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# Productive Use of Electricity – Survey Results Report

## NRECA Cooperative Development Program

Cooperative Agreement Number AID-OAA-A-13-00020

May 2020

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# **Productive Use of Electricity Survey Results Report**

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# Executive Summary

## Background

This activity was implemented by NRECA International (NRECA) through funding from the United States Agency for International Development (USAID) and is hosted by the Uganda Rural Electrification Agency (REA). This activity was designed to engage productive uses of electricity (PUE) entrepreneurs in the three rural electric cooperative service territories, which include Bundibugyo Electricity Cooperative Society (BECS), Kyegegwa Rural Electric Cooperative Society Limited (KRECS), and Pader-Abim Community Multipurpose Electricity Cooperative Society (PACMECS). This activity is modeled after a similar activity which was completed by the Power Africa Uganda Electricity Supply Accelerator (PAUESA) program in 2018 in the Kalangala Infrastructure Services (KIS) service territory.

The project objectives include: 1) identification of PUE entrepreneurs in twelve trading centers (TCs) across the three service territories; 2) identification of enabling institutions (financial, training, and trade organizations) in the same twelve TCs; 3) characterization of the PUE and enabling institution activities; and 4) selection of PUE entrepreneurs for business development skills (BDS) training and mentoring.

## Methodology & Survey Implementation

The trading center selection was done through a geospatial information system (GIS) analysis to identify the four trading centers in each service territory with the largest population. This proposed list of trading centers was then reviewed with REA and the electricity distribution service providers (SPs) to ensure that these were appropriate choices. Finally, the trading center selection was coordinated with the PAUESA team to ensure that there were no conflicts with the trading centers they were targeting for a similar PUE engagement project in the BECS, KRECS, and Kilembe Investments Limited (KIL) service territories.

Two survey instruments were developed – one for engagement with the PUE entrepreneurs and one for engagement with the enabling institutions. The open source Open Data Kit (ODK) platform was used for both applications. The sampling frame selection initially used a census approach to engage with all PUE businesses in each trading center, but the GIS analysis indicated that this would provide a sample population that would exceed the practical capacity of the BDS training and mentoring activity. Based on this challenge, the sampling approach was changed to identify the most prominent PUE activities in each trading center with a sampling goal of 50 PUE entrepreneurs per trading center. This information was obtained from each of the service providers and incorporated into the survey instrument and included such activities as welding, metal fabrication, carpentry, hair salons, and refrigeration/cold drinks.

Upon completion of the survey instruments, survey training and testing for the enumerators took place on February 20-21, 2020. The field survey was then started on February 23, 2020 and completed on March 11, 2020. A total of 555 PUE samples were obtained across the 12 trading centers, which represented 93% of the sampling goal of 600 entrepreneurs. In contrast, only 110



enabling institution samples were obtained, which represented only 46% of the sampling goal of 240 institutions (20 per trading center), revealing a limited presence of these institutions in the selected trading centers.

The most significant challenge faced by the survey team during the implementation process was the need to replace all of the selected trading centers with new locations in the BECS service territory. In the case of Hakitengya and Kirumiya trading centers, floods and landslides required relocation of businesses and residents to new locations. These trading centers were replaced by Bubukwanga and Burondo for the survey. An initial visit to Buganikere revealed that there were an insufficient number of businesses to meet the sampling goal for the survey, so this trading center was replaced with Bundimasoli. Upon visiting Bundimalinga, it was discovered that this trading center was surveyed under the PAUESA activity with an alternate trading center name of Nyahuka, so this location was substituted with Rwamabale.

### Survey Results Findings

The PUE survey samples were distributed among three categories which include production (carpentry, cocoa drying, grain milling, metal fabrication, etc.), services (hotels, restaurants, printing/copying/stationery, drug stores), and entertainment (bars, betting centers, cinema halls. The services category dominated the sample population at 62% (344 samples), followed by production at 34% (190 samples) and entertainment at only 4% (21 samples). The distribution of the PUEs over the three service territories at the category level was significantly different. For example, BECS had more production PUEs while PACMECS dominated the service category. Specific activities from both the production and services categories represent “value added” businesses. The value added to an input from a value chain is in most cases directly sold to the consumer after production or in some cases to a retailer that might sell to the final consumer. The coop service territories varied significantly in the types of value added activities, e.g., BECS was the only one with cocoa drying while grain milling was dominated by PACMECS and carpentry/timber production was most prevalent in KRECS. The breakdown of the PUEs into production, service and entertainment provides useful indicators for the week-long BDS training and mentoring, i.e., which ones will provide most revenue to the electricity providers while helping those with the most need for training in business planning, expansion plans, and financial need. In contrast, those entrepreneurs with more simplistic businesses such as mobile money sales and phone charging will be better served with basic financial literacy training

Key findings from the enabling institution survey results reveal a limited sample size, averaging only nine institutions per trading center. Financial institutions (91%) were the predominant type – with only six training organizations (5%) and fourteen trade associations (13%) across the sample population of 110 institutions. Some of the enabling institutions identified themselves under than one category. Among the financial institutions, the majority are community-owned village savings and loan associations (VSLAs). The financial institutions do have PUE, energy access, and agricultural loans available – but more than two-thirds report a low to medium level of engagement with PUE entrepreneurs. The primary products available from the VSLAs are quick loans and savings. Across all of the enabling institutions, the primary means of engagement with PUE entrepreneurs was face to face meetings. Trade organizations were predominant in BECS service territory – with an alarming 93% reporting a low to medium level of engagement with PUE



entrepreneurs. The most common training offered by these organizations includes record keeping, business basics, and customer service. In contrast, 50% of the local business development skills (BDS) training organizations indicated a high level of engagement with PUE entrepreneurs. These organizations were concentrated in PACMECS service territory and indicated a focus on farming, metal fabrication, and financial literacy.

In order to select a portion of the PUE respondents for the BDS training and mentoring, a business ranking scoring (BRS) system was developed to allow for an assessment of each of the businesses. This scoring system addressed five categories which included: record keeping, cleanliness and organization, energy level and engagement, customer interaction, and overall assessment of the business for a maximum score of ten points. Selecting those entrepreneurs ranked 8-10 for BECS and KRECS and 9-10 for PACMECS, a desired training population of ~300 entrepreneurs can be identified using the BRS approach. However, further investigation of these results indicates that only 40% of entrepreneurs selected in this manner represent “value-added” business such as grain mills, cocoa drying, metal working, carpentry, hair salons, and tailor/seamstress – while 60% are more “simplistic” retail businesses such as phone charging, mobile money sales, and drug stores. In addition to business activities, the presence of a grid connection was incorporated into the trainee selection process. This criterion was added due to the fact that this activity is part of a cooperative development project which is expected to increase service provide revenues due to increased energy consumption gained through PUE engagement. Incorporating all three criteria (top business ranking score, value added business, grid connection) results in a trainee candidate population of 129 entrepreneurs. Based on the expected BDS training capacity, this will allow each of the selected businesses to send two representatives – for a total of 258 trainees.

From a demographic perspective, the trainee selection results reveal a significant gender imbalance across all of the service territories with an overall male to female gender ratio of nearly 3:1. Hair salons are the most prominent activity in all three service territories, accounting for more than one third (36%) of the selected trainee population. Metal work/carpentry are also significant in KRECS and PACMECS, accounting for another 14% of the potential trainees. Cocoa drying is prominent in BECS but is limited to this service territory. From a geographic perspective; trainee candidates are concentrated in Bundamasoli, Kakabara, Hapuyo, Kalongo, and Palabek – accounting for more than 60% of the population.

### Recommendations

Going forward recommendations include the selection of BDS training and mentoring candidates, further investigation of the low uptake in PUE loans among survey respondents, consideration of financial literacy training for those entrepreneurs who are not invited to the BDS training, future PUE engagement by the proposed common services entity (CSE), and initiatives to address gender balance issues among PUE entrepreneurs. The next step in this project is the BDS training and mentoring activity for a selected population of PUE entrepreneurs.

Based on the survey results, it is recommended that a population of 129 PUE entrepreneurs be invited to the training which represent a combination of the highest ranking BRS scores, value-added businesses, and grid connected respondents. In order to provide the greatest impact to each business, it is recommended that the business manager and one senior employee attend the training



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– resulting in a trainee population of 258 individuals. In an effort to address the gender imbalance, it is recommended that a female be selected as the senior employee in case where the business manager is male. This training is expected to be a five-day training in each of the three service territories, with three days of training and two days of mentoring. Tentative training locations include Bundibugyo (BECS), Kyegegwa (KRECS), and Gulu (PACMECS). This training will be provided by a local BDS training organization.

