

Benin - Off-Grid Energy Access

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Overview

Identification

COUNTRY

Benin

EVALUATION TITLE

Off-Grid Energy Access

EVALUATION TYPE

Independent Evaluation

ID NUMBER

DDI-MCC-BEN2-ENERGY-OFFGRID-SI-2019-V1

Version

VERSION DESCRIPTION

- v01: Edited, anonymous dataset for public distribution.

Overview

ABSTRACT

The evaluation of OGEAP has two main components. The first is a more qualitative performance evaluation of the Enabling Environment Activity and the OCEF grant facility functioning (as a facility or mechanism, rather than looking at results of individual grants). The second component is a more quantitative impact evaluation centered on a collection of grants.

Performance Evaluation Questions:

1. Was the OCEF grant facility designed and implemented in a way that encouraged high-quality proposals and projects?

Design:

a. Were the selection criteria and procedures defined in the manual well-aligned to the objectives of selecting and scaling effective, sustainable models of off-grid energy services, and expanding access to energy to underserved communities?

b. To what extent did the grant facility's evaluation criteria incentivize the proposal and acceptance of grants that best advanced its intended outcomes as defined in the theory of change?

c. Was OCEF and the application process and requirements designed in a way that effectively led to applications and projects that addressed relevant gender and social inclusions issues?

d. To what extent did the evaluation criteria incentivize all applicants to reveal the minimum subsidy required for their investment to move forward?

e. Was the cost-sharing amount sufficient to allocate the risks appropriately to the grantee?

Implementation

f. To what extent was the technical assistance provided to grantees relevant to the gaps identified in the grantee proposals and to the grantee's objectives?

g. Did grantees perceive the technical assistance and more general communications and support they received from OCEF as hindering or enabling their ability to meet the grant's objectives?

h. To what extent were OCEF grants implemented in accordance to the grantees' implementation plans?

i. To what extent did OCEF support projects that are financial sustainable and scalable?

2. To what extent has the regulatory framework for off-grid energy been implemented?

- a. Are relevant Government entities, specifically ARE and ABERME, fulfilling the functions required for implementation of the framework?
- b. How do organizations interested in the off-grid electricity market in Benin perceive the framework?
- c. How do relevant Government entities, specifically ARE and ABERME, perceive the framework and the progress in its implementation?
- d. What are private sector actors' experiences in attempting to enter or grow in the off-grid clean energy market?
- e. Did the presence of an off-grid regulatory framework make private sector actors more or less likely to enter the off-grid clean energy market in Benin?

3. To what extent did OGEAP encourage additional investment in the sector in Benin?

- a. To what extent did the grant facility generate information externalities that encouraged subsequent investment in the off-grid clean energy sector?
- b. Did the grant facility catalyze additional commercial financing of the off-grid energy sector in Benin?
- c. To what extent did the grant facility resolve discovery and/or coordination market failures limiting investment in Benin's off-grid clean energy sector?
- d. Did the grant facility demonstrate scalable business models that would be sustainable in the absence of subsidies?
- e. To what extent did the facility encourage coordinated, complementary investments that increased the viability/sustainability of facility investments?

Impact Evaluation Questions: Grant Outcomes

1. What were the impacts of the investments on beneficiaries? Specifically, did the grants:

- a. Increase access to and consumption of energy? Was connection status and consumption sustained over time?
- b. Affect expenditures on energy?
- c. Increase appliance ownership?
- d. Increase the hours of operation and coverage of businesses and public services?
- e. Increase revenue generation, net income, consumption of perishables, and/or productivity?

2. What was the distribution of those impacts? Were the above impacts distributed differently across key population sub-groups, namely gender, age, or income groups?

3. How did impacts vary according to the exposure period?

4. What factors - contextual, household-specific, targeting or business models, other - drive or constrain adoption of new connections, appliances, and energy services related to off-grid energy?

5. Via what mechanisms did revenue generation or productivity increase? (i.e., for what types of activities/businesses did energy stimulate investment and growth?)

