



Unlocking Off-Grid Solar: How Results-Based Financing is driving energy access and powering productivity



About the Report

Author and Contributors

Authors

Oliver Reynolds (GOGLA), Susie Wheeldon (GOGLA)

Contributors

Charles Miller (ESMAP), Chiedza Mazaiwana (ESMAP), Collin Gumbu (GOGLA),
Jakub Vrba (Efficiency for Access), Serra Paixao (GOGLA), Siena Hacker (Efficiency for Access)

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Ash Sharma – Head, Beyond the Grid Fund for Africa and Modern Cooking Facility for Africa – NEFCO
Charles Miller – Energy Access Consultant – ESMAP Lighting Global
Eva-Maria Brändle – Junior Specialist – Energising Development (EnDev), GIZ
Federico Hinrichs – Energy Access Consultant – ESMAP Lighting Global
Guilla Lenne Venance – Executive Director Madagascar – Baobab+
Hack Stiernblad – Director of Business Development – SunCulture
Irene Mutisya – SEFFA Market and Data Analyst – SNV
Jamie Evans – Management Consultant – Deloitte
Javier Ayala – BRILHO Energy Africa Team Leader – SNV
Jeff Stottlemyer – Director, Clean Energy Access – CLASP
Jennifer Ifeanyi-Okoro – VP Public Policy – Sun King
John Ngigi – Project Manager – Energising Development (EnDev), SNV
Karl Skare – Chief Product & Strategy Officer – d.light
Pedro Moleirinho – Renewable Energy Consultant – SNV
Ross Thompson – Channel Head – Agent – Yellow
Thomas de Wijn – Chief Operating Officer – Solarworks



Introduction

Results-Based Financing (RBF) schemes are a powerful tool, enabling governments and development partners to leverage the private sector to achieve development goals. Over the last decade, RBF programmes have been piloted, scaled and diversified within the energy access sector, aimed at reaching the 675 million people who lack access to modern electricity today. In parallel, annual sales of off-grid solar products have more than doubled.¹ GOGLA affiliates, which make up nearly 30% of the off-grid solar market, have sold over 70 million solar lanterns and solar home systems (SHS) since 2012. Alongside them, they have sold millions of appliances for both household and productive use.

In this report, we explore the landscape of energy access RBF with a focus on stand-alone off-grid solar (OGS) energy kits (lanterns, multi light systems and solar home systems), and productive use of renewable energy (PURE) appliances. Using off-grid industry sales data and information shared by RBF providers, as well as interviews with key stakeholders, this report analyses the growing role of RBF in achieving electricity access and other development goals, showcasing its transformational potential.

What is an RBF?

Results-Based Financing is a form of public funding mechanism whereby disbursements by a funder to a recipient are conditional on the achievement of predetermined results. This mechanism involves three key features:

- Payments are made when pre-agreed results have been achieved.
- The recipient has agency over how to achieve these results.
- Results need to be independently verified to trigger a payment.

RBF can deliver supply-side subsidies, intended to help companies overcome the high costs and risks of expansion into a new, and often hard-to-reach, geographical area. They can also deliver end-user subsidies, intended to reduce prices for low income customers and overcome affordability barriers (see Figure 1²). With end-user subsidies, companies may be able to choose how much to reduce prices, or a fixed price reduction may be specified as a condition for receiving the RBF payment. Some RBFs deliver both supply-side

and end-user subsidies. RBFs can also have other objectives such as ensuring high quality products are reaching the market or reaching specific categories of customers, such as rural households or women.

With differences in objectives come differences in design. Beyond supply-side or end-user subsidies, key design features which enable to reach different objectives include eligibility criteria for company participation (e.g. product quality certification), the definition of the milestones that will trigger disbursements (e.g. sales volumes target reached), whether the RBF programme will be targeted (e.g. only sales to customers in rural provinces are eligible) or untargeted, and, finally, the subsidy level.³

Although RBF can be catalytic in markets at different stages of maturity, “RBF is not a silver bullet”.⁴ In some nascent markets, upfront grants linked to milestones might be more appropriate, whilst in some more mature markets, there may be a greater need for a credit line to provide debt. RBF is also unlikely to address all market barriers on its own. There is almost always a need for complementary activities in areas such as consumer awareness, technical assistance and quality assurance. According to the Energy Sector Management Assistance Program (ESMAP), “the most appropriate funding mechanism, or combination of mechanisms, depends on a number of factors, including the objectives of the programme, market characteristics, the time available, and the implementing capacity of the lead agency as well as any potential partners”.⁵

1 Annual sales reported by GOGLA members and companies selling VeraSol quality certified products. These represent an estimated 28% of the global market for off-grid solar lanterns and solar energy kits. For more information, please visit the [GOGLA website](#).

