CEANGAL

Community Stakeholders Technical, Organisational, and Societal Requirements Report

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Executive Summary

Atlantic Technological University Sligo (ATU Sligo) in collaboration with the Department of Electrical Engineering at the Malawi University of Business and Applied Sciences (MUBAS) is implementing the "CEANGAL Project". The project aims to improve the connection of underserved communities to sustainable electricity, by identifying mechanisms and tools to ensure ownership and sustained operation of Renewable Energy Systems (RES). The CEANGAL project puts forward an ambitious adaptable and replicable model to support activities and know-how relevant to the selection, procurement, installation, and ownership of renewable energy systems (RES), as well as providing support structures to ensure the continuous local operation and maintenance of these RES.

This report (Deliverable D2.1) is a key output of the Community Stakeholders Technical, Organisational, and Societal Requirements Work Package (WP 2). Deliverable D2.1 is informed by Task 2.1 of the project which used a combination of surveys and questionnaires, the scoping of previous projects and RE implementation, as well as identifying the end user requirements supporting RE adoption in Malawian communities. The task also involved reaching out to NGOs and groups who have had experience in the sector to tease out the societal, technical, and financial considerations affecting RE projects.

The report begins with the introduction which gives the background of the project as well as the expected outputs from Deliverable 2.1. Section 2 of the study provides the objectives of the survey as well as the methodology employed in conducting the survey. Section 3 provides the findings of the study, with section 4 summarising the survey findings and provides a recommendation on steps that can be taken to enhance the success and sustainability of the proposed RE projects.

Contents

1.0 Introduction

Energy supply and specifically electricity accessibility has been recognised as an important driver of economic growth and human development and deemed essential to helping achieve global poverty reduction goals in low-income countries globally. Goal 7 of the UN Sustainable Development Goals identifies 'universal access to affordable, reliable, sustainable [1], and modern energy for all as a target for the next 10 years. However, approximately 1 billion people globally have no electricity access, most of whom are in Sub-Saharan Africa [2]. Therefore, mechanisms that can be used to expand electricity access in such regions are needed.

To explore practical approaches for accelerating electricity access in rural communities, particularly in sub-Saharan Africa, Atlantic Technological University Sligo (ATU Sligo) in collaboration with the Department of Electrical Engineering at the Malawi University of Business and Applied Sciences (MUBAS) are carrying out applied research through the Irish Research Council (IRC) and Irish Department of Foreign Affairs funded CEANGAL project. The project aims to connect underserved communities to sustainable electricity, by connecting such groups to mechanisms and tools to ensure ownership and sustained operation of RES.

To facilitate an understanding of the current state of play with regards to community energy access especially in underserved regions, one of the activities under work package 2 (Task 2.1) of this project, informed the need for surveys to investigate opinions and general perceptions regarding overall energy access, potential requirements, and the ability of such communities to use and afford RES.

The CEANGAL project initially focusses on the energy accessibility scenarios in Malawi and intends to use the specific information garnered from this region to understand and contextualise the formulation and implementation of suitable approaches for RES implementation in the wider sub-Saharan region.

Villages and communities which are currently not covered by the national grid, which might benefit most from the CEANGAL project objectives were therefore shortlisted as suitable candidates for the project objectives implementation. Further to this, there was also a need to tease out the societal, technical, and financial considerations affecting RE

projects from non-governmental organizations (NGOs), and groups who have had experience in Malawi's renewable energy sector. Therefore, it was important to learn from the previous renewable energy projects implemented by other NGOs and engage with the local communities before the CEANGAL project approach can be implemented.

1.1 Objectives

Surveys were carried out to achieve the following objectives;

i. Investigate opinions and general perceptions regarding overall energy access, potential requirements, and the ability to use Renewable Energy Systems, RES.
ii. To tease out the societal, technical, and financial considerations affecting RE projects from non-governmental organizations (NGOs), and groups who have had experience in Malawi's renewable energy sector.

2.0 Methodology

The household survey was initially supposed to be conducted in Ngongondo village and Mangamba villages in Machinga, the southern part of Malawi. However, it was discovered that these sites were already recently connected to the national grid through the Malawi Rural Electrification Programme (MAREP). As such, new survey test sites were selected, with the survey conducted in the villages of Chiwalo and Uladi in the same district of Machinga which are currently without electricity access, and 10km away from the national electricity grid. The number of households surveyed for each site is presented in table 2-1.

A combination of open and closed-ended questionnaire methods was designed to obtain the community's perspective regarding overall energy access, potential requirements, and their desire, readiness, and overall potential ability to use RES.

A systematic random sampling method was used to obtain the households from each of the selected sub-locations [3]. The demarcation of the communities into "zones", based on the minor road or footpaths leading to rural residences, was considered to be a random way of sample selection. Therefore, every 8th household, to either the left or the right of a footpath or minor road, was chosen to be interviewed as illustrated in figure 2-1.

