



# ACCESS TO OFF-GRID ELECTRICITY OF MCA-BÉNIN II

Lessons learned from the experimentation  
of the off-grid electrification regulatory framework



# TABLE OF CONTENT

<b>I.</b>	Background	3
<b>II.</b>	Obtaining operating permits for mini-grids	5
<b>III.</b>	Construction and implementation phase	6
<b>IV.</b>	Capacity building, a permanent and decisive component of the project	7
<b>V.</b>	Role of the regulatory framework	8
<b>VI.</b>	Results achieved	9
<b>VII.</b>	Capitalization workshop	11
<b>VIII.</b>	Workshop recommendations	12
<b>VIII.1</b>	Roadmap for the Ministry of Energy - Direction de la Planification de l'Electrification Rurale, et de la Règlementation	12
<b>VIII.2</b>	Roadmap for ABERME	12
<b>VIII.3</b>	Roadmap for ARE	13
<b>VIII.4</b>	Recommendations for promoters	14
<b>VIII.5</b>	Recommendations for other players	14



Djabata mini grid in the district of Bessé – Commune by Savè (ASEMI Promoter)



# LIST OF ACRONYMS

<b>ABERME</b>	Agence Béninoise d'Électrification Rurale et de Maîtrise d'Énergie (Beninese Agency for Rural Electrification and Energy Management)
<b>AP</b>	Appel à projet / Call for proposals
<b>ABE</b>	Agence Béninoise de l'Environnement
<b>ARE</b>	Electricity Regulatory Authority
<b>AT</b>	Technical Assistance
<b>WACC</b>	Weighted Average Cost of Capital
<b>CNR</b>	Conseil National de Régulation
<b>CI</b>	Investment Committee
<b>CID</b>	Comité d'Instruction des Dossiers
<b>CVE</b>	Comité Villageois d'Électricité
<b>EHR</b>	Off-grid electrification
<b>FBR</b>	Results-based financing (see RBF below)
<b>GdB</b>	Government of Benin
<b>GSI</b>	Gender and Social Inclusion
<b>kWh</b>	Kilowatt hour
<b>MCA</b>	Bénin II Millennium Challenge Account-Bénin II
<b>MCC</b>	Millennium Challenge Corporation
<b>OCEF</b>	Off-Grid Clean Energy Facility
<b>PAGIS</b>	Gender and Social Inclusion Action Program
<b>PAYG</b>	Pay As You Go
<b>PDEHR</b>	Plan Directeur de l'Électrification Hors Réseau (Off-Grid Electrification Master Plan)
<b>PGESSS</b>	Plan de Gestion environnementale, sociale, de santé et de sécurité (Environmental, social, health and safety management plan)
<b>PSP</b>	Project Selection Panel
<b>PV</b>	Procès-Verbal
<b>RBF</b>	Result Based Financing
<b>RCCM</b>	Registre de Commerce et du Crédit Mobilier (Trade and Personal Property Credit Register)
<b>SAV</b>	Service Après-Vente
<b>SBEE</b>	Société Béninoise d'Énergie Électrique





*Solar kit for a learner - Commune of Covè in the village Lainta Cogbé (LAGAZEL Promoter)*

## Preamble

When only theory is at work, we understand everything, but things don't necessarily work.  
When practice is the only priority, we act intuitively and things work out, but we don't really know why.

What's the point of capitalizing on a project?

To prepare subsequent projects by reporting and bringing together theory and practice.

May this document achieve this objective and contribute to improving the effectiveness of future off-grid projects in Benin or elsewhere.

We hope you enjoy reading it.

# Introduction



*Raising public awareness of solar kits – Municipality of Adjohoun in the Ouémé department (Promoter QOTTO)*

One in five people living in rural communities in Benin have access to electricity<sup>1</sup>. With a national electricity access rate of 41.5% in 2018, Benin's score is lower than the average for sub-Saharan African countries (47.7% in 2018 according to the World Bank). According to national statistics, the access rate is 53.9% in urban areas compared with 6.6% in rural areas.

Electricity remains inaccessible to a large part of Benin's population, especially in peri urban and rural areas. The low level of investment in electricity distribution infrastructure has resulted in low electrification rates and a decline in the quality of electrical service. In 2017, the Government of Benin (GoB) and the Millennium Challenge Corporation (MCC) signed a US\$375 million agreement (increasing to US\$391 million in 2021) (Benin II Compact). The aim is to "develop the production and productivity, generate greater economic opportunities for households and improve the capacity to deliver public and social services by improving the quantity and quality of electricity supply".

