



FINAL DATA COLLECTION REPORT

Qualitative Data Collection Analysis and Reporting for Power Africa

QUALITATIVE DATA COLLECTION ANALYSIS AND REPORTING FOR POWER AFRICA

Final Data Collection Report

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ACRONYMS

| BTG | Beyond the grid |
|----------|--|
| DISCO | Distribution company |
| GENCO | Generation companies |
| GHS | Ghana cedi (currency) |
| KSh | Kenyan shilling (currency) |
| LEAP III | Learning, Evaluation, and Analysis Project III |
| MEL | Monitoring, evaluation, and learning |
| MSC | Most Significant Change |
| MW | Megawatt |
| ΡΑΑΤ | Power Africa-affiliated transaction |
| SHS | Solar home system |
| USAID | United States Agency for International Development |
| | |

EXECUTIVE SUMMARY

Power Africa, a United States Government initiative focused in Sub-Saharan Africa, was launched in 2013 with the goal of establishing 30,000 megawatts in new electricity generation and 60 million new connections by 2030. It combines 12 U.S. Government agencies and more than 120 private sector partners to bring power and transmission projects to fruition. The initiative uses a transaction-centered approach, accompanied by encouraging national-level policy reform, to facilitate effective and efficient energy project transactions. To achieve this, Power Africa provides a wide range of assistance, including deployment of technical advisors, based in the region, to provide business advisory services to the private sector, help host countries reform their plans and regulatory frameworks, negotiate the terms of power purchase agreements, and build local capacity in key institutions.

This report provides an overview and analysis of a data collection exercise undertaken to better understand the perspectives of three key categories of Power Africa stakeholders on the value of its assistance: (1) host-country institutions, (2) private sector partners, and (3) electricity customers. This effort is not an evaluation, and focuses on the perspectives of the external stakeholders. Our team has not

"Light gives me a sense of pride, because I now live just as those who live in the city."

—Electricity customer, Ghana

spoken directly with the Power Africa contractor to validate these perceptions or ascertain their own perspectives. Interviews with the host-country institutions and private sector partners were conducted to understand the most significant impact and other feedback on Power Africa's assistance, directly from their perspectives, as they reflected on the value of Power Africa for their organizations. Electricity customers were interviewed to understand how access to electricity has affected their way of life.¹

This data collection effort was led by Integra Government Services International LLC, in partnership with subcontractors Limestone Analytics, Dalberg Research, and WAAS International. It was conducted under the USAID Learning, Evaluation, and Analysis Project (LEAP III). The team conducted interviews between March and May 2019 in Ethiopia, Ghana, Kenya, and Nigeria. Power Africa staff and private companies/utilities helped the LEAP III team identify the respondents.

In total, the LEAP III team conducted and analyzed 246 interviews to identify overarching themes and provide recommendations for future improvements to the initiative. The team developed and fielded three in-depth interview instruments—one for each stakeholder cohort—as well as a short survey for electricity customers. When designing the instruments, the team incorporated the Most Significant Change (MSC) methodology, a participatory evaluation approach that allows decision-makers to better understand how program interventions affect change, as defined by the project participants. The team analyzed and summarized the MSC stories in this report, with the top 10 stories from all interviews included at the end of the report. In addition to these stories, and based on the team's assessment of data from the stakeholder interviews, the report identifies the most significant impacts from Power Africa assistance and recommendations for the future.

¹ In the Power Africa model, electricity customers are not aware of the direct link between their experience and Power Africa assistance and, therefore, were not asked about their experience with Power Africa.

KEY LEARNINGS

Power Africa identified three key objectives to be assessed as part of this data collection effort. Power Africa's achievements towards these objectives, as perceived by each stakeholder group, are presented in detail within the report, and summarized as follows:

1. Influencing the host-country institutions and local enabling environment: Host-country institutions partnered with Power Africa to improve the investment climate and enabling environment governing energy generation, transmission, distribution, and the off-grid sector, and to facilitate transactions that would increase access to electricity in these countries. Host-country institutions were extremely positive in their review of working with Power Africa and its embedded advisors, especially about how much they had learned from the advisors and how they had applied that knowledge to help improve their institutions and the management of the energy sector, more broadly. These stakeholders suggested that Power Africa consider engaging more often at a higher level of the host-country governments to ensure buy-in and support for necessary reforms, and consider how long-term capacity could be built once the Power Africa advisors depart.

2. Advancing energy transactions: Private sector partners found Power Africa's assistance to be helpful, albeit limited. Partners especially appreciated Power Africa's efforts to facilitate introductions to relevant stakeholders and provide advisory services. Accessing Power Africa's network was widely seen to be useful, as was the prestige associated with being a Power Africa "partner." However, although many partners found the assistance useful, they also felt it did not lead to the removal of any major barriers as they engaged in African energy markets. These interviews suggest there is space for Power Africa to play a more active role in facilitating and financing power projects in Sub-Saharan Africa.

3. Changing development outcomes at a community level: Finally, Power Africa's assistance encouraged increased access to both on-grid and beyond-the-grid electricity sources, which directly benefited the electricity customers we interviewed in Ethiopia, Ghana, Kenya, and Nigeria. The customers mentioned a wide variety of life improvements, such as increased business activity, saved time and expenses, increased educational attainment, and increased health and safety. Customers generally reported shifting from finite to renewable energy sources, including large decreases in the frequency of usage of kerosene lamps, batteries, candles, and petrol generators.

RECOMMENDATIONS

The following recommendations were suggested directly by stakeholders or were inferred based on common issues the stakeholders raised.

| STAKEHOLDERS | RECOMMENDATIONS |
|------------------------------|--|
| Host-Country Institutions | Any effort to coordinate Power Africa assistance with high-level local officials and ensure their buy- in and support for future reforms to the enabling environment and the management of the power sector will go a long way toward ensuring the success of Power Africa's assistance. |
| | • As Power Africa advisors transition away from the institutions where they are embedded, explore ways to ensure their capacity is fully transferred to the host country. |
| Private Sector Partners | Many stakeholders considered a deeper focus on the enabling environment and investment climate to be where Power Africa would give the greatest benefit to the private sector. |
| | Play a more active role in developing partnerships, beyond just facilitating the initial connection between different stakeholders. |

Table I: Recommendations

| STAKEHOLDERS | RECOMMENDATIONS |
|--------------------------|--|
| | Create additional financing products and packages to help catalyze these investments, especially in the development phase. |
| | Improve consistency in the quality of support provided by Power Africa advisors and ensure continuity when these advisors transition away from their positions. |
| Electricity Customers | Work with national and private sector partners to design communication strategies that better explain to customers the costs associated with new modalities of electricity access. |

I. INTRODUCTION AND PURPOSE

I.I ABOUT POWER AFRICA

Power Africa is an ambitious and sweeping initiative, aimed at spurring 30,000 megawatts (MW) in new generation capacity and 60 million new electricity connections by 2030. To date, it has focused on facilitating more effective and efficient energy project transactions, while driving policy reform for improved investment and operational environments in the power sector. Some examples of Power Africa's assistance to advance these goals include the following:

- Interagency teams focused on transactions that serve as catalysts to bring power and transmission projects to fruition by leveraging financing, insurance, technical assistance, and grant tools from across 12 U.S. Government agencies and more than 120 private sector partners.
- A team of field-based regional and country-focused transaction and technical advisors professionals with experience in the energy and investment sectors—who work across Sub-Saharan Africa to help the private sector advance investments and to help governments prioritize, coordinate, and expedite the implementation of projects and critical enabling environment reforms. Some of these advisors are embedded in African government institutions, working directly with host-government counterparts, in coordination with Power Africa.

1.2 POWER AFRICA DATA COLLECTION BACKGROUND

USAID Power Africa's Monitoring, Evaluation, and Learning (MEL) Unit has piloted a series of qualitative data collection initiatives designed to understand how the assistance provided has contributed to three objectives:

- I. Influencing the host-country institutions and local enabling environment;
- 2. Advancing energy transactions; and
- 3. Changing development outcomes at a community level.

Power Africa commissioned the USAID Learning, Evaluation, and Analysis Project (LEAP III), through the Statement of Work in Annex I, to collect evidence of progress toward these objectives, mainly using qualitative data and a variation of the Most Significant Change (MSC) methodology, explained in Section 2. Although this evidence is part of Power Africa's ongoing monitoring efforts, this report is not intended as an evaluation of Power Africa. This report has three purposes: to help Power Africa identify gaps in its effectiveness; to strengthen future reporting, strategic decision making, and/or communication; and to serve as a baseline for future analytical assessments.²

The data and analysis presented in this report are predominantly qualitative, emphasizing in-depth, contextualized investigation of the experiences of a relatively small number of stakeholders. This approach provides three advantages:

- 1. Improved ability to uncover and articulate the causal links between Power Africa's inputs, outputs, outcomes, and impact;
- 2. Allowing the most relevant stakeholders to directly address what is and is not working well and suggest improvements; and
- 3. Allowing Power Africa to tell a story with characters, context, motivations, stakes, and impacts that are significant in an individual's life or an organization's operations.

² Separately, the LEAP III team provided support for drafting project descriptions for the congressionally mandated *Electrify Africa Act Progress Report*, which is not discussed in this report.

2. DATA COLLECTION METHODS AND LIMITATIONS

To assess how Power Africa's assistance has contributed to each of its three objectives, the LEAP III team designed in-depth interviews, based on the documents reviewed in Annex II, with three groups of cohorts—private sector partners, host-country institutions that interacted with Power Africa, and electricity customers who have access to a new source of electricity due to a transaction affiliated with Power Africa. Interviews with the latter two cohorts were conducted in four of Power Africa's focus countries: Ethiopia, Ghana, Kenya, and Nigeria.

All three cohorts of the data collection effort were interviewed in person or over the phone, using a questionnaire with a mix of closed- and open-ended questions. Additionally, each cohort was asked open-ended questions using the MSC methodology. This participatory and qualitative data collection method, developed by Rick Davies in 1996, is useful for illustrating impacts and outcomes. Like other forms of qualitative data collection, it allows decision makers to gain a better understanding of how program interventions have affected change, as defined by participants in the process. MSC complements traditional monitoring and evaluation techniques that use predefined indicators by exploring additional, and perhaps unanticipated, evidence of impact. By collecting and interpreting customer stories, this method captures unexpected outcomes and success stories and underlines the significance of these outcomes.³

Central to the MSC methodology is identifying key "domains"—categories of significant change stories—that are of interest to a program. Typically, domains are intentionally quite open topics, left for interpretation by the interviewee. For this data collection effort, the domains were identified ahead of time, in consultation with USAID, and are listed in Table 2, along with other topics discussed with each stakeholder.

| INTERVIEW COHORTS | INTERVIEW TOPICS |
|------------------------------|---|
| Host-Country Institutions | Key domains for the MSC method: |
| | Most significant <i>barrier</i> that this assistance from Power Africa initiative has helped the institution overcome |
| | • Most significant change in the institution as a result of the assistance provided by Power Africa |
| | Other topics of discussion: |
| | Whether Power Africa assistance helped the organization to achieve its goals |
| | Power Africa's impact on the energy sector |
| | Any negative impacts or challenges in working with Power Africa |
| | How assistance could be improved |

Table 2: MSC Domains of Change and Other Interview Topics

³ Dart, J.J. & Davies, R.J. (2003). A dialogical story-based evaluation tool: the most significant change technique, *American Journal of Evaluation*, 24, 137–155.

| INTERVIEW COHORTS | INTERVIEW TOPICS |
|----------------------------|---|
| Private Sector Partners | Key domains for the MSC method: |
| | Most significant barrier or issue the company has overcome as a result of its collaboration with Power Africa |
| | Other topics of discussion: |
| | Major barriers/obstacles faced in African power sectors, and Power Africa's role in addressing them |
| | Opportunities for Power Africa to engage in the future |
| | The value behind public-private partnerships |
| | Awareness and use of Power Africa Toolbox |
| | Value of U.S. goods/services in projects that reached financial closure, or reasons why U.S. goods/services were not used |
| Electricity | Key domains for the MSC method: |
| Customers | Most significant change in <i>people's lives</i> as a result of access to an electricity source that was affiliated with Power Africa |
| | • Change in <i>people's communities</i> as a result of access to an electricity source that was affiliated with Power Africa |
| | Other topics of discussion: |
| | Energy sources and use before and after access to the new electricity source |
| | Reasons for the new access to electricity, from the customer's perspective |
| | Changes in income as a result of the new electricity source |

All interviewees were asked about the most significant story for each domain or category of change, and why they identified this change as significant. Enumerators were trained to probe when the cause of the significant change was unclear, in order for the LEAP III team to identify whether the change could be tied back to Power Africa's assistance, or whether other factors were involved.

The MSC methodology was amended slightly for this activity, in coordination with USAID, at the inception of this data collection effort. MSC is often used for project learning, as project teams read the MSC stories together and discuss why they are significant, and share their reasons for the significance. Because this data collection effort was commissioned by USAID Power Africa's MEL Unit, the story selection process was completed by the USAID MEL and LEAP III teams, and the Power Africa implementers were not involved in the story selection as a learning process.

All topics and questionnaires were discussed with and approved by USAID. Annex III presents the final instruments, along with the final training tool for the electricity customer interviews. Additionally, discussions were held to introduce the enumerators to the purpose and approach for each question in the host country and the private sector instruments.

2.1 DATA COLLECTION AND SAMPLING

The LEAP III team directly interviewed the host-country institutions and private sector counterparts and partnered with local companies Dalberg Research and WAAS International to help conduct the electricity customer interviews. Due to USAID/Nigeria travel restrictions, Dalberg Research also conducted the host-country interviews in Nigeria. Dalberg Research and WAAS International cofacilitated the in-country training of enumerators, translated the survey instrument to local languages, coordinated fieldwork and logistics, and administered the survey. The survey was conducted using an electronic version of the instrument⁴ (administered using tablets) and a recording for later transcription of the qualitative sections of the interview.

Individuals were identified and interviewed as follows, with differences by cohort:

- Host-country institutions: LEAP III sought to interview four to ten individuals in each country (Ethiopia, Ghana, Kenya, and Nigeria). Each of the four USAID missions was asked to identify up to ten stakeholders who had engaged most significantly with Power Africa and introduce them to the LEAP III team. We interviewed 21 energy sector representatives across all four countries; all but two were in person and one counterpart submitted written answers. These interviews were often conducted as one-on-one discussions, although in many cases, the host-country representatives brought several members of their teams to participate. These discussions occurred between March 19 and May 13, 2019, with interviews lasting 45–60 minutes.
- **Private sector partners:** Despite having sought interviews with 50 private sector partners, the LEAP III team ultimately interviewed only 25 of these respondents. The main reasons were: (1) lack of response from the company; (2) significant delays in receiving an introduction to the companies, which provided limited time for multiple follow-up requests; and (3) the company representative with whom Power Africa had a relationship had moved on from the partner organization. These interviews were conducted nearly exclusively over the phone (one respondent sent their thoughts via email), were attended by up to two LEAP III personnel (one subject-matter expert leading the interview and one notetaker), were often recorded. Interviews were conducted between March 29 and May 10, 2019. Interviews typically lasted 30–45 minutes.
- Electricity customers: In each of the four countries, LEAP III sought to interview 50 electricity customers who were using a new source of electricity because of a transaction affiliated with Power Africa. For beyond-the-grid (BTG) transactions, we reached out to advisors at Power Africa and the USAID missions to work with BTG companies that could identify customers to interview. In some cases, representatives of these companies accompanied the LEAP III team to the villages for interviews. In other cases, lists of customers were provided to the LEAP III team and interviews were conducted independently. On-grid customers were often also identified by the utility companies. In some cases, geographic locations were identified and the LEAP III team interviewed on-grid individuals chosen at random in these locations. Interviews took 30–45 minutes and were conducted between March 20 and April 26, 2019. These interviews were performed in person and recorded when permission was granted.

The LEAP III team obtained consent prior to all interviews. Table 3 summarizes the samples for each interview cohort.

| INTERVIEW COHORTS | SAMPLE CHARACTERISTICS |
|------------------------------|--|
| Host-Country Institutions | 21 representatives from utilities, government ministries, regulators, generating companies (GENCOs), etc., across four countries (Ethiopia, Ghana, Nigeria, Kenya). |
| Private Sector Partners | 25 representatives from private sector companies partnering or coordinating with Power Africa in the last four years. |
| Electricity Customers | 200 individuals representing households, businesses, or facilities who have received access to electricity as a result of Power Africa's direct and indirect support on increasing connections. This included 55 individuals in Ethiopia, 50 in Ghana, 45 in Kenya, and 50 in Nigeria. |

Table 3: In-Depth Interviews

⁴ KoBoToolbox, a suite of tools for programming, delivering, collecting, and analyzing surveys, is built on the open-source ODK framework. KoBoToolbox data is securely encrypted, and the database was only accessible by Integra and Dalberg Research.

