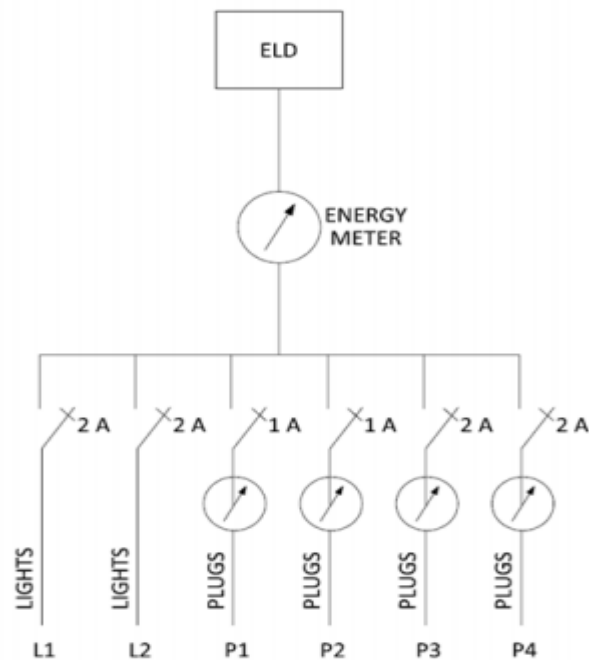


Concept Note for Performance Evaluation of the Kigoma Solar Program in Tanzania: Design and Implementation



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List of Abbreviations and Acronyms

CBO	Community Based Organization
COSTECH	Commission for Science and Technology
CSPro	Census and Survey Processing System
DED	District Executive Director
FGD	Focus Group Discussion
HBS	Household Budget Surveys
IDI	In-Depth Interview
IGA	Income Generating Activity
LGA	Local Government Authority
M&E	Monitoring and Evaluation
MCA-T	Millennium Challenge Account Tanzania
MCC	Millennium Challenge Corporation
MDA	Ministry, Department and Agencies
MKUKUTA	<i>Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania</i> (It is the Swahili acronym for the National Strategy for Growth and Reduction of Poverty)
MKUZA	<i>Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Zanzibar</i> (It is the Swahili acronym for the Zanzibar Strategy for Growth and Reduction of Poverty)
MTUHA	“Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya”
NGO	Non Governmental Organization
NSGRP	National Strategy for Growth and Reduction of Poverty
NBS	National Bureau of Statistics
PAPI	Pen-and-Paper Interviewing
REA	Rural Energy Agency
SACCOS	Savings and Credit Cooperative Society
SPSS	Statistical Package for Social Scientists
ToR	Terms of Reference

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1. INTRODUCTION

The Government of Tanzania (GoT) using funds obtained from the Millennium Challenge Corporation (MCC) is implementing Kigoma Solar PV program under the Tanzanian Compact that is being managed by Millennium Challenge Compact for Millennium Challenge Account Tanzania (MCA-T). The program is an interim solution to extremely low and geographically limited supply of electricity in Kigoma region.

Access to electricity is essential for the achievements of the Millennium Development Goals and sustainable development. Access to this important input, helps to reduce poverty and improve conditions and standards of living for the majority of the population. Energy is crucial for human development indices. Access to or deprivation of energy is an important measure of socio-economic development.

According to the World Bank (2010), barriers to electrification include insufficient generation capacity of the main electricity system and poor households and resulting less energy consumption. The resolution 65/161 of the United Nations General Assembly on access to modern affordable energy services in developing countries indicates that success can only be achieved through strong, coordinated, and sustained effort by all stakeholders. In this regard, governments, donors and multilateral institutions, businesses including banks and other financial institutions and civil society organizations (CSOs) have a role to play on both investment and sustainable use of energy. Both political and social support is very important. Utilization of renewable energy is one of technologically and environmentally efficient strategy to improve electricity. Tanzania National Energy Policy (February 2003) recognizes the use of clean technologies in its expanding energy sector, with a focus on technologies that are environmentally sound and adapted to local needs. Already, the government has created a legal framework that is conducive for growth of renewable energy utilization, including the establishment of rural energy Agency and the rural energy Fund. The agency addresses the promotion of applied research, awareness rising, and promotion of renewable energy utilization in the country. The government has also established appropriate fiscal and financial incentives for renewable energy development using the rural energy Fund. Import duties for most of the components of renewable energy systems were reduced from 25% to only 5%. Exemption of Value Added Tax on renewable energy equipment and components has been made by the government.

Tanzania is blessed with abundance sun source which is available throughout the 12 months cycle. As in most parts of the world, solar energy is not available at night, making energy storage an important issue in order to provide the continuous availability of energy. Solar energy is obtained either directly using photovoltaic (PV) or indirectly using concentrated solar power (CSP) or to split water and create hydrogen fuel using techniques of artificial photosynthesis. There are PV systems suitable for rural and remote areas. MCA-T chose PV systems to address shortage of modern affordable energy in Kigoma region. Small-scale solar power installations of the type promoted under the Kigoma programme are expected to play an increasingly important role in meeting the growing energy demand of Tanzania's rural communities.

This report describes evaluation design for the Kigoma Solar PV Program. The assignment includes evaluation design as well as data gathering, analysis and dissemination.

2. BACKGROUND

The Government of the United States of America acting through the Millennium Challenge Corporation (MCC) and the Government of Tanzania (GoT) acting through the Ministry of Finance have entered into a Millennium Challenge Compact for Millennium Challenge Account Tanzania (MCA-T) assistance to help facilitate poverty reduction through economic growth in Tanzania. The consultative process for the Program was informed by, and anchored in, the consultative process

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conducted in connection with the Government's National Strategy for Growth and Reduction of Poverty (NSGRP) which was finalized in 2005 (commonly referred to by the Swahili acronyms "MKUKUTA" and "MKUZA," for the mainland and Zanzibar, respectively).

The Compact is to be implemented over a period of five (5) years. Guided by MKUKUTA/MKUZA priorities, the Compact establishment process identified an inadequate transportation network, an insufficient and unreliable supply of energy, and a shortage of potable water as three key constraints to economic growth and private investment in Tanzania. The Millennium Challenge Compact Program is designed specifically to address each of these constraints. The Compact aims at reducing poverty through the implementation of a program consisting of three projects, namely *transport, energy and water* projects. Each project contains a number of activities and sub-activities.

The three infrastructure development projects are core components of the Compact. However, the Compact has a Monitoring and Evaluation (M&E) unit, which plays an important role in the management of the program by ensuring that the resources going into the Compact are being utilized effectively and efficiently; activities are implemented in a timely manner; services generated are being accessed, utilized and beneficiaries are satisfied with the services; and the expected results are being achieved in a sustainable manner. The M&E plan for Tanzania Compact is guided by both the national poverty monitoring system and the economic analysis that identified beneficiaries and provided economic rationale for the MCA-T programme.

The Kigoma Solar PV program is designed to address a range of energy needs in Kigoma (Rural) and Kasulu Districts of Kigoma region. The energy infrastructure is underdeveloped and access is low. The Tanzania Electric Supply Company Limited (TANESCO) powers a diesel based mini-grid in the Kigoma town area with installed capacity of 11MW but only 3-4MW is being produced. TANESCO is also developing a second mini-grid in Kasulu town, however the population of these two urban area accounts for less than 15% of the region's population. Most households, rural or urban, rely on a mix of off-grid energy sources such as wood, charcoal, kerosene, dry-cell batteries, and candles - among others.

The Kigoma Solar PV program is a broad-based comprising a free grant-funded component for public and business PV systems and a component for commercially sold PV systems for home and small businesses use. The free grant-funded component will involve installing solar modules and other electric systems in approximately 45 secondary schools, 116 dispensaries, 14 health centres, 25 village markets, and 90 fishing boat pairs. Components to be installed are described as follows:

- The secondary school system was designed to support lighting in the classrooms and will support the use of television setup or the use of computer. The system also has capacity to charge cell phones. Both cell phones charging and cinema services were expected to generate income.
- Dispensary and Health Centre Systems were designed to support lighting and media services. They also support charging of cell phones by patients against a small fee. Each health facility will have a 24 hours Vaccine Refrigerator stand alone electrical system with no other appliances connected to the system.
- Village market productive-use systems were designed to support general lighting at the village market (exterior and for each stall). It also supports four types of income generating activities, namely cell phone charging, cinema, hair cutting and sewing.
- Fishing boat pair system was designed to provide 5 LED lamps per fishing boat pair for 9 hours for Beach Management Systems (BMUs), which are fishers' cooperatives controlling fishing.
- The Project will also implement a household access strategy to facilitate household access to the full range of PV systems available across about 20 villages.

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This project was designed to complement the electricity transmission and distribution project taking place in Kigoma to increase overall access to electricity following environmental concerns that delayed a hydro-electric power station - Malagarasi II, which was also to be financed by MCC. Installations have been underway since October 2012. About 76% of the installations had been made by commencement of this assignment (April 2013). Besides supply and installations of hardware, the program includes marketing, training, maintenance and after sale services.

3. PROJECT LOGIC

The Kigoma Solar PV Program is expected to improve electricity service coverage and access, quality and consumption of electricity and other energy sources. It is assumed that these will increase investment and economic activities of businesses and individuals. It is also expected to improve human capital accumulation in terms of education and medical service delivery. The hypothesis is that these activities will ultimately result into increased income and more access to the two social services, which will in turn contribute to poverty reduction and economic growth.

The evaluation will measure the following process, outputs, outcomes, objectives and impact indicators as outlined in the revised Project Logic prepared by MCA-T:

(a) Process:***(i) Finance feasibility design activity***

- Value of feasibility contracts (\$)
- Value disbursed of feasibility contracts (\$)

(ii) Finance construction (implementation) activities

- Value of construction contracts (\$)
- Value disbursed of construction contract (\$)

(b) Outputs:***i) Increase access to electricity***

- Total capacity of systems installed (kW_{peak})

ii) Increase in technical and administrative capacity

- Percent of total training hours delivered end users (%)

(c) Outcome:***i) Improve electricity service coverage:***

- Number of PV systems installed (#)
- Number of PV systems sold and installed at household (#)
- Daily solar power consumption (kWh)

ii) Improve quality of service:

- Average availability of power in the last 24 hours

iii) Increase electricity consumption:

- Average annual quantity of other energy sources (kerosene, diesel) consumed (Kg)

(d) (b) Objectives:***i) Increase investment and economic activities***

- Average annual business revenue (\$)
- Average annual wages (\$)
- Average annual expenditure on energy (\$)

ii) Improve human capital accumulation

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- Schools with afterhours study programs (%)
- Availability of vaccines (#)
- Vaccinations administered (#)

(e) Compact Goal: Poverty reduction and economic growth

- Average annual household income per capita (\$)

A graphical presentation of the revised program logic given in the ToR is attached as *Annex I*. Definition and Unit of the Additional Indicators are shown in *Annex II*.

