GREEN PEOPLE'S ENERGY – **ENERGY SELF-SUFFICIENT VILLAGES**

Assessing the Impact and Effectiveness of Mini-Grid Results-based Financing Programmes

Analysing three mini-grid RBF programmes and their implications for project award, technical assistance, scalability, implementation

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

IMPRINT

Green People's Energy commissioned a Leveraged Partnership
to the GET.transform programme to develop this report

GET.transform
Transforming Energy Sectors Globally

LEVERAGED PARTNERSHIPS

GET.transform – Leveraged Partnerships
GET.transform is a technical assistance programme supporting national and regional partners and institutions in advancing their energy sector transformations. GET.transform is part of the European multi-donor platform Global Energy Transformation Programme (GET.pro), and supported by the European Union, Germany, Sweden, the Netherlands, and Austria.

Under its Leveraged Partnerships, GET.transform lends its advisory services to other European-funded technical assistance projects implemented by GIZ. GET.transform thereby increases its reach and capacity to mainstream and scale-up power system transformation solutions. www.get-transform.eu

–

As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

Published by:
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn, Germany

Address
Friedrich-Ebert-Allee 36+40
53113 Bonn, Germany
T +49 228 44 60-0
F +49 228 44 60-17 66

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany
T +49 61 96 79-0
F +49 61 96 79-11 15

E info@giz.de
I www.giz.de/en

Report coordinated and technically proof-red by:
Ashley Wearne (GET.transform), Sander Maebe (GIZ),
Valentin Hollain (GIZ) and Jasper Haerig (GIZ)

Report authored by:
Jakob Schmidt-Reindahl and co-authors: Nico Peterschmidt and
Muriel Hauser (all INENSUS as commissioned by GET.transform)

Design/layout:
Atelier Löwentor, Darmstadt, www.loewentor.de

Eschborn, January 2023

CONTENT

FIGURES

TABLES

LIST OF ACRONYMS

ABERME	Agence Béninoise d'Electrification Rurale
ADER	Agence de Développement de l'Electrification Rurale
AfDB	African Development Bank
AMDA	Africa Minigrid Developers Association
AT2ER	Agence Togolaise d'Electrification Rurale et des Energies Renouvelables
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
CAPEX	Capital expenditures
EAD	Energieautarke Dörfer
EnDev	Energising Development
EoI	Expression of interest
EPC	Energy performance contract
ESCO	Energy services company
GBE	Grüne Bürgerenergie
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
KfW	Kreditanstalt für Wiederaufbau
kVA	KiloVolt-Ampere
MCT	Minimum cost tender
MST	Minimum subsidy tender
NEP	Nigeria Electrification Project
O&M	Operation & Maintenance
OECD	Organisation for Economic Co-operation and Development
PBG	Performance-based grant
PERER	Promotion de l'Electrification Rurale par les Energies Renouvelables
RBF	Results-based financing
RfP	Request for proposals
SEforALL	Sustainable Energy for All
SSPU	Stand-alone solar for productive use
TA	Technical assistance
UEF	Universal Energy Facility

1 – EXECUTIVE SUMMARY

For the assessment of impacts and effectiveness of mini-grid RBF programmes, the definition of the umbrella term results-based financing (RBF) is first discussed. As an alternative financing instrument to cost-based mechanisms, RBF has been successfully used in developed markets and also increasingly in various sectors in developing countries. In the mini-grid context, the term RBF generally refers to the subsidy disbursement method of mini-grid programmes, but not the overarching procurement or implementation method. There are different approaches, from performance-based grant (PBG) to minimum subsidy tenders (MST) to other tender or auction procedures, which are combined with RBF as a disbursement method. In the last five years, expectations were set high for RBF in the mini-grid sector, as it was expected to provide transparent, predictable and easy-to-manage mini-grid programmes that would attract private investment into the market and lead to rapid scaling by the private sector. Against this background, large mini-grid programmes such as the Nigeria Electrification Project (NEP), the supraregional Universal Energy Facility (UEF), or the pilot EAD (Energieautarke Dörfer) projects in Benin, Togo and Madagascar were set up.

Using a three-step approach, this analysis first evaluates the three EAD projects through interviews with GIZ project managers, participating mini-grid companies and representatives of the government agencies involved, then reviews market established programmes such as Energising Development (EnDev), the NEP and the UEF through interviews with representatives of the World Bank, SEforALL (the UEF) and the African Minigrid Developers Association (AMDA), and finally draws conclusions from this analysis and makes recommendations for the adaptation of existing programmes or the development of new ones with regard to the most successful implementation.

For the analysis of the three EAD projects, the respective objectives, procurement concepts, and RBF disbursement methods are examined and compared. From this, the respective strengths and weaknesses are derived and the need for technical assistance is presented. It is important to note that the three EAD projects are pilots and that they were in early stages when interviews were conducted. It was too early for objectives to already be fully achieved and assessed. Still, relevant lessons can be drawn from the analysis. It can be stated that the goal of the project in Benin implemented through UEF to realise rapid scaling has not yet been achieved, as the entire implementation process has been delayed significantly due to regulatory hurdles. GIZ's goal in Togo of enabling equal opportunities for local and regional firms has worked, as a regional firm was awarded the contract.

The analysis shows that the choice of a grant disbursement method should be made after indepth analysis of the framework conditions and market situation of the country concerned and in close consultation with the authorities. A one-size-fits-all approach does not work in this context. The design of the disbursement method

has a strong influence on the ability of local/regional firms to participate. A single grant disbursement at the end of project implementation after verification of user connections, as implemented in Benin, creates high risks for the companies and excludes local companies almost automatically. Splitting the grant disbursement over several milestones, as done in Togo and Madagascar, increases the chances of local firms to successfully participate.

The need for technical assistance is clearly evident in all three projects and the local presence of a technical assistance programme is an essential factor. While GIZ was not involved in the development of the UEF approach in general, GIZ plays an important role in Benin in coordinating partners and optimising the UEF approach, whereas in Togo and Madagascar the approach was developed by the GIZ Energy Programmes together with local partners. In all three countries, the GIZ Energy Programmes provided the necessary technical support for, among other things, adaptation to the regulatory framework, tariff model refinement, licensing, site selection, process and partner coordination, and tender implementation. The markets in these countries are not yet mature enough for mini-grid RBF programmes to be successfully implemented without intensive technical support.

For scalability, however, it is important to assign the fund management tasks to organisations that are appropriately positioned. Respective funds can either be hosted within the partner structures, e.g., through existing rural electrification funds (or similar), or by third party, experienced fund managers, who, aside from having a great range of financial instruments and modalities, would also have the advantage of aiming for impactrelated, longterm goals in the projects through longterm presence and creation of corresponding incentives via milestone-based payments. The limited project timelines to which donor implementing agencies typically have to adhere often stand in the way of this aspect.

The analysis of the other mini-grid RBF programmes (EnDev, NEP, UEF) shows that the high expectations placed on the RBF mechanism, especially in terms of rapid rollout, need to be reviewed rationally, as markets are largely still too nascent for scaling aspirations to be fulfilled so far. It can be stated that these approaches are ahead of their time. They are set up similarly to instruments that have achieved good results in industrialised countries. However, they have clashed with reality on certain points in many African countries and have not yet been able to achieve the desired successes achieved elsewhere. According to the analysis conducted here, one major reason is that the markets in which the approaches described above are used are not yet sufficiently developed to allow the potential of these approaches to come to fruition. Market conditions such as a strong political buy-in for off-grid electrification and a conducive off-grid regulatory framework including balanced tariff setting for private sector participation are crucial to unlock the full potential.

Finally, a best practice case is derived from these results, which is recommended for future mini-grid RBF programmes. The choice of procurement or implementation model

(e.g., tender, PBG, or other) should be made according to the given conditions and in consultation with all relevant stakeholders. A key finding is that the main components of the procurement mechanisms to be chosen are prepared and accompanied by targeted technical assistance measures. These measures should be carried out by a well-connected technical assistance programme that actively supports the respective contracting authority in charge of the mini-grid programme. Technical advisors on the ground are needed to adapt mini-grid programmes to country-specific conditions and advise on the following aspects: balancing subsidy and tariff levels, aligning site selection with national electrification targets, providing regulatory certainty without overregulation, adapting procurement modalities to national regulations, and coordinating implementation strategies with local authority expectations.

The RBF grant disbursement mechanism should ideally be in three instalments, with the first after obtaining all approvals and financial close of the project, the second upon delivery of all system components, and the third after verification of a defined number of user connections. Additional payments can be linked to the achievement of longer-term development goals. A verification strategy should be developed that requires minimal resources while maximising the security of verification. Technical assistance should support the adjustment of the disbursement mechanism to country-specific cost structures (e.g., import fees, financing costs, license fees, etc.). If there is a financing gap, a solution should be provided for this, e. g. in the form of special construction finance funds set up by development banks and other donors. This could be in the form of forgivable loans. Once the agreed targets are met in terms of verified user connections, these credits are converted into grants. This is a mechanism, which is currently being set up by Clean Energy and Energy Inclusion for Africa (CEI Africa).

Such models, with flexible grant disbursement structures and a broad technical assistance package to support both public and private sectors, should be applied in the coming years until markets have matured and more classical RBF approaches with a simpler disbursement approach and less technical assistance needs can be successfully implemented.

The implementation of such approaches should then become feasible continent-wide, whereby overhead cost reductions and efficiencies should be achieved by combining RBF programmes of several countries under one platform, but with country-specific approaches regarding the design of grant disbursement methods and technical assistance measures.

2 – INTRODUCTION

On behalf of the German Federal Ministry for Economic Cooperation and Development (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung – BMZ), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the Kreditanstalt für Wiederaufbau (KfW) are jointly implementing the **Green People's Energy for Africa** initiative (Grüne Bürgerenergie – GBE), which aims to improve decentralised, citizen-led energy supply in selected countries in Sub-Saharan Africa. These are: Benin, Côte d'Ivoire, Ethiopia, Ghana, Mozambique, Namibia, Senegal, Uganda, and Zambia. In addition to the country-specific measures, the initiative promotes cross-country renewable energy projects and strengthens partnerships between African and European actors.

The GBE is coordinating activities under the BMZ initiative "**Energy Self-Sufficient Villages**"(Energieautarke Dörfer – EAD) piloting results-based financing (RBF) approaches for mini-grid projects in Benin, Madagascar, and Togo. Under these approaches, project preparation measures are delivered and mini-grids are developed, built and operated by the private sector. Financing is ensured by an RBF mechanism: disbursements are made after predefined results have been achieved.

The aim of this document is to develop recommendations for setting up RBF mechanisms in mini-grid programmes based on an analysis of the effectiveness of the activities carried out by Green People's Energy and implementing partners to realize the Energy Self-Sufficient Villages Initiative in Benin, Togo, and Madagascar.

The three EAD projects, which are still in the initial phase, are analysed with regard to their objectives and the ongoing implementation process, including the need for and quality of the collaboration with the partners from the respective governments. Other more established RBF approaches in the sector are looked at and used as a benchmark and comparison.

Questions are discussed regarding the best possible alignment between the objectives of the programmes and the proportionality of the use of resources, as well as the necessary accompanying measures for the most sustainable implementation of future RBF approaches.

3 – METHODOLOGY

The methodology for assessing the impact and effectiveness of mini-grid RBF programmes is based on three components: 1) analysis of EAD projects in Benin, Madagascar, and Togo, 2) a review of other RBF programmes, and 3) drawing conclusions from the analysis and developing strategies for future programmes.