The survey results also reveal a significant shortfall in the uptake of PUE loans among respondents, with only 13% reporting receiving such loans. This finding is supported by the low to medium level of engagement with PUE entrepreneurs reported by financial institutions. However, this low uptake is in contrast with the fact that financial institutions are the most prevalent type of enabling institutions and that they report having PUE, energy access, and agricultural loans available. Based on the survey results, one explanation for this shortfall may be the reported “low savings culture” in these communities which provides a limited amount of available funds for the predominant type of lender utilized by the PUEs surveyed (i.e., village savings and loan associations or VSLAs) to distribute to loan applicants. It is recommended that representatives of the local financial institutions facilitate a discussion with the PUE entrepreneurs during the BDS training activity to further explore the reasons for the low uptake in PUE loans and to explore potential solutions.

As noted in the BDS trainee selection process, a majority (60%) of the highest-ranking business represent more simplistic businesses such as phone charging, mobile money sales, refrigeration/cold drinks, drug stores, etc. While it was recommended that the five-day BDS training and mentoring would not be an appropriate intervention for these entrepreneurs, basic financial literacy training is recommended for this group of entrepreneurs. Since the implementation of this recommendation is outside the scope this PUE engagement activity, consideration should be given to leveraging the strong presence of VSLAs to provide this intervention to their members through a follow up PUE engagement activity in the future.

The survey results reveal a significant gender imbalance among PUE entrepreneurs, enabling institutions, and selected trainee candidates. While it is beyond the scope of this project to address this disparity, this issue should be kept in mind as REA and USAID look to the design of future PUE engagement activities. Potential interventions to increase the participation of women in PUE businesses may include PUE loan products targeted to women interested in starting PUE businesses, women’s groups among current female led PUE businesses, leadership training programs among current female led PUE businesses, and awareness programs targeted to female students at the local high schools and universities.

This PUE engagement activity is part of a larger cooperative development project which includes a parallel activity to develop a business plan for the formation of a common services entity (CSE) among Uganda’s rural electric cooperatives and small electricity distribution service providers. Based on the strategic planning workshop for the CSE activity which was held in January 2020 and a subsequent stakeholder survey PUE engagement, training/capacity building, and “beyond the meter” initiatives are priority needs which will be incorporated into the business plan. As such, the formation of the CSE may allow for ongoing training/capacity building opportunities, proactive engagement with entrepreneurs and financial institutions to increase PUE loan uptake, and “beyond the meter” initiatives to facilitate equipment sales to entrepreneurs through the CSE.



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## Acronyms and Abbreviations

BDS	business development skills
BECS	Bundibugyo Electricity Cooperative Society
CSE	Common Services Entity
DVD	digital video disc
EI	enabling institutions
GIS	geospatial information system
KIL	Kilembe Investments Limited
KIS	Kalangala Infrastructure Services
km	kilometer
KRECS	Kyegegwa Rural Electricity Cooperative Society Ltd
kWh	kilowatt hours
LC1	Local Council Level One
LPG	liquid petroleum gas
MCC	Millennium Challenge Corporation
MFI	microfinance institution
NGO	non-governmental organization
NRECA	National Rural Electric Cooperative Association
ODK	open data kit
PACMECS	Pader-Abim Community Multipurpose Electricity Cooperative Society
PAUESA	Power Africa Uganda Electricity Supply Accelerator
PUE	productive use of electricity
PV	photovoltaic
REA	Rural Electrification Agency
SACCO	savings and credit cooperative
SP	service provider



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TC	trading center
TV	television
UGX	Uganda shillings
USAID	United States Agency for International Development
VSLA	village savings and loan association



## Introduction & Background

This activity is part of a larger cooperative development project which is being implemented by NRECA International (NRECA) to support the needs of the rural electric cooperatives in Uganda. This project is funded by the United States Agency for International Development (USAID) and is hosted by the Uganda Rural Electrification Agency (REA). The cooperative development project includes this productive use of electricity (PUE) engagement activity as well as a training component and the development of a business plan for the formation of a Common Services Entity (CSE) of the rural electric cooperatives and small electricity distribution service providers (SPs).

Uganda's rural electric cooperatives include Bundibugyo Electricity Cooperative Society (BECS), Kyegegwa Rural Electricity Cooperative Society Limited (KRECS), and Pader-Abim Community Multipurpose Electricity Cooperative Society (PACMECS). Each of these cooperatives are serving small, rural service territories where the majority of their consumers are residential households. As such, identification of productive uses entrepreneurs and interventions to expand their businesses will serve to increase electricity demand and revenues for the cooperatives. In addition, the formation of the CSE may also serve to enhance the long-term expansion of productive uses activities through loan facilitation and equipment sales since the CSE is able to engage with consumers "beyond the meter" since it will be a trade association and not a regulated utility.

This project is modeled after a similar PUE engagement activity which was completed in the Kalangala Infrastructure Services (KIS) service territory in 2018 which targeted thirteen trading centers. This activity was implemented by Sanford Group Limited through funding from USAID under the Power Africa Uganda Electricity Supply Accelerator (PAUESA) program and is summarized in the *Report on the Business Skills Training in Productive Uses of Electricity Undertaken on Bugala Islands for Kalangala Infrastructure Services*. The scope of work for this activity included a PUE identification survey, business development skills training, business development skills mentoring, and additional follow up with productive uses entrepreneurs.

In addition to this current activity, NRECA was engaged by USAID to develop a *Productive Uses of Electricity Program Initiative* report which was completed in November 2018 and followed up by a stakeholder workshop in December 2018. This activity included the development of business cases for eight agricultural value chains including maize, cassava, coffee, fish, poultry, vegetables, fruit, and dairy. Each of these business cases considered the equipment needs, availability of local equipment suppliers, loan requirements, expected revenues, and potential profits for entrepreneurs who may be considering the initiation of agricultural PUE businesses. In the context of this PUE engagement activity, these business cases could be used as illustrative examples in the BDS training curriculum.

## Project Objectives

The objectives of this productive uses of electricity identification survey activity are as follows:

- To identify PUE entrepreneurs in twelve selected trading centers in BECS, KRECS, and PACMECS service territories



- To identify enabling institutions (financial organizations, business development skills training organizations, and trade associations) in the same twelve selected trading centers in BECS, KRECS, and PACMECS service territories
- To characterize the PUE activities and enabling institutions identified in the selected trading centers
- To select a portion of the PUE entrepreneurs for business development skills (BDS) training and mentoring

## Methodology

### Trading Center Selection

The selection of targeted trading centers for this activity was accomplished through geospatial information system (GIS) analysis, coordination with the PAUESA team, coordination with REA, and coordination with each of the electricity service providers. The goal of this task was to select four trading centers in each service territory (BECS, KRECS, and PACMECS) for a total of twelve trading centers for the PUE identification survey.

In order to perform the GIS analysis, NRECA utilized the geodatabase which was created to support the development of the service territory master plans for REA. Based on the assumption that the largest population centers in each service territory would correspond to the highest level of PUE activity, the GIS analysis was used to identify population centers with the highest number of rooftop structures (households and businesses) within a 1 kilometer (km) radius of the existing distribution transformers in each service territory. Those structures within a 1 km radius of the existing distribution transformers are the most likely to already have an electricity connection or are in sufficient proximity of the network to receive a connection. Please note that in the implementation of the PUE identification survey that home-based businesses were not included.

Following the completion of the GIS analysis, NRECA coordinated with REA's Senior Rural Electric Cooperative Development Officer to confirm that the selected trading centers represented appropriate targets for the PUE identification survey. NRECA also coordinated with the general managers for each of the rural electric cooperatives (BECS, KRECS, and PACMECS) to confirm that the selected trading centers represented appropriate targets. In addition, NRECA International was informed that PAUESA was implementing a similar PUE identification survey in KRECS, BECS, and Kilembe Investments Limited (KIL) service territories and that the survey activity was already in progress. In response to this information, NRECA reviewed the list of selected trading centers for KRECS and BECS service territories to ensure that there was no duplication of effort between the PAUESA and NRECA activities. The results of the trading center selection process are provided in Table 1 below:

**Table 1.** Selected Trading Centers

Trading Center	District	Service Provider	Service Territory
Kirumya	Bundibugyo	BECS	Rwenzori
Buganikere			
Hakitengya			
Bundimulinga			
Bukere	Kyegegwa	KRECS	Central



Bujibuli			
Kakabara			
Hapuyo			
Adilang	Agago	PACMECS	Northern
Kalongo			
Patongo			
Kal Central	Lamwo		

## Survey Instrument Design

Two survey instruments were developed for this activity. The PUE identification survey was used to interview PUE entrepreneurs (such as grain mills, carpentry shops, welding and metal fabrication, hair salons, etc.) in each trading center. The enabling institutions (EI) identification survey was used to interview financial institutions, business skills development training organizations, and trade organizations and assess their level of engagement with the PUE entrepreneurs. Both of the survey instruments were developed using the Open Data Kit (ODK) platform.

