



AFRICAN DEVELOPMENT BANK GROUP
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DE DÉVELOPPEMENT



Sustainable Energy
Fund for Africa

Accelerating private sector investments in green mini-grids

Key takeaways from the
ARE Energy Access Investment Forum 2023





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Contents

Acknowledgements	3
List of abbreviations	5
Executive summary	7
01 Green mini-grids in sub-Saharan in Africa	8
02 Key takeaways from EAIF 2023	10
03 Key market opportunities for green mini-grids in sub-Saharan Africa	16
04 Conclusions	22
References	24



List of abbreviations

ACPU	Average Consumption Per User
AECF	Africa Enterprise Challenge Fund
AfDB	African Development Bank
AMDA	Africa Mini-grid Developers Association
AMAP	Africa Mini-grids Acceleration Programme
AMP	Africa Mini-grids Programme
ARE	Alliance for Rural Electrification
ARPU	Average Revenue Per User
DRE	Distributed Renewable Energy
AEP	Energising Agriculture Programme
EAIF	Energy Access Investment Forum
EDFI MC	European Development Finance Institutions Management Company
ElectriFI	Electrification Financing Initiative
EEP	Energising Education Programme
EnDev	Energising Development
ESMP	Environmental and Social Management Plan
EU	European Union
FEI	Facility for Energy Inclusion
GEAR	Grid Efficiency & Resilience
GEAPP	Global Energy Alliance for People and Planet
GEF	Global Environment Facility
GIZ	German Corporation for International Cooperation
IRENA	International Renewable Energy Agency
ISA	International Solar Alliance
KAS	Konrad-Adenauer-Stiftung
NEP	Nigerian Electrification Project
NPSP	Nigeria Power Sector Programme
OGEF	Off-Grid Energy Fund
PUE	Productive Use of Energy

PURE	Productive Use of Renewable Energy
REA	Rural Electrification Agency
REF	Rural Electrification Fund
SEFA	Sustainable Energy Fund for Africa
SEforALL	Sustainable Energy for All
SNV	Netherlands Development Organisation
SPTA	Strategic Partnership Technology in Africa
UNIDO	United Nations Industrial Development Organization
UNEP	United Nations Environment Programme



Executive summary

The 'Accelerating Private Sector Investments in Green Mini-Grids' report, as a key takeaway from the ARE Energy Access Investment Forum 2023, presents an overview of the Distributed Renewable Energy (DRE) mini-grids sector in Africa, highlighting its potential to meet the continent's electricity access challenge. While acknowledging the benefits and sustainability of DRE mini-grids, the report identifies the necessity to overcome challenges in financing, policy, technology, and skills enhancement, necessitating collaborative efforts from investors, funding partners, governments, and the industry.

EAIF 2023 emphasised the critical need for patient growth capital and concessional finance to scale up the DRE sector. The forum brought to light innovative approaches adopted by DRE companies, including holistic solutions like agri-processing hubs, which extend beyond mere electricity provision. The report also addresses the crucial role of the private sector and the need for solid regulatory frameworks and enforceable contracts to boost investor confidence.

The report delves into the diverse market opportunities and challenges in various African regions, illustrating the complex landscape for DRE deployment. It underscores the transformative impact of these mini-grids on local communities, enhancing livelihoods, promoting gender equality, and contributing to environmental sustainability.

Key policy recommendations are outlined to guide governments in creating conducive environments for DRE growth by highlighting innovative financing models and partnerships as vital drivers in this sector. The role of private sector innovations, showcased during the forum, is recognised as a major force propelling the DRE sector forward.

In conclusion, the report advocates for a unified, multifaceted approach to achieve universal electrification in Africa via DRE mini-grids, stressing the importance of ongoing engagement among all stakeholders to drive sustainable development and climate action across the continent.



01. Green mini-grids in sub-Saharan Africa

The African Development Bank (AfDB) and the Alliance for Rural Electrification (ARE) are working collectively to expedite the provision of electricity to 567 million people in Africa who currently lack access to this essential service.¹

In particular, AfDB and ARE both strive to address this gap through distributed renewable energy (DRE) solutions, such as green mini-grids, which in many places offer a sustainable and cost-competitive solution to the electricity access conundrum while creating green jobs, mitigating climate change and enabling rural communities to become more climate resilient.²

In March 2023, ARE organised the Energy Access Investment Forum (EAIF 2023) in Abidjan, Côte d'Ivoire. This event, co-hosted by the African Development Bank's Sustainable Energy Fund for Africa and supported by GET. invest, aimed to catalyse partnerships and accelerate investments in DRE companies and projects.