Footpath/minor road

Figure 2-1: *Schematic sketch of systematic random sampling*

Table 2.1 Sites and number of households surveyed

Site Name	Households Surveyed
Chiwalo	31
Uladi	22

An online mobile data platform Kobo Toolbox, a free toolkit for collecting primary data and managing data was used. This comprises a suite of open-source tools for in-person door to door field data collection exercise that utilises smartphones to collect data which was then uploaded to a digital server for storage [4]. Data analysis was performed using Microsoft Excel after a thorough data cleaning process.

Regarding the NGOs and institutions involved in renewable energy projects implementation, the study used non-probability sampling techniques due to the respondent's perceived knowledge arising out of known experience in the renewable energy field. The probability sampling method is also referred to as judgment or non-random sampling and is well suited for research intended to generate new ideas that will be systematically applied later [5].

Stakeholder surveys were sent to a variety of relevant key players representing academia, government, private sector, and NGOs in Malawi. A general survey was included for all respondents, followed by more specific questions for industry experts depending on what sector they represented.

Table 2.2 outlines the stakeholder organisations that responded to the CEANGAL questionnaires.

Organization	Sector
Wala Limited	NGO
Zuwa Limited	NGO
Ministry of Energy	Government
Renew'N'Able Malawi (RENAMA)	NGO

Figure 2-2: *The CEANGAL researcher carrying out an in-person survey of one of the households in Chiwalo, Machinga*

3.0 Findings and Discussion

3.1 Respondents' Demographic Details

The study covered two sites in the Machinga rural area of Malawi, namely; Chiwalo and Uladi Villages, and a total of 53 respondents were interviewed. The major economic activities engaged by the local community include; farming with much focus on crops such as maize, cow peas, beans, and groundnuts among others. Livestock keeping is also practised (both subsistence and commercial), where households raise animals such as goats, chickens, and cattle. Public infrastructures are moderate and unevenly distributed in the area.

The main public infrastructure and facilities include a primary school, markets, earth roads, and a maize mill located in the nearby electrified village of Mbonechera.

The data being analysed is the aggregate of the aforementioned sites. Out of 53 respondents, 62.3% were females and 37.7% were males. In terms of highest education levels attained, 71.7% attended primary school education, 20.8% secondary school level, and 7.5% never attended any formal education. With regards to dwelling units, 41.5% of the houses were traditional, whereas semi-permanent and permanent houses constituted 30.2% and 28.3% respectively.

Figure 3-1: *From top left; Traditional, semi-permanent, and permanent house*

A house is considered traditional when it's grass-thatched and built from mud bricks/ unburnt bricks. The semi-Permanent house usually has metal sheets (i.e. iron, aluminium or zinc coated roofing) with mud bricks/ unburnt bricks or burnt bricks grass-thatched roof. A permanent house has burnt bricks. constructed using cement and usually roofed with metal or modern roofing sheets [6].

Table 3-1 Demographic details of Respondents

Characteristic	Variables	Percentage (%)
Gender	Females	62.3
	Males	37.7
Family Size	1 Person	3.8
	2 Persons	1.9
	3 Persons	35.9
	4 Persons	20.8
	5 Persons	18.9

	6 Persons and above	18.9
Education levels	No Formal Education	7.5
	Primary Education	71.7
	Secondary Education	20.8
	Tertiary Education	0.0
Age Groups	20-24	13.2
	25-29	11.3
	30-34	15.1
	35-39	18.9
	40-44	16.9
	45-49	7.6
	50 and above	17.0
Dwelling Unit	Permanent	28.3
	Semi-Permanent	30.2
	Traditional	41.5
Monthly Income	Below MKW50,000.00	56.6
	MKW50,001.00-MKW99,999.00	18.9
	MKW100,000.00-MKW199,999.00	7.6
	MKW200,000.00 and above	1.9
	Refused	15.1
Occupation	Subsistence Farmer	58.5
	Commercial Farmer	15.2
	Casual Labour	7.6
	Salaried Employee	5.7
	Pensioner	3.8
	Unemployed	3.8
	Remittances/Gifts	3.8
	Refused	1.9
Money Account Owned	Airtel Money	56.6
	Village Savings Bank	26.4
	TNM Mpamba	13.2

	Bank	11.3
	None	28.5
Property Owned	House	94.3
	Land	75.5
	Mobile Phone	69.8
	Bicycle	33.9
	Motorbike	15.2
	None	7.6

1$=MWK1,195.00

The study was also interested in finding out the households' monthly income to determine if the households can be able to pay for the renewable energy systems. The study findings show that 56.6% of the households earn Below MKW50,000.00 ($41.84) per month whereas 18.9% earn between MWK50,001.00 and MKW99,999.00 ($41.84 to $83.68) and 7.9% of the households earn MWK100,000.00 to MWK199,999.00 ($83.68 to $167.36) in a month. 15.1% of the households refused to declare their monthly income.

To identify the main local transaction methods, respondents were asked to mention the banking methods they use or bank accounts they own (if any). 56.6% of households said they have an account with Airtel money (an online money transfer service), whereas 26.4% were customers of a cooperative based microfinance aggregated savings scheme. 28.5% of respondents were not customers or subscribed to any bank or cooperative savings scheme. The rest of the social-economic characteristics are presented in Table 3-1.