The PUE identification survey instrument used a willingness to pay/energy consumption framework which NRECA has employed on previous assignments in Uganda and across sub-Saharan Africa. This framework was supplemented by the survey approach referenced above that was used in KIS service territory in 2018. The survey instrument design was also informed by NRECA’s recent experience in evaluating PUE opportunities in the street markets and economic enclaves on a Millennium Challenge Corporation (MCC) funded project in Ghana. The enabling institutions survey was developed to meet the specific needs of this project. The structure of the PUE identification survey is summarized in Table 2 below:

**Table 2.** PUE Survey Instrument Design

Module Number	Module Name	Module Details
1	Identification & Location	<ul style="list-style-type: none"> <li>• GPS location</li> <li>• Service provider</li> <li>• District/Trading Center</li> <li>• PUE activity</li> <li>• Permission to interview</li> </ul>
2	Business Demographics & General Information	<ul style="list-style-type: none"> <li>• Name &amp; contact</li> <li>• Education</li> <li>• Gender</li> <li>• # of employees</li> <li>• Years in operation</li> </ul>
3	Electricity Uses & Requirements	<ul style="list-style-type: none"> <li>• Need for electricity</li> <li>• Electricity uses</li> </ul>
4	Grid Connection and Types of Energy Used	<ul style="list-style-type: none"> <li>• Energy sources</li> <li>• Meter</li> <li>• Connection charge</li> <li>• Internal wiring</li> <li>• Outages</li> <li>• Machinery needs</li> <li>• Agricultural activity</li> </ul>



		<ul style="list-style-type: none"> <li>• Agricultural value addition</li> </ul>
5	Energy Sources	<ul style="list-style-type: none"> <li>• See Modules 5.1 to 5.9 below</li> </ul>
5.1	Kerosene	<ul style="list-style-type: none"> <li>• Use of energy source</li> <li>• Frequency of purchase</li> <li>• Units consumed</li> <li>• Cost of purchase</li> </ul>
5.2	Candles	<ul style="list-style-type: none"> <li>• Same as Module 5.1</li> </ul>
5.3	Dry Cell Batteries	<ul style="list-style-type: none"> <li>• Same as Module 5.1</li> </ul>
5.4	Rechargeable Torch or Appliance	<ul style="list-style-type: none"> <li>• Same as Module 5.1</li> </ul>
5.5	LPG	<ul style="list-style-type: none"> <li>• Same as Module 5.1</li> </ul>
5.6	Diesel or Gasoline Generator	<ul style="list-style-type: none"> <li>• Same as Module 5.1</li> </ul>
5.7	Generator by Local Distributor	<ul style="list-style-type: none"> <li>• Same as Module 5.1</li> </ul>
5.8	Vehicular or Large Battery	<ul style="list-style-type: none"> <li>• Same as Module 5.1</li> </ul>
5.9	Solar PV & solar lanterns	<ul style="list-style-type: none"> <li>• Same as Module 5.1</li> </ul>
5.10	Business use of electric lighting	<ul style="list-style-type: none"> <li>• Lighting inventory</li> </ul>
5.11	Appliance ownership & use	<ul style="list-style-type: none"> <li>• Appliance inventory</li> <li>• Supplier information</li> </ul>
5.12	Cellphone Use	<ul style="list-style-type: none"> <li>• Cellphone ownership</li> <li>• Cellphone charging</li> </ul>
6	Type of Business	<ul style="list-style-type: none"> <li>• Operating fees</li> <li>• Training received</li> <li>• Loans received</li> </ul>
7	Credits Granted	<ul style="list-style-type: none"> <li>• Detail of loans received</li> </ul>
8	Financial Institution	<ul style="list-style-type: none"> <li>• Willing to borrow</li> <li>• Member of financial institution</li> </ul>
9	Interaction with Suppliers	<ul style="list-style-type: none"> <li>• # of suppliers</li> <li>• Materials provided</li> <li>• Local suppliers</li> </ul>
10	Provision of Credit to Consumers	<ul style="list-style-type: none"> <li>• Type of credit</li> <li>• Consumer transactions</li> </ul>
11	Business Revenue and Expenses	<ul style="list-style-type: none"> <li>• Monthly revenue</li> <li>• Monthly expenses</li> <li>• Initial capital</li> </ul>
12	Banking and Mobile Money	<ul style="list-style-type: none"> <li>• Bank account</li> </ul>
13	Business Experience	<ul style="list-style-type: none"> <li>• Business failure</li> <li>• Challenges</li> <li>• Business Plan</li> </ul>
14	Business Ranking Score	<ul style="list-style-type: none"> <li>• Record keeping</li> <li>• Cleanliness &amp; organization</li> <li>• Engaged &amp; energetic</li> <li>• Customer interaction</li> <li>• Overall assessment</li> </ul>



The PUE identification survey was used to characterize the PUE entrepreneurs in terms of their business type, use of electricity, energy consumption, interaction with financial institutions, interaction with suppliers, interaction with customers, revenue & expenses, and a business ranking score. It should be noted that the “skip logic” in the survey tool is set up to ask the respondent questions based on their energy sources (such as kerosene, candles, etc.) that they indicate they are using in their business (Modules 5.1 to 5.9); so, not all of these modules had to be covered for each sample. This data was aggregated to determine their energy consumption and to infer their revealed willingness to pay for electricity. The business ranking score was used to select survey respondents for the business development skills (BDS) training activity. The structure of the EI identification survey is summarized in Table 3 below:

**Table 3.** Enabling Institutions Survey Instrument Design

<b>Module Number</b>	<b>Module Name</b>	<b>Module Details</b>
1	Identification & Location	<ul style="list-style-type: none"> <li>• GPS location</li> <li>• Service Provider</li> <li>• Trading Center</li> <li>• Permission to interview</li> </ul>
2	General Information	<ul style="list-style-type: none"> <li>• Institution name</li> <li>• Respondent contact information</li> <li>• Gender</li> <li>• # of staff</li> <li>• Years of operation</li> <li>• Type of institution</li> </ul>
3	Financial Institutions	<ul style="list-style-type: none"> <li>• Services provided</li> <li>• # of clients</li> <li>• PUE equipment loans</li> <li>• Energy access loans</li> <li>• Agricultural loans</li> <li>• Level of engagement</li> <li>• Means of engagement</li> <li>• Challenges of engagement</li> </ul>
4	Business Skills Development Training Organizations	<ul style="list-style-type: none"> <li>• Target population</li> <li>• # of trainees</li> <li>• Gender focus</li> <li>• Level of engagement</li> <li>• Means of engagement</li> <li>• Challenges of engagement</li> </ul>
5	Trade Organizations	<ul style="list-style-type: none"> <li>• # of members</li> <li>• Part of a national organization</li> <li>• Services provided</li> <li>• Level of engagement</li> <li>• Means of engagement</li> </ul>



		<ul style="list-style-type: none"> <li>• Challenges of engagement</li> </ul>
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Module 1 provides basic identifying and location information on the institution. Module 2 includes additional identifying and demographic information and determines which type of institution (financial, business skills development training, or trade organization) is being interviewed. The skip logic incorporated into the survey instrument then moves to Modules 3, 4, or 5 depending on which type of institution is being interviewed. These modules are similar in nature and identify the type of services provided, # of clients/trainees/members, level of engagement with PUE entrepreneurs, means of engagement with PUE entrepreneurs, and challenges faced in engagement with PUE entrepreneurs.

### Sampling Frame Selection

Following the selection of the targeted trading centers in each service territory, it was assumed that the sampling frame for the PUE identification survey would include a census (100% coverage) of the PUE businesses in each trading center. However, GIS analysis of each trading center revealed that this approach would not be feasible in terms of the time required to complete the survey as well as the number of training candidates that this approach would produce. This challenge is illustrated in Tables 4 and 5 below.

The “structures” column in Table 4 indicates the number of rooftop structures within 1 km of the existing distribution transformers in each trading center. The “% of businesses” column uses a factor which is based on NRECA’s experience in these communities regarding the portion of those structures that are likely to be businesses (as opposed to households). These figures are used to calculate the expected PUE sample for each trading center (TC). Table 5 illustrates the potential candidates for training, mentoring, and additional follow up based on the assumption that 50% of the PUE respondents are selected for training, 50% of trainees are selected for mentoring, etc. using the expected PUE sample result from Table 4. This filtering of candidates at each step of the process follows the methodology used for the PUE activity in KIS service territory in 2018 by PAUESA.