2 GOGLA, Discussion Paper: How End-User Subsidies Can Help Achieve Universal Energy Access, 2021

3 For a more detailed discussion of RBF design in the energy access space: EnDev, [Transforming energy access markets with Results-based Financing, 2021](#)

4 EnDev, [Transforming energy access markets with Results-based Financing, 2021](#)

5 ESMAP, [Designing Public Funding Mechanisms in the Off-Grid Solar Sector, 2022](#)

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Other mechanisms include upfront grants, tax exemptions, credit lines, risk mitigation, and public procurement.⁶

With the growing number of RBF schemes in the sector, the increasing size of the funding

committed, and the diversification of schemes, having accessible information on the impact of RBFs is becoming critically important. This report uses data on a wide-range of RBF programmes and off-grid solar sector sales to present insights from a decade of RBFs in the energy access space.

Figure 1 - Most appropriate subsidies for expanding energy access by market type*



*FROM: [GOGLA, Discussion Paper: How End-User Subsidies Can Help Achieve Universal Energy Access, 2021](#)

6 For a detailed overview of funding mechanisms in the off-grid solar sector: [ESMAP, Designing Public Funding Mechanisms in the Off-Grid Solar Sector, 2022](#)

7 IEA, IRENA, United Nations Statistics Division, World Bank, World Health Organization, Tracking SDG7 The Energy Progress Report 2023, 2023

8 [GOGLA, Powering Climate Adaptation and Justice: The Critical Role of Off-Grid Solar Technologies, 2023](#)

9 Lighting Global, GOGLA, Efficiency for Access, Open Capital Advisors, Off-grid Solar Market Trends Report 2022: State of the Sector, 2022

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Why does access to off-grid solar matter?

Today, 675 million people lack access to modern electricity and we are not on track to reach the Sustainable Development Goal of achieving universal electrification by 2030.⁷

These same communities also lack the productive use technologies needed to grow enterprise and agriculture; while a lack of electricity is limiting education, health, the provision of clean water, climate resilience and a range of other development goals.⁸

Yet we have the technology and business models that could enable us to reach all those living without modern electricity, with off-grid solar the most cost-effective solution to reach 55%.⁹

When a house gains a solar energy kit, a family gains illumination to help them work, study or spend time together, they often gain access to phone charging, a radio or a TV, enabling them to stay connected to news, watch educational programmes or gain business opportunities.

Businesses are also being supported by technologies specifically designed for productive use, such as solar water pumps and refrigeration units. For example, solar water pumps improve irrigation for smallholder farmers which can lead to higher agricultural yields and cold storage solutions can significantly decrease product spoilage. Both technologies can increase the total volume of a farmer's output that can reach the market and be sold.

The off-grid industry itself is also generating hundreds of thousands of clean energy jobs, driving economic growth and creating employment, predominantly in rural areas.

Yet electricity access and PURE appliances are often out of reach for those living under or near the poverty line, or in areas that off-grid energy providers are not yet operating. RBFs provide a key tool for helping to reach these communities and enable them access to transformative modern electricity and productive use technologies for the first time.

Methodology and Scope

This report leverages two data sources. The first, is data on the sales of off-grid solar energy kits and appliances collected by GOGLA in partnership with Lighting Global and Efficiency for Access.¹⁰ The second, is a mapping of RBFs through data shared by RBF providers as well as through the SEforAll RBF tracker¹¹ (Figure 2). While this mapping of RBFs is extensive, it is not exhaustive.

Only RBFs with focus on the following technologies were included:

- a. off-grid solar energy kits (solar lanterns, multi-light systems, solar home systems),
- b. energy efficient appliances for use in an off-grid/weak-grid context,
- c. PURE appliances such as solar water pumps and refrigeration units.