Component one analyses the three EAD projects in the case study countries, i. e., implementation of the Universal Energy Facility (UEF) in Benin, PERER (Promotion de l'Electrification Rurale par les Energies Renouvelables) in Madagascar, and ProEnergie in Togo. These projects are not yet at the point of installation which prevents an assessment of the impact upon village energy consumers. However, regular evaluation of project preparation and procurement approaches is seen as a very critical element of the international mini-grid discourse, as there are many diverging approaches on the frameworks and mechanisms used to get financing into the sector for the installation of mini-grids.

The analysis differentiates between the initial objectives, the procurement methods used, the distribution mechanisms applied, and the requirements for technical support identified. For this purpose, interviews are conducted with the managers of the three programmes implemented by GIZ, with private mini-grid developers involved in the projects and with representatives of the government authorities entrusted with the implementation of the projects, the Rural Electrification Agency of Benin (Agence Béninoise d'Electrification Rurale et de Maîtrise d'Energie – ABERME), the Rural Electrification Agency of Madagascar (Agence de Développement et d'Electrification Rurale – ADER), and the Rural Electrification Agency of Togo (Agence Togolaise d'Electrification Rurale et des Energies Renouvelables – AT2ER). Finally, the three programmes are compared with each other, strengths and weaknesses are identified, and overarching conclusions drawn.

Component two analyses other existing mini-grid projects with RBF disbursement mechanisms. These are Energising Development (EnDev), other UEF projects (in addition to Benin also active in Sierra Leone and Madagascar), and the Nigeria Electrification Project (NEP), funded by the World Bank and the African Development Bank (AfDB). For this purpose, interviews are conducted with representatives of the UEF, the World Bank, as well as AMDA as an important voice in the sector. Conclusions are drawn from these three examples and again linked to the findings from component one.

The interviews conducted for components one and two are based on questionnaires designed for this study applying evaluation criteria developed by the OECD Development Assistance Committee (OECD DAC) Network on Development Evaluation, a framework for the evaluation of development programmes[1]. This uses six criteria to guide evaluations. The interviews are about understanding whether, in the view of the interviewees, the respective RBF approach is properly designed (relevance), sufficiently adapted (coherence), achieves the intended goals (effectiveness), uses resources efficiently (efficiency), achieves a sufficiently large impact (impact), and achieves sustainable benefits in the long term (sustainability). As the EAD projects are all still in the initial phase, some of these criteria do not yet apply fully in this context.

Component three takes up the lessons learned in components one and two, taking into account the views of the interviewees, and presents scenarios for future implementation strategies of mini-grid programmes with RBF integration, both in the short, medium and long term.

1 OECD. Accessed at: www.oecd.org/dac/evaluation/evaluation-criteria-flyer-2020.pdf

4 — RESULTS-BASED FINANCING

4.1 HOW TO READ THE IMPACT MATRIX?

Results-based financing (RBF) has been a popular means of increasing the effectiveness of public financing measures in different markets for some time. RBF is an umbrella term that characterizes various approaches in different countries, such as, among others, performance-based financing (PBF), output-based aid (OBA), or cash on delivery (COD). These terms often refer to specific subcategories that differ based on the type of result, the mechanism in which the implementing partners are compensated, or the sector in which they are applied. In literature, these terms are not uniformly defined, and their definitions often overlap[2]. What these approaches have in common is that they **reward, through financial or other incentives, the delivery of predefined outcomes or results, rather than inputs, once those outcomes or results have been verified**.

RBF therefore represents an alternative funding scheme to the cost-based disbursement mechanisms commonly applied in development assistance. Here, subsidy payments are linked to the costs incurred by the implementing partner during the development of a project. Unlike the RBF mechanism, it focuses on the project's inputs rather than the outputs or outcomes. The main advantages of a cost-based approach are that it provides the funding partner greater influence over the implementing process and ensures that funds are spent correctly and according to the agreed budget. Project implementation is therefore well defined in advance and the costs are carefully tracked and documented. This strategy thus aims precisely at the traceability of project expenditure. However, there are a number of key benefits of an RBF mechanism compared to a cost-based disbursement mechanism[3]:

- **Greater focus is placed on achieving results.** The cost-based strategy is closely targeted at the accountability of the project's roll-out and expenses. In contrast, in an RBF approach, the payments are not tied to the cost incurred by the grantee, but solely to the results. Thus, they only receive payments upon achievement of previously agreed results, which creates greater accountability for project outcomes.
- **Efficiency is stimulated.** Under an RBF programme, the grantee receives a predefined payment when results are achieved. This incentivises the grantee to reduce project costs and maximise the efficiency of the implementation process to increase its profit. In a cost-based approach, the grantee is reimbursed for the cost incurred, so beyond the prescribed procurement methods, there is no strong incentive to work as cost efficiently as possible.
- **Risk is shared between the donor and the implementing partner.** A fundamental difference between cost-based and RBF approaches is the sharing of risk between donor and recipient. In conventional methods, the donor bears most of the risk of a project failing, as payments are made during implementation and are unlikely to be recovered. With RBF mechanisms, the recipient bears a substantially greater risk since no payments are made until results are achieved. This redistribution of risk has the advantage of increasing the incentive for the recipient to achieve the desired results. However, the implications and the extent to which the recipient can handle this transfer of risk have to be carefully assessed for each project, particularly when the project has an experimental or pilot-type nature.
- **Transaction costs, bureaucracy, and administrative burden can be reduced.** As the subsidy is paid when the outcome is achieved, rather than to cover incurred cost throughout the project lifetime, less investment is required in negotiation, tracking and reporting of costs.
- **Innovation and flexibility are encouraged.** In an RBF programme, recipients are free to structure their approach, as the donor is only concerned with achieving the results, not the implementation method itself. Therefore, project developers have more leeway to apply innovative methods or adapt their approach to local conditions or unforeseen challenges without the need for validation by the donor.

Despite the numerous advantages that an RBF approach has to offer, there are some preconditions that must be

2 Johannes, L., Mimmi, L., & Mumssen, Y. (2010). A Snapshot of the OBA Universe. OBA Approaches, (33).

3 Silverman, R. (2021). Translating Results-Based Financing from Theory to Operational Reality: Lessons from the Practical Application of RBF at the European Commission. Center for Global Development.

fulfilled for it to function smoothly[4]. First, the results tied to disbursement must be suitable for monitoring and verification. This implies that the results should be easily measurable and reflect the overall project objectives. Second, both implementing and funding partner must have sufficient capacity to adapt to an RBF scheme. On the one hand, the funding partner must be able to set up a viable RBF structure and ensure efficient disbursement of funds once results are achieved. On the other hand, the implementing partner must be able to adapt its business to the new incentive structure (i. e., lagged cash flows). Third, the implementing partner must have access to funding (either through capital markets or own resources) to cover the upfront cost prior to disbursement. The importance of the third point is closely related to the duration of the project and the scale of the upfront investment required. High upfront investments and long-term interventions that require an extended time period before results can be verified require the implementing partner to obtain large, long-term loans. The feasibility of obtaining such loans depends largely on the respective local market conditions. The crosscutting condition that applies more generally to the project's feasibility, is that the objective must be achievable for the party responsible for achieving the results (the developer). Mini-grid projects are well-known to require various interventions from the public sector side in order to succeed.

In the mini-grid context, the term RBF has a specific application. It describes the way in which subsidies are distributed, which, as defined above, takes place after predefined goals have been achieved. However, in the mini-grid sector there are many variations of project approaches in which this type of grant disbursement is combined with different project implementation components.

The currently dominant approaches to mini-grid programmes usually have RBF components integrated. In a performance-based grant (PBG) approach, RBF is usually applied in its "classical form". Funds are provided that are paid out against verified electricity customer connections, thus at the end of the project implementation process. In comparison to tender-based procurement mechanisms, a PBG window allows developers to prepare projects themselves, rather than 'waiting' for a tender to be published by government. As such, a PBG feels like a grant disbursement modality, but it is also seen as a method to procure developers, who in this case present themselves, rather than being invited through a tender.

Minimum subsidy tender (MST) and other tender or auctioning approaches also integrate RBF by linking the disbursement of subsidies to the achievement of certain milestones. Similar to PBG, these can be verified by electricity customer connections. Usually, however, there are several milestones to be reached upon which subsidies are paid out, e. g., with the delivery of the hardware, installation, commissioning, and ending with the aforementioned connections of the customers.

In the context of this report, RBF is therefore understood in its most general definition: a disbursement mechanism in which the payment of a subsidy occurs only after predefined goals have been achieved. This also conveys the important difference between RBF as a disbursement mechanism and the overarching procurement mechanism of a project. RBF refers merely to a disbursement method of a project and is independent of the procurement mode applied in the project.

4.2 LIMITATIONS

RBF is used in both developed as well as developing markets. A popular example of a successfully applied RBF approach is the feed-in tariff for renewable energy technologies under the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz – EEG) in force in Germany since 2000. It regulates the preferential feed-in of electricity from renewable sources into the electricity grid and guarantees the producers fixed feed-in tariffs. This policy instrument fostered the uptake of renewable energies and reduced the costs of these technologies. Overall, it proved to be highly effective in stimulating the renewable energy market and increasing its competitiveness.

In developing countries, RBF has been introduced to programmes in various sectors such as education, health, water and sanitation, or energy. In education, RBF has been used to increase school attendance rates

4 ESMAP (2013). Results-Based Financing in the Energy Sector – An Analytical Guide.

by offering conditional cash transfers to parents, or by linking the funding of local governments to regional educational results[5]. In health, RBF mechanisms have been applied to reduce maternal and child deaths by providing bonuses to health care providers for increased service coverage through household visits[6]. RBF methods have also been applied in the energy sector to incentivize clean cooking solutions, solar home systems, or mini-grids. In the mini-grid sector specifically, RBF mechanisms have been deployed in a number of projects, though its introduction has been more recent than in other sectors such as health or education. Compared to these projects, mini-grid projects are different in nature due to large upfront investments and long project lifetimes. This in turn can have important impacts on the feasibility of RBF as a disbursement mechanism. Sector-specific experiences are therefore highly valuable for optimizing projects that aim to use RBF mechanisms.

A mini-grid funding programme usually consists of a procurement mechanism and a disbursement mechanism. As defined above, the term RBF refers in the mini-grid context only to the disbursement mechanism. A RBF disbursement mechanism is applied in most of the approaches currently used for mini-grid programmes, both in PBGs and MSTs, or other tender or auction-based approaches. An overview of the common approaches with their specific features is presented in the Annex.

Some large, well-known programmes have specifically used RBF mechanisms in the recent past. These include the Energising Development Programme (EnDev) funded by a partnership of multiple European governments and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the Nigerian Electrification Project (NEP), funded by the World Bank and the AfDB and implemented by the Nigerian Rural Electrification Agency (REA), and the Universal Energy Facility (UEF), funded by various donors and managed by Sustainable Energy for All (SEforALL). They all apply RBF mechanisms to increase access to energy, but their approaches differ significantly. The three programmes are briefly presented below.