It is assumed that the BDS training will be delivered in each of the three service territories. It is also assumed that a reasonable population of trainees in each service territory would be 100 PUE entrepreneurs – which suggests a maximum of 200 PUE samples per service territory (50 per trading center) at a 50% filtering rate. This approach indicates a goal of 600 PUE entrepreneur samples across all twelve trading centers to provide an appropriate population of potential trainees. In contrast, the original census approach would produce an estimated 2,236 samples (Table 4) – nearly a four-fold increase over what is realistic from a training perspective. This discrepancy is also illustrated by the training candidates (Table 5) which should be limited to 100 per service territory – but range from 127 – 768 under the census approach.



**Table 4.** GIS analysis expected PUE sample – census approach

Service Territory	Trading Center	Structures	% of businesses	Expected PUE Sample
BECS	Kirumiya	303	20%	61
	Buganikere	308	20%	62
	Bundimulinga	1106	20%	221
	Hakitengya	510	20%	102
KRECS	Matiri	266	25%	67
	Bukere	283	25%	71
	Bujubuli	255	25%	64
	Hapuyo	212	25%	53
PACMECS	Adilang	976	30%	293
	Kalongo	1,739	30%	522
	Patongo	1,679	30%	504
	Kal Central	729	30%	219
<b>Total</b>		<b>8,366</b>		<b>2,236</b>

**Table 5.** Training, mentoring, and follow up candidates per service territory – census approach

Service Territory	PUE Sample	Training @ 50%	Mentoring at 50%	Follow up at 50%
BECS	445	223	111	56
KRECS	254	127	64	32
PACMECS	1,537	768	384	192

Based on this analysis, the sampling approach was revised to focus on determining the most prominent PUE activities in each trading center and obtaining a sample of 50 entrepreneurs distributed across these activities. In principle, the sampling goal would be to engage 10 entrepreneurs in each of 5 prominent PUE activities in each trading center. It was also assumed that the prominent PUE activities would vary from trading center to trading center. Stakeholder consultation was conducted with the service providers to determine the most prominent productive uses activities in each trading center. The results are shown in Table 6 (BECS), Table 7 (KRECS) and Table 8 (PACMECS), below. Please note that PACMECS (Table 8) reported the same set of prominent PUE activities across all trading centers. From a training and mentoring standpoint, the use of these prominent PUE activities to govern the sampling approach should facilitate the training and mentoring activities by providing groups of PUE entrepreneurs who are engaged in the same activities. These PUE activities were integrated into the business activity choices in PUE identification survey instrument.



**Table 6.** Prominent PUE Activities - BECS

<b>Trading Center</b>	<b>PUE activity</b>
Kirumya	Welding/metal fabrication
	Refrigeration/cold drinks
	Carpentry workshop
	Hair salons
Buganikere	Welding/metal fabrication
	Refrigeration/cold drinks
	Carpentry workshop
	Hair salons
	Cocoa drying
Hakitengya	Welding/metal fabrication
	Refrigeration/cold drinks
	Hair salons
	Cocoa drying
	Grain milling
Bundimulinga	Welding/metal fabrication
	Carpentry workshop
	Grain milling
	Petrol stations
	Dairy coolers
	Betting centers
	Stationery/printing/photocopying

**Table 7.** Prominent PUE Activities – KRECS

<b>Trading Center</b>	<b>PUE activity</b>
Bukere	Welding/metal fabrication
	Refrigeration/cold drinks
	Hair salons
	Grain milling
	Phone charging
Bujibuli	Refrigeration/cold drinks
	Hair salons
	Grain milling
	Phone charging
	Stationery/printing/photocopying
Kakabara	Welding/metal fabrication
	Hair salons
	Grain milling
	Phone charging
	Stationery/printing/photocopying
	Petrol stations
	Vehicle repair garages
Hapuyo	Welding/metal fabrication



	Refrigeration/cold drinks
	Hair salons
	Grain milling
	Stationery/printing/photocopying
	Vehicle repair garages

**Table 8.** Prominent PUE Activities – PACMECS

<b>Trading Center</b>	<b>PUE activity</b>
Adilang, Kalongo, Patongo, Kal Central	Welding/metal fabrication
	Refrigeration/cold drinks
	Carpentry workshop
	Hair salons
	Grain milling
	Stationery/printing/photocopying

### Survey Training & Implementation

The survey team for this project included a survey team leader, a survey team field supervisor, 5 enumerators, and 4 local NRECA staff. The field supervisor and enumerators were all individuals that NRECA has deployed for previous energy consumption/willingness to pay surveys in Uganda. Incorporating NRECA local staff into the survey team allowed for an accelerated survey schedule as well as a capacity building opportunity for those team members. In terms of responsibilities the enumerators' focus was on the PUE identification survey while the NRECA local staff addressed the enabling institutions survey.

Prior to mobilization to the field, NRECA provided a one-day training for the survey team at its office in Kampala. Following the training day, there was a one-day survey testing activity in Mityana. The purpose of the testing day was to ensure that enumerators clearly understood and could apply the training from the previous day and to ensure that both of the survey instruments were working smoothly.

In terms of logistics, team members carried a letter of introduction from REA describing the activity and the trading centers where they would be engaged. The survey team leader was also in contact with a local representative for each of the service providers (BECS, KRECS, and PACMECS) as well as local officials (typically the Local Council Level One (LC1)) in each trading center to ensure that the team was well received. In terms of organizing the team, each enumerator was assigned to a specific PUE activity each day while the local staff were assigned to engage with the enabling institutions.

The quality control process for the survey included the shadowing of each of the enumerators by the field supervisor or survey team leader throughout the day as well as a review of each of the samples in the evening prior to uploading the sample data to the results database.

Survey challenges were encountered in meeting the overall sampling goals, in meeting the sampling goals in specific trading centers, and in implementing the survey in the selected trading centers in



BECS service territory. As noted in the sampling frame selection section above, the overall survey goal was for 50 PUE samples and 20 EI samples per trading center for a total of 600 PUE samples and 240 EI samples across the twelve trading centers. The survey results indicate that 555 PUE samples (93% of the goal) and 110 EI samples (46% of the goal) were obtained. In the case of the enabling institutions, this result reveals a limited presence of these organizations in the selected trading centers. Bujibuli trading center had a very low number of PUE (20) and EI (2) samples, which appeared to be due to the fact that this trading center is focused on services for refugees – as opposed to more typical productive uses of electricity.

The trading centers which were surveyed in the BECS service territory differ from the list of selected trading centers described above. In the case of Hakitengya and Kirumiya trading centers, floods and landslides required relocation of businesses and residents to new locations. These trading centers were replaced by Bubukwanga and Burondo for the survey. An initial visit to Buganikere revealed that there were an insufficient number of businesses to meet the sampling goal for the survey, so this trading center was replaced with Bundimasoli. Upon visiting Bundimalinga, it was discovered that this trading center was surveyed under the PAUESA activity with an alternate trading center name of Nyahuka, so this location was substituted with Rwamabale.

A number of specific challenges were also noted in the implementation of the PUE survey across all of the trading centers. These include the respondent not having information on the connection charges from the service provider or the internal wiring cost. In some cases, this is because the business was a tenant and these costs were incurred by the landlord. In other cases, this was due to the fact that the connection and internal wiring were completed a number of years ago. The survey team also faced challenges with many of the respondents in obtaining their meter number – either because the respondent had no records of this information or because the power was off, and the information couldn't be obtained from the interface unit. In a number of cases, the enumerators found it difficult to obtain appliance ratings due to a lack of legibility on the nameplates. Finally, the team faced challenges in securing a complete set of responses from a number of business who suspected that the team were actually from the Uganda Revenue Authority (URA).

## Survey Results

This section includes an overview of the survey results as well as a detailed discussion of the productive use of electricity (PUE) survey, the enabling institutions (EI) survey, and the business ranking score.

### Overview

Table 9 below provides a summary of the samples obtained for the PUE and enabling institutions surveys. The PUE samples show a large population for PACMECS (41%), while the EI samples show a more even distribution among the three service territories. The PUE sample total (555) represents 93% of the sampling goal of 600 entrepreneurs across the twelve service territories. In contrast, EI sample total (110) represents only 46% of the sampling goal of 240 enabling institutions across the trading centers. This is due to a limited presence of such institutions the selected trading centers.