2.2 DATA ANALYSIS

Closed-ended questions posed to all three cohorts were analyzed using descriptive statistics. The quantitative data summary statistics are presented in the findings throughout this report. The qualitative data were analyzed to identify major themes and trends, as well as key stories that illustrate how Power Africa assistance may have contributed to the changes at the individual or organizational level. To achieve this, qualitative data were analyzed using a two-pronged approach:

- 1. Deductive, to test the expected responses, using pre-set codes, in collaboration with USAID for analyzing the qualitative data from these open questions; and
- 2. Inductive, to uncover other theories that could explain the findings from the data.

One member of the LEAP III team reviewed the interview transcripts/notes to code each interview. Then, to ensure quality control, two senior members of the data collection team reviewed the coding, and a final, consistent code was identified for the analysis.

Additionally, 25 transcripts from electricity customers—containing particularly illustrative examples of significant changes—were selected for USAID's review. From this subset, USAID selected the top ten stories that demonstrate the greatest significance for inclusion in this report (Annex IV).

2.3 LIMITATIONS

The data collected in this report may reflect the following limitations:

SELECTION BIAS

- In most cases, the BTG companies or local utilities chose the sample of electricity customers interviewed. In at least two instances, companies mentioned that they were picking their happier customers; we suspect this could be the case for many of the recruited interviewees. Similarly, host-country institutions were identified by USAID advisors, which could also lead to selection effects (e.g., host-country institutions that were heavily engaged with Power Africa and supported the reforms proposed by the initiative). As a result, the findings in this report are likely skewed toward customers who are having a relatively positive experience with the new electricity source and toward host-country institutions that are relatively more engaged with Power Africa. This limitation was discussed early on with USAID, and it was agreed to proceed with the approach, due to time and resource constraints.
- Electricity customers from each country were not chosen to be representative of all customers who might have been affected by Power Africa. Rather, customers were chosen purposefully based on location, safety for the enumerators, and anticipated ability to easily identify and interview relevant people. Additionally, these perspectives—as well as those of the host-country institutions—are limited to only four of the countries where Power Africa is operating.
- Interviews with representatives from private sector partners and host-country institutions were only conducted if representatives responded affirmatively to our invitation for an interview. We sent out roughly 85 invitations to individuals from both cohorts, with multiple follow-ups. It is possible that those interviewed had a more polarized reaction to Power Africa, which they wished to share. Companies or institutions with lesser Power Africa involvement, or whose representatives had more neutral feelings, might have been less likely to respond to our request and, therefore, might be less represented in our sample.

LIMITATIONS RELATED TO DATA COLLECTION

- Interviews with electricity customers were often held near others, including other interviewees, villagers, and power company representatives. This proximity could have biased the responses.
- Interviews with electricity customers were mostly held in local languages, and later transcribed to English. Although we are confident in the quality of the outputs, it is conceivable that some details could have been lost in the translation or transcription process.
- Interviews with private sector partners, and a small number of host-country institutions were conducted over the phone. This lack of face-to-face communication could have affected communication, and it is possible that sensitive details could have been either misinterpreted or inferred incorrectly, if not stated explicitly.

As is common with all qualitative research, using a small and targeted sample for all cohorts means the key themes presented below cannot be generalized to the entire population of affected stakeholders. This likely implies that rare, but significant, details that are relevant to only a small or specific subset of stakeholders will be overlooked. Similarly, the magnitude or scale of the successes and issues identified in the report cannot be properly placed in the context of the entire Power Africa initiative.

Otherwise, enumerator training was conducted carefully to mitigate common biases in data collection. This included discussions on limiting expectations for future benefits and techniques to avoid leading questions and other behavior that could influence the interviewees' responses.

3. INFLUENCING THE HOST-COUNTRY ENABLING ENVIRONMENT

The first objective of this data collection activity was to determine whether Power Africa assistance had influenced host-country institutions and the local power sector enabling environment. Interviews were conducted with 21 host-country institutions across four countries—representing generation companies (GENCOs), transmission companies, distribution companies (DISCOs), regulators, and ministries (Figure 1)—to gather their opinions on Power Africa's achievement toward this objective.

As Figure 2 illustrates, our host-country interviewee sample mostly represented large and mediumsized institutions. Each country had unique challenges and successes in their work with Power Africa. Some common achievements emerged, as well as suggestions, that could provide a basis for Power Africa reforms or operational strategy.



Figure I: Host-Country Institution Sample, by Type

Figure 2: Host-Country Institution Sample, by Size



- Small institutions (<50 Employees)
- Medium institutions (50-250 Employees)
- Large institutions (250+ Employees)

3.1 POWER AFRICA ASSISTANCE IN THE HOST-COUNTRY CONTEXT

IMPRESSIONS FROM ETHIOPIA

From the limited host-country power sector interviews available, it was apparent that Ethiopia's power sector is undergoing a transformation. As the country widens its power network and welcomes more private firms into the sector, Ethiopia's government officials expect to expand electricity access and improve electricity strength throughout the country.

Before Ethiopia's decision to modernize its power sector, government officials described a suboptimal system. Ethiopian Electric Power, the power producer, lacked the in-house expertise to draft the extensive documentation for a new electricity generation contract. As the Ethiopian Electric Authority staff—the regulators—had limited experience, they mostly relied on case studies of others to review power contract proposals. Ethiopian Electric Utility, the power distributor, was losing 25–40 percent of its electricity. Power Africa worked in collaboration with the Government of Ethiopia to update the country's power regulations and technical capacity. Through training, technical development, and exchange programs, Power Africa provided a blueprint, along with the necessary tools, to encourage the Ethiopian power sector to develop.

Major improvements to the Ethiopian power sector, identified by interviewees, include a new system of accounts, a standard template for power purchase agreements, and a complete overhaul of the revenue collection system for customers. Power Africa partnered with Ethiopian power companies to assist with these updates by building local capacity to enable power sector staff to implement these changes. Now, the power production staff draft their own contracts, the regulators review the contracts, and the distributors read the electricity meters and accurately bill their customers.

IMPRESSIONS FROM GHANA

The Ghanaian energy sector is unusual, in that its supply of power exceeds its demand. A lack of planning and coordination among key stakeholders has led to expensive, underutilized capital investments. This seems to be one of the main focuses of the Power Africa transaction advisors in Ghana, as well as the related Integrated Resource and Resilience Planning project—a USAID activity supporting Power Africa's objectives in Ghana by promoting the development of a cohesive, strategic planning document for the power sector.

Stakeholders in the Ghanaian energy sector were overwhelmingly positive about the influence and impact of Power Africa's transaction advisors and of the USAID Integrated Resource and Resilience Planning project—specifically, in their ability to bring a level of coordination throughout the energy supply chain as a result of the joint planning, training, and workshops. One stakeholder recounted that a transaction advisor had started a thread on the social media platform, WhatsApp, with key government energy stakeholders. This newer form of communication encouraged a higher level of coordination, many stakeholders reported being able to access to information. With increased coordination, many stakeholders further up or down the supply chain. Stakeholders universally reported that their ability to plan investments and forecast future energy demands had improved as a result of both programs. Power Africa played a significant role toward creating a combined power sector, with pricing models that better matched its planned investments.

Stakeholders generally did not believe Power Africa had yet had a direct impact on the sector, since the changes are primarily in planning for the future, and most stakeholders mentioned that changes in the energy sector always take time. The biggest risk was perceived to be that improved roles and responsibilities, designed as part of the Power Africa initiative, now must be approved at the highest levels of government. Most stakeholders worried that these changes might not be approved and that the improvements in data and coordination would therefore be short-lived. The recommendation from many stakeholders was that Power Africa should be engaging at high levels from the beginning to ensure political buy-in to this initiative and its recommendations, so its investment is not wasted.

IMPRESSIONS FROM KENYA

Among African countries, Kenya has one of the longest histories of providing power to its citizens, with the Kenya Power and Lighting Company having recently celebrated its 95th anniversary. The sector is expanding its network and beginning to work through alternative financing mechanisms. To preserve its stature as one of the highest-capacity power producers in East Africa, the Government of Kenya and its power-focused institutions are working to update their systems to account for medium-term power needs.

Before Power Africa began working with the institutions in Kenya, the country's power sector was fairly static. Five-year strategic plans existed for GENCOs and DISCOs; however, the "new" plans were based on the previous five-year plans and did not address the country's future power needs. In addition, some institutions were reaching their debt limits, meaning they needed to find innovative methods to bring more power on board.

The Power Africa team worked with Government of Kenya counterparts to advance the power sector's capacity on multiple fronts. From a generation perspective, new rules and regulations were discussed and ultimately introduced around renewable energy sources. By helping to standardize the grid rules, Power Africa assisted the Kenyan government to tap into previously unavailable energy-generation projects. Another major component of Power Africa's work in Kenya focused on advancing the strategic plans of local institutions. The new plans included clear goals, a strategy to engage employees and customers alike to increase plan buy-in, and capacity building to enable the transfer of skills and knowledge to institutional partners. The results of these updated plans are still being determined, but initial findings are very promising. Kenya's power sector staff believe partnering with Power Africa has allowed them to continue as a regional leader in maintaining a robust power network that is prepared to meet the power needs of the upcoming generation.

IMPRESSIONS FROM NIGERIA

One of the largest problems facing Nigeria's energy sector is the lack of creditworthy utilities, due to heavy losses in the sector. Power Africa staff were embedded in five DISCOs—Abuja, Benin, Eko, Ibadan, and Ikeja—to focus on organizational losses within the utilities, as well as commercial losses in the sector and overall financial viability. With Power Africa's support, regulators, the judiciary, and law enforcement have come up with a framework to address energy theft. Penalties have been introduced in confirmed cases of power theft, and the judiciary has the authority to prosecute individuals found stealing power. As a result, stakeholders have already reported decreasing losses in the sector and increased revenues. Stakeholders also report improved planning and procurement because of Power Africa's assistance, due to targeted technical assistance and transparency and bankability of sector investments.

However, it was also suggested that sustained improvements in the sector would be best achieved through concentrated technical assistance throughout the supply chain.

3.2 MOST SIGNIFICANT CHANGES FOR THE HOST-COUNTRY INSTITUTIONS

Host-country institutions were asked what the most significant change their institution had experienced was as a result of Power Africa assistance. This section identifies the main themes.

CAPACITY BUILDING

Capacity building was frequently cited as a key change associated with Power Africa's assistance across a number of organizations. Many representatives had stories of Power Africa's having provided embedded advisors, who were often experts in technical areas such as forecasting, modelling, and data analysis. These experts improved the efficiency and effectiveness of organizations and demonstrated the value of their knowledge to many in the organization. Some respondents suggested that these experts had helped changed the culture of the organizations. Power Africa–affiliated training was mentioned frequently, which in some cases provided employees with beneficial new skills or perspectives. Other interviewees remarked at the usefulness of international exchanges, where hostcountry staff were embedded in utilities in different parts of the United States and Europe. Many requested even more training in the future.

WORKING CULTURE

"Every new energy project requires documentation and feasibility studies, including government risk, default probabilities, etc. [My unit] is responsible for assessing how to properly manage these risks. Power Africa assisted [us] in creating a custom template for all of the documents for new projects, allowing [us] to prepare these documents in-house. Before, document preparation took around 3 years, now it takes around 6 months."

-Host-country institution representative

Inefficient bureaucratic processes and lack of communication among sector stakeholders were often mentioned as a barrier to success that Power Africa had contributed to overcoming. Interviewees mentioned examples of advisors' playing management roles, working to help connect stakeholders in the sector or to reform the roles of different institutions. Some interviewees also mentioned embedded advisors' overseeing reforms to the processes by which institutions managed their affairs. In Ethiopia, for example, revisions to billing procedures to eliminate outliers drastically reduced the utility's energy losses from customers.

"There is interagency rivalry and Power Africa helped clarify the roles based on best practice in other countries. You see here, it depends very much on the personality of the leaders in a stakeholder and that is how they decide what the roles are. But [the Power Africa embedded advisor] clarified the roles with us and it 'brings sanity.' And the roles for the interdependencies among the different organizations are also much clearer. The impact has been very significant."

—Host-country institution representative

3.3 THE IMPACT OF POWER AFRICA'S ASSISTANCE

The majority of stakeholders interviewed in the four countries (71 percent) said Power Africa's assistance had contributed to their institutions' achieving some of their goals or targets, and many (52 percent) were optimistic that these changes had already led to changes in the sector, usually in the way the sector was managed. Specific examples mentioned included faster issuing of permits and other benefits from standardizing processes, better forecasting and planning, more efficient resource allocation, more proactive and faster problem-solving, and help in transferring governments to a public-private partnership approach.

Only one interviewee from the host-country institutions felt Power Africa assistance had led to any increased generation or access to energy on the ground (specifically, in the renewables sector). According to the rest of the respondents, increased access to electricity was not yet a benefit that could be attributed to the Power Africa's assistance in the four countries. However, most stakeholders noted that change in the energy sector in any country would take a long time and much effort. Many noted that Power Africa was well on its way to achieving its goals, in coordination with the host-government entities, but that those goals could not be achieved overnight. Power Africa's relationship with host-country institutions focuses on long-term planning, enabling environment issues, and other deliverables that are not yet necessarily connected to increased generation or connections (whereas the work on increased connections is pursued with other stakeholders).

"Power Africa's suggested 'go green' strategy has impacted the Kenyan energy sector, with the geothermal focus proving transformational. Currently, Kenya is going through a drought. However, with the geothermal focus, the power supply is stabilized. The strategy is also leading others to look to [us] as a model on how to deliver results in energy."

—David Muthike, Kenya Electricity Generating Company PLC (KenGen)

3.4 SUGGESTED IMPROVEMENTS FROM THE HOST-COUNTRY INSTITUTIONS

The vast majority of interviewees had extremely positive feedback about the work Power Africa is doing and were supportive of the reforms promoted as part of the assistance. In fact, one of the largest problems that interviewees highlighted was their concern about when Power Africa advisors would depart the embedded agencies. Most said there were no challenges in working with Power Africa, although a handful mentioned that cultural differences often proved tricky. All interviewees were also asked to suggest areas for improvement. Two key themes emerged from these discussions, as described below.

MORE POLITICAL ENGAGEMENT

Interviewees were unsure of how politically engaged the U.S. Government was at high levels to support the reform efforts. Some interviewees held the perception that Power Africa could better reach its full potential if U.S. officials were directly discussing with host-country politicians the agendas and plans developed as part of the Power Africa initiative. These interviewees thought there was significant buy-in at the lower levels of government, but that higher levels in the host-country governments needed to be engaged for Power Africa's proposed ideas to become a reality. Another concern was that years of effort would be put into promoting coordination, reform, and improved planning that would be wasted without higher-level buy-in. "At a very high level, perhaps Power Africa could lobby a lot more. Not sure if it is their responsibility. However, before programs like Power Africa are implemented USAID, or whoever decides on the programs, need to get people at the very top to buy into the program so they become sponsors of whatever program as it is being initiated. Once these top people buy in—it's easier for people further down the line to make it work."

> —Joseph Dadzie, Ghana National Petroleum Corporation

PLAN FOR TRANSFER OF TECHNICAL KNOWLEDGE AFTER POWER AFRICA'S COMPLETION

Some interviewees were concerned about the loss of key relationships, information, and momentum after the embedded advisors completed their Power Africa assignments. This points to the value of the initiative, but also to the potential dependency it may have created in some cases. Some interviewees suggested that training and embedding of local advisors might mean the capacity will remain with the relevant stakeholders once the Power Africa contract is completed, or that a greater focus on training current staff in the government institutions might mitigate this issue.

"We hope the transition process away from the [current Power Africa] contract would be smooth and replacing the consultants would be smooth. We don't want a gap; we don't want the institutional memory to be lost. There should be a smooth transition period with overlap of the consultants, or keep the same consultants if possible."

—Horace Hato, Ghana Ministry of Energy

4. ADVANCING ENERGY TRANSACTIONS

A second key objective for this data collection exercise was to understand how Power Africa's assistance has contributed to advancing energy transactions. The LEAP III team interviewed 25 private sector partners regarding their involvement and partnership with Power Africa to gather their perceptions about Power Africa's contribution toward this objective. The sample included project developers, equipment suppliers, private equity firms, nonprofit organizations, independent power producers, and cooperatives. Eleven of these partners are based in the United States. See Annex II for a full listing of partners.

Partners interviewed are responsible for operations spanning roughly 40 African countries in a variety of energy sectors, with the majority of operations taking place in Southern and East Africa. Solar was the most heavily reported energy technology among respondents (56 percent of the sample), followed by wind (24 percent) and combined cycle gas producers (16 percent). By interviewing a range of company representatives, the LEAP III team worked with Power Africa to ensure a diverse set of perspectives regarding the assistance. Figure 3 shows the breakdown of companies by size, with the majority of representatives coming from large and small companies. These companies included both on-grid and off-grid stakeholders.