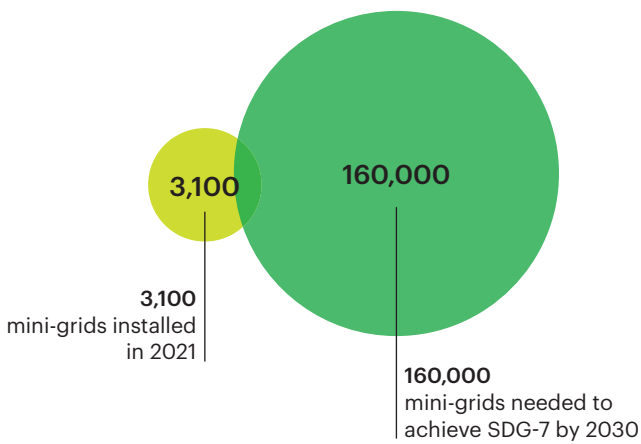
EAIF 2023 was held in a hybrid format with 375 people physically present and an additional 485 unique viewers online. The event enabled discussions and strived to turbocharge partnerships for green mini-grids, potentially connecting an estimated 380 million people across Africa through 160,000 mini-grids by 2030.³ Participants included public and private investors, developers, EPCs, and governmental agencies from different countries.

The focus of EAIF 2023 also extended to identifying prevailing challenges in scaling up green mini-grids and exploring potential strategies to overcome these obstacles and promote market expansion. The subsequent chapters will highlight key insights and takeaways from the event.



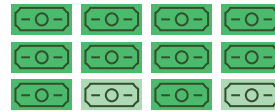
Infographic.

Green mini-grids in Africa
 (installed vs. required capacity by 2030)



380M

Population in Sub-Saharan Africa that may benefit from green mini-grids as the least-cost electrification solution by 2030



7 billion USD
 Current investment in green mini-grids in Africa

91 billion USD
 Cumulative investment needed in green mini-grids in Africa by 2030

CLIMATE ADAPTATION AND RESILIENCE POTENTIAL OF GREEN MINI-GRIDS IN SUB-SAHARAN AFRICA⁴

<p>Enables local agricultural, commercial and industrial activities through productive uses of energy</p>	<p>Empowers women entrepreneurs and promotes gender equality</p>	<p>Fast to deploy (in a matter of days or weeks)</p>	<p>Mitigates risk of power cuts across larger areas, as systems are decentralised and operate independently</p>
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CLIMATE MITIGATION POTENTIAL OF DRE IN AFRICA
 (GREEN ENERGY MINI-GRIDS & STAND-ALONE SOLUTIONS)⁵

GREEN JOB CREATION POTENTIAL IN AFRICA
 (GREEN ENERGY MINI-GRIDS & STAND-ALONE SOLUTIONS)⁶

626 m/t CO₂e

avoided, with a target goal of full electricity access by 2030

7 million

new direct jobs



02. Key takeaways from EAIF 2023

A. Improving green mini-grid transactions

EAIF 2023 highlighted that green mini-grids are long-term infrastructure projects, which require patient capital in some cases with modest commercial returns and perceived high risks but with very high social, economic and climate impacts through sustainable electricity to households, productive uses of energy such as agriculture, commercial and industrial users of energy, as well public services such as health care, education and administration.

To appreciate the broader implications of these projects, it's important to consider their collective impact. Although individual mini-grid projects may seem limited in scale, their true value proposition becomes evident when considered in a larger portfolio approach. It is the cumulative impact of numerous green mini-grids combined that enables effective electrification and climate action.

This broader impact is where institutions like the AfDB play a pivotal role. AfDB primarily aids the green mini-grid sector through SEFA. This includes offering upstream support to governments for the broader deployment of green mini-grids, exemplified by technical assistance initiatives in the Democratic Republic of Congo and Nigeria and the Green Mini-grid Helpdesk which provided support to developers. More recently, pan-African scale support is planned through the technical assistance of the Africa Mini-grid Acceleration

Programme (AMAP). AMAP is currently collaborating with seven sub-Saharan African governments to advance their mini-grid market goals.

The AfDB's efforts at the governmental level through SEFA and AMAP form a crucial part of the broader ecosystem supporting green mini-grids. Complementing this, at a company level, all types of financing play a role throughout the trajectory of company growth, including smart grants, equity, and debt instruments. In the current state of the green mini-grid market in Africa, patient growth capital in the form of equity and equity-like instruments is much needed. This type of capital is required to grow companies, which is critical to delivering connections and climate action on the ground past the early stages of development. EAIF 2023, for example, provided a platform for the announcement of Gaia Energy Impact Fund II.⁷

In addition to these financing needs, specific financial instruments and mechanisms are deployed to support these initiatives. SEFA deploys downstream financing mechanisms and offers concessional finance instruments, such as results-based financing, loans, and equity instruments, often blended with AfDB investments to close viability gaps, build a more robust pipeline of projects, and improve the risk-return profile of individual investments. This is, for example, done through the Facility for Energy Inclusion (FEI)⁸ and the Off-Grid Energy Fund (OGEF), which offers flexible debt financing solutions for DRE companies across sub-Saharan Africa.