6. Can the OCEF-supported investments be considered cost-beneficial or cost-effective, relative to alternatives?

Exposure to treatment

The impact evaluation samples households or businesses randomly from the lists of only those customers signing up for new connections from the grantees, and collect baseline and follow-up data from these individuals. Such lists will need to be obtained promptly from grantees once new customers are identified, and surveys will need to be deployed rapidly to collect

baseline data, prior to connections being installed (baseline surveying will need to occur on a rolling basis).

Control zones will be oversampled at baseline, to allow ex post matching from a representative sample of households or businesses in control communes to those actually signing up to receive connections in treatment zones. This approach requires a larger sample of controls at baseline but would allow a full panel analysis of households and businesses for the matched sample of observations. Importantly, treatment is defined at the household or business level in this approach for Windows 2 and 3, and probably at the community level (given that the investments there are for public services) for Window 1. (The appropriate level of assignment for Window 4 is currently unclear.)

EVALUATION METHODOLOGY

Difference-in-Difference

TOPICS

Topic	Vocabulary	URI
Energy	MCC Sector	

KEYWORDS

Off-grid, electricity, energy, benin

Coverage

GEOGRAPHIC COVERAGE

National coverage

UNIVERSE

Study populations are:

Impact Evaluation:

- Households, businesses, and communities sampled for the evaluation of OCEF grants: these are households, businesses, and communities (including those in rural and off-grid areas) which are targeted as customers by OCEF grant recipients. The control population are equivalent entities in control (non-treated) communities which will be matched ex-post

- OCEF grant beneficiaries

Performance Evaluation:

- OCEF grant beneficiaries

- Other private sector off-grid energy firms (including those who at least initiated an application for OCEF funding in Calls 1 and/or 2, and those who completed an application but were not shortlisted)

- Other key stakeholders involved in or knowledgeable about OCEF, including representatives from: MCC, MCA, NIRAS, IED, the Government of Benin (eg, ARE, ABERME), and other stakeholding entities (e.g, EU, World Bank, GiZ)

Producers and Sponsors

PRIMARY INVESTIGATOR(S)

Name	Affiliation
Social Impact	

FUNDING

Name	Abbreviation	Role
Millennium Challenge Corporation	MCC	

Metadata Production

METADATA PRODUCED BY

Name	Abbreviation	Affiliation	Role
Millennium Challenge Corporation	MCC		Review of Metadata

DDI DOCUMENT ID

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MCC Compact and Program**COMPACT OR THRESHOLD**