4.1 BARRIERS FACED BY THE PRIVATE SECTOR IN AFRICAN POWER MARKETS

Respondents were asked to speak about the most significant barriers or obstacles they faced in the past four years in African power markets. The most commonly cited barrier, by 56 percent of survey respondents, reported the enabling environment to be a major obstacle. Issues behind the enabling environment spanned from insufficient procurement frameworks, in various countries, that make it unclear whether authorities supported particular procurements or how development projects fit into the country's long-term supply plan, lack of realistic planning, non-adherence to contractual obligations, and mismanagement or poor capacity of key power sector entities.

Another significant barrier was financing (reported by 32 percent of respondents). Specific issues highlighted focused on the significant development capital that is required just to reach financial closure of private sector transactions—specifically, for feasibility assessments and environmental investigations. Many respondents cited equity as particularly challenging to find, whereas it was easier to obtain debt. Others suggested that understanding the financial ecosystem in Africa was a

challenge, especially for new entrants to the sector. Additional credit and financing products, such as venture capital, were also recommended as a way Power Africa could provide more assistance.

Figure 4 lists other barriers facing the private sector. Many of these issues are inter-related, and possibly have common causes.



Figure 4: Major Barriers Faced by the Private Sector in the Past 4 Years

4.2 MOST SIGNIFICANT CHANGES FOR PRIVATE SECTOR PARTNERS

Via the MSC methodology, partners were also asked to identify the most significant barrier or issue that had been overcome as a result of their partnership with Power Africa. The LEAP III team identified the top themes to emerge from this question, as depicted in Figure 5. Most partners felt Power Africa had played a role in reducing some of these barriers, although perhaps not the largest barriers identified in the previous section.





[#] of Interviews Where Mentioned

NOT HELPING TO OVERCOME BARRIERS

Although partners were grateful to Power Africa's networking services and other benefits, the other major theme that emerged from the interviews (cited by 36 percent of respondents) was that Power Africa had not helped companies to overcome any barrier over the course of their partnership. The general sentiment from these respondents was that Power Africa provided several benefits, but nothing groundbreaking or

"We see Power Africa as more serving a purpose as focusing attention on clean and renewable energy in Sub-Saharan Africa, but it is difficult for us to point to a particular event as a major breakthrough because of Power Africa."

—Private sector partner

significant had changed for them as a result of their partnership or collaboration.

NETWORKING AND MARKET OPPORTUNITIES

When discussing their most significant barriers overcome, attributable to Power Africa, 28 percent of respondents referenced the opening of new market opportunities. Specifically, they credited Power Africa with helping them connect with other Power Africa partners and lending credibility to each of the partners. Respondents appreciated that Power Africa "opens doors" and provides insights

"Even a 20-million-dollar project is massive in Africa, and there are a lot of eyes on this. Power Africa helps us deal with the politics. We don't have feet on the ground, so it's pretty tough without them."

—Private sector partner

on the stakeholders to which they were introduced. Multiple respondents noted that Power Africa had created a network of service providers and investors—an ecosystem where people come together, talk about the challenges, and come up with solutions together. This platform has been very useful for private companies to make connections and seek other partnerships.

Additionally, the private sector partners clearly value Power Africa and the U.S. Government's ability to advocate with host-country governments on behalf of the energy sector and the partners. U.S. embassy employees have been particularly instrumental in securing meetings with key government officials that would have been difficult to schedule otherwise. At least one respondent mentioned that there was prestige attached to being a Power Africa partner that helped to open doors with the government.

However, while partners were quick to credit Power Africa for catalyzing connections, many mentioned that Power Africa could do more, beyond facilitating the initial introduction, to help solidify or finalize relationships between partners. Most stakeholders said that Power Africa has a valuable network, but was not actively building relationships or partnerships.

"I do think that having the platform there is useful for partnership and seeking partners, right. I think being at the Power Africa annual partners meeting ... you meet people every time and you start conversations ... As an active facilitator, not so much. I think they create a platform that attracts a variety of actors, but I don't find them to be active facilitators ... We're kind of left to figure it out."

—Private sector partner

REDUCING RISK

The third-largest theme related to significant barriers that had been overcome because of Power Africa's assistance was in helping partners reduce risk (16 percent of respondents). Several partners understood that Power Africa had advisors, embedded in ministries, who were paving the way for key reforms, improved planning, and sector negotiations that benefited private companies.

Respondents noted that Power Africa's embedded advisors helped smooth the development of project documents and negotiations, while significantly reducing the risk and lack of transparency in the development phase. Credit risk provided by USAID's Development Credit Authority was also cited as providing significant assistance.

"Power Africa's work on regulation has derisked the renewable sector to the point where investment is more desirable. The American government has gravitas and gets stakeholders around the table."

—Bob Chestnutt, Anergi

4.3 THE IMPACT OF POWER AFRICA ASSISTANCE

When reviewing the evaluation survey instrument, Power Africa staff wanted the evaluation team to provide feedback on how private sector partners perceived their work on the ground. Specifically, Power Africa asked the team to assess how Power Africa was promoting U.S. goods and services, and to ask about the Power Africa Toolbox—a collection of resources for private sector partners.⁵ While collecting this feedback, the evaluation team also learned about more general obstacles private sector partners face when working with Power Africa.

SUPPORTING U.S. GOODS AND SERVICES PROVIDERS

Assessing how much Power Africa's work has encouraged the purchase and/or use of U.S. goods and services is difficult because of the current stage of many of the projects. Out of all partners interviewed, 56 percent were involved in projects that had reached financial close.

Of companies whose projects had reached financial closure, nine (64 percent) had included, or will include, U.S. goods or exports as part of the transaction). The primary reason for not including these goods or exports was non-competitive offers from U.S. companies (cited by seven partners). A large number of partners specifically cited extremely low pricing and possibly unfair

"I would say one of our biggest problems in Africa is the, I would call it, unfair competition. Some suppliers are dumping very low prices just to [increase] their market share."

—Private sector partner

competition from other companies as an issue, both regarding procurement and staying competitive in the energy market.

Another partner voiced his opinion that Power Africa was not doing enough to support U.S. companies. In his interview, he stated, "Power Africa has not focused on enabling U.S. exports in the past. Perhaps more now ... Power Africa does too much work on the big picture, not enough support for specific U.S. projects."

POWER AFRICA TOOLBOX AND ASSISTANCE

In addition to the direct support that Power Africa relationship managers provide to private sector partners, Power Africa has developed a toolbox of 160 resources on transaction assistance, financing and risk mitigation, policy/regulatory design and reform, capacity building, legal assistance, and convening and coordination to support private sector partners in accelerating power sector

⁵ <u>https://www.usaid.gov/powerafrica/toolbox</u>

transactions. This repository is meant to bolster the technical capacity and resources available to partners, where needed. As part of the LEAP III team's objectives in understanding how Power Africa's assistance has contributed to advancing energy transactions, we asked private sectors to explain how they used the Power Africa Toolbox, or why they did not use it, where relevant.

Only 28 percent of partners reported having used the toolbox, and an additional 48 percent were aware of the toolbox but did not use it. Twenty percent of the respondents reported being completely unaware of the toolbox. In the current toolbox, the respondents highlighted the United States Trade and Development Agency grants facility and the guidelines and manuals for evaluating power purchase agreements as particularly helpful.

For the 48 percent of partners that did not use the toolbox, several partners—especially those involved in financing—stated that it was geared toward project developers and, therefore, not applicable to their work. However, some project developers commented that the toolbox was more appropriate for less mature companies/developers, suggesting that more sophisticated resources are needed for experienced developers.

TECHNICAL AND ADMINISTRATIVE BURDENS

Power Africa's private sector partners were asked what technical and administrative burdens they had encountered in working with Power Africa. The general sentiment from the interviews was that Power Africa had not been overly burdensome or challenging to work with; in fact, many respondents expressed that they were surprised at how easy it had been to work with Power Africa. Nonetheless, when trying to answer the question respondents, made the following points:

- **Turnover:** One of the largest themes to emerge from this question was that staff turnover between Power Africa contracts has been burdensome (reported by four respondents). Respondents mentioned that staff turnover had meant that information and relationships were lost. They also mentioned power projects are long-term and often very dynamic; losing consistent staff was a missed opportunity to keep the transactions moving smoothly.
- None: Four respondents also said there were no technical or administrative burdens at all.
- **Bureaucracy:** Four respondents also said they found Power Africa to have some heavy bureaucracy and paperwork requirements. Of these respondents, one mentioned that navigating Power Africa was a challenge, especially at the beginning, which resulted in long waiting periods for information or assistance. Two respondents mentioned that paperwork requirements were overly burdensome, particularly grant and loan guarantee documents.
- Quality of Power Africa relationship managers: Although nearly all private sector partners commented on some very high-performing individuals at Power Africa, respondents from four companies also mentioned that "like any organization," some individuals were less qualified for the work. These stakeholders said Power Africa staff could be very "hit or miss," meaning that that quality of engagement with Power Africa varied significantly, based on the person with whom they were working.
- Others: Two other issues were mentioned by two respondents each: (1) Power Africa did not play an active facilitation role and left the burden of relationship-building with the companies; and (2) meetings were held in the United States⁶ (and related perceptions that Power Africa favored U.S. companies).

⁶ Although some meetings are held in the United States, Power Africa meetings are also held in Africa; for example, a May 2019 field meeting in Pretoria.

4.4 SUGGESTED IMPROVEMENTS FROM THE PRIVATE SECTOR

Private sector partners were also asked where they felt Power Africa could improve, and provided the following recommendations.

DEEPEN THE FOCUS ON THE ENABLING ENVIRONMENT AND INVESTMENT CLIMATE

Forty-one percent of the respondents suggested that Power Africa could better support them by focusing on the enabling environment and investment climate. Suggestions included keeping the advisors embedded, exercising Power Africa and the U.S. Government's convening power to address difficult decisions or negotiations that would help facilitate the investment environment, and ensure fair competition.

PLAY A MORE ACTIVE ROLE IN PARTNERSHIP FACILITATION

Several partners felt that Power Africa could play a more direct role to ensure the success of partnerships, beyond facilitating the initial connection. Although partners were generally pleased with the connections they had made through the Power Africa network, they felt Power Africa could do more, such as by providing guidance on structuring particular partnerships. Another idea was to create a quarterly newsletter, similar to the one provided by the USAID Powering Agriculture Grand Challenge for Development 7 that highlights key market

"I would like to see, as a function of [Power Africa], that they do more collaborative operation or joint ventures with American finance companies. So don't just create feasibility studies; we would like more follow up. We would like more private equity or project finance than there is."

—Private sector partner

Challenge for Development,⁷ that highlights key market trends and opportunities.

CREATE ADDITIONAL FINANCING PRODUCTS AND PACKAGES

Although numerous respondents referenced the USAID Development Credit Authority and other U.S. Government actors as being helpful to reduce credit risk and secure financing under the Power Africa initiative, several commented that they thought Power Africa could do more by way of creating other financial tools or mechanisms to support financial closure. One partner estimated that Power Africa funding from the United States Trade and Development Agency for feasibility studies is useful, but only provides about 20 percent of the total amount needed for development costs. Financing packages and tools mentioned that could be useful for catalyzing financial resources included mechanisms to mitigate financial risks, guarantees for power purchase agreements, and credit enhancements.

Another partner remarked that the Power Africa brand carries a lot of weight and could be used to raise more grant and subsidy money, especially for the private sector. Several respondents noted that Power Africa seemed to have received more funding in recent years than at the beginning of the initiative, and has consequently become more agile in this regard.

IMPROVE CONTINUITY AND CONSISTENCY IN SUPPORT RECEIVED FROM POWER AFRICA ADVISORS

Several respondents expressed a need for improved continuity regarding Power Africa advisors when Power Africa staff and contractors are transitioning roles. Separately, many also reported varying quality of service provided from advisor to advisor and from country to country. Both findings suggest that Power Africa advisors could benefit from additional training to ensure the consistency of services provided over time and across countries.

⁷ <u>https://poweringag.org/</u>

5. CHANGING DEVELOPMENT OUTCOMES AT THE COMMUNITY LEVEL

The last key objective for this data collection was to examine whether Power Africa's assistance is changing development outcomes at the community level. To assess whether this is happening and in what ways, the LEAP III team traveled to Ethiopia, Ghana, Kenya, and Nigeria in March and April 2019 to interview customers of Power Africa–affiliated companies and utilities. These interviews provide a better understanding of how improvements to electricity access is changing lives and communities. Enumerators conducted 200 interviews with customers (112 male respondents and 88 female respondents). The mean age of participants was 44 years. More than 80 percent were older than 30 and none were younger than 18 years old. See Annex II for more details.

Power Africa does not perform capacity building or other activities directly with electricity customers. Instead, USAID identified energy companies and utilities with which Power Africa had interacted, and these companies/utilities identified their electricity customers or locations for interviews. In some cases, the companies reportedly only having had limited interactions with Power Africa, such as attending a training program. In any case, the electricity customer interviews focused on a distinct improvement affecting customers' access to electricity, which we refer to as the "Power Africa–affiliated transaction" (PAAT), or the transaction that was encouraged, to some extent, by Power Africa. These transactions fell into four types of improved electricity technologies—on-grid, mini-grid (self-contained local electricity grids), solar home system (SHS), and solar lanterns.

More than half of the sample benefited from an on- or off-grid-based PAAT (59 percent), as seen in Figure 6. An additional 20 percent of respondents had purchased an SHS. In addition, 21.5 percent were using solar lanterns, which provide a narrower set of applicable household or business uses, such as charging phones or providing lighting (but cannot, for example, supply an electric stove).



Figure 6: Electricity Connection for Interviewed Customers

5.1 POWER AFRICA ASSISTANCE AT THE COMMUNITY LEVEL

To provide a deeper understanding of the changes reported by customers, this section summarizes the individual responses in Ethiopia, Ghana, Kenya, and Nigeria.

ETHIOPIA

The first two sites in Kilinto and Tulu Dimtu are condominiums on the outskirts of Addis Ababa, where customers had been connected to the main grid within the past two years. Before this connection, both communities had shared an extended line, left by construction crews that had built the housing developments. As a community, respondents paid for access to that line, regardless of their electricity use. This payment and sharing scheme caused tension among

"I was unable to use my washing machine with the old system when we used one common transformer. If I used a washing machine here, my neighbor and I paid the same amount, which isn't fair. Now I can use any electrical equipment as I want because I pay for what I have consumed."

—Tsige Mengistu, Ethiopia

community members regarding power use and the destruction of electronic equipment. After the PAAT, these customers were pleased to have individual meters installed, citing benefits such as the ability to prepare and preserve food at the time of their choosing, increased income, access to information as a result of television and/or radio, and a sense of freedom that they could use an electronic device without burdening their neighbors or causing conflict.

That said, several respondents complained of significant price increases within the past two months, which were confirmed during interviews with the Ethiopian Electric Utility. In Tulu Dimtu, the team also interviewed several business owners who had experienced significant increases in income as a result of being able to work late and use more electronic appliances. Refrigerators, for example, were useful for storing food, medical supplies, and other perishables.

In Menz Gera District, the team visited two small farming communities, where Ethio-Resources Group—a private sector Power Africa partner—had installed and supplied solar and wind power. In both communities, each household received four hours of electric power, which was sufficient to power a single light bulb in all homes. Many respondents expressed that the ability to do housework and engage in income-generating activities in the evening, such as spinning wool, had greatly improved their incomes. It has also enabled them to spend more time together and invest in their farms.

The two other communities in Ethiopia were rural areas in the regions of Guragea and Oromia, where Sun Transfer Tech PLC—a solar equipment company and Power Africa partner had provided SHSs. Unlike in Menz Gera District, the power generated was sufficient to power multiple lightbulbs and other electronic devices. Several respondents expressed that the cost was very high.

"Our children were not able to study before; they were using kerosene lanterns. That used to go off. Now they are studying properly. Even us, we have escaped from being suffocated by the smoke ... All these things have significantly changed our lives."

—Bikasa Urdufa, Ethiopia

GHANA

The LEAP III team interviewed SHS customers in Fordjour and Nyambekyere. These customers expressed high levels of general satisfaction with their new access to electricity, mentioning the economic benefits of having a charged cell phone (previously, work opportunities were often unavailable due to lack of contact) and the impact of lighting on their children's ability to study, which led to reportedly quantifiable academic improvements.

"Improvement in my wife's business is our most significant change because we do not have to worry about how to preserve fresh fish again. Once we got connected to the solar system, we acquired a refrigerator. With it, we are able to buy and preserve more fresh fish for sale. Compared to other shops in the community, we sell more soft drinks because most people prefer a chilled drink...My wife has increased her daily sale amount from GHS [Ghana cedi] 70 to GHS 150 within a very short period. We have enough money to cater for the needs of our children in school and their general upkeep."