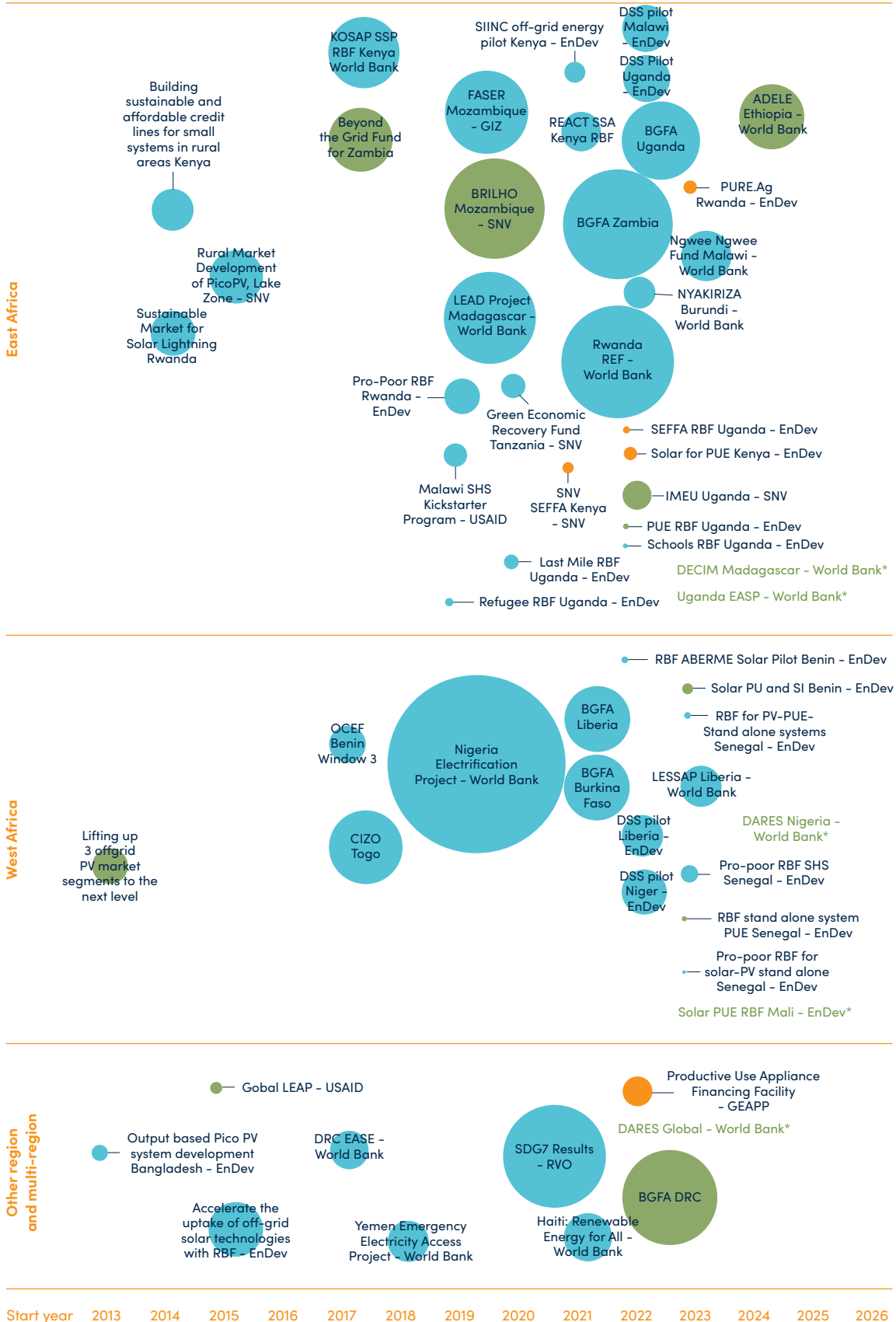
Data from RBFs focused primarily on mini-grids or clean cooking for example were excluded from the mapping. In a limited number of cases, RBFs tracked in this report may also include funding to support other technologies. Additionally, RBFs excluded from this report due to their focus on excluded technologies may have included funding committed to support solar energy kits, household appliances and PURE appliances.

¹⁰ The full [methodology](#) is available on the GOGLA website

¹¹ [SEforAll RBF Tracker](#)

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Figure 2 - RBF programmes by region, start year, fund size and focus on household solar or productive use appliances



Area of focus of the RBF programme

- Household solar
- Productive use of renewable energy
- Both

* funding committed unknown



Trends in Results- Based Financing for off-grid solar and PURE



Trends in Results-Based Financing for off-grid solar and PURE

Analysis of the evolution of RBFs over the last ten years demonstrates how their use in energy access has gradually normalised and scaled. RBFs are now a common mechanism used by development organisations such as EnDev, the Beyond the Grid Fund for Africa and the World Bank to accelerate energy access and PURE uptake.

Regional focus of RBFs

Since 2013, the data shows a continuing growth trend in the number of RBF programmes launched, with a significant acceleration around 2019. The geographic distribution of RBFs has also evolved. Although overall there is a prevalence of schemes in East African countries, there has been a progressive growth of RBFs in West Africa since 2020-2021 (Figure 3).

Examining the total funding committed through RBF programmes shows that they have been predominantly concentrated in East and West Africa. Since 2012, \$260 million has been committed in East Africa and \$116 million in West Africa, totalling 58% and 26% of total funding respectively (Figure 4).