› **Energising Development:** EnDev was one of the pioneers in the application of RBF in the mini-grid sector. They tested a variety of RBF concepts and technologies in different regions to assess the viability of RBF for rural electrification. EnDev implemented 17 projects across 14 countries in Africa, Asia, and Latin America from 2013 to 2020. Of the 17 projects, two projects targeted the deployment of mini-grids in Africa, namely Kenya and Rwanda. By 2020, the project had implemented ten mini-grids in Kenya and two mini-grids and 22 nano-grids in Rwanda. As these projects have already been completed, GIZ was able to draw a number of lessons from their implementation, which in turn, according to the project managers, have fed into the design of the EAD mini-grid RBF projects in Madagascar and Togo (see Chapter 5).

› **Nigerian Electrification Project:** The NEP, launched in 2018, is a federal government initiative that is funded by the World Bank (US$ 350m) and the AfDB (US$ 200m). Under its mini-grid component, it follows two procurement approaches: a) MST, and b) PBG. In both approaches, RBF disbursement mechanisms are applied. US$ 71m have been allocated for the MSTs to electrify at least 350 communities in several phases. US$ 48m were assigned to the PBG programme, where grants of US$ 600 per connection are disbursed within three milestones (delivery of goods to site, commissioning of mini-grids, verified connections). The same disbursement structure is applied to the MST programme.

› **Universal Energy Facility:** The UEF is an RBF facility specifically targeting the mini-grid and SSPU (stand-alone solar for productive use) sectors in Sub-Saharan Africa. The mini-grid window of the facility was launched in Sierra Leone and Madagascar in 2020, and in Benin in 2021 (through the GBE project), followed by the Democratic Republic of the Congo in 2022. In August 2022, a new window for SSPU projects was launched in Nigeria. SEforALL is the programme and fund manager providing incentive payments to eligible organizations developing mini-grid and SSPU projects. In the mini-grid window, subsidies of US$ 592 are paid out for each verified customer connection. UEF has set a target of providing 1.3 million electricity connections and 300,000 clean cooking solutions by 2023[7].

These three programmes are subjected to an analysis in Chapter 6 in order to benchmark the findings from the evaluation of the three EAD projects and to derive general recommendations for future programmes.

5 The World Bank, 2022, Results-based financing and results in education for all children (REACH), Accessed at: https://www.worldbank.org/en/programs/reach

6 The World Bank, 2014, RBF Health, Accessed at: https://www.rbfhealth.org/project/democratic-republic-congo-drc

7 SEforAll. Accessed at: https://www.seforall.org/results-based-financing/universal-energy-facility

5 – ANALYSIS OF MINI-GRID RBF PROGRAMMES IN BENIN, TOGO, MADAGASCAR

In the following, the three EAD projects in Benin, Madagascar and Togo are examined and compared in terms of their objectives, their procurement methods, and their disbursement mechanisms. It is important to note that the three projects are pilots and that they were in early stages when interviews were conducted. It is too early for objectives to already be fully achieved and assessed. Still, relevant lessons can be drawn from the analysis.

5.1 OBJECTIVES

In order to assess the effectiveness of RBF mechanisms, it is necessary to have a good understanding of the objectives of the respective programmes and the methods chosen for implementation. Feedback from the ongoing project implementation processes and experiences from other projects can be used to draw initial conclusions about the choice of methods to achieve the set objectives and the proportionality of the means.

The outlines and objectives of the three EAD projects are as follows:

- **Benin:** Benin was selected for a funding window by the UEF because it is a market with a relatively well-developed framework and some established mini-grid companies. The Benin window, funded by GIZ on behalf of the BMZ, aimed to establish a rapidly implementable, scalable funding scheme for mini-grids by prequalifying suitable companies based on transparent criteria and the provision of grants for verified connections. From BMZ's point of view, it was of great interest to gain experience with the UEF as a scalable funding solution in order to support mini-grid funding programmes more intensively in this way in the future. The initial target was to reach at least 4,000 connections in 37 villages (with a total investment of US$ 3.2m and a total grant disbursement to private developers of US$ 2.7m).
  - UEF objectives: Establish a rapidly implementable, scalable funding scheme for mini-grids.
  - BMZ objective: Gain experience with the UEF as a scalable funding solution.
- **Madagascar:** The RBF approach in Madagascar, implemented by GIZ under the PERER programme, was designed to electrify four villages and builds upon the mini-grid project preparation blueprint (tender mechanism etc.) which GIZ and ADER have used to procure mini-grid developers. The most important objective was to solve the main problems identified in the sector, i. e., to facilitate access to funding, and to create conditions that are as simple as possible so that implementation can proceed quickly. Another objective was to establish a process for acquiring further donor funding for certain tender rounds. The current approach thus serves as a pilot, on the basis of which various donors have meanwhile shown interest in funding further bidding rounds.
  - Objective: Facilitate access to funding and create the easiest possible conditions for accelerated implementation.
  - Objective: Establish a process for acquiring further donor funding for certain tender rounds.
- **Togo:** The RBF approach in Togo, implemented by GIZ under the ProEnergie programme, was developed based on the "Pro Mini Grids" approach implemented in Uganda in order to be able to start mini-grid implementation in two villages as quickly as possible. The RBF approach was designed to provide the project developer the following incentives: i) to move forward as quickly as possible, ii) to make it easy for bidders to prepare their financial bids, iii) to support the winning developer financially already in the procurement and construction phase, and thus to give local companies the opportunity to bid. The verification of milestones is clearly defined, which allows for a speedy review without having to sift through a multitude of supporting documents. This is another way to minimise delays in the process. The stated aim for this approach was to give local/regional developers a fair chance to compete with international firms.
  - Objectives: Provide incentives for private developers to implement quickly and create a level playing field for local/regional firms through an adapted disbursement structure.

In summary, all three approaches are about speeding up processes so that private developers can implement projects quickly. In Benin, it is also about gaining experience in implementing the supraregional approach of the UEF and separating the function of technical assistance and fund management, a distinction that is also applied by the Swedish International Development Cooperation Agency (SIDA) in the Beyond the Grid Fund for Africa projects. In Togo, special attention is paid to equal opportunities for local/regional developers.

5.2 PROCUREMENT

As explained above, RBF mechanisms can be combined with different procurement methods. In the three case study countries, three different procurement methods are applied. While in Benin a PBG is implemented according to the standards of the UEF, GIZ implements an MST approach in Madagascar and a minimum cost tender (MCT) approach in Togo in close collaboration with their national partners. All three procurement methods are explained in more detail below.

5.2.1 PBG IN BENIN

Under the PBG approach applied in Benin, there is no competitive bidding. The procurement process takes place on a spontaneous, unsolicited (outside of government programmes) basis and covers the following steps:

a) Pre-qualification: Developers must first pass a pre-qualification stage where they must prove that they meet the eligibility requirements of the UEF.

b) Site-specific application: Communities to be electrified are then identified, verified, and sensitized by the pre-qualified mini-grid developers. They submit a site-specific application that must meet the minimum technical requirements set by the UEF. At the same time, the developer applies for the necessary licenses and permits.

c) Contracting: Once the licenses and permits have been obtained, a grant agreement can be signed between the UEF and the developer.

d) Implementation: The developer pre-finances the entire project, purchases the hardware and implements the mini-grid project.

e) RBF: After customer connections are verified, the contractually agreed subsidy is paid out (see Chapter 5.3).

The following graph shows an overview of the procurement process steps under the PGB in Benin.

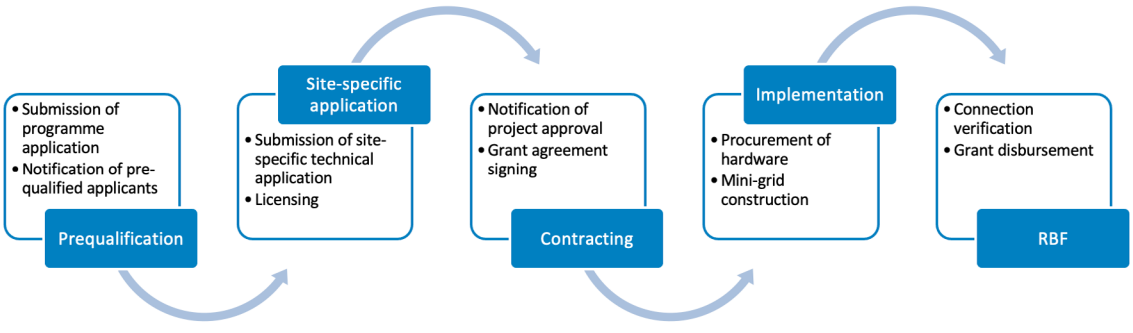

Figure 1: PBG procurement process applied under the UEF in Benin

At the time of writing, 6 out of 7 developers have successfully progressed through the pre-qualification process. This required demonstrating local representation and reference of at least one implemented mini-grid with 200 connections, as well as meeting various financial requirements. The six pre-qualified companies have submitted site-specific technical applications, of which UEF has approved the applications of five developers. The signing of the grant agreements for these projects is imminent.

The main findings of the analysis of the procurement process applied in the EAD project in Benin are:

Time planning: The original schedule set by the UEF proved to be practically unfeasible and had to be extended several times for multiple reasons. The first proposals submitted by developers unexpectedly did not meet the quality requirements and had to be rejected. Delays also resulted from lengthy underestimated processes, e. g., with regard to licensing and other administrative procedures, also due to a severe understaffing of the key government agencies. Some design weaknesses were also evident in the concept, starting with very complex and burdensome requirements in the pre-qualification phase, as reported by developers. Adjustments in the flow of the procurement process and increased coordination efforts in site allocation were also necessary along the way.

Partner coordination: The RBF mechanism is managed through the UEF. As the UEF is not represented with staff in Benin, GIZ took on the role of the technical assistance (TA) provider as well as the project implementer on behalf of the UEF. The main task involves coordinating between the government agencies, the mini-grid developers, and the UEF. Despite initial difficulties in coordinating the mandates between the partners, both the UEF and GIZ consider this collaboration to be very beneficial. This is confirmed by ABERME (Rural Electrification Agency of Benin).

Technical assistance: The presence of GIZ has also paid off as it has made it possible to provide assistance to solve some of the problems that have arisen. With the technical advisory of GIZ, the procurement process was adapted to local conditions, problems with site allocation were solved, tariff calculations were optimized, and other simplifications in the overall process were made possible. ABERME acknowledges the support provided by GIZ and sees a need for additional support in terms of expanded capacity building for public sector stakeholders and closer accompaniment of the mini-grid companies by development partners with technical assistance throughout the procurement and project development processes.

Site selection: In the site-specific application stage, developers can submit applications from a list of 37 sites for locations of their choice. Despite efforts to ensure transparent allocation, there were delays due to multiple applications for individual sites. ABERME sees a need for better coordination of the site selection process, e. g., under a concession model. For further scaling of the approach, a streamlined process for identifying feasible sites would be necessary.

Adjustment of the approach: UEF's original intention of not being involved in the process until the grant agreement was signed had to be adapted, as developers need a funding commitment in order to be licensed by the regulator and a higher level of certitude during the development stage to be able to raise additional funding. Now, developers receive a pre-approval from the UEF earlier in the process, which is accepted by the regulator. In addition, there is now a regular exchange between the UEF and developers (which previously only took place via GIZ).

Scalability: Scalability of the UEF approach is limited in its current form under the regulatory framework in Benin, as developers can only make spontaneous applications to individual sites up to a total cumulative capacity of 500 kVA. Beyond that, an open tender would have to take place, for which the UEF approach would have to be fundamentally changed.