**Table 9.** PUE and EI samples by service provider

Service Provider	PUE samples	PUE % of total	EI samples	EI % of total
BECS	160	29%	39	35%
KRECS	169	30%	33	30%
PACMECS	226	41%	38	35%
<b>Total</b>	<b>555</b>	<b>100%</b>	<b>110</b>	<b>100%</b>

Table 10 below breaks down the survey sample data by trading center. Among the trading centers, the most difficult challenge was faced in Bujibuli where only 20 PUE and 2 EI samples were obtained. This shortfall appears to be due to the fact that this trading center is devoted to providing services to refugees, as opposed to functioning as more typical commercial trading center. It should also be noted that all of the trading centers in BECS service territory differ from those that are described in Table 1 of the Methodology, Trading Center Selection section above. The explanation for the changes to these trading center selections is described in the Methodology, Survey Training and Implementation section above as a survey challenge.

**Table 10.** PUE and EI samples by trading center

Service Provider	Trading Center	PUE Samples	PUE % of total	EI samples	EI % of total
BECS	Bublikwanga	39	7	9	8
	Bundimasoli	52	9	14	13
	Burondo	30	5	8	7
	Rwamabale	39	7	8	7
KRECS	Bujibuli	20	4	2	2
	Bukere	52	9	13	12
	Hapuyo	45	8	10	9
	Kakabara	52	9	8	7
PACMECS	Adilang	45	8	6	6
	Kalongo	67	12	10	9
	Patongo	58	10	12	11
	Palabek	56	10	10	9

### PUE Entrepreneurs

The PUE Survey included 555 different businesses spread between the three service providers (BECS, KRECS, and PACMECS). The PUEs were aggregated to illustrate the results in each of the service providers' territories and were grouped according to whether they were primarily Production, Services or Entertainment. Table 11 below shows the results.



**Table 11.** PUE results by business activity

Type of PUE Category & Activity	BECS	KRECS	PACMECS	Total
<b>PRODUCTION</b>				
Carpentry	0	9	3	12
Cocoa Drying	11	0	0	11
Grain Milling	4	6	29	39
Refrigeration	39	29	7	75
Tailoring/Seamstresses	10	11	7	28
Welding/Metal Fabrication/Carpentry	4	8	12	24
Bakery	1	0	0	1
<b>Total Production</b>	<b>69</b>	<b>63</b>	<b>58</b>	<b>190</b>
<b>Production % of Total</b>	<b>43%</b>	<b>38%</b>	<b>26%</b>	<b>34%</b>
<b>SERVICES</b>				
Drug Shops & Pharmacies	14	8	21	43
Fuel/Petrol	3	6	3	12
Hairdressers	26	23	30	79
Auto/Moto/Boda Repair & Parts	4	14	15	33
Hotels	3	0	4	7
Restaurants	5	5	18	28
Supermarkets	0	2	0	2
Medical	1	1	2	4
Mobile \$/Phone Charging	17	21	14	52
Printing, Photo & Secretarial	3	13	20	36
Cold Water & Popcorn/Snacks	0	0	30	30
Hardware	4	8	6	18
<b>Total Services</b>	<b>80</b>	<b>101</b>	<b>163</b>	<b>344</b>
<b>Services % of Total</b>	<b>23%</b>	<b>29%</b>	<b>47%</b>	<b>62%</b>
<b>ENTERTAINMENT</b>				
Bars	8	3	2	13
Sports Betting	1	0	3	4
Cinema	3	1	0	4
<b>Total Entertainment</b>	<b>12</b>	<b>4</b>	<b>5</b>	<b>21</b>
<b>Entertainment % of Total</b>	<b>7%</b>	<b>2%</b>	<b>2%</b>	<b>4%</b>
<b>GRAND TOTAL</b>	<b>161</b>	<b>168</b>	<b>226</b>	<b>555</b>

The most prominent PUE activities include refrigeration (18%), hair salons (14%), and mobile money/phone charging (11%) which account for 43% of the entrepreneurs. These activities are followed by drugstore/pharmacy, metal fabrication/woodwork/carpentry, grain & simsim milling, and stationery/copying/printing which account for another 29% of the entrepreneurs. Refrigeration



includes freezers and refrigerators for storing perishables. Cold water sales occur only in PACMECS<sup>1</sup>. As noted, cold water sales are accompanied by other items such as popcorn or other snacks. Hair salons are numerous and are dominated by barbering (80% vs beauty salons (about 20%). Hair salons generally use a variety of small electric apparatuses.

Mobile money and phone charging were grouped together due to their common “technology” (the use of the cell phone) and represent somewhat less than 10% of the productive uses surveyed. The service is common the all three service territories. While mobile money is a highly valued convenience as a service and phone charging is an essential service, it is very likely that this category is very low electricity usage and not “productive” in the sense of a “product” which is why it is placed in the service category of Table 11 above.

Cocoa production exists only in the BECS service territory; while grain milling is mostly located in PACMECS. Three-quarters of the restaurants are located in PACMECS with the rest located in BECS. Retail stores such as drugstores, hardware outlets, stationery and printing services, and supermarkets (which are scarce) have modest electricity usage but provide essential services. Likewise, for auto parts stores. Petrol/fuel stations require pumping machinery that can be fairly electricity intensive. Bars and lounges require refrigeration and lighting. No air conditioning was mentioned in the survey. Their electricity usage would most likely be a modest business expense vs. the main services provided (drinks, music, etc.). Restaurants can have more diverse equipment, some of which would be electric. Medical facilities would have need for refrigeration and specialized medical equipment.

Alternatively, the category Metal and Wood Working, while not being numerous, probably has the larger machines and electricity uses (although some may use diesel engines also called gensets).<sup>2</sup> Table 12 shows the distribution of gensets and the combinations that are used within each service territory.

**Table 12.** Use and Distribution of Gensets

Genset Combinations	Number	Type OF PUE	Service Territory		
			BECS	KRECS	PACMECS
Grid + Genset	1	Hotel			1
Grid + genset + PV	3	Printing			3
"	1	Hair		1	
"	2	Restaurant		1	1
"	1	Petrol	1		
"	1	Bar	1		
Grid + Genset + rechargeable	1	Printing			1
"	1	Drug			1

<sup>1</sup> The entrepreneur buys pre-bottled water and refrigerates it before selling.

<sup>2</sup> 20 PUEs are reported to have gensets. Of these, 13 have a grid connection plus genset and often one more option. Those with gensets and **not on the grid** include only genset (4), pv/genset (1), genset + drycells (1), and genset pv drycells (1).



<b>Grid+ Genset + dry cells</b>	1	Bakery	1		
"	1	Refrig	1		
<b>Genset</b>	3	Grain			3
"	1	Printing			1
<b>PV+Genset</b>	1	Grain			1
<b>Genset PV drycells</b>	1	Grain			1
<b>Genset drycells</b>	1	Grain			1
"	20		4	2	14

Grain milling (six) and printing operations (one), which are the only off grid PUEs identified, might be converted to electricity if the viability of the electricity source and cost are deemed to be more profitable, especially if the proper equipment can be obtained. Despite high electricity demand carpentry and welding do not appear to rely on gensets as backup while it is likely that the hotel, printers, hair salon, bakery and refrigeration operations seem to be relying on gensets for backup during outages. Agricultural production and transformation (cocoa and grain milling) have high electricity use in season. Genset use is highest (70% of respondents) in PACMECS service territory, pointing to a high rate of service outages and or power quality issues.

Virtually all of those surveyed used some form of lighting (e.g., security lighting or interior lighting). The appliances and other equipment reported was quite varied. Table 13 below provides a listing of appliances used by PUE entrepreneurs in their businesses. Some such as fans, radios and phone chargers are fairly routine (though evidently not universal). Other equipment is more specific to the type of business, e.g., computers might pair with photo development or stationary production, while hair clippers would pair with hairdressers. If the high cost of electricity becomes an issue and availability of better equipment becomes a topic in the BDS training, this data will be useful, especially when the final selection of trainees has been made. Given the number of cold water sellers, the large number of refrigerators is not surprising. Likewise the number of shaving devices and the large number of hairdressers. Grain mills are a prominent and electricity intensive use. There may be issues with the age and capacity of the mills and the added value that might occur if older equipment would be replaced with those that are more efficient or larger volume. The survey did not capture that level of data but the BDS training could cover this issue. Satellite receivers and TVs generally make business more pleasant and possibly would draw customers. Deeper investigation of the purpose and use of the appliances is well warranted.