Benin Compact II

PROGRAM

Off-Grid Energy Access Program The Benin II Compact between the MCC and the Government of Benin (GoB) was signed on September 9, 2015 and entered into force (EIF) on June 22, 2017. The Compact targets poor electricity infrastructure, noting that insufficient quantity and quality of electricity results in reduced productivity, output, and investment for businesses, less effective delivery of public and social services and diminished well-being and economic opportunity for households. The causes underlying these problems are lack of resources, and public policies and institutions that have been unable to deliver sufficient power to meet growing national demand. The Compact will approach these fundamental problems through policy reforms and institutional strengthening, large-scale investments in energy generation and distribution infrastructure and off-grid electrification to expand access in a country where only one-third of the population has access to electricity. The Compact includes four Projects, each with a related project objective: (i) the Policy Reform and Institutional Strengthening Project, (ii) the Electricity Generation Project, (iii) the Electricity Distribution Project, and the (iv) Off-Grid Electricity Access Project. The focus of this evaluation is the fourth, namely: The Off-Grid Electricity Access Project (\$46 million). The OGEAP has the objective of increasing access to electricity and thereby (i) increasing the hours of operation for businesses and public and social services, (ii) reducing reliance on costlier sources of energy, (iii) reducing losses of products and perishable goods, and (iv) improving productivity for users of electricity. The OGEAP is comprised of the Enabling Environment for Off-Grid Electricity and Off-Grid Clean Energy Facility activities: Under the ENABLING ENVIRONMENT FOR OFF-GRID ELECTRICITY ACTIVITY(\$5.7 million), MCC is supporting: - Design and implementation of a national off-grid electrification framework in form and substance satisfactory to MCC ("National Framework"). The National Framework will articulate a model for off-grid electrification to include regulatory and institutional framework, licensing, tariff evaluations, regulations and technical standards. The model will be designed to ensure minimum technical specifications, quality of service standards, licensing, pricing and contracting arrangements, and consideration of gender and social inclusion needs and concerns; and - Development of market information, market characterization, outreach to the private sector and sector donors, and community-led engagement on the OCEF. The National Framework consists of the an Off-Grid Electrification Policy, the Off-Grid Electrification Master Plan, and the Off-Grid Regulatory Framework, which was approved by the Government of Benin and signed by President Patrice Talon in September 2018. The OFF-GRID CLEAN ENERGY FACILITY (OCEF) ACTIVITY (\$40.3 million) aims to increase access to electricity for the currently unconnected majority of the population in rural and peri-urban areas, by reducing or removing initial cost and investment barriers for off-grid electricity service providers. MCC funding will support the establishment of OCEF and grants issued there under in four primary windows: 1. Essential public infrastructure; 2. Mini-grids providing electricity generation and distribution for various uses; 3. Household generation, storage, and productive uses; and 4. Energy efficiency measures (via independent interventions, or together with Windows 1-3) The facility manager for OCEF selects the most promising partners (those selected for awards are hereafter referred to as "grantees") across the four windows based on a strict set of criteria, including cost-sharing requirements. This granting process effectively serves as a pilot project of the off-grid regulatory framework. Proposals will be selected through two rounds of calls for proposals and are expected to grant awards ranging between \$100,000 and \$5,000,000 per proposal. The OCEF is expected to award no more than 20 grants between the two calls for proposals. The first round closed in early 2018, and then in August 2018 short listed 10 proposals for further elaboration (two of which were selected as "reserve" projects that might go forward with some improvement). The second call has been issued and proposals must be submitted by early March 2019. In the second call, proposals that include multiple windows may be submitted, and were in fact encouraged. Following evaluation, pre-selected organizations, which are eligible to become grantees contingent on meeting certain requirements, begin a technical assistance program during which they are provided with expertise related to environmental and social performance, gender and social inclusion, monitoring and evaluation, and economic analysis. As a part of this process, they also submit more detailed design proposals and discuss implementation prior to signing their funding agreements (expected in February/March 2019 for the first round). Grant activities, which can be implemented throughout Benin, are expected to start immediately after the final grant agreements are signed and to then provide support over a 24-month period. "Beneficiaries" are the end users (individuals, households, small firms, or communities) who adopt and use connections or technology promoted by the grantees. During the first call for proposals, which was open to proposals under Windows 1, 3 and 4 (Window 2 requires satisfaction of policy compliance requirements that had not been satisfied at the time of the first call), requirements were placed on the minimum distance from the electricity grid, to avoid conflicts with grid extension; these requirements were however relaxed in the second call for

proposals, which is open to proposals under any of the four windows. That second call was announced in December 2018 and pre-selection under call 2 is expected in June 2019 (with implementation agreements in place around December 2019).

MCC SECTOR

Energy (Energy)

Sampling

Study Population

Study populations are: Impact Evaluation: - Households, businesses, and communities sampled for the evaluation of OCEF grants: these are households, businesses, and communities (including those in rural and off-grid areas) which are targeted as customers by OCEF grant recipients. The control population are equivalent entities in control (non-treated) communities which will be matched ex-post - OCEF grant beneficiaries Performance Evaluation: - OCEF grant beneficiaries - Other private sector off-grid energy firms (including those who at least initiated an application for OCEF funding in Calls 1 and/or 2, and those who completed an application but were not shortlisted) - Other key stakeholders involved in or knowledgeable about OCEF, including representatives from: MCC, MCA, NIRAS, IED, the Government of Benin (eg, ARE, ABERME), and other stakeholding entities (e.g, EU, World Bank, GiZ)

Sampling Procedure

HOUSEHOLD SURVEY:

The subcontractor will conduct a Household Listing in selected clusters in half of the total number of communities. Because the communities and their populations are not known at this point, it is not known how many households will be listed.