5.2.2 MINIMUM SUBSIDY TENDER (MST) IN MADAGASCAR

The project in Madagascar is based on a minimum subsidy tender (MST). A MST is generally defined as a tender process in which mini-grid developers compete based on their technical (technical proposal) and financial (financial proposal) qualities. The financial bid that has the lowest subsidy requirements scores the highest. The procurement process covers the following steps:

a) Expression of interest: Developers express their interest by demonstrating their eligibility and qualification to bid in the tender. Eligible bidders are shortlisted and invited to submit a bid.

b) Call for proposals: The shortlisted bidders submit a proposal for the electrification of sites that are identified, verified, and sensitized by ADER with strong support from the bilateral GIZ programme. The evaluation of the proposals is done in two stages (first qualitative evaluation of the project concept, then quantitative evaluation based on Key Performance Indicators, KPIs).

c) Contracting/Licensing: The qualitatively suitable bidder who requires the lowest amount of subsidy while guaranteeing the lowest tariffs is awarded the contract. The contract is signed once the bidder has obtained the necessary licenses and permits.

d) Implementation: The developer implements the projects and receives grant disbursements upon achievement of predefined milestones (see Chapter 5.3).

The approach adopted in Madagascar is based on a tendering process in which a maximum subsidy amount has been made available with which a minimum number of connections must be made. Bidders can exhaust this sum but can also use less subsidy. The subsidy may amount to a maximum of 50 % of the total capital expenditures (CAPEX). The tariffs are determined by the regulator based on the costs declared by the bidder.

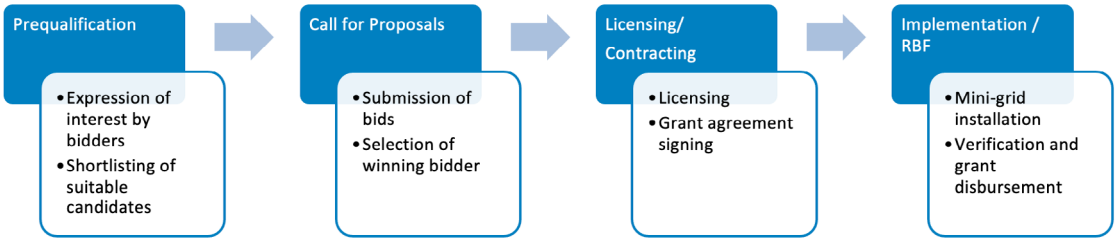

Figure 2: MST procurement process applied in Madagascar

At the time of writing, the tender in Madagascar has been completed and the winning bidder was selected. The contract between the government and the winning bidder is expected to be signed soon. The main findings of the analysis of the procurement process applied in the EAD project in Madagascar are:

Delays: Several delays have hampered the project. Most of these delays can be attributed to the lack of experience with the new approach. For example, the tender had to be repeated because in the first round not a single bid met the minimum government standards, and the official evaluation committee aborted the procedure. In addition, during the second round, the admissibility of one of the participants had to be legally verified with the respective authorities and the market regulatory board. An additional delay was caused by the fact that the winning bidder, a consortium of a Chinese and Malgache company, was not able to guarantee their continued cooperation and participation in said consortium. The original offer was thus at question for several months. During the slow advancements in the tender procedure, the original disbursement structure, which had already been confirmed, was reexamined and found to be incompatible with GIZ regulations. The approach was adjusted to link disbursements more closely to actual costs.

Technical assistance: Due to its close and long-standing relationship with the concerned authorities, GIZ was able to help advance the project and coordinate the overall process, even in the case of overlapping mandates of different authorities that occurred at the beginning. The support provided by GIZ is perceived as very positive by ADER, especially with regard to the standardisation of frameworks to facilitate investments in the sector.

Site selection: The procurement mechanism was adapted to accommodate for the preference of the government to be in charge of site selection. They prefer to tender a portfolio of sites within a region. This allows the combination of more attractive villages together with less attractive ones in one bundle. It also saves ADER time, as it can verify multiple villages together (in contrast to spontaneous tenders, where each village has to be verified individually).

Coordination: The delays caused by the redesign of the disbursement mechanism can be prevented in the future if the donor programme involves the relevant contract department at its headquarters as early as possible in the process to ensure that measures chosen are compatible with the donor's regulations.

5.2.3 MINIMUM COST TENDER (MCT) IN TOGO

The project in Togo is based on an adapted minimum cost tender (MCT) approach. A MCT in this particular case is defined as a bidding process in which mini-grid developers compete based on their technical (technical proposal) and financial (financial proposal) qualities. The financial bid that charges the lowest additional cost (monthly service fee on top of the set tariff) scores the highest. The procurement process covers the following steps:

A) Open tender: Interested bidders demonstrate their eligibility and qualification and submit a proposal for the electrification of sites that are identified, verified, and sensitized by the Togolese government with support from GIZ.

B) The evaluation of the proposals is done in three stages: first verification of eligibility, then technical evaluation and finally financial evaluation incl. a proposed monthly fee. The approach is based on a fixed subsidy amount (in this case 800,000 EUR) and a fixed retail power tariff of 120 XOF per kWh. In addition, bidders propose a monthly service fee, depending on power consumption and type of connection (single phase, three phase) on top of the kWh-based tariff. The evaluation uses weighting factors of 40 % for technical and 60 % for financial criteria, the bidder with the highest overall score emerges as the winner of the bid.

C) Technical evaluation looks at aspects such as local economic development, the development of a key maker model study (to identify specific local economic potentials), trainings of productive use of electricity and credit schemes for households and business owners which intend to connect to the new grid.

D) Contracting/Licensing: After the conclusion of the evaluation, the bidder signs a financial incentive agreement with the Togolese government via the rural electrification agency AT2ER. The contract is only valid once the bidder has also obtained the necessary operation license and permits which are issued by the Ministry of Finance, the regulator ARSE (Autorité de Réglementation du secteur de l'Electricité), the Ministry of Energy and Mines and the cabinet of ministers presided by the Togolese president. This makes this step very time consuming and complex.

E) Implementation: The developer implements the projects and receives incentive disbursements upon achievement of predefined milestones, which are not just related to progress concerning infrastructure but also in regard to accompanying measures, such as promotion of productive use of electricity (see Chapter 5.3).

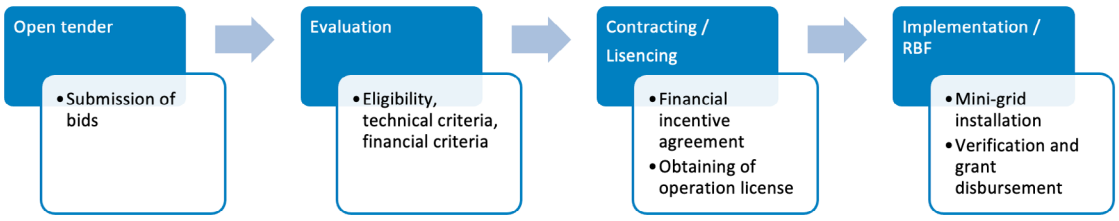

Figure 3: MCT procurement process applied in Togo

At the time of writing, the tender in Togo has been completed and the financial incentive agreement between the developer, a Beninese company and the Rural Electrification Agency has been signed. The main findings of the analysis of the procurement process applied in the EAD project in Togo are:

Technical assistance: The chosen adapted MCT approach with a RBF disbursement method was well accepted by the partners, as comparatively speedy planning and implementation was made possible. This is primarily due to GIZ's established relationship with the authorities, which enabled all challenges to be overcome in a timely manner through a joint effort. GIZ is able to deliver the required technical assistance measures to support the government on the basis of the ongoing mini-grid support programme ProEnergie in the required form.

However, it has emerged that the Togolese government intends to strongly regulate the mini-grid market like the solar home system market. As the Togolese government is also implementing a bigger mini-grid project with 317 mini-grids, all other projects that are below the scale of the public "317 mini-grids" project shall be aligned with the bigger project. This follows a decision by the cabinet of ministers in August 2022 which brought implementation of the EAD project to a hold.

To further allow for project continuation and alignment, the Togolese government intends to become the majority shareholder of the special project vehicle that will construct and operate the two mini-grids. After two to three years, the public investment company, Togo Invest SA, will complete the takeover and then lease or sell the two EAD mini-grids to one of the operators of "317 mini-grids" project.

Scalability: The approach was initially considered to be well scalable in Togo due to its good embedding in the regulatory framework, the acceptance of the competent authorities, and the relatively quick implementation in comparison to other approaches applied in the sector. However, the emphasis on the 317 mini-grid flagship project prevents other approaches from being implemented or being scaled. Additionally,, the strong involvement of the Togolese government means that the leverage of private sector funds will be very limited as the majority owner of the project vehicle will have to contribute the contractually agreed co-financing.

Local ownership: The intended goal of making local/regional companies competitive through the design of the procurement and grant disbursement processes has been brought to fruition. A mini-grid developer from Benin has been awarded the contract although the proposed changes strongly limit its role to the construction phase.

Finite phases: Due to the limited time usually available within a phase of a donor programme (in this case the bilateral GIZ programme ProEnergie), the implementation of a mini-grid RBF approach may not have enough time to achieve additional important goals in the development context. In the case of this project, it was not possible to link extra impact related disbursements to achievable objectives later in the mini-grid project, such as job creation, improved health care and education, gender related aspects, or others. This would be facilitated by involving a partner for the long-term implementation and disbursement of funds, which would remain in place after the end of the phase of the donor programme and the exit of the donor from the process. This aspect becomes even more important as current delays drag out the process and the end of the current GIZ programme phase approaches. It is therefore important that the Togolese governments includes such conditions in the leasing or sales agreement for the future operator of the two mini-grids.

5.3 RBF DISBURSEMENT

As derived above, RBF in the mini-grid context is merely the type of disbursement that is linked to the achievement of certain results. This can be combined with different procurement approaches, e. g., PBG, MST, or other tender concepts on financial indicators. In Benin a PBG is implemented, in Madagascar an MST and in Togo an MCT, in all three cases with an integrated RBF disbursement method.

5.3.1 BENIN

In Benin, a PBG is implemented in its classical form. The subsidy is paid entirely against proof of customer connections (after two months of operation), and thus at the end of the project implementation phase. This has the advantage that the disbursement process is very clear and simple for all sides, and that the UEF only has to fulfil its commitment to make payments after the projects have been completed. In addition, the verification effort is manageable. However, developers are thus forced to prefinance the projects completely, which poses considerable risks in the event of respective delays in the process.

The subsidy amount per connection was originally US$ 433, but this was criticized as too low by the private sector. Recently, this amount was raised to US$ 592 per connection. This sum may cover a maximum of 50 % of the total project costs. The retail tariffs are around US$ 0.4 per kWh plus a fixed monthly tariff.

The feedback from the stakeholders in the implementation process in Benin with developers, ABERME, GIZ, and UEF, is mostly critical regarding the current disbursement method. While the UEF maintains the principle of payment upon completion, it is generally considered necessary to split the payment over several milestones and thus allow for earlier payments. This is justified by the fact that the delays in the processes, often related to issues outside the developers' control, drive up the financing costs for the developers and thus increase their risk. Experience also shows that many potential customers wait first before getting connected. This leads to additional delays in disbursement. The increased risks make it difficult or impossible

for financially weaker companies from the local and regional market to participate in this process, and they are virtually excluded from competition[8]. While international companies are often considered with lower risk by project sponsors, they may also come with higher return expectations and less local market experience, so there are strong reasons to promote local content, as has been shown in Nigeria.

