture capital, while off-grid solar (OGS) investors have become increasingly cautious about repayment rates and companies' pathways to profitability.

▶ **Three market leaders - Sun King, d.light and Ignite Energy Access - captured around 70% of corporate financing in 2024–25.** The number of market leaders dropped from six in 2020 to three in 2025, and broadly the same volume of capital now flows to fewer operators through larger tickets. These companies are shifting from equity toward debt and securitization, and off-grid solar receivables are becoming an investable asset class. African Frontier Capital's USD 50 million green bond in June 2026 was among the first off-grid solar transactions to reach public capital markets, and pooled facilities are being built to extend off-balance sheet finance to mid-sized companies.

▶ **Mid-sized and small companies continued to struggle to raise capital.** Debt financing to these companies fell from USD 175 million in 2022–23 to USD 79 million in 2024–25, and equity fell 38%, although it recovered in 2025 as fewer companies raised larger tickets. Financing remains largely out of reach for smaller companies, which often lack the collateral, track record, systems and clear pathway to profitability investors require, while high transaction costs deter investors from writing the smaller tickets they need. In 2025, locally owned companies accounted for only 3.1% of total corporate financing, while women-led companies accounted for just 2.4%. Grant funding held steady at around USD 11–12 million a year in 2024–25, but grant deals fell from 88 to 28 in 2025, with small companies hit hardest.

▶ **Local currency financing remains concentrated among market leaders.** Market leaders received 95% of the USD 128.6 million raised in local currency in 2024–25. Encouragingly, a growing number of small and mid-sized companies have found innovative routes

to local currency financing, and World Bank credit lines increasingly build foreign exchange risk mitigation into their design. These developments might make it easier for mid-sized and small companies to access local currency financing in future.

▶ **Public funding has grown substantially over the past decade and held steady in the latest period.**

The World Bank Group, the largest source of public funding for electricity access, committed USD 974 million to off-grid solar in FY25–26, level with FY23–24. Between FY17–21 and FY22–26, RBF rose from 24% to 41% of commitments for households and PUE, while credit lines fell from 48% to 25% and upfront grants from 6% to 1%. The portfolio made its first equity commitments in FY25, which now account for 10% of FY22–26 commitments.

▶ **Results-based financing is scaling up, but weaknesses in RBF design are undermining investor confidence.**

Cumulative RBF funding has reached USD 1.2 billion, and the World Bank accounts for 78.8% of committed RBF capital. Where programs are well designed, sales have grown rapidly, as in Nigeria, Malawi, and Mozambique. Elsewhere, subsidies set too high have exhausted funds before new ones were approved, restrictive eligibility has excluded smaller companies, and disbursement lags of up to 18 months have created liquidity crunches and made RBF-backed companies look riskier to investors. Untargeted subsidies can pull companies toward cheaper-to-serve, under-the-grid areas, while those targeting remote areas can strand them when programs end without an exit strategy. Programs in Nigeria and Rwanda show how RBF design can improve over time.

▶ **PUE investment has been broadly stable over five years and is reaching more companies with smaller tickets.**

The number of transactions rose from 79 to 118 between 2022–23 and 2024–25 as average ticket sizes fell, and PUE's share of OGS grants roughly doubled to 71%. Companies given grants and technical assistance sequentially were more likely to raise follow-on capital than those given both as a bundled package.

3.1 Financing Flows



Key Concept: Corporate Financing, Public Funding, Private Investment and Company size Categories

This chapter explores access to finance by company size, by financing instrument, and by source of funds (see **Figure 11**). Key terms include:

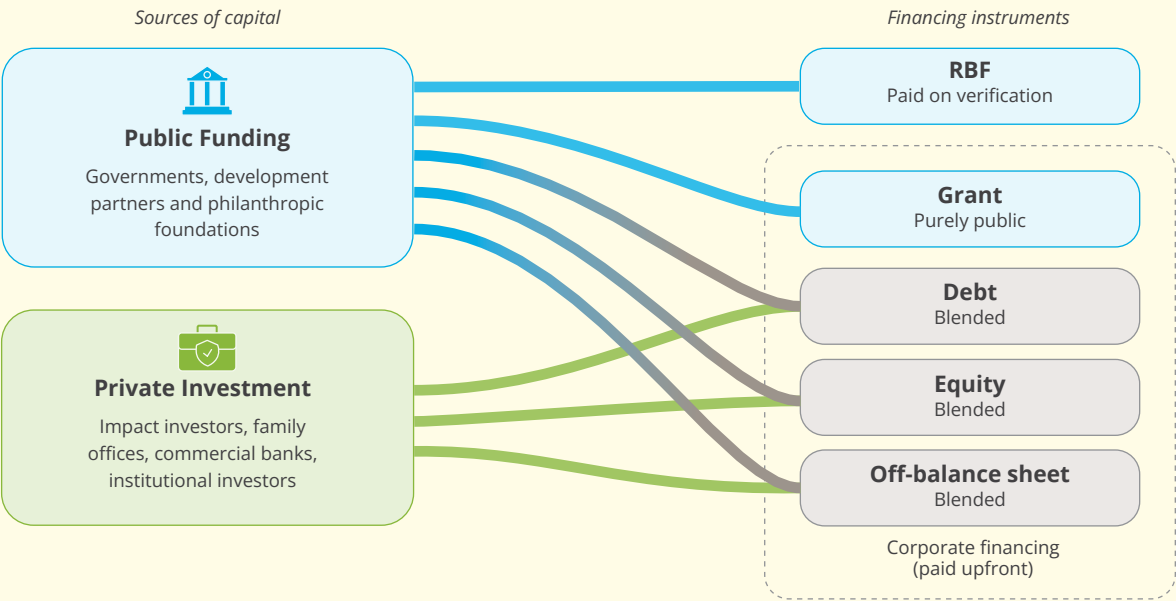
Sources of Capital:

- **Public funding** comes from public sources such as governments, development partners and philanthropic foundations. It reaches companies directly through grants and RBF, as well as through blended debt, equity, and off-balance sheet instruments. Within debt, equity, and off-balance sheet financing, public funding plays two roles: some absorbs risk through first-loss capital, guarantees or concessional terms so that private capital can follow, while some is invested by DFIs and MDBs on commercial or near-commercial terms.
- **Private investment** comes from private sources such as impact investors, family offices, commercial banks or institutional investors. It reaches companies through debt, equity, and off-balance sheet instruments, that are often – but not always - de-risked using public funding.

Financing Instruments:

- **Corporate financing** refers to all financing instruments that are paid upfront including grant, debt, equity, and off-balance sheet commitments.
- **RBF** is tracked separately because it is paid upon verification of results.

Figure 11 Illustrative Sources of Capital and Financing Instruments



The chapter groups OGS companies into three size categories based on the total capital each company has raised to date, following GOGLA's classification.¹²²

- **Market leaders** (called "scale-up" by GOGLA) have raised more than USD 100 million
- **Mid-sized companies** (called "start-up" by GOGLA) have raised between USD 3 million and USD 100 million
- **Small companies** (called "seed" by GOGLA) have raised less than USD 3 million

3.1.1 OVERALL FINANCING FLOWS

Corporate financing for OGS stabilized at USD 315 million in 2025, making it broadly consistent with the historical range since 2016, after the anomalous peak in 2022 caused by Sun King's USD 330 million Series D and d.light's multiple sizable debt raises. It is not keeping pace with increasing sector ambition, with market leaders recently announcing ambitious new targets.¹²³ Since 2022 the lack of growth in OGS financing reflected macroeconomic headwinds that drove a broader contraction across African venture capital over the same period. The African Private Capital Association (AVCA) data shows African VC deal volume falling from USD 5.2 billion in 2022 to USD 3.5 billion in 2024 - a 33% decrease over two years - before stabilizing in 2025 with USD 3.9 billion

raised.¹²⁴ Currency depreciation in key markets, post-pandemic inflation, and elevated fuel and fertilizer costs eroded investor appetite. Successive interest rate rises in 2022–2023 pulled investor capital toward safer, higher-yielding developed-market assets and away from frontier markets, pushing several African central banks to raise local rates in turn, thereby increasing the cost of local-currency debt. Although many central banks began easing rates again from late 2024 as inflation cooled, the balance-sheet damage from the earlier tightening cycle continued to weigh on companies, contributing to distressed acquisitions and insolvencies in the 2024–25 period¹²⁵ (see [Chapter 1, Global State of the OGS Market](#))

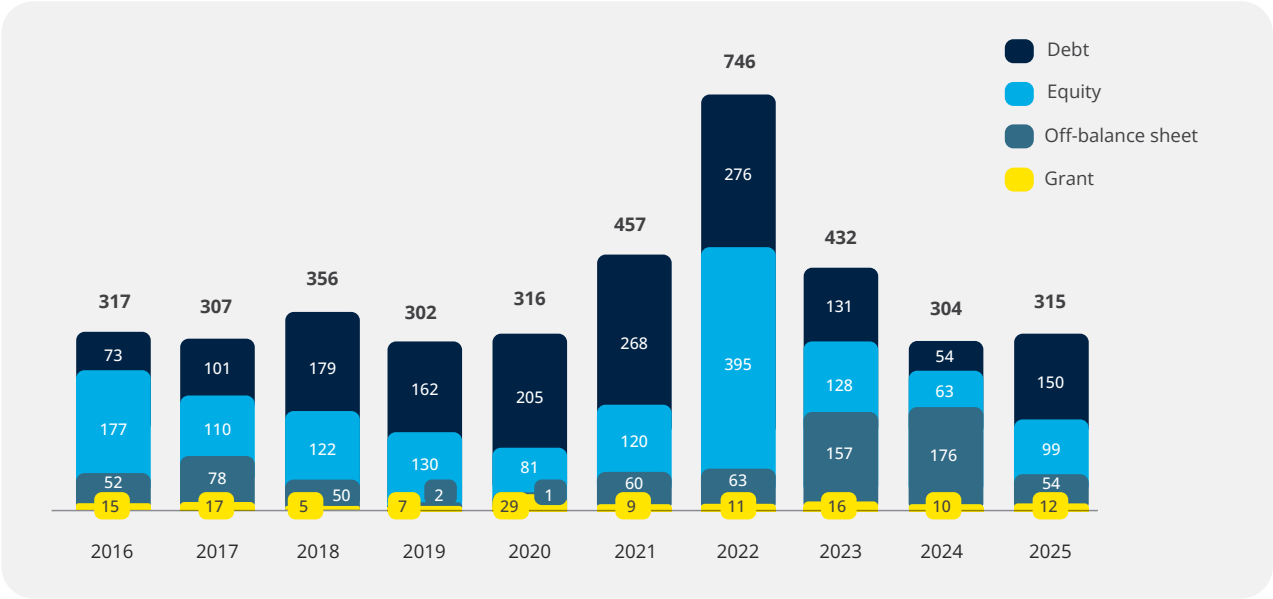
122. Note: The amount raised to date is cumulative, so a company remains in its category even if it later contracts, and a company that grows mainly through its own revenues may sit in a lower category than its sales would suggest.

123. For example, d.light aims to transform the lives of 1 billion people by 2030, Sun King has committed to reach 200 million people with first-time or improved access to clean, affordable electricity by 2030, and Ignite aims to connect 100 million people to clean energy by 2030. Sources: d.light (2023), "d.light transforms the lives of 150M people worldwide, aims for 1BN by 2030", press release, 16 May 2023, <https://www.prnewswire.co.uk/news-releases/dlight-transforms-the-lives-of-150m-people-worldwide-aims-for-1bn-by-2030-301826216.html>; Sun King (2025), "Sun King Targets Clean Energy for 200 Million People by 2030", press release, <https://sunking.com/news-blog/sun-king-targets-clean-energy-for-200-million-people-by-2030/>; Ignite Power (2024), "Ignite Power Agrees Terms for Carbon Off-Take Agreement with SEFE, Advancing Goal to Connect 100 Million by 2030", press release, 2 October 2024, <https://sun-connect.org/ignite-power-agrees-terms-for-carbon-off-take-agreement-with-sefe-advancing-goal-to-connect-100-million-by-2030/>.

124. Source: [AVCA, Venture Capital in Africa Report \(2023, 2024, 2025 editions\)](#)

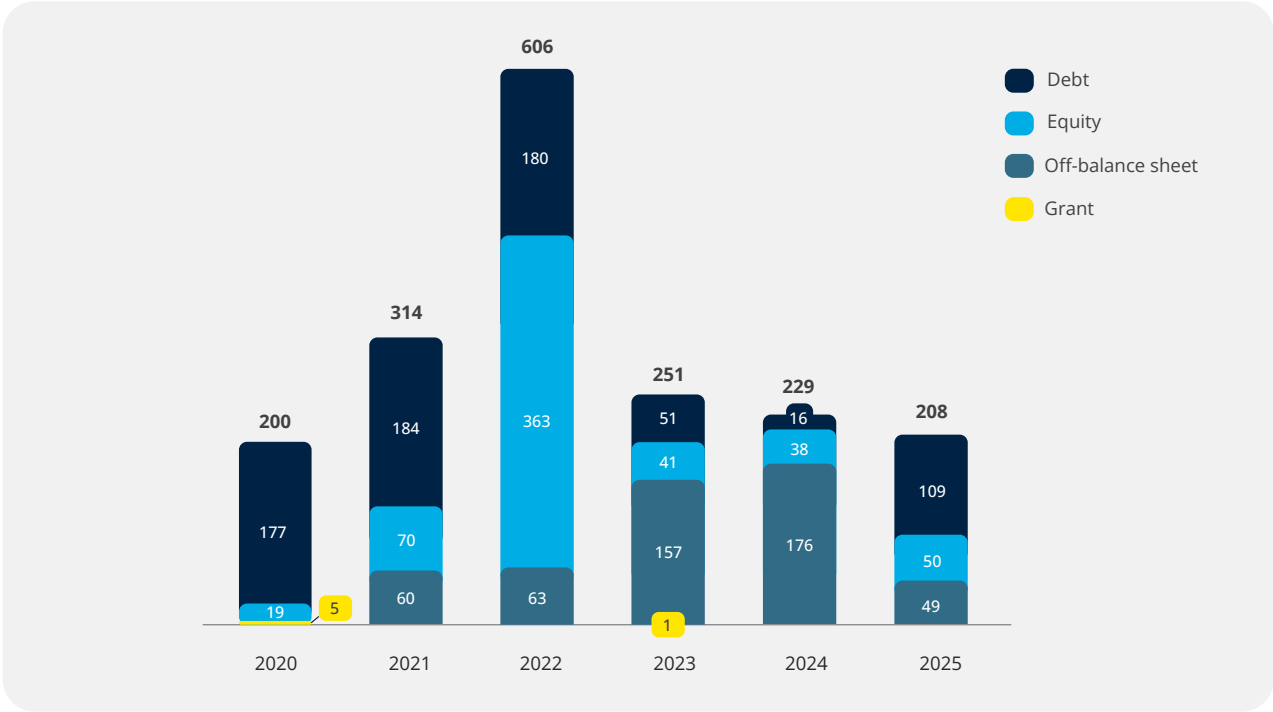
125. Note: The Fed raised its policy rate by a cumulative 425 basis points across 2022 alone, the fastest tightening cycle in four decades, prompting a broad-based response across sub-Saharan Africa: the median country in the region raised policy rates by roughly 350 basis points from end-2021 through 2023 to defend currencies and contain imported inflation, even as several currencies still depreciated sharply and reserve buffers thinned. This began to reverse from late 2024, as the Fed cut rates from September 2024 through 2025 and regional inflation eased from a 2022 peak of 9.3% to around 4.5% by 2024; several central banks pivoted to cutting in turn, including South Africa (from September 2024) and Kenya (six consecutive cuts in 2025, to 9%), and sovereign Eurobond access reopened in early 2024 after a near two-year freeze, albeit at high coupons. Not every market followed this pattern — Angola and Malawi, among others, held rates high into 2025 amid their own currency and debt pressures. Sources: IMF, [Regional Economic Outlook: Sub-Saharan Africa — The Big Funding Squeeze](#), 2023; Finance in Africa, [Falling inflation gives African central banks room to ease policy in 2025](#), 2025

Figure 12: Total Corporate Financing by instrument 2012-25 (USD millions)



Source: GOGILA, [Investment data 2025](#)

Figure 13: Total Corporate Financing for OGS market leaders by instrument 2020-25 (USD millions)

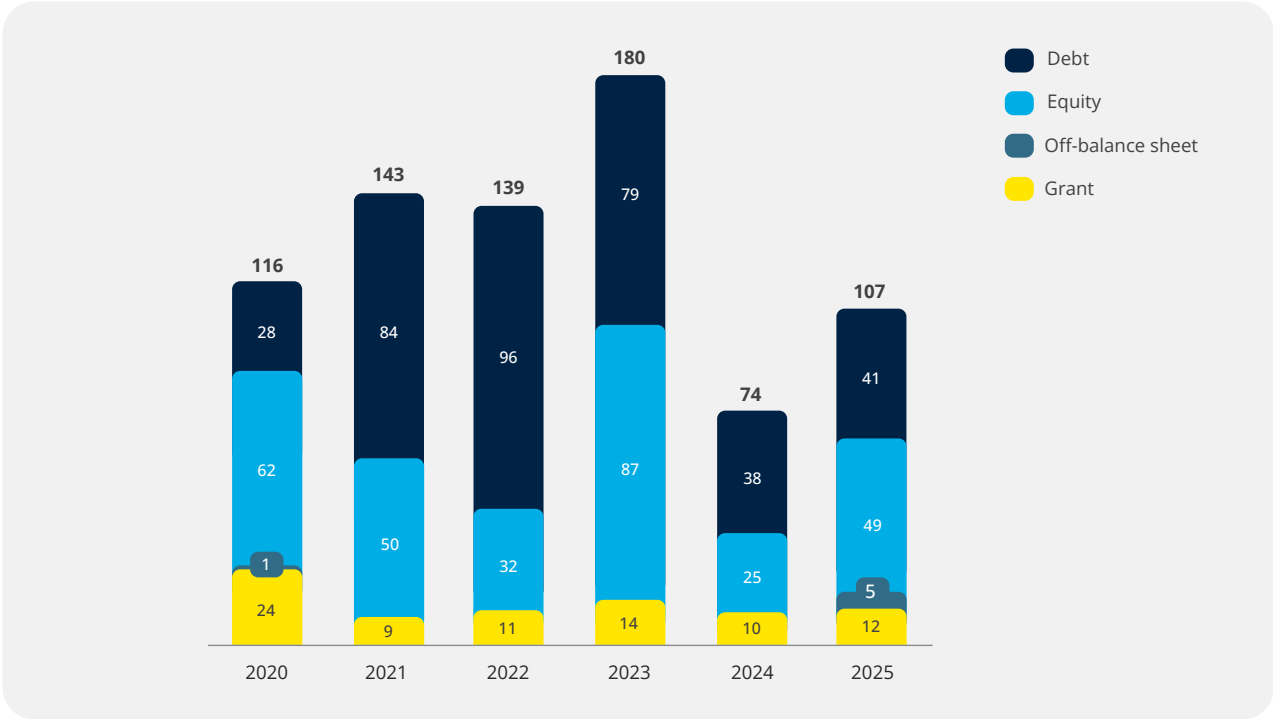


Source: GOGILA, [Investment data 2025](#)

Funding models have increasingly diverged by company maturity, with the market leaders shifting toward debt and structured finance (Figure 13), while mid-sized and small companies continue to raise funds through equity and grants (Figure 14). In 2025, the market leaders raised USD 109 million in debt and USD 49

million in off-balance sheet financing, compared with USD 50 million in equity. This reflects a broader maturation of the largest companies, which can increasingly leverage receivables, access securitization, and structured credit, and attract local-currency lending from domestic banks.

Figure 14: Total Corporate Financing for OGS mid-sized and small companies by instrument 2020-25 (USD millions)



Source: GOGILA, [Investment data 2025](#)

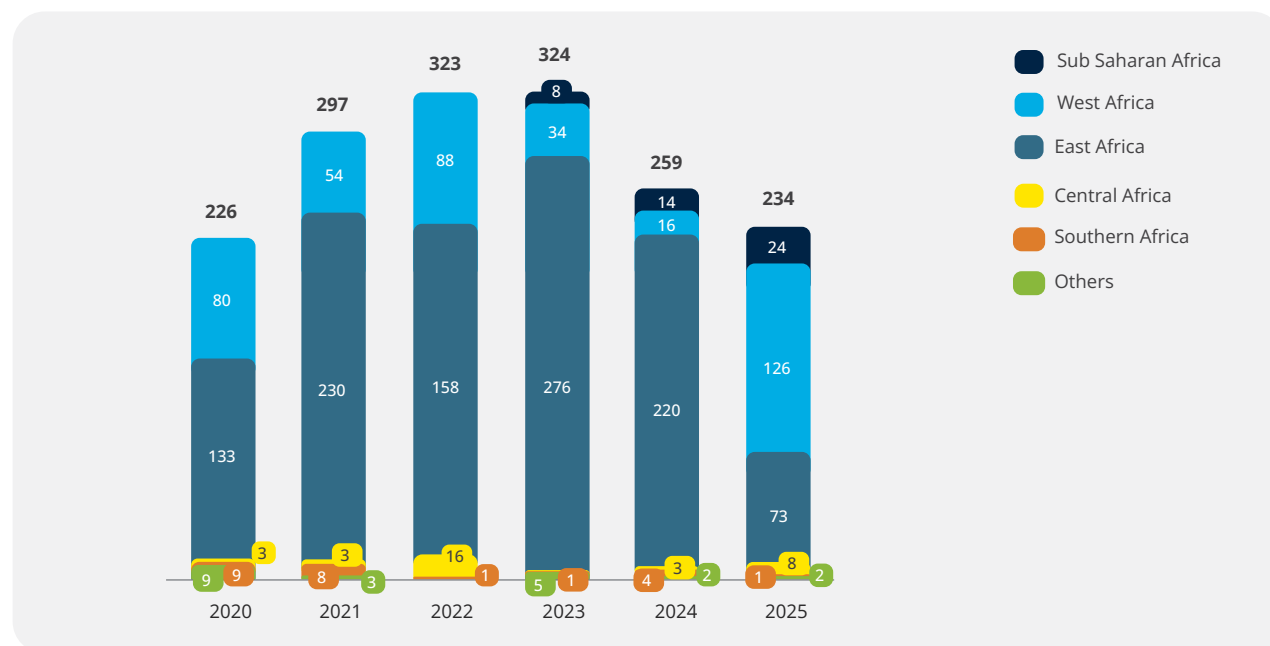
Financing for mid-sized and small companies has followed a different trajectory, with equity recovering from a recent trough. Overall corporate financing fell to USD 74 million in 2024 before recovering to USD 107 million in 2025, while equity rebounded from USD 25 to USD 49 million. Grant funding held steady at around USD 11–12 million a year in 2024-25, but grant deals fell from

88 in 2024 to 28 in 2025, with small companies hit hardest. Grant deals to small companies fell from 71 to 14 and the number of small companies receiving any investment halved from 73 to 35, while the number of companies receiving first-time funding dropped from 52 to 25. Grants have been the main way into the sector for many companies, especially locally owned ones.¹²⁶

126. GOGILA. [The Sector Is Maturing. Capital Is Concentrating](#). 2026.

3.1.2 FINANCING BY REGION

Figure 15: Total Corporate Financing disaggregated by region 2020-25 (USD millions)



Source: GOGA, [Investment data 2025](#)

Note: 'Sub-Saharan Africa' = multi-country deals. 'Others' = Northern Africa, South Asia, South-east Asia, East Asia & Pacific, Latin America & Caribbean, Europe. Unassigned funding excluded from calculation

Corporate financing patterns show a potential emerging shift toward West Africa, which received more funding than East Africa in 2025 for the first time (Figure 15).