The Compact also aimed to "strengthen Benin's national electricity distribution company, attract private sector investment and finance investments in electricity production and distribution infrastructure, as well as off-grid electrification for poor and unserved households".

To this end, the Compact has supported four projects in the following areas: (1) Policy reform and institutional strengthening, (2) Electricity distribution, (2) Electricity generation, and (4) Off-grid electricity access.

This document focuses on the fourth project, access to off-grid electricity and more specifically on the lessons learned during the implementation of the Off-Grid Clean Energy Facility (OCEF), the aim of which was to increase access to electricity by removing upfront costs and barriers to investment in the off-grid electricity sector.



*Solar generator for run-of-river pumping in Zalimey - Municipality of Zogbodomey (ENERDAS Promoter)*

1. The World Bank. (2020). World Bank Global Electrification Database: Access to Electricity, rural. Accessed 22 May, 2023. <https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=B>

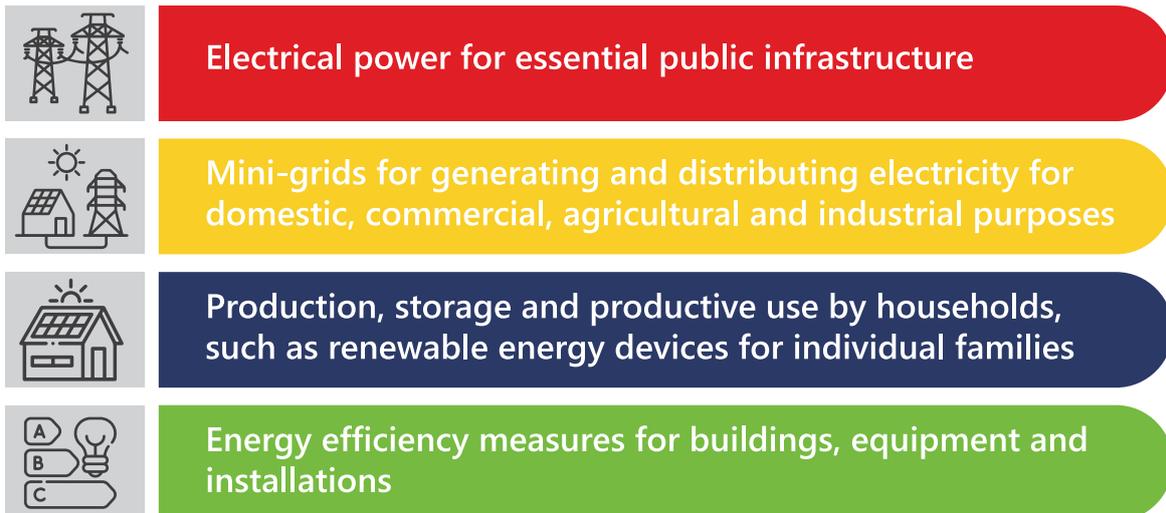
# 1. Context

With the support of USD 32 million, the OCEF aimed to bring electricity to remote areas of Benin not connected to the conventional grid. It consisted of a matching grant Challenge Fund to support off-grid electrification and energy efficiency projects. Through calls for project proposals, grants (capital) were awarded to national and international private companies private national and international companies, community organizations, NGOs and others proposing viable off-grid electrification and energy efficiency solutions in Benin.

Candidates applied to the OCEF over the course of two calls for proposals launched via an online application platform, SmartME. In February 2018, OCEF's first call for projects targeted three specific categories of intervention:

1. Installation of micro power plants to supply electrical energy to essential public infrastructure,
2. Solar kits
3. Implementation of energy efficiency measures.

Figure 1: Final OCEF categories





*Mini grid of the Hontonou site - Commune of Apllahoué (Promoter Energicity, Wéziza Benin project)*

In December 2018, the launch of the second call for projects opened category 2 to mini-grids. OCEF's governance was structured around two decision-making bodies, namely (i) the Project Selection Panel, responsible for pre-selecting projects eligible for co-financing by OCEF, and (ii) the Investment Committee, which ultimately selected beneficiary projects.