5.3.2 MADAGASCAR

In Madagascar, the disbursement methodology has not been finalised at the time of writing. The initially established disbursement structure preferred by the partners did not fully comply with GIZ regulations and is currently being adjusted. However, it is safe to assume that the subsidy will be paid out over several milestones, similar to Togo, in order to provide financial support to the developer as early as possible in the process and reduce their risk. The grant disbursement will thus be closely linked to the actual costs. The total grant amount available is € 1,500,000, which is about 50 % of the total expected cost of the project and, given the number of potential clients, about US$ 750 per connection. The tariff will be determined using a methodology defined in the tender documents and based on the verified costs provided by the developer.

In the eyes of ADER, this approach goes in the right direction, as they are mainly concerned about the financial strength of local companies, which are not able to prefinance larger sums, even if the RBF funds are firmly committed. It remains a challenge to define an approach that meets both the government's and donors' demands in terms of target achievement and accommodates local firms in terms of securing funding.

5.3.3 TOGO

In Togo, it was decided to split the payments in multiple instalments to facilitate local participation. The disbursement mechanism offers the possibility of one upfront payment against provision of a bank guarantee, which must be fully refunded, and provides for three milestone payments. This is expected to reduce the financial risk for the developer, which in turn will encourage local participation. Concerns have been expressed that without the possibility of receiving upfront payments, local/regional companies would not have the financial capacity to advance all payments. This in turn would give international companies an advantage to win the project. It was confirmed by developers that the biggest challenge for them is to overcome the funding gap and that a financial solution is needed to close it.

The amount of the grant was determined based on a detailed estimate of the total project costs. A total grant of € 800,000 was set, representing 80 % of the expected total costs of the project. Given the expected total number of connections in the two villages, the grant per connection is approximately US$ 730. The payment mechanism for the subsidy is as follows: The developer has the option of receiving an upfront payment of € 140,000 (17.5 % of the total amount). This would be disbursed at the signing of the contract and is subject to the developer providing a bank guarantee for the same amount. If the developer exercises this option, the upfront payment will be progressively deducted from subsequent milestone payments. The milestone payments are made in three instalments: a) € 400,000 (40 % of the total grant) is paid when the imported equipment arrives in Lomé and the bill of lading is presented; b) € 200,000 (30 %) is paid when the two mini-grids are installed and a technical verification has taken place on site; € 200,000 (30 %) is paid when the mini-grids have been commissioned and at least 100 potential productive users have been trained.

As the subsidy amount covers 80 % of the project costs, the remaining 20 % is contributed by the developer. The retail tariff is set at approx. US$ 0.18 per kWh. The developer generates additional income through a separate monthly service fee.

8 To give local companies a better chance, the conditions for them were eased so that they only had to prove financial capacities of 25 % of the expected project costs, compared to 100 % for foreign companies. Nevertheless, there was no interest from the local private sector.

5.4 EVALUATION OF THE THREE MINI-GRID RBF PROGRAMMES

The in-depth analysis of the three case study countries makes it possible to identify the strengths and weaknesses of each project, and to derive principal conclusions.

In Benin, the aim was to test the UEF approach on a broad scale in one of the first three countries (the UEF is so far also active in Madagascar and Sierra Leone), and also to gain experience for the BMZ with regard to a future expansion of support activities in the area of RBF. The approach is based on a PBG in which pre-qualified companies submit applications for individual villages and receive a fixed subsidy amount per connection after verification.

The analysis conducted suggests that this approach is a simple and transparent mechanism that requires little management efforts for UEF and would open the door for longer-term targeting due to its long-term commitment (way beyond the period of donor programme phases).

What is criticised from the point of view of the developers and the government is the fact that the pre-qualification phase presents a high hurdle for applicants, that high financing costs are incurred by distributing the subsidy only at the end of the implementation phase, and that this virtually excludes the local private sector from competition.

An important lesson from this analysis is that the PBG approach pursued in Benin requires a higher level of technical assistance than envisaged. The approach needs to be well adapted to local regulatory conditions, coordination between stakeholders needs to be supported, the tariff model needs to be adapted, participating companies need to be closely supported throughout the process and capacity building for the public sector must be provided. These elements were not greatly considered in the UEF approach, but due to the cooperation with the locally anchored GIZ programme, some of the challenges, especially in coordination, could be overcome. However, there is still need for more support, as expressed by ABERME, especially to better adapt the approach and to better accompany the mini-grid developers.

The situations in **Togo** and **Madagascar** are largely comparable. Both projects aim to create incentives for the private sector to implement projects quickly and with an impact as positive as possible, and to offer the local/regional private sector more equal opportunities vis-à-vis international companies.

Both projects implement a tendering approach where villages are pre-selected by the government and allocated to the winner. Subsidy disbursement takes place in several stages, each upon achievement of certain milestones. Compared to the UEF in Benin, payments take place much earlier in the process and are linked to actual project costs, thereby reducing costs and risks for the companies (in Madagascar, the approach has not yet been finalised at the time of writing).

GIZ's long-standing, close cooperation with the authorities in both countries made it possible to jointly develop the RBF approach and adapt it well to the respective regulatory conditions. Both approaches were seen as potentially scalable by the electrification authorities of the two countries, and, in the case of Madagascar, there is already interest from some donors to roll out the approach.

The fact that the process is managed by a donor organisation (in this case GIZ on behalf of BMZ) has the disadvantage that, in terms of disbursement, no long-term objectives aimed more at sustainability can be included, but only time spans that are within the scope of the current technical assistance programme phases can be considered. With an external partner (such as a fund manager or government-hosted fund), this issue can be compensated. With the attachment of the EAD project to AT2ER, there has been a capacity developement effect. Further long-term objectives can be developed with AT2ER and government funds such as the new Fonds Tinga “Electricity for all”.

Similar to the case of the UEF in Benin, the approaches in Togo and Madagascar also require the support of development partners. The two approaches have largely been carried out according to plan, as a technical assistance programme on the ground is providing the support needed. This is necessary for the creation and implementation of the whole approach, coordination between stakeholders, adaptation of the tariff model, support to companies throughout the process and capacity building for the public sector.

A cost-benefit comparison is difficult to make between these three countries, as the conditions are very different. In Benin, the subsidy amount per connection is the lowest at US$ 592 (compared to ~ US$ 750 in Madagascar and ~ US$ 730 in Togo), however, developers can generate significantly higher revenues based on a higher tariff of US$ 0.4 per kWh plus a monthly fee, compared to US$ 0.18 per kWh in Togo (in Madagascar, the tariff has yet to be determined at the time of writing).

The latest developments in Togo have however shown that strategic governmental decisions impact smaller scale pilot projects profoundly. This is especially the case if decisions are not aiming at more competition or more dynamic approaches but focus on regulating and harmonizing mini-grid implementation as a total. As a result, the mini-grid market in Togo will remain heavily regulated where the private sector is being called upon rather than private sector driving market development.

A summary of the three case studies is presented in the following table:

	Benin	Madagascar	Togo
Objectives	• UEF: Apply rapid, scalable funding scheme • GIZ: Gain experience with UEF to either continue supporting it or to develop own RBF instruments	• GIZ: Facilitate access to funding and create easiest possible conditions for accelerated implementation.	• GIZ: Provide incentives for quick implementation and create a level playing field for local/regional firms.
Procurement	• PBG on a spontaneous, unsolicited basis • Communities to be electrified are identified, verified and sensitized by pre-qualified developers	• MST with 2-stage tendering process (EoI, RfP) • Communities to be electrified are identified, verified and sensitized by GIZ on behalf of the govt.	• MCT with 2-stage tendering process (EoI, RfP) • Communities to be electrified are identified, verified and sensitized by GIZ in close collaboration with the governmental partners.
RBF	• Single payment per verified connection • Cost: US$ 592 per connection (actual payout upon verification and 3 months operation) • Tariffs: ~ $ 0.4 per kWh plus monthly fee.	• Multiple instalments (not finalized) • Cost: ~US$ 750 per connection (theoretical amount, as the payments are already made in the course of project implementation. A minimum number of connections must be realised.) • Tariff to be determined by the regulator based on costs claimed by the developer	• Advance payment + 3 instalments • Cost: ~US$ 730 per connection (theoretical amount, as the payments are already made in the course of project implementation and are not linked to the number of connections) • Tariffs: ~ $ 0.18 per kWh
Strengths	• Simple and transparent disbursement mechanism • Low management requirements • Long-term commitment beyond period of GIZ phase	• Well-adapted to local conditions thanks to close collaboration with govt. • Potentially scalable • Reduction of financial risks for the private sector	• Well-adapted to local conditions thanks to close collaboration with govt. • Potentially scalable • Reduction of financial risks for the private sector • Capacity building for government partners strengthens sustainability
Weaknesses	• High prequalification effort • High financing costs for developers • Quasi exclusion of local companies • Need for external TA support to adapt approach to local conditions	• Finite GIZ phases prevent longer-term objective setting	• Finite GIZ phases prevent longer-term objective setting for the GIZ-financed RBF mechanism. • Small scale of the pilot makes it vulnerable to shifting government priorities
TA requirements	• Adjustment of approach to local conditions • General coordination of stakeholders • Site selection • Licensing and tariffs • Capacity development for public sector • Accompaniment of developers	• Set-up and implementation of tender • General coordination of stakeholders • Site selection • Licensing and tariffs • Capacity development and capacity transfer to the public sector partners • Accompaniment of developers	• Set-up and implementation of tender • General coordination of stakeholders • Site selection • Licensing and tariffs • Capacity development and transfer to the partners sector • Accompaniment of developers

Table 1: Summary of three case studies Benin, Madagascar and Togo

5.4.1 LESSONS LEARNED IN BENIN, TOGO, AND MADAGASCAR

The following aspects can be drawn as general lessons from these three projects:

Choice of procurement method: All three procurement approaches (MST, MCT, and PBG) are feasible approaches that can be combined with an RBF disbursement mechanism. The different procurement mechanisms affect the level of government involvement in the process and the potential need for technical assistance. The decision to use one of the two procurement mechanisms should only be made after extensive dialogue with the respective government to ensure that the programme is in line with national regulations and electrification objectives and is accepted by the government.

Choice of disbursement structure: The RBF disbursement structure influences the ability of local companies to participate. Two different disbursement structures could be observed in the three case studies: Either the grant is disbursed in several instalments during the implementation or in a single instalment at the end. The reason for choosing a multi-instalment approach is to support the developer to close the financial gap that occurs with a single disbursement at the end. Feedback from both developers and the government agencies involved indicates that disbursements at earlier stages of the project are welcomed.

Need for technical assistance: The three projects all benefitted from the fact that GIZ's technical assistance has a local presence and excellent networks on the ground. In Benin, GIZ was not involved in the development of the UEF approach but was able to contribute to its adaptation and improvement through stakeholder coordination during implementation. In Togo and Madagascar, GIZ was able to develop and adapt the approaches jointly with the national partners from the beginning. In general, it can be said that the markets in the three countries are not mature enough to successfully implement RBF approaches without the close accompaniment of a locally anchored technical assistance partner. This must be taken into account in future programmes.

Achievement of objectives: It is too early to judge which of the three projects has achieved or will achieve the original objectives in which form. All three are still in the procurement phase, no mini-grid has been installed yet and no grant disbursement has taken place. Nevertheless, it can be said that the goals for Benin to develop a quickly implementable, scalable approach have not yet been achieved. Neither has it been implemented quickly nor is the approach scalable. In this respect, it would be advisable to improve the approach. For Togo, it can be stated that the subgoal of offering equal opportunities to local/regional firms was achieved insofar as a firm from the neighbouring country of Benin was awarded the contract, however as this is no government priority it is unlikely that the Togolese government will opt for similar approaches in the near future. The rapid scalability of the approaches in Togo and Madagascar still needs to be proven.