—Kofi Siaw, Ghana

In Kofihwikrom, a small community health clinic now has access to electricity because of the solar mini-grid. This clinic reported that medicines can now be refrigerated and staff no longer work in the dark.

Multiple interviewees in these rural villages reported health and economic benefits from their electricity access. Some interviewees mentioned that the increase in lighting allowed them to see poisonous snakes that come out of the jungle at night. Previously, dangerous animal bites—in addition to the unelectrified clinic—had led to situations where it was necessary to travel to the nearest town (more than a 45-minute drive) to obtain antivenom. Now, there is less risk from animals in the dark, and when bites occur, antivenom is refrigerated at the local clinic.

Economic benefits were also reported in these villages, with multiple individuals mentioning that the grid had provided positive economic impacts associated with refrigeration and cell phone charging. These changes led to time savings, since they no longer need to travel to the nearest town to buy batteries and other goods. Across these remote farming villages, the value of entertainment, whether through

"Teachers now happily accept[ing] posting to our schools, because they can have access to the solar power. They stay in the community to support the school children. They can have solar power to iron their clothes, charge their phones, and power radio or television if they want."

-Electricity customer, Ghana

radio or television, was also repeatedly mentioned. Some even linked entertainment to education; reportedly, now that visiting teachers can listen to radio and watch television at night, more are choosing to stay for longer teaching assignments.

KENYA

The LEAP III team first connected with customers on Ndeda and Ringiti islands, where solar- and wind-powered mini-grids were installed to provide or enhance electricity access. The mini-grids have provided a significant amount of electricity to the islands' inhabitants. Respondents from the community mentioned encountering numerous power constraints before the introduction of the minigrid, such as needing to rely on inadequate phone-charging services from a nearby community. "I also lost customers in my business, since some of my clients waited too long. Right now, I am able to pay full attention to my business. I can knit clothes up to midnight because of light. Initially, I had only one customer in a month. Right now, I can handle over five customers in a month ... Initially, I could make about KSh [Kenyan shillings] 50 per day, but now I can make over KSh 2,000 in a month, which per year is around KSh 60,000."

—Millicent Waguma, Kenya

From these first two communities, the most commonly mentioned benefits were improved economic activity and security. As a result of a more reliable power supply, businesses now sell cold drinks, play videos, and provide other services that require electricity, resulting in increased patronage. Respondents mentioned new barbershops, photocopying stations, and phone charging stations. Other interviewees mentioned saving money that they used to help pay for school fees, school supplies, and better food for their children. Increased security was attributed to electric lighting in the community. The perception shared by multiple respondents was that improved lighting now deters theft and other crimes.

The final interviews were conducted with customers in three communities located near Eldoret. Based on responses, the Kapsoya, Kaptuyot, and Kisii communities seemed to have been heavily reliant on kerosene lamps before the introduction of the *d.light* solar lights. Survey respondents reported increased savings

"Before we got [solar power], we were using a generator; we could even get KSh 800 as fuel bill. When this one has come, we use maybe KSh 500 or KSh 450."

—George Ouma, Kenya

when switching to solar lighting. One respondent mentioned that pricing and demand for kerosene before *d.light* was high. With the income saved from switching to solar lighting, most respondents answered that the most significant effect of the lighting was that their children could study, or that they could pay for school supplies for their children.

NIGERIA

Interviews in Nigeria were primarily in urban or peri-urban settings near Lagos and Abuja. Respondents in Lagos—and a lesser number in Abuja—had purchased *d.light* solar lanterns through a local microfinance bank. Many of these customers were introduced to solar lanterns through an annual general meeting of the University of Lagos's employee union. "The stress is off, and I am saving cost, this one is more convenient, and also health wise, the fumes from the generator are taken away, I don't have to spend money on hospital, I don't need to go pull on the generator, so it is convenient."

—Mr. Ilori, Nigeria

Interviews with these respondents painted a picture of only minor enthusiasm for the solar lanterns, with a number claiming that the main value was as a backup source when their grid connection was not providing electricity, or when they did not feel like turning on their generators. These individuals tended to be distinct from the other countries where interviews took place, since these customers primarily relied on the grid connection, and the solar lanterns were useful only as an alternative source of back-up electricity.

However, a number of interviewees in Lagos expressed significant enthusiasm for the lanterns. Many of those who seemed to benefit the most from the lanterns were small business owners, including a large percentage of women. Respondents mentioned that the lighting made their storefronts/market fronts more attractive to those passing by at night and helped attract business. Many also appreciated the reduced cost of fuel resulting from the substitution of solar lanterns for kerosene lighting. The primary benefit the respondents cited was increased income and savings; the solar lighting system allowed individuals to make more money by working later hours, and increased savings because respondents no longer needed to buy batteries or rechargeable lights as often. Respondents cited savings of at least 2,000 naira (approximately \$5) per week.

Customers in Kabusa—a peri-urban, low-income ("squatter") community outside of Abuja—are assumed to be low power users. Kabusa is able to access the national grid (NEPA) and, in recent years, the local utility has worked on upgrading the power supply for these customers. Consequently, customers can access power for a longer period than previously, when power was often inaccessible for days at a time. Some customers complained of higher costs since the upgrades, but a majority appreciated the reduction in outages, and had been able to expand their businesses as a result. Many also mentioned accelerated growth in the area as a result of more light at night. "My poultry business, I grow more birds now because during the rainy season ... the heat makes them to survive; if there is no electricity to heat them up you will have a great loss. So, my poultry business is doing very well now, because of the constant light and I brood more. With the profit I made, I have been able to build my own house, I am living in my personal house now and I have been able to reach my family and extend my business to them as well."

—Electricity customer, Nigeria

5.2 MOST SIGNIFICANT CHANGES FROM THE ELECTRICITY CUSTOMERS

Although many topics were discussed in the interviews with electricity customers, five emerged as the main "most significant change" themes (Figure 7): increased business activities, saved costs and time, improved quality of life, increased education, and improved health and safety.



Figure 7: Most Significant Changes for Electricity Customers, Overall

The themes identified above are the most common across all 200 interviews with electricity customers. When analyzing the four most common themes for each type of new technology that electricity customers were using, the themes do vary somewhat (Figure 8):

- Increased business activities and saved costs and time were more commonly cited as the most significant change with mini-grid connections, on-grid connections, and solar lanterns, but were not as common with SHSs.
- On the other hand, changes to education seem to be quite prevalent with SHSs and to a lesser extent mini-grid connection, but were not common themes for on-grid connections and solar lanterns.
- Health, safety, and crime-prevention impacts were linked with on-grid connections and SHSs.
- Quality-of-life changes were commonly mentioned across all technologies.



Figure 8: Most Significant Change for Electricity Customers, By Technology

INCREASED BUSINESS ACTIVITY OR INCREASED INCOMES

The largest theme was how respondents were able to use electricity to improve their business and other income-generating activities; at least 57 people named this as the most significant change for them. Nearly half (49 percent) of these people had received a mini-grid connection, 28 percent had received an on-grid connection, 18 percent had solar lanterns, and 7 percent were using SHSs. A number of business owners had stories about improvements to their businesses resulting from the PAAT. Many

"When there's light, people can do business at night with ease, just like during the day. Also, you can see clearly and no one can snatch from you ... It wasn't always like that, because you could not carry the kerosene lamp and go with it to do business in the night, because it was windy. Now there's free lighting."

—Anthony Onyago, Kenya

business owners commented on the benefits of a dependable electricity supply. Businesses use electricity for lights, air conditioners, refrigeration, music, and other purposes; with these amenities, they can attract more customers and sales, leading to increased revenue.

A number of respondents also mentioned how improved lighting had increased their ability to operate businesses at night. Multiple business owners described how solar lanterns had provided lighting to the areas around their stalls, and others mentioned that the reduced threat of theft added comforts for late-night work. This attracted customers and allowed business owners to safely serve those customers late into the night.

Finally, individuals reported having access to more regularly charged cell phones, which also improved their business operations. Many respondents reported that their phones are their primary source of contact for work (i.e., keeping the phone charged leads to greater income). Farmers and herders mentioned that they were able to call for market price information and sell their commodities at higher prices.

"Before, I needed to travel to a different town or village to charge my phone. If I took it in the evening, I had to go for it the next day. With solar, I can charge my phone at home ... If your phone is off and someone wants to buy a chicken, the person cannot reach you. Then your produce will be sitting there without being sold. Now I can be reached. People used to complain that my phone was always off."

—Isaac Opoku, Ghana

SAVED COSTS AND TIME

Many interviewees (40 respondents) commented on how electricity had helped save significant time and financial resources. Most of these people (45 percent) had an on-grid connection; 28 percent had solar lanterns, 20 percent had a mini-grid connection, and 8 percent had an SHS. Individuals reported previously paying high costs to charge their cell phones, and complained of using several days' time in transit to get to areas where charging was possible. Previously, respondents who lived in rural areas often traveled to nearby villages to charge their phones for a fee, and left their phones uncharged otherwise. Leaving a cell phone with a charging business required the customer to either wait until the phone was charged or to return

"I must say the solar system has really helped my money matters (finances). I can save a lot of money now, because I no longer spend on batteries or pay for transportation to a different town in order to charge my phone. I also do not buy kerosene. My expenses have reduced drastically. I now save enough money to hire laborers to work on my farm. I can cultivate larger farms than before because I have laborers to assist me. I also use some of the money I save for my children's school fees."

—Yamoah John, Ghana

later, both options that consume time and other resources. Some customers also feared that charging businesses might steal their batteries or memory cards. Now, phones can be charged from home, eliminating travel costs.

Another key benefit, mentioned primarily by female respondents, was that electricity saved a significant amount of time in household work. For example, households were able to buy washing machines (saving time on this chore) or electric stoves/ovens (reducing the need to prepare firewood or charcoal), and/or coffee could be ground using an appliance, instead of manually. Often, households would have to share electric appliances or share the use of electricity in a building, and would have to wait their turn to cook at night, which reportedly caused hunger if there was no time to prepare a meal before school or bedtime. This also relates to the quality-of-life theme; many respondents said saving time was significant to them because they could spend more time playing with their children. Finally, households would sometimes be forced to buy food instead of preparing it when the electricity was down, which was costly. Households mentioned significant savings in charcoal after being introduced to electric kitchen appliances.

IMPROVED QUALITY OF LIFE

Nearly 20 percent of respondents reported feelings of general happiness, pride, and improved satisfaction in life as a result of access to electricity. Of these, exactly half had received an SHS, 28 percent had an on-grid connection, 17 percent had a mini-grid connection, and 6 percent used solar lanterns. Electricity provided individuals with fans, who reported that easing the heat significantly improved their quality of life and ability to sleep at night. Related to the previous theme of saving time, many respondents reported that their biggest change was being able to spend more time with their families as a result of time-saving electronic appliances. Regularly charged cell phones also allowed respondents to spend more time connecting with others through social media or phone calls with family and friends in cities or more distant locations.

Another item often reported was reduced stress, either directly from finances (as discussed in the previous theme) or from being able to work late into the night, if needed, and not needing to stress

about getting home before it got too dark to prepare meals. Similarly, many individuals reported convenience for cooking; with lightbulbs, cooking became much easier and less stressful to manage than cooking with a flashlight.

"Having the time for social life is very important because it is the basis of our culture. We have funerals, weddings, birthdays, visiting sick people and those that gave birth. That makes our connection stronger. I also need to meet up with my friends. All this means that I am not secluded, I am interacting with others and maintaining my culture."

—Electricity customer, Ethiopia

IMPROVED EDUCATION

Increased access to electricity or solar lanterns was often cited as a reason for improved educational outcomes for the children of electricity customers and their neighbors, and was cited by 32 individuals as their most significant change. Of these individuals, 53 percent were relying on an SHS, and 31 percent on a mini-grid connection; 13 percent used a solar lantern and 3 percent had an on-grid connection. The most common mechanism for improved education was

"Our children are able to study for longer hours these days without having to struggle over the single lamp or flashlight with other members of the household. I see a number of children grouped around the lights at night to study."

—Yamoah John, Ghana

increased availability of lighting, which enabled children to study when insufficient light had previously been a constraint. Multiple respondents mentioned stories of children's previously needing to study by flashlight, which was awkward and not conducive to their ability to learn. Some mentioned cases of children's needing to share flashlights, which limited the amount of learning that could happen at any given time. The introduction of electric lights typically allowed all household members to study simultaneously, without any additional technology. There were also stories of electricity's affecting the ability of rural villages to attract and retain teaching talent (as mentioned in the previous section).

Access to knowledge and education was also widely reported by adults. Individuals reported that cheaper and more regular access to electricity increased the amount of information they received. Many individuals reported their gratitude for a broader awareness of issues outside their village. Specifically, farmers reported learning best practices from television programs that they applied to their fields. Although radios seemed to be widely available, the cost of batteries was often too high, and people were previously not accessing information as commonly as they reported after the PAAT.

HEALTH, SAFETY, AND CRIME REDUCTION

Eighteen respondents mentioned how electricity had affected their health or sense of personal safety in their communities by preventing crime or animal attacks. Of these respondents, 50 percent are using an SHS, 28 percent rely on an on-grid connection, 17 percent use a mini-grid solution, and 6 percent are relying on solar lanterns. Several respondents said they now use access to television and radio to listen to reports on nearby areas with recent violence, which they would then know to avoid. Many also spoke of the dangers of kerosene, in

"I did not have toilets before, but now I use pit latrines. This is the knowledge I got from watching programs on TV. Some diseases might come from defecating outside ... I have issues with my eye and asthma and that could have been one of the causes for it. If I had known earlier, I would have prevented from these issues happening."

—Shume Zimeta, Ethiopia

addition to the health impacts from smoke inhalation, telling stories of children and homes being burned as a result of spilled kerosene lamps and related accidents.

Many respondents reported that the PAAT allowed them to switch to using lightbulbs instead of battery-powered flashlights. As opposed to a flashlight, lightbulbs can provide light for an entire room or area and enable extra visibility at night. This was mentioned as a specific advantage in preventing theft and other crimes. Some customers and business owners mentioned that they had experienced fear of intruders or criminals before the PAAT, which was now less of a worry with improved lighting. Lighting at night also reduces risks posed by dangerous animals,

"It has been very useful, when I was using candle... one of my sons left the candle on and put it on the bedside, and the candle fell at the back of the bed, it caught up with the mattress, it was a terrible incident here, one of the rooms got burnt, but we thank God for our lives. Before it is not okay, I wasn't feeling comfortable then, but now with solar I can sleep soundly without any disturbance."

—Abosede Kayode, Nigeria

especially snakes and scorpions. Many rural respondents mentioned how many snakes they found in their homes as a result of using lightbulbs. Several people also mentioned that being able to use a fan at night prevented mosquitos.

"We lived in fear because the house was always dark. Any wicked individual can sneak into the house without being noticed."

—Kwame Attah, Ghana

5.3 THE IMPACT OF POWER AFRICA'S ASSISTANCE

Survey data provided insights into the impact Power Africa's assistance is having with electricity customers via the types of energy they used before and after the PAAT. As expected, customers described an increase in the use of all PAAT technologies (grids, SHSs, and solar lanterns). Of more interest was a marked decrease in the use of combustible power sources (e.g., kerosene, candles, generators, and dung) after the PAAT.

Many customers eliminated or reduced the use of other energy sources (typically for economic or health reasons) after the introduction of the PAAT (Figure 9). For example, many respondents in Ethiopia mentioned that they used a new on-grid connection to power their electric ovens, replacing firewood and charcoal ovens. Electricity customers commonly cited their satisfaction with no longer using kerosene, complaining of smoke inhalation, burning eyes, soot, and a general fear of fire-related injury prior to having the PAAT. For many customers, however electric solutions cannot replace traditional household cooking methods that rely more heavily on charcoal, firewood, and dung—resources where there was relatively little change (see Figure 9).

Figure 10 illustrates the primary energy source identified by customers (as a percentage of the sample). The reported percentage of our sample who primarily accessed energy through grid connections or solar power had more than doubled after the PAAT. These data reveal a clear pattern of customers' referencing the PAAT technologies as their primary energy source, many of which are based on cleaner renewable-energy technologies. Power Africa is not directly trying to replace combustibles, which are often used for cooking, with electric solutions; however, it is clear that on- and off-grid solutions, solar lanterns, and SHSs have managed to replace combustibles as the *primary* energy source.