4. EVALUATION QUESTIONS

The performance evaluation design and implementation will address the following overarching questions across the geography, activity scope and the Project Logic of the Kigoma Solar PV program:

- i. How well was the program implemented? (Including analysis of Project scope, timing, costs, and public perceptions); were the output targets achieved? If not, why?
- ii. What type of challenges were encountered during implementations?
- iii. How well has the solar energy approach addressed the energy needs of the beneficiary population?
- iv. What are the outcomes of the program on solar energy access, use and costs as well as productivity income etc.?
- v. How sustainable are the outcomes?
- vi. What lessons can be learned from the experience of the program?
- vii. Was the project successful in catalyzing investments in the energy sector in Kigoma? If not what conditions will need to be in place for the pilot to encourage additional investments?
- viii. Are there any unplanned results due to the implementation of the Kigoma Solar project?

In addition to the above the evaluation design and subsequent data gathering activities will address the following key research questions on outcome, objectives and Compact Goal:

- i. Has the Kigoma Solar Project contributed to an improvement in electricity service coverage across different customer types?
- ii. Has the Kigoma Solar Project contributed to an improvement in the quality of electricity available, across different customer types?
- iii. Has the Kigoma Solar Project contributed to an increase in consumption of electricity, across different customer types?
- iv. Has the Kigoma Solar Project contributed to an increase in investment in economic activities across different customer types?
- v. Has the Kigoma Solar Project contributed to an improvement in human capital accumulation across different customer types?
- vi. Has the Kigoma Solar Project contributed to a reduction in poverty across different customer types, as measured by household income per capital?

The study is also expected to collect data that will feed into the formulation of the Economic Rate of Return (ERR) model for the Kigoma Solar program. This will include data on the sources of energy used prior to the installation of PV systems and their associated prices and quantities data, energy use and cost after the PV installation, ways and purposes for which the system are being used, and energy sources used in homes in the project area.

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5. CONCEPTUAL FRAMEWORK

Figure 1 shows conceptual model of the project and identifies key evaluation issues. It presents the project's structure, connections, and expected outcomes and impacts. The conceptual model has been developed based on the Project Logic and the key evaluation questions. It is described as follows:

- The box on the far left of the figure shows the main project activities of the Kigoma Solar PV Program. These include: installations of solar PV hardware, marketing, training, maintenance, and after sale services.
- The second box from left shows that the project activities are expected to create some short term impacts such as enabling access to free grant-funded and commercially bought Solar PV systems that may in turn enable beneficiaries to access to electricity from the systems. Access of electricity from at the free grant-funded installations will be immediate but access by customers that will commercially buy the systems through *Clusters* or SME-MFI such as SACCOS and VICOBA may not be immediate because it will depend on the effect of marketing and training activities, and responsiveness of the *Clusters* and SME-MFIs. Moreover, willingness and ability to acquire and use the Solar PV systems is likely to be affected and controlled by gender, age, education, income as well as perception of households with regard to knowledge gap on PV technology, concerns about quality issues, cost, financing, distribution, operations and maintenance of the PV systems, appliance use limits and awareness of productive use opportunities. It is also affected by control factors of business such as type of business, size of the business, location of the business vis-à-vis location of the installations and perception of the owner on issues stated above. The box shows that design of the program had addressed factors that limit both coverage and access through organized marketing of the solar systems and their benefits as well as installer, vendor and end user training.
- The first box in the third column shows that coverage of electricity in Kigoma and Kasulu Districts is expected to improve after including public infrastructures (dispensary, health centre and secondary schools), businesses and households where the solar PVs will be installed. The coverage is expected to improve more when individual customers use electricity at public infrastructures and village markets for cell phones charging, cinema services, hair cutting and sewing as per the design of each installation. It is expected that energy costs/bills may decrease because solar electricity is expected to be cheaper than other sources of energy such as kerosene and diesel. The study will also identify uses of other appliances that may have not been included in the design of the program but are used or can be used using electricity of the installations. The marketing intervention could have made spillover effects such that households outside the target villages - including peri-urban areas with grid electricity, may have bought Pico Solar PV systems and Solar Home Systems (SHS) in various sizes for home and small businesses use.
- The second box in the third column shows that the Kigoma Solar PV Program is expected to improve quality of electricity. Tanzania is blessed with abundance sun source which is available throughout the 12 months cycle. Therefore, unlike grid electricity that is normally characterized by incidences of blackouts and fuel shortages, the solar PV energy is expected to be available throughout the rated hours – if proper appliances and luminaires are used. In this regard, people with the program's solar PV installations will have longer hours of electricity access during the 24 hours of a day than those connected to the grid electricity in nearby areas. Costs/bills are likely to decline because solar electricity is expected to be cheaper than other sources of energy such as kerosene and diesel. Outputs of the program in areas with the grid will reduce pressure on the already overstretched grid; hence increase its electricity quality. Other sources of energy such as wood, charcoal, kerosene, dry-cell batteries, and candles, among others – have to be collected or procured and the same is repeated after being depleted – a hassle undertaking.

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- The third round figure in the third column shows that a combined effect of improved electricity coverage and quality may increase electricity consumption in the two districts. It is expected that electricity consumption is expected to increase while consumption of other sources will decline because solar electricity is expected to be cheaper than these other sources of energy. Electricity consumption at both homes and businesses is likely to be affected and controlled by gender, age, education, income, time since electrification as well as perception of households and businesses with regard to knowledge gap on PV technology, concerns about quality issues, cost, financing, distribution, operations and maintenance of the PV systems, appliance use limits and awareness of productive use opportunities (See lowest box in the model). Meter readings and the period when non-metered PV systems¹ are used will measure consumption. Consequently, the quantity of consumption of other sources of energy such as wood, charcoal, kerosene, dry-cell batteries, and candles - among others is expected to decrease - following availability of the solar PV electricity – a power source substitution effect.
- The third box figure in the third column shows that increased electricity consumption is expected to increase investment and economic activities at the free grant-funded public and business installations as well as at commercially bought systems in households and businesses. Decrease of expenditure on energy following substitution with cheaper solar energy could free-up money that will be invested in maintenance, replacement of batteries and purchase of additional solar power PV systems if so required. Availability of electricity will depend on how owners and users address maintenance challenges of the PV systems such as availability of parts and timeliness. Availability of money for re-investment and sustainability will depend on revenue collection efficiency of owners of businesses that bought the solar PVs and the free grant-funded systems at schools, health facilities and markets. Businesses using electricity are likely to operate for more hours and introduce new services/products that will combine to generate more revenue and employment (number and wages). According to the Africa Energy Unit (AFTEG) of the World Bank (2004), normally there are spontaneous investment and economic effects and delayed effects based on type and size of investments as well as time since electrification. All these factors will be considered in the evaluation. Households may utilize the electricity for productive use opportunities, which will be various Income Generating Activities (IGAs). Fishers that are members of BMUs covered by the program are likely to increase their fishing mission per period, catch size and revenue than when they were using kerosene lanterns that could enable them to plan for or actually purchase more boats and additional solar PV systems.

Moreover, availability of electricity is expected to be catalyst for schools provided with the solar installations to introduce afterhours study programs. Schools may also introduce new technology that requires electricity such as computers and associated programs. Dispensaries and health centres served by the program will get solar-powered vaccine refrigerators that will enable them to store vaccines for various diseases such as BCG, Measles, and Polio. Vaccinations will start to be administered. Healthy facilities may also plan for or introduce new services and more service provision hours.

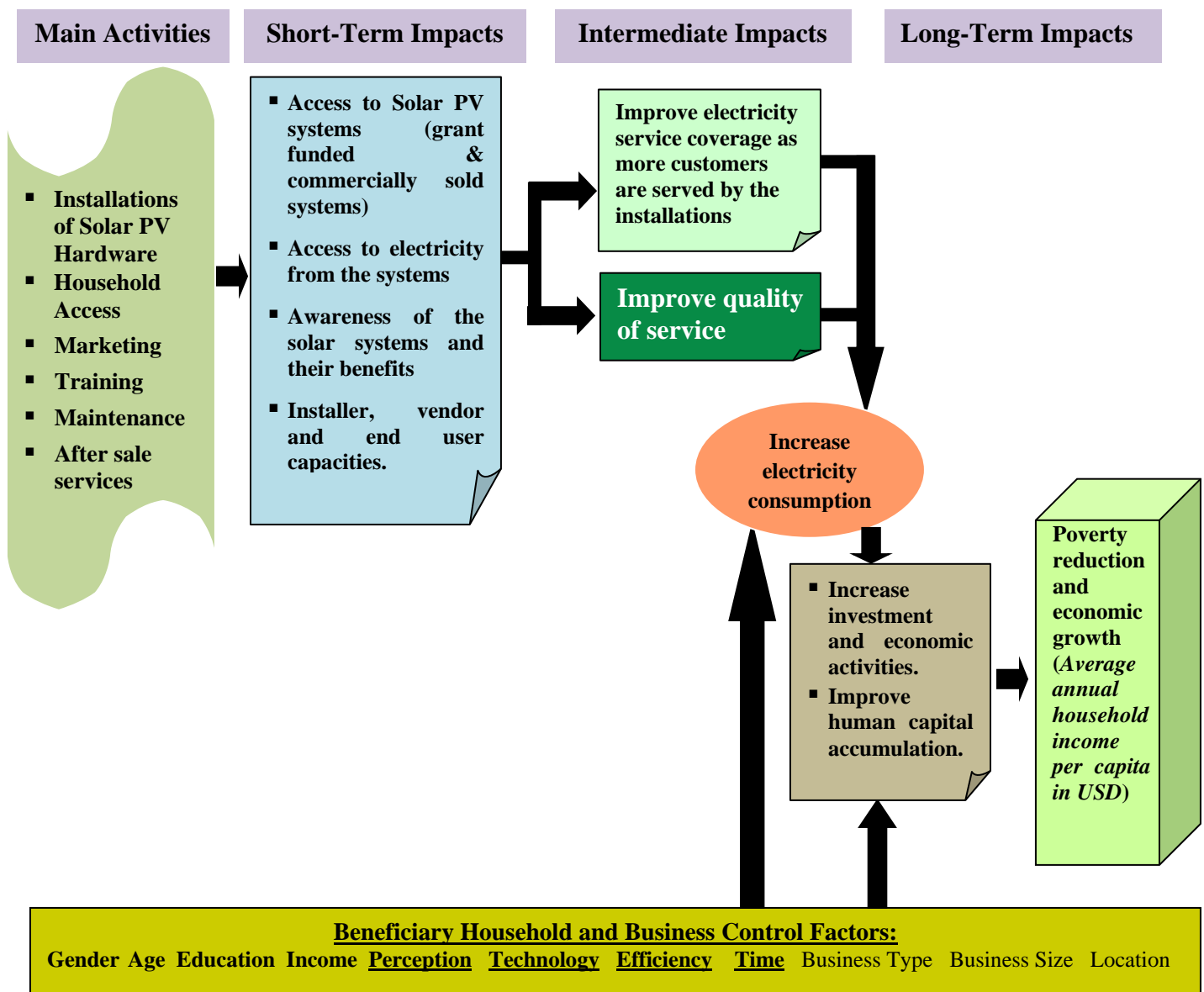
- Increased investments, resulting economic growth and improved human capital accumulation may lead to increase of the average annual household income per capita hence poverty reduction and economic growth in the two districts as shown in the box on the far right.