3.2 Social Economic Activities

The survey examined the social-economic activities in which local people are engaged. It was discovered that 58.5% of the respondents are substance farmers and 15.2% were commercial farmers, which means combined 73.7% were farmers. 7.6% of the respondents were casual labourers (working both in the village and in nearby towns) while 5.7% salaried employees. It was also noted that there are only six people who

operate businesses locally that require electricity. The businesses include selling popcorn, running a video show centre (community cinema), tailoring, and a groceries shop.

The average monthly income generated from such businesses are presented in Table 3-2.

Table 3-2 Business Activities

Business Name	People Employed	Monthly Income (MKW)
Popcorn	1-2 Persons	Below 50,0000.00
Grocery Shop	1-2 Persons	100,000.00 to 199,999.00
Video show Centre	1-2 Persons	100,000.00 to 199,999.00
Tailoring	3-5 Persona	100,000.00 to 199,999.00

1$=MWK1,195.00

The respondents were then asked if they were willing to take loans to boost their businesses. The loan size, repayment periods, and consequently the potential ability of the respondents to repay such loans were the major factors influencing the potential use of such facilities.

4 out of 6 people said they were willing to take business loans. 3 people said they would be willing to take a business loan that is below MWK500,000.00 whereas one person said he would take a loan above MWK1,000.000.00. Based on the preferred loan sizes, two people said they will be able to repay the loan in 4 to 5 years, while the other two people said they would service the loans in 6 to 12 months and 1 to 3 years respectively.

Figure 3-2: *The solar-powered video show centre in Chiwalo village, Machinga*

3.3 Current Energy Sources, Usage, and Expenditure

Respondents were asked if they were interested in getting access to electricity. Out of 53 respondents, only one person said she wasn't interested in adopting future electricity systems because she had a reliable solar home system. Household owners who were interested in getting access to electricity were asked when they wanted to access electricity and the results are presented in figure 3-3.

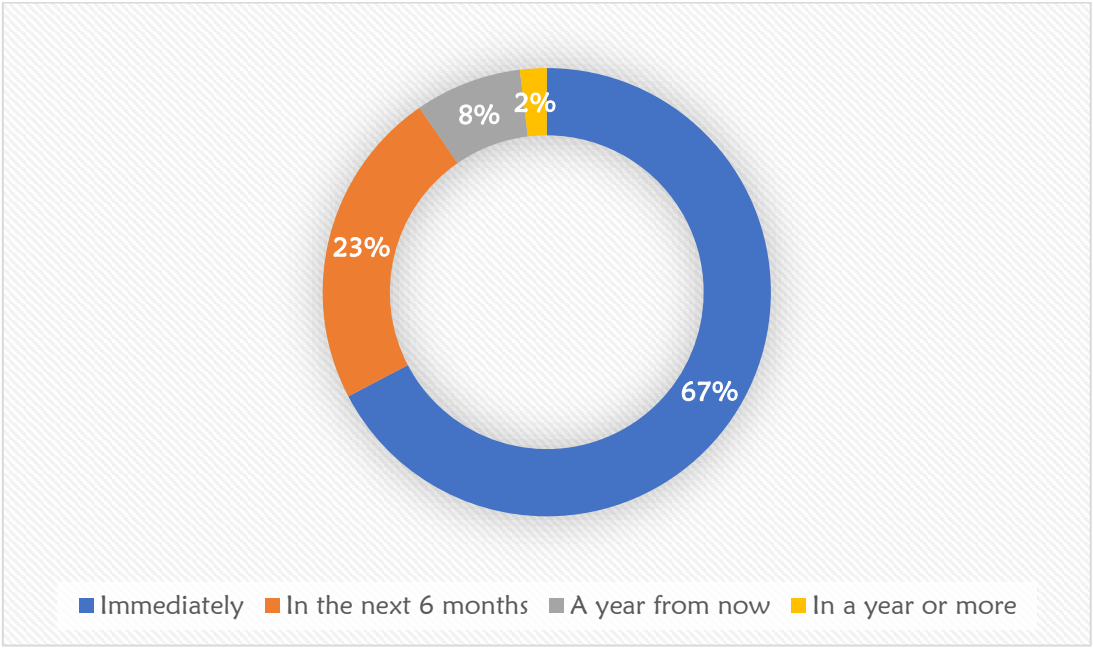

Figure 3-3: *A pie chart showing the time households are willing to have electricity*

As indicated in figure 3-3, 67% of the respondents said they would like to have electricity immediately, whereas 23% indicated that they would be content with having electricity in the next 6 months. Some respondents (8%) were content to have electricity supply implemented a year from the time the survey was conducted, while the other (2%) wanted to have electricity after longer periods i.e more than a year (if supply was sustained).