Between 2022 and 2023, East Africa received the majority of funding, drawing 67% (USD 434 million) of total corporate financing, compared to West Africa's 15%. Across 2024 and 2025, the regional balance narrowed, with West Africa's share of total corporate financing rising to 29% (USD 142 million).

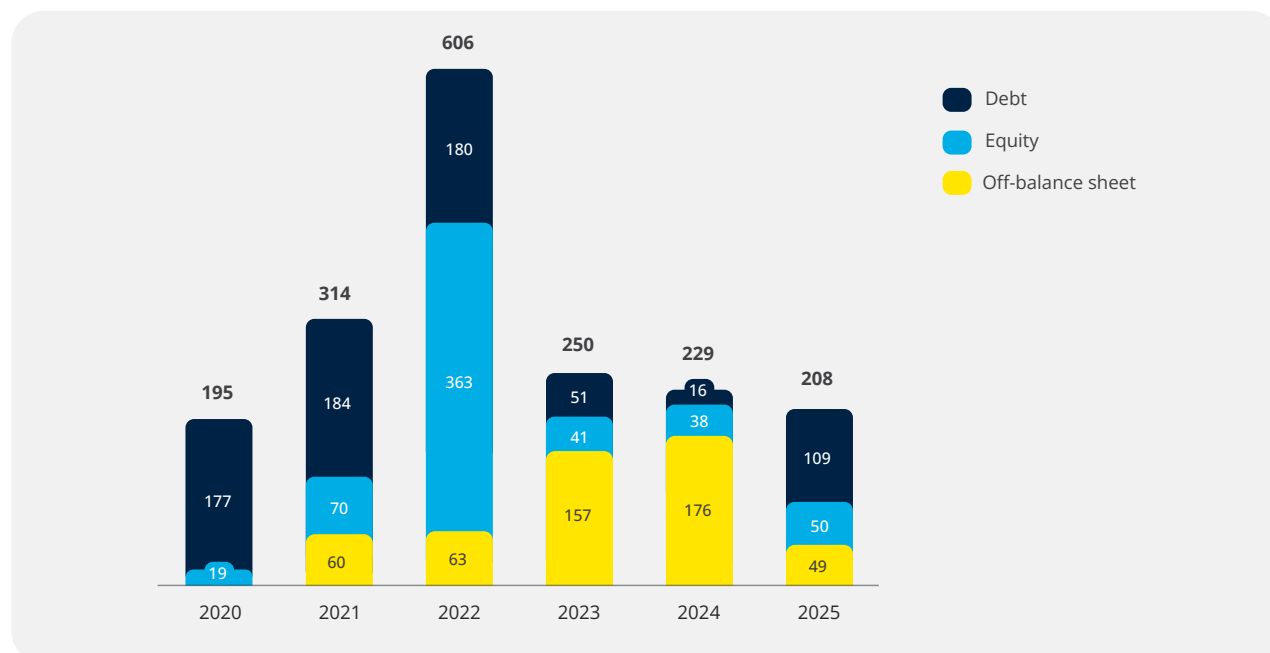
Nigeria accounts for 91% (USD 114 million) of the 2025 West African total, reflecting renewed investor appetite following a currency adjustment and the scaling of Nigeria DARES. East Africa's lower 2025 total likely reflects the timing of new deal signings rather than reduced appetite to invest in the region: East Africa remains the region's most developed OGS market, and the decline from 2024 to 2025 is mostly driven by a single large transaction in 2024.

3.2 Key Financing Trends

3.2.1 MARKET LEADERS CAN ACCESS AN INCREASINGLY WIDE RANGE OF FINANCING INSTRUMENTS

The market leaders raised USD 437 million in 2024-25, continuing to capture around 70% of overall corporate financing. The pool of market leaders able to absorb large-ticket investment has contracted, concentrating capital among a few winners (see [Chapter 1, Global State of the OGS Market](#)). Historically, investment in the OGS sector was concentrated among seven market leaders — Bboxx, d.light, ENGIE Energy Access, Lumos, M-KOPA, Sun King, and ZOLA Electric. Bboxx, Lumos and ZOLA have had to scale

back and restructure; M-KOPA pivoted away from solar into livelihood assets and digital finance in 2020, and ENGIE Energy Access was acquired by Ignite in 2025 (subsequently rebranded Ignite Energy Access). The number of market leaders receiving investment fell from six in 2020 to three by 2025 — Sun King, d.light, and Ignite Energy Access — with broadly the same volume of capital now flowing to fewer operators, through larger ticket sizes.

Figure 16: Total Private Investment for market leaders 2020–25 (USD Millions)

Source: GOGLA, [Investment data 2025](#)

Note: GOGLA datasets are revised between releases; minor differences in company coverage, reporting period, or classification can produce small variances between figures drawn from different GOGLA releases.

Market leaders such as d.light and Sun King are increasingly accessing off-balance sheet financing through securitization (Figure 16). Companies bundle pools of future customer repayments and sell the right to collect them to investors in exchange for upfront cash, which can then be recycled into consumer on-lending or other business needs – supporting liquidity and commercial health. This differs from an on-balance-sheet loan, where a lender extends credit against the company's balance sheet as a whole: securitization instead isolates specific, predictable cash flow and finances against that. This is why securitization remains largely out of reach for smaller PAYG companies: transactions require sufficiently large and diversified receivables pools, reliable portfolio-performance data, sophisticated servicing and reporting systems, and come with high fixed transaction costs.¹²⁷

The transition from equity towards off-balance sheet financing for market leaders is a sign of maturity increasing capital efficiency. After Sun King's USD 330 million Series D raise in 2022, equity investment

into market leaders dropped because need fell. Market leaders are increasingly able to self-finance from internally generated revenues and off-balance sheet financing, instead of diluting equity.

Off-balance sheet financing continues to oscillate year on year. Market leaders structure these facilities as multi-year vehicles rather than annual transactions,¹²⁸ so a quiet year does not signal declining access. Examples of off-balance sheet transactions include:

- July 2024: d.light closed a USD 176 million multi-currency receivable financing facility with African Frontier Capital to expand PAYG across Kenya, Tanzania, and Uganda.¹²⁹
- July 2025: Sun King raised USD 156 million in Kenyan Shillings through securitization, expected to finance approximately 1.4 million solar products and smartphones in Kenya.¹³⁰

127. Source: [ESMAP, Funding the Sun: New Paradigms for Financing Off-Grid Solar Companies](#), 2020

128. Source: [Africa Energy Portal, d.light Has Secured \\$718 million Across Five Facilities Since 2020](#)

129. Source: [Africa Energy Portal, d.light Has Secured \\$718 million Across Five Facilities Since 2020](#)

130. Note: A portion of the deal was excluded from GOGLA's 2025 investment data because it refinanced an existing securitization rather than providing new capital.

- July 2025: d.light expanded the "Brighter Life by d.light" (BLd) receivables facility capacity by over USD 300 million, pushing total capacity to USD 842 million.¹³¹
- June 2026: African Frontier Capital issued a USD 50 million green bond, fully guaranteed by the Green Guarantee Company and rated BBB by Fitch. Proceeds fund securitization vehicles backed by off-grid solar receivables from d.light, with the structure designed to be replicable. Arranged by Standard Chartered and listed on the London Stock Exchange's International Securities Market, it is among the first off-grid solar transactions to access public capital markets, attracting mainstream institutional investors such as Legal & General alongside impact investors including Calvert Impact Capital and Ceniath.¹³²

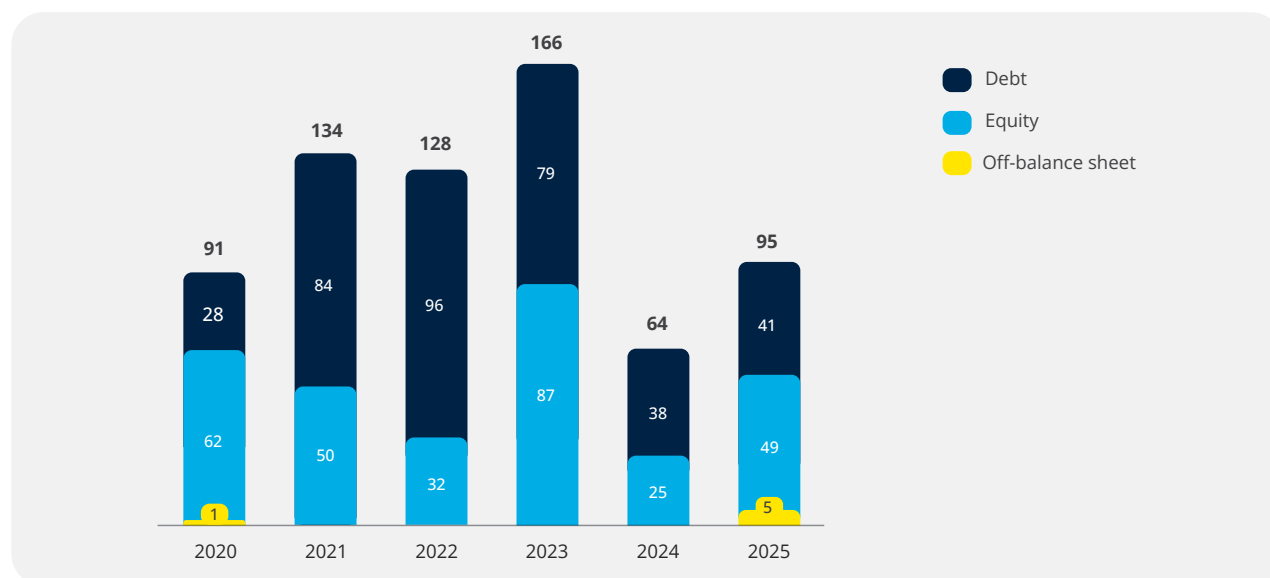
Pooled structures are being developed to extend off-balance sheet finance beyond market leaders. African Frontier Capital is establishing a USD 125 million multi-originator warehouse facility to aggregate receivables from multiple PAYG companies across eligible sub-Saharan

African markets. The facility will pool receivables from multiple companies and use subordinated blended-finance capital to protect senior lenders, allowing the overall structure to achieve greater scale and diversification.¹³³ Bridgin, developed by Solaris Offgrid, has been building a multi-originator platform that pools and standardizes smaller PAYG receivables, and in 2025 Bridgin and SunCulture announced a USD 15 million-equivalent off-balance sheet facility to finance farmer receivables in Kenya through a ring-fenced, local-currency vehicle.¹³⁴

Beyond off-balance sheet financing, market leaders continued to raise both equity and debt. Across 2024 and 2025 every disclosed market leader equity transaction went to Sun King: USD 20 million from LeapFrog in 2024, followed by USD 40 million from Lightrock, and a further USD 10 million from LeapFrog in 2025. Total debt for market leaders rose to USD 109 million in 2025, a level not seen since 2022. Notably, 82% of this debt (USD 89 million) was denominated in local currency, mostly through DFI lending (see section 3.2.4).

3.2.2 MID-SIZED AND SMALL COMPANIES CONTINUE TO HAVE CHALLENGES WHEN RAISING DEBT AND EQUITY

Figure 17: Total Private Investment for mid-sized and small companies 2020–25 (USD Millions)¹³⁵



Source: GOGA, [Investment data 2025](#)

Note: GOGA datasets are revised between releases; minor differences in company coverage, reporting period, or classification can produce small variances between figures drawn from different GOGA releases.

131. d.light Press Release, [d.light Expands 'Brighter Life by d.light \(BLd\)' Receivables Financing Facility. Extending the Capacity of its Securitization Structures to Over USD \\$842 Million. Enhancing Access to Clean Energy for Off-Grid Communities Across Africa](#), 2025

132. Source: ImpactAlpha, [D.light tops \\$1 billion in securitized financing](#), 2026; Standard Chartered, [Case study: African Frontier Capital](#), 2026

133. Source: IFC, [AFC Warehouse Facility – PAYGO Receivable Financing](#), 2026

134. Source: [SunCulture and Bridgin to Launch 15M USD Structure to Finance Climate-Smart Agriculture in Kenya](#).

135. Note: GOGA datasets are revised between releases; minor differences in company coverage, reporting period, or classification can produce small variances between figures drawn from different GOGA releases.

For mid-sized and small companies, debt availability has worsened. Debt financing for mid-sized and small companies fell from USD 175 million in 2022-23 to USD 79 million in 2024-25,¹³⁶ continuing a trend identified in the 2024 MTR, which found that over 60% of small and mid-sized OGS companies identified access to finance as a significant challenge. Debt remains largely inaccessible to smaller companies, due to a lack of collateral, track record, or systems needed to meet lender due diligence requirements.¹³⁷

Equity availability has worsened too, though with signs of recovery in 2025 (Figure 17). Mid-sized and small company equity fell 38%, from USD 119 million in 2022-23 to USD 74 million in 2024-25. However, it rose 91% between 2024 and 2025, from USD 25 million to USD 49 million — concentrated in larger investments to fewer companies with average ticket rising from USD 1.6 million to USD 6.5 million.¹³⁸ The mid-sized companies succeeding in raising equity remain focused on financial and operational discipline — tighter unit economics, stronger credit management, and leaner business models designed to reach profitability.

Small last-mile distributors have found it significantly harder to raise any kind of capital. The GDC's 2025 State of the Sector report covered companies with median revenue of around USD 200,000. Across 114 companies, the number raising any grant funding fell 40% between 2021 and 2023, those raising any debt fell 54%, and those raising any equity fell 75%.¹³⁹ The Regional Off-Grid Electricity Access

Project (ROGEAP) is playing a leading role in addressing this challenge in West Africa, by scaling up upfront grants with over USD 142 million deployed, to 165 mostly local companies in 12 countries, with a dedicated focus to Sahel countries.

Locally owned companies are struggling to secure growth-stage capital: in 2025 3.1% of total OGS funding went to locally owned companies.¹⁴⁰ USD 9.9 million was invested in locally owned companies in 2025, down 81% on 2024 values. And just 2.4% of all corporate investment went to women-led companies in 2025,¹⁴¹ despite many investors stating a desire to invest in women and classify investments as gender-smart investments.¹⁴² The challenges are related to scale: appropriately sized, smaller instruments are not readily available, and transaction costs are too high for existing industry investors to reduce ticket size.

Development partners are investing in facilities designed to deliver smaller ticket sizes and earlier-stage transactions, through de-risking, investor cost reduction, and company investment-readiness support. The GDC's Investment Catalyst Facility (backed by EnDev), Charm Impact's Hummingbird Fund (backed by Ikea Foundation), and Carbon Trust's forthcoming Venture Facility (backed by FCDO) are structured to make smaller, earlier-stage tickets viable, and have the potential to demonstrate scalable approaches that could be replicated through larger WBG programs.

136. Note: Figures are aggregated over two-year periods because annual debt volumes for smaller companies are lumpy and can be heavily skewed by a small number of large transactions.

137. Source: ESMAP, GOGLA and Dalberg Advisors, [Off-Grid Solar Market Trends Report 2024](#), 2024

138. Source: [GOGLA Investment data 2025](#)

139. Source: Global Distributors Collective, [Last Mile Distribution: State of the Sector Report 2025](#), 2025, p.27 and 32

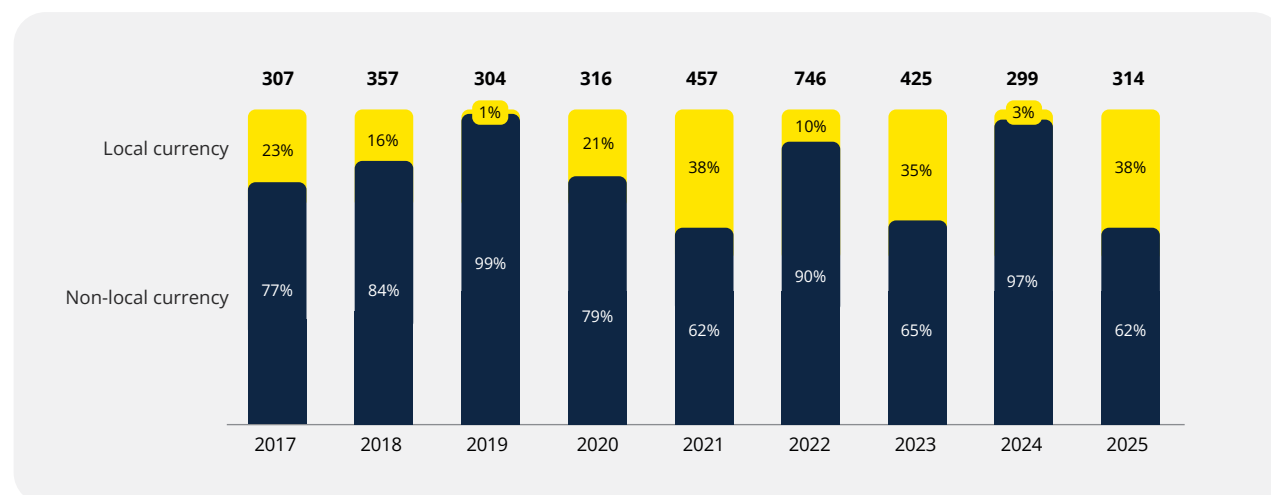
140. Source: [GOGLA Investment data 2025](#)

141. Source: [Dalberg analysis based on GOGLA Investment Data](#), 2025

142. Source: <https://www.2xchallenge.org/>

3.2.3 EMERGING LOCAL CURRENCY TRENDS

Figure 18: Investment amount split by type of currency, 2017-25 (USD millions)



Source: GOGA, [Investment data 2025](#)

Note: GOGA datasets are revised between releases; minor differences in company coverage, reporting period, or classification can produce small variances between figures drawn from different GOGA releases.

The share of total sector investment denominated in local currencies has oscillated over the past nine years, doubling or halving from one year to the next with no sustained direction (as illustrated in Figure 18). The pattern is transaction-driven: each peak and trough in the series corresponds closely to whether one or two large, locally structured deals closed in that year, rather than to a widening base of local currency lenders or products across the sector. A more consistent signal emerges when the data is examined by company stage.

Market leaders have succeeded in accessing local currency financing, most notably in Kenya, Nigeria, and Tanzania. Of the USD 128.6 million raised in local currency across 2024–25, 95% (USD 122 million) went to the market leaders, with a single naira-denominated IFC facility to Sun King accounting for USD 78.8 million. Local currency financing to mid-sized and small companies was 4% (USD 3.0 million) in 2024 and 3.3% (USD 3.6 million) in 2025 of total corporate financing.

A growing number of small and mid-sized companies have found innovative routes to local currency financing, with support from their investors. The most notable is Yellow Malawi, which negotiated with four investors - FEI OGEF, Oikocredit, Acumen's Hardest-

to-Reach Fund, and the Malawi Electricity Access Project - to borrow in hard currency but repay in Malawian Kwacha at a pre-agreed exchange rate. This structure effectively transferred currency risk to lenders willing to absorb it. Acumen's USD 2 million blended-currency loan within that package drew on a subsidy from the TXC EU Market Creation Facility to reduce hedging costs.¹⁴³ Easy Solar accessed USD 2.5 million in Sierra Leonean-denominated financing in 2023, and Baobab+ drew on XOF-denominated capital the same year.

World Bank-backed credit lines increasingly build foreign exchange risk mitigation directly into their design. Recent examples include Malawi's Electricity Access Project, Uganda's EASP, and Madagascar's DECIM project providing local-currency loans; Access to Distributed Electricity and Lighting in Ethiopia (ADELE) project offering local-currency windows through local banks; and Rwanda's Renewable Energy Fund Project matching local-currency loans to local currency revenues. Burundi's Soleil-Nyakiriza Project takes the most restrictive approach, prohibiting USD-denominated credit or disbursement to local suppliers entirely.¹⁴⁴ These trends should make it easier for mid-sized and small companies to access local currency financing in the future.