¹ Vaccine refrigerators, BMU night fishing systems, Pico Solar PV systems and Solar Home Systems (SHS).

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Figure 1: Conceptual Framework for Kigoma Solar PV Program



The four underlined issues (Perception, Technology, Efficiency, and Time) are cross-cutting for both households and businesses. Perception of the PV solar systems by households and business owners may affect access, use and maintenance of the systems. Availability of the technology will make access and maintenance easy than when the PV systems and parts are not readily available in the market. Efficiency on use of the systems and revenue collection are important for longer access of solar power, its repair and replacement or expansion. Timely repair and maintenance improves power availability because delays can lead to blackouts.

The rigor of the evaluation will also be able to measure **relevance** (compact formulation process), **efficiency** (process and output indicators, and timeliness), **effectiveness** (outcome and objectives indicators), **Cost-benefit analyses** (Is the project warranted based on re-estimation of cost - benefit analyses?), **Unintended consequences** (Are there unintended impacts of the program - positive or negative?), and **sustainability** (Are the stakeholders ready and committed to keep and perpetuate impact created by the project? Did the project benefits reach intended/unintended beneficiaries? How was the activity perceived by potential/actual beneficiaries? What challenges were encountered? How

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were the challenges addressed? Can the revenue earned make the installed systems sustainable?). It will also identify and document applicable **lessons learned** - What modifications had to be made in the project design to address challenges? What are the implications of the evaluation findings for scaling up, replication or long-term policymaking?

6. EVALUATION METHOD EVALUATION METHOD

The consultant will use a **pre-post or before and after** comparison evaluation method. This involves estimating differences of the status before and an outcome after a program is implemented. Therefore, the “before” status is baseline data. Justification for selection this evaluation method is as follows:

- Although results of the pre-post method may not produce impact estimates that are conclusively causal because of lack of a counterfactual, they may provide a good basis for future work, including policy implications.
- According to the US Embassy and the Ministry of Minerals and Energy (The guardian - 22nd August 2012), the Kigoma Solar PV Program is the largest solar project of its kind in Tanzania. This type of large-scale intervention is in contrast to the smaller and often scattered solar interventions by Rural Energy Agency (REA) and others. Nevertheless, they can also have measurable outcomes similar to this Program.
- The socio-economic development in Kigoma and Kasulu districts is mainly driven by coffee farming (in northern parts of Kasulu), fishing (in communities near Lake Tanganyika in the two districts), and mixed farming in other parts of the two districts. Bukoba and Muleba Districts near Lake Victoria in Kagera Region have similar activities but their type of coffee and fish are different. Also, Kigoma and Kasulu activities are highly influenced by import-export trade with the neighbouring countries of Democratic Republic of Congo, Burundi and Rwanda. There is no other part of Tanzania with similar characteristics. Consequently, it is not feasible to identify a similar comparison group outside of the treatment districts.
- In Tanzania, people are free to use services of any health facility, school, market, fishing boat or businesses. Therefore, if logistics and financial means allows, people from villages not provided with the solar PVs of the program in Kigoma and Kasulu can access and get changed by services installed in other villages. Therefore, selection of facilities not provided with the solar PVs of the program in communities within the treatment districts as comparison groups may be misleading because they might be accessing the services from communities provided with the solar PVs of the program.

The Progress Report 4 of 5 of Supervising Consultant dated 20th March 2013 indicates that about 76% of the installations had been completed. Only ninety-three (93) systems, or 24%, of the original 390 systems were yet to be installed. These were mostly BMU and village market systems due to extraneous issues that faced their installations. The report also shows that all activities of the Kigoma Solar PV Program is expected to be completed by mid-August 2013. Therefore, “baseline” data will be collected after the intervention has already begun. To mitigate this problem, the pre data (baseline) will be based on recall data. It is likely that some respondents may have forgotten the situation before installation of the solar PVs. To mitigate this, questions to be asked will have a specific reference period of ONE YEAR before data collection, which could match with the period before implementation.

Nevertheless, there are dispensaries, health centres and secondary schools, village markets, fishing boats, businesses and households in the two districts that have not been provided with the solar PVs of the program and are located very far from program target areas such that they cannot access and get affected by the interventions – given logistics in the two districts. List of villages and travel distance data from the two districts can be used in the selection of villages/facilities located very far from

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program target areas. These could be comparison groups because they are similar facilities in similar communities in the same geographical and socio-economic region and are unlikely to access and get changed by the intervention. Therefore, **differences of comparison of treatment and such comparison groups** could complement and enhance the pre-post evaluation. The additional method would distinguish program impacts from changes that occur throughout the Kigoma and Kasulu Districts. Similarities of data between the two groups will serve to indicate whether the comparison group was an appropriate counterfactual, while changes of the indicators – under this method - will be based on differences of findings for the two groups.

Table 1 shows the mixed pre-post and comparison evaluation method to be adopted. We will map the evaluation into the geographic and activity scope of the program.

Although the Kigoma Solar PV program is broad-based, the centre-stage for the evaluation will be the installations of solar PV hardware. Other activities (marketing, training, maintenance, and after sale services) will be evaluated with a view of better understanding the success and failures of the main activity.

Table 1: **Proposed Mixed Evaluation Methodology**

Activity	Evaluation Methodologies	Pre-post Comparison Method	Differences of Treatment and Comparison Groups Method	Key Outcomes, Effect and Impact
<ul style="list-style-type: none">▪ Installations of Solar PV Hardware▪ Household Access▪ Marketing▪ Training▪ Maintenance▪ After sale services	<ul style="list-style-type: none">▪ Baseline status compared with status after implementation▪ Differences of changes occurred in treatment and comparison groups after implementation	<ul style="list-style-type: none">▪ Recall of situation one year before solar PV installation began (Baseline)▪ Situation Months after solar PV installation is completed	<ul style="list-style-type: none">▪ Status in communities that got program installations (Treatment Group)▪ Status in similar communities and facilities that did not get installations and cannot access program services (Comparison Group)	<ul style="list-style-type: none">▪ Improve electricity service coverage▪ Improve quality of service▪ Increase electricity consumption to reduce per-unit energy costs▪ Increase investment and economic activities▪ Improve human capital accumulation▪ Poverty reduction and economic growth (Increased average annual household income per capita)

The installation and use of solar PVs is very unique for each public facility, business or household. It has easily traceable outcome, effect and impact. In this regard, the study of the Kigoma PV program will be a mixed performance and impact evaluation that will use descriptive statistics instead of experimental or quasi experimental evaluation design used in impact evaluations.

The evaluation will use both quantitative and qualitative data as complements in an evaluation strategy. Therefore, the consultant will also use a “mixed-method” design of data and data collection that combines techniques traditionally labeled “quantitative” with those traditionally labeled “qualitative”. The choice is based on type of data to be collected, timeframe and nature of data source/respondents relevant for each type of data. Primary data will be collected using these methods. It will be complemented by secondary data addressing the evaluation questions from Household Budget Surveys (HBS), Health and Demographic Surveys (HDS), Basic Education Statistics (BEST), Health Statistics reports and data from the Health Information System (MTUHA register books and tally forms listed in *Annex II*), Human Development Report (HDR) – among others, and administrative data from relevant institutions in Kigoma (Rural) and Kasulu Districts, including

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TANESCO. Findings of each round of the evaluation will be compared with findings of other surveys in the literature. Bidding document, feasibility study and progress reports of Supervising Consultant will be used to assess process, outputs and challenges.

7. ROUNDS OF DATA COLLECTION AND USE

All activities of the Kigoma Solar PV Program will be completed by mid-August 2013. If some issues raised in the Progress Report 4 of 5 by the Supervising Consultant are timely addressed, all activities may be complete at the start of data collection in June/July 2013. By that time there would be nothing to modify or fine-tune in the project design because it will be completely implemented. Therefore, **Interim evaluation** round that is normally conducted after activity implementation is near a half way is not possible. Early checks to determine immediate changes brought by the by-then 100% progress of process and outputs can be done during the first round of data collection that will also collect baseline data.

Furthermore, improvement of electricity service coverage and quality of electricity obtained as well as increase of electricity consumption will happen immediately but incrementally after completion of each solar PV installation. These outcomes will likely occur before the first round of data collection. Therefore, all outcome indicators can be measured during the first round of data collection.

It is indicated in the Conceptual Framework that, normally there are spontaneous investment and economic effects as well as delayed effects depending on type and size of investments as well as time since electrification. For instance, expenditure on energy consumed is not likely to decrease immediately after installations because replacement of other type of energy used for cost-saving purposes does not occur immediately; time and money are needed for changing appliances and perceptions. Increase of employment and wages also cannot occur immediately because they depend on increase of markets and businesses as response to availability of electricity, which cannot occur immediately. Furthermore, introduction of afterhours study programs at schools and availability of vaccines at health facilities may also not occur immediately because of time required to change plans and acquire necessary resources. Therefore, the first round of data collection will collect only baseline information of objective indicators. Data on changes of such indicators will require another round of data collection one year after program implementation because there will be no significant changes of these indicators during the first round of data collection.

Therefore, a **two-stage rounds project evaluation cycle** will be adopted - comprising:

- **First Broad-based Round** of combined baseline and interim round that will also measure outcome indicators; and
- **Follow-up evaluation** round to measure changes related to objectives and the Compact Goal - Poverty reduction and economic growth. This should be done at least one year after project completion.