Figure 3 - Number of RBF programmes launched in each region per year¹²

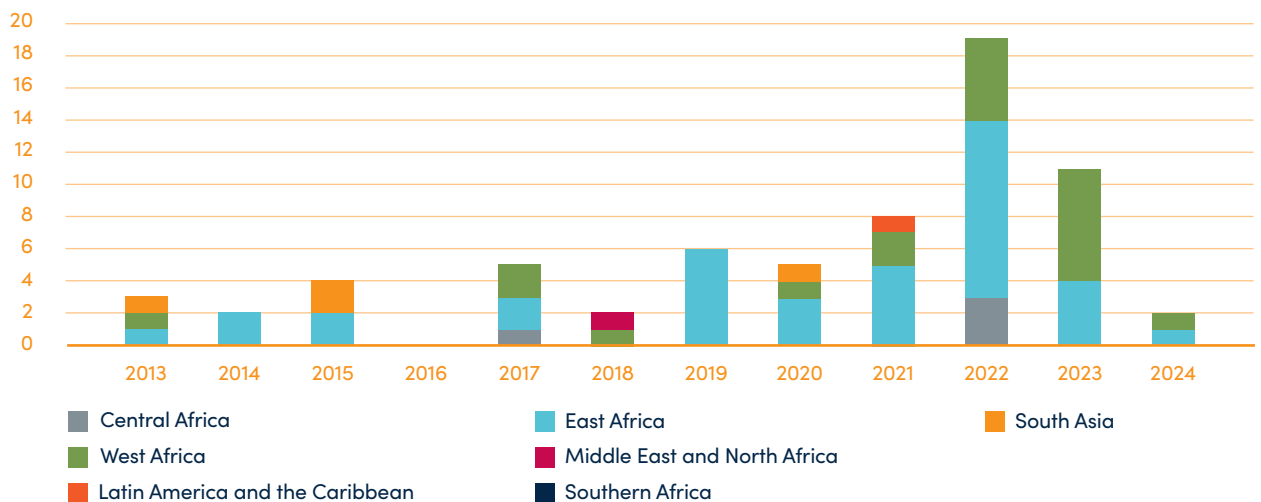
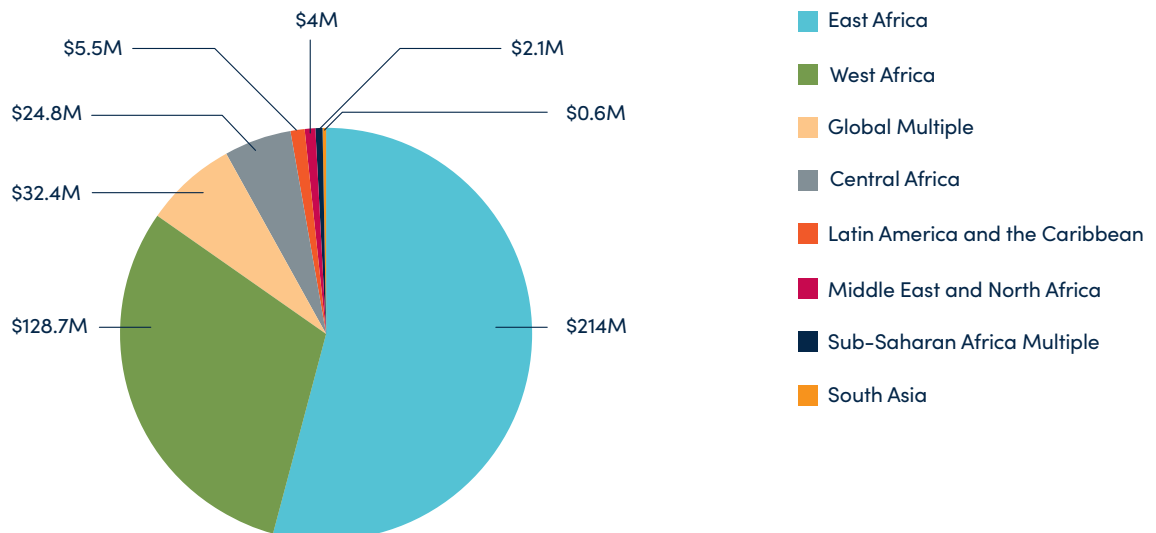