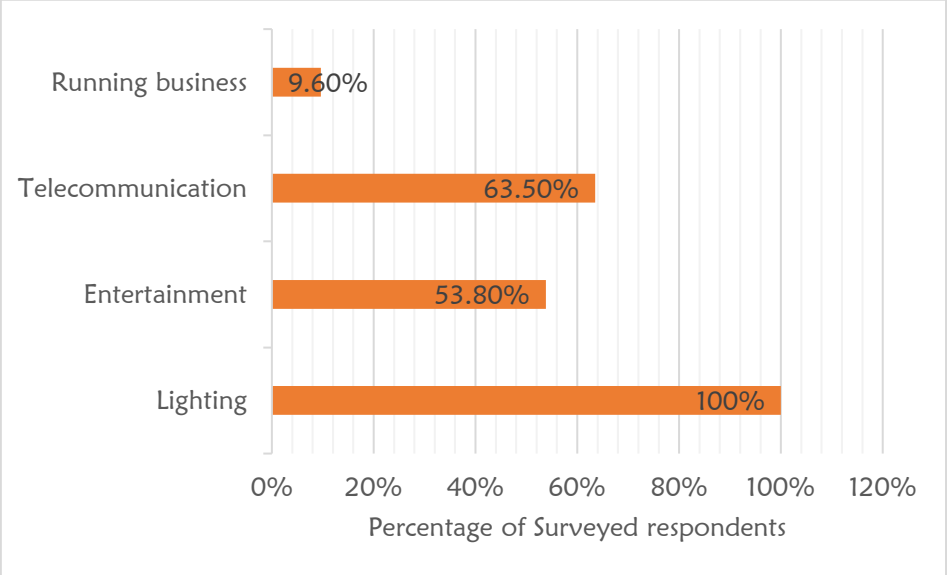

Figure 3-4: *A graph showing household' preferred electricity usage*

Figure 3-4 indicates that all 52 respondents (100%) wanted electricity for lighting while the other 63.5% wanted electricity to facilitate use of telecommunication appliances i.e., charging mobile phones. Some respondents (9.6%) wanted electricity so that they can start businesses that require electricity such as selling cold drinks and opening welding shops among others. 53.8% of the respondents said they would use electricity for entertainment (especially home-based entertainment i.e. TV and radios). Asked whether respondents wanted a renewable energy system, 82% of the respondents said yes and 18% were not interested in having a renewable energy system that means all their needs because they felt it could be expensive to have such as system.

3.3.1 Current energy usage for cooking, lighting, phone charging, and Entertainment

The current key household energy needs for the two sites are cooking, lighting, entertainment, and for mobile phone charging. The energy use pattern shows that, of

53 households living in the surveyed communities, 78% rely on firewood while 14% use charcoal for cooking; only 8% cook using crop residues.

As a primary energy source for lighting, of the 52 respondents surveyed; 62% use battery torches, 19 percent use solar torches, 10 percent use candles and 7 percent use solar home systems. On entertainment and operating electrical appliances especially for mobile phone charging, 60% charge their phones at a solar charging station located at a non-governmental organisation (NGO) office, with community members paying MWK100.00 ($0.08) per mobile phone to get them charged. 10% use car batteries and 2% use solar home systems whereas 21% of the respondents did not have electric appliances that require electricity.

Table 3-3: Households' Energy Services

Energy Need	Energy sources in Use	Percentage (%)
Cooking	Firewood	78
	Charcoal	14
	Crop residues	8
Lighting	Battery Torches	62
	Solar torches	19
	Candles	10
	Solar system	7
	Car battery	2
Entertainment and phone charging	Solar charging station	60
	Car battery	10
	Solar system	2
	None	21

3.3.2 Households Expenditure on Energy Services

Table 3-4 presents a summary of the statistics on how households responded when asked to indicate their expenditure on household energy services. The mean expenditure on cooking was MWK2,160.37, ($1.8) per month per household since most (55%) of households fetch firewood and crop residues for free in their respective farmlands. The average expenditure is therefore drawn from the 45% of households who spend money on firewood and other energy sources for cooking.

It was also observed that on average households spent MWK1875.47 ($1.6) per month on lighting while an average of MWK3,009.52 ($2.5) is spent on entertainment

(including radio usage) and phone charging. Further details are presented in Table 3-4.

Table 3-4: Household expenditure on energy services

Description		Statistic Value
Expenditure on cooking and heating	Mean	MWK2,160.37
	Minimum	MWK0.00
	Maximum	MWK12,000.00
Expenditure on lighting	Mean	MWK1875.47
	Minimum	MWK0.00
	Maximum	MWK6,000.00
Expenditure on phone charging and entertainment	Mean	MWK3,009.52
	Minimum	MWK0.00
	Maximum	MWK5,000.00

1$=MWK1,195.00

It is difficult to compare household energy expenditure as prices of primary energy sources varied by location, but surveys carried out in other parts of Malawi reported an average monthly expenditure of about US$3 on lighting alone and US$2 to US$10 per month for cooking and entertainment [7] [8]. These figures may however be more representative of communities with improved energy access which in turn have more energy consuming appliances when compared to the surveyed communities.

3.3.3 Renewable Energy Schemes and willingness to pay

Respondents were asked if they were previously involved in any renewable energy schemes. 15% of those surveyed (i.e., 8 respondents) indicated that they had been previously involved in RES schemes.