8. ANSWERING KEY EVALUATION QUESTIONS

This section provides descriptive answers to the evaluation questions concerning program implementation, externalities, beneficiary perceptions, outcome and impact of the program. The key research questions will be addressed as follows:

8.1 Process and outputs indicators related questions:

Research Question 1 — How well was the program implemented? (Include analysis of Project scope, timing, costs, and public perceptions), Were the output targets achieved? If not, why?

To address this question the consultant will use review of secondary data from the energy department of MCA-T such as bidding document, feasibility study and progress reports of Supervising Consultant.

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This will be done in the first data collection cycle. Clarifications will be sought from the energy department, the M&E department and the joint venture partners - Camco and Rex Investment Ltd (if need arises). Achievements of agreed output targets, milestones and timelines as reported in the documents will be assessed. Reasons for success and failures will be collected through in-Depth interviews of key program implementers. Data on the following process and output indicators will be extracted from the secondary data:

- Value of feasibility contracts (\$)
- Value disbursed of feasibility contracts (\$)
- Value of construction contracts (\$)
- Value disbursed of construction contract (\$)
- Total capacity of systems installed (kW_{peak})
- Percent of total training hours delivered end users (%)

Organized Focus Group Discussions (FGDs) of community members in villages where the various solar PV installations were made including villagers and members of BMUs and SACCOS will collect data on relevance, and perceptions on processes and outputs, benefits and how they value the intervention, negative effects (if any), problems/challenges encountered, opinions, beliefs, and attitudes towards the project.

Research Question 2 — What type of challenges were encountered during implementations?

To address this question the consultant will use data from review of and progress reports of Supervising Consultant. This will be complemented by primary data that will be obtained through In-Depth interviews (IDIs) of leaders of the villages, BMUs and SACCOS involved in the program. Challenges will also be obtained through FGDs of community members in villages where the various solar PV installations were made.

Research Question 3 — How well has the solar energy approach addressed the energy needs of the beneficiary population?

To address this question the consultant will collect primary data on energy needs of the beneficiary population using a questionnaire that will be administered face to face during field data collection. Beneficiaries will be asked to recall their energy needs and use before solar PV installation began, including factors that limited access to and use of electricity and other sources of energy. They will also be interviewed on current energy needs and factors that limit current access to and use of electricity and other sources of energy. Changes will indicate how well the solar energy approach addressed the energy needs of the beneficiary population.

Research Question 4 — What are the outcomes of the program on solar energy access, use and costs as well as productivity income etc.?

To address this question the consultant will collect the following five data items: Number of PV systems installed, Number of PV systems sold and installed at household, Daily Solar power consumption, Average availability of power in the last 24 hours and Average annual quantity of other energy sources (kerosene, diesel) consumed. A data extraction checklist will be used to collect secondary sources and administrative data from the energy department of MCA-T on the number of PV systems installed, and the number of PV systems sold and installed at household. Questionnaires will be used to collect data on daily solar power consumption, average availability of power in the last 24 hours and average annual quantity of other energy sources (kerosene, diesel) consumed from dispensaries, health centres and secondary schools, village markets, fishing boats, businesses and households.

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Heads of Households and businesses that accessed electricity through the program will be interviewed on solar energy access, use and costs as well as productivity income and other related issues. Responses will be based on records and recall memory.

Research Question 5 — How sustainable are the outcomes?

To address this question the consultant will collect primary data on existing, planned and expected measures to make the installations and accrued benefits sustainable. Sustainability questions will be fielded in all face to face interviews of stakeholders including Local Government Authorities in Kigoma Rural and Kasulu Districts up to village level. All public facilities where the free grant-funded installations were made are under local governments. Owners and managers of other installations will also be interviewed on their plans, commitments and how revenue from the installations will contribute to sustainability.

Research Question 6 — What lessons can be learned from the experience of the program?

To address this question the consultant will collect primary data on lessons through face to face interviews of energy department of MCA-T, Local Government Authorities in Kigoma Rural and Kasulu Districts up to village level, as well as owners and managers of the installations. Therefore, lessons will generally come out of all data collection activities.

Research Question 7 — Was the project successful in catalyzing investments in the energy sector in Kigoma? If not, what conditions will need to be in place for the pilot to encourage additional investments?

To address this question the consultant will collect primary data on these questions as part of interviews of Local Government Authorities in Kigoma Rural and Kasulu Districts up to village level, and owners and managers of the installations. Through surveys, the consultant will collect data on plans and actions of households, small businesses and members of BMUs to invest in additional solar PV systems as well as maintenance and replacement of batteries.

Research Question 8 — Are there any unplanned results due to the implementation of the Kigoma Solar project?

To address this question the consultant will collect primary data on unplanned results due to the implementation of the Kigoma Solar project from all stakeholders and owners/managers of the installations.

The study will also identify customers and uses of other appliances that may have not been included in the design of the program but are used or can be used using electricity of the installations.

8.2 Outcome, Objectives and Compact Goal indicators related questions:**Research Question 1** — Has the Kigoma Solar Project contributed to an improvement in electricity service coverage across different customer types?

To address this question the consultant will collect primary and secondary data as listed and defined below:

- i) **Number of PV systems installed through the Kigoma Solar Activity (#)** – This will be collected by type (dispensaries, health centres and secondary schools, village markets, fishing boats) through extraction from secondary data such as progress reports of the Supervising Consultant and updates from the energy department of MCA-T. Data on coverage of installations at each location/facility by use category will be collected through interviews of the owner/managers of the installations as follows:
 - **Village market installations:** data on coverage will include number of lighting at the village

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market (exterior and number of stalls with lighting) and number of cell phone charging points, cinema, hair cutting and sewing points. It will be obtained from Secretary of the Village Market Committee.

Data on beneficiaries of village market installations – disaggregated by gender - will include number of owners of operational stalls provided with lighting at the village market; number of cell phone charging customers; number of people providing cinema services; number of people providing hair cutting services; number of people providing sewing services using the program electricity. Data on customers of stalls and those using the market’s installation for cinema, hair cutting and sewing will also be collected through administrative data extraction and recall memory.

- ***Health facility installations:*** data on coverage for this type of installation at each location/facility will include number of lighting at the facility, number of media (cinema or computer) points, number of cell phone charging points, and the solar-powered Vaccine Refrigerator system. It will be collected from the Head of the health facility.

Data on beneficiaries covered by the healthy facility installations – disaggregated by gender - will include number of patients served by the health facility (day and night), workers of the health facility, number of people providing media (cinema or computer) services at the health facility, and number of cell phone charging customers. Data on patients will be extracted from the Health Information System (MTUHA register books and tally forms filled by the healthy facility. Data on other beneficiaries will be obtained through interview of the Head of the Healthy Facility.

Secondary School installations: data on coverage for this type of installation at each location/facility will include number of lighting in the classrooms, number of media (television and computer) points, and number of cell phone charging points. It will be collected from the Head of the school.

Data on beneficiaries – disaggregated by age and gender - will include number of teachers, non-teaching staff, and students; number of people providing media (television or computer) services, and number of cell phone charging customers.

- ***Fishing lanterns installations:*** data on coverage for this type of installation at Beach Management Units (BMUs), which are fishers cooperatives controlling fishing that were provided with the installations, will include number of fishing boat pair provided with the systems.

Data on beneficiaries – disaggregated by age and gender - will include number of owners and fishers using fishing boat pair provided with the systems.

- ii) **Number of PV systems sold and installed by the MCA-T contractor (#)** – This will be collected by location (households or businesses). It will be extracted from secondary data such as progress reports of the Supervising Consultant and updates from the energy department of MCA-T.

Data on coverage of each installation in terms of use categories (lighting, cinema, computer, etc.) at each location will be collected using questionnaire to be administered to the Head of Household and owner/managers of the installations.

Data on beneficiaries – disaggregated by age and gender - will include number of household members, owners and employees of businesses that bought the installations.

The marketing intervention could have made spillover effects such that households outside the target villages - including peri-urban areas with grid electricity, may have bought Pico Solar PV

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systems and Solar Home Systems (SHS) in various sizes for home and small businesses use. Data on this effect will be included in the business and household surveys.

- iii) **Daily solar power consumption (kWh)** – This will be collected as units of electricity consumed at metered solar PV installations in the last seven days divided by seven days, averaged over sampled households. Data on hours electricity was availability at non-metered installations² in the last seven days will also be collected.

Research Question 2 — Has the Kigoma Solar Project contributed to an improvement in the quality of electricity available, across different customer types?

To address this question the consultant will collect administrative data on average availability of power in the last 24 hours. Administrative data will be obtained from record books given to the installations that will be obtained from owner/managers of the installations.

Average blackouts data during a **month's period** will be collected as primary data from recall memory of owners of each installation.

Research Question 3 — Has the Kigoma Solar Project contributed to an increase in consumption of electricity, across different customer types?

Consumption of electricity will be measured as explained in part (iii) of the answer to Research Question 1. Increase in consumption of electricity will replace and cause decline of use of other sources of energy. To address this question the consultant will collect survey data on average annual quantity of other energy sources (kerosene, diesel) consumed (Kg). Their consumption is expected to decrease - following availability of the solar PV electricity. All charges of bills/costs will be converted into kWh equivalent.

These measurements will be obtained as primary recall data from all owner/managers of the installations.

Research Question 4 — Has the Kigoma Solar Project contributed to an increase in investment in economic activities across different customer types?

To address this question the consultant will collect the following primary data from owners/managers of sampled installations:

- Average annual business revenue (\$)
- Average annual wages (\$)
- Average annual expenditure on energy (\$)

Average annual business revenue will be collected for village market solar PV income generating activities that include cell phone charging, cinema, hair cutting and sewing; health facilities revenue for charging of cell phones of patients against a small fee; schools revenue for cell phones charging and cinema services; fish catch revenue of BMUs with the installations; revenue earned by households from Income Generating Activities (IGAs) that were established so as to use Solar Home Systems (SHS); revenue earned by small businesses from new services/products established so as to use Pico Solar PV systems – that would have never been traded if the systems were purchased.

Data on average annual wages attributed to and paid for generating the above revenue will also be collected, including wages in the form of materials and services.

Data on expenditure on energy will be broad-based including costs for maintenance of the solar PVs as well as replacement of batteries, expansion of the solar PV systems, grid bills – if connected, and expenditure on other energy sources such as wood, charcoal, kerosene, dry-cell batteries, and candles -

² Vaccine refrigerators, BMU night fishing systems, Pico Solar PV systems and Solar Home Systems (SHS).

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among others. All charges of bills/costs will be converted into kWh equivalent. For free grant-funded installations it will also include contribution on expenditure on energy from revenue collected from the installations (how the revenue is used).