The role of a technical assistance programme on the ground: GIZ played an important role in Benin as a coordinator and implementer on behalf of the UEF and was also able to contribute to improving the approach thanks to its presence on the ground. However, it may make sense to exert greater influence on the design of the approach from the outset in close coordination with the government authorities and to bring these partners in earlier. In Togo and Madagascar, GIZ was able to exercise this kind of influence, with the result that well-adapted approaches co-developed with and accepted by the government were implemented. In addition, significant capacity building and transfer was achieved for the local partners. For scalability, however, the question is whether a typical technical assistance programme is the right organisation to act as fund manager. This should be done by more suitable partners, who would also have the advantage of aiming at more impact-related, long-term goals in the projects through long-term presence and creation of corresponding incentives through milestone-based payments. There are a number of competitive privately operated fund managers with strong experience, fiduciary standards and a variety of financial instruments within their capacity.

Overall, it can be said that the involvement of a technical assistance provider is essential for the development, adaptation, and implementation of any kind of mini-grid programme with RBF mechanism, as it is evident that most markets in Sub-Saharan Afrika are still too immature to achieve the desired results without this kind of support. Few African regulatory frameworks exhibit investment-friendly landscapes for mini-grid developers to enter the market without the need for financial and technical derisking.

6 – OTHER RBF-BASED PROGRAMMES IN THE SECTOR

In the following, three major RBF approaches in the mini-grid sector are subjected to a high-level analysis to compare with the lessons learned from the three EAD projects above. A look at these other measures helps to derive stronger recommendations for action on future mini-grid programmes with RBF mechanisms.

6.1 ENERGISING DEVELOPMENT (ENDEV)

EnDev is one of the pioneers in the application of RBF in the mini-grid sector in Africa. By 2020, the programme had implemented ten mini-grids in Kenya and two mini-grids and 22 nano-grids in Rwanda. As these projects have already been completed, a number of lessons can be learned from their implementation.

In both Kenya and Rwanda, technical assistance was required to establish business enabling environments. When the project started in Rwanda, the mini-grid sector was poorly developed, so an effective technical assistance component assisted the government in improving investment conditions. There was also capacity development of local companies (e. g., on how to conduct proper tariff modelling and demand estimation) to help develop well-founded business models. It was highly beneficial to insert an actor to set realistic time horizons and to coordinate among different stakeholders in the sector, such as development partners and national authorities.

RBF disbursement must be adapted to the financial abilities of the developers. Access to finance persists as a major challenge in the mini-grid sector. To ease the financial challenges experienced by private developers, EnDev adjusted their programme in two ways. First, they disbursed the RBF payments in multiple instalments to lower the need to fully prefinance all expenses. The payments were tied to the successful procurement of equipment, the commissioning of mini-grids, and effective operation of the mini-grid after one year. Second, EnDev explored ways to bridge the financing until the RBF disbursement. In Rwanda, EnDev collaborated with the World Bank's Scaling Renewable Energy Program (SREP) to offer developers loans at lending conditions better than provided by commercial banks. From EnDev's experience, a RBF project requires up-front financing facilities, technical assistance to improve the regulatory environment, and a well-coordinated interface between all the involved development partners. EnDev sees RBF not as a stand-alone tool, but as an element of a toolbox, which is best included into broader market development programmes together with technical assistance.

6.2 NIGERIA ELECTRIFICATION PROJECT (NEP)

The Nigeria Electrification Project (NEP) is a federal government initiative that aims to increase electricity access to households and micro, small and medium enterprises in unserved communities, and students and patients at federal universities and teaching hospitals throughout Nigeria. The Rural Electrification Agency (REA), the implementing agency for the project, worked with the World Bank (providing US$ 350 million in support) and AfDB (providing US$ 200 million in support) to design the programme. Under its mini-grid component, the project follows two approaches: a) MST, and b) PBG. In both approaches, RBF disbursement mechanisms are applied. Initially, disbursement of the grants was done upon verification that customers have been successfully connected.

Initial approach: The idea behind the design of the PBG was to find a simple, transparent, and predictable approach that is quick to implement, easy to manage and attracts private investment into the market. As mentioned above, the PBG modality is seen as an instrument to identify developers without government and donors having to conduct as much project preparation or run a fully-fledged project tender. To this end, US$ 350 were initially made available to be paid to prequalified companies per verified connection, but the expected private sector investments in mini-grid deployment did not materialize at this level of grant funding. Feedback from the private sector was that the funding gap was a major obstacle, that the subsidy per connection was significantly too low, and that the

overall prequalification process was too complex. As such, the burden and risks on the developers was far too high and reimbursement too low.

Adjustments: The PBG approach was adjusted by increasing the subsidy to US$ 600 per connection and splitting the payment into three milestones. These are: a) Delivery of specific goods to site (payment of 40 % of grant amount); b) Commissioning of the mini-grid and verification of initial connections (payment of 40 % of grant amount); and c) Verification of connections after three months of operation (payment of 20 % of grant amount). The same disbursement structure is applied to the MST programme.

Feedback: As a result, demand from the private sector has increased significantly, with more than 60 companies having passed the prequalification phase and preparing projects, and 80 mini-grids commissioned by the end of 2022. However, challenges remain in terms of financing, as the subsidies are distributed in local currency. The companies would like to see disbursements in hard currency so that they are less exposed to exchange rate risks when purchasing hardware on international markets. In addition, there is still a need to improve and simplify administrative processes.

It is also important to note that an intensive technical assistance programme, the Nigerian Energy Support Programme (NESP), prepared the processes, mechanisms, and instruments for Nigeria's different mini-grid programmes prior to the financing windows being expanded to this volume.

6.3 UNIVERSAL ENERGY FACILITY (UEF)

The Universal Energy Facility (UEF), a RBF facility managed by SEforALL, launched its Wave 1 facility for mini-grids in Sierra Leone and Madagascar in October 2020, followed by Benin in collaboration with GBE in January 2021. Similar to the PBG in Nigeria, the UEF was set up with the objective to create a simple, transparent and predictable approach that is quick to implement, easy to manage and leads to quick scaleup.

The process consists of a prequalification stage for interested organizations, followed by a site-specific technical application stage, grant agreement signing and project implementation. Only when the connection of electricity customer is verified, the agreed grant amount is disbursed to the project developer. The UEF attempts to apply the same process and subsidy amount (if possible, based on the financial model) to all countries where the approach is implemented. The grant amount was initially set at US$ 433 per connection. The UEF has reached its first big milestone, it verified its first set of 654 electricity connections to mini-grids in Madagascar.

Since then, the UEF has benefitted from both on the ground experience as well as private sector feedback that it has collated.

As part of the UEF commitment to conduct the first subsidy review 18 months after the launch of Wave 1, it consulted a wide range of stakeholders, including mini-grid developers funded under the UEF, donors, investors and other sector stakeholders. In addition, it collected data on the financial model's variables in order to validate the inputs. Based on this, the subsidy was increased to $592/connection, a 37 % increase from the previous subsidy. In addition, the role of the technical assistance flanking the RBF window, as learned in Benin, has also been acknowledged as having greater importance on the outcome than was originally envisaged. Important lessons learned are:

Local presence: Prior to opening a new funding window, the UEF engages with key government stakeholders in each country. However, the UEF did not have any local UEF representation in the respective countries. In Benin, the UEF cooperated with the locally represented organisation, GIZ, which took over the coordination tasks and helped to adapt the approach and support the applicants. In addition, SEforALL has also recruited country managers and UEF staff on the ground that help coordinate UEF efforts in the country, especially in Sierra Leone, Nigeria, and Benin.

Subsidy disbursement: Access to upfront construction finance remains a challenge for some developers. Based on this lesson, the UEF has updated the payment structure by adopting partial disbursements which will unlock and catalyze investment capital for developers and widen the base of developers who access UEF funding, as well as accelerate the implementation and delivery of energy access connections. Since then, the UEF is instituting milestone payments to include partial payments upon milestones.

Scalability: One of the key objectives of the UEF is rapid scalability by the private sector. The UEF has been able to operationalise an RBF model and is demonstrating the viability of the model in terms of raising funds,

verifying connections, securing buy-in from host governments, receiving developer applications, and commencement of project construction. Currently, it does not include technical assistance and it is possible that we will see a revised format presented with greater technical assistance components as SEforALL scales a second wave of the UEF.

6.4 LESSONS LEARNED FROM OTHER RBF PROGRAMMES

Over the past five years, high hopes have been pinned on RBF as the new method to solve many of the problems preventing rapid progress in the mini-grid sector. The idea of an approach that is easy to manage from the financiers' point of view, and that ensures transparent, predictable terms from the private sector's point of view, should ensure that private investment is attracted to the market. These approaches hoped to avoid having to go through lengthy bidding processes with poorly resourced government agencies to then develop high volumes of government-selected villages with mini-grids. This also hoped to eliminate the need for complicated and inefficient grant programmes. Private developers would be able to identify sites and develop projects quickly without having to comply with complicated bureaucratic processes, based on the promise of a secure subsidy distribution after proof of projects implemented. On this basis, it should be possible for them to access financing relatively easily in order to prefinance the projects and cover the private share of the projects.

Large budgets were set up to implement nationwide PGB and MST programmes under the NEP in Nigeria, for example, or to use the multi-donor financed UEF on a supra-regional basis to enable rapid scaling. The hopes and expectations were accordingly immense, especially in the donor community, and to some extent also in the private sector. The Mini-Grid Funders State of the Global Mini-Grids Market Report 2020 estimated that from US$ 2.07 billion in approved mini-grid funds, only 13 % was disbursed into projects.

Given these high expectations, the results achieved since then have been sobering. In Nigeria, only a very manageable number of projects were launched. Only with the adjustment of the distribution structure over several milestones and the increase in the subsidy amount, was it possible to arouse greater interest on the part of the private sector. UEF has made some results, but it did not fully match their expectations yet. In Sierra Leone, where the facility was launched in 2020, two companies have signed an agreement so far with UEF and given the market interest, a Wave 2 has been launched. In Madagascar, also since 2020, results have been seen in a span of 18 months of the UEF being operational. In Benin, which started in 2021, five companies have submitted project applications. Here, too, there have been long delays and no project implementation yet. UEF started with the aim of applying the same conditions in all countries in terms of pre-qualification, project applications, contracts, and financing. The financing windows were in some countries launched without first implementing a technical assistance programme for preparation of regulatory frameworks, site identification, and project preparation. In Madagascar, where these issues were receiving attention from the PERER programme, it was easier to identify developers with projects somewhat prepared and licensing processes being clear.

The results suggest that simple financing windows with 'few strings attached' are partially ahead of their time and should perform better through the inclusion of robust project preparation programmes. They are set up similarly to instruments that have achieved good results in industrialised countries. However, they clash with reality in many African countries and cannot achieve the desired successes achieved elsewhere. According to the analysis made here, one major reason is that the markets and regulatory frameworks in which the approaches described above are used are not yet sufficiently developed to allow approaches with such a high degree of risk for developers. In detail, this can be seen in the following points:

Pre-qualification: The pre-qualification processes are demanding to ensure that only established, experienced companies are preselected that are able to provide the corresponding prefinancing. However, as the mini-grid sector is still relatively young, and the local private sectors in particular are still in their infancy, these pre-qualification requirements already pose high hurdles, sometimes too high for local companies. The entire process is thus delayed from the beginning and generates excessive effort and thus costs for the companies. A simplification of this process would be advisable in order to give more firms that have not been present in the market for long and do not have the capacity to pre-finance the entire project the opportunity to be pre-selected.