Recognising this, organisations like ARE step in to provide multifaceted assistance. ARE

supports companies across the DRE value chain, including green mini-grid developers, technology providers, investors, EPCs and installers, investors and other stakeholders in the sector. Support services include business development & market intelligence, capacity building, policy & advocacy, and communications & marketing.⁹ For instance, ARE, with the support of GET.invest, organises Investment Academies, helping early-stage DRE companies enhance their business models and fundraising skills. It also brings DRE investors together, coordinating, streamlining and standardising investments through its Financier Circle.

B. Increasing green mini-grid profitability and stimulating productive uses of energy

The importance of green mini-grids as boosters of productive uses of energy that empower populations was reiterated throughout EAIF 2023. Productive uses were equally emphasised as a key opportunity for green mini-grid companies to improve profitability.

To this end, DRE companies have developed holistic approaches for green mini-grids, providing both electricity and productive use solutions such as agri-processing hubs, ice machines, business incubation and linkages with electric vehicles, all of which enable increased income generation within communities, enhanced purchasing power and more sustainable mini-grid business models. Some DRE companies have shifted their business approach from a traditional utility model, which primarily involves selling electricity under the Productive Use of Renewable Energy (PURE)¹⁰ framework, to an energy services model. This new model

concentrates on increasing the average revenue per user (ARPU)¹¹. Strategies in this model may involve offering sales and financing options for appliances to both households and businesses, as well as grouping together customers who use energy for productive purposes. The effectiveness of this approach, particularly the aspect of appliance financing, is supported by data from ARE Members. This data shows that mini-grid locations where appliance financing is available experience a 48% higher Average Consumption Per User (ACPU)¹² compared to sites without such financing options. This indicates a significant increase in energy usage and, by extension, potentially higher revenue when appliance financing is part of the service offering.¹³

From a government perspective, grants made available to cover parts of the costs of productive use equipment, enabling “adapted processing centre models” which allow consumers to repay productive equipment over time rather than through upfront payment. This has, for example, been applied in Nigeria.

In Ethiopia, the AfDB, through SEFA, in partnership with GEAPP, the Agricultural Transformation Energy, and the Ministry of Water and Energy of Ethiopia, launched an agricultural productive use project named Distributed Renewable Energy-Agriculture Modalities (DREAM).¹⁴ DREAM is expected to transform household farmer-based agricultural, and commercial clusters by providing reliable and affordable green mini-grid power to enable large-scale cluster irrigation farming throughout the year. Compared to diesel generator-based irrigation solutions, DREAM’s goal is to substantially increase farmer

productivity by 91%, farm production by 86% and farmer income by 80%. Since DREAM enables an irrigation anchor load, significant opportunities to include the productive uses of energy in agro-processing and e-mobility increases potential commercial viability for DRE companies.

ARE partners with the French Agency for Ecological Transition (ADEME) to advance the use of renewable and reliable electricity for productive uses of energy and essential services in Benin, Cameroon and Madagascar. As part of this collaboration, ARE is launching a market panorama on the status of productive use equipment for income-generating purposes and is conducting capacity building on productive use uptake and appliance financing opportunities for rural entrepreneurs in Benin, Cameroon and Madagascar.

Furthermore, ARE also collaborates with the United Nations Industrial Development Organization's Investment Promotion and Technology Office in Germany (UNIDO ITPO) to modernise and build bridges between DRE and key industries like agriculture, mobility, and mining in remote and rural areas. The partnership focuses on knowledge products and business support to enable these linkages.¹⁵

C. Enhancing policy, legal and regulatory frameworks

EaIF 2023 illustrated the need to address prevailing challenges and risks related to policy, regulations, and licensing. Private investors perceive the absence of enforceable and bankable contracts and regulations and limited robust governance procedures as key risk factors.

Most importantly, green mini-grids need policy and regulatory frameworks that clarify the envisaged role of the private sector and green mini-grids within government electrification and energy transition plans, as well as a clear tariff approach. This needs to be accompanied by appropriate subsidy mechanisms for private sector involvement in last-mile electricity provision (e.g., smart grants/results-based finance) and technical assistance, for example, in the form of site surveys, efficient procurement, licensing and contracting procedures, as well as transparent and enforceable rules in case of main grid arrival.

The Clean Energy Mini-Grid Policy Development Guide was developed in 2021 by ARE, AfDB, UNIDO, AMDA and INENSUS, outlining the various forms and models that public-private cooperation can take and reflects on the outcomes of various policy decisions on green mini-grid deployment. The Guide is accompanied by Concession Agreement, EPC Agreement, ESMP, Mini-Grid Regulation and Results-Based Grant Agreement templates.¹⁶

The AfDB AMAP programme offers assistance to governments in supporting them in designing bankable, national mini-grid acceleration programmes to attract public and private investment for mini-grid implementation. It is currently working with seven African governments to help implement such policy frameworks.