Research Question 5 — Has the Kigoma Solar Project contributed to an improvement in human capital accumulation across different customer types?

To address this question the consultant will collect the following primary data from sampled installations:

- Schools with afterhours study programs (%)
- Availability of vaccines (#)
- Vaccinations administered (#)

A questionnaire for Headmasters/mistresses will be used to collect data on whether schools have introduced afterhours study programs, following electrification. Data on the number of vaccines available on day of survey in the targeted health centers or dispensaries installed with PV vaccine refrigeration systems, averaged across the survey sample will be collected using a questionnaire to be administered to Heads of Healthy facilities. Vaccines include BCG, Measles, and Polio. Data on vaccines administered at a health facility will also be collected using the same questionnaire.

Research Question 6 — Has the Kigoma Solar Project contributed to a reduction in poverty across different customer types, as measured by household income per capital?

The household income per capital will be established from primary data on households' income that will be collected in the household survey. The survey will also capture data on household income, household size as well as ownership of assets and food poverty as proxy of poverty indicators at micro level.

8.3 Economic Rate of Return (ERR) indicators related questions:

The study will also collect data that will feed into an analysis of the Economic Rate of Return (ERR) of the program. This will include data on the sources of energy used prior to the installation of PV systems and their associated price/cost, data on sources of energy use and cost after the PV installation, data on the ways and purposes for which the system are being used, and data on the energy sources used in homes in the project area.

To address these data requirements, all these data items will be included in primary data collection tools. All are included in the above answers to key evaluation questions.

9. STAKEHOLDERS INVOLVEMENT

This program was implemented directly by the energy department of MCA-T without an implementing agent. Therefore, there was limited involvement of MDAs and institutions related to the intervention such as the Ministry of Energy and Minerals, TANESCO, Rural Energy Agency (REA), Ministry of Education and Vocational Training, and Ministry of Health. Other stakeholders of renewable energy such as Tanzania Renewable Energy Association (TAREA) and Tanzania Traditional Energy Development Organization (TaTEDO) also had limited involvement in the project. However, Local Government Authorities in Kigoma Rural and Kasulu Districts up to village level, owners and managers of the installations were closely involved in project implementation. The evaluation design ensures participation of all stakeholders to tap their knowledge base, literature and ideas, and with a view to create ownership and make sure results are incorporated in future policy choices and used to inform the allocation of resources across programs/sectors.

Results of the baseline study will be disseminated to all stakeholders. The aim is to ensure evaluation results will be applied to policy development and resources allocation. Recommendations will identify entry points for use of evaluation results.

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Variables required for addressing each evaluation questions are identified in Section 8. *Table 2* presents the required data sets, nature of data to be collected, collection method, their analytic purpose, and the timing of data collection rounds.

Table 2: Data Needs and Collection Rounds

Dataset	Nature	Data Collection Method	Analytic Purpose	Timing/Data Collection Rounds
Literature	Quantitative	Literature review (Secondary data)	To capture process, outputs and some outcome indicators focusing on how well the program was implemented - including analysis of project scope, output targets achieved - If not, why, other milestones, timing, costs, and challenges.	First Broad-based Round
			To capture availability, access and consumption of electricity and other sources of energy across different customer types, and resulting investment and economic activities.	First Broad-based Round
Managers and Stakeholders of the free grant-funded and commercially acquired Solar PV systems	Qualitative	In-Depth Interviews (IDI) (primary data)	<ul style="list-style-type: none"> ▪ To capture challenges of project implementation and operations as well as lessons learned and sustainability ▪ To capture whether the project successful in catalyzing investments in the energy sector in Kigoma program areas and factors limiting investment. 	First Broad-based Round
	Quantitative	Questionnaire (primary data)	<ul style="list-style-type: none"> ▪ To capture investment in energy such as additional solar PV systems as well as maintenance and replacement of batteries and factors limiting investment. ▪ To capture how the solar energy approach addressed the energy needs of the beneficiary population and factors that limited access before and those limiting current access. 	First Broad-based Round and Follow-up Evaluation
	Quantitative	Questionnaire (primary data)	<ul style="list-style-type: none"> ▪ To capture whether the Kigoma Solar Project contributed to an improvement in electricity service coverage across different customer types, including solar power consumption. ▪ To capture whether the Kigoma Solar Project contributed to an improvement in the quality of electricity including availability to reduce blackouts ▪ To capture whether the Kigoma Solar Project contributed to an increase in consumption of other energy sources (kerosene, diesel) ▪ To capture whether the Kigoma Solar Project contributed to an increase in investment in economic activities across 	First Broad-based Round and Follow-up Evaluation

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			<p>different customer types</p> <ul style="list-style-type: none"> ▪ To capture whether the Kigoma Solar Project contributed to an improvement in human capital accumulation at schools and health facilities 	
Businesses Survey	Quantitative	Questionnaire (primary data)	<ul style="list-style-type: none"> ▪ To capture introduction of new services/products that would have never been traded if the program's solar PV systems were purchased. ▪ To capture whether the Kigoma Solar Project contributed to an increase in investment in economic activities across different customer types ▪ To capture data on investment of members of BMUs on additional fishing gear before and after 	First Broad-based Round and Follow-up Evaluation
Households Survey	Quantitative	Questionnaire (primary data)	<ul style="list-style-type: none"> ▪ To capture households Income Generating Activities (IGAs) established so as to use Solar Home Systems (SHS). ▪ To capture whether the Kigoma Solar Project contributed to an increase in investment in economic activities across different customer types. ▪ To capture whether the Kigoma Solar Project contributed to a reduction in poverty across different customer types, as measured by household income per capital. 	First Broad-based Round and Follow-up Evaluation
Community	Qualitative	FGD (primary data)	To capture relevance and perceptions on processes and outputs, benefits and how they value the intervention, negative effects (if any), challenges, opinions, beliefs, and attitudes towards the project.	First Broad-based Round

10.1 Existing Data

The evaluation will make use of existing data. As indicated at the end of Section 6 and *Table 2*, some secondary data evidence already exists to gauge the effectiveness of this type of project. Secondary data and some administrative data on the project are available.

10.2 Primary Data Collection Needs

Available secondary data will be complemented by primary data collection. Variables for the following datasets will be collected as primary data:

- Managers and Stakeholders of free grant-funded and commercially acquired Solar PV systems;
- Businesses Survey;
- Households Survey; and
- Community

10.3 Data Sources

The data sources to be used in the evaluations are shown in *Table 3*.

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Dataset	Data Variables	Source
Literature	<ul style="list-style-type: none"> ▪ Value of feasibility contracts (\$), Value disbursed of feasibility contracts (\$), Value of construction contracts (\$), Value disbursed of construction contract (\$), Total capacity of systems installed (kW_{peak}), Percent of total training hours delivered to end users (%), output targets achieved - If not, why?, achievements of agreed milestones and timelines, Number of PV systems installed, Number of PV systems sold and installed at household ▪ Prices and average transport and installation cost of each type of the solar PVs of the program. ▪ Challenges were encountered during implementations ▪ Lessons can be learned from the experience of the program 	NBS, MCA-T, Ministry of Education and Vocational Training, Ministry of Health and Social Welfare, LGAs, TANESCO, other stakeholders and Internet.
Managers and Stakeholders of grant-funded and commercially acquired Solar PV systems	<ul style="list-style-type: none"> ▪ Number of operational stalls provided with lighting at the village market with gender of owners, person (s) providing cinema, hair cutting and sewing services at the village markets, and cell phone charging customers – disaggregated by gender. ▪ Number of unintended customers and uses of other appliances and their power needs 	Energy Department at MCA-T, Literature, Village Markets
	<ul style="list-style-type: none"> ▪ Availability of vaccines (#), Vaccinations administered (#), and cell phone charging customers – disaggregated by gender ▪ Number of unintended customers and uses of other appliances and their power needs 	Energy Department at MCA-T, Literature, Health Facilities
	<ul style="list-style-type: none"> ▪ Schools with afterhours study programs (%), person (s) providing cinema services at the schools, and number of cell phone charging customers – disaggregated by gender ▪ Number of unintended customers and uses of other appliances and their power needs 	Energy Department at MCA-T, Literature, Secondary Schools
	<ul style="list-style-type: none"> ▪ Number of fishing boat pairs using the LED night electrical fishing system ▪ Number of unintended customers and uses of any of the duo solar PV array and a portable battery charger 	BMUs-Chairperson of Boat Owners and Fishermen’s Association at Kibirizi-Kigoma
	<ul style="list-style-type: none"> ▪ Total and one week intended and unintended households and small businesses served by program SME MFIs disaggregated by gender 	SME MFIs
	<ul style="list-style-type: none"> ▪ Recall of energy needs and use before solar PV installation began and current ▪ Recall of factors that limited access to and use of electricity and other sources of energy before solar PV installation began and current ▪ One month blackouts data, annual cost of grid bills, maintenance and replacement costs of the PV systems 	All owner/managers of the installations
	<ul style="list-style-type: none"> ▪ Average availability of power in the last 24 hours, ▪ Daily Solar power consumption (kWh), ▪ Units of electricity consumed at metered solar PV installations and hours electricity availability at non-metered installations ▪ Quantity of consumption of other sources of energy such as wood, charcoal, kerosene, dry-cell batteries, and candles - among others across different customer types. All charges of bills/costs will be converted into kWh equivalent. ▪ Challenges were encountered during implementations ▪ Number of beneficiaries of each installation by use type. 	All owner/managers of the installations
	Income generating activities’ revenue, employment related to the installation, wages including wages in the form of materials and services, average annual expenditure on energy, and contribution on expenditure on energy (how the revenue is used)	All owner/managers of the installations
	<ul style="list-style-type: none"> ▪ Existing, planned and expected measures to make the installations and accrued benefits sustainable ▪ Lessons learned from the experience of the program ▪ Plans and actions to invest in additional solar PV systems as well as maintenance and replacement of batteries ▪ Conditions needed to be in place in order to encourage additional investments in the energy sector in Kigoma 	All Managers and Stakeholders and LGAs
	Businesses	Demographic characteristics of the owner, sources of energy before and after,