143. Source: Acumen, [Hardest-to-Reach initiative provides innovative blended-currency loan to Yellow Malawi to support energy access](#), 2024

144. Source: WBG data and analysis

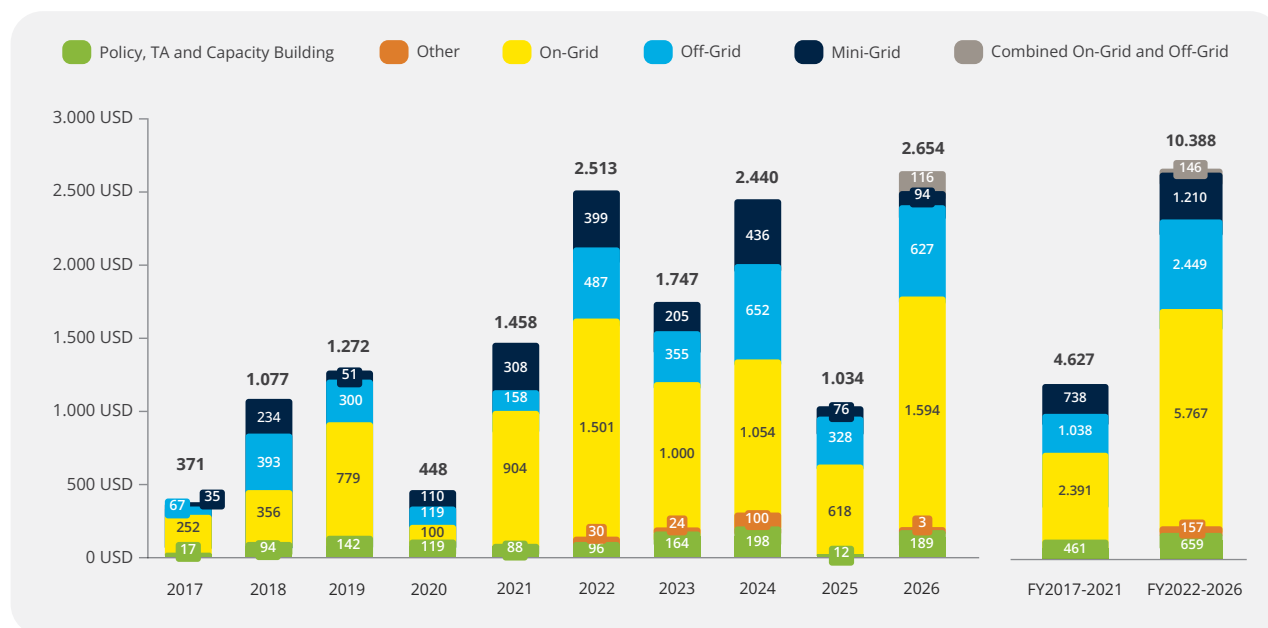
3.2.4 PUBLIC FUNDING IS STABLE, RBF COMMITMENTS ARE INCREASING, AND PROGRAM DESIGN IS IMPROVING

WORLD BANK PORTFOLIO TRENDS

Public funding for electricity access has risen substantially over the last ten years. The WBG, which provides an estimated 80%¹⁴⁵ of public funding for electricity access, made average annual commitments of nearly USD 2.1 billion in the five years from Financial Year (FY) 22 to FY26 compared to an average of USD 920 million a year in the previous five-year period. FY26 was a record

year with USD 2.6 billion committed. The share of funding for distributed renewable energy was stable at 38% in both five-year periods, with the share dedicated to off-grid solar also stable at around 23% of new electricity access financing commitments (Figure 19).¹⁴⁶ The remainder of this section focuses on off-grid solar. The methodology for mapping WBG commitments is set out in Annex D.

Figure 19: New World Bank and IFC Funding Commitments for Electricity Access by Sector and Year, 2017-26 (USD Million)



USD 974 million was committed by WBG for off-grid solar in FY25-26, essentially level with FY23-24.¹⁴⁷

Funding increasingly combines household electrification and productive use of energy (PUE) to maximize spending flexibility. FY25-26's share of commitments to households and PUE increased to 85.3%, from 72.6% in FY23-24, while commitments to public institutions decreased to 8.5% from 19.1%. Similarly, funding is increasingly allocated to DRE, rather than disaggregated by OGS, PUE, or mini grid.¹⁴⁸ Funding for technical assistance is expanding

beyond government capacity building to also support the private sector and financial institutions, through vehicles such as the ASCENT Project Preparation Facility. The reduction in new commitments for public institutions and TA in FY25-26 is linked to the timing of major project approvals, with projects including significant components that were launched in 2022 and 2024 still active. The TA numbers presented in Figure 20 represent off-grid-specific TA only, and therefore likely understate the total TA funding for the sector.¹⁴⁹

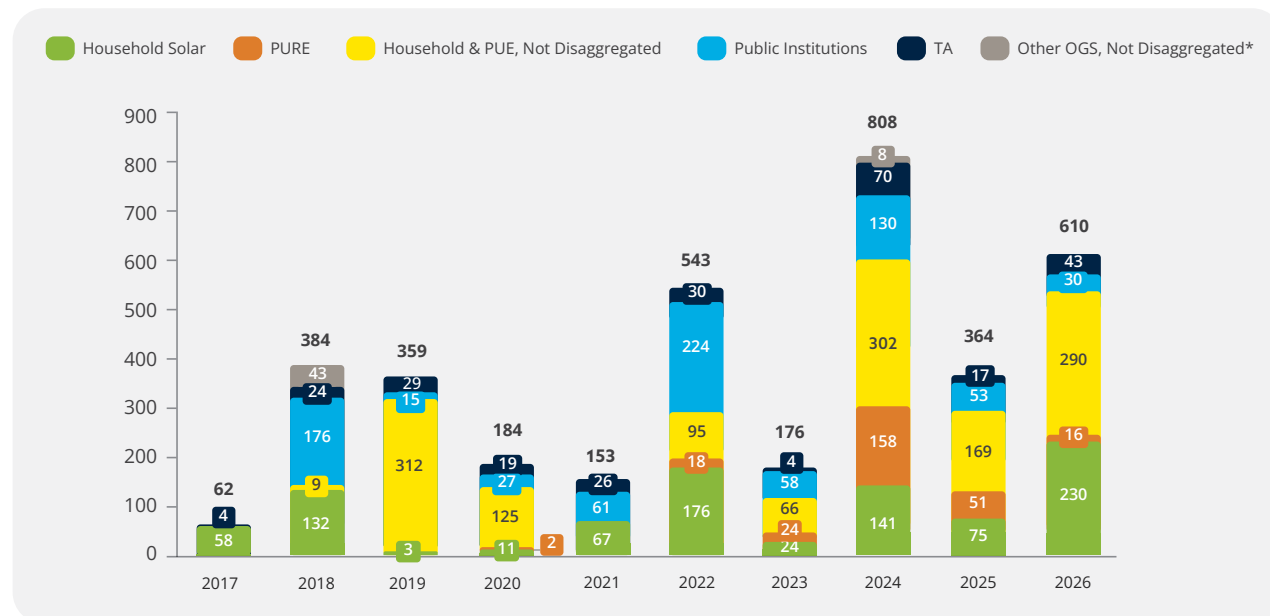
145. Note: This estimate is based on RBF - the only funding instrument where figures were available across funders - where the World Bank's share of funding was 78.7%. The World Bank's likely overall share is higher, given its substantial role in instruments such as credit lines and guarantees.

146. Source: World Bank Group, Energy and Extractives (EEX) Global Practice Operations Portal. Unpublished.

147. Note: The figures in the previous paragraph and figure 19 represent commitments at the time of appraisal and count technical assistance fully separately. This figure and all subsequent World Bank funding figures include off-grid specific technical assistance (TA), and reflect the latest committed funding, accounting for restructurings, additional financing, and - for completed projects - final spending totals.

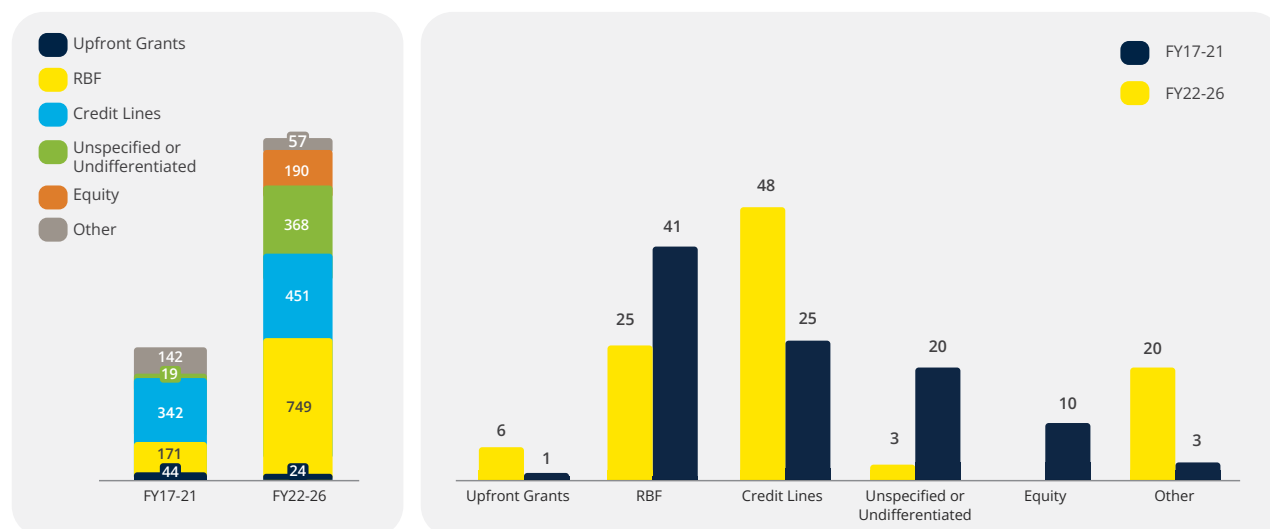
148. Note: Of the USD 627 million committed to off-grid electrification overall in FY26 (Figure 19) - including the USD 536 million committed to household and/or productive uses (Figure 20) - only USD 230 million was committed to standalone off-grid solar only.

149. TA was counted only if (1) an off-grid-specific TA component or sub-component was listed with itemized funding, or (2) the TA component related to a project for which >80% of total funding was for off-grid.

Figure 20: New World Bank Group Funding Commitments to Off-Grid Solar, by sub-Sector and Year 2017-2026 (USD Millions)

Between FY17-21 and FY22-26 the share of RBF financing for households and PUE grew from 24% to 41%, while credit lines fell from 48% to 25%, and upfront grants dropped from 6% to 1% (Figure 21). The Regional Off-Grid Electricity Access Project (ROGEAP) remains the main project deploying upfront grants, while smaller grant components sitting alongside RBFs support earlier-stage and/or PUE-focused companies in projects such as Madagascar's DECIM and Burundi's Soleil-Nyikiriza project.

FY25¹⁵⁰ recorded the portfolio's first equity commitments, which now make up 10% of FY22-26 commitments — including USD 55 million from the World Bank and USD 120 million from IFC to the Zafiri equity vehicle, and USD 22 million to the Mission 300 Patient Capital Facility, which will invest through Africa50 into established DRE equity funds. There is no pre-defined proportion or target of WBG DRE equity commitments specifically directed towards OGS.

Figure 21: World Bank Group Funding Mechanisms deployed to support household solar and productive uses, USD million amounts and percentage share of total, FY17-21 and FY22-26

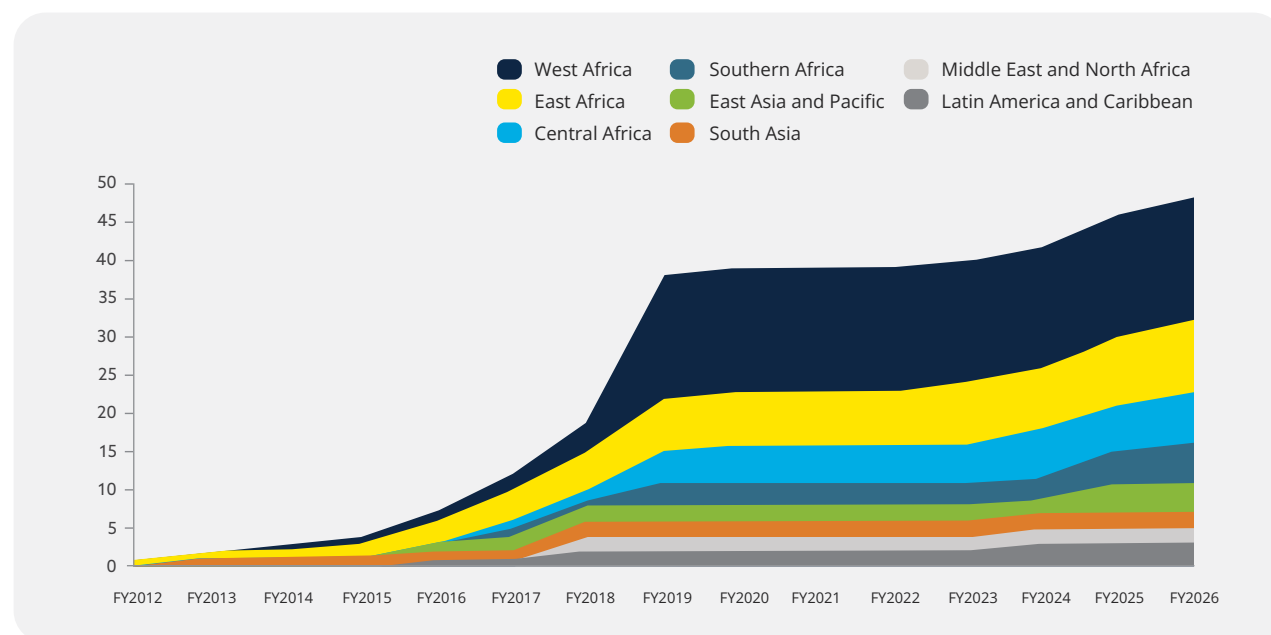
150. Source: <https://www.africa50.com/>

The WBG's off-grid portfolio is increasingly a group-wide commitment, deploying a broader range of financing and support instruments. IBRD and IDA lending remains the largest channel; the IFC is now providing debt and equity; MIGA is developing portfolio-level guarantees including for IFC's Zafiri fund; and the ASCENT Green initiative is working to access carbon financing. Regional projects such as ASCENT, Regional DARES, and ROGEP enable countries to access high-quality fund management and benefit from instruments that would be too complex or costly for individual countries to implement on their own, such as digital

Monitoring, Reporting, and Verification (dMRV) platforms, or carbon financing mechanisms.

The portfolio is also expanding geographically. Projects are reaching a wider range of countries than before, both within Africa and globally, including several countries using World Bank financing to support the off-grid solar sector for the first time, such as Papua New Guinea, Sudan, and Eswatini. Continued expansion of this kind is needed to reach the smaller, more nascent markets the portfolio has not yet covered.

Figure 22: Number of countries that have been covered by at least one World Bank-funded project with a dedicated OGS component (either active or closed), cumulative



According to GOGA's RBF database, updated to June 2026, USD 1.2 billion has been committed across 92 programs to date, of which USD 1.0 billion is committed across 56 currently active programs.¹⁵¹ 2026 saw USD 211 million in new commitments to OGS RBF - the second highest ever - driven by the launch of the Regional DARES project in West and Central Africa and the new ASCENT project in Madagascar.

Governments deploying World Bank IDA loans are the largest providers of OGS RBF, with development partners stepping back as governments scale the mechanism. The World Bank now accounts for 78.8% of committed RBF capital. Beyond the Grid Fund for Africa has disbursed USD 26 million to date, with an additional USD 100 million committed through 2030.¹⁵² GEAPP spending has increased from USD 2.1 million in 2022–2023 to USD 63.4 million in 2024–2025: with funding mainly allocated to mini grids, and some focus on productive uses and public institutions.¹⁵³

151. Note: Figures were updated by GOGA for this report and are not yet published; GOGA's published 2025 figures are USD 1.1 billion across 92 programmes, with USD 881 million across 52 active programmes. Updates will be reflected in GOGA's 2026 RBF dashboard.

152. Source: Day, E., Gogoi, E., Lichty, S. & Trace, S. (2026). *Beyond the Grid Fund for Africa Mid-Term Evaluation: Final Report*. Oxford Policy Management and Greencroft Economics, commissioned by NEFCO

153. Source: GOGA RBF database, updated to June 2026. Data provided for this report; not yet published.

Where RBF is well designed, the effect on market growth is striking, but poor design and slow disbursement can have a negative impact on commercial performance and investor confidence.

Analysis of results-based financing programs finds solar home system sales growing at compound annual rates of 75% in Nigeria (2018–2022), 120% in Malawi (2019–2021) and 159% in Mozambique (2018–2022) during the active RBF phase, with solar water pumps growing 117% a year in Kenya (2019–2021).¹⁵⁴ A review of RBF programs by GOGLA found recurring design weaknesses: several RBF programs set subsidies too high and program funds were exhausted before new funds could be approved, leading to a gap in RBF availability; stringent eligibility requirements, along with limited ability to adjust pricing as conditions changed, discouraged newer and smaller companies from participating; others failed to incentivize sustained energy access (see Chapter 4, Sustaining Access through OGS).¹⁵⁵ The same review found that RBF disbursements often lag claim submission by up to 18 months, creating unanticipated liquidity crunches for companies which hit smaller, capital constrained, companies hardest. Consultations with investors for MTR 2026 found that uncertainty around the amount and timing of RBF payments can make an RBF-backed company look riskier.¹⁵⁶

“First-come-first-served” approaches to RBF disbursement can lead to prioritization of sales over right-sizing product offerings to meet customers’ ability to pay and thus sustain access; while untargeted subsidies can result in companies targeting cheaper-to-reach, under-the-grid areas rather than delivering first-time access. In contrast, subsidies that are only available for remote rural areas risk undermining commercial performance, pulling companies into more resource intensive areas, leaving them stranded if RBF programs end abruptly without a clear exit strategy. The complexity of RBF targeting must be aligned with institutional capacity, or further delays and challenges can be expected to materialize.

Subsidy design is set through dialogue between governments, funders, and other key stakeholders: lessons are being learned, and programs adjusted to address evidenced shortcomings. For example, Nigeria transitioned from an untargeted approach under the Nigeria Electrification Project (NEP) to excluding urban areas and using a vulnerability access index for geographic targeting under the DARES project.¹⁵⁷ In Rwanda, EnDev transitioned from fixed subsidy levels based on product categories, to more targeted subsidies linked to the Ubudehe poverty categories, before this approach was scaled by the government through the Renewable Energy Fund.¹⁵⁸

3.2.5 PRODUCTIVE USE OF ENERGY FINANCING IS INCREASINGLY IMPORTANT TO DONORS

PUE investment volume has remained relatively stable over the past five years, but the nature of investment is changing. As with other OGS product categories, a single year peak in investment may be attributable to raises from a small cluster of companies and does not

necessarily represent a trend: the 2023 peak seen in Figure 23 was largely due to ECOZEN and SunCulture raises. The 2025 trend shows an annual 14% increase in PUE investment value, and an increasing number of companies securing investment.¹⁵⁹

154. Source: GOGLA, [Unlocking Off-Grid Solar: How Results-Based Financing is Driving Energy Access and Powering Productivity](#)

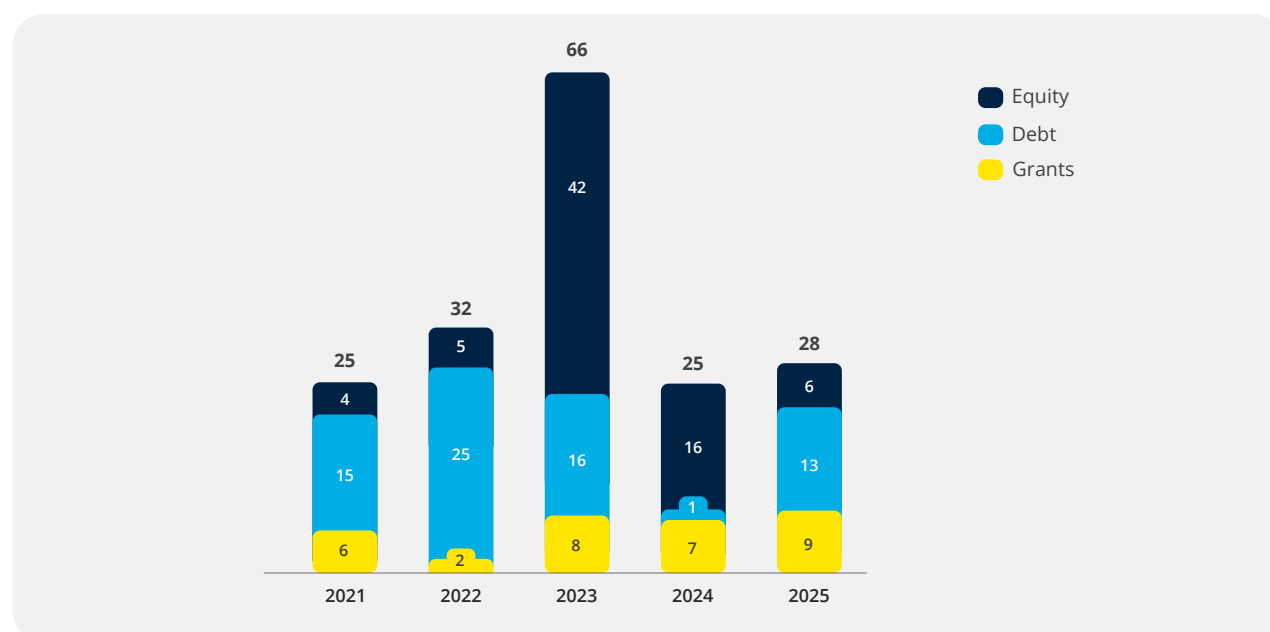
155. Source: GOGLA, [Revamping Results-Based Financing](#)

156. Source: Investor survey conducted by Dalberg, 2026

157. Source: Nigeria Rural Electrification Agency, [DARES Project](#)

158. Source: EnDev, [How Shifting to a Pro-Poor Approach Accelerated Energy Access in Rwanda](#), 2026

159. Source: GOGLA, [The Sector is Maturing: Capital is Concentrating](#), 2026

Figure 23: Productive Use Investments reported by companies to GOGLA, by type and year (USD millions)

Source: GOGLA, [Investment data 2025](#)

From 2022–23 to 2024–25, average ticket sizes fell across all instruments while the number of transactions rose from 79 to 118. For debt and equity, the number of transactions held roughly steady, falling from 36 to 34, while the average debt ticket fell from USD 2.4 million to USD 1.0 million and the average equity ticket fell from USD 2.5 million to USD 1.1 million. Grants moved differently. Grant funding rose from USD 10 million to USD 16 million, but the number of grants nearly doubled, from 43 to 84, so the average grant fell by less, from USD 220,000 to USD 187,000.¹⁶⁰

Grant funding is increasingly concentrated on PUE, as development partners prioritize job creation and economic opportunity development.¹⁶¹ PUE's share of OGS grants roughly doubled, from 35% in 2022–23 to 71% in 2024–25.¹⁶² Donors have taken proactive steps to increase support to early-stage, locally owned companies, in the form of grants and technical assistance.¹⁶³ According to the 2026 Scaling Potential Report, cooling accounted for the largest share of support agreements (48%), followed by irrigation (35%), and agro-processing (17%).¹⁶⁴

Companies that receive both grants and technical assistance are more likely to go on to raise commercial capital. Of the 127 productive use companies supported by CROWD members, 28 (22%) have gone on to raise private investment, typically between one and five years after first receiving support. Those receiving both grants and technical assistance were more likely to secure follow-on capital (33%) than those receiving grants alone (19%) or technical assistance alone (10%).¹⁶⁵

Companies given grants and TA separately in sequence were far more likely to raise capital (47%) than those given the two bundled together in a single package (21%).¹⁶⁶ Bundled TA is typically pre-packaged and delivered on a fixed schedule set before the funder knows what the company will need. Sequenced support, by contrast, is delivered in response to company needs. TA offered upfront can shape how a grant gets deployed, while TA offered after a grant can address gaps that the company's own progress has revealed. This suggests that funders should treat grants and TA as distinct stages of their support to a company, revisiting critical challenges that TA can address as the company's trajectory becomes clearer. The Scaling Potential Report stated that just three PUE companies, SunCulture, ECOZEN and Izili,¹⁶⁷ secured 70% of publicly disclosed commercial capital.