The RES schemes involved included; Solar Pico lights/Solar lanterns and closed solar systems which are all-in-one solar system kits typically consisting of lights and a control box for charging phones and listening to the radio i.e., Biolite solar kits.

Quizzed on the challenges they encountered, it was noted that the solar systems did not meet all their energy needs, such that were mainly used for lighting. Additionally, the systems were observed to only be operational for short periods. The results of their preferred renewable energy implementation (i.e., domestic or community-based) scheme are presented in Figure 3-5.

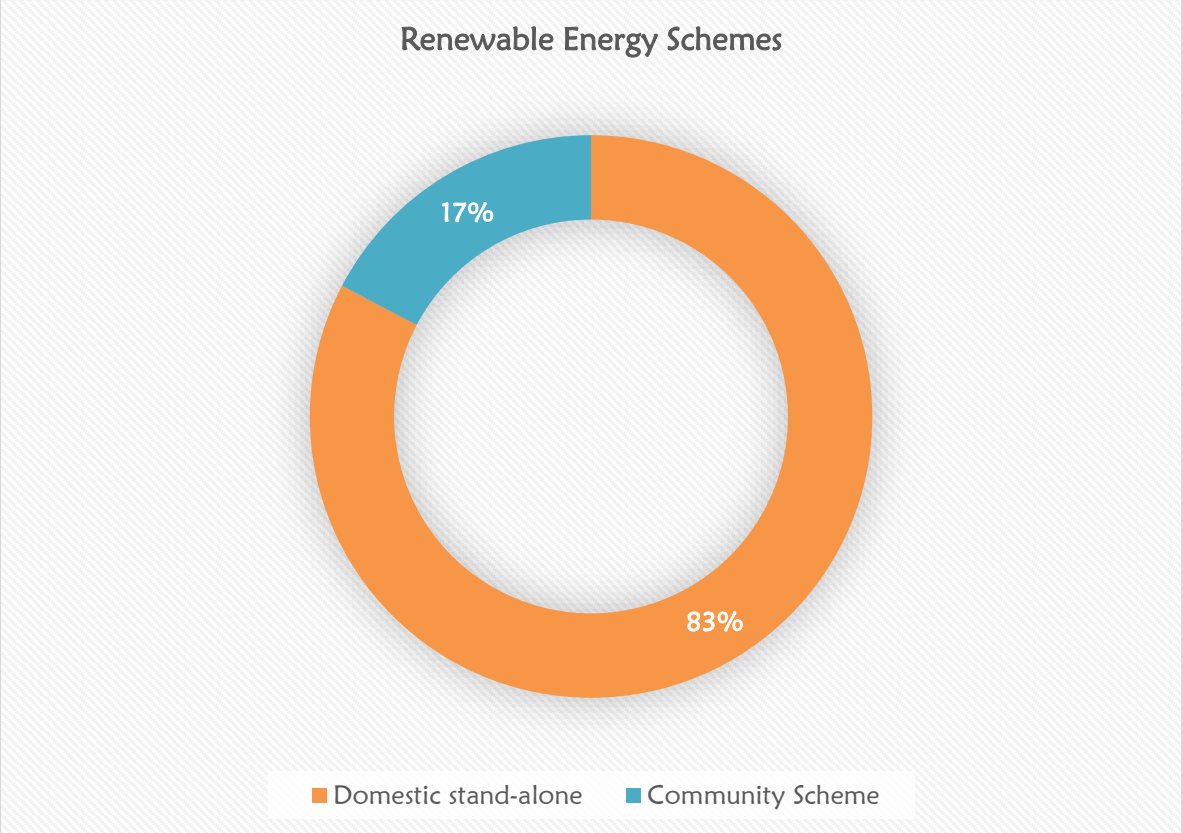

Figure 3-5: *A pie chart showing households preferred renewable energy scheme*

As illustrated in figure 3-5, 83% of the respondents indicated that they would prefer domestic standalone systems whereas 17% preferred community schemes. The reasons for their choices are presented in table 3-5.

Table 3-5: Households' reasons for choosing their preferred renewable energy scheme

Domestic Stand-Alone Scheme	Community Scheme
✓ Easy to manage, repair, and maintain ✓ Secure ✓ No payment of monthly electricity bills	✓ Can meet all my energy needs ✓ Cheaper as there is no need of paying for high upfront costs ✓ Public Facilities can also benefit from this scheme ✓ Introduction of business opportunities such as maize mills, welding shops, etc

The survey was interested in knowing the amount of money households who opted for community schemes would be willing to pay per month. 6 out of the 9 respondents who preferred community schemes said would afford to pay MWK2,001.00 to MWK4,999.00 ($1.67 to $4.18) per month, and 2 people said would afford to pay an

amount below MWK2,000.00 ($1.67). One respondent indicated the ability to afford to pay above MWK5,000.00 ($4.18) on electricity per month.