Regulations: The mentioned approaches are sometimes not adapted to the regulatory frameworks of the respective countries. Some RBF programmes are seeking to avoid a large degree of technical detail in the

quest to be agile and cheaper. This is in particular a challenge for the UEF, as the approach hopes to apply the same conditions in all countries. As the example of Benin shows, this may clash with certain regulatory aspects and may even affect the site selection process. This leads to long delays in the overall process, which may be painful for the companies that are already in the application process and have to bear costs. It has been necessary, in hindsight, to adapt the approach for each country specifically to the prevailing conditions and to invest some time to fill potential gaps in the regulatory framework, which simply does not exist in most countries, due to the innovative nature of the mini-grid business model. This requires a good analysis of the conditions and cooperation with a partner organisation that is well connected in the respective country. It creates additional effort for the responsible organisation, which pays off later as it can avoid problems and delays in the process, especially in the sense that private investment is not stalled midway but brought in once the framework is in place.

Financing: One of the main problems across the board have been the financing modalities. The low level of subsidy can easily be adjusted to the respective requirements by increasing it, as was done in both the NEP and the UEF. A bigger problem is that the participating mini-grid companies, at least currently in the UEF, have to pre-finance the projects completely and thus bear the corresponding financing costs. These costs increase the longer the processes take. In addition, the conditions of available financing are often worse than originally assumed and make the situation more difficult for the companies. On the one hand, this can be remedied by adapting the distribution modalities in such a way that the companies receive several payments in the course of the project, as has now been implemented in the NEP. In addition, solutions should be sought as to how developers can bridge the financing gap via innovative financing instruments that can cover at least the construction finance of the firms. To this end, a new initiative by financial cooperation partners such as development banks should be proposed.

Technical assistance: The projects analysed clearly show a difference whether and in what form TA is provided for the implementation of the approaches. The example of the UEF shows that in Benin, where a technical assistance programme is responsible for on-site coordination, the processes are running better than in Sierra Leone or Madagascar, where involved stakeholders complain about a lack of coordination and process support. Technical assistance is necessary to further develop the markets until the implementation of "classical" RBF approaches like UEF are possible without the accompanying support of a partner. The fields in which support is needed are manifold: adaptation of the approach to the regulatory framework, adaptation of tariff models, support with pre-qualification and site-specific technical applications, support of companies with licensing, project implementation, and result verification. In addition, there is a need for close coordination between all stakeholders throughout the process, as well as capacity building, especially for the often understaffed and underfunded government agencies.

Scaling: One of the main objectives of approaches such as the PBG in Nigeria or the UEF was to enable rapid scaling. Unfortunately, these expectations have so far not been met. The reasons for that are numerous and some are listed above. Important voices in the sector, such as AMDA, complain that the village-by-village approach stand in the way of rapid scaling. Experience from the developers interviewed suggest that it is very difficult for companies to quickly implement many mini-grids based on these approaches. They are held up by the lengthy processes described above and are heavily burdened by the necessary, costly upfront financing. The current conditions in most countries in Sub-Saharan Africa are not ideal for rapid scaling through this kind of PBG approaches. Better results are currently achieved through MST programmes, in which companies can more easily mobilise financing when awarded larger clusters of villages and thus implement a larger number of projects more quickly. A good example is the MST approach in Sierra Leone (the Rural Renewable Energy Project – RREP, financed by the UK Foreign, Commonwealth & Development Office – FCDO and implemented by the United Nations Office for Project Services – UNOPS), which has developed about 100 mini-grids in the same period that only a handful of projects were implemented under the PBG in Nigeria.

Unavoidable delays due to administrative and licensing processes are present in any type of approach, as shown above, and need to be resolved. However, RBF disbursement mechanisms can very well be integrated into MST/MCT or other programmes, as the EAD examples in Togo and Madagascar show.

7 RECOMMENDATIONS

The analysis of the three EAD projects as well as the other RBF programmes has brought to light a number of interesting and useful lessons. These can now be used to influence the development of new concepts, or the adaptation of existing ones, in such a way that they have a higher probability of success. First, the most important recommendations are summarised:

7.1 BEST PRACTICE CASE FOR MINI-GRID RBF PROGRAMMES

As the detailed project analysis show, the experiences gathered, and challenges encountered are coherent across different countries and programmes. From this, general lessons can be learned and a best practice case for mini-grid programmes with RBF disbursement mechanism can be established. It integrates the procurement method, the disbursement method and the technical assistance required for successful project implementation.

The key lies in the efficient embedding of targeted technical assistance measures by a well-connected technical assistance programme to support the responsible implementing organisations in the respective process steps. The results of the analysis made above show that without appropriate technical assistance no significant progress is made in the markets concerned. The essential necessary support measures are outlined below.

7.1.1 PROCUREMENT METHOD

MST/MCT and PBG approaches can all be combined with an RBF disbursement mechanism. The choice of procurement method should be based on a thorough analysis of the country concerned and in close consultation with the local authorities. It should be ensured that the chosen approach is in line with the regulatory framework, fits into the rural electrification objectives and is accepted by the government. A one-size-fits-all approach cannot work well given the different requirements in each country.

First, the components and respective technical assistance required for the procurement method of MST/MCT approaches are presented:

Option 1: Minimum Subsidy Tender (MST) / Minimum Cost Tender (MCT)		
Procurement method	The government is much more involved than in a PBG programme and has full control over the process.	Depending on the maturity of the market in question, specifically adapted technical assistance measures should be incorporated into the development of mini-grid programmes.
	• The government selects the sites and publishes a tender for the development of these sites.	➢ TA is required to align the selection of project sites with national electrification priorities. ➢ TA is required to support the contracting authority in the preparation and implementation of the tender.
	• Bidders must meet minimum technical standards and charge tariffs that are mostly already fixed or calculated on the basis of the tender results.	➢ TA is required to make a country-specific adaptation of technical standards and to verify their compliance by bidders. ➢ TA is required to define the right balance between desired tariffs and required subsidies.
	• The bidder with the lowest subsidy requirement (MST) or lowest additional service cost (MCT) is awarded the contract to develop the tendered sites.	➢ TA is required to conduct a transparent evaluation and contract negotiations with the winning bidders. ➢ TA is required to support the winning bidders in obtaining the necessary licences and permits.

Next, the components and respective technical assistance required for the procurement method of PBG approaches are presented:

Option 2: Performance Based Grant (PBG)		
Procurement method	The government is much less involved and has less control over the process than in a MST/MCT approach.	Depending on the maturity of the market in question, specifically adapted technical assistance measures should be incorporated into the development of mini-grid programmes.
	• The contracting authority defines the subsidy amount per connection and launches the PBG. • Developers apply to be pre-qualified or short-listed.	➢ Technical assistance is required to define the right subsidy amount that results in desired tariff levels. ➢ Technical assistance is required to support the contracting authority in the shortlisting of suitable developers.
	• Developers select sites (from a list of pre-selected sites or anywhere in the country, if applicable) for which they submit site-specific technical applications.	➢ Technical assistance is required to balance interests of private and public sectors regarding site selection. ➢ Technical assistance is required to conduct a transparent evaluation and contract negotiations with the winning bidders.
	• If approved, developers develop sites on a first come, first served and rolling basis.	➢ Technical assistance is required to support the winning bidders in obtaining the necessary licences and permits.

7.1.2 DISBURSEMENT METHOD

The grant disbursement should be adjusted to market conditions so that the participating companies are not burdened by excessive risks, e. g., by high financing costs, and local companies are not disadvantaged. In order to cushion risks, it is advisable to split the disbursement over several milestones. If there is a financing gap, a solution should be provided for this, e. g., in the form of special construction finance funds set up by development banks and other donors. This could be in the form of forgivable loans. The first or the first two instalments are issued as a loan to the respective developer. Once the agreed targets are met in terms of verified user connections, these credits are converted into grants. This mechanism, which is currently being set up by Clean Energy and Energy Inclusion for Africa (CEI Africa), offers donors additional security regarding the use of funds. In order to not disadvantage local and smaller firms, these loans should be issued without collateral if possible.

Future programmes could also set up financing instruments as one-stop-shops, in which the disbursement of grants (incl. RBF) and the provision of debt capital are provided from a single source based on one due diligence process. Synergy effects can thus be achieved and costs reduced. CEI Africa, for example, has developed such a one-stop-shop offer to mini-grids developers.

In general, for both procurement options shown above, an RBF disbursement mechanism with three instalments is recommended for the best practice case:

Option 1 (MST/MCT) + Option 2 (PBG)		
Disbursement	➢ Technical assistance is required to adjust the disbursement mechanism to country specific cost structures (e.g., import fees, financing costs, license fees)	
	1. The **first instalment** (which amounts to at least 30% of the total grant) is paid upon presentation of all necessary licenses and permits that have to be obtained by that time as per the regulations, as well as proof of financial close for the project.	➢ Verification: by desk review of relevant documents
	2. The **second instalment** (which amounts to at least 35% of the total grant) is paid upon presentation of the bill of lading of all components to be imported for the project.	➢ Verification: by desk review of relevant documents
	3. The **third instalment** (balance of the subsidy) is paid after verification of reliable electricity supply for a pre-determined minimum number of customer connections.	➢ Verification: by a combination of remote digital data review and on-site surveys
	4. **Additional incentives** can be created by making further disbursements upon the achievement of more long-term, **impact-related results** (such as job creation through productive use of energy (PUE), improved health care, improved education results, gender-related aspects, etc.)	➢ Verification: by on-site surveys with digital data collection

The number, timing and scope of the instalments can be adjusted according to the characteristics of the project. The cost of the verification of results should be kept as low as possible while still ensuring target achievements. The first two instalments can be verified by desk review, while the third (and potential additional impact related instalments) require on-site verification, possibly in combination with verification by remote monitoring systems.

A multiple milestone disbursement mechanism as described here is more appropriate for the current stage of development of the sector but can eventually be transformed into a single disbursement at the end of the project process (proof of connections) as the framework conditions gradually improve. With a well-adapted approach to local regulations, improved local mini-grid sector, faster processes, and more experienced local developers, it is expected that private financing will be more accessible to developers and thus they will have to take less risk.