160. Source: GOGLA, Investment data 2025, 2026. Transaction counts and average ticket sizes are based on GOGLA's transaction-level data.

161. Source: [AECF, Global Energy Alliance for People and Planet, Ikea Foundation, OECD, Shell Foundation, SNV, World Bank](#).

162. Source: GOGLA, [Investment data 2025](#), 2026

163. Source: Efficiency for Access, [Scaling Potential](#), 2026

164. Note: data reported as of June 2025, [Scaling Potential](#), 2026

165. Source: Efficiency for Access, [Scaling Potential: Strengthening Early-Stage Support for PURE Companies](#), 2026

166. Source: Efficiency for Access, [Scaling Potential: Strengthening Early-Stage Support for PURE Companies](#), 2026

167. Note: Izili (ex Baobab+) raised capital for operations that extend beyond PUE

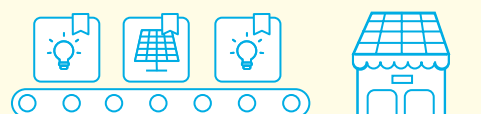
CHAPTER 4

Sustaining Access through Off-Grid Solar (OGS)



Key Messages

- ▶ **Tier 1 SHS serve different purposes depending on market context:** providing first-time electricity access, upgrading from smaller or lower-quality solar products, or as a back-up to unreliable and costly grid or generator power. MTR 2026 household research found evidence of movement up the energy access staircase, and latent demand for progression towards higher levels of service. There were also reported instances of lateral and downward movement on the energy staircase, with some customers shifting to SHS as the primary source of energy in the face of expensive unreliable grid or fossil-fuel powered generator connections, and others reverting to traditional energy sources while OGS products underwent repair or ceased functioning.
- ▶ **Customer experience of repair was identified as an area for improvement.** Nearly four in ten customers surveyed for MTR 2026 reported at least one technical issue since acquiring their product, and only 36% of those felt it had been satisfactorily repaired or replaced. Dissatisfaction rose sharply once products were out of warranty and stemmed mainly from not knowing where to obtain a repair, the cost of out-of-warranty repair, and the distance to repair services, while in-warranty customers were frustrated by repair times. These findings highlight the growing importance of repair ecosystems in sustaining electricity access over time.
- ▶ **Product durability findings challenge assumptions about short OGS product lifespans.** 95% of PAYG customers surveyed reported that their quality-verified Tier 1 SHS was still functional four or more years after purchase. OGS companies are more confident in the durability and longevity of products, increasingly extending warranties and marketing promises well beyond the 2-year-minimum industry standard. Government subsidized access programs are also increasing minimum warranty length requirements.
- ▶ **When products are no longer functional or repairable, they are rarely discarded.** Two-thirds of people surveyed who owned some form of non-functional OGS product planned to keep it at home, consistent with earlier Global LEAP research showing that customers perceive residual value in retained products rather than treating them as waste — with implications for future repair markets, second-life use, and e-waste planning.



This chapter provides new insights into product lifespans and what happens when products need repair, or reach end-of-life. The findings are based on customer surveys conducted by 60 Decibels with 458 PAYG SHS household customers in May 2026 across Kenya, Madagascar, and Nigeria, served by 5 OGS companies. The survey focused on four topics: movement along the energy staircase, product lifespans, repair experiences, and product end-of-life outcomes.

See [Annex E](#) for the sample breakdown by country and the customer survey instrument and methodology.

4.1 Movement on the Energy Staircase

Many customers transition from solar lanterns or smaller SHS to quality-verified Tier 1+ systems. MTR 2026 research found that in Kenya and Madagascar approximately 40% of respondents currently using Tier 1 SHS were previously using smaller solar products as well as other sources of lighting, while 60 Decibels' Why Off Grid Matters 2024 report,¹⁶⁸ which surveyed 38,630 customers serviced by 75 companies, reported that only 10% of Tier 1 SHS customers previously owned a solar light. Available research indicates that movement along the energy staircase differs significantly by country and is not always linear.

Energy stacking is common, and traditional fuels are sometimes used alongside modern energy. Most respondents reported using multiple energy sources pre-SHS uptake. Excluding Nigeria, around 40% used small solar lanterns, 40% used kerosene lamps, 25% used torches, and 21% used candles. Respondents were not asked whether they continued to use these sources after adopting the Tier 1 SHS, however GOGLA research from 2020 found that 26% of OGS users continued to use traditional sources for additional points of light.¹⁶⁹ Energy stacking requires further research, particularly for accurate carbon credit accounting.

In Nigeria, SHS have been adopted to improve energy reliability and reduce costs, representing lateral, or downward, movement on the energy staircase. 17% of respondents reported switching from the grid or fossil-fuel powered generators to SHS as the primary source of energy in the face of outages or rising fuel costs. One respondent stated, *"fuel later became very expensive... after purchasing the solar lights, I stopped using the generator completely,"* while another lamented, *"I still pay electricity bill even though I don't get light in my house from NEPA."* Many MTR 2026 survey respondents in Nigeria reported using their Tier 1 SHS as a backup source providing resilience in the context of unreliable grid or generator fuel supply. A 2026 Sun King proprietary customer study found that 37% of the 2,000 surveyed households use SHS as a secondary power source. Back-up power is an important part of the energy access matrix, requiring further investigation.¹⁷⁰

Reducing energy expenditure is the most cited driver for SHS adoption, and 72% of customers reported making savings after adoption. Respondents frequently mentioned the high cost of kerosene, candles, batteries, generator fuel, and electricity bills, and reported using savings on food, school fees, business expansion, and health – demonstrating how OGS is also an enabler of other development goals.

While nearly half of respondents indicated they would consider a product upgrade, only one-third were contacted with an offer to do so. Participating companies were interviewed about their up-selling and cross-selling functions: customer eligibility criteria, timing, product range and staff capacity were cited as the likely causes for limited follow-up. Survey responses suggest that some customers are interested in additional power and productive-use equipment. Further research on ability-to-pay would be needed to determine whether these responses represent an untapped commercial opportunity.

Although movement on the 'energy staircase' was typically towards higher levels of service, lateral and (temporary) downward movement was also observed. Many households progressed from candles, kerosene, torches, solar lanterns, and small SHS toward larger and more durable solar systems. Some Nigerian households transitioned from a grid connection or generator connections to Tier 1 SHS as the primary source of energy, despite (potential) capacity being significantly lower. Kenyan and Malagasy households reported reverting to traditional energy sources during repair or when products failed, with one respondent *"back to purchasing candles,"* another to purchasing *"a battery powered torch as back up,"* and several respondents mentioning using phone light, candles, torches, or kerosene lamps. This finding is supported by a 2026 SolarAid repair survey,¹⁷¹ which found that during SHS repair, 29% of customers temporarily reverted to candles or kerosene, and 8% reported having no lighting source. These findings illustrate how sustained access is at risk when there is no viable repair offer available.

168. Source: <https://60decibels.com/wp-content/uploads/2024/03/Why-Off-Grid-Energy-Matters-2024-60dB.pdf>

169. Source: GOGLA, [Powering Opportunity in East Africa](#), 2019

170. Source: ESMAP-SEforAll, Technical Note Series – MTF x M300, 2026

171. Source: SolarAid, [State of Repair in the Off Grid Solar Sector](#), 2024

4.2 Product Lifespans

OGS solutions are a core component of the electricity access matrix, and steps are being taken to ensure that access is sustained, or that higher levels of service are achieved, beyond the first-life of solar products. OGS is a legitimate provision of electricity and will continue to be the primary source of sustained access for hundreds of thousands of households and MSMEs for decades to come. OGS is not (only) a pre-electrification solution, providing first-time access until the grid arrives.

Development partners and governments are increasingly focused on how to ensure electricity access delivered through OGS is sustained over time. A greater emphasis is being placed on maintenance, repair, and component replacement. Rwanda's rural electrification plans have included OGS for more than a decade; the growing failure rate of the aging asset base has led the government to consider battery replacement schemes and explore building a requirement for 'easy' battery replacement into future programs.

Although some stakeholders have expressed concern around SHS lifespans, the survey found that 95% of quality-verified Tier 1 SHS are functional 4+ years post-purchase.¹⁷² All respondents had purchased a Tier 1 SHS on a PAYG contract that they had completed at least two years prior.¹⁷³ These findings contribute to a growing body of evidence that quality-verified SHS remain functional for considerably longer than the current GOGLA Impact Metrics¹⁷⁴ product lifespan assumptions, which shall be revised in the coming year.

After years of continual improvement, OGS companies are more confident in the durability and longevity of products, increasing warranties and marketing claims to reflect 5–10-year product lifespans. In 2026, d.light increased the warranty period on its SHS and inverters to 5 years and Sun King began advertising the HomePlus Max system as having a 10-year lifespan.¹⁷⁵ These assurances became possible due to incremental product improvements and adjustments in aftersales care, in addition to product longevity being proven through multi-year multi-country company research with customers on product lifespan. Other manufacturers are likely to follow suit, as companies and investors increasingly recognize product longevity and responsible aftersales as drivers of growth, customer retention, and long-term value creation,¹⁷⁶ while governments and development partners increasingly focus on sustained access rather than sales. The Nigeria DARES RBF program, for example, requires participating SHS companies to provide 5-year warranties for their products.¹⁷⁷

172. Source: Customer Sustainability Access Survey, June 2026 (N=458); "Non-working products" refers to cases where customers, 2+ years after completing their PAYG contract, stopped using the system and cited the product not working as the reason.

173. Note: Tier 1 SHS contracts are generally 12-18 months. Accounting for delayed repayment, most completed contracts are paid off in 24 months.

174. Source: GOGLA, [Standardized Impact Metrics for the Off-Grid Solar Energy Sector](#), 2020

175. Source: d.light and Sun King customer research

176. Source: GOGLA's "Strengthen and Scale" initiative

177. Source: World Bank, [NIGERIA DARES Project Implementation Manual](#), 2024



How OGS Companies Honor Warranties and Offer Repair Services

Affiliate OGS providers ensure that customers have access to aftersales care during the **manufacturer warranty period**, which in the case of PAYG sales often overlaps with the contract repayment period. For issues arising from product faults, rather than misuse, repair or replacement is provided free of charge. Damage caused by misuse, or product failure that manifests after the manufacturer warranty period (1-3 years), is considered out-of-warranty (OOW), and the cost of repair or replacement, if possible, is borne by the customer.

Vertically integrated repair – companies engaged in both manufacturing and distribution develop complex hub-and-spoke repair operations to enable fast, cost-efficient, repair or component replacement. Staff are trained to replace components and to conduct repairs on circuit boards and ports; economies of scale enable procurement of spare parts; harvesting and reuse of parts is maximized to keep costs down; e-waste is stored responsibly and disposed of in bulk where facilities exist.

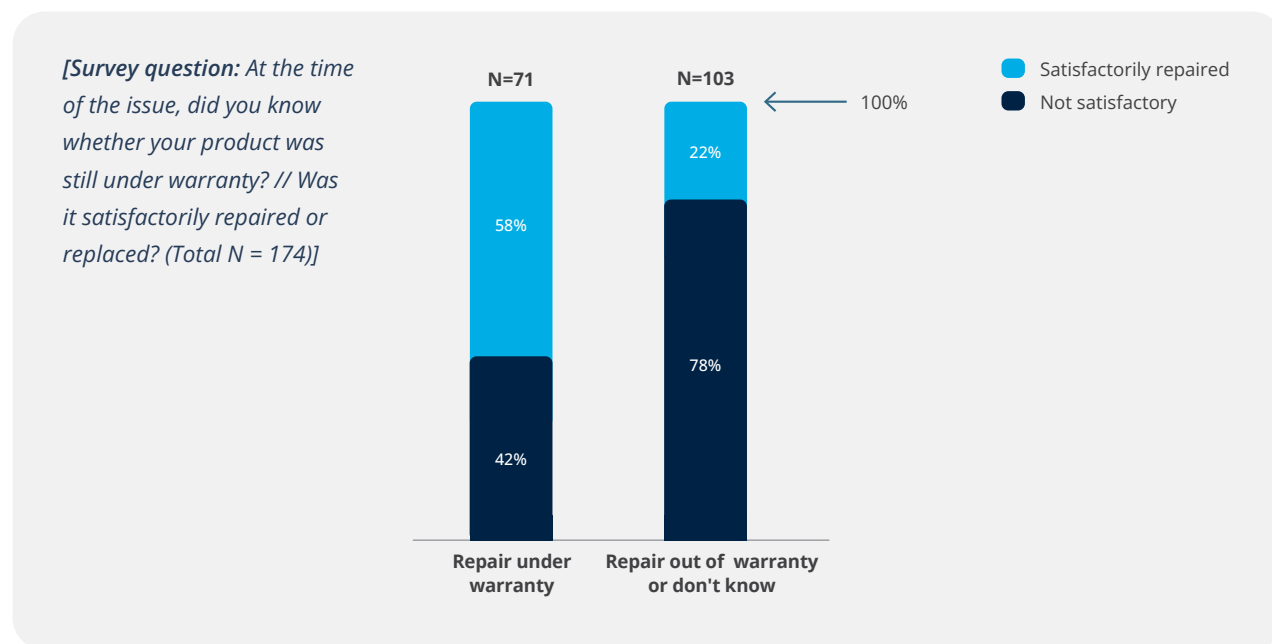
Distributor repair – local distributors of quality-verified products often operate at a much smaller scale, with fewer resources, and a primary focus on sales and distribution. Until they reach a certain scale, they are not authorized to carry out repairs that maintain the manufacturer's warranty. Instead, manufacturers supply them with replacement units in proportion to expected failure rates, so faulty products or components under warranty are swapped out rather than repaired. Distributors that want to repair closed-box systems themselves - particularly out-of-warranty products - struggle to obtain spare parts, either because manufacturers' minimum order quantities are too high or because products are no longer in production.¹⁷⁸

The MTR survey showed high rates of dissatisfaction with repair, with the causes most linked to low awareness, low availability, and cost, rather than unsuccessful repair outcomes. Although 95% of customers reported that their SHS was functional 4+ years post-purchase, 38% reported having had at least one technical issue so far, and only 36% of those felt that their product was satisfactorily repaired or replaced. The most common barriers were not knowing where to obtain repairs (27%), out-of-warranty repair costs being too high (15%), perceptions that products were not repairable (12%), and the absence of nearby repair services (11%). Similarly, in SolarAid's 2026 multi-country repair survey, dissatisfaction was principally due to long turnaround times, distance to repair centers, and repeat failure post repair. Taken together, the findings suggest that investment in repair infrastructure would increase satisfaction and meaningfully extend product lifespans.

MTR research found that dissatisfaction with repair increased significantly once products were out-of-warranty (see Figure 24). In-warranty customers were frustrated by time to repair, while out-of-warranty dissatisfaction was related primarily to lack of known repair options nearby and the cost of repair. The 2026 SolarAid research identified that repeat failure was common after out-of-warranty repair, particularly when the original product provider is unable to perform repairs and informal providers are called upon, who may lack appropriate skills, tools, or quality parts. The study concludes that availability of quality spare parts is the primary barrier to successful and timely repairs.

178. Source: SolarAid, [State of Repair in the Off Grid Solar Sector](#), 2024

Figure 24: Repair experience satisfaction for SHS products (Yes/No) – comparison across products in and out of warranty.



Source: 60 Decibels, Customer Sustainability Access Survey, June 2026.

The OGS sector is mobilizing to strengthen repair ecosystems and improve repair experiences. The Off-Grid Solar Repair Lab, launched in 2026, aims to test scalable models that could expand repair options for

customers with out-of-warranty products. Reports such as SolarAid's State of Repair series have helped elevate repairability as a core issue – linked to both sustained access and sustainability.

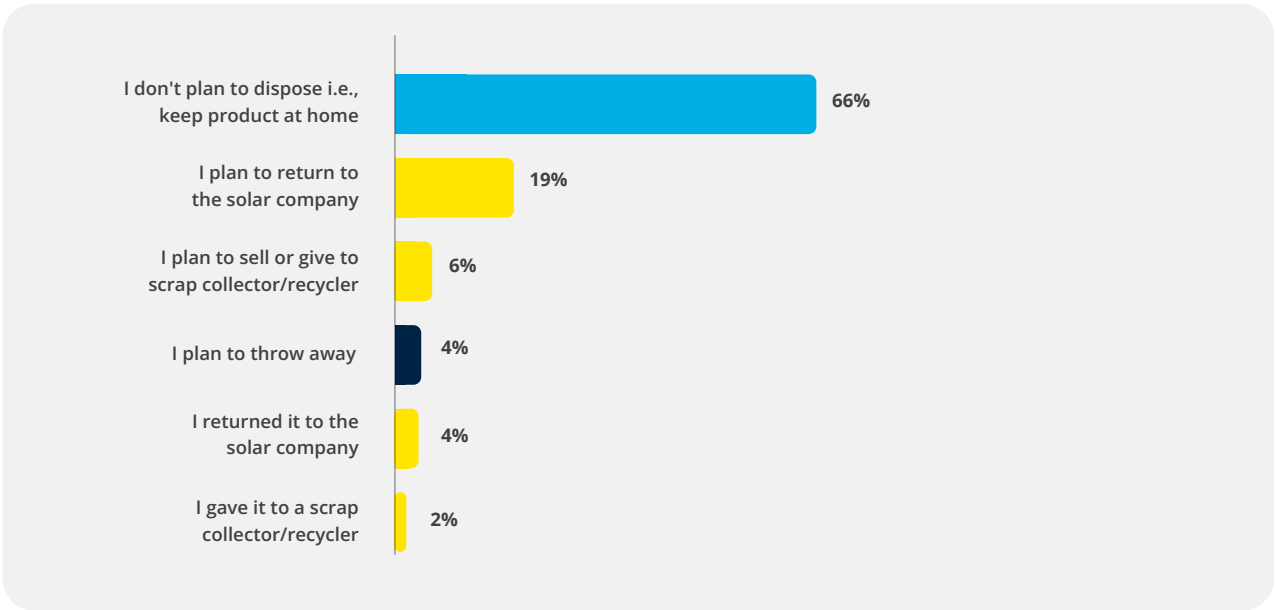
4.3 Product End-of-Life Outcomes

Solar products are rarely disposed of, even when they are no longer functional or repairable. MTR survey respondents were asked if they owned, or had owned, any non-functioning solar products, and what they intended to do with them - 66% planned to keep them in the home. This adds weight to the findings of the 2019 Global LEAP Solar E-Waste Challenge, where research across multiple countries among the customers of large and small OGS distributors, showed that customers generally do not view non-functioning

off-grid solar products as waste.¹⁷⁹ Instead, products are retained in the household and perceived to retain residual value, due to the household investment in the product and the potential that they may be repaired one day. This suggests significant latent demand for repair. If companies are incentivized to offer affordable repair services and to inform customers about them, uptake is likely to be high, helping to sustain access while minimizing e-waste.

179. Source: Efficiency for Access, [Innovations and Lessons in Solar E-Waste Management: Global LEAP Solar E-Waste Challenge](#), 2021

Figure 25: Distribution of End-of-Life Outcomes for SHS
[Survey question: Do you currently own a non-working unit, if yes, how do you plan to dispose of it? (N=114)]



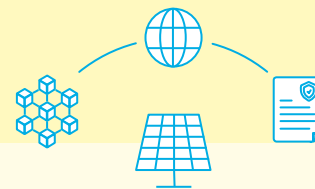
Source: 60 Decibels, Customer Sustainability Access Survey, June 2026.