Technical standards and quality frameworks already implemented in multiple African countries ensure a high quality of services and allow for grid integration of mini-grids, which are equally important. ARE, through the

Grid Efficiency & Resilience (GEAR) initiative, collaborates with governments to co-develop state-of-the-art quality assurance frameworks and energy efficiency policies.¹⁷

As exemplified in Uganda, interconnected mini-grid projects could build on strong partnerships between national utilities and DRE companies. They could contribute to alleviating grid encroachment risks perceived by commercial investors.¹⁸

D. Accelerating access to domestic debt financing

As high-impact infrastructure projects, green mini-grids have a tremendous potential for scale, which requires large amounts of debt funding. EAIF 2023 demonstrated that only a limited number of green mini-grid projects have secured loans from commercial lenders to date. Commercial banks are often risk-averse and reluctant to lend to mini-grid companies until their business models are proven, and key risks are mitigated. At the same time, many domestic banks may have limited experience in cash-flow lending and require significant collateral. International lenders are often concerned about foreign exchange risks and may be deterred by the small ticket size of mini-grid transactions.

A key challenge for mini-grid developers in sub-Saharan Africa is the foreign exchange (FOREX) risk. Most of the capital cost of mini-grids is in hard currency, while revenues are in local currency. Mini-grids, therefore, often lose value in hard currency if the local currency loses value against the euro or dollar. This currency mismatch creates significant problems for projects funded in dollars or euros, except those in Francophone countries using the CFA Franc, which is pegged to the euro.

EAIF 2023 highlighted successful approaches to address FOREX risks from a developer perspective. These include multi-year increases in tariff pricing to prevent loss on local currency depreciation and effective cash management, which sometimes meant quickly converting revenues in local currency into US dollars. DRE companies have, in some cases, secured local currency debt reimbursed by cash from sales.¹⁹

Institutions focused on development and multilateral finance, like the AfDB, offer supportive mechanisms to reduce financial risks, including local currency guarantees. An example of this support is a pool of grant funding that can be accessed when significant inflation affects the local currency. This grant can offset the impact of currency fluctuations beyond a certain threshold, enabling green mini-grid companies to adjust their tariffs accordingly without bearing the full brunt of inflation.

Building on these efforts to mitigate financial risks, organisations like GET.invest and ARE are concentrating on enhancing the availability of local financial resources for renewable energy projects.

They are equally working on strengthening the domestic supply side of financing and increasing local currency investment in renewable energy. Working closely with domestic financiers, both organisations aim to support financial institutions in developing and offering financial products and assessing renewable energy finance requests.²⁰

E. Building the 21st century DRE workforce and enhancing green job creation in Africa

As the DRE sector inevitably grows and the world moves towards universal electrification by 2030, it is of utmost importance that sustainability is embedded in all green mini-grid projects and that safety, efficiency and reliability become the cornerstone of rural electrification efforts.

Ensuring maximum levels of safety, efficiency, and reliability of DRE systems is critical to maximising electricity output and ensuring the longevity of systems. From the viewpoint of financiers, ensuring that mini-grid systems consistently operate at full capacity over their entire lifecycle helps to reduce investment risks. Enhancing technical sustainability is key and can be achieved at three critical stages of the DRE systems' project cycle: system design, installation, and operations & maintenance. Additionally, a recent survey conducted with ARE members revealed that over 70% of companies face challenges recruiting skilled domestic field staff.²¹

EAIF 2023 emphasised that addressing the sustainability challenge in the green mini-grid sector hinges on enhancing the skills of domestic workforces. This skill development is crucial to effectively manage the expected substantial growth in green mini-grids in the coming years.

Key initiatives include domestic and global technical training programmes aimed at further skilling the DRE workforce and supporting green jobs, such as the RES4Africa Microgrid Academy²², the STAR-C programme of UNIDO²³ and the Cornerstone of Rural Electrification (CORE)²⁴. CORE is managed by ARE and steered

in collaboration with ICA, IRENA, SEforALL, UNIDO and UNEP. It offers training of trainers to universities, technical and vocational institutions, governments and communities across Africa.²⁵ Related to this, ARE collaborates with UNIDO and ISA with funding from the French Government on the STAR-C programme to enhance regional DRE quality infrastructure frameworks across West and East Africa and the Pacific.

Similarly, ARE and the Konrad-Adenauer Stiftung (KAS)²⁶ collaborate to support job creation and skills development across the sector through solid evidence-building on "Rural Green Job creation in West Africa"²⁷ and public-private policy dialogues.