The Beninese Agency for Rural Electrification and Energy Management/Agence Béninoise d'Électrification Rurale et de Maîtrise d'Énergie (ABERME) and the Electricity Regulatory Authority (ARE) were represented on the Project Selection Panel, and the Investment Committee was set up in accordance with the OCEF Procedures Manual and the Submission Guidelines for Applicants – published at the time of the Calls for Proposals and validated by ARE in accordance with regulations (decree 2018-415).

A total of 17 projects were supported by OCEF, with the signing of a co-financing agreement: 2 in Window 1, 8 in Window 2, 6 in Window 3 and 1 in Window 4. Of these

17 projects, 12 were implemented. The remaining 5 could not be implemented for various reasons: 1 withdrawal, 3 abandoned/terminated for lack of financial closure, and 1 terminated due to the ARE's unfavorable opinion on the signing of a concession agreement with the conceding authority (ABERME).

OCEF subsidized an average of 38% of the costs of the various projects it subsidized, and provided technical assistance for all the applications and implementation of the projects via the OCEF Manager recruited for this purpose by MCA-Bénin II.

A workshop to capitalize on the experience of setting up the off-network regulatory framework was held on 26-27 July 2023 in Cotonou. The overall aim of the workshop was to share the lessons learned over the six years of OCEF's operation and propose recommendations for all stakeholders, and in particular a roadmap for institutions, in order to improve and perpetuate the achievements of the aforementioned regulatory framework for off-grid electrification.

*Validation mission for solar water pumping systems in the localities of BOA, Gbassi and Bouca Municipality of Kalalé (Promoter Solar Electric Light Fund - SELF)*



*Inspection of the Takpatchiomé mini-network - Municipality of Apllahoué (Energicity promoter, Wéziza Benin project)*



## ii. Obtaining operating licenses for mini-grids

Once applications had been finalized and co-financing agreements signed at the OCEF level for mini-grid promoters, the applications were forwarded in September 2020 to the competent authority (ABERME) to obtain an operating license. Regulations require all promoters to obtain such a license prior to installing and operating a mini-grid in Benin. To this end, ABERME appraised the applications, drew up the draft concession agreement and forwarded it to the ARE for approval before signature.

ABERME set up a File Examination Committee/Comité d'Instruction des Dossiers (CID), composed of ABERME representatives and experts from MCA Benin II and NIRAS (the OCEF manager). Given that this was ARE's first such experience and in order to save time, the Authority took the initiative of getting involved as a resource without taking part in CID decision-making. The work of the CID took place until the end of 2020, including several exchanges with the promoters (on various regulatory provisions, additions, taking into account promoters' suggestions, adjustment of tools, etc.). In November 2020, 6 out of 8 applications were completed and forwarded by ABERME to ARE for agreement.

ARE's technical and tariff analysis led to tariff agreements with four developers in June and July 2021, and public consultations were held in the field in September 2021

to present the projects and tariffs to the local population. Based on the results of the public consultations, the Conseil National de Régulation (National Regulatory Council) issued its favourable opinion, and concessions were signed between ABERME, representing the Beninese state, and the promoters in November 2021. Two other promoters were able to sign a concession agreement with ABERME – in January 2022 for one and January 2023 for the other.

In the end, of the 8 promoters under Window 2 who had signed a co-financing agreement with OCEF and submitted a concession application to ABERME, 6 were able to obtain a concession agreement and one promoter's project was reclassified to window 3 (market services). This phase took longer than initially planned for a number of reasons:

- On the promoters' side, there were technical files with gaps and inconsistencies;
- On the institutional side, there were issues with tools and framework documents for the implementation of Decree 2018-415 (concession agreement, tariff model, technical specifications, service regulations), as well as limited service regulations and limited availability of human resources given the large number of files to be processed (127 villages).

*Mini grid of the Gounsoé site in Paouignan - Commune of Dassa-Zoumè (Promoter Energicity, Wéziza Benin project)*



### iii. Works and implementation phase

The regulatory framework divides off-grid electrification operations into two categories, namely (i) economic operators of mini-grids, who must hold an operating licence before operating, and (ii) others grouped under the heading of market services, for which there are no requirements. The project developers under OCEF windows 1 and 3 fall into the latter category and start operations as early as 2020, once their co-financing agreements have been signed.

For mini-grid promoters, article 13.1 of the concession agreement stipulates that a promoter can only start work in a locality once ABERME validates the detailed execution studies for the locality. Furthermore, once the work on the mini-grid has been completed and the performance tests

carried out, a Technical Conformity Inspection carried out by ABERME without any major reservations is a prerequisite for ABERME to issue the authorization to commission the mini-grids.