CHAPTER 5

Policy and Planning



Key Messages



- ▶ **Off-grid solar (OGS) continues to move up the international agenda, with growing recognition of its critical role in achieving universal access and driving economic growth.** Mission 300 aims to connect 300 million people in sub-Saharan Africa by 2030, with half of new connections expected to come from DRE, and is driving OGS integration into national electrification planning. The G7 and G20 have also called for greater private investment in decentralized energy.

- ▶ **Enabling environments for OGS have matured since 2020, and electrification planning is beginning to reflect how OGS is delivered and paid for.** RISE scores improved across all off-grid indicators between 2020 and 2023, though progress on pro-poor subsidies and e-waste regulation has lagged. Least-cost planning is beginning to shift from a target level of service toward affordability and demand, with early evidence that this favors standalone solar and lowers overall investment requirements.

- ▶ **Mission 300's National Energy Compacts mark a step change in government recognition of OGS, but early implementation is mixed.** Some countries have used the Compacts to recognize OGS in national electrification strategies or set OGS-specific targets for the first time, and several include productive use alongside access goals. The first Compact Progress Reports show governments prioritizing enabling frameworks, with Lesotho adopting a National Electrification Strategy that includes annual off-grid targets, and Chad and Madagascar advancing off-grid regulation. Elsewhere, key initiatives have been delayed, including Nigeria's updated electrification strategy and Malawi's proposed off-grid investment fund. With PUE cutting across energy, agriculture, finance, and industry ministries, translating productive use commitments into delivery will depend on strengthening cross-sector collaboration.

- ▶ **Fiscal incentives are increasingly used to improve affordability, but remain vulnerable to reversal.** The share of RISE countries with duty or tax exemptions for standalone systems rose from 57% to 69% between 2020 and 2023, and 70% of Compacts include fiscal measures for DRE. VAT exemptions linked to product quality standards, and customs enforcement, remains an area for further strengthening. Yet governments are revisiting exemptions to meet revenue goals, as recent changes in Kenya, Pakistan and South Africa show.

- ▶ **PAYG financing is attracting dedicated regulatory attention, with significant implications for sector costs and growth.** Kenya's 2026 reforms bring PAYG under financial services regulation, which could strengthen portfolio discipline but will raise costs and may slow customer acquisition. Stakeholders increasingly favor bespoke, proportionate PAYG frameworks over regulation designed for banks, MFIs or hire-purchase providers.

- ▶ **Quality assurance infrastructure is maturing, but enforcement gaps and an underdeveloped regime for productive-use equipment remain.** 28 countries apply IEC-harmonized standards, 11 as a condition of legal importation, and Lesotho, Liberia and Namibia are building the systems needed to restrict tax exemptions to products that meet quality standards. IEC and VeraSol reforms are reducing certification costs, but weak enforcement still lets non-verified products circulate widely. For productive uses VeraSol tests but does not yet certify products and is developing rapid assessment methods for nascent technologies. Certified installers and firms are increasingly needed for larger, component-based PUE systems.

- ▶ **Extended Producer Responsibility (EPR) and Environmental, Social and Governance (ESG) requirements risk outpacing e-waste infrastructure, and repair, not recycling, is the more realistic near-term lever.** Where collection and treatment capacity is absent, EPR fees fall on compliant, quality-verified companies while others escape the net. Kenya's new EPR legislation, emphasizing design for reuse and take-back, offers an early example of a better-sequenced approach.

5.1 OGS on the International Agenda

Since 2024, Mission 300 has helped to push energy access up the international agenda, while elevating the critical role of OGS in achievement of energy access goals. Mission 300 aims to extend first-time electricity access to 300 million people in Africa by 2030, with about half of new connections coming from DRE.¹⁸⁰

Mission 300 is also driving a shift beyond 'connections', towards energy as an enabler of jobs, enterprise growth, and improved livelihoods.

Many national energy compacts place productive use and economic transformation objectives alongside electrification targets. Since its launch, 130,000 businesses have gained access to electricity, 57,000 have adopted productive use of energy equipment, and 21,000 social and public institutions have been electrified.¹⁸¹

The G7, G20, and other major global forums have called for increased private investment in DRE. The 2024 G7 communiqué explicitly called for investment in standalone generation, off-grid and mini grids in developing countries.¹⁸² Initiatives like Energy for Growth in Africa will use public and concessional finance to develop bankable projects and attract private capital.¹⁸³ Similarly, Brazil's G20 Clean Energy Investment Roadmap set out actions to reduce risk and financing costs in developing economies.¹⁸⁴ South Africa's 2025 G20 presidency made financing decentralized energy access a formal priority.¹⁸⁵

5.2 National Policy and Planning Trends

Policy and regulatory reform continue to be important enablers of off-grid solar market growth. The off-grid solar (OGS) indicators under the ESMAP Regulatory Indicators for Sustainable Energy (RISE) framework, demonstrate a maturing enabling environment for the sector across many countries. Over

the past 15 years there has been an evolution in policy and regulatory dimensions, including electrification planning, legal recognition of off-grid providers, quality assurance standards, consumer protection, affordability mechanisms, access to finance, and monitoring systems for rural electrification (see Figure 26).

180. Source: World Bank Group, [FAQ: Mission 300, 2024](#).

181. Source: [Mission 300 Progress Portal](#). The Mission 300 methodology can be found here <https://www.worldbank.org/ext/en/energizingafrica/faq#1>

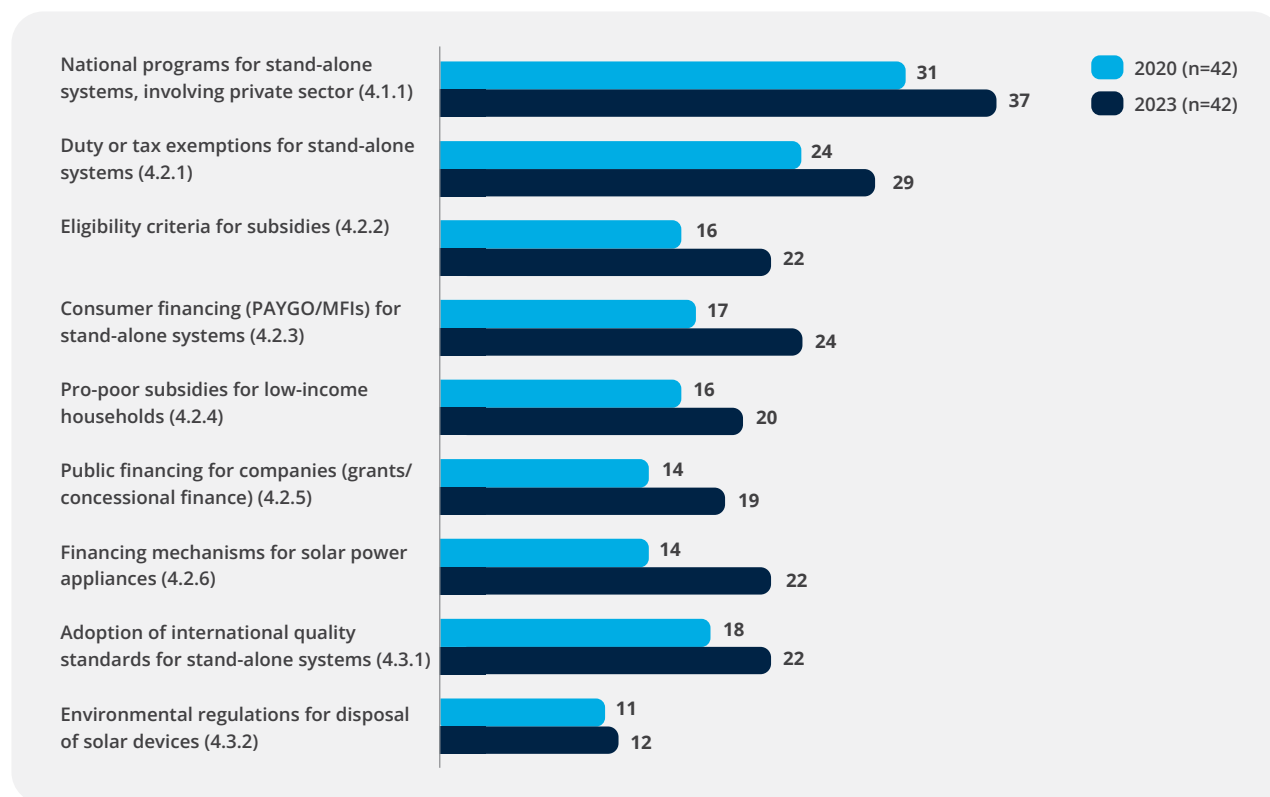
182. Source: G7 Italia, [Climate, Energy and Environment Ministers' Meeting Communiqué](#), 2024

183. Source: G7G20, [Joint statement on Energy growth in Africa](#), 2024

184. Source: IEA, [IEA Contributions to the G20: Brazil](#), 2024

185. Source: G20 South Africa 2025, [Energy Transitions Working Group](#), 2025

Figure 26: Progress on the RISE off-grid framework in 35 sub-Saharan African and 7 South Asian countries, by number of countries per sub indicator, 2020 and 2023



Source: Dalberg analysis, 2026, based on ESMAP, Regulatory Indicators for Sustainable Energy (RISE) Data, 2023 Methodology.

Note: Analysis within this report focuses on subset of countries within the RISE dataset including 35 in Sub-Saharan Africa and 7 in South Asia. Please see methodological annexes for detailed breakdown and rationale.

Least-cost planning exercises, which inform the development of national electrification strategies, are starting to be based on affordability and demand assessment, rather than a target level of service.

Standard least-cost planning practice identifies the technology with the lowest cost per kilowatt-hour for a target tier of service, but off-grid providers do not sell electricity by the kilowatt-hour and a per-kWh generation cost does not capture what determines whether OGS is financially viable or affordable. Easy Solar proposed an alternative measure - the levelized cost of access (LCOA) - which divides an off-grid asset's full lifetime cost (CAPEX, financing, OPEX and decommissioning) by the number of households served and the asset's useful life, producing a monthly cost per household that can be compared directly against local income and affordability thresholds.¹⁸⁶ The LCOA has since been adopted by the IEA.¹⁸⁷ The World Bank's least-cost planning approach is also moving in this direction: a 2026 pilot of the next-generation Global

Electrification Platform in Sierra Leone found that basing scenarios on estimated household demand, shifted the technology mix toward standalone solar and lowered overall investment requirements.

Dedicated financing and delivery mechanisms for the OGS sector expanded between 2020 and 2023, but unevenly, with pro-poor subsidies still in place in fewer than half of countries, and environmental regulation for solar device disposal barely moving.

National programs supporting standalone systems with private-sector involvement grew from 74% to 88% between 2020 and 2023, and countries with duty or VAT exemptions for standalone systems rose from 57% to 69%. Scores for availability of consumer financing mechanisms increased from 40% to 57%, pro-poor subsidies for low-income households moved from 38% to 48%, while environmental regulations for disposal of solar devices lagged furthest behind, rising only from 26% to 29% in the period.¹⁸⁸

186. Source: Alexandre Tourré, Access: [Rethinking the Cost of Off-Grid Energy Solutions \(LinkedIn\)](#), 2026

187. Source: IEA, [Financing Electricity Access in Africa](#), 2025

188. Source: Regulatory Indicators for Sustainable Energy (RISE) Data, 2023 Methodology; Dalberg analysis restricted to sub-Saharan Africa and South Asia (n=42)

The National Energy Compacts developed under Mission 300 represent a major step forward in government recognition of off-grid solar, and an important policy achievement.¹⁸⁹ Some countries have used the Compacts to recognize OGS as an important component of their national electrification strategies for the first time.¹⁹⁰ Others have set targets for access to be delivered through OGS for the first time, while others have outlined new delivery models, financing mechanisms and policy measures such as tax exemptions to support the sector. For many countries, Compact commitments have yet to be translated into the strategies, plans, and programs needed to show how governments will support the sector.

Early implementation of these commitments is mixed. The first Q1 2026 Compact Progress Reports¹⁹¹ show several governments beginning to translate DRE commitments into concrete policy and implementation measures. Lesotho, for example, has adopted a National Electrification Strategy that includes annual targets for 18,212 off-grid solar connections, while Chad reports implementation of regulation for off-grid solutions as on track, and Madagascar reports revisions to off-grid solar regulation and measures to support private DRE

investment as progressing. The initial focus appears to be on putting enabling policy, regulatory, and financing frameworks in place. Key initiatives have been delayed including Nigeria's updated National Electrification Strategy and Implementation Plan, Malawi's proposed national fund to support private investment in off-grid solar, and Niger's National Electricity Access Strategy and mini grid regulations.

Comprehensive PUE national strategies are beginning to emerge, but progress depends on improved collaboration across ministries. Examples of formal national commitment include India's framework for distributed renewable energy (DRE) livelihood applications, Kenya's National Roadmap on Scaling Up PUE, and PUE inclusion in Mission 300 energy compacts in Ghana, Kenya, and Lesotho. PUE lacks a clear "policy home," since it cuts across energy, agriculture, finance, and industry ministries. Without cross-sectoral coordination, efforts risk staying fragmented, donor-led, or limited to pilots. Coordination efforts have increased between ministries, within development partner departments and multi-institutional partnerships such as the Agri-Energy Coalition and the PUE Center of Excellence gaining traction.

5.3 Fiscal Incentives

Fiscal incentives are a powerful tool for establishing and scaling OGS markets by improving affordability and promoting quality. Import duties and VAT feed directly into retail prices, affecting affordability in markets where customers are highly price sensitive. Modeling for East Africa estimated that a 20% import tariff would reduce sales by 18% for smaller solar home systems and 32% for larger kits.¹⁹² Kenya's experience illustrates

this sensitivity in practice. The reintroduction of VAT on solar products in 2020 increased end-consumer prices by 10-24%, and sales slowed by around 20%.¹⁹³ The VAT was subsequently removed in 2021, with analysis estimating that the wider economic, household, and government benefits of the exemption outweighed the foregone tax revenue by seven to one.¹⁹⁴

189. Source: [World Bank Group, National Energy Compacts](#), 2026

190. Source: GOGA, [Mission 300 Compact Analysis](#), 2026

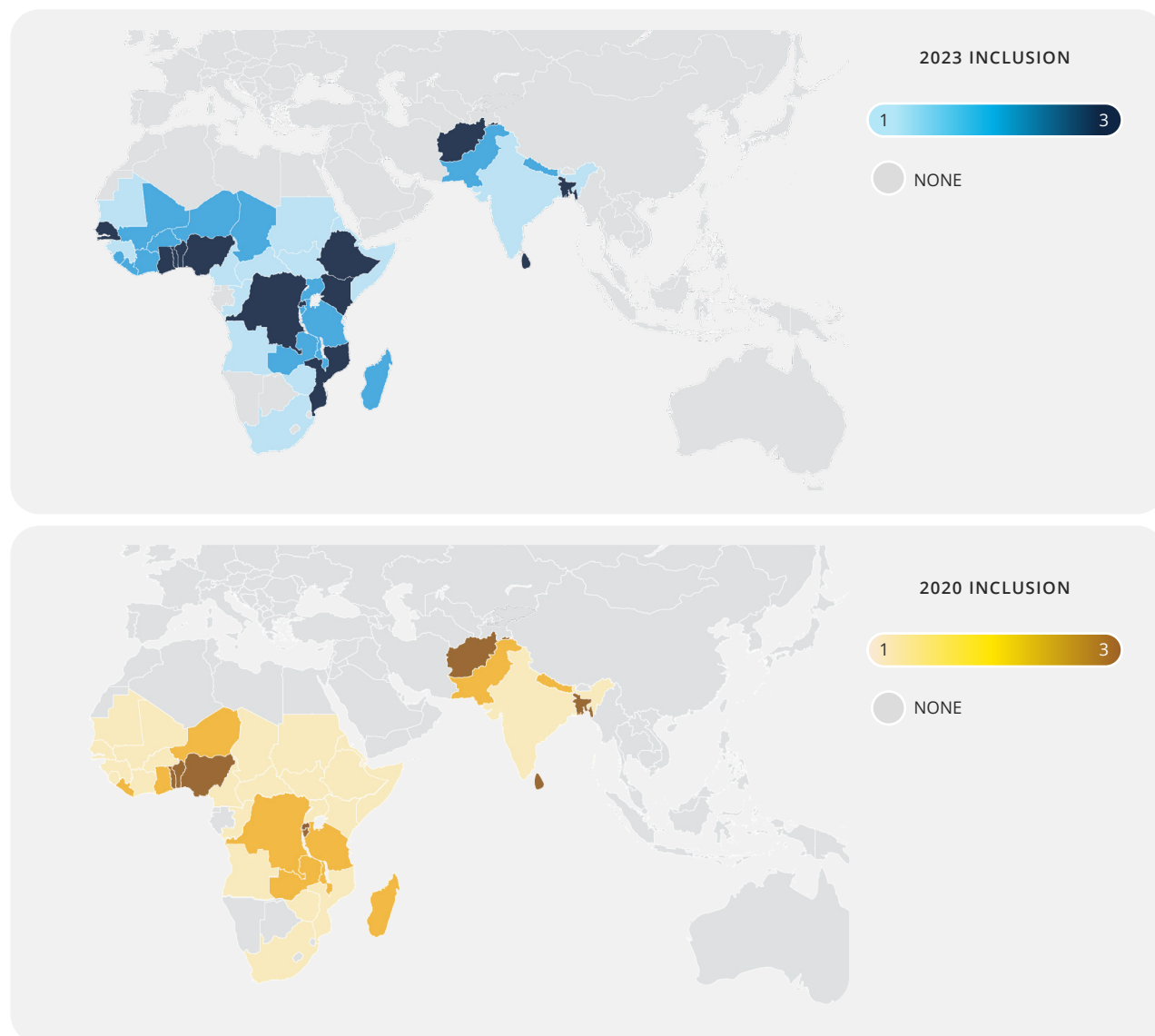
191. Source: [World Bank Group, Mission 300 Compact Progress Reports, Q1 2026](#)

192. Source: Rob Fetter, Jonathan Phillips, Duke Energy Access Project, 'The True Cost of Solar Tariff East Africa', 2019

193. Source: KERE and GOGA, [Impact of VAT and Import Duty on the Stand-Alone Solar Sector in Kenya. A policy position paper](#)

194. Source: World Bank Group, [The Off-Grid Solar Policy Toolkit](#), 2024

Figure 27: Inclusion of Fiscal Incentives for off-grid systems in National Electrification Planning in 2023 versus 2020



Source: Dalberg analysis, 2026, based on ESMAP, Regulatory Indicators for Sustainable Energy (RISE) Data, 2023 Methodology.

Note: For the purposes of this analysis, RISE scores on fiscal incentives have been grouped into three categories, with 1 indicating limited fiscal support (0–33), 2 moderate fiscal support (34–66), and 3 strong fiscal support (67–100). Higher scores indicate that a broader set of fiscal incentives relevant to off-grid systems is in place.

Tax exemptions are increasingly used to improve the affordability of OGS and support market growth. 69% of RISE countries had duty or tax exemptions in place for standalone solar systems in 2023, compared with 57% in 2020,¹⁹⁵ and 70% of Mission 300 National Energy Compacts include fiscal incentives for DRE equipment.¹⁹⁶ Beyond Compacts, recent country-level examples show fiscal incentives continuing to evolve for quality-verified

products. For example, Liberia has renewed tariff suspensions for quality-verified off-grid solar products through executive orders,¹⁹⁷ Côte d'Ivoire has introduced VAT and customs-duty exemptions for renewable-energy equipment,¹⁹⁸ and Uganda's 2025 stamp-duty reform¹⁹⁹ removed duty on SHS consumer financing (PAYG) agreements.

195. Source: ESMAP, [Regulatory Indicators for Sustainable Energy \(RISE\)](#), 2026

196. Source: GOGLA, [Mission 300 Compact Analysis](#), 2026

197. Source: Rural and Renewable Energy Agency, [Liberia Electricity Sector Strengthening and Access Project](#), 2024

198. Source: Direction Générale des Douanes de Côte d'Ivoire, [Circulaire n°2355 du 25 avril 2025 – Mise en œuvre des dispositions de l'annexe fiscale pour la gestion 2024 relatives aux mesures en faveur de la préservation des ressources environnementales](#), 2025.

199. Source: UNREEEA, [Uganda's Solar Sector Seeks Exemption from Stamp Duty to Protect Low-Income Consumers](#), 2025

As OGS markets mature, there is an increased risk of governments reducing or reversing earlier tax exemptions, driven by revenue goals.²⁰⁰ Governments periodically revise OGS fiscal incentives as they balance affordability and access goals against budget constraints, revenue collection priorities, and changing political or sectoral priorities.²⁰¹ Pakistan added a 10% tax on imported panels in the 2025–26 budget²⁰² and South Africa did the same in 2024.²⁰³ Kenya's 2025 Finance Bill proposed removal of VAT relief on solar equipment, reverting to the standard 16% VAT rate.²⁰⁴ Concern around the impact on OGS customers resulted in a shift from zero-status to VAT-exempt status. This is a partial reprieve, because exempt suppliers cannot reclaim input VAT, so

some tax cost still feeds into retail prices. The private sector is relied upon to achieve electrification targets, and the frequent review and adjustment of fiscal incentives can have negative impacts on long-term business planning, investor confidence, and perceptions of political commitment to achieving universal energy access.

Fiscal policy is also shifting upstream. From April 2026, China ended VAT export rebates for photovoltaic products and cut battery export rebates from 9% to 6%, which could increase the landed cost of OGS products globally. Any increase is likely to be passed on to end-consumers and felt most acutely by lower-income, more price-sensitive households.