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Survey	<p>Consumption of electricity and other sources of energy, Purchase including source and use of Pico Solar PV systems, Costs/bills before and after the installation of PV systems, Purpose and ways the PV systems and other sources of energy are used, Business revenue, employment and wages, expenditure on energy, new services/products related to the Pico Solar PV systems, opinion on contribution of the project, investment of members of BMUs on additional fishing gear before and after, and general electrification benefits.</p> <ul style="list-style-type: none"> ▪ Hours electricity availability at non-metered installations ▪ Existing, planned and expected measures to make the installations and accrued benefits sustainable ▪ Plans and actions to invest in additional solar PV systems as well as maintenance and replacement of batteries ▪ Conditions needed to be in place in order to encourage additional investments in the energy sector in Kigoma 	
Households Survey	<p>Demographic characteristics of the households, sources of energy before and after, Consumption of electricity and other sources of energy, Purchase including source and use of Solar Home Systems (SHS), Costs/bills before and after the installation of PV systems, Purpose and ways the PV systems and other sources of energy are used, Income Generating Activities (IGAs) related to Solar Home Systems (SHS) and their revenue, employment and wages, expenditure on energy; opinion on contribution of the project, ownership of assets and food poverty as proxy of poverty indicators at micro level, and Household income per capita.</p> <ul style="list-style-type: none"> ▪ Existing, planned and expected measures to make the installations and accrued benefits sustainable ▪ Plans and actions to invest in additional solar PV systems as well as maintenance and replacement of batteries ▪ Conditions needed to be in place in order to encourage additional investments in the energy sector in Kigoma 	Households
Community	<p>Relevance, challenges, and perceptions on processes and outputs, benefits and how they value the intervention, negative effects (if any), problems, opinions, beliefs, and attitudes towards the project, and general electrification benefits.</p>	Community Members

11. DATA COLLECTION PROTOCOLS AND INSTRUMENTS

The consultant has drafted data collection instruments and protocols based on data needs, sources and methods in Section 10. For efficiency purposes, extraction of administrative data and collection of non-administrative data will be included in one set of instruments. Therefore checklists will be incorporated into semi-structured questionnaires. *Table 4* presents a list of data collection instruments.

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Table 4: **Data Collection Instruments**

Instrument	Respondent
Questionnaire No. 1	Treated Schools (Headmasters/mistress)
Questionnaire No. 2	Comparison Schools (Headmasters/mistress)
Questionnaire No. 3	Treated Healthy Facilities (In-charge of Dispensaries and Health Centres)
Questionnaire No. 4	Comparison Healthy Facilities (In-charge of Dispensaries and Health Centres)
Questionnaire No. 5	Treated Village Markets (Village Market leaders)
Questionnaire No. 6	Comparison Village Markets (Village Market leaders)
Questionnaire No. 7	Treated BMUs (Secretaries of BMUs)
Questionnaire No. 8	Comparison BMUs (Secretaries of BMUs)
Questionnaire No. 9	Treated Businesses (Owner/managers of Businesses)
Questionnaire No. 10	Comparison Businesses (Owner/managers of Businesses)
Questionnaire No. 11	Treated Households (Head of Households)
Questionnaire No. 12	Comparison Households (Head of Households)
In-Depth interviews (IDIs) No. 1	SACCOS (SME-MFIs) involved in the program
In-Depth interviews (IDIs) No. 2	Stakeholders (Energy department of MCA-T, District Councils, and Village leaders)
FGD Guide No. 1	Treated Community Members – Male and Female
FGD Guide No. 2	Comparison Community Members – Male and Female
Literature Checklist	Institutions and websites

Data collection instruments are given as **Annex III**.

Protocols on the process and rules that will guide the evaluation are given in **Annex IV**. Most of the rules and instructions will be built into the data collection instruments.

12. SAMPLING AND WEIGHTING PLANS

12.1 Sampling Plan

Sampling will involve subjects covered by the intervention for the **pre-post** comparison evaluation method. This will be complemented by including communities not covered by the Program that qualify to be comparison group for the differences of treatment and comparison of groups evaluation method. Sampling is guided by data collection methodology where sections 8 through 11 indicate that the evaluation will use face to face interviews with respondents using records and recall memory. Respondents and discussions' participants will need sampling.

The evaluation will use **Stratified Purposeful Random Sampling** because sources of data required and respondents are stratified, and for efficiency purposes villages with most of the types of the solar PV installations (village market, secondary school, dispensary, health centre, BMU and SME-MFI) will purposefully be given priority in the sampling. This will ensure all types of installations, conduits and beneficiaries are covered by the evaluation. The selection of comparison of groups' villages and facilities will also be done purposefully to ensure that they located far from the target villages and facilities of the program to the extent that they cannot access services provided by the program. Selection of villages will purposefully ensure that villages with SACCOS and BMUs that participated in the program are included in the sample. This is because SACCOS and BMUs were in few villages.

(a) Literature Extraction

There will be full coverage of all institutions that have been identified in **Table 3** as sources of literature (no sampling).

(b) Administrative Data Extraction

Extraction of administrative data will be done during face to face interviews. Therefore, same sample will be used.

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(c) Health Facilities and Secondary Schools Survey

All existing dispensaries, health centres, secondary schools in each sampled village, whether treatment or comparison village, will be fully covered (no sampling at a sampled village). Respondent will be the Head of each facility.

(d) Businesses Survey

This will cover village markets and related businesses, SACCOS and businesses that commercially bought the solar systems, and BMUs and fishers.

Sampling of villages will purposefully include villages with village markets. There is no list of businesses connected to the solar PVs of village markets. The sampling strategy will be to cover all business units connected to village market installations for cell phones charging, cinema services, hair cutting and sewing, in each sampled village (no sampling at a sampled village).

There is no list of business that bought Pico Solar PV systems. This intervention was not in all villages. Therefore, selection of villages will purposefully ensure that villages with SME-MFIs/SACCOS involved in selling Pico Solar PV systems of the program are included in the sample. Then, all businesses that commercially bought Pico Solar PV systems through clusters or from SACCOS in each sampled village will be fully covered, and from them get businesses that bought the systems, where – if a list is not available for random sampling, full coverage whereby snowballing technique will be used to get respondent businesses at each sampled village. At each business, the respondent will be the owner or manager of the business.

According to the Progress Report 4 of 5 of Supervising Consultant (March 2013) and update from MCA-T, by 26th April 2013, the following 22 SACCOS were involved in the program:

S/N	Name of SACCOS	Village	District
1	Umoja SACCOS	Basanza	Kigoma Rural
2	Kandaga SACCOS	Kandaga	Kigoma Rural
3	Nguruka SACCOS	Bweru	Kigoma Rural
4	UmojaniNguvu	Mwandiga	Kigoma Rural
5	Kaharambuga	Mgaraganza	Kigoma Rural
6	Luiche	Kasuku	Kigoma Rural
7	Chemchem	Kaseke	Kigoma Rural
8	Mwangu	Ilagara	Kigoma Rural
9	Jitihada	Uvinza	Kigoma Rural
10	Harambee	Nguruka Village	Kigoma Rural
11	Matumaini	Mwamgongo Village	Kigoma Rural
12	Basanza	Bitale Village	Kigoma Rural
13	Umoja	Nyenge	Kasulu
14	MuonganoTalanta	Munyama	Kasulu
15	Heruka	HeruJuu	Kasulu
16	Tumaini	Nyumbigwa	Kasulu
17	Kumsenga	Kasulu	Kasulu
18	VIKUCOM	Murufiti	Kasulu
19	TIMASHO	Titye	Kasulu
20	Mkiza	Kigogwe	Kasulu
21	Tugeze	Bugaga	Kasulu
22	Rusesa.	Rusesa.	Kasulu

It is not clear how many SACCOS will be involved till the end of the program. The tenth and twelfth were in the initial list but were not in a latter list.

With regard to BMUs and fishers, the program plans to cover 90 fishing boat pairs under BMUs. BMU Kibirizi in Kigoma Municipality was the focal point for implementation of this intervention. Selection of villages will purposefully ensure that villages with BMUs involved in the program are included in

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the sample. Therefore, sampling should include villages in terrestrial area and Lake Tanganyika beach where there are BMUs. MCA-T has no list of BMUs involved in the program. It could be obtained from BMU Kibirizi - during piloting. Then, all BMUs and fishers (as businesses) in sampled villages will be included during the evaluation's data collection.

(e) Households Survey

Households were covered by the program through a component for commercially sold PV systems for home and small businesses use. Households were expected to buy Solar Home Systems (SHS) through clusters or from SME-MFIs/ SACCOS. This intervention was not in all villages. Therefore, selection of villages will purposefully ensure that villages with SME-MFIs/SACCOS involved in selling SHS of the program are included in the sample. There is also no list of households provided with the solar PVs through cluster or SME-MFIs. The sampling strategy will be to include all SACCOS in sampled villages and from them get households that bought SHS, where – if a list is not available for random sampling, full coverage whereby snowballing technique will be used to get responding households. At each household, the Head of Household will be the respondent.

12.2 Sample Selection***(a) Village Sample Selection***

Sampling for this survey will be village and intervention based. For efficiency purpose, as mentioned in Section 12.1, villages with most of the types of the solar PV installations will be given priority in the sampling. The number of villages will be guided by the National Master Sample (NMS) developed by the National Bureau of Statistics (NBS). The optimal sample size for producing national estimates in Tanzania varies from 5-10 clusters (EAs³) per stratum (region) depending on the sensitivity of the study (the average strata/EAs per region is 50). Data obtained from MCA-T indicate that the program will cover a total of 131 villages (58 villages in Kigoma Rural District and 73 villages in Kasulu District). Distributions of villages by the number of interventions based on the Progress Report 4 of 5 of Supervising Consultant dated 20th March 2013 were as shown in **Table 5**.

Table 5: Geographical and Activity Distribution of the Kigoma Program

District	Number of Interventions	Number of Villages	Installations				
			Dispensaries*	Health Centres*	Secondary schools	Village markets	BMUs
Kigoma Rural	4	7	7	1	7	6	0
	3	22	20	2	13	5	4
	2	29	27	2	0	0	0
	1	0	0	0	0	0	1**
	Sub-total	58	54	5	20	11	5
Kasulu	4	8	7	1	8	8	0
	3	20	17	3	16	4	0
	2	44	38	5	1	1	0
	1	1	0	0	0	1	0
	Sub-total	73	62	9	25	14	0
Total for the Two Districts							
	4	15	14	2	15	14	0
	3	42	37	5	29	9	4
	2	73	65	7	1	1	0
	1	1	0	0	0	1	1
Grand-total		131	116	14	45	25	5

*Includes Vaccine Refrigerators

**At Kibirizi – Kigoma Municipality

³ EAs are Enumeration Areas demarcated prior to the population census activities covering a maximum of 900 persons in the rural settings and 400 in the urban areas. These areas are used by researchers for carrying social economic studies.