Figure 4 - Total funding committed by region in USD

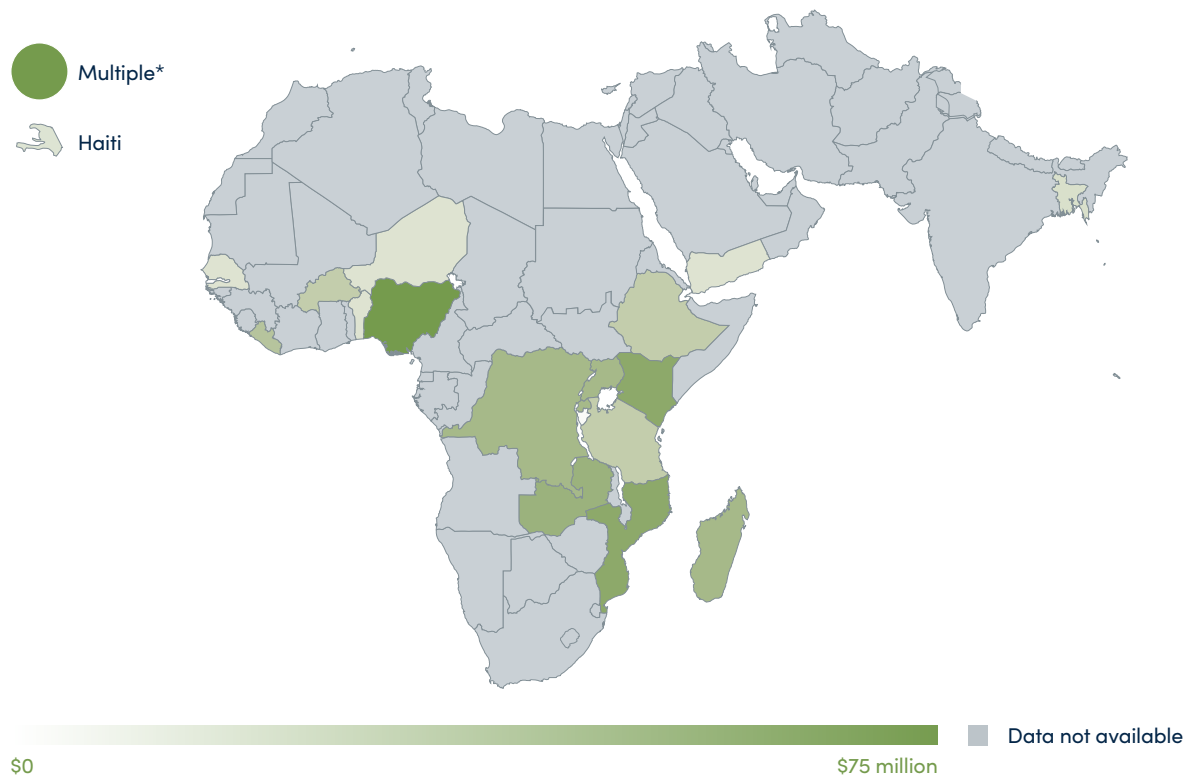


12 RBFs that cover several regions are counted once in each region. In the definition of regions used by GOGLA (in line with the [United Nations](#)), East Africa also includes Madagascar, Malawi, Mozambique, Zambia and Zimbabwe.

Trends in Results-Based Financing for off-grid solar and PURE

Figure 5 shows the distribution of funding by country, highlighting the regional difference in concentration highlighted above. Of particular notice is that funding in West Africa is highly concentrated in Nigeria. In East Africa, funding is more evenly distributed among key markets such as Kenya, Madagascar, Mozambique, Rwanda, Uganda or Zambia (Figure 5).

Figure 5 - Map of funding committed by country¹³



*Multiple includes RBF schemes that cover multiple countries and for which data is not disaggregated per country.

13 RBFs covering multiple countries for which funding per country was not made available are counted under the Multiple category.

Trends in Results-Based Financing for off-grid solar and PURE

Technology focus of RBFs

The technology focus of RBFs has also evolved over time.

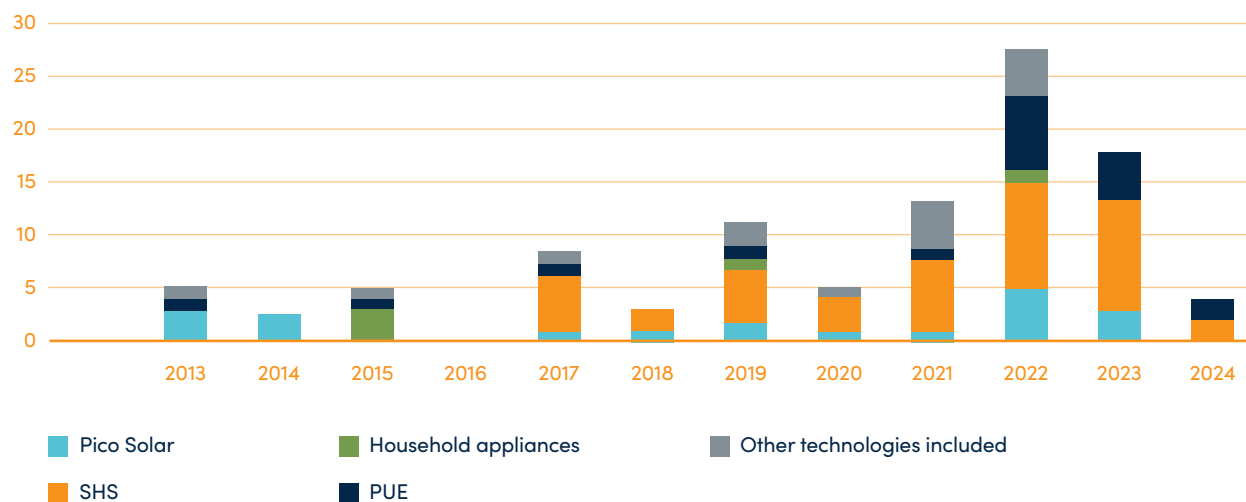
Solar energy kits (lanterns, multi-light systems and SHS) While several early RBFs focused on smaller solar energy kits such as multi-light systems, more recently, the focus of many schemes has been on larger capacity SHS. This is a positive trend in terms of the movement of homes and businesses to a higher level of energy service. However, even with reduced costs due to RBFs, large SHS are still too expensive for hundreds of millions of people.¹⁴ Support for Tier 1¹⁵ products remains needed to ensure no one is left behind.