Figure 9: Energy Sources Used Before and After PAAT, by Number of Customers





5.4 SUGGESTED IMPROVEMENTS FROM THE ELECTRICITY CUSTOMERS

Although the vast majority of electricity customers remarked on the positive changes in their lives after their access to electricity, many respondents also expressed surprise and, in some cases, discontent at the energy pricing structure. The respondents often reported not having been aware of the prices they would face, or that the prices had increased after they received access to this source of electricity. This was the case for both BTG and on-grid solutions. Sensitivity to energy prices is a common issue globally, and increasing prices are a reality, especially in countries where the power sectors struggle to maintain financial viability. However, there could be room for Power Africa–associated companies and utilities to work on their communication strategies with electricity customers to set realistic expectations about energy prices.

6. CONCLUSIONS AND RECOMMENDATIONS

The findings above seem to suggest that Power Africa's assistance is contributing to the three objectives outlined by its MEL Unit. For each objective, the LEAP III team interviewed key stakeholders to collect and summarize their opinions. Their opinions on Power Africa's achievements towards reaching these objectives are as follows:

- 1. Influencing the host-country institutions and local enabling environment: Hostcountry institutions were extremely positive in their review of working with Power Africa and its embedded advisors. The most useful aspect, to them, has been the capacity building in which the advisors have engaged; many respondents reported specific skill sets and benefits that have helped improve the institutions and the management of the energy sector more broadly.
- 2. Advancing energy transactions: Although private sector partners feel there is more Power Africa could be doing to assist them, they seem to be pleased with the work overall, especially when it comes to accessing Power Africa's network. Several partners reported that working with Power Africa has been much easier than originally expected, lending credibility and bringing leverage with governments that the companies would have otherwise lacked. Private sector partners clearly recognize and appreciate the role Power Africa fills in creating connections. These interviews also suggested that there is space for Power Africa to play a more active role in facilitating and financing power projects in Sub-Saharan Africa.
- 3. Changing development outcomes at a community level: Electricity customers from companies and utilities that have worked with Power Africa reported a broad array of development outcomes and benefits associated with their access to electricity. This primarily includes benefits to business activities, as well as reduced time and costs, improved quality of life and education, and an increased sense of safety and reduced crime. The benefits occurred with both on-grid and off-grid solutions, including small-scale technologies. Electricity access in remote communities and low-income urban areas is transformative and yields many life-changing results.

The interviewees highlighted a number of areas where Power Africa could provide additional assistance. To increase efficiency and achieve its goals, Power Africa might consider the following recommendations from the stakeholders interviewed.

6.1 KEY RECOMMENDATIONS FOR THE FUTURE

INFLUENCING THE HOST-COUNTRY INSTITUTIONS AND LOCAL ENABLING ENVIRONMENT

- Any effort to coordinate Power Africa assistance with high-level local officials and ensure their buy-in and support for future reforms to the enabling environment and management of the power sector will go a long way toward ensuring the success of Power Africa's assistance. Host-country institutions felt that senior levels of government needed greater buy-in to Power Africa, in order for the ideas toward reform, improvements, or reorganization to become a reality. As a result, they worried that Power Africa's efforts could be wasted.
- Carefully consider knowledge transfer as Power Africa advisors' transition away from the institutions where they are embedded, and explore ways to ensure their capacity is fully transferred to the host country. Host-country counterparts (and private sector partners) felt that turnover among Power Africa advisors led to lost relationships, information, and momentum.

ADVANCING ENERGY TRANSACTIONS

- Many private sector partners suggested that a deeper focus on the enabling environment and
 investment climate by Power Africa would be the most helpful benefit to the private sector. This
 was identified by the most private sector partners as the biggest barrier they have faced in the
 past four years. Private sector stakeholders acknowledged that it is hard for a third party to
 change the host country's enabling environment, but they believed Power Africa's advocacy
 efforts could be greatly enhanced to help nudge countries along this path.
- Play a more active role in developing partnerships, beyond just facilitating the initial connection between stakeholders. Private sector partners felt that Power Africa could do more to provide guidance or direct support in structuring partnerships and/or highlighting key market trends and opportunities.
- Create additional financing products and packages to help catalyze these investments, especially in the development phase. Although private sector partners had the impression that Power Africa was already moving in this direction, they felt the Power Africa brand could be leveraged to raise much more in subsidies and grant money from other actors or to build other financing packages and tools to mitigate risks, provide guarantees, and so on.
- Improve consistency in the quality of support provided by Power Africa advisors and ensure continuity when these advisors transition away from their positions. Private sector partners, like host country counterparts, felt that turnover between Power Africa staff led to lost relationships, information, and momentum.

CHANGING DEVELOPMENT OUTCOMES AT A COMMUNITY LEVEL

 Work with national and private sector partners to design communication strategies that better explain to customers the cost structure associated with new modalities of electricity access. Electricity customers overwhelmingly appreciated their new or improved access to electricity, but many of them also expressed surprise and distress about rising and/or unforeseen costs associated with this electricity.

ANNEX I. DATA COLLECTION SCOPE OF WORK

Qualitative Data Collection Analysis and Reporting Support For Power Africa

Summary

Power Africa, a United States Government (USG) is undertaking a pilot qualitative data collection initiative to determine the effectiveness of its approach to capacity building, legal and reforms, and transaction support. This effort will also seek to get an understanding how access to energy has affected development outcomes. As part of a broader evidence and evaluation strategy, Power Africa's Monitoring, Evaluation and Learning (MEL) Unit has begun to pilot a series of qualitative data collection initiatives designed to understand how the assistance provided has contributed to: 1) advancing energy transactions; 3) Affected host country institutions and local enabling environment; and 3) the nature of the change in development outcomes at a community level.

Power Africa MEL is looking for analytical support to augment our team and assist with data collection and analysis. The offeror will be expected to collaborate with our team based in Washington, D.C. and Pretoria on design, piloting and data collection in a relative tight timeframe. This is intended to be a pilot of an ongoing data and evidence gathering effort utilizing a variation of the Most Significant Change Methodology. While the leadership of this effort will remain within the MEL unit, the offeror will be expected to provide technical support to assist in the over all data collection process which will include in-person and telephone interviews across sub-saharan Africa as well as some community level surveys.

The offeror will also provide support to the coordinator's office to research, draft, format and publish the *Electrify Africa Act Report*. Section 7 of the Electrify Africa Act 2015 ("the Act") requires a final, progress report be submitted to the House Committee on Foreign Affairs and the Senate Committee on Foreign Relations not later than three years after the date of enactment of the Act (i.e., NLT February 9, 2019). The Report is to describe progress made in achieving the goals listed in the Act (i.e., 20,000 KWs of generation and 50 million people having access to energy).

Section 7 of the Act also notes the need for project descriptions; the identification of programs designed to strengthen enabling environments; estimates of resources; and, the number of individuals, communities, businesses, schools and health clinics impacted by the availability of energy as a result of USG assistance (among other requirements).

I. Purpose

This is not intended to be an evaluation but rather an evidence gathering exercise in support of the aforementioned congressional report and general monitoring. While traditional data collection tool and methods may be used, the purpose of the data collected will be highly qualitative and used for reporting, strategic decision making, and communications for the *Electrify Africa Report* as well as serve as a baseline for future analytical requirements. Given these needs, the MEL unit has identified and designed a data collection process using a variation of the Most Significant Change Methodology. The contractor will also assist in the compilation and drafting of project descriptions, support final formatting and editing as well as assist in the final production of the report.

2. Methodology

The **Most Significant Change Technique** (MSC) is a monitoring and evaluation (M&E) technique / method used for evaluating complex interventions. It is most commonly used in community development programs to understand the change that a given intervention may, or may not be effecting on the ground. This technique will be used to evaluate the effect of Power Africa's work at a community level and within host country institutions.

Activities Include:

- Identifying communities that have received electricity as a result of a Power Africa transaction and doing surveys and individual interviews where possible, conducted by a contractor and/or members of the M&E team. These interviews will focus on the effect of electrification on economic, health, and education outcomes in the words of the communities.
- Targeting communities, or individuals who have received electricity as a result of a BTG transaction in coordination with the communications effort to interview BTG customers.

Most Significant Problem (MSP) technique will be used to examine the effect of enabling environment and/or institutional development work. While Most Significant Change looks at change in the words of the beneficiary, MSP asks stakeholders in a particular sector about barriers or issues with the enabling environment that they have overcome. This would be done at an institutional or organizational level as well as at the stakeholder/beneficiary level, which would be defined as private sector investors, utilities, etc. in this case.

Activities Include:

- Interviewing private sector partners about their experience with Power Africa to understand how the transaction-focused approach is working at the partner level and at what stage of the transaction process Power Africa is most useful.
- Interviews with host country institutions, utilities, and regulators to understand the effectiveness of the various forms of capacity building and technical assistance provided by Power Africa and its partners.
- This approach, coupled with performance evaluations, will help us fill gaps around our effectiveness at the institutional level.

The contractor will work with Power Africa to refine these approaches.

2. Deliverables and Timeline

i. Contractor Work plan:

Within 5 working days of award of the contract, the awardee will meet (in-person or via phone/video conference) with the COR and/or Activity Manager from the Power Africa ME&L team to discuss the SOW, expectations, and set the parameters for the work plan and evaluation design. The contractor team will support the Power Africa MEL unit, taking direction from the unit's lead to support the data collection process. It is envisioned that the contractor team will have the primary responsibility to collected beneficiary level data and help coordinate and conduct interviews as needed.

Within the first 10 working days of being awarded of the contract, a draft work plan for the evaluation shall be completed by the Offeror's Team Lead and the MEL unit Lead and presented to the Agreement Officer's Representative/Contracting Officer's Representative (AOR/COR) and Power Africa Management. The work plan will include: (1) the anticipated schedule and logistical

arrangements, (2) a list of the members of the evaluation team, delineated by roles and responsibilities; and (3) costs breakdown by tasks

ii. Data Collection Tool Design:

Within 30 business days of approval of the work plan, the evaluation team must submit to the Agreement Officer's Representative/Contracting Officer's Representative (AOR/COR) the following:

- Draft questionnaires and other data collection instruments or their main features;
- the list of potential interviewees and sites to be visited and proposed selection criteria and/or sampling plan (must include calculations and a justification of sample size, plans as to how the sampling frame will be developed, and the sampling methodology);
- Known limitations to the evaluation design;
- A dissemination plan;
- Conflict of interest mitigation plan;
- Copies of the Disclosure of Conflict of Interest forms for each member of the evaluation team as included in the proposal.

Initial drafts of the tools have been completed and the contraction will have to finalize them in close consultation with Power Africa's MEL unit, USAID offices and relevant stakeholders are asked to take up to 10 working days to review and consolidate comments through the AOR/COR. Initial drafts of these protocols are in Annex X. Once the evaluation team receives the consolidated comments on the initial tool design and work plan, they are expected to return with a revised evaluation design and work plan within 10 working days. This layer of buy-in is important to ensure that all key stakeholders are

iii. Data Collection:

The contractor will be expected to conduct phone interviews as well as in-person data collection where feasible. We expect that private sector partners will be primarily phone or email interviews, whereas community level surveying will be in person, involving travel to a few key sites across Kenya, Nigeria, Tanzania, Ethiopia and others. The contractor should propose a plan of action for accomplishing the data collection.

iv. Kick-off briefing:

Within 2 working days of arrival in Pretoria, South Africa, the data collection team(awardee) will have an in-briefing with the Power Africa ME&L Team, COR for the Evaluation and PATRP for introductions and to discuss the team's understanding of the assignment, initial assumptions, evaluation questions, methodology, and work plan, and/or to adjust the Statement of Work (SOW), if necessary.

v. Mid-term Briefing and Interim Meetings:

The data collection team is expected to hold a mid-term briefing with the COR and Power Africa ME&L team on the status of the evaluation, including potential challenges and emerging opportunities. The team will also provide the evaluation COR/manager with weekly briefings and feedback on the team's findings, as agreed upon during the in-briefing. Weekly briefings may be done by phone or email at the discretion of the COR.

vi. Draft Report:

The draft report should be consistent with the guidance provided in Section 10: Final Report Format. The report will address each of the questions identified in the SOW and any other issues the team considers to have a bearing on the objectives of the evaluation. Any such issues can be included in the report only after consultation with USAID. The submission date for the draft report will be determined in the evaluation work plan. Once the initial draft is submitted, Power Africa will have 20 business days in which to review and comment on the initial draft, after which point the AOR/COR will submit the consolidated comments to the team. The team will then be asked to submit a revised final draft report 15 business days hence, and again Power Africa will review and send comments on this final draft report within 10 business days of its submission. Should differences arise between Power Africa and the awardee, a statement of differences outlining areas in which opinions or interpretations differ, will be drafted and annexed at the back of the final report. The data will need to be presented in a various formats, both visually and written so it can be used for reporting and communication purposes as well as general monitoring.

vii. Final Evaluation Report:

The evaluation team will be asked to take no more than 10 working days to respond/incorporate the final comments from Power Africa. The team leader will then submit the final report to the AOR/COR. All project data and records will be submitted in full and should be in electronic form in easily readable format, organized and documented for use by those not fully familiar with the project or evaluation, and owned by USAID.

viii. Draft project descriptions

The contractor will be tasked with drafting a series of 95 to 100 project description of $\frac{1}{2}$ to 1 page in length.

ix. Draft Electrify Africa Report with formatting

The contractor will work the coordinator's office team to compile a draft final report, accompanying graphics, charts, tables, etc.

x. Final Production of Electrify Africa Report

The contractor will produce a final version of the report with required print and digital copies.

3. Team Composition and Management

The evaluation team will be made up of the following;

- Team Leader- Sr. Evaluation Specialist
- Deputy Team Lead Mid-Evaluation Specialist
- Data collectors 4 per country, fluent in local languages and English. One would also assist with logistics and making local connections.
- Mid-level researcher
- Design and format specialist/Editor
- Graphic Designer/Data Visualization specialist

All attempts should be made to ensure that the team is made up of at least one female team member.

i. Team Leader/Evaluation Specialist

Team Leader/Senior Evaluation Specialist should have a post-graduate degree in Development Studies/Economics/Energy/Evaluation. S/he should have at least 10 years senior level experience working in Energy/Development programs in developing countries. S/he should have extensive experience in conducting evaluations/ assessments and strong familiarity with the Sub Saharan Africa region. Excellent oral and written skills are required.

The Team Leader should also have experience in leading evaluation teams and preparing high quality documents. The Team Leader will take specific responsibility for assessing and analyzing the organization's progress towards targets, factors for such performance, benefits/impact of the strategies, and compare with other possible options. S/he will also suggest ways of improving the present performance, if any. S/he will provide leadership for the team, finalize the evaluation design, coordinate activities, arrange periodic meetings, consolidate individual input from team members, and coordinate the process of assembling the final findings and recommendations into a high quality document. S/he will write the final report. S/he will also lead the preparation and presentation of the key evaluation findings and recommendations to the Power Africa team and Tetra Tech Inc.

ii. Local technical experts

The technical expert should have a minimum of a Bachelor's Degree in one of the following fields energy or electrical engineering, law, policy, environmental studies, or monitoring, and evaluation. The incumbent must also have least 5 years of relevant experience particularly in Sub Saharan Africa.

iii. Mid-level researcher

The researcher will expected to support the drafting of the project descriptions as well as support the drafting of the final report.

iv. Design and format specialist/Editor The Editor will be responsible for ensuring the report is consistently formatted and copy edited.

v. Graphic Designer/Data Visualization Specialist

Will be responsible for creating data visualizations and graphics to accompany the report text.

vi. Management

This will be a unique data collection effort that will be led by Power Africa's MEL team with the contractor expected to provide supporting staff as opposed to a traditional evaluation where the contractor leads the technical implementation. During the Data collection activities, the contractor will take direction from the drafting team and in consultation with the Activity Manager attached to the MEL unit.

4. Schedule and Logistics

Instructions: Provide an estimated timeframe (in days) for the evaluation (period of performance) to be conducted as well as an anticipated start date. Period of performance should include the time it takes for USAID to review the draft and final evaluation reports and for all work to be completed for the evaluation. Likewise it is very important that the schedule include time for review throughout the process with key stakeholders and USAID staff. Consider including a timeline table (GANTT chart) or indicative schedule in narrative form.

Guidance: The sample table outlines these main phases of a performance evaluation. The guiding questions are:

- i. What is the period of time (duration) you expect the evaluation team to take to review activity/project documents and become familiar with the program (prior to travel)?
- ii. How long will it take to get the necessary clearances for travel and to complete any protocols to visit communities and prepare for data collection?