To complement these efforts, the AfDB's AMAP is vital in strengthening the green mini-grid ecosystem. AMAP's focus extends to improving technical skills among various industry actors, aligning with the broader goals of enhancing sustainability and workforce capability in the DRE sector.

In conclusion, the collective efforts of these organisations and programmes are essential for ensuring that the expansion of the DRE sector is sustainable, efficient, and reliable. By focusing on technical skill enhancement and workforce development, the industry is better equipped to meet the growing demand for green mini-grids and contribute significantly to global electrification goals.

F. Leveraging the power of innovative technologies

In many places in Africa, green mini-grids have become the least-cost way to bring high-quality 24/7 electricity to towns and cities off

the grid or experiencing regular power cuts. Nevertheless, EAIF 2023 highlighted that electricity affordability remains a key challenge, especially in the most remote communities.

Innovation is pivotal in driving down costs and enhancing the efficiency, quality, and sustainability of DRE systems. In the DRE space, new high-quality and modular technologies, such as AI, advanced demand and GIS mapping, remote monitoring, new control software and systems, data-driven platforms, as well as innovative energy storage and hydrogen solutions are helping drive the cost of green mini-grids down, while their efficiency, longevity and sustainability simultaneously go up.

If technology can be seen as a vehicle to achieve development, then investments and financing are the fuel that helps drive its engine and bring these innovations to market. EAIF 2023 discussed investing in technological innovation, thus investing in the future of the DRE sector, progress on all the SDGs and rural socio-economic development.

The event also highlighted several private sector innovations that are ripe for investment and, through an exhibition, brought to light various new technologies emerging in the market. These included the smart, solar-powered hybrid inverters designed to supply power to locations with limited access to the grid and remote monitoring platforms specifically designed for rural electrification to enhance the visibility of mini-grid sites.²⁸

The introduction of the PROSPECT initiative by GET.invest at EAIF 2023 marked a significant advancement. This open-source data platform

for the energy access sector enables the customisation of data flows from on-grid, mini-grid, and stand-alone sources, offering a new dimension in managing and understanding energy distribution.

A key development in the sector was the establishment of a landmark partnership for carbon credits, set to certify and issue carbon credits, which will be instrumental in accelerating financing for the DRE industry.²⁹

The Alliance for Rural Electrification plays a significant role in promoting DRE innovations within the renewable energy sector. Its “Innovation 4 Electrification” programme encompasses expos, awards, webinars, knowledge exchange training, and masterclasses. This initiative, conducted in collaboration with GIZ’s Strategic Partnership Technology in Africa (SPTA), Messe Augsburg, UNIDO ITPO Germany, and other key partners, is pivotal in fostering innovation and collaboration.

In conclusion, integrating advanced technologies such as AI, remote monitoring, and energy storage solutions is crucial for reducing costs and enhancing the efficiency and sustainability of DRE systems. This investment is pivotal for the DRE sector, the broader socio-economic development, and achieving the Sustainable Development Goals in Africa. The innovations pioneered by the private sector provide promising investment opportunities and demonstrate the sector’s readiness to embrace technological advancements, paving the way for a brighter, electrified future.



03. Key market opportunities for green mini-grids in sub-Saharan Africa

Democratic Republic of Congo (DRC)



Population
95.9 million

Access to electricity
10% (rural 1%, urban 35%)

Universal electrification target
100% by 2035

DRE target (green mini-grids + stand-alone systems)
45%

Existing mini-grids
39

DRE companies active
~50

GDP per capita
584 USD

Estimated monthly spending on energy
11.6 USD

Mobile money users
8 million (8.3%)

Opportunities

Public-private partnerships (PPP) to contribute to universal household electrification targets through Fonds Mwinda, SEFA, UEF, SMG and/or commercial investments

Partnerships with demand-side industries to provide reliable and sustainable in particular for agricultural, telecommunications and mining end-users that have poor access to power

Providing green and climate-friendly power to public infrastructure, such as education and health care facilities, natural reserves and parks

Challenges

Limited enforceable and bankable contracts and regulations

PPP model not yet fully developed or proven at scale

Limited ability to pay for electricity in rural villages

High cost of logistics, transport and taxes

Limited capacity of national utility and institutions on green mini-grids

Key financing initiatives

SEFA
Supports green mini-grid deployment, for example larger mini-grids, managed by AfDB

Fonds Mwinda
Main national fund for rural electrification, managed by ANSER

Scaling Mini-Grids (SMG)
Financing and advisory support. Investment and risk mitigation instruments for governments and the private sector, managed by IFC

Universal Electrification Facility (UEF)
Results-based financing for green mini-grids, managed by SEforALL

Madagascar



Population
25.6 million

Access to electricity
34% (rural 14%, urban 70%)