In practice, numerous exchanges took place between ABERME and the concessionaires on the execution of the studies for the mini-grids, with several versions of the studies being transmitted for each locality up to 2023.

By the end of July 2023, ten mini-grids had been commissioned and eight other mini-grids were completed and awaiting inspection for inspection and commissioning authorization. At the time of writing, 38 sites were under construction and expected to be completed by December 2023 at the latest.

*Mini grid – Municipality of Djabata May 2022 (ASEMI Promoter)*



## iv. Capacity building: a permanent and decisive component of the project

Throughout the project, MCA-Benin II implemented a major capacity-building program, focusing on three areas:

- Training;
- Technical assistance; and
- Provision of equipment to institutions, in particular to enable them to carry out tests on the mini networks

Two specific training phases have taken place: the first in 2018–2019 to build the capacity of institutions to implement the regulatory framework once it was adopted. The second was held in 2023, during the program's

closing phase. These training courses covered electrical and mechanical network sizing, sizing of isolated solar power plants, the economic analysis of mini-grid projects, the regulatory framework, demand forecasting productive uses of energy, and energy efficiency in mini grids, etc.

NIRAS provided promoters ongoing technical assistance, and the Facility supported AER and ABERME through the Innovation Energie Development (IED). ABERME was provided with a complete range of equipment, including all the measurement tools needed for compliance inspections of mini-grids (production and distribution).



## v. Role of the regulatory environment

The regulatory framework, approved by the Government in 2018, was an essential and necessary measure to guarantee private investment in Benin. According to the World Bank's Energy Sector Management Energy Sector Management Assistance Program, Benin ranks among the top 10 countries, out of 52 worldwide, with a regulatory framework conducive to private sector investment.

The regulatory framework describes the processes to be followed by ARE (the regulator) and ABERME (the rural electrification agency) in issuing operating permits and off-grid electrification authorizations for projects under 500 kVA, and off-grid electrification concessions

(operators of projects over 500 kVA, such as mini-grids) for project tendering, establishment, maintenance and completion. The regulatory framework was explicit on mini-grid projects. The OCEF application categories had to be staggered to enable the framework to be put in place, which occurred in September 2018, ahead of the call for applications for Window 2 (the same year).

The OCEF was therefore the first real test of the regulatory framework. Thus the difficulties associated with implementing the framework for the first time led to delays in project implementation and forced promoters to review their approach, sometimes including their business model.



## vi. Results obtained

The main aim of the MCA-Benin II Program, focused on the development of electric power, was to support private investment through support for institutional reforms and investment in the production and distribution of clean electricity, as well as off-grid electrification via the OCEF. The ultimate aim was to boost production and productivity of businesses, generate economic opportunities for the

people of Benin, and improve the Government's ability to provide public and social services by improving the quantity and quality of electricity supply in Benin.

Thanks to the MCA-Benin II OCEF, thousands of households now have access to electricity in areas not covered by the SBEE network:



Over 42,113 solar kits with an installed capacity of 1.52 MWp were sold through a distribution network to final beneficiaries, customers or subscribers of OCEF promoters. Thanks to these portable lighting and solar home systems, many households have been able to reduce their dependence on more expensive energy sources such as diesel generators, kerosene and batteries.



8 solar mini-grids were commissioned with an installed capacity of 334.4 kWp and more than 50 are anticipated (with a planned total output of 2.08 MWp) to improve the quality of life and generate new sources of income for the most vulnerable populations



The construction of mini-grids and the distribution of solar kits have had an impact on 84 small and medium-sized businesses.



77 solar pumps (44 for community use and 33 on private farms) will give people in the departments of Atlantique (Allada), Borgou (Kalalé) and Zou (Djidja, Zogbodomey) to have access to water and develop new income-generating and value-adding economic activities. (market gardening, field irrigation, etc.).