- iii. How many sites/regions will the team be expected to visit, and what is a realistic timeframe for such requirements? Will the team be split up into smaller units during data collection to speed up the time required to collect the data?
- iv. What is the period of time (duration) it takes to collect data?
- v. What is the period of time (duration) allocated to analyze the data following data collection?
- vi. What is the period of time (duration) to prepare briefings and reports? If data visualization and graphical requirements are included state these.

| Timing (Anticipated Days /Duration) | Proposed Activities | Important Considerations/Constraints |
|---|---|--|
| | Preparation of the work plan and evaluation design | |
| | USAID review of the work plan and evaluation design | Take into account availability in the Mission Or Washington OU |
| | Travel [optional: evaluation design] and preparations for data collection | Take into account visa requirements (if an expatriate team is being mobilized) |
| | In-Briefing | Take into account the availability of USAID's ME&L team |
| | Data Collection | Take into account the number of sites, methods, sectors, etc. |
| | Data Analysis | Take into account the number of sites, methods, sectors, etc. |
| | Report writing | Take into account the number of sites, methods, sectors, etc. |
| | USAID review of Draft Report | Take into account availability in the Mission Or Washington OU |
| | Incorporate USAID comments and prepare Final Report | |

 Table 4-Sample Format: Illustrative Schedule

Instructions: The section should also include illustrative information about the level of effort (LOE) expressed as days, to complete the evaluation. However, it is not required that specific and detailed level of effort be provided by team member. Requirements associated with the level of specificity for the level of effort are determined by the contracting mechanisms.

Level of effort calculations by team member is generally required to prepare an accurate Independent Government Cost Estimate (IGCE). See the Guidance Note on IGCE for Evaluations for a detailed explanation for estimating level of effort. Some key factors for determining the level of effort (number of workdays to complete a task) include:

- i. Planning/Evaluation Design: How many documents are there to review and how methods of data collection are anticipated? Time is required to review the documentation, prepare a work plan, and design instruments. Each method of data collection will require its own instrument.
- ii. Preparations for Data Collection: Is there an expatriate team? How long does travel take? How much travel is required outside of the capital city?
- iii. Data Collection: How many different geographic locations will be are required? How many people will travel to each location? How many days per person are required by method for data collection?
- iv. Analysis: How many different types of data sets are going to be generated? Are there quantitative data? If so, allocate time for data entry and cleaning.
- Reporting and Briefing: How many different deliverables are required? Allocate time by deliverable and by person (not all team members will spend the same amount of time).
 vi.

The sample table shells are illustrative for a simple evaluation with four team members.

| Task | LOE for Team Lead | LOE for Expat [Technical Expert] | LOE for Local [Technical Expert] Consultant | LOE for Local [Technical Expert] Consultant | Total LOE in days |
|---|----------------------------|---|--|--|-------------------------|
| Document review/desk review/work planning (evaluation design remote or in-country) | | | | | |
| Preparations for travel and organizing data collection (contracting translators, vehicles, etc.). | | | | | |
| In-brief, Evaluation Design (including meetings with USAID) | | | | | |

Table 5: Estimated LOE in days by activity for a team of four

| Preparations for data collection (scheduling) | | | |
|--|--|--|--|
| Data collection days by method by site | | | |
| Data analysis | | | |
| Briefing | | | |
| Draft final report and debrief to USAID [include time for translation if necessary] | | | |
| Final report | | | |
| Totals | | | |

Table 6: Estimated LOE in days by position for a team of four

| Position | Preparation | Travel to/from Country | In-Country Data Collection | Finalization of Report | Total LOE in days |
|---------------------|-------------|---------------------------|-------------------------------|---------------------------|----------------------|
| Team Leader | | | | | |
| Expat Specialist | | | | | |
| Local Consultant | | | | | |
| Local Consultant | | | | | |
| Totals | | | | | |

Power Africa will provide overall direction to the evaluation team, identify key documents, and assist in facilitating a work plan. Power Africa will assist in arranging meetings with key stakeholders and identified by Power Africa prior to the initiation of fieldwork. The evaluation team is responsible for arranging other meetings as identified during the course of this evaluation and advising Africa

prior to each of those meetings. The evaluation team is also responsible for arranging vehicle rental and drivers as needed for site visits around places where they need to go, but Power Africa will facilitate travel to sites in the governorates (including air travel when/if necessary) Power Africa can also assist with hotel arrangements if necessary but the evaluation team will be responsible for procuring its own work/office space, computers, internet access, printing, and photocopying. Evaluation team members will be required to make their own payments. Power Africa personnel will be made available to the team for consultations regarding sources and technical issues, before and during the evaluation process.

5. Budget

The USAID is expected to spend a ceiling \$530,000 dollars for this effort.

6. Format of the Data Collection Report

The data collection report will be made up of the following section;

- A. Acronyms
- B. Executive Summary
- C. Data collection Purpose and Questions
- D. Project or Program Background
- E. Data Collection Methods and Limitations
- F. Findings, Conclusions and recommendations
- G. Annex i: Statement of Work
- H. Annex ii: Data Collection Methods and Limitations
- I. Annex iii: Data collection instruments
- J. Annex iv: Sources of information
 - a. -List of persons interviewed
 - b. -Bibliography of documents reviewed
 - c. -Databases reviewed
- K. Annex v: Disclosure of any conflicts of interest
- L. Annex vi: Statements of differences (if applicable)
- M. In accordance with <u>AIDAR 752.7005</u>, the contractor will make the final evaluation reports publicly available through the Development Experience Clearinghouse within 30 calendar days of final approval of the formatted report.

This is format is offered as a guideline and the final report and format may change as requirements neccesite however, it is anticipated that:

7. Criteria for ensuring the quality of the report

While this is not a traditional evaluation report, Power Africa will expect the contractor to follow the Agency's accepted standards for quality in the absence of a protocol for this type of monitoring/research report:

- i. Per the USAID Evaluation Policy and USAID <u>ADS 203</u>, draft and final evaluation reports will be evaluated against the following criteria to ensure the quality of the evaluation report.2
- ii. The evaluation report should represent a thoughtful, well-researched, and well-organized effort to objectively evaluate what worked in the project, what did not, and why.
- iii. Evaluation reports shall address all evaluation questions included in the SOW.
- iv. The evaluation report should include the SOW as an annex. All modifications to the SOW whether in technical requirements, evaluation questions, evaluation team composition, methodology, or timeline—need to be agreed upon in writing by the AOR/COR.
- v. The evaluation methodology shall be explained in detail. All tools used in conducting the evaluation—such as questionnaires, checklists, and discussion guides—will be included in an annex in the final report.
- vi. Evaluation findings will assess outcomes and impact on males and females.

- vii. Limitations to the evaluation shall be disclosed in the report, with particular attention to the limitations associated with the evaluation methodology (selection bias, recall bias, unobservable differences between comparator groups, etc.).
- viii. Evaluation findings should be presented as analyzed facts, evidence, and data and not based on anecdotes, hearsay, or the compilation of people's opinions. Findings should be specific, concise, and supported by strong quantitative or qualitative evidence.
- ix. Sources of information need to be properly identified and listed in an annex.
- x. Recommendations need to be supported by a specific set of findings.
- xi. Recommendations should be action-oriented, practical, and specific, with defined responsibility for the action.

8. Other requirements

- i. All quantitative data collected by the evaluation team must be provided in machine-readable, non-proprietary formats as required by USAID's Open Data policy (see <u>ADS 579</u>). The data should be organized and fully documented for use by those not fully familiar with the project or the evaluation. USAID will retain ownership of the survey and all datasets developed.
- ii. All modifications to the required elements of the SOW of the contract/agreement, whether Select those that are applicable and included: in technical requirements, evaluation questions, evaluation team composition, methodology, or timeline, need to be agreed upon in writing by the COR. Any revisions should be updated in the SOW that is included as an annex to the Evaluation Report.

9. Conflict of Interest

Upon being awarded this contract, the evaluation team shall be requested to provide a declaration form attesting to a lack of conflict of interest or describing an existing conflict of interest with subject to PA.

ANNEX II. SOURCES OF INFORMATION

SITE VISITS FOR COMMUNITY ELECTRICITY CUSTOMER INTERVIEWS

Table II.1: Site Visits for Electricity Customers

| LOCATION | ELECTRICITY SYSTEM OF INTEREST – PAAT (AFFILIATED WITH POWER AFRICA) | # OF PEOPLE INTERVIEWED |
|---|---|----------------------------|
| Ghana, Nyamebekerye (Ashanti Region) | Solar home system | 8 people |
| Ghana, Fordjour (Eastern Region) | Solar home system | 8 people |
| Ghana, Kofihwikrom (Ashanti Region) | Mini-grid | 12 people |
| Ghana, Adoowa community (Ashanti Region) | Mini-grid | 8 people |
| Ghana, Amanhyia community (Ashanti Region) | Mini-grid | 5 people |
| Ghana, Wenchi community (Brong Ahafo Region) | Solar home system | 12 people |
| Ethiopia, Addis Ababa City Outskirt, Kilinto Condominium | On-grid | 13 people |
| Ethiopia, Addis Ababa City Outskirt, Tulu Dimtu Condominium | On-grid | 14 people |
| Ethiopia, Amhara Region, Menz Woreda, Limat Aamba community/village | Mini-grid | 4 people |
| Ethiopia, Amhara Region, Menz Woreda, Sin Amba community/village | Mini-grid | 4 people |
| Ethiopia, Amhara Region, Menz Woreda, Boda Amba community/village | Mini-grid and solar home systems | 6 people |
| Ethiopia, Amhara Region, Menz Woreda, God Amba community/village | Mini-grid | 2 people |
| Ethiopia, Guragea region, Mehur and Aklil Woreda, TekleHaimanot Kebele | Solar home system | 9 people |
| Ethiopia, Addis Ababa Outskirt, Akaki Kality Woreda, Bilbillo Kebele | Solar home system | 3 people |
| Kenya, Ndeda | Mini-grid | 12 people |
| Kenya, Ringiti | Mini-grid | 16 people |
| Kenya, Ngeria | On-grid | 12 people |
| Kenya, Kapsoya | Solar lanterns | 3 people |
| Kenya, Kisii | Solar lanterns | 2 people |
| Nigeria, Lagos (outskirts) | Solar lanterns | 19 people |
| Nigeria, Abuja (outskirts) | Solar lanterns and on-grid | 31 people |

ELECTRICITY CUSTOMER SAMPLE

Table II.2: Interview Demographic

| | CATEGORIES | FREQUENCY | PERCENTAGE OF TOTAL | SOURCE |
|------------------|----------------------|-----------|------------------------|--------------|
| Sex | | | | |
| | Males | 112 | 56.0% | Question 5 |
| | Female | 88 | 44.0% | |
| Age ⁸ | | | | |
| | <18 | 0 | 0.0% | |
| | 18–30 | 38 | 19.0% | Question 6 |
| | 30–50 | 111 | 55.5% | Question 6 |
| | 50+ | 50 | 25.0% | |
| | | | | |
| PAAT Technology | | | | |
| | Mini-grid connection | 68 | 34.0% | |
| | On-grid connection | 49 | 24.5% | Our stiens 0 |
| | Solar lantern | 43 | 21.5% | Question 8 |
| | Solar home system | 40 | 20.0% | |
| | | | | |

CONTACTS INTERVIEWED FOR PRIVATE SECTOR AND HOST COUNTRY IN-DEPTH INTERVIEWS

Table II.3: Private Sector Counterparts Interviewed

| COMPANY | US-BASED? |
|--|-----------|
| Access Power | |
| Aldwych International (subsidiary to Anergi) | |
| APR Energy | x |
| Ariya Capital | |
| Azuri Technologies | |
| Babcock & Wilcox Enterprises, Inc. | × |
| Blue Haven Initiative | × |
| Fenix International | × |
| First Solar, Inc. | × |
| General Electric (GE) | × |
| Global Communities | × |
| Industrial Development Corporation (IDC) | |
| JCM Power (JCM), formerly JCM Capital | |

⁸ One participant did not provide their age.

| COMPANY | US-BASED? |
|---|-----------|
| KMR Infrastructure (KMRI) | Х |
| National Rural Electric Cooperative Association (NRECA) | Х |
| Pele Green Energy | |
| PowerGen Renewable Energy | |
| Proton Energy | |
| PW Power Systems (PWPS) | Х |
| Rand Merchant Bank | |
| Solar Sisters | Х |
| Standard Chartered | |
| Upepo Energy | |
| Vestas Wind Systems | |
| Virunga Power | |

Table II.4: Host-Country Institutions Interviewed

| COUNTRY | INSTITUTION | ROLE IN POWER SECTOR |
|----------|--|--------------------------|
| Nigeria | National Power Training Institute of Nigeria (NAPTIN) | Public training facility |
| Nigeria | Abuja Electricity Distribution Company (AEDC) | DISCO |
| Nigeria | Transmission Company Nigeria (TCN) | Transmission |
| Nigeria | Niger Delta Power Holding Company (NDPHC) | GENCO |
| Nigeria | Qua Iboe Power Plant (QIPP) | GENCO |
| Ghana | Energy Commission | Regulator |
| Ghana | Ghana National Petroleum Corporation (GNPC) | National Oil Company |
| Ghana | Petroleum Commission | Regulator |
| Ghana | GRIDCo | Transmission |
| Ghana | Ministry of Finance | Ministry |
| Ghana | Northern Electricity Distribution Company (NEDCo) | DISCO |
| Ghana | Ministry of Energy (two interviews here) | Ministry |
| Ghana | Electricity Company of Ghana (ECG), now called Power Distribution Services Ghana | DISCO |
| Ethiopia | Ethiopian Electric Power (EEP) | GENCO |
| Ethiopia | Ethiopian Energy Authority (EEA) (two interviews here) | Regulator |
| Ethiopia | Ethiopian Electric Utility (EEU) | DISCO |
| Kenya | Kenya Electricity Generating Company (KenGen) | GENCO |
| Kenya | Kenya Power and Lighting Company | DISCO |
| Kenya | Energy Regulatory Commission | Regulator |

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ANNEX III. FINAL QUESTIONNAIRES AND TRAINING GUIDES

HOST SECTOR INSTITUTIONS SURVEY INSTRUMENT

I. Interview Script:

Thank you for taking the time to speak with me today about the cooperation between [organization/institution name] and Power Africa, a US Government project. My name is ______ and I am working with Integra Government Services, which has been contracted by the US Agency for International Development to collect data on the Power Africa initiative to date. We are interviewing about 40 government institutions in the energy sector as part of this effort.

The purpose of our interview is to learn more about the effect of capacity building and technical assistance received provided by the Power Africa initiative. We believe that hearing partners' experiences will help us learn about:

- 1) What works, for whom and in what contexts?
- 2) Impact of capacity building assistance
- 3) How the US Government can improve current and future partnerships

I encourage you to be open and honest in your reflections on both successes and challenges your organization has experienced while working with the Power Africa initiative. Unless you specify otherwise, feedback will remain confidential and reported in aggregate.

Before we begin with my questions - do you have any questions for me about this data collection effort?

| I) Do you have any questions? | Yes | No |
|--|-----|----|
| 2) Do you wish to participate in this interview? | Yes | No |

Comments/notes:

| Contact Details | |
|-------------------------------------|--|
| 6) Name of company: | |
| 7) Address of company: | |
| 8) Name of company representative: | |
| 9) Title of company representative: | |
| 10) Interview date (DD/MM/YY): | |

II. Background questionnaire

| ١. | Type of institut | ion: | a. | Utility | b. | Generation Company (GENCO | | | с. |
|----|------------------------------|------|---------|------------------|-----------------|---------------------------|-------|--|----|
| | Distribution Company (DISCO) | | | d. Private compa | Private company | e. | | | |
| | Regulator | f. | Ministr | у | | g. | Other | | |

2. Institution's (approximate) number of employees:a. Small (1-50)b. Medium (51-250)c. Large (>250)

3. Type of assistance received from Power Africa:

[Note to interviewer: check the box for any of these topics covered, describe below, confirm]

a. Coaching/mentoring- Ranges from informal engagement and day to day work of staff to more structured, conscious coaching or mentoring

b. Expert Technical Assistance: bringing in specialized experts through secondments or limited term appointments.

c. Training: development of individual skills and knowledge through structured formal efforts

d. Peer learning: workshops, seminars, study tours, etc.

e. Brokering or Supporting new relationships: supporting organization engagements with other stakeholders

f. Facilitating access to knowledge: supporting access to relevant knowledge or information

g. Equipment or logistical support: provision of equipment or the funding and facilitation of travel and/or training

- h. Other Funding (not included in g)
- i. Other: _____

4. What organizational capacities were developed:

[Note to interviewer: check the box for any of these topics covered, describe below, confirm]

- a. Management and Implementation
- b. Strategy development
- c. Communication and outreach
- d. Procurement
- e. Operation and Maintenance
- f. Tariffs
- g. System of accounts
- h. Other _____

Describe:

5. Dates of assistance (DD/MM/YY), from: ______ to: _____

III. Most significant change in the sector of the interviewee

Interview Script:

Now I'd like to ask you to think of the most significant change as a result of the Power Africa initiative partnership. We are interested in collecting as many details as you can recall. Please feel free to take your time in answering these questions.