5.4 PAYG Financial Regulation

Concerns that PAYG financial regulation could hamper sector growth have evolved into an industry preference for bespoke regulation rather than PAYG being included in regulation designed primarily for other sectors. PAYG companies are essentially selling two products, solar equipment and financial loans. The regulatory question is therefore how PAYG should be treated under national banking, microfinance, hire-purchase, or consumer-finance rules - and what this means for provider licensing, consumer protection, product design, operating costs, and affordability.²⁰⁵

Kenya – the largest PAYG market - introduced a Microfinance Bill that explicitly includes PAYG asset financing in 2026. As of July 2026, Kenya's amended Central Bank Act expressly includes asset financing, buy-now-pay-later arrangements and pay-as-you-go arrangements.²⁰⁶ As a result, PAYG providers are faced with a more formal compliance regime as financial service providers. The legislation includes materially higher fees than the earlier digital credit regime, and broader requirements covering governance, reporting,

data security and risk management,²⁰⁷ although a tiered framework places lighter requirements on smaller firms. These measures could strengthen market discipline and portfolio management but will also increase costs and may slow customer acquisition,^{208,209} as OGS companies built to sell energy access products transform into financial service providers. Separately, a 2026 ruling on a disputed Bboxx tax assessment resulted in the Tribunal and Kenya Revenue Authority agreeing that PAYG sales are equivalent to hire-purchase agreements, subjecting PAYG companies to further income tax.²¹⁰

The Kenyan experience illustrates the tension that arises when PAYG providers, which are both energy and consumer-finance providers, are regulated under frameworks designed for banks, MFIs or hire-purchase providers. Stakeholders increasingly favor bespoke, proportionate frameworks that provide clarity on licensing, disclosure of financing terms, data privacy, taxation, and reporting, because compliance costs are ultimately passed on to customers.²¹¹

200. Source: KPMG, [Incentives and tax policy: Between growth, fairness and global collaboration](#), 2026

201. Source: Stakeholder Consultations

202. Source: Business Recorder, [Tax on imported solar panels: what does it mean for Pakistan's renewable energy future](#), 2025

203. Source: ITAC, [Increase in customs duty on crystalline silicon photovoltaic modules/panels from 0% to 10%](#), 2024

204. Source: Bowmans, [Kenya: The Finance Bill, 2025](#), 2025

205. Source: World Bank Group, [The Off-Grid Solar Policy Toolkit](#), 2024

206. Source: Central Bank of Kenya, [The Central Bank of Kenya \(Non-Deposit Taking Credit Providers\) Regulations](#), 2025

207. Source: M&O Fintech Consulting Group, [Kenya NDTCP Regulations 2025: CBK Licensing Guide](#), 2026

208. Source: Essenti, [CBK's 2025 NDCP Regulations: A Gamechanger for Africa's Digital Lending Landscape](#), 2025

209. Source: M&O Fintech Consulting Group, [Kenya NDTCP Regulations 2025: CBK Licensing Guide](#), 2026

210. Source: Academy of Tax Law, [Bboxx Capital Kenya Ltd v Commissioner of Legal and Board Services \(Appeal E1164 of 2025\) \[2026\] KETAT 270 \(KLR\) \(27 July 2026\) \(Judgment\)](#), 2026

211. Source: CGAP, [Responsible Digital Credit: Frontier Solutions for Authorities and Providers](#), 2025

5.5 Quality Assurance

VeraSol estimates that as of 2026, 28 countries have adopted quality standards that harmonize with IEC Technical Standard 62257-9-8, with 11 making adherence compulsory for legal importation – although borders remain porous. Additionally, some countries, including Lesotho,²¹² Liberia,²¹³ and Namibia²¹⁴ are seeking to put in place the systems and processes needed to only provide tax exemptions to products that meet relevant quality standards. Despite this progress, products that do not meet quality standards continue to circulate widely across markets where cheaper, unverified alternatives are attractive to price-sensitive consumers. Enforcement remains the main gap. Customs officers and conformity assessment partners often lack training, and product registration and market surveillance systems are weak or absent in many markets.²¹⁵

The IEC standard for solar energy kits was revised in 2025 to reduce certification costs without sacrificing

product quality.²¹⁶ The headline operational changes extend certificate validity from two to three years,²¹⁷ and simplify and reduce test sample requirements.²¹⁸ These changes aim to reduce lab costs²¹⁹ and the frequency of re-certification.²²⁰ No fundamental safety tests were removed, leaving core durability and safety requirements intact.

VeraSol launched a decentralized certification model in 2026, transferring core certification tasks to accredited commercial laboratories while retaining an oversight and quality-assurance role.²²¹ VeraSol's certification model has evolved since 2009, from full donor subsidy of testing costs to partial manufacturer cost-sharing, to full commercial pricing, to accredited commercial labs taking on certification assessment with VeraSol oversight. The shift to decentralized product certification is another step towards the sector taking ownership of its quality assurance infrastructure and is an indication of increasing technological maturity.



Quality assurance for PUE

Quality assurance for PUE remains underdeveloped relative to the broader off-grid solar market.

In the SHS sector, VeraSol tests and certifies products using the globally recognized IEC test methods and quality standards that it helped to develop. Currently, VeraSol tests, but does not certify, select PUE equipment types. It tests PUE products using standardized methods that assess energy performance, quality and durability, safety, and consumer-facing information such as warranties and performance claims. It is developing rapid assessment methods for nascent PUE technologies such as egg incubators, milling machines, and agricultural sprayers.²²²

Certification of staff and firms has an important role to play in PUE quality assurance, alongside product certification. With a significant proportion of PUE appliances and infrastructure powered by large component-based systems - requiring site visits, bespoke system sizing and professional installation and maintenance - qualified and certified engineers and firms are also needed.

212. Source: GOGLA, [Lesotho National Energy Compact Mission 300](#), 2025

213. Source: Patrick Jowett, [Liberia renews suspension of import tariffs on off-grid solar products](#), 2026

214. Source: GOGLA, [Namibia National Energy Compact Mission 300](#), 2025

215. Source: Dalberg Analysis, 2026

216. Source: VeraSol, [Transition to IEC TS 62257-9-5:2024 and IEC TS 62257-9-8:2025](#), 2025

217. Source: VeraSol, [Transition to IEC TS 62257-9-5:2024 and IEC TS 62257-9-8:2025](#), 2025

218. Note: previously, manufacturers needed to submit six units for products below 10W and four units for products between 10 and 350W; under the new standard, a flat two-unit sample applies uniformly across all product sizes. Source: VeraSol, [Recent Changes to Test Methods and Requirements for Solar Energy Kits in IEC TS 62257-9-5 and -9-8](#), 2026

219. Note: The net cost impact of the 2025 VeraSol/IEC changes has not yet been fully modelled, as final commercial lab pricing was not confirmed at the time of this report. Longer certificate validity and smaller sample requirements should substantially offset higher certification fees, with smaller manufacturers likely to benefit proportionally more, though very small producers may face some added burden from the fixed minimum stock requirement

220. Source: Dalberg analysis, 2026 [Interview with CLASP]

221. Source: VeraSol, [A New Phase for VeraSol Certification](#), 2025

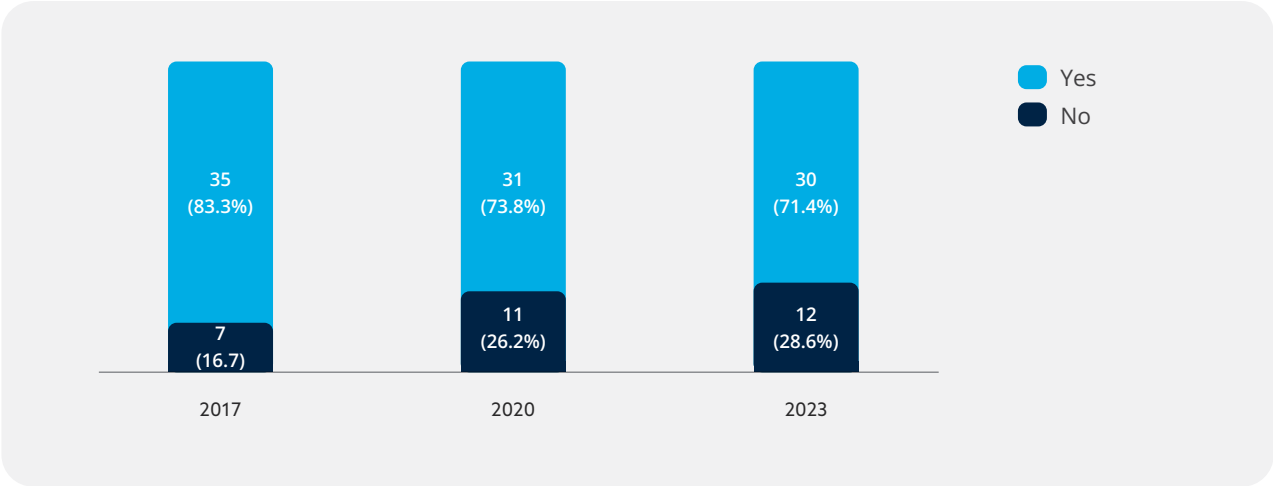
222. Source: VeraSol, [Test Methods](#), 2026. See also the [VeraSol Product Database](#)

5.6 End-of-Life Management

Regulation and compliance requirements are outpacing e-waste infrastructure. Extended Producer Responsibility (EPR) regulations are emerging across the sector — in Nigeria, Rwanda, Uganda, Zambia, Malawi, and Kenya — and this trend is also visible in the RISE dataset (Figure 28).²²³ Where EPR requires recycling and recycling infrastructure capacity is not readily available, EPR fees can function as a tax on the formal, quality-verified companies that comply, while others remain beyond the compliance

net. In some markets, sector stakeholders have raised concerns that off-grid solar is being targeted more directly than the principal e-waste-producing industries, creating uneven compliance costs in a still-weak ecosystem.²²⁴ Recycling infrastructure remains especially limited for complex fractions such as batteries, circuit boards, and PV modules, which often require specialized treatment that is not available in-market and almost impossible to transport across borders.

Figure 28: Number of RISE countries in sub-Saharan Africa and South Asia (n=42) whose national energy planning includes environmental regulations on the disposal of solar devices and standalone system products or components.



Source: Dalberg analysis, 2026, based on ESMAP, Regulatory Indicators for Sustainable Energy (RISE) Data, 2023 Methodology.
Note: RISE Indicator 4.3.2 assesses whether environmental regulations are in place for the disposal of solar devices and stand-alone system products or components. Countries are coded on a binary basis, with Yes indicating that relevant regulations are in place and No indicating that they are not.

223. Note: Extended producer responsibility (EPR) is a policy principle that aims to promote environmental improvements across a product's life cycle by extending manufacturers' responsibility beyond the point of sale, particularly to take-back, recycling and disposal. Source: Energy Sector Management Assistance Program. 2024. [Off-Grid E-Waste Management Toolkit](#). ESMAP Paper. Washington, DC: World Bank. License: Creative Commons Attribution CC BY 3.0 IGO.

224. Source: Institute of Development Studies, [Drivers, Barriers and Opportunities of E-waste Management in Africa](#), 2024

Product end-of-life management is increasingly built into funding and investment requirements, yet cannot always be meaningfully implemented.

Commercial investors,^{225,226} donors²²⁷ and publicly funded programs require companies to demonstrate e-waste management plans and comply with Environmental, Social and Governance (ESG)²²⁸ safeguards, but where e-waste infrastructure is limited or absent, it is not always feasible for companies to implement plans. The Beyond the Grid Fund for Africa (BGFA) mid-term evaluation found that while technical assistance for e-waste and ESG policies helped companies meet contractual requirements, several energy service providers questioned the practicality of e-waste policies in markets without disposal or recycling facilities and viewed compliance-oriented TA as less relevant than demand-led support for core business needs.²²⁹

Repair, not recycling, is the realistic near-term lever and Kenya's new EPR legislation offers an early example of what a better-sequenced approach might look like.

This regulation requires manufacturers to “design products and packaging that minimize waste and facilitate reuse, recycling, and recovery,” and encourages take-back refurbishment and reuse.²³⁰ Such practices are already commonplace among many vertically integrated²³¹ companies. Increasing in-country repair capabilities, and initiatives like the Off-Grid Solar Repair Lab are expected to increase the circulation of high-quality refurbished products.

225. Source: Acumen, [Hardest-to-Reach Environmental and Social Management System](#), 2025

226. Source: Acumen, [KawiSafi II Environmental and Social Management System](#), 2023

227. Source: Beyond the Grid Fund for Africa, [Promoting Responsible E-Waste Management In The Off-Grid Sector](#), 2020

228. Note: Environmental, social and governance (ESG) refers to a set of non-financial factors used to assess an organisation's impacts on, and the risks and opportunities it faces from, environmental, social and governance issues. Source: Pollman, E. (2024). “[The Making and Meaning of ESG](#).” Harvard Business Law Review, 14, 403–453. Earlier version: ECGI Law Working Paper No. 659/2022.

229. Source: Beyond the Grid Fund for Africa, [Mid-term Evaluation](#), 2026

230. The Republic of Kenya, [Sustainable Waste Management \(Extended Producer Responsibility\) Regulations, Legal Notice 176 of 2024](#), 2024

231. Vertically Integrated (VI) companies control multiple stages of the supply chain including manufacture, importation, distribution and sale to the end customer capabilities, and initiatives like the [Off-Grid Solar Repair Lab](#) are expected to increase the circulation of high-quality refurbished products.

CHAPTER 6

Outlook and Recommendations



Key Messages

- ▶ **The sector is rightly prioritizing commercial sustainability over rapid growth, and is expected to continue to do so.** Companies will continue improving portfolio quality and profitability to attract commercial capital. However, persistent affordability challenges, foreign exchange volatility, and rising operating costs mean significant price reductions are unlikely in the near term. Larger, vertically integrated companies are better placed to absorb these pressures than smaller and mid-sized firms. The 2026–27 El Niño and wider climate impacts will deepen vulnerability in communities without access, making off-grid solar (OGS) both a resilience priority and a growing market. The sector's trajectory will depend above all on whether public funding evolves to crowd in private capital.
- ▶ **The immediate priority is to scale up public funding and improve its design so that it attracts the private co-investment needed to meet ambitious access goals.** Reaching all 398 million people for whom OGS is the least-cost solution requires around USD 11.4 billion between 2027 and 2030, and this cannot be met without a substantial increase in private investment. Public funding should be aligned to customer segments, with subsidies either low and broad or high and targeted, but never high and untargeted. RBF programs should reward sound credit risk management, disburse predictably and be designed in consultation with investors, so that public funding builds toward commercial investment. Governments and development partners should explore ways to monitor sustained access, commercial health and private co-investment alongside first-time access.
- ▶ **Alongside better-designed public funding, companies need to strengthen portfolio quality and governments need to provide stable policy and regulation.** Separating credit decisions from sales targets, linking agent incentives to repayment and engaging customers earlier can improve portfolio performance and investor confidence. Embedding OGS in national plans through Mission 300, applying fiscal incentives consistently and adopting proportionate, risk-based PAYG regulation will reduce investor risk perception and the cost of capital.
- ▶ **In the medium term, public programs need to sustain and deepen the impact of access, not only expand it.** Programs should build in sustained access through extended warranties, after-sales care, battery replacement and repair, and help customers move to higher levels of service. Blended finance mechanisms are needed to unlock risk-tolerant equity and local-currency debt for small and mid-sized companies, especially in nascent markets. Scaling productive uses and workforce development will strengthen job creation and economic impact. Electrifying social infrastructure will require public investment to more than triple by 2028, with funds used to procure performance-based energy services rather than assets.
- ▶ **In the long term, reaching the hardest-to-reach and forcibly displaced populations will require new delivery models and deeper integration into national systems.** Open-market PAYG cannot serve every community, so governments and development partners should continue testing licensing, concessions, tendering and household EaaS. In displacement settings, the priority is a transition to development-led solutions that integrate forcibly displaced people into national and local energy systems. E-waste infrastructure and enabling policies also need to be in place before recycling obligations are imposed.



6.1 Outlook

The off-grid solar (OGS) sector is prioritizing commercial sustainability over rapid customer acquisition, a shift expected to persist. Companies will continue improving portfolio quality, operational efficiency, and profitability as they seek to attract greater volumes of commercial capital. Persistent affordability challenges, foreign exchange volatility, and rising operating costs in nascent markets and hard-to-reach geographies will require a step-change in public support if electricity access targets are to be achieved. Significant reductions in OGS prices are not expected in the near term given ongoing macroeconomic uncertainty and supply-chain risks. Larger companies with stronger balance sheets and more vertically integrated supply chains may be better positioned to manage these pressures, while smaller and mid-sized firms continue to face greater financing and scale constraints.

Innovation is likely to continue reshaping the sector. Artificial intelligence and data-driven analytics may deliver incremental improvements but are unlikely to fundamentally alter the economics of last-mile distribution. Companies are expected to continue experimenting with more flexible payment structures and approaches better aligned with household and enterprise cash flows. Receivables financing, securitization, and other off-balance sheet structures are expected to grow and become increasingly available to mid-sized firms. Growing investor familiarity with the sector,²³² and improved availability of guarantees, are expected to improve access to local-currency financing.

Business model diversification is likely to accelerate, as companies pursue new market segments and higher-margin business lines to improve commercial performance. In the PUE segment, the route to scale will likely depend on stronger cross-sectoral partnerships and end-user market linkages.

Climate change and the 2026-27 El Niño will intensify droughts, floods, and extreme weather events, deepening the vulnerability of communities that already lack energy access.²³³ OGS can help households, enterprises, and public institutions withstand and recover from these shocks by providing essential energy, water, cooling, and communications services, powering early warning systems and disaster response, and protecting livelihoods, while also reducing reliance on diesel and kerosene. Scaling these solutions is both a resilience priority and a growing market opportunity, particularly in climate-vulnerable regions.²³⁴

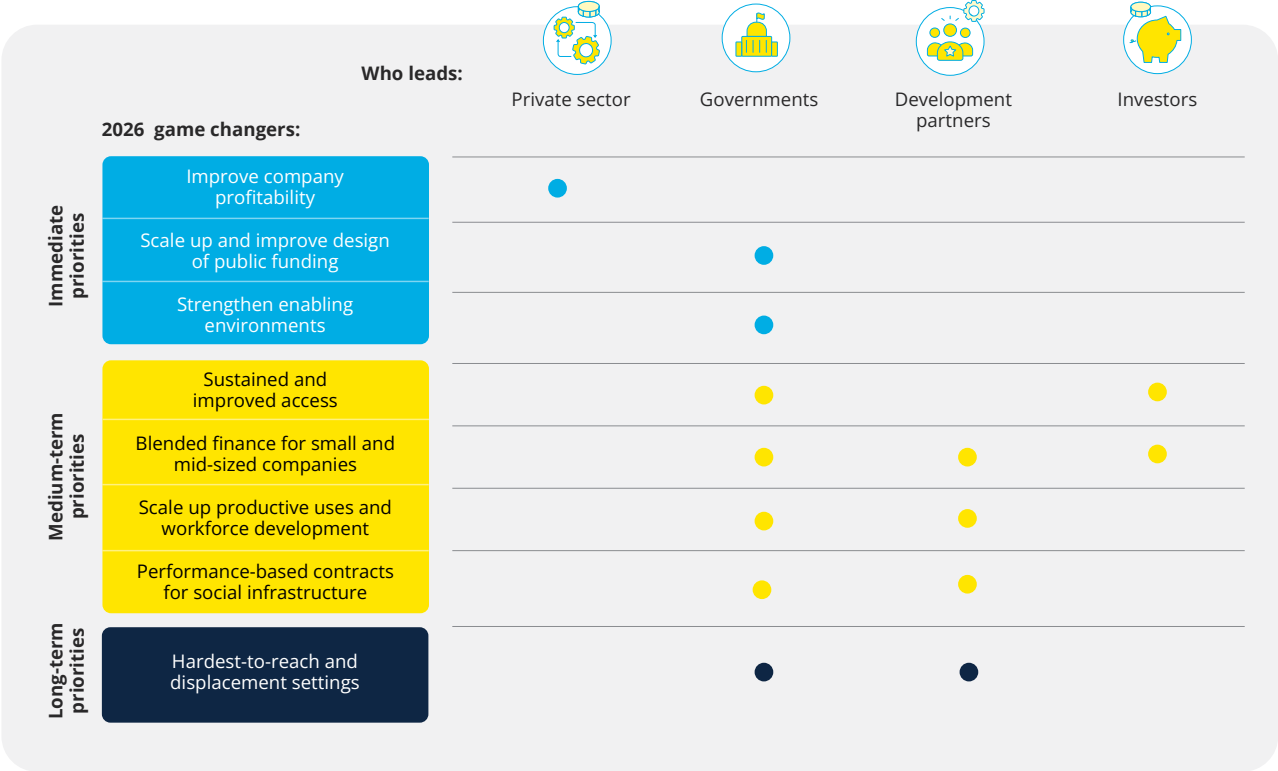
Several critical uncertainties remain, primarily related to sources of funding. It is not yet clear whether public funding mechanisms will evolve sufficiently to strengthen commercial sustainability and crowd in larger volumes of private capital, or whether development finance institutions and investors will expand the availability of more risk-tolerant equity, guarantee, and local-currency debt instruments for smaller and mid-sized companies. Of equal importance is the extent to which governments integrate off-grid solar within national electrification strategies, strengthen enabling environments, and address affordability constraints. These uncertainties underpin the recommendations that follow. The choices that companies, development partners, governments, and investors make now will determine the sector's trajectory, and whether it evolves to truly fulfil its potential.

232. Note: GOGLA identified 18 new investors in the OGS sector in 2025, out of a total of 41. Source: GOGLA, [The Sector Is Maturing. Capital Is Concentrating. GOGLA Investment Data 2025](#), June 2026.