Concept Note:**Performance Evaluation of the Kigoma Solar Program in Tanzania: Design and Implementation****(b) Representative Sample Selection**

Based on the sampling plan in and the above representative sample guidance, geography and activity scope, the representative sample will be as shown in *Table 6*.

Table 6: **Sample Selection**

Installation Type	Total Population	Representative Sample's Range	For villages with 4 Interventions	For villages with 3 Interventions	Choice	
					Treatment Group	Comparison Group
Dispensaries	116	12 - 23	14	37	14	4
Health Centres	14	1 - 3	2	5	6	4
Secondary schools	45	5 - 9	15	29	10	4
Village markets	25	3 - 5	14	9	6	4
BMUs	5*	1 - 2	0	4	5	2
SACCOS	22*	3 - 5	4	7	4	2
Businesses	Not Known				Full Coverage	Full Coverage
Households	Not Known				Full Coverage	Full Coverage
Comment/Total			<ul style="list-style-type: none"> ▪ Health Centres not Adequate ▪ Village Markets Excessive 	<ul style="list-style-type: none"> ▪ Add 2 Health Centres from each district ▪ Cover all the 4 BMUs and Kibirizi 		

*As per list from MCA-T (26th April 2013) – but more are likely to be involved.

(c) Sampled Treatment Group

Table 7 presents a purposive and random list of sampled villages based on the above rules and procedures and selected PV installations that meet representative sample requirements.

Table 7: **Sampled Villages**

S/N	Ward	Village	Dispensaries	Health Centres	Sec. Schools	Village Markets	BMUs	SACCOS	Bus.	HHs
Kigoma Rural District										
1.	Bitale	Bitale								
2.	Nguruka	Nguruka*		1						
3.	Mkigo	Nyarubanda	1		1	1			**	
4.	Kalinzi	Kalinzi	1		1					
5.	Mwandiga	Kibingo								
6.	Kazuramimba	Kazuramimba	1		1	1			**	
7.	Uvinza	Uvinza	1	1	1			1	**	**
8.	Kagunga	Kagunga	1				1		**	
9.	Mwamgongo	Mwamgongo*		1			1		**	
10.	Ilagala	Ilagala			1	1		1	**	**
11.		Mwakizega	1				1		**	
12.	Sunuka	Karago	1				1		**	
Sub-total			7	3	5	3	4	2		
Kasulu District										
1.	Munzeze	Munzeze	1		1	1			**	
2.	Kwaga	Kwaga	1							
3.	Rusesa	Rusesa		1	1			1	**	**
4.	Nyange	Nyange*		1						
5.	Rungwe Mpya	Rungwe Mpya	1		1					
6.	Murufiti	Murufiti	1					1	**	**
7.	Rusaba	Rusaba	1		1	1			**	
8.	Munanila	Kibwigwa	1		1	1			**	
10.	Buhigwe	Buhigwe	1							
11.	Janda	Janda*		1						
Kibirizi in Kigoma Municipality			7	3	5	3	1	2	**	**
Total			14	6	10	6	5	4		

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*Additional Health Centres

** Full coverage of all found at a sampled village.

(d) Sampled Comparison Group

The comparison dispensaries, health centres, secondary schools and village markets will be selected after getting more geographic information during piloting in Kigoma. Comparison groups should not be located near treatment because people from near villages can obtain services from the facilities provided with the solar PVs of the program.

Since, implementation of BMUs was done in Kigoma District alone, similar respondents in Kasulu District will be used as a comparison group.

(e) Community FGD

The selection rule for villages where FGDs will be conducted will be to pick the third village when moving between villages during field data collection. Therefore, given the above sampling of villages for household survey, a total of 8 FGDs (4 for Male and same number for Female) will be conducted in 4 villages where there are Health Centre and/or Village Market installations. The geographical arrangements of villages are not known enough to determine a movement track that could help make the choice of FGD villages at this stage.

Four (4) FGDs (2 for Male and same number for Female) will be conducted in 2 comparison villages.

12.3 Weighting Plan

Some indicators will be generated through weighting. Proportions to total population of interest and reference time periods (day/week/month) will be used in weighting. For example:

- Average duration of power available per day (hrs) for one type of installation, times number of installations to get total duration of power made available by the program.
- Average meter readings (kWh) for one type of installation, times number of installations to get total quantity produced.

Weighting will be calculated and incorporated into the data entry and processing software/system.

13. DATA COLLECTION PLAN

Data collection methodologies have been selected based on the nature of the variable to be collected (primary/secondary) and nature of the source of data

13.1 Secondary Data

Secondary data will be extracted from literature reviewed using a checklist. It will also be extracted from administrative records also using a checklist. The Checklists for Administrative Records will be sent to owners/managers of all installations after obtaining their contacts details from MCA-T. As a contingency for non-return of some checklists and for triangulation purposes, the checklists will also be administered face to face during field visits.

13.2 Primary Quantitative Data

Quantitative primary data will be collected using semi structured questionnaires. Preparations will involve the following:

(a) Translation

The survey will use English and Swahili Languages. All communications and deliverables to the Client will be in English while field data collection will largely be conducted in the Swahili Language, especially for primary data. Therefore, data collection instruments and protocols will be prepared in English and immediately translated from English into Kiswahili. The original English document will be compared with the back translation document to identify sections not correctly translated.

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(b) Pre Testing

All data collection instruments and protocols will be tested before training for clarity and flow through mock interviews.

(c) Training and Mobilization

Before training, the Consultant will carry out mobilization, ensuring that all the resources and appointments required are in order.

Additional data collection and processing staff will be trained on the importance, roles and responsibilities, data collection tools and protocols to be used, as well as procedures and logistics pertaining to their roles in the assignment such as confidentiality and ethics.

For contingency purposes, training will involve more than the critical number of additional staff.

(d) Pilot-test

Pilot testing will commence after MCA-T has approved this Inception Report/Concept Note and after training. The piloting exercise will test logistics and all the approved data collection instruments and procedures in the protocols. Therefore, it will test all questions and operational procedures for all stages of the evaluation. Piloting will be also used to ascertain availability and formats of secondary data available.

Piloting will be done in the same Kigoma Rural and Kasulu Districts covering villages and installations not sampled for the main evaluation. For each district, the sample will be two treatment villages each with three interventions and one comparison village with similar facilities. Efforts will be made to cover all types of installations during the pilot. Additional staff will participate in the pilot.

(e) Field Data Gathering

Data will be collected using the traditional Pen-and-Paper Interviewing (PAPI) technology.

The consultant will visit the installations to conduct interviews. Since the program is at advanced stage of implementation, respondents will be allowed to use a mix of recall and records to answer evaluations questions in the data collection instruments.

Community Focus Group Discussions (FGDs) will be conducted by two persons, a Moderator and Recorder. The Consultant will be the Moderator, while one of the additional staff will be the Recorder.

13.3 Qualitative Data

Qualitative data will be collected through In-depth Interviews (IDI) and Focus Group Discussions (FGDs).

FGDs (Male and Female) will have 8 – 12 participants. Preparations will include a protocol comprising rules and instructions to be followed in each FGD, to ensure consistency, and thus increase the reliability of the findings. A guide that lists the questions or issues to be explored during the FGD will also be prepared. The protocol and guide will be translated into Kiswahili, the language that will be used in the discussions. During the discussions probes will be used as and when needed. FGD will be conducted by two persons, a Moderator and Recorder. The recorder will use a Note Book, Tape Recorder and camera.

During the discussion I will explain the purpose of the discussion meeting, why they have been chosen, and the expected duration of the discussion. I will then seek informed consent of the participants. I will verify some of the information as and when deemed fit.

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13.4 Staffing Plan

Due to the workload of datasets, respondents and very wide distribution of the installations in the two districts, about four (4) enumerators and two (2) data entry staff will be required.

13.5 Research/ethical Clearance

The Consultant will ensure the research follows international and national ethical research standards. In Tanzania, all research work must get a permit either from the Commission for Science and Technology (COSTECH) or the National Institute of Medical Research (NIMR) if they are medical related. Therefore, the Consultant will apply for human subjects/ethical clearance from COSTECH. The evaluation will adhere to human rights such that no person will be interviewed before giving consent to be interviewed. The letter of clearance from COSTECH is normally copied to Regional Administrative Secretary (RAS). The Consultant will ask for a letter of introduction from MCA-T.

14. DATA ENTRY AND CLEANING PLAN

Since data will be collected using paper surveys, there will be double data entry. All data entry will be in English. The SPSS software will be used by the Consultant. Data entry clerks will be recruited and trained to help the consultant. The data dictionary will be used as a guide. There will be data consistency checks to identify any inconsistencies and then cleaning for outliers. There will be a data quality control/verification process inbuilt into the data management system that clearly identifies data entry range restrictions and consistency checks to values appropriate for Tanzania leading to a pop up dialog box if there is violation.

Due to challenges of qualitative data, the consultant will review and edit the scripts against the voice recorded during the discussions, and a data entry plan guide will be prepared to guide on aggregation of similar responses/answers stated in different sentences but meaning the same thing.

15. ANALYSIS PLAN

Analysis of quantitative data will use descriptive statistics. Experimental design is not suitable analysis because of small total population (45 secondary schools, 116 dispensaries, 14 health centres, 25 village markets, and 90 fishing boat pairs), from which samples will be selected. The SPSS software will be used in the analysis. The analysis will produce cross-tab tables for key variables as per the tabulation plan and requests of the Client. Age and income intervals as well as other data disaggregation used in similar studies will be adopted. Statistical confidence limit (p values of the findings) will also be calculated, whenever considered appropriate. Sampling weights will also be calculated and variance analysis will be conducted. After production of an acceptable clean data set, a Data Analysis Documentation will be prepared as indicated in the ToR, covering descriptive statistics complimented by summary description, list of files, data dictionary, codebook, do files, and weighting plan.

Analysis of qualitative data collected through FGDs and IDIs will be through transcription (review), which involves reading through the scripts to look for patterns or themes among the participants, and then group them in any meaningful way, such as by type of participant.

Data will be disaggregated by the control factors in our Conceptual Framework, thus: gender, age, education, and income in households; and type, size, and location of Businesses.

16. DISSEMINATION PLAN

Results of the evaluation will be disseminated to the target audience through reports and workshops presentations. The data sets and their documentations will also be part of dissemination. The consultant will also consider how the data analysis for the report can also be used to generate MCC's policy relevant paper. (Similar to the World Bank's Policy Working Paper Series).

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Report writing will involve presentation in the form of tables and figures, and interpretation of the descriptive statistics findings of the quantitative survey. Qualitative descriptors will compliment the quantitative findings in some sections using qualifiers such as “the prevalent feeling was that . . .,” or “several participants strongly felt that . . .,” or even “most participants agreed that . . .” There will be quotes (in boxes) from FGD respondents (without revealing their identity) in some sections of the report to add credibility to the information.