PURE appliances The growth in RBF programmes for PURE technologies such as solar water pumps (SWPs) and refrigeration units (RUs) is welcome, especially as affordability is likely to be an even bigger barrier to access for these appliances.

However, for PURE, providing access is only the first step towards impact and other barriers often need to be lifted for end-users to fully benefit from the technologies. For example, access to a solar water pump may help a farmer to achieve an improved agricultural yield, but it will not lead to increased income if the farmer is not integrated in a value chain with market access. Optimising RBFs for PURE may therefore also entail providing other support for customers (e.g. market linkage services) so that the benefits of the technologies can be fully realised, either directly through an energy-sector led programme, or in partnership with agriculture or water sector programmes.

Household appliances Very few RBFs have explicitly targeted household appliances such as fans or TVs, but with so many RBFs focused on SHS, appliances are likely to have often been indirectly included.

Figure 6 - Number of RBF programmes focusing on each technology per year of launch¹⁶



¹⁴ Lighting Global, GOGLA, Efficiency for Access, Open Capital Advisors, Off-grid Solar Market Trends Report 2022: State of the Sector, 2022

¹⁵ ESMAP, Beyond Connections Energy Access Redefined, 2015

¹⁶ RBFs covering multiple technologies are counted once for each technology. Some RBFs also include other technologies such as improved cooking solutions, street lighting or mini/micro-grids along with OGS.

Trends in Results-Based Financing for off-grid solar and PURE

Additional RBF trends

Other trends worth noting, but for which the data is too incomplete to be cited, include:

- A growing number of RBFs that include end-user subsidies. There have been multiple end-user subsidy pilots launched by EnDev in Liberia, Malawi, Niger and Uganda as well as larger programmes like the RBF under the Nigeria Electrification Project, which included both supply-side and end-user subsidies.
- An increased focus on inclusivity with more and more RBFs including milestones linked to best practices around consumer protection or gender-based employment, such as the Beyond the Grid Fund for Africa's RBFs.
- More RBFs with payments linked to sales and to provision of high-quality after-sales service over time, such as the Togo CIZO Cheque programme.
- There are also a growing number of RBFs that incentivise reaching the most remote, the poorest and/or women. More recently, EnDev piloted a Social Impact Incentives (SIINC) RBF scheme where the disbursement of funds is not only tied to increased access to products but to proof of impact at the outcome level (e.g. energy savings, productive use by women).
- A progressive shift from RBFs that are led by development agencies and private sector implementation partners, to RBFs where national governments play a leading role. This trend has in large part been driven by an increase in the use of RBFs by the World Bank Group.



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**The potential
impact of RBFs**

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The potential impact of RBFs

The analysis in this report and feedback from practitioners suggest that RBFs are playing a key role in achieving electrification and other development goals.

Highly targeted pilot schemes appear to be successfully helping to reach vulnerable communities with off-grid solar and providing proof of concept, while larger programmes are helping to move the needle on country-scale electrification. The purpose of this research is not to assess or compare the efficacy of different RBF design features or evaluate specific programs.

The charts below and on the next page show the correlation between the active phase of RBF programmes in different countries, and significant increases in off-grid solar sales. They also demonstrate how the sales during the period translate into improved energy access by millions of people.¹⁷

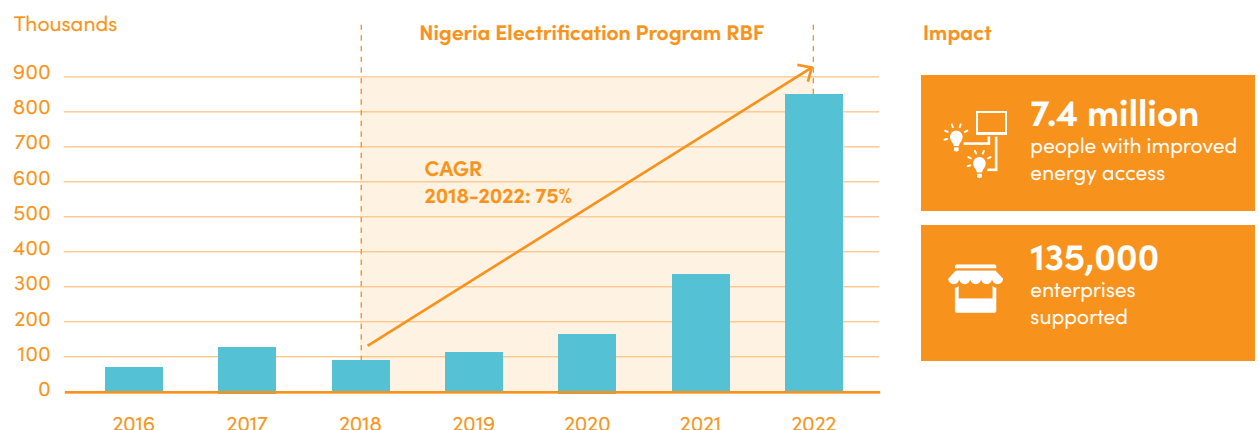
In the figures shown in this section, the compound annual growth rate (CAGR) of sales is between 75%-159%. While it should be noted that not all the sales recorded in the sales data will have been sold under the RBF, the RBFs are likely to have played a critical role in building the market and enabling companies to reach more people with a wider array of off-grid solutions. For example, relating to the RBF programmes analysed in Nigeria, Malawi and Mozambique,