Respondents who opted for domestic stand-alone systems were asked if they were willing to take a loan to finance their installation and purchase of renewable energy systems components. Of the 43 people who opted for the domestic stand-alone system, 36 said they were willing to take the loan. 36 people suggested a willingness to take a loan that is below MWK500,000.00 ($418.41) whereas five people said would take MWK500,001 to MWK999,999.00 ($418.41 to $836.82). Two people said were willing to take a loan above MWK1,000.000.00 ($836.82) to finance the purchase of a renewable energy system.

Asked when they can service the loan, 42% of the respondents willing to take the loan said would afford to pay back the loan in 6 to 12 months from the time they got the loan. Furthermore, 36% said they would repay the loan in a 1 to 3 years period whereas 17% and 5% of the 36 respondents interested in taking the loan said they would pay back the loan in 4 - 5 years, and 1 - 6 months periods respectively.

Table 3-6: Households' willingness to pay and take loans for renewable energy schemes

System Type	Amount (MWK)	Frequency (respondents)	Percentage of respondents
Community scheme	Below K2,000.00	2	22
	2,001.00 to 4,999.00	6	67
	Above 5,000.00	1	11
Domestic stand-alone system	Below 500,000.00	35	82
	500,001 to 999,999.00	6	14
	Above 1,000,000.00	2	4

1$=MWK1,195.00

3.4 Awareness and Benefits of RES

The other section of this survey was to know how the local people in the respective sites where the project will be rolled out are aware of renewable energy systems and how they think the implementation of such systems will be beneficial to them and their community at large.

3.4.1 Awareness and Training

Asked if they are aware of renewable energy systems, all the respondents acknowledged that they are aware of different RES. The figure presents different types of renewable energy systems of which the community is aware of along with the percentages.

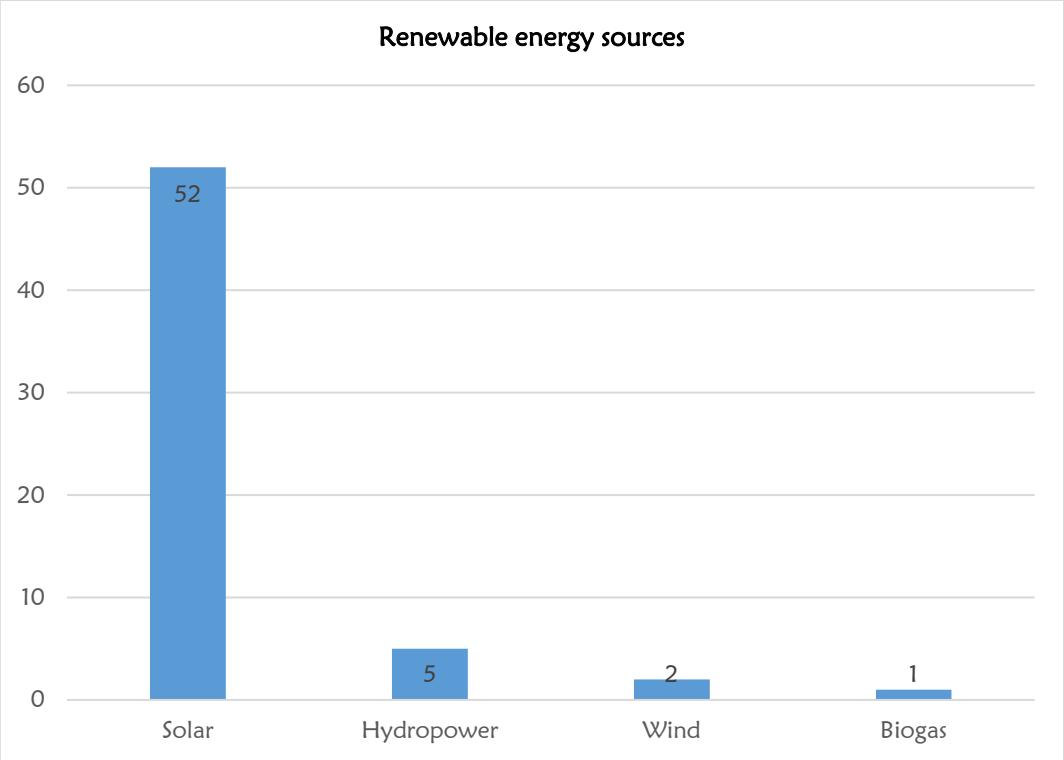

Figure 3-6: *Renewable energy sources known by households at the survey sites*

Results in figure 3-6 show that 52 respondents knew about solar energy systems, 5 people were aware of hydropower, 2 people about wind energy systems, and only one person knew about biogas.

Respondents we asked if they were willing to participate in the training programs to broaden their knowledge of renewable energy systems. 52 of the 53 respondents said were interested in such training. Further to this, all 52 respondents said were interested in taking training courses to improve their knowledge of how to maintain renewable energy systems. 83% of the respondents preferred that the training should be delivered face to face, and 13% preferred paper-based distance learning whereby they would be given books and study at their respective homes. 4% of the respondents preferred that the training materials should be left at the nearest college or any educational institution where they can easily go and study these training materials/books. These findings are presented in Figure 3-7.