1) From your point of view, can you describe the most significant <u>barrier</u> that this assistance from Power Africa initiative has helped your institution overcome?

[Note to interviewer: if not addressed, ask how this assistance contributed to these changes]

- 2) Why is overcoming this barrier significant to you and your organization?
- 3) From your point of view, can you describe the most significant <u>change</u> you have observed within your institution as a result of the assistance?

[Note to interviewer: if not addressed, ask how this assistance contributed to these changes]

4) Why is this change significant to you and your organization?

Questions on Impact

Interview script:

Now I'd like to ask you some questions about what you think the impact has been as a result of the relationship with the Power Africa initiative, if any.

- 5) Has this assistance helped your institution achieve its goals or targets? Please explain:
- 6) Have the changes in your institution resulted in changes in the sector? If so, what are they?
- 7) Are there any specific generation or connections results that are attributable to this assistance?
- 8) From your point of view, are there any negative impacts that this assistance has had on your institution? If so, please describe:
- 9) Were there any technical or programmatic challenges in working with Power Africa?
- 10) How could this assistance be improved should it be possible to continue in the future

11) Are there any other observations you'd like to share that we have not covered?

IV. Confidentiality

Interview Script:

One last thing before we complete this interview. While the primary purpose of any data collected is to inform the internal management and programming of the Power Africa initiative, the US Government may want to use your inputs for reporting and sharing with other stakeholders, particularly any specific successes or best practices.

 Do you consent to us using your most significant change experience for publication or reporting? Yes No

2) If yes, would it be alright if the US Government reached out to you directly to learn more about the most significant change experience we discussed for publication? Yes No

3) Do you want to have your organization's name associated with any publication on the most significant change experience? Yes No

PRIVATE SECTOR PARTNER INSTRUMENT

I. Interviewer Script:

Thank you for taking the time to speak with me today about the partnership between [private sector company name] and Power Africa. My name is ______ and I am working with Integra Government Services, which has been contracted by the U.S. Government to collect data on the Power Africa initiative to date. We are interviewing about 50 private sector partners as part of this effort.

The purpose of our interview is to learn more about the effect of capacity building and technical assistance received provided by the Power Africa initiative. We believe that hearing partners' experiences will help us learn about:

1) What works, for whom and in what contexts?

2) Public-Private collaboration

3) How can the US Government improve current and future partnerships?

I encourage you to be open and honest in your reflections on both successes and challenges your organization has experienced while working with the Power Africa initiative. Unless you specify otherwise, feedback will remain confidential and reported in aggregate terms.

Before we start - do you have any questions for me about this data collection effort?

| I) Would you agree to participate in this interview? | Yes | No |
|--|-----|----|
|--|-----|----|

2) We would like to record our conversations for note-taking. These recordings will not be shared with anyone outside our company. Do you consent to our recording this conversation? Yes No

Comments/notes:

Contact Details

| 3) Name of company: |
|-------------------------------------|
| 4) Address of company: |
| 5) Name of company representative: |
| 6) Title of company representative: |
| 7) Interview date (DD/MM/YY): |

II. Demographic information

Interview Script:

The following information is to confirm the accuracy of the data in the US Government systems, and inform our analysis.

- I. Company's (approximate) number of employees:
 - a. Micro (1-10) b. Small (11-50)
 - c. Medium (51-250) d. Large (>250)
- 2. Type of company
 - a. Private equity b. Debt provider c. Equipment supplier
 - d. Distribution company (DISCO or DISTCO) e. Developer/sponsor
 - f. Non-profit/foundation/association g. Other: _____
- 3. Type of technology they are promoting for Power Africa (check all relevant)
 - a. Solar b. Wind c. Geothermal d. Hydro e. Coal
 - f. Combined cycle gas g. Simple cycle gas h. Nuclear
 - i. Technology-agnostic k. Other:_____
- 4. Where does your company work in Africa:

4.1 Africa: [enter country/countries] _____

[Note to coder: please enter the corresponding regions in Africa after completing the interview]

Central region includes: Democratic Republic of Congo, Republic of Congo, Central African Republic, Cameroon, Gabon, and Equatorial Guinea.

East region includes: Burundi, Democratic Republic of the Congo, Djibouti, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Tanzania, and Uganda.

Sahal region includes: Burkina Faso, Chad, Mauritania, and Niger.

Southern region includes Angola, Botswana, Lesotho, Madagascar, Malawi, Mozambique, Namibia, South Africa, Swaziland/Eswatini, Zambia, and Zimbabwe.

Western region includes Benin, Burkina Faso, Cote d'Ivoire, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and The Gambia.

III. Questions

1. Let's start with discussing your partnership with the Power Africa Initiative. Can you please explain to me how you have worked with the Power Africa Initiative?

Probes: What other players were involved?

2. How did your company first become involved with the Power Africa initiative?

[Note to interviewer: check the box for any of these topics covered and specify below]

- a. Through an industry event
- b. Through personal networking
- c. Through work with the US government or other agency
- d. Other _____

3. What is the most significant barrier or issue that your company has overcome as a result of your partnership with the Power Africa initiative?

[Note to interviewer: This is the Most Significant Change story. We are hoping to gather as many details as possible, please pursue questions to gather these details if the interviewee is not forthcoming.]

- a. Opening up new markets and opportunities
- b. Reduces costs/improves profitability
- c. Reduces risk/attracts new investors/lenders
- d. Other _____

Probes: Please tell me about why this was a barrier? Can you provide an example?

How was Power Africa instrumental in this change?

Can you explain how you would manage this barrier before working with Power Africa?

4. Why have you identified this barrier as particularly significant?

5. In the last 4 years, what were the major obstacles or barriers your company faced in the sector in Africa?

[Note to interviewer: describe below and check the box for any of these topics covered]

- a. Start up costs b. Raising capital c. Logistics
- d. Enabling environment e. Financing/lending (debt, foreign currency, risk, etc.)
- f. Other_____

Describe:

5.1. Did the Power Africa initiative help you overcome any of these barriers you just identified (other than the one discussed as the most significant barrier)?

6. Looking to the future, are there other barriers or issues that the Power Africa initiative could help resolve? If so, how?

[Note to interviewer: check the box for any of these topics covered and describe below]

- a. Barriers associated with risk for investment
- b. Barriers associated with enabling environment
- c. Barriers that are country/region specific
- d. Other _____
- e. None

7. In your opinion, what is the value of engaging in a Public-Private Partnership with the Power Africa initiative to your company?

7.1. In what ways does the public partner add value to the partnership?

[Note to interviewer: Only ask if not addressed in original answer to this question]

7.2. In what ways does the private partner add value to the partnership?

[Note to interviewer: Only ask if not addressed in original answer to this question]

8. What was the biggest technical or bureaucratic challenge in working with the Power Africa initiative?

9. Are there any unintended results (positive or negative) that have occurred as a result of this partnership?

10. Did your company use the Power Africa toolbox?

[Note to interviewer: please check the box, follow up as instructed, and describe below]

- a. If yes, which tools? What was useful/relevant about them?
- b. If the answer is no, what wasn't useful/relevant? How can it be improved?

c. Check if the interviewee has never heard of the toolbox

11. Thinking back on your involvement with the Power Africa initiative, is there anything that the initiative could have done differently?

[Note to interviewer: please check the box for any of these topics covered and describe below]

a. Nothing, it should keep doing what it's doing

b. Have a wider focus/support a broader array of business types and models (for example: corporate, social entrepreneurship, pay-as you go, etc.)

c. Have a narrower focus/support a smaller array of business models (for example: corporate, social entrepreneurship, pay-as you go, etc.)

d. Other _____

Describe:

12. Did any of your projects reach financial close? If so, did the project(s) include U.S. goods, services, or financing at any stage from project pre-feasibility through construction, as well as in operations and maintenance?

[Note to interviewer: review each of options below with the interviewee and describe below]

- a. U.S. Goods & Exports
- b. U.S. Ownership
- c. U.S. Funding
- d. U.S. Intellectual Property; Research & Development
- e. U.S. Advisory Services
- f. Other "content" coming from the U.S.

Describe:

12.1. If your project did include U.S. goods and services, please provide the estimated value of the goods, services, and/or financing.

12.2. If your project did not/will not include U.S. content, was there any reason for sourcing goods, services, and/or financing from outside the United States?

[Note to interviewer: please check the box for any of these topics covered and describe below]

- a. Lack of interest from U.S. companies
- b. Lack of knowledge of U.S. companies that could provide required goods/services
- c. Non-competitive offers from U.S. companies

d. Other national governments offered funding for your project if the transaction utilized host-country products, solutions, manufacturing, etc.

e. Other (please explain)

Describe:

14. Do you have any other observations you'd like to share that we haven't discussed yet?

IV. Confidentiality

Interviewer Script:

One last thing before we complete this interview. We mentioned earlier that your responses will remain confidential. However, you've mentioned some success stories and we might want to quote you or paraphrase your experience. If we do this – could we attribute it to your company? If not, we will keep it anonymous.

I) Do you want to have your company's name associated with any publication of your experience?

Yes No

COMMUNITY BENEFICIARY INSTRUMENT

Note to interviewers - all text in italics are notes for you and not to be read aloud

Before the interview:

Name of the interviewer: _____

Name of country: (select one) Ghana, Ethiopia, Kenya, or Nigeria

Location (name of province and community/village):

Location (type): a. urban b. peri-urban c. rural

I. Interviewer Script:

Hello, thank you for taking the time to speak with us. My name is ______ [name of interviewer]. This is my colleague ______ [name of onsite translator], who will help me in taking notes during our interview. I work for Dalberg Research, an independent research organization contracted by Integra Government Services to learn more about a U.S Government project called Power Africa. The project helps facilitate energy generation and they would like to know what your experience has been now that you have access to [solar home systems, grid electricity, or name transaction of interest]. The information you provide will be collected with data from 200 people in 4 different countries.

We are hoping to capture a story about personal or community changes that may be connected to the bringing of electricity to this area. The interview begins with questions about your history with access to energy and then we will ask you about your experience with [grid electricity, or name of Power-Africa transaction of interest].

These interviews will help tell the donors and stakeholders about any significant changes that have happened to community members as a result of their programs. I would like to begin by going over the consent form and make sure you would like to participate in this interview.

There are no costs to you except a maximum of one hour of your time. I will take notes and record our voices, but the interview will not be video-taped. We will record the conversation for reference and for clarifying notes during analysis stage. The information you provide will be kept private and confidential and only described in a report as a collection of responses without any names unless you say it is ok for the US Government to use your name. The transcript of our interview will be shared with Integra and with the US Government, but it will not be tied to your name unless you provide your permission.

There are no risks to your participation. Your willingness to participate is not tied to any goods or services you will receive from any organization. Likewise, there is no direct benefit to you for participating in this survey. However, your participation may help design better energy investments or help donors understand the value of this energy to individuals in _____ [name country you're in].

Your participation is voluntary, and you have the right to withdraw your consent or discontinue participation at any time without penalty. You have the right to refuse to answer any question. There are also no correct answers to any of the questions, we are just interested to know about your experience.

| I) Do you have any questions? | Yes | No |
|--|-----|----|
| 2) Do you wish to participate in this interview? [If no, thank them] | Yes | No |
| 3) Do you consent to having our voices recorded? | Yes | No |

II. Demographic information

The following information is to inform our analysis.

4) Name: (optional)

[Note: If the respondent does not want their name written down, just write "villager" or "student" or a similar description and assign a unique number to be used later for the recording]

5) Gender (observe and record): a. Male b. Female

6) Age (optional): _____

7) Ethnicity (optional):

Information for interviewer to fill in:

8) Power Africa Transaction that resulted in the connection: select one [on-grid, mini-grid, solar home system, solar lantern]

Note – this selection will replace the words below that say "Power Africa-linked power source" in the electronic version of the questionnaire

Interviewer Script:

Thank you for agreeing to take part in this data collection. We greatly value your time and the information you agree to share with us. Let's begin.

- We would like to start by asking about your access to energy that you use for lighting, heating, and any other purpose before you gained access to electricity from the [Power Africa linked power source]
 - 1.1. Before the [Power Africa-linked power source], how did you access energy at home? [Ask respondent about each option and select if they have this: solar lantern, solar home

system, grid connection, diesel generator, petrol generator, batteries, candles, firewood, dung, charcoal, kerosene lamp, other_____.]

- 1.2. What was your primary source of energy? [list one option from the list provided in 1.1]
- 1.3. Before [the Power Africa-linked power source], how many hours of energy did you access on an average day from each of those energy sources you just mentioned at home? [allow for numerical answer for each option listed in 1.1]
- 1.5. Did you regularly use any devices, electronics or equipment that needed electricity? [Ask respondent about each option and select if they have this: cell phone/phone charger, lights, television, radio, rechargeable batteries (including for flashlights), electric cookstove, refrigerator, fan, irrigation pump, other:_____. None.]
- 2) When did you gain access to electricity from the [state the Power Africa-linked power source]? (list Month and Year, or only Year if month unknown. OR Cannot remember)

Now I would like to talk about your access to energy after you gained access to electricity from the [Power Africa-linked power source].

- 3.2 Including the [Power Africa-linked power source], what are your sources of energy these days at home? [Ask respondent about each option and select if they have this: solar lantern, solar home system, grid connection, diesel generator, petrol generator, batteries, candles, firewood, dung, charcoal, kerosene lamp, other_____. None.]
- 3.3 Of all those sources of energy, what is your primary source of energy these days? [*list one option*]
- 3.4 After the [Power Africa-linked power source], how many hours of energy did you access on an average day from each of those energy sources you just mentioned at home? [allow for numerical answer for each option listed in 3.2]
- **3.6** What electricity-reliant objects or devices do you regularly use these days? [Ask respondent about each option and select if they have this: cell phone/phone charger, lights, television, radio, rechargeable batteries (including for flashlights), electric cookstove, refrigerator, fan, irrigation pump, other:_____. None]
- 3.7 Do you plan on buying additional objects or devices that require electricity in the next 6 months? If yes, please list which ones. [Ask respondent about each option and select if they have this: cell phone/phone charger, lights, television, radio, rechargeable batteries (including for flashlights), electric cookstove, refrigerator, fan, irrigation pump, other:_____. Or Select None]

3.8 Do you plan on obtaining any additional sources of energy in the next 6 months? If yes, please list which ones. [Ask respondent about each option and select if they have this: solar lantern, solar home system, rid connection, diesel generator, petrol generator, batteries, candles, firewood, dung, charcoal, kerosene lamp, other_____. OR Select None]

IV. Qualitative Questions on Electrification Process

Begin **recording** (if allowed). Once recording has started, verbally announce the name of the community/village and the name of the respondent if given, if not record the name of the community and the number assigned to the respondent at the beginning of the interview.

Now we would like to know how the connection to electricity happened.

[Restriction: IF INDIVIDUAL ANSWERS ON-GRID OR MINI-GRID TO QUESTION 9 IN SECTION I ABOVE → PROCEED WITH QUESTIONS 4.1 – 4.3. IF NOT SKIP TO QUESTION 4.4]

For on-grid or mini-grid solutions:

- 4.1 Who do you think was responsible for the connection?
- 4.2 Did you know the connection was coming? Possible probe: Who told you?
- 4.3 Did anyone provide an explanation for why you or the community was being connected to the grid? _____

For solar home systems or solar lanterns:

- 4.4 How did you come across this system- Did someone come to you or did you have to find the solar company?
- 4.5 Why did you decide to buy or rent the [Power Africa-linked power source]?

Now we would like to know a bit more about how access to [state the Power Africa-linked power source] has influenced your life and your community.

V. Most significant change in personal life of respondent

Continue recording

Interview Script:

I'd like to ask you to think of the most significant change as a result of the access to power. We would like to hear your story and are interested in collecting as many details as you can recall. Please feel free to take your time in answering these questions.

- 5.1 Looking back over the time since you've had the [Power-Africa linked power source], what do you think was the most significant change in your life after you gained access to this new electricity source?
- 5.2 Why is that significant to you?
- 5.3 Looking back over the time since you've had the [Power-Africa linked power source], what do you think was most significant change for your community as a result of the access to this new electricity source?
- 5.4 Why do you believe that is significant?
- 5.5 Has the [Power-Africa linked power source] changed your income and/or expenditures in any way? How?
- 5.6 Other than the stories you've just shared, has your this source of electricity created any other changes in your life?

End the recording

VI. MSC interview consent form

Interviewer Script:

Thank you for sharing your experiences with us. The US Government may want to use your interview for reporting purposes or to share with other research participants and the general public, or to add to the Power Africa initiative website. We previously mentioned that your information will not be shared unless you give permission. You are not required to give this permission.

6.1 Do you consent to us using your story for publication or reporting?

Yes No

[Restriction: If the respondent says no, please conclude the interview. If the respondent says yes, continue to questions 6.2 and 6.5]

6.2 Do you want to have your name on the story? Yes No

6.5 Would you be willing to provide your contact information in case there are any followup questions for the publication (optional): ______ Please conclude the interview and thank them for their time.