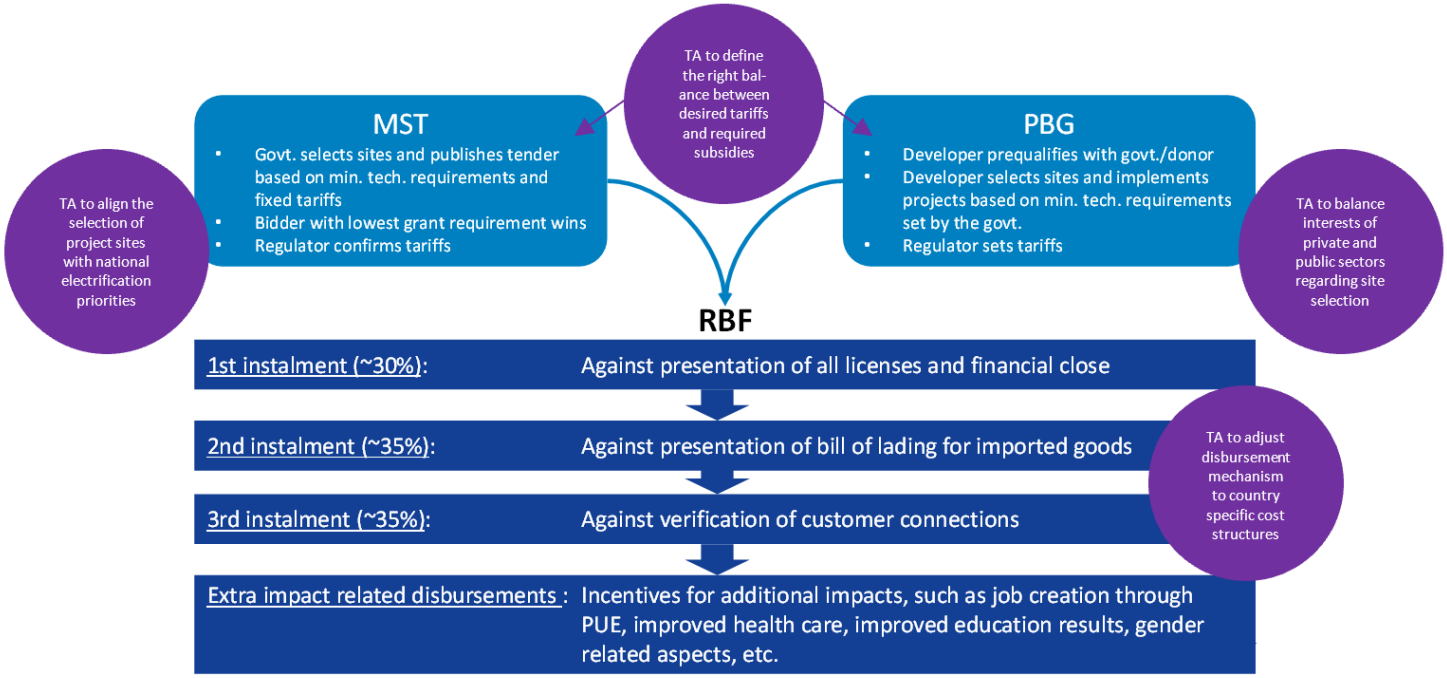

Figure 4: Best practice case for mini-grid RBF programmes

7.1.3 TECHNICAL ASSISTANCE

The analysis shows that the involvement of a technical assistance is essential for the development, adaptation and implementation of any kind of mini-grid programme with any kind of mini-grid programme with RBF mechanism that is launched in a new country for the first time, as it is evident that most markets in Sub-Saharan Africa are still too immature to achieve the desired results without this kind of support.[9]

Technical advisors in country can provide insights into the local mini-grid sector and knowledge about the required framework conditions and lend robustness and grassroots support to the project. It is therefore an a key success factor of project implementation. The amount of TA required depends on the state of the local mini-grid sector. It is necessary to bring the different actors together, improve the conditions in the sector and move the project forward. The results of this analysis show that TA is particularly valuable for the following four aspects of a project (see also Figure 4):

9 Mature markets dispose of a strong political orientation to achieve universal energy access through off-grid electrification. With a conducive off-grid regulatory framework that has been set in place for many years, these market focus on private sector integration and cooperation that is reflected in balanced tariffs.

› **Tariff vs. grant:** In projects that receive both public subsidies and distribute a public good (electricity), it is essential that these two variables are well aligned. Simplistically, the more subsidies an operator receives, the lower the tariffs it can charge, and vice versa[10]. At the same time, it can be said that if a certain (possibly very low) retail tariff is imposed by regulation, this will result in the need for a certain subsidy. Other important factors influencing this equation are the number of electricity connections and the economic viability of the mini-grid operation. Combining all these factors and determining the right subsidy level and tariffs is a highly complex process that usually requires the assistance of experienced experts.

› **Site selection vs. national electrification priorities:** Site selection can become a very political issue, especially if it is not fully in line with national electrification priorities, which may dictate an even distribution of sites across the country. Support from experienced experts is needed to balance these issues and develop viable solutions with the relevant authorities.

› **Regulatory control vs. legal protection:** Mini-grid developers/operators must submit to regulatory control in order to operate within the rules of the respective country, which at the same time provide them and their investors with legal protection. Many early mini-grid developers and programmes operated within a framework that was either over-regulated, thereby over-complicating processes and creating unnecessary costs, or unregulated, thus providing no legal cover. Countries such as Nigeria, Sierra Leone, Uganda, Rwanda, Ethiopia and Mozambique are improving the framework by developing specific mini-grid regulations with the help of experts.

› **Programme procurement vs. national procurement legislation:** It happens often that a programme's procurement rules are not fully in line with national procurement rules, licensing processes or concession frameworks. Support from experienced specialists is needed to avoid conflicts, through detailed coordination between the respective parties.

› **Implementation strategy vs. local political expectations:** A developer's implementation strategy can easily clash with the expectations of local authorities (possibly at village level) if they are not well aligned. The support of experienced experts is necessary for close coordination.

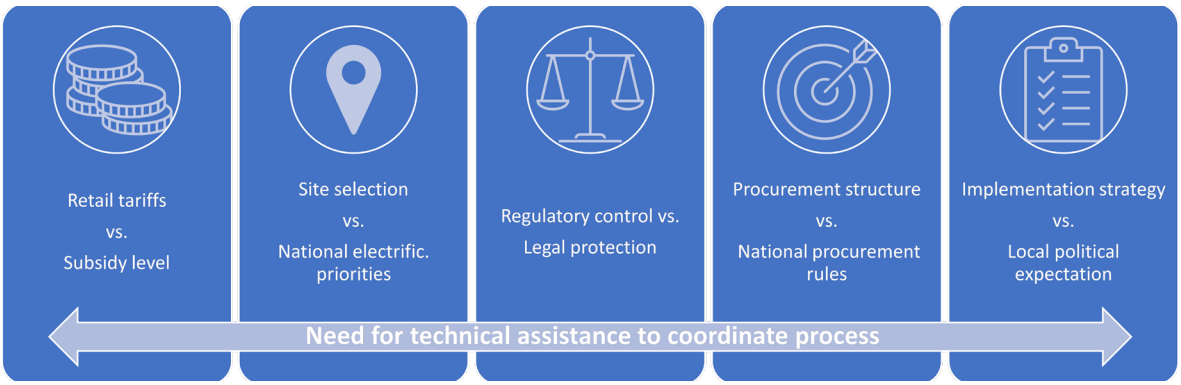

Figure 5: Need for technical assistance for mini-grid RBF programme coordination

7.2 OUTLOOK

The best practice case described in the previous subchapter should be used until frameworks are robust and markets begin to establish, in a form adapted to each country. During this time, the accompanying measures described above help to gradually improve conditions. It is necessary to improve conditions to the extent and until approaches with more streamlined RBF windows can be implemented, without the problems described, and the long delays that increase risks for the private sector. The following conditions must be met:

10 As we have seen, the subsidy amount in Togo is higher than in Benin, but the tariff is much lower.

- Implementation approaches can be aligned with improved regulatory frameworks
- Capacities and resources of national authorities have improved
- Financial capacities and track-records of local/regional private sector have improved
- Access to finance for the private sector is facilitated
- Coordination between the key stakeholders has improved
- Implementation periods are greatly reduced

It is the task of technical assistance providers to accompany donors in implementation and to ensure that the conditions listed above are met over time.

The implementation of such approaches continentwide is feasible, whereby the potential of overhead cost reduction and efficiency increase is achieved by combining RBF programmes of several countries under one platform (similar to the approaches of the UEF and CEI Africa), but with country-specific approaches regarding the design of grant disbursement methods and technical assistance measures.

8 ANNEXES

	Government-driven approaches			
	EPC approaches	**EPC + O&M approaches**	**MST approaches**	**PBG approaches**
Delivery models	• EPC contracting (utility operated)	• ESCO with service charge contract • ESCO with tariff-based contract	• Hybrid – split asset with grant • Split asset model • Private with CAPEX grant	• Private with CAPEX grant
Background	The Govt. has complete control over all aspects of the market. The role of the private sector is limited to EPC services.	The Govt. retains full control over the electrification sector and the operation of mini-grids. Mini-grid tariffs are at the level of the national electricity tariff, for which the necessary subsidies are raised.	The Govt. organises the electrification sector centrally and transfers important functions to the private sector. Subsidies are applied to reduce electricity tariffs as much as possible without jeopardising the economic viability of private mini-grid developers.	The electrification sector is based on a free market economy. Relatively loose regulations guarantee a secure electricity supply and protect the interests of private developers and investors, e.g., by approving cost-reflective electricity tariffs.
Site selection	The communities are identified by the Govt.	The communities to be electrified are identified, screened, and sensitised by the Govt.	The communities to be electrified are identified, screened, and sensitised by the Govt.	The communities to be electrified are identified, verified, and sensitized by private mini-grid developers.
Procurement	The Govt. issues tenders for EPC of mini-grids.	The Govt. issues tenders for the development of the projects and for the long-term operation of the systems. Usually these are two separate tenders, but sometimes they are combined so that the same contractor offers EPC and O&M.	The Govt. issues a tender for the development and operation of the projects, which is usually based on a certain electricity tariff and the bidder who requires the lowest subsidy while guaranteeing this tariff is awarded the contract.	Private mini-grid developers apply to the government for the award of mini-grid sites and a financing grant on a spontaneous basis.
Financing	The Govt. finances all mini-grid assets.	The Govt. finances all mini-grid assets, often through targeted loans or grants provided by donors.	• Under a "split-asset with grant" approach, the Govt. finances the distribution grids and contributes to the financing of power generation assets. • Under a "private with grant" model, the private operator finances all assets and receives a subsidy from the Govt.	The developer finances the entire project and receives a fixed subsidy per proven user connection from the Govt. Usually the Govt., with support from donors, establishes a finite fund for these payments.
Ownership	All mini-grid assets are owned by the Govt.	All mini-grid assets are owned by the Govt. Replacement investments can be financed from operations, if necessary, but remain in the ownership of the Govt.	• Under a "split-asset with grant" approach, the Govt. owns the grids, the developer owns the power plants. • Under a "private with grant" model, the developer usually owns all the assets. In special cases, a distinction is made between publicly and privately financed and owned assets.	All mini-grid assets are owned by the private mini-grid developer.
Operation	After commissioning, the utility takes on the operation.	The Govt. contracts private ESCOs to operate the systems for a defined period. The ESCOs generate their income either from a contractually defined service charge from the Govt., and/or from the sale of electricity to the end customers.	The private developer operates the mini-grids on the basis of a long-term contract with the Govt. and generates its revenue from the sale of electricity. The developer is subject to the provisions of the applicable mini-grid regulations.	The private developer operates the mini-grids on the basis of a long-term contract with the Govt. and generates its revenue from the sale of electricity. The developer is subject to the provisions of the applicable mini-grid regulations.

Table 2: Overview of common mini-grid implementation approaches and their main features

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn

Friedrich-Ebert-Allee 36+40
53113 Bonn, Germany
T +49 228 44 60-0
F +49 228 44 60-17 66

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany
T +49 61 96 79-0
F +49 61 96 79-11 15

E info@giz.de
I www.giz.de

On behalf of

Federal Ministry
for Economic Cooperation
and Development