233. GOGLA & Practical Action. 2025. Off-Grid Solar: Powering Climate Resilience.

234. GOGLA. 2023. Powering Climate Adaptation and Justice: The Critical Role of Off-Grid Solar Technologies.

Figure 29: Summary of 2026 game changers



6.2 Immediate Priorities

6.2.1 IMPROVE COMPANY PROFITABILITY TO ATTRACT PRIVATE FUNDING [PRIVATE SECTOR]

Companies need to improve the quality of PAYG portfolios to reduce risk perception, demonstrate a path to profitability, and attract investment. Tried and tested good practices include: separating credit decisions from sales targets so loan approval is not driven by revenue incentives; linking agent incentives to repayment performance rather than the point of sale alone; strengthening customer screening and credit

scoring at onboarding; and shifting post-sale engagement earlier, to prevent delayed payments rather than reacting once customers have fallen behind.²³⁵ Where financing is not a core capability, energy providers can partner with specialist third-party finance providers rather than building lending capability from scratch.

235. Source: PAYGo Lab, PAYGo 2.0 Pioneers: Early Insights and Evidence, June 2025

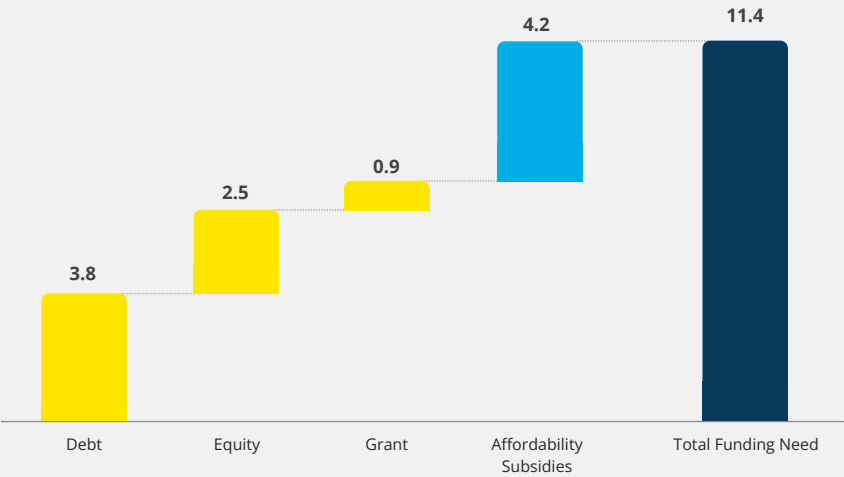
6.2.2 SCALE UP AND IMPROVE THE DESIGN OF PUBLIC FUNDING TO MAXIMIZE PRIVATE CO-INVESTMENT [GOVERNMENTS]



The Funding Need

Overall levels of sector financing need to increase. Reaching all 398 million people for whom OGS is the least-cost solution by 2030 requires around USD 11.4 billion between 2027 and 2030 (Figure 29).²³⁷ Around USD 1.3 billion a year of this is in the form of grants and affordability subsidies, with the remaining USD 1.6 billion a year in equity, debt and receivables financing. Public credit lines and DFI equity can meet part of the debt and equity requirements, and guarantees can help mobilize more, but the funding need cannot be met without a substantial increase in private investment.

Figure 30: Total funding required to provide first-time access to the unelectrified population, for whom OGS is the least cost solution, using Tier 1 OGS PAYG systems (USD billion)



The improvements made to the affordability estimate detailed in Chapter 2 have a significant impact on the estimated funding need for the industry presented here. The 2024 Off-Grid Solar Market Trends Report (MTR 2024) estimated a funding need of USD 21.3 billion to reach universal energy access by 2030, which has been revised down to USD 11.4 billion in this edition. As outlined in Chapter 2, three improvements drive the revised estimate. First, pricing is now based on real PAYG prices for Tier 1 systems in mature markets, where VAT exemptions are likely to apply. Second, the estimated cost of serving rural households has been revised down based on consultation with companies. Third, companies are assumed to cross-subsidize rural customers to maintain uniform national pricing, in line with observed company pricing strategies.

Source: Dalberg analysis, 2026
Note: The funding need calculation in this chapter incorporates both affiliate and non-affiliate entry-level Tier 1 SHS, based on an assumption that QV sales will continue to represent approximately 30% of the total market going forward, consistent with recent trends. Non-QV is included because excluding it would imply a transition to an entirely QV market — an unrealistic scenario that would substantially inflate the estimated subsidy requirement and misrepresent how the market is likely to evolve.

236. Source: Dalberg Analysis, 2026

With limited public funding, governments need to carefully align financing and delivery models to different customer segments. The remaining access gap spans three distinct customer segments. The first can be served on commercial terms and should continue to be reached through market-based delivery. The second is commercially reachable, but only with public support that enables providers to serve more lower-income or higher-cost customers, including through well-designed RBFs. The third sits beyond the reach of conventional market-based approaches because of remoteness and low incomes. Commercial capital should serve the viable market, blended public-private approaches can extend the frontier, and public support will remain central to serving the hardest-to-reach populations. Households also move between these segments as prices, incomes, and policies change, and public support needs to adjust accordingly.

Grants and subsidies need to be better targeted to ensure efficient use of public funding, with a clear focus on bridging the affordability gap. Subsidies should be either 'low and broad', used as means to incentivize companies to expand into new markets, with the result of achieving significant sustained access gains over a short time-period, or 'high and targeted' for the hardest-to-reach and lowest-income communities. Subsidies should never be high and untargeted (see [Chapter 3, Access to Finance](#)). The complexity of targeting should match implementation capacity; where capacity is limited, a lower, broader subsidy is the safer design, and programs can tighten targeting over time. Whatever the design, public funding needs to be predictable and transparent, calibrated to evidence of the affordability gap or financing need, and paired with a credible exit strategy or long-term funding source to cover ongoing costs.

Greater attention needs to be paid to how public funding can attract private co-investment. Given limited public funding, attracting private co-investment remains essential to maximizing total financing deployed and governments' ability to reach ambitious energy access goals. Investors consulted for this MTR clearly identified uncertainty around companies' pathways to profitability as the key constraint to further investment²³⁷ - and improving repayment rates is key to improving commercial health (see [Chapter 1](#)). Designing programs around commercial sustainability, predictable disbursement schedules and transparent performance metrics can help reduce investor risk perceptions while strengthening company balance sheets. RBF should reward sound credit risk management, pairing point-of-sale payments with payouts tied to sustained repayment, and avoiding first-come-first-served disbursement. Investors should be consulted on program design, so that public funding builds toward follow-on commercial investment.

Governments and development partners should explore ways to monitor sustained access, commercial health and private co-investment, alongside first-time access. Adopting industry-standard, consumer-centric KPIs such as PAYGo PERFORM's Repayment Rate and Customer Ownership Rate within programs could give implementers better management information to inform decision-making and help make performance comparable across programs and countries.²³⁸ These metrics can help ensure that public funding delivers both first-time access and sustained access, whilst supporting the commercial health of the industry and attracting the private co-investment needed to meet ambitious access goals.

6.2.3 STRENGTHEN ENABLING ENVIRONMENTS [GOVERNMENTS]

Governments need to develop and maintain stable policy and regulatory environments to enable more effective business planning and reduce investor risk perception. Mission 300 has created strong momentum behind universal electricity access, and the priority now is to build on it by integrating OGS meaningfully into national

plans through targets, implementation mechanisms, financing instruments and policy reform. Embedding OGS in this way gives companies and financiers the confidence to invest at scale, removing a source of uncertainty that would otherwise be priced into the cost of capital. access.

237. Source: MTR 2026 investor survey (19 investors), 2026.

238. Source: GOGLA, Guidance for PAYGo RBF Funds, 2026

Fiscal policy should be designed with energy access and productive use goals for households, MSMEs, and public institutions front of mind. Tax exemptions are typically passed through to end-users, increasing the share of the population able to afford OGS and reducing the share that will require subsidy support. Maintaining exemptions predictably matters as much as introducing them, because reversals undermine business planning and investor confidence and pass costs directly to customers (see [Chapter 5, Policy and Planning](#)). Beyond fiscal policy, governments can lower the cost of doing business through reforms covering market entry and competition, access to consumer credit data, product quality standards, consumer protection and data privacy.²³⁹ ESMAP's Off-Grid Solar Policy Toolkit identifies a range of options from

light-touch to more prescriptive policy action, and the right choice will depend on country context.²⁴⁰

As PAYG markets mature, governments should develop proportionate, risk-based financial regulation through structured dialogue with the private sector and consumer groups. Rather than fitting PAYG providers, which are both energy and consumer-finance providers, into categories designed for banks, MFIs, or hire-purchase providers, regulation should give clarity on licensing, consumer protection, disclosure of financing terms, data privacy, taxation and reporting, without compliance burdens that raise costs for consumers (see [Chapter 5, Policy and Planning](#)).²⁴¹

6.3 Medium-term Priorities

6.3.1 FOCUS ON SUSTAINED AND IMPROVED ACCESS [GOVERNMENTS AND INVESTORS]

Governments need to build sustained access mechanisms into public funding programs. For PAYG programs this may entail linking subsidy disbursements to ongoing customer repayments, requiring extended warranties and provision of after-sales care, planning for battery replacement or system upgrades from the outset, and supporting the expansion of out-of-warranty repairs. Other initiatives may include making refurbished products eligible for inclusion in programs and exempting spare parts from import duties and VAT.²⁴² Strengthening enforcement through training for customs officers and conformity assessment partners, mandatory product registration, market surveillance and closer regional coordination can also reduce the number of non-QV products in the market, which are less likely to provide sustained access (see [Chapter 5, Policy and Planning](#)).

Impact investors' approaches to ESG compliance need to shift toward strengthening repair systems and infrastructure alongside requiring compliance with e-waste policies. Financing the after-sales, repair,

and refurbishment capabilities of companies could be a legitimate investment thesis in its own right, and financing structures that reward sustained service and repeat relationships with existing customers - rather than just sales and credit quality - are likely to better reflect where durable value in the sector sits.

Both governments and investors need to incentivize companies to keep solar equipment running over the long term, and raise consumer awareness around repair options. Financial incentives and technical assistance can encourage companies to extend after-sales service, repair and replacement, supporting warranty and repair awareness campaigns to close the knowledge gap that prevents many repairs, and helping to establish repair financing schemes to address affordability constraints. The data infrastructure used for credit management and remote monitoring can be leveraged to track sustained access.

239. Source: ESMAP/PPIAF/DDP, [The Off-Grid Solar Policy Toolkit: Supporting Inter-Ministerial Collaboration to Advance Energy Access, Digital Transformation, and Financial Inclusion](#), 2024

240. Source: ESMAP/PPIAF/DDP, [The Off-Grid Solar Policy Toolkit: Supporting Inter-Ministerial Collaboration to Advance Energy Access, Digital Transformation, and Financial Inclusion](#), 2024

241. Source: ESMAP/PPIAF/DDP, [The Off-Grid Solar Policy Toolkit: Supporting Inter-Ministerial Collaboration to Advance Energy Access, Digital Transformation, and Financial Inclusion](#), 2024

242. Source: SolarAid, [State of Repair in the Off Grid Solar Sector](#), 2024

Beyond sustaining access, governments can help customers move to higher levels of service, which few will reach without external support. They can do so by extending subsidies to add-on appliances, PUE equipment and larger systems, supporting companies to offer consumer financing for these upgrades, and promoting modular, upgradeable, and interoperable product design. Companies can use repayment histories to identify customers ready to upgrade, while expanding trade-in and buy-back options.

In the longer term, governments need to put e-waste infrastructure and enabling policies in place before making recycling mandatory. Most emerging extended producer responsibility frameworks focus on recycling and disposal, which is not feasible while infrastructure and policy remain weak (see Chapter 5, Policy and Planning). Responsible management of all e-waste - not just OGS e-waste - would generate the necessary economies of scale. Regional facilities, enabled by policies permitting cross-border movement of e-waste, are likely to offer the best cost-benefit.²⁴³

6.3.2 BUILD INNOVATIVE BLENDED FINANCE MECHANISMS FOR SMALL AND MID-SIZED COMPANIES, ESPECIALLY IN NASCENT MARKETS [DEVELOPMENT PARTNERS, GOVERNMENTS AND INVESTORS]

Innovative blended financing mechanisms are needed to unlock earlier-stage, risk-tolerant, patient equity and local-currency debt for small and mid-sized companies. Development partners, DFIs, and MDBs should provide smaller-ticket equity targeted at nationally owned, early-stage and growth-stage companies. Aggregation should be used to reduce the transaction costs incurred in securitization,²⁴⁴ while channeling funding through specialist intermediary investors who provide TA to investees can maximize the chances of smaller companies improving commercial performance and attracting follow-on financing.²⁴⁵ Debt providers should offer local-currency financing wherever possible to help

companies manage currency depreciation, devaluation and convertibility risks, and guarantees and first-loss structures can play a similar role, absorbing risks that commercial lenders are not yet willing to price.

In nascent markets, public programs need to be designed for thinner markets and smaller, often local, companies. Financing and support should be tailored to the needs of the companies being supported, which often means more inclusive RBF design, more risk-tolerant credit lines, and a greater role for catalytic, upfront grantmaking and technical assistance.

6.3.3 SCALE UP PRODUCTIVE USES AND INVEST IN WORKFORCE DEVELOPMENT TO STRENGTHEN JOB CREATION AND ECONOMIC IMPACT [DEVELOPMENT PARTNERS AND GOVERNMENTS]

Tailored approaches are needed to scale up productive uses of energy and to strengthen the job creation, economic, and fiscal impact of access programs.²⁴⁶ Outcome-led program design should reflect PUE's longer payback periods and utilization-dependent revenues, and build in the cross-sector collaboration needed to address the full range of market barriers at end-user, PUE supplier

and value chain levels. The [PUE: A Program Design Guide](#) accompanying this MTR, organized around five principles (agile, cross-sectoral, outcome-led, holistic, and lasting), provides practical guidance for governments and funders designing PUE programs.

243. Source: World Bank, [Off-Grid E-Waste Management Toolkit](#), 2024

244. Source: Bridgin, [Home page](#), 2026

245. Source: Persistent, [About Us](#), 2026

246. Source: GOGILA, [Powering Lives and Livelihoods: Scaling Productive Uses of Renewable Energy \(PUE\)](#), 2023

Governments and development partners need to work together to provide early-stage support for PUE companies through a connected pathway rather than a series of one-off interventions. Emerging evidence suggests that grants and technical assistance should be sequenced, with technical assistance timed to shape how a grant is deployed or to address the gaps a company's progress reveals, and clear handoffs to follow-on funding and support opportunities when projects end. Funders should coordinate more closely through shared data standards, mutually recognized due diligence, and structured referrals, so that companies can move between programs without repeating the same work and avoid long gaps between periods of support. Targeting should focus on underserved markets and neglected parts of the

value chain such as after-sales, local assembly, and end-user financing. Finally, programs should track company outcomes for three to five years after support ends - the period in which follow-on capital is typically raised - and use the results to inform future program design.²⁴⁷

Governments and development partners should treat off-grid solar as a platform for job creation, enterprise development and workforce participation. Programs should complement access targets with workforce development, entrepreneurship support and local value-chain development, with particular attention to women, youth and other underserved communities.²⁴⁸ Where feasible, they should also monitor employment, enterprise and income outcomes alongside electrification metrics.²⁴⁹

6.3.4 SCALE UP THE ELECTRIFICATION OF SOCIAL INFRASTRUCTURE THROUGH PERFORMANCE-BASED SERVICE CONTRACTS [DEVELOPMENT PARTNERS AND GOVERNMENTS]

Electrifying the social infrastructure best served by OGS requires a significant increase in funding, to procure long-term energy services rather than assets. ESMAP estimates that annual public investment needs to rise from around USD 120 million today to USD 400 million by 2028, catalyzing a parallel increase in private

investment from around USD 20 million to USD 200 million a year through concessional finance, guarantees and RBF.²⁵⁰ Service-based procurement links payments to verified performance, giving providers a direct incentive to keep systems running (see Chapter 1, OGS for Social Infrastructure Trends).

6.4 Long-term Priorities

6.4.1 ADAPT INSTRUMENTS FOR HARDEST-TO-REACH COMMUNITIES AND DISPLACEMENT SETTINGS [DEVELOPMENT PARTNERS AND GOVERNMENTS]

Governments and development partners should continue to test innovative delivery models such as household EaaS with the potential to provide access at lower cost to the hardest-to-reach populations. Open-market PAYG cannot serve every community. Limiting the number of operators through licensing, or appointing a single operator through a concession, can unlock economies of scale, reduce the cost to serve and improve affordability, and both technology-agnostic and technology-specific tendering remain worth piloting. Success will depend on aligning regulatory, institutional

and fiscal commitments and capabilities with the chosen arrangements.

In displacement settings, inclusive national policies can remove structural barriers to market-based energy provision (see Chapter 1, Access to Energy in Displaced and Conflict-Affected Contexts). The longer-term priority is a transition to development-led solutions that integrate forcibly displaced people into national and local energy systems, supported by improved data, dedicated funding and private-sector engagement.²⁵¹

247. Source: Efficiency for Access, [Scaling Potential: Insights and Recommendations to Strengthen Early-Stage Support for Productive Use of Renewable Energy Companies](#), 2026.

248. Source: FSD Africa, [Unlocking Africa's Green Transition: Opportunities Towards a Green and Inclusive Workforce](#), 2026.

249. Source: Sustainable Energy for All (SEforALL), organizational strategy and monitoring framework on jobs, livelihoods, industry development and inclusive energy transitions.

250. Source: ESMAP, [Sustainable Energy for Schools and Health Centers: Public-Private Partnerships for People's Prosperity](#), 2026.

251. Source: UNITAR and GPA, [Powering Inclusion: How Policy can advance equitable Energy Access for Displaced Persons](#), 2025.

Annexes

ANNEX A: METHODOLOGY FOR ESTIMATING TOTAL AFFORDABILITY GAP

Affordability is assessed by comparing the amount that households currently spend on energy to the monthly cost of a basic (Tier 1) SHS. A household is considered unable to afford the system if the required monthly payment exceeds a set share of their monthly expenditure. This is tested at two thresholds, $\leq 5\%$ of household income, and 5-10% of household income. According to the ESMAP/World Bank's Multi-Tier Framework, affordability is defined as 5% of household income, while 'affordable at a stretch' is 5-10%. These thresholds are a normative benchmark developed for global energy-access measurement to provide a simple and comparable definition across countries.

Step 1: Calculate the monthly payment for the SHS

Affordability and payment calculations are based on a total PAYG price of USD 90 for an entry-level Tier 1 SHS, reflecting actual prices in mature off-grid solar (OGS) markets. Payments are assumed to require a 5% downpayment, with the remaining balance repaid in equal installments over a 12-month contract. These values are calculated in current USD, then an inflation factor is applied to convert this to 2017 USD, so amounts are directly comparable to the expenditure data used in Step 2 (which is also calculated in 2017 USD).

Step 2: Calculate average household expenditure

Using the World Bank's Poverty and Inequality Platform database for 2025 (using 2017 PPP USD), average monthly expenditure is calculated for each expenditure quintile in every country.

Step 3: Determine which quintiles cannot afford the system

For each country, the monthly SHS payment (from Step 1) is compared to each quintile's average expenditure (from Step 2) at the 5% and 10% thresholds. A quintile is considered able to afford the system if its existing average expenditure on energy is equal to or exceeds the amount of the monthly payment at that threshold. The poorest quintile that meets this bar is identified; every quintile poorer than this is assumed unable to afford the system.

Step 4: Translate this into number of people

- Using data from the World Bank's Global Monitoring Database, the share of households without electricity access falling into each quintile is calculated, per country. For countries where this data is not available, an equal distribution of people without access to electricity across the quintiles is assumed.
- This is combined with Step 3 to estimate the share of unelectrified people that cannot afford the system, assuming that if a quintile's average expenditure falls below the required payment, all households in that quintile are unable to afford it.
 - » The same proportion of people (as households) is assumed to be unable to afford the monthly payment. The number of unelectrified people within a country who cannot afford it is the product of this proportion and the total number of unelectrified people in the country.
- This same share is applied to the population (not just households) to estimate the number of unelectrified people who cannot afford the system, by multiplying this share by the total unelectrified population in the country.

Step 5: Cover the remaining countries

The World Bank data covers 169 countries, representing 95% of the global population without electricity access. For the remaining 5%, the global average affordability rate calculated from the 169 countries is applied, assuming similar affordability patterns hold.

ANNEX B: METHODOLOGY FOR ESTIMATING TOTAL SUBSIDY NEED

Subsidy need is calculated by estimating how many unelectrified households require financial support to afford a PAYG solar system, then quantifying the size of that support (both for the downpayment and ongoing monthly payments).

Step 1: Calculate unelectrified households in each income percentile

For each country, unelectrified households are estimated per income percentile:

- The population within each percentile is the product of the percentile's population share (from World Bank PIP) and the country's total population.
- The number of households in the percentile is estimated using the national average household size.
- The number of unelectrified households is the product of the proportion of unelectrified households in the percentile (from DHS surveys and World Bank Global Monitoring Database) and the total number of households in the percentile.

Step 2: Determine OGS-viable unelectrified households

Based on Global Electrification Platform (GEP), we assume off-grid solar (OGS) electrification is the most viable solution for 41% of unelectrified households. This share is applied to the household counts from Step 1 to identify the OGS-viable unelectrified household base for the subsidy calculation.

Step 3: Calculate the subsidy needed to cover monthly PAYG payments

For OGS-viable unelectrified households, the subsidy needed to cover monthly PAYG payments is calculated using the following assumptions:

- People can afford to spend 5% of their monthly consumption expenditure on electricity.
- One person earns an income in each household.

The gap between this affordable amount and the required monthly PAYG payment is calculated for each percentile, then aggregated across all percentiles to produce the total monthly PAYG subsidy need for the country.