However, from this list, 3168 households will be sampled, representing 75% of the total number of baseline households to be surveyed. In the other half of communities, a full list of targeted respondents will be drawn from grantees' customer sign-up lists from which to sample the remaining 1056 households, for a total baseline sample of 4224: 3168 control households and 1056 treatment households to which to administer the Household Survey.

At endline, 1056 of the 3168 baseline control households will be matched ex-post to the 1056 treatment households, for a total endline sample size of 2112.

VILLAGE ENTERPRISE SURVEY:

In each community in which the household survey is being conducted, a Village Enterprise Listing will also be conducted using the same methodology. 10 enterprises will be sampled per community to be surveyed using the Village Enterprise Survey: this is a minimum of 600 enterprises (in 60 communities) and a maximum of 1200 enterprises (in 120 communities).

COMMUNITY SURVEY:

In each community in which the household survey is being conducted, a Community Survey will be administered to one knowledgeable person in the community (e.g. village leader, teacher, etc).

APPLICANT SURVEY:

60 off-grid energy sector firms operating in West Africa will be selected for the Applicant Survey, representing: firms that were shortlisted for OCEF funding and received technical assistance under the program, firms that submitted an OCEF application but were not shortlisted, and firms that registered interest in OCEF but did not submit an application.

QUALITATIVE DATA COLLECTION

At least two firms from each of the categories listed for the Applicant Survey will also be selected to participate in Focus Group Discussions for the performance evaluation. In addition, specific individuals will be selected for Key Informant Interviews to support the same. Lastly, Focus Group Discussions with community members in support of the quantitative data used for the impact evaluation is also planned, although details are not available right now.

Questionnaires

Overview

Questionnaires were developed in English, and will be translated into French. After an initial review the questionnaires will be translated back into English by an independent translator with no prior knowledge of the survey. The back translation from the French version will be independently reviewed and compared to the English original, and differences in translation will be reviewed and resolved in collaboration with the original translators.

The French questionnaires will be piloted as part of the survey pretest. In addition, a strategy for translating questionnaires into local languages will be reviewed with data collection teams during training.

1. APPLICANT SURVEY:

This survey includes modules on: respondent characteristics, organization/firm characteristics, experience with the OCEF Application and grantee selection process, perceptions of the off-grid sector in Benin and applications, off-grid energy and/or energy efficiency projects and experience, (possibly) a discrete choice experiment, challenges facing the organization, general organization performance, off-grid activity inputs and costs, and energy efficiency and off-grid profits.

The Applicant Survey is to be administered to the following types of respondents:

- a) if the firm did not submit a complete OCEF application, someone familiar with off-grid interventions or ventures of the firm, and preferably who started and/or could have completed this type of application had the firm decided to apply
- b) If firm did submit a complete OCEF application but was not selected or has a pending application, someone who is familiar with the application and who is otherwise familiar with off-grid interventions or ventures of the firm
- c) If firm did submit a complete OCEF application and was selected, someone who is familiar with the application process and who is otherwise familiar with off-grid interventions or ventures of the firm

2. HOUSEHOLD SURVEY

This survey is to be administered to sampled households in treatment and control areas, and includes modules on: household characteristics, perceptions of energy situation and electrification status, household electricity status (and supply and demand), energy usage, daily habits (time usage and preferences), willingness to pay for a connection, health information, socioeconomic variables, use and perceptions of public services and businesses, and questions on women's empowerment for female heads of household or female spouses of the household head.

3. (VILLAGE) ENTERPRISE SURVEY

This survey is to be administered to sampled enterprises in treatment and control areas, and includes modules on: respondent characteristics, basic business information, perceptions of energy situation, electricity status and supply and demand, other energy sources and uses, assets, general business performance, business inputs and costs, business outputs/revenues/profits, and time preference and risk. Control group respondents will also be asked questions about their willingness to pay for off-grid electricity solution

4. COMMUNITY SURVEY

This survey is to be administered to a knowledgeable person in the village (e.g. village leader), and includes modules on: basic village information, village energy situation, and public services.

Data Collection

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Data Processing

No content available

Data Appraisal

No content available