**Table 13.** PUE appliances used

<b>Appliances Used in PUEs Surveyed</b>			<b>Samples</b>
<b>Main Appliances Mentioned</b>	<b>Samples</b>	<b>Additional Appliances (Cont)</b>	
Computer	10	Gaming machines	1
DVD	3	Grinder	3
Fan	12	Hair clippers	3
Iron	7	Hand drier	10
Sewing Machine	3	Woofer (electronics)	6
Freezer	1	Hot comb machine	1



Grain Mill	21	Juice maker	1
Electric Heater	1	Juice mixer and freezer	1
Music	14	Laminator	3
Radio	17	Laptop	3
Phone charger	51	Microscope	22
Refrigerator	68	Music system	1
Refrigerator/Freezer	12	Electric Kettle	2
TV	27	Phone Charger	1
<b>Additional Appliances</b>		Photo printer	1
Amplifier	4	Popcorn Machine	1
Blender	2	Printer	7
Camera	2	Printer/photocopier	1
Carpenter moulding machine (motor)	1	Public address system	1
Compressor	1	Radio	1
Cutting machine	1	Router	1
Decoder (Satellite TV Receiver?)	10	Security camera	1
Dispenser	1	Shaving machine	17
Drilling machine	5	Speakers	1
Electric kettle	1	Sterilizer	2
Electric planer	1	Tailoring machine	1
Electric sewing machine	5	Hair Curling Machine	1
Electrical drill	1	Welding machine	12
Fuel pump	10	Wood Grinder	1

The vast majority (86%) of the businesses surveyed were located in a permanent building, as illustrated in Table 14 below. In the context of this survey, permanent structures include concrete foundations, brick or cinder block construction, and iron sheets for roofing. Those located in permanent structures are more likely to be better established businesses and to have an electrical connection. Many PUEs do not own their building and depend on landlords for maintaining the building as well as providing amenities including electricity connections.

**Table 14.** Structures for PUE businesses

Structure Type	Samples	% of Total
Permanent	480	86
Semi-permanent	23	4
Kiosk	15	3
Temporary	26	5
Other	11	2

At any rate those with temporary locations should be further scrutinized to determine the reasons and solutions underway or planned, again as part of the training, should any of these entrepreneurs be selected for the BDS training despite their temporary situations. Kiosks imply a certain type of business activity: little inventory or daily one-on-one activities. The 15 Kiosks noted above appear



only in BECS service territory and are mostly bars (8), auto-parts (4), the one and only bakery in the survey, a carpentry shop and a cinema. There was one mobile money business operating in BECS from a mobile “kiosk” (but counted as permanent in the survey with a secondary note about its unusual mobility).

**Table 15.** Years in Operation

Years in Operation	
Average	4.2
Min	0.002
Max	45
Median	3

This information on years in operation (and location) give the BDS trainers an idea of the range of businesses that will be engaged. Once the selection of the actual trainees occurs, this metric should be recalculated. Start-ups have very different experience and expectations than long time businesses, and training needs can be quite different.

**Energy Sources Used by PUEs**

**Table 16** below breaks down the energy sources of the PUEs as reported in the PUE survey. Indeed, 496 (89%) of the PUEs were found to have an electrical connection to the grid, leaving roughly 10 % with only alternative sources of energy. A small percentage (7%) have PV or PV plus miscellaneous energy sources such as candles, rechargeable lighting, batteries, etc.

**Table 16.** Energy sources used by PUE entrepreneurs

Energy Source	Samples	% of Total
Grid	267	48
Grid + Photovoltaic (PV)	112	20
Grid + candles	82	15
Grid + Generator + Miscellaneous	2	1
PV	33	6
PV + Miscellaneous	7	1
Only Candles, LPG, etc.	52	9

**PUE Credit and Finance Sources, Uses and Terms**

A very small proportion (15%) of PUE entrepreneurs had requested a loan, of which 15 were rejected by the financial institution. Reasons given for rejections were:

- asking for too much money,
- income insufficient to repay the loan,
- lack of national ID,
- no credit history, and
- having a history of default (either on loan or other business obligations).



In general, the status of the loans at the time of the survey was that around half of the entrepreneurs had repaid their loan, eleven had paid more than half, with the remainder having paid back around half. Of the 72 loans reported by the PUEs surveyed, they ranged in term from one to 84 months with the average being about 10 months. Credit institutions accessed were SACCOS, VSLAS, credit or commercial banks. The average amount was roughly 10 million Ugandan shillings (UGX) or roughly US \$2,700. Forty of the PUEs taking out loans used the funds to expand their businesses; twenty directed the funds to purchases of supplies or merchandise for sale; while only three mentioned using the funds for starting a business and only four for purchasing equipment.

**Gender Balance**

Table 17 below shows the gender balance across the PUE respondents and indicates a dominance (70%) of males in the role of business manager while Table 18 illustrates the gender balance by service provider. Table 18 shows the gender balance of the business manager in each service territory. Results were roughly the same in each service territory, i.e., ~ 28 to 31% were female.

**Table 17.** Gender of business manager

<b>Gender</b>	<b>Samples</b>	<b>% of Total</b>
Male	390	70
Female	165	30

**Table 18.** Gender of business manager by service provider

<b>Gender</b>	<b>BECS</b>	<b>BECS % of total</b>	<b>KRECS</b>	<b>KRECS % of total</b>	<b>PACMECS</b>	<b>PACMECS % of total</b>
Male	110	69%	121	72%	160	71%
Female	50	31%	48	28%	66	29%

Table 19 below illustrates the gender of the business manager by business type. In only two business types was there close to parity - stationary/printing type and tailoring. The category of timber processing and carpentry shops and hotels both had 100% women managers.

**Table 19.** Gender of business manager by business type

<b>PUE Business Types</b>	<b>% Males</b>	<b>% Females</b>
Auto Repair/Parts	66%	34%
Bar	62%	38%
Carpentry	73%	27%
Cinema Hall	100%	
Cocoa drying	91%	9%
Drug shop	89%	11%
Fuel station	100%	
Grain milling	83%	17%
Hair Salon	78%	22%



Hardware	78%	22%
Hotel		100%
Metal fabrication/welding	75%	25%
Mobile money/Phone Charge	70%	30%
Refrigeration	66%	34%
Restaurant	71%	29%
Stationery	54%	46%
Tailoring	54%	46%
Timber processing/carpentry shops		100%
Welding	74%	27%

Analysis of employee gender balance and of the proportion of employees who were family members revealed the following. There was an average of three employees across the 555 businesses. Of those, on average about 1.5 would be a family member. Of the three average employees, there would be one woman for every two men (that is, 1/3 were women and 2/3 men). One and a half men were employed full time for every woman employed full time. Almost all women were full time and very few women worked part-time. Family-owned businesses with employees that are family members tend to operate differently than those with non-family employees. Often family members can be “exploited” (lower pay or longer hours). In the BDS training, the pros and cons of such arrangements might need to be discussed.

### Enabling Institutions

For the purposes of this project, enabling institutions are defined as local financial institutions, training organizations, and trade associations who may be working with PUE entrepreneurs. The sampling goal for the enabling institutions survey was 20 enabling institutions for each of the 12 trading centers – for a total of 240 respondents. The survey results provide a total of only 110 samples (46%) of the goal – for an average of nine enabling institutions per trading center. This points to a more limited presence of these institutions than was expected during the survey design. Among respondents, financial institutions predominated, accounting for 91% of the samples as shown in Table 20 below:

**Table 20.** Enabling institution type

Enabling institution type	Samples	% of Total
Training	5	5
Financial	86	78
Financial, Training	5	5
Financial, Training, Trade	1	1
Financial, Trade	8	7
Training	5	4

Among the financial institutions, quick loans (79%) and savings accounts (66%) were the most common products provided to clients/members. Across all of these institution types, there were an average of 222 clients/members. On average, these organizations have been in operation for five



years. The vast majority (67%) of these organizations identified as village savings and loans (VLSAs), as shown in Table 21 below:

**Table 21.** Organization type

Organization type	Samples	% of Total
VSLA	74	67%
Savings and Credit Cooperative (SACCO)	7	6%
Microfinance Institution (MFI)	5	4%
Commercial Bank	4	4%
Other	10	9%
Blank	10	9%

Since VSLAs and SACCOs are the most common organization type, it follows that community ownership of the enabling institutions is predominant, accounting for 82% of all respondents, as shown in Table 22 below:

**Table 22.** Type of ownership

Type of ownership	Samples	% of Total
Community	90	82%
Private	18	16%
Faith-based	1	1%
NGO	1	1%

A key question explored by this survey was the level of engagement of the enabling institutions with PUE entrepreneurs. In other words, how proactive are these institutions in working with PUE entrepreneurs to support their businesses. As shown in Table 23 below, the results are quite disappointing, with a substantial 67% of respondents reporting a low or medium level of engagement:

**Table 23.** Level of engagement with PUE entrepreneurs

Engagement	BECS	KRECS	PACMCES	Total	% of Total
Low	9	3	5	17	15
Medium-low	1	1	1	3	3
Medium	23	15	16	54	49
Medium-high			1	1	1
High	3	5	5	13	12
Other		2	2		2
Blank	3	7	10	20	18

In terms of gender ratio, male respondents (59%) outweighed female respondents (41%) across the enabling institutions survey, with the largest disparity in BECS service territory at a 2.5:1 male/female ratio. This information is summarized in Table 24 below:

**Table 24.** Gender ratio

Gender	BECS	KRECS	PACMECS	Total	% of Total
Female	11	18	16	45	41%
Male	28	15	22	65	59%
Ratio (M:F)	2.5	.83	1.4	1.4	

Among the financial institutions, an average of 41 loans are made annually with a maximum loan limit (average) of 6,313,218 UGX (\$US1,730), average loan term of 6 months, and an average interest rate of 9% per year. The portion of institutions having PUE loans (80%), energy access loans (55%), and agricultural loans (72%) available is reported as quite strong in Table 25 below. It is worth noting that these results seem to contradict the low levels of engagement with PUE entrepreneurs reported in Table 23 above – indicating that these products may be available – but that there is a low uptake among PUE entrepreneurs. This issue warrants further discussion with financial institutions and PUE entrepreneurs to identify the factors that are creating this gap, which may include the application process, collateral requirements, and limited availability of funds.