All outputs specified in the Contract will be submitted in electronic and hard copies. The submission schedule provided in the ToR will be adopted. Each deliverable will be submitted first as a draft for review and comment by the Client before preparation of final version that incorporates comments on the Draft. The Consultant understands and agrees to the provision in the ToR that there could be more than one round of comments. The aim will be to produce high quality deliverables. This applies to all deliverables. Besides a detailed narrative report, presentation of baseline indicators established by the survey will be in the same manner as the Indicator Tracking Table (ITT) for the energy sector. The table shows expected time by which each result will be achieved.

It is proposed that “cross-tab tables for key variables” be submitted to the Client before report writing. This will give opportunity to for the Client to request additional tables – if any. Intermediate reports (Monthly progress reports, Data Gathering Report, and Final Implementation Report) should include plans for addressing the challenges. This will inform the next level(s) of the assignment.

The deliverables of the assignment are summarized as follows:

Item No.	Deliverables	Contents/Outline
1a	Preliminary Evaluation Concept Note	Draft covering outline in this report with survey instruments and protocols
1b	Final Evaluation Concept Note	Final incorporating final MCA-T and MCC comments on initial drafts
2a	Final English and Kiswahili versions of Survey Instruments	Final survey instruments and protocols incorporating final MCA-T and MCC comments on initial drafts
2b	Pre-Test Report	Pilot findings, experiences, lessons learnt and changes in sampling and the survey instruments and protocols
3a	Monthly Progress Reports	Progress made on activities carried out during the previous month, challenges faced, lessons learned, and plans for addressing the challenges
3b	Final Data Gathering Report	Sample coverage – geographic, subject/major unit of observation, quantitative and qualitative (number of questionnaires and other instruments completed), challenges faced, lessons learned, and plans for addressing the challenges.
4	Final data files, including any transcripts from interviews, codebooks, do files, and corresponding documentation	Clean data set and documentation (Descriptive statistics complimented by summary description, list of files, data dictionary, codebook, and do files)
5	Final Evaluation Report and dissemination presentations	Based on MCA-T template/outline. It will be submitted first as a draft and then a final document incorporating final MCA-T and MCC comments on initial drafts

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17. EVALUATION TIMELINE AND WORK PLAN

Table 8 shows the timeline and work plan for the evaluation.

Table 8: **Timeline for Evaluation**

Date	Event
June 2013	First Round of Baseline and Interim Data Collection
<i>August 2013</i>	<i>Installations Completed</i>
August 2013	Baseline and Interim Report
August 2014	Follow-up data collection
November 2014	Final Evaluation Report

The timeline is graphically presented in *Figure 2*. The Consultant will prepare a work plan for each round of the evaluation.

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Figure 2: **Schedule of Evaluation Tasks**

	2012				2013				2014			
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
<i>Installations Started</i>	S											
Planning												
First Round of Baseline and Interim Data Collection												
<i>Installations Completed</i>							E					
Baseline and Interim Report												
Follow-up data collection												
Final Evaluation Report												

18. COMBINED BASELINE AND INTERIM DATA GATHERING

The first round of data collection during that baseline study will start immediately after approval of the evaluation design. It will cover both treatment and comparison groups. As shown in Section 6, similarities of data between the two groups will serve to indicate whether the comparison group was an appropriate counterfactual.

The Work Plan for this round is given as *Figure 3*.

Concept Note:

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Figure 3: Combined Baseline and Interim Evaluation Work Plan

Item/Month	April				May				June				July				August			
	Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>Drafting Concept Note/Inception report</i>	■	■	■	■																
Research Ethical Consideration Clearance from COSTECH			■	■																
MCA-T comments on the Evaluation Concept Note					■															
Final Evaluation Concept Note						■														
Translation of survey Instruments and Protocols							■													
Recruitment and Training of Additional Staff								■												
Pilot Testing									■											
Monthly Progress Report No. 1					■															
Collection of existing secondary data									■											
Monthly Progress Report No. 2										■										
Collection of primary Data in Kigoma and Kasulu Districts										■	■	■								
Data Entry										■	■	■	■							
Monthly Progress Report No. 3													■							
Draft Data Gathering Report													■	■						
MCA-T comments on the Draft Data Gathering Report													■	■						
Final Data Gathering Report													■	■						
Data Analysis													■	■						
Data Analysis Documentations Report														■						
MCA-T comments on the Data Analysis Documentations Report														■	■					
Monthly Progress Report No. 4																	■	■		
Draft Baseline Report															■	■	■	■		
MCA-T comments on the Draft Baseline Report															■	■	■	■		
Final Baseline Report															■	■	■	■		
Dissemination															■	■	■	■	■	■

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19. POTENTIAL CHALLENGES AND PROPOSED RESPONSES

Measurement Units – the project area does not use standard/modern measurements of energy sources. For instance, wood and charcoal that could best be measured in kg are sold in heaps. Kerosene, which could be measured in litres could be sold in various sizes of cans. Candles and dry-cell batteries are also likely to be of various sizes lasting for different hours. Remedy will be to use conversional measuring units to change the local units into a standard measuring unit, Kg. All charges of bills/costs will be converted into kWh equivalent.

Common errors – (1) *sampling error* because of using a sample instead of the whole population; (2) *sample bias* due to refusal or incomplete information; and (3) *response bias* when questions are misunderstood or respondents chose not to tell the truth. Remedy will be to use of adequate sample, good approach to reduce refusal, careful editing to ensure completeness, testing and piloting to identify unclear, leading, or threatening questions, qualified and experienced staff for both interviews and data cleaning.

Culture – can affect the whole evaluation processes, especially interactions with respondents/sources of data/information. As mitigation, data collection instruments will ensure conformity to the way people of Kigoma behaves socially. Questions that are likely to cause panic or misunderstanding will be avoided. The approach to respondents will be in line with the local culture. In this regard, testing and piloting of data collection instruments with groups similar to the target sources of data will be done to ensure cultural compliance.

Language – the evaluation results can be affected by language barrier in properly communicating issues of the evaluation. While English is the language of the evaluation, some sources of information may not be English speakers. To address this limitation, some data collection instruments such as Focus Group Discussion (FGD) guide will be translated from English to Kiswahili. In order to ensure the same weight and meaning is maintained, bilingual translators will be used.

Attitudes – negative attitude of respondents/sources of data/information can affect the level of response and success of the data collection exercise.

20. CONCLUSION

The success of the evaluation designed in this report will depend on cooperation between the Consultant and stakeholders. There will be challenges in both project implementation and evaluation activities. The timeline and work plan in this design has provided cushion for some small variations that may occur without affecting timing of the evaluation events. Success will depend on planned mitigation against potential challenges.

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ANNEX I: Revised Energy Sector Project Logic for Kigoma Solar PV Program

ENERGY SECTOR PROJECT LOGIC

Kigoma Solar

PROCESS		OUTPUTS		OUTCOMES		OBJECTIVES		COMPACT GOAL	
Activities	Indicators	Result	Indicators	Result	Indicators	Result	Indicators	Result	Indicators
Finance feasibility, design activities	Value of feasibility contracts (\$)	Increase access to electricity	Total capacity of systems installed (kWp)	Improve electricity service coverage	Number of PV systems installed (#)	Increase investment and economic activities	Average annual business revenue (\$)	Poverty Reduction and Economic Growth	Average annual household income per capita (\$)
	Value disbursed of feasibility contracts (\$)				Number of PV systems sold and installed at household (#)		Average annual wages (\$)		
Finance construction (implementation) activities	Value of construction contracts (\$)	Increase in technical and administrative capacity	Percent of total training hours delivered to end users (%)	Improve quality of service	Average availability of power in the last 24 hours	Improve human capital accumulation	Schools with afterhours study programs (%)		
	Value disbursed of construction contract (\$)			Increase electricity consumption	Average annual quantity of other energy sources (kerosene, diesel) consumed (Kg)		Availability of vaccines (#)		

Bolded text refers to Indicator Tracking Table (ITT) Indicators which will be reported on a quarterly basis. All other indicators will be reported on as data is available.

ANNEX II: Definition and Unit of the Additional Indicators

Indicator level	Indicator Name	Definition & Unit
Objective	Availability of vaccines	<p>Number of vaccines available on day of survey in the targeted health centers or dispensaries installed with PV vaccine refrigeration systems, averaged across the survey sample. Vaccines include BCG, Measles, and Polio</p> <p>Unit: Number</p>
Outcome	Number of PV systems installed at household	<p>Total number of PV systems supplied and installed by the MCA-T contractor to households through the SACCOS system in the two target districts in Kigoma</p> <p>Unit: Number</p>
Outcome	Number of PV installed	<p>Total number of solar power systems (PV) installed in schools, health facilities, village markets, BMU through the Kigoma Solar Activity</p> <p>Unit: Number</p>
Outcome	Daily Solar power consumption	<p>Total Solar power consumption in the last seven days divided by seven days, averaged over sampled households</p> <p>Unit: Kwh</p>

ANNEX III: List of MTUHA Register Books and Tally Forms for Data Collection and Reporting at Health Statistics in Tanzania

Register book/Tally form number	Register book/Tally form title and functionality
1	Guidelines manual (user manual) - A reference book for health workers, explaining how to collect and compile data.
2	Health facility data book - Contains summaries that are transcribed from the other register books. - Contains all the vital information about the running of the health facility for the year.
3	Community outreaches - Used to collect information from the community.
4	Ledger book - Used for monitoring the flow of drugs and other medical supplies, for example, what is received from donors and what is used.
5	Outpatient Department (OPD) register book - Used to collect information on outpatients
6	Antenatal register - Used for monitoring pregnant women.
7	Child register - Used for recording information about the children attending the health facility.
8	Family planning book - Used for recording all the family planning clients as well as the quantity of contraceptives supplied to clients.
9	Diarrhea Treatment Corner (DTC) register - Used for recording all patients referred to the DTC from OPD and MCH clinics.
10	Report book - Includes all forms that are used to prepare health facility reports.
11	Dental register - Used for dental clinics.
12	Laboratory register - Used for recording all the work done in the laboratory.
F201	Child tally form - Used to record children's attendance and to record the weight of the children who come for measles immunization.
F202	Immunization and vitamin A tally form - Used to record data on immunization and vitamin A supplementation for children
F203	General tally form - Used to prepare summaries from all registers.
F204	Neonatal tally form - Used for monitoring neonatal tetanus disease.