the following trends can be observed for products not directly targeted by the RBF programme (as reported by GOGLA affiliates):

- Nigeria 2018–2022: in addition to a 75% CAGR for SHS and multi-light systems leading to an additional 1.5 million units sold, annual solar lantern sales grew 72% from 195,000 to 335,000 and household appliances sales (fans and TVs) grew from just below 5,000¹⁸ units sold per year to 274,000 units.
- Malawi 2019–2021: in addition to a 120% CAGR for SHS leading to an additional 230,000 units sold, annual solar lantern sales grew 47% from close to 17,000 to 24,000.
- Mozambique 2018–2022: in addition to a 159% CAGR for SHS leading to an additional 236,000 units sold, annual solar lantern sales grew from 0 to 31,000 and TV sales grew from around 100¹⁹ units to 2,700.

All these numbers translate into greater impact achieved, with the RBFs appearing to play a more widely catalytic role.

Figure 7 - Sales volumes of multi-light systems and solar home systems in Nigeria



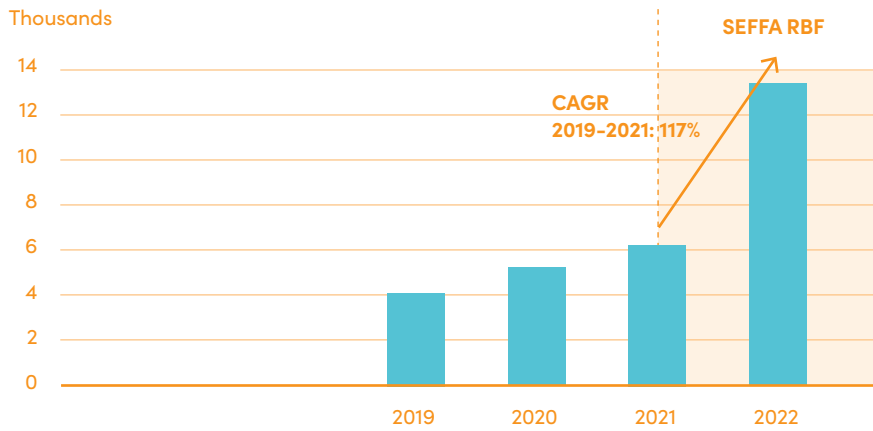
¹⁷ Solar energy kits are assumed to reach a household estimated to be composed of 5.5 people on average. PURE appliances are assumed to reach a farmer or a business. Discount factors are applied to account for product loss, loss of access and repeat sales.

¹⁸ Data collection for appliances began in the second half of 2018. Sales from July–December 2018 were doubled to estimate annual sales.

¹⁹ Based on 2019 sales.