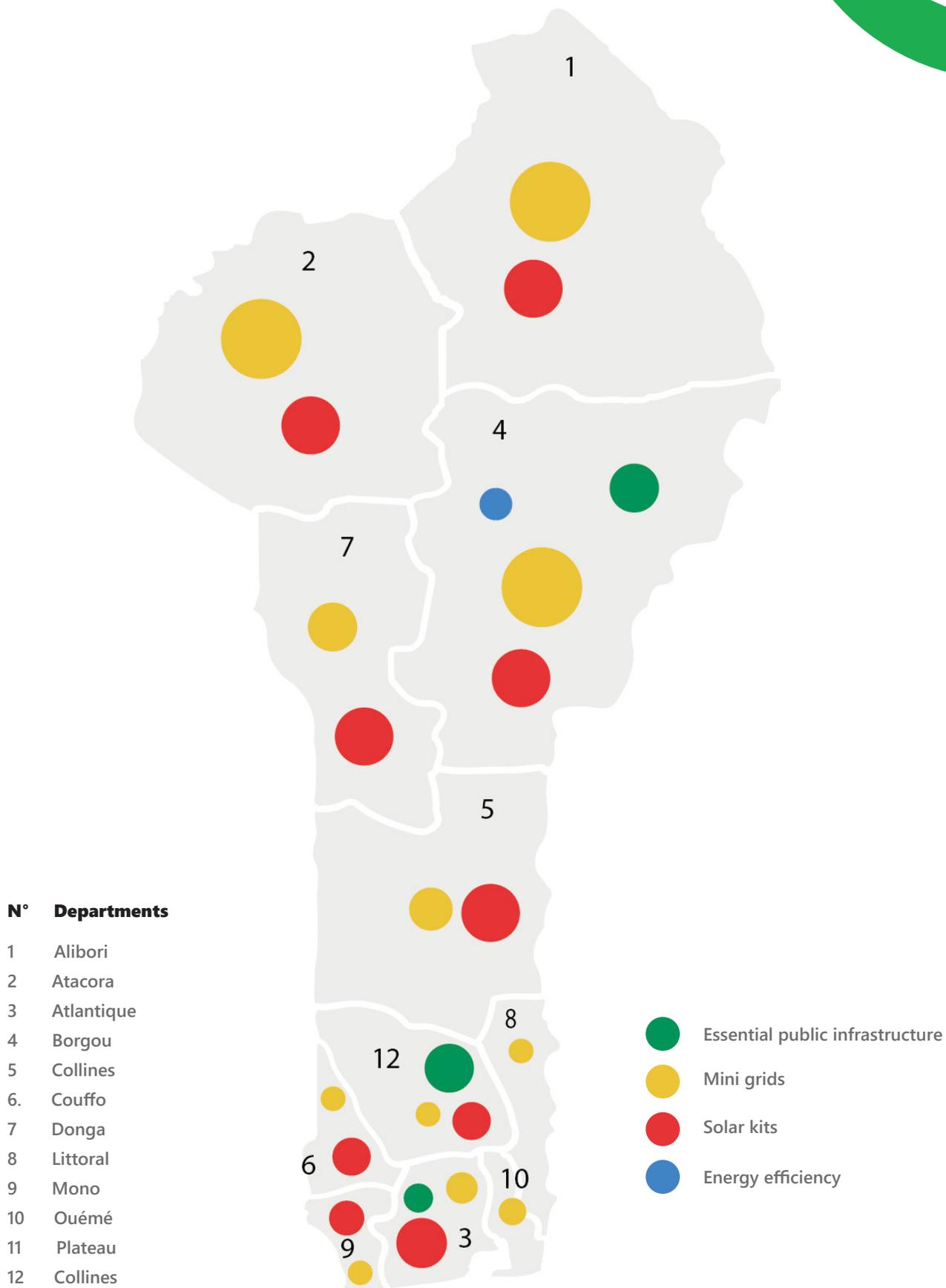


15 solar streetlamps were installed in 5 Kalalé localities for public lighting, including lighting in health centers that had benefited from solar refrigerators.



5 WHO-compliant solar refrigerators have been installed in rural health centres in the Kalalé commune, enabling them to store vaccines.

Figure 2: Benin-Localities impacts



## vii. Lessons learned workshop

The Access to Off-Grid Electricity Project is a first in Benin and has achieved the results presented above. However, the implementation of the project was marked by a number of challenges that all stakeholders had to overcome. As the project drew to a close, it was important to take stock, to examine the lessons learned and the best practices to be retained in the event of replication, but also and above all to reflect on the future in order to ensure the sustainability of the gains made. This was the aim of the workshop held in Cotonou at the end of July 2023 to capitalize on the experience of setting up the regulatory framework for off-grid rural electrification and its implementation in Benin.