Universal electrification target
70% by 2030 - 100% by 2040

DRE target (green mini-grids)
30%

Existing mini-grids
130

DRE companies active
~30

GDP per capita
571 USD

Estimated monthly spending on energy
4.7 USD

Mobile money users
10.7 million (42%)

Opportunities

Contribution to electricity access, targeting the potential to connect 5.7 million people

Providing reliable and sustainable power to rural industries, in particular forestry, tourism, and agriculture, including processing, livestock and fishing industries

Providing green and climate-friendly power to public infrastructure, such as public education and health care facilities

Challenges

Low ability to pay for electricity in rural villages

Hard to find specialised personnel to install, operate and maintain mini-grids

Mini-grids tendered out via ADER at the regional level, making economies of scale difficult

High FOREX risks and difficulty in transferring incomes in local currency to USD

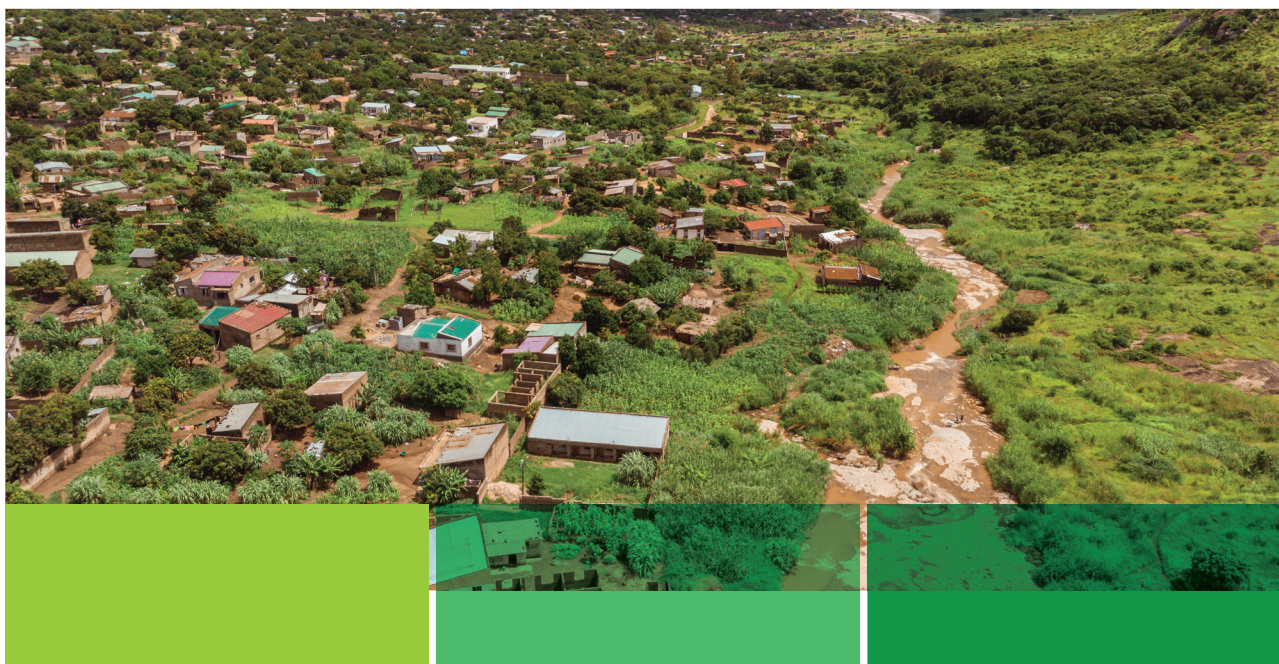
Key financing initiatives

UEF
Results-based financing for green mini-grids, managed by SEforALL

Promotion of Rural Electrification through Renewable Energies (PERER III)
supporting training and implementation of innovative RE solutions, managed by GIZ

Africa Mini-grids Programme (AMP)
Technical assistance programme for mini-grids across 21 countries, managed by UNDP

Mozambique



Population
32.2 million

Access to electricity
40% (rural 5%, urban 73%)

Universal electrification target
100% by 2030

DRE target (green mini-grids)
13%

Existing mini-grids
76

DRE companies active
~20

GDP per capita
574 USD

Estimated monthly spending on energy
5.5 USD

Mobile money users
19.3 million (65%)

Opportunities

Contribution to electricity access target through PPPs (new off-grid and mini-grid legislation launched in December 2022 and May 2023)³⁰

Providing reliable and sustainable power to rural industries, in particular agriculture, fish conversation, telecommunications and marine sectors

Challenges

Most companies are at an early stage of development

Lack of low-interest loans from domestic commercial banks

Low ability to pay in rural households

New off-grid and mini-grid legislation just launched and is yet to be tested in practice

Key financing initiatives

BRILHO: Supporting the regulatory framework and market development, managed by SNV