Enter End Time of Interview

Collect GPS coordinates (optional)

ANNEX IV. MOST SIGNIFICANT CHANGE STORIES

I. SUSANA – KOFIHWIKROM, GHANA

My name is Susana. I live in the Kofihwikrom, a rural community in central Ghana. I work as a midwife at the local community health center. When I started working at the facility there was no electricity, but this changed in 2017 when a company called Black Star Energy installed a solar grid in the community.

Prior to the installation, working here was very tedious and uncomfortable. Originally, I was supposed to go to a community that had light, but was transferred here instead. Previously, when patients and clients came in during the night, there was no electricity to take care of them. The place was very dark and there was no entertainment like a television in the community. This made life boring, and the work very difficult. If it were not for the light, I likely would have asked for a transfer.

Thanks to the electricity, life has improved, both for the health center and the wider community. For example, we now have refrigerators that preserve our vaccines. Previously, the community health nurse would have to transport the vaccines from Jakobu to Antoakrom Health Center, where they could be kept. Even then, our staff would have to travel to Antoakrom to get the vaccines before conducting any outreach with the community.

"Also, if you don't have lights ... how are you going to reconstitute the drug ... you will not be able to take the right amount of drug you are supposed to give to the patient. So it might even bring in mortality to the client. But when there is light, you are able to see well and prevent emergencies ..."

Now that we have electricity, we can keep the vaccines here. We take the vaccines to the outreach center to stop childhood diseases like tetanus, measles, and tuberculosis. If you don't keep these vaccines in a fridge, and you administer the vaccine, there is no immunity. But when there is electricity, you can keep the vaccines in the refrigerator until you are ready to transport them to the outreach center.

Electricity also means that we can help more patients. When pregnant mothers come in at night, I now have light to work for the number of hours the delivery requires. This improvement to my work has been the most significant change in life. It has helped save lives. Previously, if a mother came in at night, I would have to hold a torchlight while my hands were bloody. Now, as a result of electricity, my hands are free to perform the work and I can see well thanks to the light. The ability to see properly is very important. You definitely need a source of light to help you stop the post-partum hemorrhaging.

2. EMMANUAL – KOFIHWIKROM, GHANA

My name is Emmanuel, and I live in Kofihwikrom, a small farming community of Ghana. Two years ago, I was able to connect my home to a solar grid built by Black Star Energy. Since then, life has improved.

I used to spend a lot of time and money traveling to charge my phone in Bekwai. Now I am able to do it at home. The ability to see, thanks to the "I have killed about three cobras in my compound ever since the solar home system came. It has helped improve my security. Before the solar home system, it was difficult to spot these snakes and other harmful objects." electric light, also means I can see snakes and other harmful objects at night. I have killed about three cobras in my home ever since the solar home system was installed.

In terms of entertainment, I can also listen to the radio. Previously I was dependent upon batteries, which I could not afford to buy constantly. This has been the most significant change in my life. The radio is a source of news and entertainment, so I am able to stay connected to the world at all times. But there are other beneficial changes throughout the community as well. Children can now study at night, and the local clinic can refrigerate its medicines.

Even quality of care from the nurses and other staff has improved, because people are happier. A lot of healthcare professionals refused postings here previously because we did not have electricity. Many patients would be referred to Bekwai. Now we have professionals working at the facility to provide the best care.

Another change in the community is that we now have a cold store. Formerly, we had to walk long distances to buy fish and meat. Now we have two cold stores and cold water, which have also brought business to the community.

3. KOFI – ADOOWA, GHANA

My name is Kofi. I live in the Adoowa community of Ghana. We received electricity two years ago from a solar grid, which my home is now connected to. Since then our life has transformed.

My wife runs a family business selling groceries, fresh fish, and drinks. Prior to having electricity, it

"Once we got connected to the solar system, we acquired a refrigerator. With it, we are able to buy and preserve more fresh fish for sale. We serve more customers now and that has increased our daily income from the business."

was a struggle to preserve the fish all the time. Even though there was high demand for fish in the community, we could not expand our business because we had no means of preserving it. Now, we do not have to worry about how to preserve fresh fish. This improvement in my wife's business is our most significant change.

Once we got connected to the solar grid, we acquired a refrigerator. With it, we were able to buy and preserve more fresh fish for sale. We also sell more soft drinks compared to other shops in the community, because people prefer them cold. This has increased our daily income from the business, from 70 GHS to 150 GHS within a very short period. This gives us enough money to cater to the needs of our children in school, and pay for general upkeep.

There have also been major changes in the community. We no longer live in the dark because most areas have streetlights due to the solar system. Security has also improved. The incidence of theft and crime has almost been eliminated because the streetlights provide more security for the community. Lastly, more teachers accept postings to our schools because they can have access to power. They stay to support the children, can iron their clothes, charge their phone, and watch television.

Previously, without power, teachers kept moving in and out of the community. This is a significant change to the community, and I have seen my children's education improve. The teachers stay longer and the children like to learn more now. In the previous term, my youngest child had fourth position in his class, while the elder had fifth position. This past term, they both took first position in their classes.
4. ELISA – TULU DIMTU, ETHIOPIA

My name is Elisa. I live in a condominium in the Tulu Dimtu community of Ethiopia, and I own a restaurant. A year ago, we were not connected to adequate power, with everyone sharing a communal line left over from construction of the condominium. You were not able to use the

"The smoke, the time it took to kindle the fire and the time it took to take out to customers ... If I were able to serve ten customers then, now I am able to serve 30 to 40 customers."

power any time you wanted, and the breaker would disconnect the power if you used electrical appliances.

Now that we have been connected to the power lines, I am able to use the blender for juice, coffee and the like, as well as a stove and electrical oven to make Injera. This means I can take any order out to the customer quickly. Previously, with firewood, it took thirty minutes for an order to get served to a customer. Now, I can serve a customer in five to ten minutes. Further, I do not get exhausted now, so I can go out of the kitchen to serve customers and receive comments from them. I can serve almost double the number of customers, as I was able before.

I am also able to preserve produce and store it in the freezer, which I was not able to do before. Previously, we threw out a lot of vegetables and meat products, which were a major loss of profit on the business. This cost even more than what we spend on power, about two to three thousand [Ethiopian] birr per week. There is nothing like that now, because of the electric power supply. It also enables me to keep the restaurant open for as long as I want to, even at night when there is enough business to work.

The business is now profitable because of these changes. The power saved a lot of labor and money I was spending previously. Previously, the restaurant would use firewood, which took a lot of time, money and labor compared to the current situation we have now. Charcoal would only last a few days, and I would spend up to three thousand birr back then for energy on firewood and kerosene, without considering the labor and time wasted. Now I pay around 50 percent of the expense I did before, and my profit grew because of it.

This profit motivates me to work harder to achieve my dreams—a bigger restaurant in the future. I am also able to send my children to a better school, and I am happy because of this.

5. YARED – TULU DIMTU, ETHIOPIA

My name is Yared, and I own a Pharmacy in Woreda 9 of Tulu Dimtu, Ethiopia. I opened my shop right after the community was settled. Previously, there was one line of communal power that almost 20 to 30 people used. It was not enough power and damaged equipment because of power shortages. One line was distributed for all the houses and power was not enough for any of us to use properly.

"Before the [on-grid] connection, we almost never used the refrigerator since there was not enough power... We stopped bringing many medicines because of that ... [now] you can take medicines for diabetic people, tetanus medicines and so on... Now that we do not have power shortage, we are able to store our medicines properly"

Access to power has caused a big change in my work because I am able to use a refrigerator at the pharmacy. There was not enough power to do this before. Now, we can take medicines for diabetic people and tetanus. Now that we do not have a power shortage, we are able to store our medicines properly. We carry more medications that patients ask for, with tetanus and insulin being the two most important. We must have them by all means necessary, and people used to get angry with us when we told them we did not. In addition to losing money, we lost customers. Now we do not have this type of problem.

Previously, people could not see clearly using just the solar lantern. It did not generate that much brightness. Now they can see. We also have the medicines they want, so I can compete with other businesses. Previously, customers used to go to Akai or Kality (five and ten kilometers away, respectively), but now they come to us. They get to have whatever they need nearby. People also walk around the neighborhood at night when there is light, so it is possible we stay open until I0–I0:30 p.m. Before, we closed around 7–8 p.m.

After the power connection, there has been a 50 percent change in our income. Earlier there were not enough people living out here. Now that the connection to power is possible, many people moved out here, increasing our customers. This has created a lot of change in my life. I have bought appliances for my home, like a washing machine and an oven, and am thinking about opening another business as well.

Because of the power connection, everything is possible. You can't seem to do anything without the connection. There is nothing like electricity.

6. NEGA – MUHER AKLIL, ETHIOPIA

My name is Nega. I live in Muher Aklil, Ethiopia with seven people in the same room. Before we got the solar home system, we used to use kerosene lanterns. I used kerosene when I used to go to school, and I didn't want my children to go through the same struggle. It is very dangerous, and there were other children who died using kerosene. They were lying on the floor studying when the gas spilled. In this neighborhood, another

"It is very dangerous to use kerosene lantern... There were children who caught fire and were killed... They were lying on the floor and studying when the gas spilled on them and caught fire. I thought about that when the solar system opportunity came to our town"

child's face got burned and the whole house burned down. So I thought about that when the opportunity for solar came.

Now my children are pursuing their education without any worry.

My children have shown progress in their education. They are becoming more confident in their education than ever before. More than anything, we are very happy about our life since the solar connection. We don't have to worry about having firewood to light up the house at night; now we just sit and eat dinner happily with the lights on. We have also become more conscious about our lifestyle and health. Our interactions are happier and more peaceful than before. My children are able to study as long as they want, or they can just play or sit in the house without any worry. So if we didn't have the solar system in our house, or life would be very hard to handle.

Providing good education for your children means preparing them for the future. If they have a bright future, that means I will have a bright future as well. I don't want them to be farmers like me, so I want to provide everything I can to help them succeed. In the past, there was only one lantern in the center of the house hanging from the ceiling. Now, having light has encouraged them to study more and that gives them confidence to do whatever they want in their lives. If they do well in their studies, they will definitely reach a great position. It is possible that they could even rule their country.

There are people in my neighborhood that gained the solar system before I did, and when you see their lives now, their children are well educated and their lives have improved so much. Some of their children are now teachers in our neighborhood's high school. When you see children of parents who have solar home systems, almost all of them completed their education and are able to reach great positions, and it is all because they were able to study using electric light. That is what I am doing now—providing solar home system for my children to encourage them in their education.

7. JOSEPH – RINGITI ISLAND, KENYA

My name is Joseph, and I am the head of a fishing cooperative on Ringiti Island, Kenya in Lake Victoria. Long ago, before we got this light from a company called Renewvia, we had a lot of problems. There was darkness everywhere. Now, there is light and we have seen big changes.

"There is a great change... here in Ringiti we depend on fishing, [so] because of this light, we can even fish at night... We work at night just like the day time because of the light."

The way the cooperative works, the fishermen bring in the fish that we sell. They keep the majority of that amount, and a small amount goes into an account for them within the cooperative. Of what goes to the cooperative, this is mostly kept for the fisherman's savings, with a very small amount going to operational expenses of the co-op.

In Ringiti we depend on fishing, and because of this light, we can even fish at night. Since we got electricity, we can now work past 7pm, which has increased our income up to three times. With this, we hope to buy extra engines for the members. We've also been saving this money to buy a refrigerator in December. The members of the cooperative also benefit individually. Some own televisions and can charge their cell phones from the comfort of their own home. Others have electric irons and refrigerators.

It has benefitted the fisherman because they used to suffer a lot at night. They used to stay in the dark the entire night guarding their fish, but now thieves cannot come and steal their fish. When we had darkness people could do that, break a door and go, but that has stopped completely.

Now that we have electricity, the community has changed. People can iron their clothes, charge their phones, and watch television. The light helps in business, which makes people at home very happy because there is daily bread. In my own home, I can purchase food regularly instead of in small quantities like before. It is important because the children at school do not perform well without the proper nutrition.

Businesses also stay open later in the community because of the light. This is very helpful for the fishermen, because they can get food from the shop after it is dark when they come home from fishing. They can bring bait and transact business at night. Now when the dark comes, you just switch on the light and it is light until morning. Everywhere in Ringiti is lighted.

8. JULIA – KAPTUIYOT, KENYA

My name is Julia, and I live in Kaptyuiyot near Eldoret, Kenya. I had hoped that my children would finish school and assist in getting us access to electricity, but by the grace of God the government came to our aid.

Before getting electricity, we used to rely on kerosene lamps. Now, our standard of living has

"The electricity performs a number of functions such as security and lighting up everywhere. Like, now the children's rooms can stay well-lit for hours, or even continuously. The security lights can stay on until morning ... the security has improved."

improved, and we have replaced the kerosene lamps with solar. The children's rooms can stay welllit for hours, even continuously, and the security lights can stay on until morning. Before, you had to wake up and light the kerosene lamp before you could move outside. Because of this, security has improved.

The children are also studying more, and I've noted that their grades have improved. My daughter, in class six, recently scored 380 marks when previously she had 360. When I asked her how she did it, she simply said she wakes up to study at night. I also have a son who comes to study for about an hour and is in a day school as well. Education is the most important change, because it means that I

will not have problems. When the children study well, they will get good jobs and be able to support me in the future with a good education. I also want them to live well on their own in the future, as I may not be able to support them. I do not want them to live a life of poverty.

There have also been important changes to the community. Before, the community used to rely on a seasonal river and wells along the river. There are still people that go there to fetch water today, but many can access water through boreholes. In the community, you will find that some people pump water, using electricity, and assist others that do not have reliable water sources. This saves people time from having to fetch water. The water from boreholes is also cleaner than the river, because it does not bring dirt, which can help improve health in the community.

9. SAMUEL – KABUSA, NIGERIA

My name is Samuel, and I am a business owner living in Kabusa, Nigeria. Even though we initially had power from the grid, the government did a power upgrade so we can get more hours of light in a day. Prior to 2016, there were many business

"My business is the most significant change for me because my business is the one putting food on my table. If with electricity, my business is on, my family is happy."

ideas that I could not execute because of poor light. After 2016, when the light became more stable, I began to think about those ideas, and started an ice-block and a poultry business.

Before the power upgrade, I had tried to run the poultry business but I couldn't keep up because you need energy to sustain it. If you have broilers, you need heat, and we were using kerosene lanterns at the time. Sometimes they push the lantern down and the kerosene would pour out and start burning. It is also very difficult to run an ice-block business on a generator, so there are some business ideas I was not able to execute. After the intervention upgrading the power, I have been able to do all of these things.

Now, my poultry business grows more birds because during the raining season, the heat allows them to survive. If there is no electricity to heat them up, you lose a lot. So, the poultry business is doing very well because of the constant supply of electricity. It has made me strive in my business, and make good profit, which I have extended to family and friends. I have also used this profit to build my own house, where my wife and baby are happy because they can watch television with the electricity.

At the community level, the electricity has helped with water. Before we were suffering and people had to go the stream to fetch water. Now, many people have boreholes. Businesses have also spring up, such as milling machines. Welders have come into the community and trained other people in the community. This brings about development. Development has come to Kabusa.

10. CHUKWU - KABUSA, NIGERIA

My name is Chukwu and I live in Kabusa, Nigeria. My community received an improvement to the on-grid electricity in 2016, and now we have light regularly. This has been an improvement in my life.

Before the electricity was upgraded, our food used to get spoiled and we would have to cook every

"Firstly, I am happy ... I have fresh goods to sell ... Before when my customer comes, they will say my goods are not fresh ... [now they] buy fresh fish from me and I am happy that I am selling good things for the member of the community."

day. We also did not sleep very well because we would get heat rashes, and businesses lost money as a result of irregular or unstable light. Now we can cook food in bulk and keep it in the refrigerator, which also helps to save time and energy. Business is moving and it gives me happiness because I used to think about all the goods that spoiled. Now I can freeze my stock, buy and resell, and business is moving very well. Now with this electricity I am much more relaxed. Before this improvement the energy bill was very high. It cost so much I had to close down my cold room business. But now I don't think about the light. It has helped my business and I can eat fresh food. Before, I used to have constant high blood pressure, but now it is gone. I also used to have a lot of headaches. Now, I have fresh goods to sell and the headaches have disappeared because of the constant light.

Before the improvement, customers would come and say my goods are not fresh. Sometimes I would have spoilt fish due to electric shortages. Now, the community no longer talks against me and I am happy to sell good things to the community. The community also saves money because they can buy fish from me. If they go to the market they have to pay for transportation to and from. This gives them joy because now they can eat fresh food. I am also able to save more now because more people buy from me.

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