More specifically, the workshop aimed to

- Share an assessment of the experience gained: regulatory framework, implementation system, main results achieved, difficulties encountered and approaches to solutions, lessons learned and best practices;
- Enhance the value of work carried out within the OCEF framework: work and products of private operators; and
- Formulate recommendations for the sustainability and development of off-grid electrification in Benin.

The workshop was attended by Government institutions, notably ARE, ABERME, Contrelec, DGPEERR (formerly

DGRE), SBEE and SBPE, and donors represented by GIZ and AFD.

The private sector was represented by numerous stakeholders, the majority of which were promoters who had benefited from the OCEF. These included: Qotto, Lagazel, Enerdas, Tolaro Global, Bahaau, Weziza Bénin, ARESS, Soleils Du Bénin, ENGIE, Ismast Energy, AECOM, Mionwa and ASEMI SA. The firms that supported MCA-Benin II in implementing the Decentralized Energy Project, IED and NIRAS, the Nordic firm managing the OCEF Facility, were also present. Let us recall here the words of the AER President, who summed up the state of mind that was the main factor behind the results achieved: "We must not abandon the group work and concerted effort that has prevailed to date".

A large number of actions are planned to be carried out in conjunction with other players in the sector. The pilot of the action is therefore responsible for involving the sector in a way that is consistent with the roles and missions of each.

The recommendations and roadmaps resulting from the workshop are presented here by institution to simplify their use and follow-up, as the actions are integrated into the table of the institution piloting them.



## VIII. Recommendations from the workshop

### VIII.1 Roadmap for the Ministry of Energy - Direction de la Planification, de l'Electrification Electrification, et de la Règlementation

Planification	Deadline
Ensure the unification of the sector's GIS databases, and the updating of the reference GIS database. Set up a mechanism for checking lists of localities available for EHR before any integration into a project. Ensure that stakeholders have access to the information in the database.	End of 2023
Update planning in a participatory manner and set up steering and and periodic review mechanisms.	December 2023
Tax issues	Deadline
Maintain the 7% exemption for equipment, citing the provisions of the framework for promoting renewable energies and energy efficiency efficiency (Finance Act 2024). See also ECOWAS and UEMOA directives. Meet with customs to define the conditions under which the under which the 7% exemption can be applied to equipment imported in equipment (televisions, lamps, spare parts) intended to be integrated into kits assembled in Benin).	August 2023
Take action to obtain VAT exemption on rural tariffs (following applied to rural populations (following the drafting of the for VAT exemption - ARE recommendation n°2.1).	1 <sup>st</sup> quarter of 2024

### VIII.2 Roadmap for ABERME

Regulatory framework	Deadline
Launch tenders for defined allotments, on the basis of preliminary studies which integrate environmental approvals and secure land tenure, while allowing promoters a certain degree of freedom and allowing them to propose improvements. Update the one-stop shop on the ABERME website with the latest and application tools	1 <sup>st</sup> quarter of 2024
Add said documents also to the various calls for tenders. Organize information sessions on the regulatory framework with potential interested potential operators Work in synergy through specific committees (ABERME, SBEE, etc.) for the evaluation of EHR files.	End of 2023
Continue to build the capacity of our teams to analyze the able to analyze technical and financial bids submitted by promoters. Work in synergy through specific committees (ABERME, SBEE, etc.) for the evaluation of EHR files.	Continuously
Set up a consultation framework for all actors in the EHR sector which meets periodically.	End of 2023
Tax issues	Deadline
Simplified customs clearance procedure for solar equipment at Fiscal Authorities.	From now on
Raising dealers' awareness of VAT collection issues.	August 2023
Make corporate tax exemption operational: hold meetings with APIEX meetings with APIEX and develop and validate with APIEX a simplified procedure for obtaining this exemption.	December 2023
Tariffication and financing	Deadline
Organize a specific round table to design a mechanism to support private sector financing support mechanism. (ARE follow-up).	End of October 2023