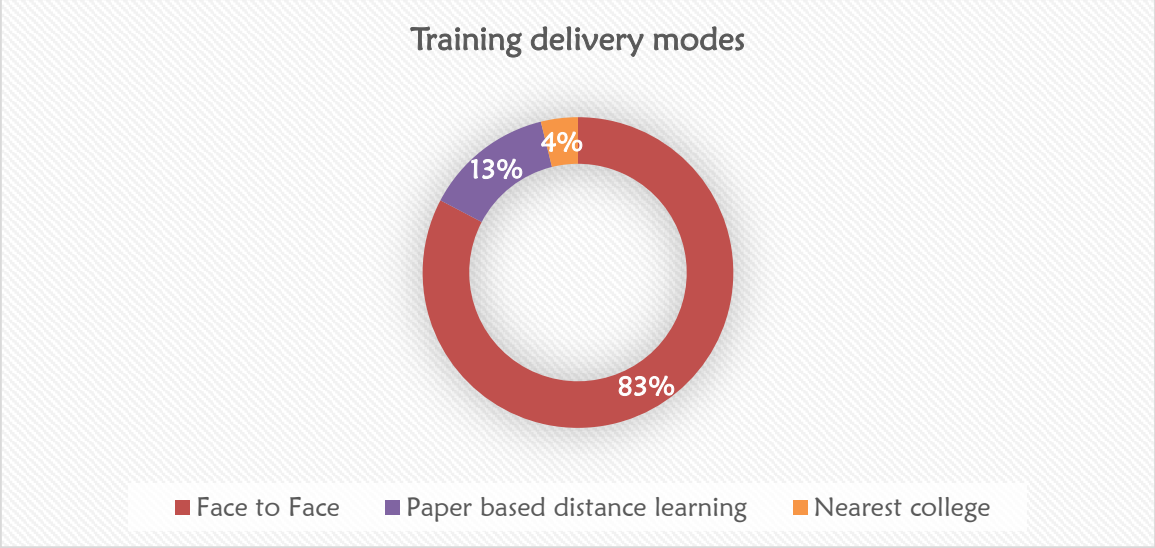

Figure 3-7: *A pie chart indicating households' preferred training delivery modes*

3.4.2 Expected Benefits from the Electrification Project

Respondents were asked about the benefits that electricity brought into their respective communities. The results are presented in Figure 3-8.

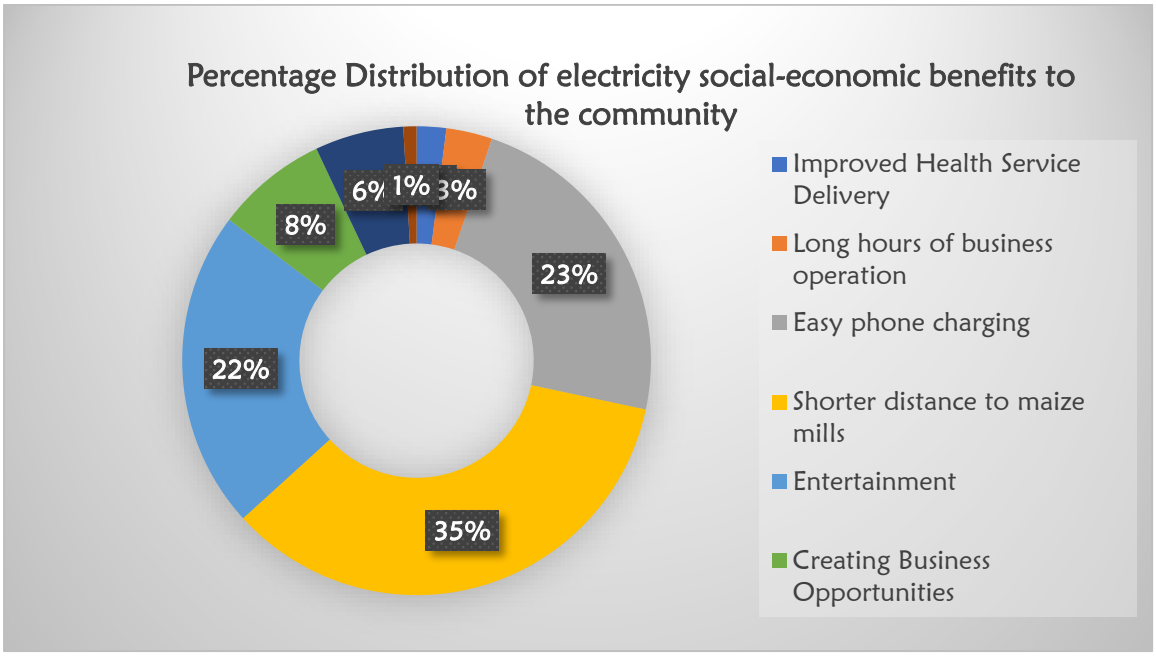

Figure 3-8: *Public's Perception of social-Economic benefits of electricity*

The findings show that 35% of the respondents said once their community is electrified there would be a shorter distance to the maize mills such that people would no longer travel long distances to access maize mills. 23% said it would be easier to charge phones which would consequently improve communication and access to information.