Step 4: Calculate the subsidy needed to cover the downpayment

The subsidy needed to cover the downpayment is calculated using the following assumptions:

- People can spend 5 times their monthly electricity spend as an upfront downpayment. This aligns with the market standard of 3 months of electricity spend, adjusted upward to reflect the lower monthly incomes of unelectrified populations today.
- One person earns an income in each household.

The gap between this affordable amount and the required downpayment is calculated for each percentile, then aggregated across all percentiles to produce the total downpayment subsidy need for the country.

Step 5: Calculate total subsidy need

The total subsidy needed for each country is the sum of the total downpayment subsidy (Step 4) and the total monthly PAYG subsidy (Step 3). This represents the affordability gap to be covered.

ANNEX C: ACCESS TO FINANCE DEFINITIONS, METHODOLOGY AND SOURCES

This annex sets out how financing data are defined and classified in this report. Financing is classified by the instrument through which it reaches companies (grants, RBF, debt, equity and off-balance sheet financing), because data on the original source of funds is limited.

'Corporate financing' refers to all grant, debt, equity, and off-balance sheet financing commitments to affiliate OGS companies. It excludes RBF, which is paid upon verification of results (typically sales), rather than committed to companies upfront, and is therefore tracked separately.

'Public funding' refers to funding from governments, development partners, and philanthropic sources, including multilateral development banks and development finance institutions, whatever form it takes. It includes grants and RBF, and also capital from these sources provided as debt or equity, whether through credit lines, investment vehicles, or de-risking layers such as guarantees and first-loss capital. Public funding figures in this report are based on the best available data – covering WBG commitments, which account for an estimated 80% of public funding for electricity access, and GOGLA's grant and RBF datasets, which include grants and RBF from other development partners or philanthropic sources, alongside those from the WBG.

'Private investment' refers to funding from private sources, such as commercial and local banks, impact investors, and institutional investors, which is provided in pursuit of financial return, often alongside development objectives. It is the counterpart to public funding, and what distinguishes the two is the source of funds rather than the instrument. Most private investment in the off-grid solar sector is de-risked or supported by public funding to some extent, for example through guarantees or first-loss layers in capital stacks. Because data on the source of funds is limited, private investment cannot be measured directly. Private investment figures in this report therefore refer to the debt, equity and off-balance sheet components of corporate financing, which include some capital from public sources, such as credit lines on-lent by local banks or investment by development finance institutions.

Corporate financing data comes primarily from GOGLA's Access to Finance database, which tracks financing commitments to affiliate companies by instrument and company size. Companies are grouped by the total capital they have raised to date, following GOGLA's classification (see Key Concept box in Chapter 3). Small companies have raised less than USD 3 million, mid-sized companies USD 3–100 million, and market leaders more than USD 100 million. RBF is tracked separately in GOGLA's RBF database. WBG energy access project data is presented in Chapter 3 (World Bank Portfolio Trends) and shows how WBG funding is deployed across countries and instruments.

Several differences between the datasets affect how they can be compared. WBG figures are commitments to projects, which are typically disbursed over several years, whereas GOGLA figures are commitments made directly to companies, which are usually drawn down within one to two years. WBG data is reported by fiscal year (July to June) and GOGLA data by calendar year. WBG funding allocations should also be interpreted as indicative, as project financing is often deliberately structured flexibly across technologies and funding mechanisms rather than assigned to specific uses upfront. Allocations may evolve during implementation through reallocations, restructuring, or cancellations, meaning the breakdown presented represents the best available estimate based on published project documentation and internal consultations with World Bank project teams at the time of analysis.

The same differences determine how current funding is compared with the funding need in Chapter 6. Current funding levels are split by instrument to compare against the funding need, which is presented by instrument. For debt and equity, the comparison uses GOGLA's company-level data, which records debt and equity reaching companies from all sources, including public capital such as credit lines on-lent by local banks and investment by development finance institutions. WBG credit line and equity commitments remain public funding, but they are captured through the GOGLA data rather than added separately: a two-year total of project commitments does not show how much capital reached companies in that period, and adding it would count the same capital twice. WBG data is used only where no company-level source exists. Grants and RBF payments to companies are not tracked at transaction level, so the baseline combines WBG commitments for households and PUE other than credit lines and equity, GOGLA data on grants to companies, and an estimate of RBF from other development partners based on the World Bank's 78.8% share of committed RBF. Because WBG commitments are disbursed over several years, this baseline is likely to overstate the funding reaching companies in any one year, so the estimated increase required in grants and subsidies is conservative.

ANNEX D: METHODOLOGY FOR MAPPING THE WORLD BANK GROUP OFF-GRID SOLAR PORTFOLIO

World Bank Group funding figures in this report represent the best available estimate of approved public financing attributable to off-grid solar. They are compiled from the most recent and relevant project documentation, supplemented by consultations with project teams. World Bank operations are designed to be flexible, so that governments and project teams can reallocate financing as market demand, implementation experience, and country priorities evolve, and allocations may change through restructuring or cancellation. This flexibility improves implementation but means that precise totals by use case and financing mechanism are not always available from project documentation. Amounts are therefore assigned to household solar, PUE, public institutions, and financing mechanisms only where the evidence supports the split; otherwise, they are reported as combined or unspecified. The figures should be interpreted as indicative, rather than as fixed commitments or final expenditure.

Scope and measurement

Projects were identified from components classified as off-grid, or as combined grid and off-grid, in the World Bank's Energy and Extractives (EEX) portfolio database. This list was cross-checked against other projects known to contain off-grid elements, including regional projects classified as mini grid, and against projects in the Mission 300 Progress Portal. Each project was traced through its additional financing, restructurings, and cancellations. The analysis includes IBRD and IDA financing, World Bank-administered trust funds and co-financing from other donors channeled through World Bank projects, so figures described as WBG commitments in this report include this co-financing. It excludes private co-financing, company contributions, and projected private capital mobilization. Five IFC projects are included, based on sub-sector information provided by IFC. Active and closed projects approved by the Board by 30 June 2026 are included; pipeline projects are not.

For active projects, figures reflect the latest approved allocation, including additional financing, and restructurings. For closed projects, they reflect final component costs where available in the Implementation Completion and Results Report (ICR). All figures, including IFC figures, are therefore commitments rather than disbursements, except for closed projects where final expenditure is available. Financing is assigned to the World Bank Group fiscal year of Board approval (1 July to 30 June). Because the latest allocation is used, cancellations and restructurings revise earlier fiscal years, so figures may differ from those in earlier editions of this report and in the EEX database.

More recent and project-specific information takes precedence over earlier or higher-level documentation. Current information from project teams was given priority, followed by the most recent formal documentation: the Implementation Completion and Results Report for closed projects, or the latest restructuring or additional financing paper or Implementation Status and Results Report (ISR) for active projects, and then the Project Appraisal Document. The EEX database was used for screening and cross-checking only. Document review was AI-assisted, with supporting text checked against the source and verified manually where the evidence was unclear.

Allocation by use case

Funding was allocated at the most granular level the evidence supports. Household solar and PUE are reported together, because in both cases the household or business is the paying customer in a private transaction that public funding supports, whereas electrifying public institutions is a direct government purchase. Wherever household solar, PUE, and public institutions share an inseparable allocation, the amount is reported as unspecified. Where off-grid solar is combined with mini grids or clean cooking in a component that cannot be separated, the full component is included, as these activities serve closely related decentralized energy access objectives and off-grid solar typically accounts for a significant share; this was especially relevant in FY26, where all off-grid funding was included in shared components with mini grid funding. These components are flagged in the underlying dataset and may somewhat overstate funding for off-grid solar. Where off-grid solar is combined with grid investment, the component is excluded unless the off-grid amount can be isolated, since grid investment normally accounts for most of its value.

Allocation by financing mechanism

Financing is classified as RBF; credit lines, which also include IFC debt; upfront or market development grants; equity; other, covering named mechanisms too uncommon for a separate category, such as guarantees; and unspecified or undifferentiated, where one envelope can finance several mechanisms without a stated split or the mechanism is not specified. Amounts are assigned to a mechanism only where project documentation states them. Funding for public institutions is not split by mechanism, as it is generally provided through procurement, service delivery arrangements or capital grants rather than mechanisms comparable with RBF or credit lines.

Technical assistance

TA is reported separately, as it is usually a project-wide component supporting several activities. Off-grid TA is included where it is explicitly identified within the TA component or provided by the project team. Where project-wide TA supports a project with a significant off-grid component (>80% of total financing) and no split is available, the full TA amount is generally included; where the off-grid element is minor, project-wide TA is excluded. These cases are judgment-based to some extent.

Comparison with the Mission 300 Progress Portal

Figures in this report differ from those in the Mission 300 Progress Portal in scope. This analysis is global, while the portal covers sub-Saharan Africa. However, the portal covers all electricity access investment, including grid, whereas this analysis excludes grid investment and, where separable, mini grid and clean cooking financing. The broader technology scope generally outweighs the narrower geographic scope, so portal totals are higher.

Country coverage

Figure 22 counts countries covered by at least one World Bank-funded program with an identifiable off-grid solar element, from FY12 onwards. Each country is assigned to the fiscal year in which the earliest such program covering it was approved, and is counted only once. Regional programs are included only where their participating countries are explicitly documented. ROGEAP, approved in FY19, is the only regional program for which this is the case: its 19 participating countries, including Benin, are assigned to FY19, except Burkina Faso, Liberia, Niger and Nigeria, which were covered by earlier programs. Countries are grouped according to the regional classification used in the dataset.

ANNEX E: DETAILS ABOUT THE CUSTOMER SURVEY

Survey Methodology Note

The analysis in Chapter 4 draws on a primary survey of 458 SHS customers across Kenya, Madagascar, and Nigeria, complemented by insights from five OGS companies that served these customers. All respondents had purchased an entry-level Tier 1 SHS on a pay-as-you-go (PAYG) basis and had completed their PAYG contract at least two years prior to being surveyed. This allowed the chapter to observe customer experience and product performance at a point when the system was fully paid off.

The breakdown of respondents across the three countries is as follows:

- Kenya – 154 respondents
- Madagascar – 147 respondents
- Nigeria – 157 respondents

The survey was administered via telephone by 60 Decibels, an independent research firm, on behalf of the World Bank. Research assistants called respondents directly, using contact details provided by the five participating OGS companies. Each call opened with a standard introduction confirming the purpose of the study, participants' voluntary consent, and confidentiality of responses, before proceeding through a structured questionnaire covering topics such as product usage, ongoing product functionality, repair experience, upgrade behavior, and end-of-life disposal practices. Calls were structured to route inactive customers (i.e., those no longer using their product) through a shorter path focused on what happened to the product (e.g. whether it was repaired, stored, discarded, or other disposal), while active customers proceeded through the full set of questions on usage and satisfaction.

Survey findings are complemented by secondary research, direct interviews with the five participating companies, and wider sector evidence, allowing the chapter's findings to be cross-checked across customer-reported experience and company-level perspectives.

Survey Questions

Ref	Question / Prompt	Answer options
I	Are you happy to continue with the interview? (SS)	• Yes — “Thanks so much, let’s get started” • No — “No problem, thank you for your time.” [End interview]
J	To confirm survey eligibility, can you share what year you were born? (NM)	Open ended
K	Have you completed payment for at least one entry-level [Company] [product] at least two years ago	• Yes — “Thanks so much, let’s get started” • No — “No problem, at this time you are not eligible to take part in this survey but thank you for your time.” [End interview]

Ref	Question / Prompt	Answer options
Thank you for sharing this. I will start by asking about your [company][product]		
Q1	Where are you using this [Company]'s [product] (SS)	• Home (Skip to Q3) • Business/Farm (Skip to Q3) • Both (Skip to Q3) • I am currently not using the [company] [product]
Q2	What happened to the [company] [product] you bought? (SS)	• I still have it, but it is not working • I returned it to the solar company • I sold or gave it to someone else • I gave it to a scrap collector / recycler • I disposed of it • Other, please specify:
Q3	What is the current status of [company] [product] you bought? (SS)	• I use it as my primary source of lighting and energy • I use it as my back-up source of lighting and energy
Q4	What sources of light or energy were you using at home before acquiring the [company] [product] you bought? (MS)	• Grid electricity • Kerosene lamp • Torch or flashlight • Candle • Smaller SHS (3–49.99Wp) • Solar lantern • Generator • Mini Grid • Larger SHS (>49.99Wp) • None • Other, please specify:
Q5	Besides [company] [product] you bought, what sources of light and/or energy do you currently use at home? (MS)	• Grid electricity • Kerosene lamp • Torch or flashlight • Candle • Smaller SHS (3–49.99Wp) • Solar lantern • None (Skip Q6) • Generator • Mini Grid • Larger SHS (>49.99Wp) • Other, please specify:
Q6	What is the main reason you started using this other product or energy source? (SS)	• Needed more power or capacity • Wanted additional features or appliances (e.g., TV, fan, etc.) • Wanted a healthier/cleaner alternative • Need a backup energy source • Can now afford it • Financing or payment options available • Wanted better value for money • Wanted a product or service that better met my needs • Grid became available where I live (new connection possible) • Mini-grid connection became available where I live • Other, please specify

Ref	Question / Prompt	Answer options
Q7	Did your savings balance change because of the [company] [product/service]? Has it: (SS)	• Very much increased • Slightly increased • No change • Slightly decreased • Very much decreased
Q8	Why do you think your savings balance has increased / not changed / decreased? (OE)	• Open-ended
Q9	Did the money you earn (your income) change because of the [company] [product/service]? Has it: (SS)	• Very much increased • Slightly increased • No change • Slightly decreased • Very much decreased
Q10	How did you use this additional income/savings balance? (OE)	• Open-ended
Thank you for sharing. I would now like to ask questions about your experience with repairs – if any – for the [company] [product].		
Q11	Have you experienced any technical issues with the [company] [product] that prevented you from using it? (SS)	• Yes • No (Skip to upgrade section)
Q12	At the time of the issue, did you know whether your [company] [product] was still under warranty? (SS)	• Yes, it was under warranty • No, the warranty had expired • I did not know
Q13	Was it satisfactorily repaired or replaced? (SS)	• Yes (Skip to upgrade section) • No
Q14	What was the main reason your systems was not repaired, or not repaired to your satisfaction? (SS)	• Did not know where to get it repaired • No repair service available nearby • Repair was too expensive • Thought it could not be repaired • Poor past experience with repairs • Partially repaired • Other, please specify
Thank you for sharing that. I would now like to ask questions about your experience with upgrading [company] [product].		
Q15	After you finished paying for your [company] [product], did [company/provider] or one of their agents contact you to offer an upgrade or a new system? (SS)	• Yes (skip to Q17) • No • Can't remember

Ref	Question / Prompt	Answer options
Q16	What would need to happen for you to buy another solar product or switch to a different energy source? (Select all that apply)	• Lower monthly payments • Access to a subsidy or discount • More features or appliances • When I have more savings • If grid electricity becomes available where I live • If a mini-grid becomes available where I live • No plans to buy or switch • Other, please specify
Q17	What product did the agent offer? (SS)	• A similar solar home system • A solar-powered TV • A larger solar home system (SHS) • A generator • Solar powered fan • Solar powered radio • Solar powered refrigerator • Solar powered phone • Grid electricity • A mini-grid connection • Other, please specify:
Q18	Did you accept that offer and buy a new system through [company/provider]? (SS)	• Yes • No (Skip to next section)
Q19	When you got your new product, did you receive any special financial offer or support? (MS)	• A discount on the price • A subsidy • A voucher • Better financing or payment terms • A trade-in credit for my old product • No special offer • Other, please specify
Finally, I'd like to ask a few questions about your experience with solar products that are no longer working or have reached the end of their life.		
Q20	Do you currently own any solar products that are not working?	• Yes • No (skip to Q21)
Q21	How do you plan to dispose of them?	• I don't plan to dispose i.e., keep product at home • Return to the solar company • Sell or give to a scrap collector / recycler • Throw away • Other (please specify)
Q22	Have you ever disposed of a non-functioning solar product in the past?	• Yes • No (skip to end of survey)
Q23	How did you dispose of it?	• Return to the solar company • Sell or give to a scrap collector / recycler • Throw away • Other (please specify)
End of survey: Thank you very for your valuable input!		

ANNEX F: METHODOLOGY FOR ANALYSIS OF RISE OGS POLICY INDICATORS

Data source

All figures are drawn from the **Regulatory Indicators for Sustainable Energy (RISE) dataset**, using the **2017, 2020, and 2023 editions**. RISE scores each country against a fixed set of policy and regulatory questions, with composite indicators reported on a 0 to 100 scale and their constituent sub questions scored as binary (100 for yes, 0 for no). Country selection and regional classification follow the Dalberg off grid solar analysis tab of the source workbook, which applies World Bank regional groupings.

Country coverage

The analysis covers 42 countries in sub-Saharan Africa and South Asia.

- Sub-Saharan Africa (35): Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo Dem. Rep., Congo Rep., Côte d'Ivoire, Eritrea, Ethiopia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Federal Republic of Somalia, South Africa, South Sudan, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe.
- South Asia (7): Afghanistan, Bangladesh, India, Maldives, Nepal, Pakistan, Sri Lanka.

Treatment of India

RISE scores India at state level rather than nationally, covering five states: Andhra Pradesh, Bihar, Maharashtra, Uttar Pradesh and West Bengal. Two rules are applied.

For composite indicators reported on the 0 to 100 scale, India's score is the simple unweighted mean of the five state scores. For binary sub questions, India is counted as yes only where all five states score yes. This unanimity rule is conservative and was chosen for consistency.

Indicators used

Indicator	Type	Years reported
1.3 Inclusion of decentralized energy solutions for specific groups	Composite, 0 to 100	2020, 2023
1.3.1 Plan includes decentralized energy solutions	Binary	2017, 2020, 2023
1.3.4 Plan addresses electricity access of vulnerable groups	Binary	2020, 2023
4.1.1 National programs to develop stand-alone system markets	Binary	2020, 2023
4.2 Financial incentives	Composite, 0 to 100	2020, 2023
4.2.1 Duty or tax exemptions for stand-alone systems	Binary	2020, 2023
4.2.2 Clear eligibility criteria for subsidies	Binary, conditional	2023

Indicator	Type	Years reported
4.2.3 Consumer financing (PAYGO/MFIs) for stand-alone systems	Binary	2020, 2023
4.2.4 Support for low-income households, pro poor subsidies	Binary	2020, 2023
4.3.1 Adoption of international quality standards	Binary	2017, 2020, 2023
4.3.2 Environmental regulations on disposal of solar devices	Binary	2017, 2020, 2023

Scoring bands

Composite indicators are grouped into three bands following the RISE convention: 67 to 100 denotes a relatively strong policy and regulatory framework, 34 to 66 an intermediate framework, and 0 to 33 a relatively weak framework. Bands are applied only to the composite indicators 1.3 and 4.2. Binary sub questions take only the values 0 and 100 and are reported as the share of countries answering yes, not as band distributions.

Conditional indicators

Indicator 4.2.2 is conditional on 4.2.1, asking whether countries with duty or tax exemptions in place have established clear eligibility criteria. It is therefore reported against the base of countries answering yes to 4.2.1 (29 countries in 2023) rather than against all 42.

Indicator 4.2.4 is not conditional on 4.2.1 and is reported against all 42 countries. Four countries (Angola, Liberia, Maldives and Sudan) have support for low-income households without any tax exemption in place, so nesting 4.2.4 within the 4.2.1 base would drop these cases and understate the figure.

ANNEX G: METHODOLOGY FOR ESTIMATING FUNDING NEED

Funding Need is calculated by estimating how many households will need a first-time off-grid solar (OGS) connection over the next several years, then modeling the cash flows and investment gap OGS companies face in serving them, factoring in revenues, costs, and financing terms.

Step 1: Determine the number of households needing a first-time connection.

The number of households needing a first-time Tier 1 energy connection through OGS products (3–10 Wp) is estimated using the Global Electrification Platform (GEP) model, projected over the next four years.

Step 2: Define the product cost and financing terms

The Tier 1 OGS product is assumed to cost USD 90, sold on a PAYG basis with a 5% deposit and a 12-month repayment tenure.

Step 3: Calculate OGS companies' cash flow for each year

For each year, OGS companies' cash flow is calculated as follows:

- **Households served:** OGS companies are assumed to serve the same number of households without access each year from 2027 to 2030 in order to achieve universal Tier 1 access by 2030
- **Replacement sales:** The annual number of replacement products sold from 2027 to 2030 is estimated assuming a four-year product lifetime for Tier 1 products sold before 2025, and a six-year lifetime for products sold from 2025 onward. All Tier 1 products are assumed to be replaced upon reaching the end of their lifespan
- **Revenue:** Operating revenue is calculated from new product sales and replacement sales, assuming a PAYG down payment rate of 5% and a consumer repayment rate of 70%
- **Cost of goods and gross profit:** Landed costs are assumed to be approximately 43% of the PAYG price, and sales, marketing, service, and customer care costs are assumed to be 22% of the PAYG price. Together with financing costs, bad debt costs, and margins, these make up the remaining cost drivers used to calculate gross profit
- **EBIT:** Overhead costs are assumed to be 5% of costs before gross profit, and are used to calculate earnings before interest and taxes (EBIT)
- **Interest and loan repayment:** Loans are assumed to have a three-year tenure at a 13.5% interest rate, used to calculate capital repayment and interest expenses
- **Taxes:** A corporate tax rate of 30% is applied to calculate tax expenses
- **Investment expenses:** A scale-up investment factor (investment required per USD 1 of sales) is calculated from the GOGLA investment database, and multiplied by the number of target products sold to calculate investment expenses (e.g., for scaling operations or expanding into new geographic markets)

Step 4: Calculate the investment need for OGS companies each year

The annual investment need is calculated as follows:

- Companies are assumed to reinvest their cash into the following year's operations
- A debt-to-equity ratio of 1.5 is assumed
- Grants are assumed to account for 12% of the total funding need
- The gap between revenue and expenses is calculated for each year, ensuring companies always retain enough cash to support the following year's operations

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