**Table 25.** PUE, energy, and agricultural loans available

Response	PUE loans		Energy loans		Agricultural loans	
	Samples	% of Total	Samples	% of Total	Samples	% of Total
Yes	88	80%	61	55%	79	72%
No	12	115	29	26%	9	8%
Blank	10	9%	20	18%	22	20%

The challenges faced by financial institutions in working with PUE entrepreneurs were predominated by failure to make payments (58 respondents) and other (63 respondents) – with education level (28 respondents) and no business plan (30 respondents) also reported as concerns. This question allowed for multiple responses. The most common issues reported under the “other” response dealt with the low income of member, low balance in the group account, and a low savings culture in the community.

Trade organizations were represented by a small sample of only 14 respondents (13% of the EI sample), with the majority (86%) offering PUE training to their members. Unfortunately, the engagement with PUE entrepreneurs was a bit alarming, with 93% of respondents reporting a low or medium level, as illustrated in Table 26 below:

**Table 26.** Trade organizations level of engagement

Level of engagement	Samples	% of Total
Low	6	43%
Medium	7	50%
High	1	7%



Among this sample, the presence of trade organizations was predominated by BECS (43%), as shown in Table 27 below:

**Table 27.** Trade organizations by service provider

Service Provider	Samples	% of Total
BECS	6	43%
KRECS	4	29%
PACMECS	4	29%

The predominant focus of these trade organizations was farming and bee keeping. Looking more closely at the trading centers, the trade organizations are concentrated in Burondo TC (BECS) with 29% of the total and Adilang (PACMECS) at 21% of the total respondents. The training focus for these trade organizations was predominated by record keeping (50%), business basics (43%), and customer service (21%) as summarized in Table 28 below. This survey question allowed for multiple responses.

**Table 28.** Trade organizations training focus

Training focus	Samples	% of Total
Record keeping	7	50%
Business basics	6	43%
Customer service	3	21%
Marketing	2	14%
Financial assistance	2	14%
Farming	2	14%
Business Plan	1	7%

BDS training organizations were also represented by a small sample of only 6 respondents, which was predominated by PACMECS (66%) and following by BECS and KRECS – both at 17% of the total. Farming, metal fabrication, and financial literacy were reported as the focus of these organizations. An average of 73 trainees and 19 PUE businesses were served by the organizations in 2019. In contrast to the previous engagement results, 50% of these organizations reported a high level of interaction with PUE entrepreneurs – with all of those concentrated in the PACMECS service territory. These results are summarized in Table 29 below:

**Table 29.** BDS training level of engagement

Engagement	Samples	% of Total
Low	1	17%
Medium	2	33%
High	3	50%

In addition to looking at the level of engagement between the enabling institutions, the survey also looked at the means of engagement used by these organizations to interact with PUE entrepreneurs. Across the financial, training, and trade organizations – these interactions were dominated by face to



face meetings, as illustrated in Table 30 below. This survey question allowed for multiple responses. The most common response for “other” was phone calls.

**Table 30.** Means of engagement with PUE entrepreneurs

Type of engagement	Financial	Trade Organization	Training Organization
Face to face meeting	88	14	5
Radio	12	0	2
Trade fairs & events	9	4	0
Government sponsored networking events	8	2	0
Other	12	1	3

### Business Ranking Score

A key output of the PUE survey is the selection of a portion of the PUE entrepreneur respondents for business skills development (BDS) training in each of the service territories. The PUE survey goal was to obtain 50 samples in each of the twelve trading centers for a total of 600 PUE samples. Based on filtering approach used by PAUESA for the KIS service territory in 2018 and setting a realistic limit for the number of trainees, it is assumed that approximately 50% of the survey respondents will be selected for the BDS training. This equates to a total of approximately 300 trainees or 100 per service territory in BECS, KRECS, and PACMECS.

In order to select PUE respondents for the BDS training, a business ranking scoring system was incorporated into the PUE survey instrument to provide an assessment of those entrepreneurs most suitable for the training activity. This assessment was made by the survey enumerator based on their observations and impressions during the interview process, not by posing specific questions to the respondents. Observations were made in the following five categories:

1. What is the level of record keeping?
2. What is the level of cleanliness and organization of the business?
3. How energetic and engaged is the respondent?
4. How does the respondent interact with customers?
5. What is your overall impression of the business?

Each of these five categories were assigned a maximum value of two points for a maximum business ranking score of 10 points. Using this approach and a goal of 100 trainees per service territory provides the following results, illustrated in Table 31 below:

**Table 31.** Business ranking score results

Service Provider	Potential Trainees	Business Ranking Scores
BECS	102	8,9,10
KRECS	98	8,9,10
PACMECS	104	9,10



These results meet the original goal of 100 trainees per service territory and 300 trainees total – with 304 trainees being selecting using this filtering approach. In reviewing these results, however; it was noted that many of the businesses with the highest scores were those providing limited “value added” due to the productive use of electricity. As an example, the business activity for numerous respondents included mobile money, phone charging, refrigeration of cold drinks, and drug stores – which also require a low level of capital investment and business acumen. Instead of selecting these businesses for a full week of BDS training and mentoring, it is believed that a different intervention such as basic course in financial literacy might be a more appropriate intervention. As such, additional investigation was conducted to identify the more capital intensive, valued added business activities among the PUE respondents. These value-added businesses included such activities as grain milling, welding/metal fabrication, carpentry, hair salons, tailors/seamstresses, and printing/copying/stationery. Finally, additional filtering was done to identify those PUE businesses with a grid connection. This additional criterion was added since this is a cooperative development project which is expected to increase revenues for BECS, KRECS, and PACMECS through higher energy consumption by the PUE entrepreneurs. The combination of these criterion (high business ranking score, value added, grid connected) results in a smaller population of selected trainees. The results of this analysis are provided in Table 32 below.

**Table 32.** Trainee selection results using BRS, value added, and grid connected

<b>Service Provider</b>	<b>Top BRS score</b>	<b>Grid connected</b>	<b>Value Added</b>	<b>Selected</b>
BECS	102	98	40	38
KRECS	98	90	46	42
PACMECS	104	90	57	49
<b>Total</b>	<b>304</b>	<b>278</b>	<b>143</b>	<b>129</b>

Table 32 indicates that the majority (91%) of those with the top BRS scores are grid connected – but that only about half (47%) represent value added businesses. Combining these criteria results in a selected trainee population of 129 entrepreneurs, which is 42% of the population that would have been selected using the business ranking score alone. Investigating the selected trainee population in more detail reveals the most prominent PUE activities among these candidates, as illustrated in Table 33 below.

**Table 33.** Value added PUE activities of trainee candidates

<b>Business Activity</b>	<b>BECS</b>	<b>% of total</b>	<b>KRECS</b>	<b>% of total</b>	<b>PACMECS</b>	<b>% of total</b>
Hair Salon	16	42%	18	43%	12	24%
Tailor/seamstress	4	11%	5	12%	4	8%
Cocoa Drying	6	16%	na	na	na	na
Metal work/carpentry	3	8%	6	14%	9	18%
Boda boda/auto garage	1	3	3	7%	4	8%
Restaurant/hotel	4	11%	3	7%	7	14%
Grain milling	3	8%	3	7%	5	10%
Cinema Hall	1	3%	na	na	na	na
Printing/copying/stationery	na	na	4	10%	8	16%



Reviewing the results from Table 33 above, hair salons are the most prominent activity in all three service territories, accounting for more than one third (36%) of the selected trainee population. Metal work/carpentry are also significant in KRECS and PACMECS, accounting for another 14% of the potential trainees. Cocoa drying is prominent in BECS but is limited to this service territory. A surprising finding here is the limited population of grain milling entrepreneurs, representing only 8% of the trainee population. These results will be used in forming breakout groups for the BDS training as well as guiding the industry specific examples that will be used in the training curriculum. These results may also be useful in planning future interventions which may be focused on enhancing the capacity of specific PUE activities.