PROMOVE Energia (GET.invest) Mobilising finance, advisory services, business support, managed by GIZ

RERD: Potential finance for mini-grids, managed by Enabel

REACT SSA: potential finance for mini-grids, managed by AECF

ProEnergia: potential funding of mini-grids, managed by World Bank

EnDev: Financing of private companies, potentially including mini-grids. Managed by GIZ and RVO

Nigeria



Population
206 million

Access to electricity
55% (rural 25%, urban 84%)

Universal electrification target
100% by 2040

DRE target (green mini-grids)
10%

Existing mini-grids
106

DRE companies active
~120

GDP per capita
2,085 USD

Estimated monthly spending on energy
6 USD

Mobile money users
15.3 million (7.4%)

Opportunities

Contribution to electricity access target, for example, through the Nigerian Electrification Project (NEP) and Rural Electrification Fund, other public-funded initiatives and/or commercial investments

Agriculture: opportunities to contribute to agri-value chains, for example, through the Energising Agriculture Programme (EAP) accelerating, productive uses

Providing reliable and sustainable power and replacing diesel for rural industries, for example, telecommunications

Challenges

Limited availability of skilled human resources in rural areas

Affordability and ability-to-pay constraints

Limited access to consumer finance

FOREX risks, as well as inflation and declining consumer purchasing power

Key financing initiatives

NEP
Main electrification platform for the country, managed by REA, co-funded by World Bank and AfDB

REF
Cost-effective expansion of electricity access in un-electrified rural areas, managed by REA

GIZ Nigeria Energy Support Programme (NESP)
Electrification planning, frameworks, enabling environment, and capacity building, managed by GIZ

Providing sustainable power to rural businesses such as vulcanising, tailoring, and barbing, for example, via Solar Power Naija as part of the Economic Sustainability Plan of Nigeria

Electrification of social infrastructure, such as public education and healthcare facilities, for example, via the Energizing Education Programme (EEP)

ElectriFI

DRE impact investment, implemented by EDFI MC, funded by EU, PowerAfrica, Sweden and Italy

Nigeria Power Sector Programme (NPSP)

power sector reform, enabling environment, and increased private sector investment, managed by PowerAfrica

Energising Agriculture Programme (EAP)

Stimulates productive use of energy via mini-grids in Nigeria, managed by REA, funded by GEAPP

Africa Mini-grids Programme (AMP)

TA programme for mini-grids across 21 countries, managed by UNDP, funded by GEF

Energising Education Programme (EEP)

Initiative of the Federal Government of Nigeria to provide sustainable power to universities and teaching hospitals



04. Conclusion

DRE mini-grids present a sustainable and effective solution to the electricity access challenge and can significantly catalyse climate action. However, their widespread deployment across Africa has not yet been achieved. Overcoming this requires addressing key challenges such as financing, increasing demand, policy development, skills enhancement, and technology deployment. This collective effort calls for the active participation of investors, international funding partners, governments, and the DRE industry.

During EAIF 2023, a key focus was the necessity for patient growth capital in equity and equity-like instruments to grow companies, while concessional finance can help grow markets upstream.

To address demand-side challenges, DRE companies have developed holistic approaches for green mini-grids, providing both electricity and productive use solutions such as agri-processing hubs, ice machines, business incubation and linkages with electric vehicles, all of which enable increased income generation within communities, enhancing purchasing power and more sustainable mini-grid business models. Some DRE companies have moved from a utility model based on electricity sales to an energy services model, focusing on increasing ARPU. This may include introducing appliance sales and financing for households and businesses and aggregating productive use off-takers.

Private investors often view the lack of enforceable and bankable contracts, regulations, and robust governance procedures as significant risk factors. For green mini-grids to thrive, it is essential to establish clear policy and regulatory frameworks. These frameworks should define the private sector's role in government electrification and energy transition plans and include a well-defined tariff strategy. Additionally, these efforts should be supported by suitable subsidy mechanisms to encourage private sector participation in last-mile electricity provision. Clear, transparent, and enforceable guidelines are also necessary to address scenarios involving the arrival of the main grid.

Furthermore, EAIF 2023 showcased various developer strategies to mitigate FOREX risks. These include multi-year increases in tariff pricing to prevent loss on local currency depreciation and effective cash management, which sometimes meant quickly converting revenues in local currency into US dollars. DRE companies have, in some cases, secured local currency debt reimbursed by cash from sales.

The growing need for skilled domestic workforces was another crucial point at the event. Domestic workforces must be further strengthened to deal with the monumental increase in green mini-grids in the years to come. Key initiatives include technical training programmes to skill the DRE workforce further

and support green jobs, such as the STAR-C and CORE.