The other expected benefits include; improved health service delivery, entertainment, long hours of business operation, security, creation of business opportunities, and enabling students to study for long hours thereby improving their quality of life. According to [9], electrification had a positive influence on all dimensions of the human development index, HDI, with the education component having the strongest effect which shows that electricity access is a major requirement to improve the quality of life.

3.5 Non-Government Organisation Engagement

There is a growing consensus on the role of renewable energy systems (RES) in accelerating rural electrification to complement the currently overwhelmed national utility power grid in Malawi.

Currently, there several renewable energy projects such as mini-grids and domestic solar home systems operating in Malawi. Some are owned by the Government or owned and run by charities or the private sector. For instance, Mulanje Electricity Generating Agency (MEGA), supported by Mulanje Renewable Energy Agency (MuREA) is a social enterprise established with the mission to provide affordable electricity to villages using micro-hydropower technology [10]. MEGA has constructed one micro-hydro scheme and has two more schemes in the pipeline in nearby communities i.e., Upper Bondo and Ndiza.

Renew'N'Able Malawi (RENAMA) has implemented several projects such as solar energy kiosks aimed at providing access to electricity to communities. Additionally, Community Energy Malawi developed an 80kW Solar mini-grid in Sitolo, Mchinji district. The electricity supplies electricity to 149 households [11]. Similarly, Wala limited and Zuwa Energy has implemented various renewable energy projects such as solar home systems and solar irrigation systems.

This survey also looked at the importance of learning from these NGOs about the challenges and successes they encountered in implementing renewable energy projects. A questionnaire link was sent to approximately 10 institutions but only four institutions managed to submit their responses. The institutions were asked to mention some of the key projects they implemented, and the summary is given in Table 3-7.

Table 3-7: A summary of renewable energy projects implemented by various NGOs

Location and Project Duration	Implementers	System description & Cost	Beneficiaries and Successes	Status	Challenges and solutions
Central and South, Duration: 24 months	Wala Limited	Solar Water pumping systems for irrigation ***$289,000***	25,000 farmers, Improved living standards of smallholder farmers	Functional	Some farmers defaulted on loan payments. This was addressed by introducing productive use and farmers were paying back the loan from the income generated from business
Central Region Duration: 3 months	Zuwa Energy	The solar home system, with capacities of 12KW, 10KW and 7.5KW ***$15,000***	9 health facilities and staff houses. The systems enabled the health facility to perform medical operations	Functional	Delays by Malawi Revenue Authority, MRA to clear the imported solar products at the bolder. This challenge was addressed by engaging the Malawi Bureau of Standards, MBS.
Thyolo and Phalombe Districts Duration: 24 months	Renew'N'Able Malawi (RENAMA)	Two Solar energy kiosks, each 5KW £100,000	4000+ beneficiaries. The project has enabled access to electricity for the community and public facilities such as schools as witnessed by an improved number of students excelling in the national examination	Functional	Sustainability - replacement of battery storage equipment after 3 years. Revenue generated by the kiosks was not sufficient to cover the eventual replacement of batteries and other needed repair work. The organisation resolved this challenge by seeking additional funding from its donor partners. The key lesson learned was that a sustainable revenue model is key to achieving the long-term sustainability of the project beyond the project implementation period.
Kavuzi, Nkhatabay	Ministry of Energy, MoE	Hydro mini-scheme, 50KW **$155,000**	Local	Dropped	Funded by GEF and UNDP, it was subsequently decided that it was cheaper to electrify the village through a national grid extension
Chipopoma	MoE, Local Innovator	Hydro, 50kW **$350,000**	Domestic	Functional	Funded by UNDP, entrepreneurship development

4.0 Conclusion

The survey aimed to investigate opinions and general perceptions regarding overall energy access, potential requirements, and the ability to use Renewable Energy Systems as well as learning from NGOs and groups who have previously implemented renewable energy projects. Overall, 53 people currently residing in two villages which currently are not connected to the Malawian national grid and have poor energy access were surveyed in this study. The findings of this survey show that 52 of the 53 respondents were interested in getting access to electricity as well as adopting renewable energy systems. It was noted that most people (87%) preferred domestic stand-alone systems over community schemes as they believed that it's easy to sustain such systems. The findings also indicate that 52 of the 53 respondents were interested in participating in the training aimed at improving their knowledge of renewable energy systems repair and maintenance. 83% preferred that this training should be delivered face to face as they cannot afford to study the training materials/books. The NGO engagement exercise reviewed that some renewable energy projects failed due to a lack of funds to support the operation, repair, and maintenance of renewable energy systems.

The main challenge observed whilst conducting the survey is that it was discovered that previously identified sites (in the Machinga district) obtained from the Ministry of Energy are now electrified through the Malawi rural electrification program (MAREP). Hence, new unelectrified sites had to be identified within the same district. It is therefore recommended that all the sites earmarked for this project have to be physically verified to avoid issues associated with the assessment of sites that are already electrified.

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