The potential impact of RBFs

Figure 8 - Sales volumes of solar water pumps in Kenya



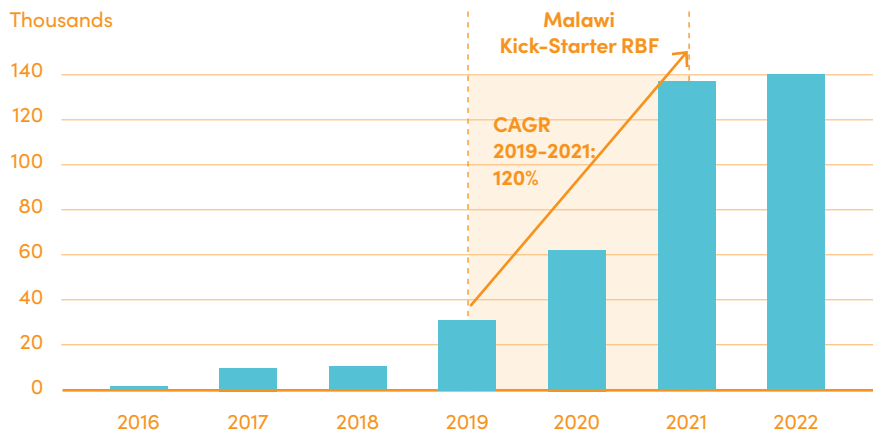
Impact



19,066

farmers with improved irrigation powered by renewable energy

Figure 9 - Sales volumes of multi-light systems and solar home systems in Malawi



Impact



1.1 million

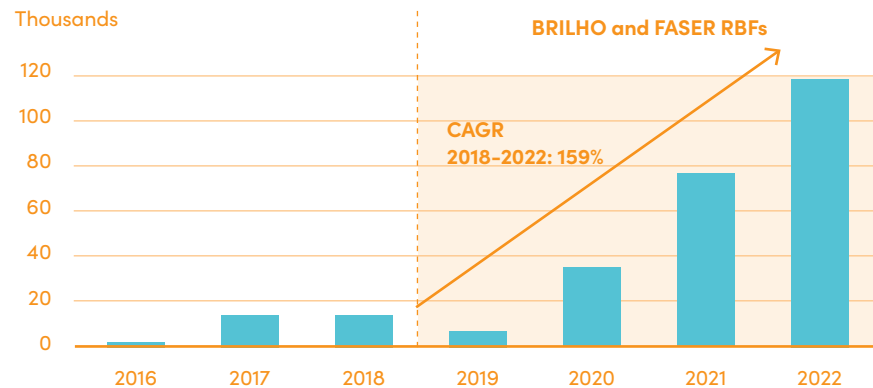
people with improved energy access



20,000

enterprises supported

Figure 10 - Sales volumes of multi-light systems and solar home systems in Mozambique



Impact



1.1 million

people with improved energy access



20,000

enterprises supported

Recommendations and Conclusions

Recommendations for future research

While the data in this report provides key insights into the impact of RBFs, improved data collection processes and granularity of data would help to generate deeper learnings for RBF providers and energy access stakeholders. In particular, improved data collection would enable systematic attribution of funding committed and disbursed by technology type and country, as well as better assessing the funding committed and disbursed per end-user reached.

Better data would also help to uncover how RBF schemes can be optimised through the use of other interventions, and explore when they are the most appropriate mechanism for achieving a particular objective. For example, stakeholders interviewed for this research advised that RBFs have the most transformative impact in countries where additional mechanisms, such as tax incentives, concessional financing or capacity building and government support, are also enhancing the outcomes of the RBF. Better data would allow for an understanding of the synergies between interventions and the stage of market development.

Improved data collection would further enable categorisation of RBF programmes by objective or mechanism, to compare programmes like for like. For example, this would allow for a better understanding of the effects of end-user vs supply-side subsidies, and/or targeted vs untargeted programmes. RBF programmes generate large amounts of data that could be better leveraged for improved evaluation and learnings.

Lastly, the data used for analysis in this report did not enable us to assess the sustainability of the impact delivered by the RBF programmes. Enhanced data tracking could also be used to monitor the long term impacts of such RBF programmes. Sustainability of impact can be assessed in different ways. For example by exploring whether the people reached are durably connected to electricity, or if a commercially viable market serving the target population has been established. In either case, the idea is to understand how customers will be served once the RBF programme is over.

There are already tools available that could help to unlock better data collection and management, such as the Prospect tool launched by A2EI and GET.invest or the Odyssey platform used to gather data around the recent RBF in Nigeria. There are also available mechanisms which could allow for better data sharing and compilation, such as SEforALL's RBF tracker and GOGLA's annual investment data collection. Improved coordination between RBF providers and these initiatives, as well as better coordination between these initiatives, could accelerate the sharing of learnings on RBF for energy access and the productive use of renewable energy.

Conclusions

The world is not on track to reach universal access by 2030. The data in this report shows that RBF schemes focussed on off-grid solar technologies can have a significant impact on accelerating energy access and ensuring that farms and businesses have the PURE appliances needed to increase productivity and drive economic growth. By leveraging the private sector, RBFs provide governments and development partners with a cost-effective funding mechanism to reach the unconnected.

To date, RBFs have been most dominant in East African markets, helping them become established markets for off-grid electrification. They have more recently been employed in the rest of Sub-Saharan Africa, notably in West Africa. In these regions too, they have helped to rapidly scale access to off-grid solar technologies, both through technologies directly included in the RBF scheme, as well as other products sold by off-grid solar companies. There has also been a more recent growth in the use of RBFs to catalyse access to PURE appliances such as water pumps and refrigeration units – helping to drive scale and increase their use within enterprise and agriculture.

While a range of interventions are needed to rapidly accelerate access to off-grid technologies, the data explored in this report shows that RBFs are an essential tool for achieving a clean energy transition that leaves no one behind.

Johan Cruijff Boulevard 83-95
1101 DM Amsterdam
The Netherlands

info@gogla.org
+31 202 400 729



The Voice of the **Off-Grid Solar Energy** Industry