From a gender perspective, the trainee selection results reveal a significant disparity between males and female managers/owners across all three service territories – indicating nearly a 3:1 male/female gender ratio across the PUE population. The gender results are shown in Table 34 below:

**Table 34.** BDS trainee candidates gender balance

Gender	BECS	BECS % of total	KRECS	KRECS % of total	PACMECS	PACMECS % of total	Total	% of Total
Male	28	74%	31	74%	34	69	93	72%
Female	10	26%	11	26%	15	31	36	28%
M:F ratio	2.8		2.8		2.3		2.6	

From a geographic perspective, the trainee selection results were also reviewed to examine the distribution among the twelve targeted trading centers. This information is summarized in Table 35 below:

**Table 35.** BDS trainee candidates' geographic distribution

Service Provider	Trading Center	Trainee Candidates	% of SP total
BECS	Bundimasoli	19	50%
	Burondo	7	18%
	Bubukwanga	7	18%
	Rwamabale	5	13%
KRECS	Bujibuli	2	5%
	Bukere	10	24%
	Kakabara	17	40%
	Hapuyo	13	31%
PACMECS	Kalongo	17	35%
	Palabek	13	27%
	Adilang	9	18%
	Patongo	10	20%

Table 36 indicates that Bundamasoli, Kakabara, Hapuyo, Kalongo, and Palabek (five trading centers) account for the majority of the trainee candidate population – representing 61% of the total.



This information may be useful in designing future PUE engagement interventions in these service territories.

## Conclusion

### Findings

There is a wide variety of PUE types in the three service territories which has to be taken into account when selecting the trainees and developing the curriculum for the BDS training.

Approximately one-third (190) of the value added PUE activities surveyed were in the Production category, e.g., grain milling, meaning that there is value added to an input from a value chain which is in most cases directly sold to the consumer after production or in some cases to a retailer that might sell to the final consumer. The service-related PUEs made up somewhat less than two thirds (342) of those surveyed with the remainder being PUEs that are electricity-intensive (21) and provide entertainment, e.g., cinema, to consumers. The gender balance for business owners or managers in the survey sample is about one third women versus two thirds men when averaged over the range of PUE entrepreneurs surveyed. The spread of the PUEs over the three service territories is significantly different at many of the category levels. BECS has more production PUEs while PACMECS dominates the service PUEs. These factors will have significant bearing on the selection of the PUEs for BDS training, mentoring, and follow up.

Key findings from the enabling institution survey results reveal a limited sample size, averaging only nine institutions per trading center. Financial institutions (91%) were the predominant type – with only six training organizations and fourteen trade associations across the sample population of 110 institutions. Among the financial institutions, the majority are community-owned village savings and loan associations (VSLAs). The financial institutions do have PUE, energy access, and agricultural loans available – but report a low to medium level of engagement (67%) with PUE entrepreneurs. The primary products available from the VSLAs are quick loans and savings. Across all of the enabling institutions, the primary means of engagement with PUE entrepreneurs was face to face meetings. Trade organizations were predominant in BECS service territory – with 93% reporting a low to medium level of engagement with PUE entrepreneurs. The most common training offered by these organizations includes record keeping, business basics, and customer service. In contrast, 50% of the business development skills (BDS) training organizations indicated a high level of engagement with PUE entrepreneurs. These organizations were concentrated in PACMECS service territory and indicated a focus on farming, metal fabrication, and financial literacy.

In order to select a portion of the PUE respondents for the BDS training and mentoring, a business ranking scoring (BRS) system was developed to allow for an assessment of each of the businesses. This scoring system addressed record keeping, cleanliness and organization, energy level and engagement, customer interaction, and overall assessment of the business. Selecting those entrepreneurs ranked 8-10 for BECS and KRCS and 9-10 for PACMECS, the desired training population of ~300 entrepreneurs can be selected using the BRS approach. However, further investigation of these results indicates that only 40% of entrepreneurs selected in this manner represent “value-added” business such as grain mills, cocoa drying, metal working, carpentry, hair salons, and tailor/seamstress – while 60% are retail businesses such as phone charging, mobile money sales, and printing/copying. In addition, the presence of a grid connection was incorporated



into the trainee selection process. This criterion was added due to the fact that this activity is part of a cooperative development project which is expected to increase service provide revenues due to increased energy consumption gained through PUE engagement. Incorporating all three criteria (top business ranking score, value added business, grid connection) results in a trainee candidate population of 129 entrepreneurs.

From a demographic perspective, the trainee selection results reveal a significant gender imbalance across all of the service territories with an overall gender ratio of nearly 3:1. Hair salons are the most prominent activity in all three service territories, accounting for more than one third (36%) of the selected trainee population. Metal work/carpentry are also significant in KRECS and PACMECS, accounting for another 14% of the potential trainees. Cocoa drying is prominent in BECS but is limited to this service territory. From a geographic perspective; trainee candidates are concentrated in Bundamasoli, Kakabara, Hapuyo, Kalongo, and Palabek – accounting for more than 60% of the population.

## Recommendations

Going forward recommendations include the selection of BDS training and mentoring candidates, further investigation of the low uptake in PUE loans among survey respondents, consideration of financial literacy training for those entrepreneurs who are not invited to the BDS training, future PUE engagement by the proposed common services entity (CSE), and initiatives to address gender balance issues among PUE entrepreneurs. The next step in this project is the BDS training and mentoring activity for a selected population of PUE entrepreneurs.

Based on the survey results, it is recommended that a population of 129 PUE entrepreneurs be invited to the training which represent a combination of the highest ranking BRS scores, value-added businesses, and grid connected respondents. In order to provide the greatest impact to each business, it is recommended that the business manager and one senior employee attend the training – resulting in a trainee population of 258 individuals. In an effort to address the gender imbalance, it is recommended that a female be selected as the senior employee in case where the business manager is male. This training is expected to be a five-day training in each of the three service territories, with three days of training and two days of mentoring. Tentative training locations include Bundibugyo (BECS), Kyegegwa (KRECS), and Gulu (PACMECS). This training will be provided by a local BDS training organization.

The survey results also reveal a significant shortfall in the uptake of PUE loans among respondents, with only 13% reporting receiving such loans. This finding is supported by the low to medium level of engagement reported by financial institutions with PUE entrepreneurs. However, this low uptake is in contrast with the fact that financial institutions are the most prevalent type of enabling institutions and that they report having PUE, energy access, and agricultural loans available. Based on the survey results, one explanation for this shortfall may be the “low savings culture” in these communities which provides a limited amount of available funds for the village savings and loan associations (VSLAs) to distribute to loan applicants. It is recommended that representatives of the local financial institutions facilitate a discussion with the PUE entrepreneurs during the BDS training and mentoring activity to further explore the reasons for the low uptake in PUE loans and to explore potential solutions.



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As noted in the survey results findings for the assessment and selection of PUE entrepreneurs to attend the BDS training, a majority (60%) of the highest-ranking business represent more simplistic businesses such as phone charging, mobile money sales, printing/copying, drug stores, etc. While it was recommended that the five-day BDS training and mentoring would not be an appropriate intervention for these entrepreneurs, a basic financial literacy training is recommended for this group of entrepreneurs. Since the implementation of this recommendation is outside the scope this PUE engagement activity, consideration should be given to leveraging the presence of VLSAs in all of the trading centers to provide this intervention to their members.

The survey results reveal a significant gender imbalance among PUE entrepreneurs, enabling institutions, and selected trainee candidates. While it is beyond the scope of this project to address this disparity, this issue should be kept in mind as REA and USAID look to the design of future PUE engagement activities. Potential interventions to increase the participation of women in PUE businesses may include PUE loan projects targeted to women interested in starting PUE businesses, women's groups among current female led PUE businesses, leadership training programs among current female led PUE businesses, and awareness programs targeted to female students at the local high schools and universities.

This PUE engagement activity is part of a larger cooperative development project which includes a parallel activity to develop a business plan for the formation of a common services entity (CSE) among Uganda's rural electric cooperatives and small electricity distribution service providers. Based on the strategic planning workshop for the CSE activity which was held in January 2020 and a subsequent stakeholder survey training/capacity building, PUE engagement, and "beyond the meter" initiatives are priority needs which will be incorporated into the business plan. As such, the formation of the CSE may allow for ongoing training/capacity building opportunities, proactive engagement with entrepreneurs and financial institutions to increase PUE loan uptake, and "beyond the meter" initiatives to facilitate equipment sales to entrepreneurs through the CSE.