Innovation is a key driver to reduce costs while improving DRE systems' efficiency, quality and sustainability. In the DRE space, new high-quality and modular technologies, such as AI, advanced demand and GIS mapping, remote monitoring, new control software and systems, data-driven platforms, as well as innovative energy storage and hydrogen solutions are helping drive the cost of green mini-grids down, while their efficiency, longevity and sustainability simultaneously go up.

The latest EAIF gathering also provided a platform for private sector innovations ready for investment, including smart, solar-powered hybrid inverters designed to supply power to locations with limited access to the grid and remote monitoring platforms specifically designed for rural electrification to enhance the visibility of mini-grid sites.

In conclusion, EAIF 2023 has shed light on the multifaceted nature of the challenges and opportunities in the DRE mini-grid sector. Achieving widespread electrification in Africa through sustainable means involves a collaborative effort encompassing finance, policy, technology, and human capital development. While the challenges are significant, the innovations and strategies discussed during the event demonstrate a robust and evolving response from the sector. Moving forward, the continued engagement of all stakeholders, from private investors to international partners and local communities,

will be pivotal in realising the full potential of DRE mini-grids. This collective effort is a crucial step towards sustainable development and climate action in Africa.



Abbreviations

¹IEA, IRENA, UNSD, World Bank Group, WHO, Tracking SDG7: The Energy Progress Report, 2023

² World Bank Group, Mini Grids for Half a Billion People | Market Outlook and Handbook for Decision Makers, 2022

³ World Bank Group, Mini Grids for Half a Billion People | Market Outlook and Handbook for Decision Makers, 2022

⁴ ARE, Off-Grid Renewable Energies to achieve SDG-7 and SDG-13: Cheaper, Cleaner and Smarter, 2020

⁵ Shell Foundation & Rockefeller Foundation, Unlocking Climate Finance to Accelerate Energy Access in Africa, 2021

⁶ Rockefeller Foundation, Transforming a Billion Lives: The Job Creation Potential from a Green Power Transition in the Energy Poor World, 2021

⁷ ARE Launch of Gaia Energy Impact Fund II | The Alliance for Rural Electrification (ARE), 2023

⁸ AfDB, Energy Investment Fund | The Facility for Energy Inclusion FEI Africa

⁹ ARE, Join the Alliance for Rural Electrification, 2023

¹⁰ Productive Use of Renewable Energy (PURE) refers to applying renewable energy sources, such as solar, wind, and hydro, for activities that directly contribute to economic growth and improved livelihoods. It encompasses the use of clean energy for income-generating and productivity-enhancing activities, extending benefits to businesses, communities, and local economies. PURE initiatives are characterised by their focus on sustainability, community involvement, and their potential to transform energy access into tangible socio-economic advancements.

¹¹ ARPU is a measure companies use to gauge the average revenue generated per user or customer, particularly in the telecommunications and energy sectors. It's a useful metric for understanding the

revenue effectiveness of a company's pricing strategy and service offerings.

¹² ACPU refers to the average energy consumed per user, typically used in utility services like electricity. It's an important metric for energy companies, as it helps in understanding customer usage patterns and the overall efficiency of energy consumption.

¹³ Crossboundary, Appliance Financing 3.0 Innovation Insight, 2022

¹⁴ GEAPP, DREAM Initiative Builds First Solar Mini-grid Powered Large Scale Irrigation System to Power Agriculture in Africa, 2022

¹⁵ ARE, Publications | The Alliance for Rural Electrification (ARE), 2023

¹⁶ ARE, UNIDO, AfDB, INENSUS, AMDA, Clean Energy Mini-Grid Policy Development Guide, 2021

¹⁷ GEAR, GEAR initiative, 2023

¹⁸ PowerforAll, New integrated energy model to reduce electrification cost in Uganda, 2021

¹⁹ European Investment Bank, Benin: Access to reliable and affordable off-grid energy to be transformed under new EIB – ENGIE Energy Access initiative, 2022

²⁰ GET.invest, Capacity Development for Domestic Financiers, 2023

²¹ ARE, ICA, IRENA, SEforALL, UNIDO, UNEP, CORE Position Paper, 2022

²² <https://res4africa.org/programmes/res4africa-academy/>

²³ <https://starc-project.org/>

²⁴ <https://core-initiative.org/>

²⁵ CORE, CORE initiative, 2023

²⁶ <https://www.kas.de/de/>

²⁷ ARE & KAS, Catalysing Green Rural Job Creation with DRE in West Africa, 2023

²⁸ Schneider Electric, Schneider Electric presents inclusive and sustainable energy solutions at Energy Access Investment Forum in Africa, 2023

²⁹ ARE, ENGIE partners with CarbonClear to finance the access to energy challenge in Africa through the Voluntary Carbon Market, 2023

³⁰ GIZ, Mozambique Publishes Sub-Regulations for Off-Grid Energy Supply » GET.transform (get-transform.eu), 2023



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