Consider a permanent reinvestment subsidy mechanism to enable more allow for more prudent demand assessments and rate stabilization (ARE follow-up).	End of October 2023
<b>Connections and productive uses</b>	<b>Deadline</b>
Define internal wiring diagrams with the approval of Contrelec, and integrate these internal wiring costs into the ARE tariff model (Follow-up ARE, Contrelec).	1 <sup>st</sup> quarter of 2024
Organize a workshop on the development of productive uses (financing, dissemination mechanisms, public-private partnerships, etc.).	End of 2023
<b>Environment</b>	<b>Deadline</b>
Provide incentives for Promoters who meet standards ESSH.	December 2023
Suspend work in the event of non-compliance on a site.	Continuous
Have a team and a mechanism for regular ESHS monitoring of worksites Promoters.	December 2023
Acquire and secure project sites and make them available to the available to Promoters.	For each project
Study the possibility of streamlining the environmental authorization procedure for mini networks (simplified procedure).	December 2023
<b>Gender and social inclusion</b>	<b>Deadline</b>
Standardize the PAGIS approach and ensure its integration into regulations.	From now on
Set up, train and provide technical support to a GIS unit for GSI unit for : <ul style="list-style-type: none"> <li>Monitoring and support for off-grid electrification promoters on the implementation of their GSI actions;</li> <li>Participate in socio-economic studies concerning the GSI.</li> </ul>	August 2023
Make corporate tax exemption operational: hold meetings with APIEX meetings with APIEX and develop and validate with APIEX a simplified procedure for obtaining this exemption.	December 2023
<b>Communication</b>	<b>Deadline</b>
Involve the communications department in field visits.	(1) from now on
Enhance the value of EHR on ABERME's website and social networks.	(2) January 2024
Set aside a specific budget line for communication in the annual ABERME budget	(3) For the 2024 budget

### VIII.3 Roadmap for ARE

<b>Regulatory framework</b>	<b>Deadline</b>
Introduce technical regulations to govern/regulate commercial services (solar kits, sale of consumer equipment).	1 <sup>st</sup> quarter of 2024
Continue to build the capacity of our teams to analyze the able to analyze technical and financial bids submitted by promoters.	Continuous
Working in synergy through specific committees (ABERME, SBEE, etc.) for the evaluation of EHR files.	
<b>Taxation</b>	<b>Deadline</b>
Finalize the estimate of lost VAT revenue in the event of a decision exemption decision for EHR consumers, and finalize the for VAT exemption.	En of August 2023
<b>Tariffication and financing</b>	<b>Deadline</b>
Ensure that a start-up advance is included in co-financing contracts, and ensure flexibility on intermediate disbursement milestones to the achievement of final results.	Continuous
Conduct a nationwide study on tariff harmonization (compensation mechanisms).	En of March 2024
<b>Environment</b>	<b>Deadline</b>
Ensure that ESHS risk mitigation criteria are maintained in the project selection process.	
<b>Gender and Social Inclusion</b>	<b>Deadline</b>
Ensure that articles concerning GSI are included in co-financing co-financing agreements.	Continuous



## VIII. 4 Recommendations for developers

### Taxation

Certify all products imported as part of your business activities for exemption of taxes.

### Connections and productive uses

Integrate and ensure implementation of the marketing strategy right from the project design stage, including budgeting for prospecting activities with dedicated human resources.

Improve the quality of addressing and demand forecasting activities (the project study should be based on real data collected in the field).

Specify the implementation of commercial activities in project documents (leasing, sale by instalments by instalments, separation of commercial entities) to anticipate regulatory issues.

### Environment

Contract companies specializing in hazardous waste management.

Acquire equipment from suppliers with end of life take back schemes.

Only sell equipment at their end-of-life to companies specializing in recycling and destruction.

If used equipment is to be reused by a third party, make sure that the third party will manage it when the equipment reaches the end of its useful life.

## VIII. 5 Recommendations for other actors

### Regulatory framework

Include regulatory framework documents and tools for applying them to the various calls for tenders (concession agreement, pricing model, specifications, service regulations).

### Tariffication, financing

Systematize the principle of start-up advances to private-sector promoters, and ensure flexibility on intermediate disbursement milestones upon achievement of final results (EHR facilities, funding agencies).

Integrate consideration of EHR private sector financing right from the design stage of a support facility for the (EHR facilities, financing organizations) and involve local and international financial institutions interested in the sector.

### Environment

Use coercive measures in the event of non-compliance with EHSR requirements.

### PAGIS

Allocate a budget to PAGIS implementation (funding organisations).

Ensure that a mechanism is in place to motivate the best PAGIS implementation results. PAGIS - RBF bonus for example (funding organisations).

Ensure that GSI-related articles are included in co-financing agreements.

*Receipt of WONKO vaccine refrigerators at the isolated maternity ward of Korodji - Commune of Kalalé (SELF Promoter)*

